TEST REPORT

APPLICANT	:	Reliance Communications LLC
PRODUCT NAME	:	Orbic Fun Pro 5G
MODEL NAME	:	R678L5SFP
BRAND NAME	:	Orbic
FCC ID	:	2ABGH-R678L5SFP
STANDARD(S)	:	47 CFR Part 15 Subpart E
RECEIPT DATE	:	2023-11-28
TEST DATE	:	2023-12-06 to 2024-02-23
ISSUE DATE	:	2024-04-24

Edited by: Peng Mi (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

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Change History		
Version	**Date**	**Reason for change**
1.0	2024-04-24	First edition

1. Summary of Test Result

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS$_{Note1}$	No deviation
2	ANSI C63.10	Duty Cycle of the Test Signal	Mar. 13, 2023	He Yuyang	PASS$_{Note1}$	No deviation
3	15.407(a)	Maximum Conducted Output Power	Mar. 13, 2023	He Yuyang	PASS$_{Note1}$	No deviation
4	15.407(a)(e)	Emission Bandwidth	Mar. 13, 2023	He Yuyang	PASS$_{Note1}$	No deviation
5	15.407(a)	Peak Power Spectral Density	Mar. 13, 2023	He Yuyang	PASS$_{Note1}$	No deviation
6	15.407(g)	Frequency Stability	Mar. 13, 2023	He Yuyang	PASS$_{Note1}$	No deviation
7	15.207	Conducted Emission	Jan. 01, 2024 to Feb. 04, 2024	Wang Deyong	PASS$_{Note1}$	No deviation
8	15.407(b)	Restricted Frequency Bands	Jan. 19, 2024 to Feb. 23, 2024	Gao Jianrou	PASS$_{Note1}$	No deviation
9	15.407(b)	Radiated Emission	Jan. 19 to 22, 2024	Gao Jianrou	PASS$_{Note1}$	No deviation

Note 1: The test results of these test items in this report refer to the test report (Report No.: SZ23080316W09).

Note 2: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.102013.

Note 3: These RF tests were performed according to the method of measurements prescribed in KDB 789033 D02 v02r01.

Note 4: These RF tests were performed according to the method of measurements prescribed in KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02.

Note 5: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 6: When the test result is a critical value, we will use the measurement uncertainty give the

judgment result based on the 95% confidence intervals.

1.1. Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

• 47 CFR Part 15 Subpart E Radio Frequency Devices

1.2. Test Equipment List

1.2.1 Conducted Test Equipment

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2023.02.27	2024.02.26
USB Wideband Power Sensor	MY54180008	U2021XA	Agilent	2023.10.17	2024.10.16
Temperature Chamber	12108015	DTL-003S 101	YOMA	2023.09.19	2024.09.18
RF Cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial Cable	CB02	RF02	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

1.2.2 Conducted Emission Test Equipment

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2023.02.09	2024.02.08
				2024.01.25	2025.01.24
LISN	8127449	NSLK 8127	Schwarzbeck	2023.02.21	2024.02.20
				2024.02.02	2025.02.01
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2023.06.27	2024.06.26
RF Coaxial Cable (DC-100MHz)	BNC	MRE04	Qualwave	N/A	N/A

1.2.3 List of Software Used

Description	Manufacturer	Software Version
Test System	MaiWei	2.0.0.0
Morlab EMCR	Morlab	V1.2
TS+ -[JS32-CE]	Tonscend	V2.5.0.0

1.2.4 Radiated Test Equipment

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2023.06.21	2024.06.20
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2023.07.01	2024.06.30
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2023.06.26	2024.06.25
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2023.07.01	2024.06.30
Test Antenna – Horn	BBHA9170 #773	BBHA9170	Schwarzbeck	2023.07.01	2024.06.30
Preamplifier (10MHz-6GHz)	46732	S10M100L3802	LUCIX CORP.	2023.06.27	2024.06.26
Preamplifier (2GHz-18GHz)	61171/61172	S020180L3203	LUCIX CORP.	2023.06.27	2024.06.26
Preamplifier (18GHz-40GHz)	DS77209	DCLNA0118-40C-S	Decentest	2023.07.04	2024.07.03
RF Coaxial Cable (DC-18GHz)	MRE001	PE330	Pasternack	2023.06.27	2024.06.26
RF Coaxial Cable (DC-18GHz)	MRE002	CLU18	Pasternack	2023.06.27	2024.06.26
RF Coaxial Cable (DC-18GHz)	MRE003	CLU18	Pasternack	2023.06.27	2024.06.26
RF Coaxial Cable (DC-40GHz)	22290045	QA360-40-KK-0.5	Qualwave	2023.07.04	2024.07.03
RF Coaxial Cable (DC-40GHz)	22290046	QA360-40-KKF-2	Qualwave	2023.07.04	2024.07.03
RF Coaxial Cable (DC-18GHz)	22120181	QA500-18-NN-5	Qualwave	2023.07.04	2024.07.03
Notch Filter	N/A	WRCG-5150-5350	Wainwright	N/A	N/A
Notch Filter	N/A	WRCG-5725-5850	Wainwright	N/A	N/A
Anechoic Chamber	N/A	9m*6m*6m	CRT	2022.05.10	2025.05.09

1.3. Measurement Uncertainty

Test Items	Uncertainty	Remark
Peak Output Power	±2.22dB	Confidence levels of 95%
Power Spectral Density	±2.22dB	Confidence levels of 95%
Bandwidth	±5%	Confidence levels of 95%
Restricted Frequency Bands	±5%	Confidence levels of 95%
Radiated Emission	±2.95dB	Confidence levels of 95%
Conducted Emission	±2.44dB	Confidence levels of 95%

1.4. Testing Laboratory

Laboratory Name	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone	+86 755 36698555
Facsimile	+86 755 36698525
FCC Designation Number	CN1192
FCC Test Firm Registration Number	226174

2. General Description

2.1. Information of Applicant and Manufacturer

Applicant	Reliance Communications LLC
Applicant Address	555 Wireless Blvd. Hauppauge, NY 11788, USA
Manufacturer	Unimaxcomm
Manufacturer Address	35F,HBC HuiLong Center Building-II Minzhi Street,Longhua, Shenzhen, P.R. China 518110

2.2. Information of EUT

Product Name:	Orbic Fun Pro 5G	
Sample No.:	4#	
Hardware Version:	V1.0	
Software Version:	R678L5SFP_v1.0.18_LVZ	
Modulation Technology:	OFDM	
Modulation Mode:	802.11a, 802.11n (HT20), 802.11n (HT40) 802.11ac (VHT20), 802.11ac (VHT40), 802.11ac (VHT80)	
Operating Frequency Range:	5180MHz-5240MHz; 5745MHz-5825MHz	
Antenna Type:	PIFA Antenna	
Antenna Gain:	0.85dBi	
Accessory Information:	Battery	
	Brand Name:	Orbic
	Model No.:	BTE-5004
	Serial No.:	N/A
	Capacity:	4870mAh
	Rated Voltage:	3.87V
	Charge Limit:	4.45V
	Manufacturer:	Shenzhen Aerospace Electronic Co.,Ltd.

Accessory Information:	AC Adapter	
	Brand Name:	Orbic
	Model No.:	OACH023US1
	Serial No.:	N/A
	Rated Input:	5V⎓3A; 9V⎓2A; 12V⎓1.5A
	Rated Output:	100-240V~50/60Hz, 0.5A
	Manufacturer 1:	WATAI ELECTRONICS PRIVATE LIMITED
	Manufacturer 2:	KANGYIN ELECTRONIC TECHNOLOGY CO.,LTD
	USB Cable	
	Model No.:	HX-YLMK-06
	Manufacturer:	HUIZHOU WASHIN ELECTRONICS CO.,LTD

Note 1: This is a variant report of original report (Report No.: SZ23080316W09, FCC ID: 2ABGH-R678L5S). Based on the similarity between before, only change the product name, model name, software version, FCC ID, appearance and antenna, the others are the same as before. No other changes, all RF parameters remain the same. The changes do not affect the test results.

Note 2: We use the dedicated software to control the EUT continuous transmission.

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

2.3. Channel List of EUT

(U-NII-1) 5180MHz-5240MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	**36**	**5180**	40	5200
	44	**5220**	**48**	**5240**
40MHz	**38**	**5190**	**46**	**5230**
80MHz	**42**	**5210**		
(U-NII-3) 5745MHz-5825MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	**149**	**5745**	153	5765
	157	**5785**	161	5805
	165	**5825**		
40MHz	**151**	**5775**	**159**	**5795**
80MHz	**155**	**5775**		

Note 1: The black bold channels were selected for test.

2.4. Test Configuration of EUT

2.4.1. Modulation Type and Data Rate of EUT

Mode	Bandwidth (MHz)	Modulation Technology	Modulation Type	Data Rate	RU Size
802.11a	20	OFDM	**BPSK**	**6**/9/12/18/24/36/48/54Mbps	N/A
			QPSK		
			16QAM		
			64QAM		
802.11n	20/40 (HT20/40)	OFDM	**BPSK**	**MCS0**~MCS7	N/A
			QPSK		
			16QAM		
			64QAM		
802.11ac	20/40/80 (VHT20/40/80)	OFDM	**BPSK**	**MSC0**~MCS9	N/A
			QPSK		
			16QAM		
			64QAM		
			256QAM		

Note1: The worst-case mode (bold face) in all data rates has been determined during the pre-scan, only the test data of the worst-case were recorded in this report.

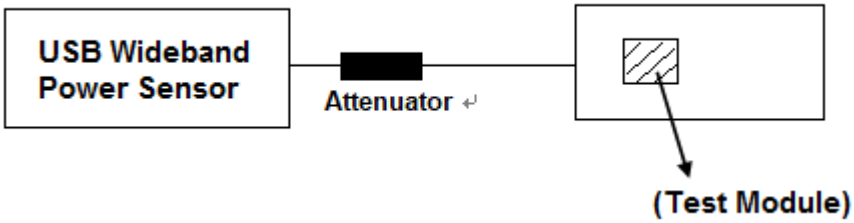
2.5. Test Conditions

Temperature (°C)	15-35
Relative Humidity (%)	30-60
Atmospheric Pressure (kPa)	86-106

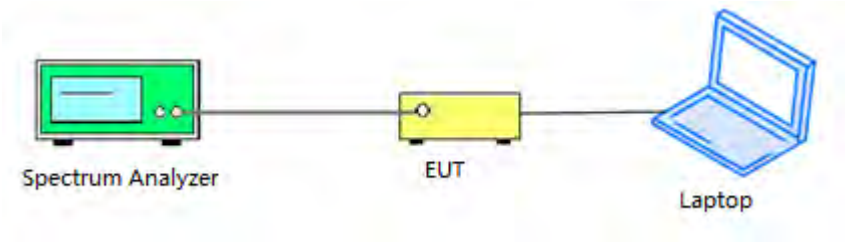
2.6. Test Setup Layout Diagram

2.6.1.Conducted Measurement

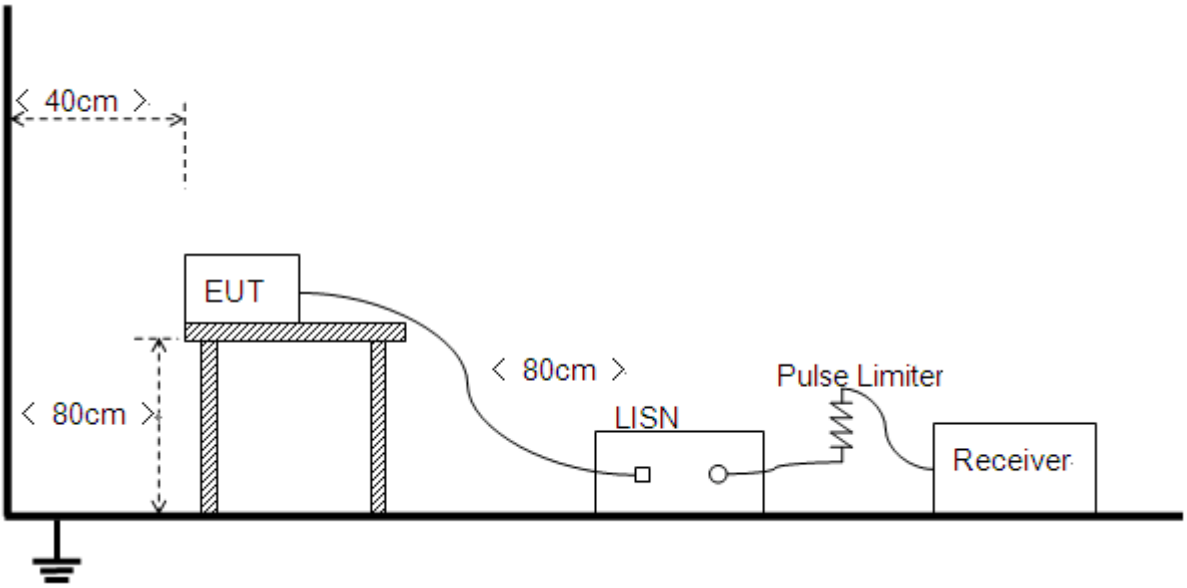
For power item that BW below 80MHz system:



For power item that BW equal or above 80MHz and other items:

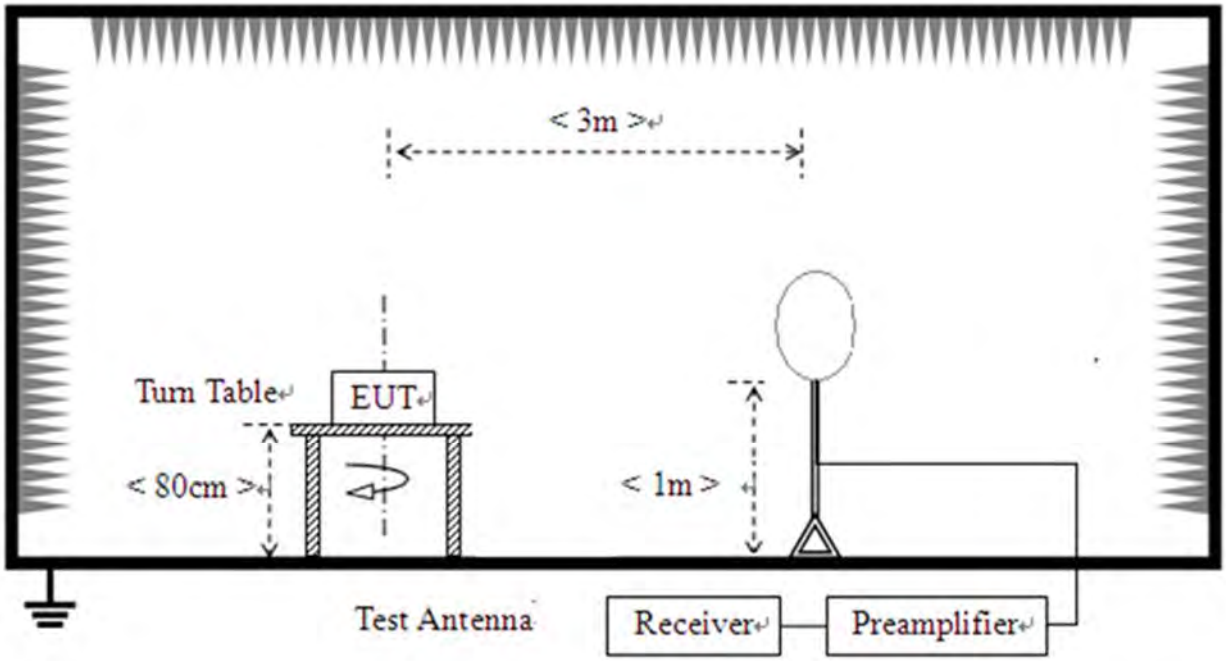


2.6.2.Conducted Emission Measurement

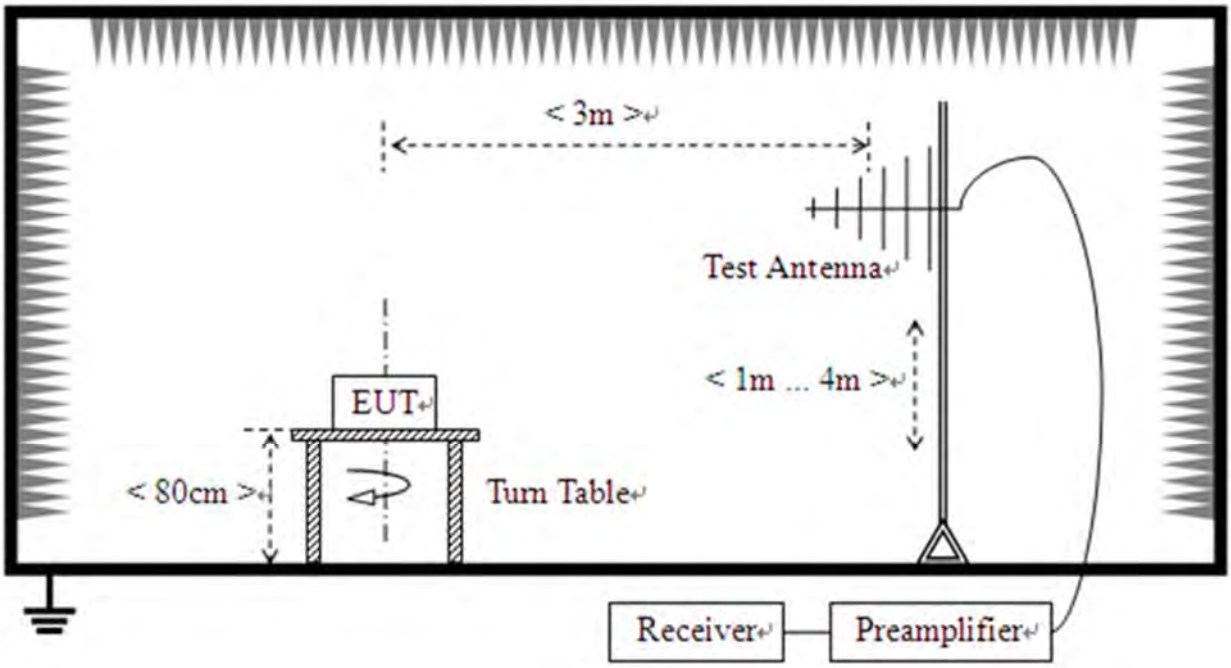


2.6.3.Radiation Measurement

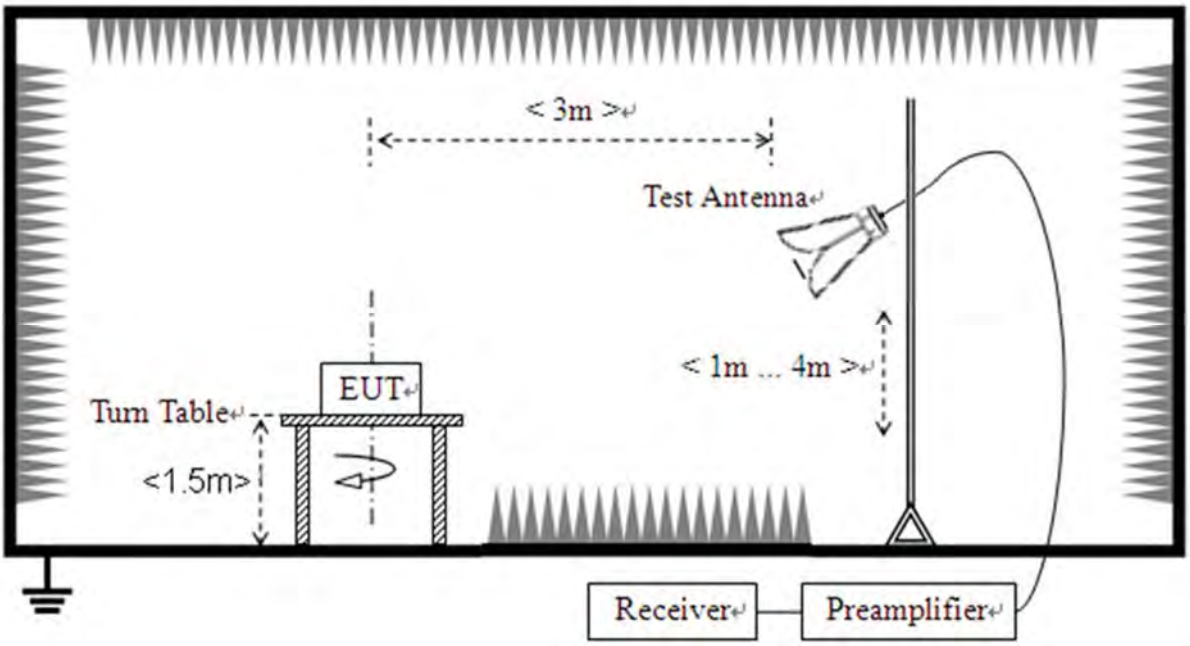
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



3. Test Results

3.1. Antenna Requirement

3.1.1.Requirement

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.

3.1.2.Test Result

Inside of the EUT has a PIFA antenna coupled with the metal shrapnel. Please refer to the EUT photos.

3.2. Duty Cycle of Test Signal

3.2.1.Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%).When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration(T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e.,no transmitter OFF-time is to be considered).
When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this sub clause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ±2%; otherwise, the duty cycle is considered to be non constant.

3.2.2.Test Result

Refer to Annex A.1 in this report.

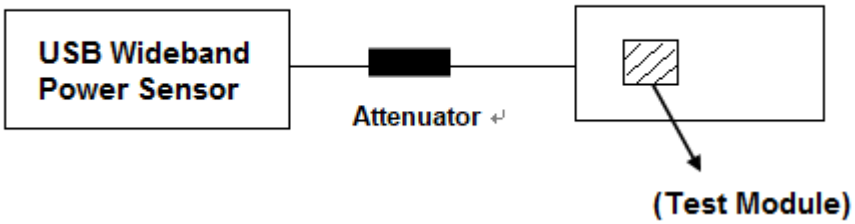
3.3. Maximum Conducted Output Power

3.3.1.Requirement

(1) 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 250mW provided the maximum antenna gain does not exceed 6dBi.
(2)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 250mW or 11dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.
(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.
If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
(4) According to KDB662911D01Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.
(5) According to KDB 662911 D01, the directional gain = G_{ANT} +10log(N_{ANT})dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

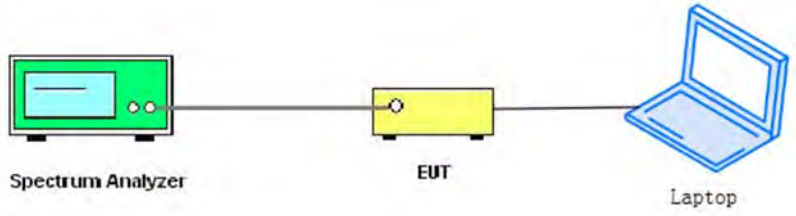
3.3.2.Test Procedures

Section E) 3) of KDB 789033 defines a methodology using a USB Wideband Power Sensor.
Test Setup:



The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in USB Wideband Power Sensor.

For ac (VHT80) mode power



The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

3.3.3.Test Result

Refer to Annex A.2 in this report.

3.4. Emission Bandwidth

3.4.1.Requirement

For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement. Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

3.4.1.Test Procedures

1. KDB 789033 Section C) 1) Emission Bandwidth was used in order to prove compliance
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
2. KDB 789033 Section C) 2) minimum emission bandwidth for the band 5.725-5.85GHz was used in order to prove compliance.
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for theband5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

3.4.2.Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.4.3.Test Result

Refer to Annex A.3 in this report.

3.5. Peak Power Spectral Density

3.5.1.Requirement

(1)For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.
(2)For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.
(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30dBm in any 500kHz band.
If transmitting antennas of directional gain greater than 6dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
(4) According to KDB662911D01Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.
(5) According to KDB 662911 D01, the directional gain = G_{ANT} +10log(N_{ANT}) dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

3.5.2.Test Procedures

KDB 789033 Section F) Maximum Power Spectral Density (PSD) Method SA-3 was used in order to prove compliance

1) Set span to encompass the entire 26-dB emission bandwidth
2) Set RBW = 1MHz. Set VBW ≥ 3MHz
3) Number of points in sweep ≥ 2 Span / RBW. Sweep time = auto
4) Detector = Average
5) Trace mode=Max hold

Record the max value

3.5.3.Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.5.4.Test Result

Refer to Annex A.4 in this report.

3.6. Frequency Stability

3.6.1.Requirement

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

3.6.2.Test Procedures

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between 5°Cto 40°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

3.6.3.Test Result

Refer to Annex A.5 in this report.

3.7. Conducted Emission

3.7.1.Requirement

According to FCC section 15.207, 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

Note:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

3.7.2.Test Procedures

The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

3.7.3.Test Setup Layout

Refer to chapter 2.6.2 in this report.

3.7.4.Test Result

Refer to Annex A.7 in this report.

3.8. Restricted Frequency Bands

3.8.1.Requirement

The peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(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 EIRP of -27dBm/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 EIRP of -27dBm/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 EIRP of -27dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

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

The following formula is used to convert the equipment isotropic radiated power(e.i.r.p.) to field strength (dBμV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

3.8.2.Test Procedures

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.
KDB 789033 Section H) 3)5)6(d)) was used in order to prove compliance
For the Test Antenna:
Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

3.8.3.Test Setup Layout

Refer to chapter 2.6.3 in this report.

3.8.4.Test Result

Refer to Annex A.8 in this report.

3.9. Radiated Emission

3.9.1.Requirement

The peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(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 EIRP of -27dBm/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 EIRP of -27dBm/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 EIRP of -27dBm/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 not exceed an e.i.r.p. of -27 dBm/MHz.
The following formula is used to convert the equipment isotropic radiated power(e.i.r.p.) to field strength (dBμV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

3.9.2.Test Procedures

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. For measurements above 1 GHz, keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

3.9.3.Test Setup Layout

Refer to chapter 2.6.3 in this report.

3.9.4.Test Result

Refer to Annex A.9 in this report.

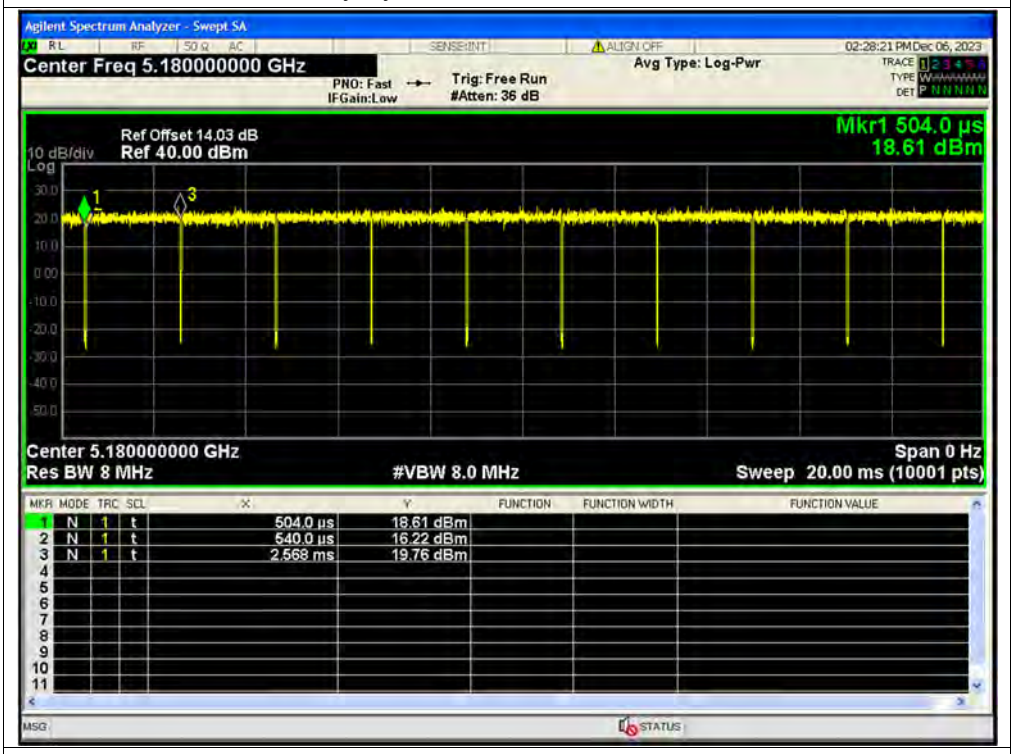
Annex A Test Data and Result

A.1. Duty Cycle of Test Signal

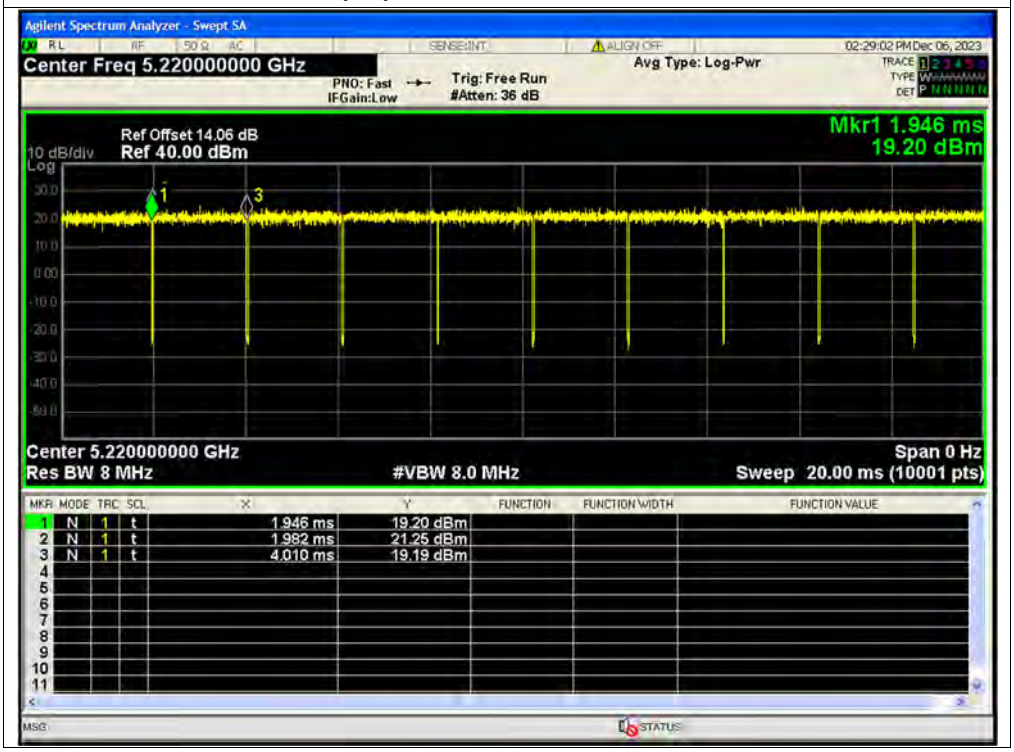
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	a	5180	Ant1	98.26	0.08	0.49
NVNT	a	5220	Ant1	98.26	0.08	0.49
NVNT	a	5240	Ant1	98.26	0.08	0.49
NVNT	a	5745	Ant1	98.26	0.08	0.49
NVNT	a	5785	Ant1	98.26	0.08	0.49
NVNT	a	5825	Ant1	98.16	0.08	0.49
NVNT	n20	5180	Ant1	98.13	0.08	0.53
NVNT	n20	5220	Ant1	98.13	0.08	0.53
NVNT	n20	5240	Ant1	98.13	0.08	0.53
NVNT	n20	5745	Ant1	98.13	0.08	0.53
NVNT	n20	5785	Ant1	98.13	0.08	0.53
NVNT	n20	5825	Ant1	98.13	0.08	0.53
NVNT	n40	5190	Ant1	96.47	0.16	1.08
NVNT	n40	5230	Ant1	96.27	0.17	1.08
NVNT	n40	5755	Ant1	96.47	0.16	1.08
NVNT	n40	5795	Ant1	96.47	0.16	1.08
NVNT	ac20	5180	Ant1	98.13	0.08	0.53
NVNT	ac20	5220	Ant1	98.13	0.08	0.53
NVNT	ac20	5240	Ant1	98.13	0.08	0.53
NVNT	ac20	5745	Ant1	98.13	0.08	0.53
NVNT	ac20	5785	Ant1	98.13	0.08	0.53
NVNT	ac20	5825	Ant1	98.03	0.09	0.53
NVNT	ac40	5190	Ant1	96.3	0.16	1.07
NVNT	ac40	5230	Ant1	96.3	0.16	1.07
NVNT	ac40	5755	Ant1	96.3	0.16	1.07
NVNT	ac40	5795	Ant1	96.3	0.16	1.07
NVNT	ac80	5210	Ant1	93.09	0.31	2.18
NVNT	ac80	5775	Ant1	92.68	0.33	2.19

Test Graphs

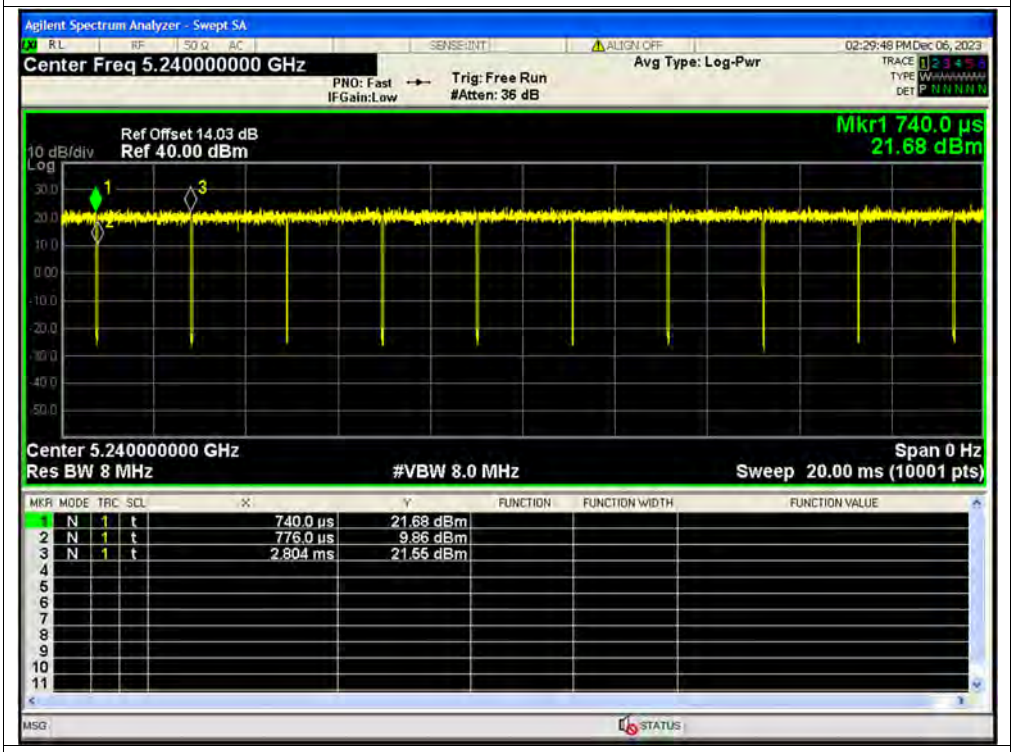
Duty Cycle NVNT a 5180MHz Ant1



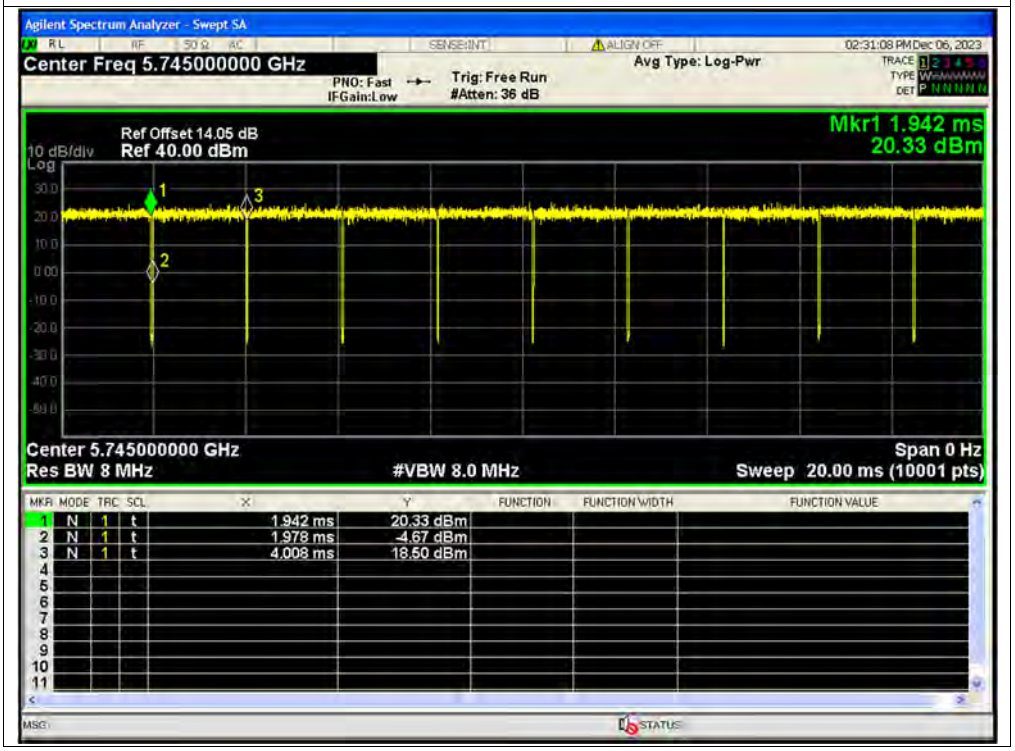
Duty Cycle NVNT a 5220MHz Ant1



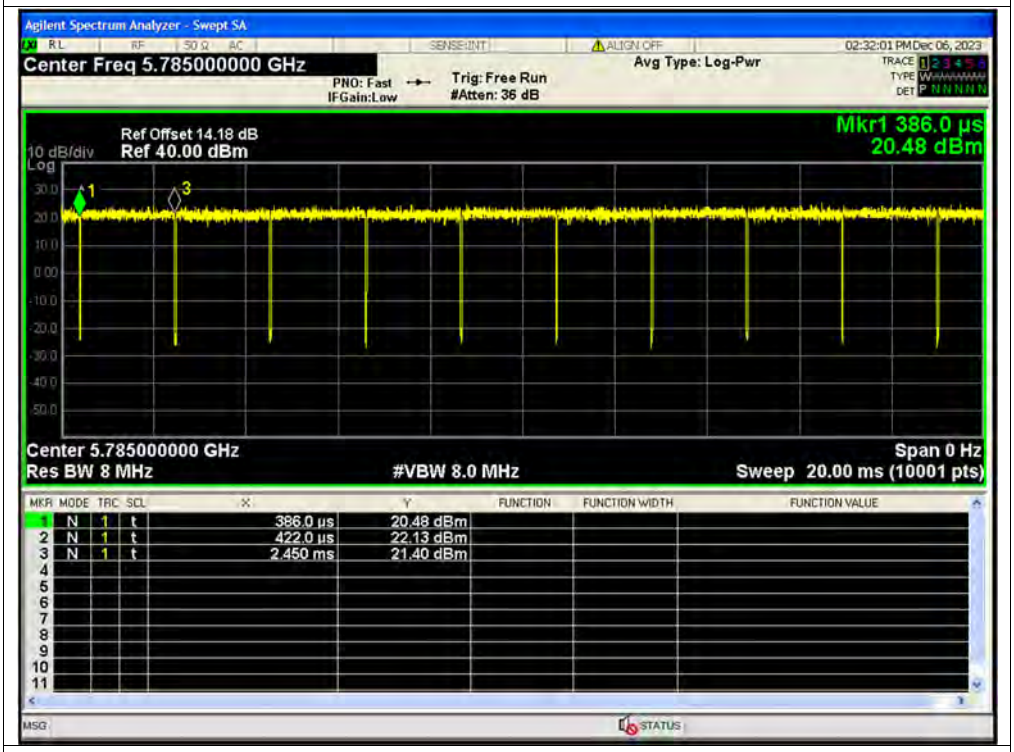
Duty Cycle NVNT a 5240MHz Ant1



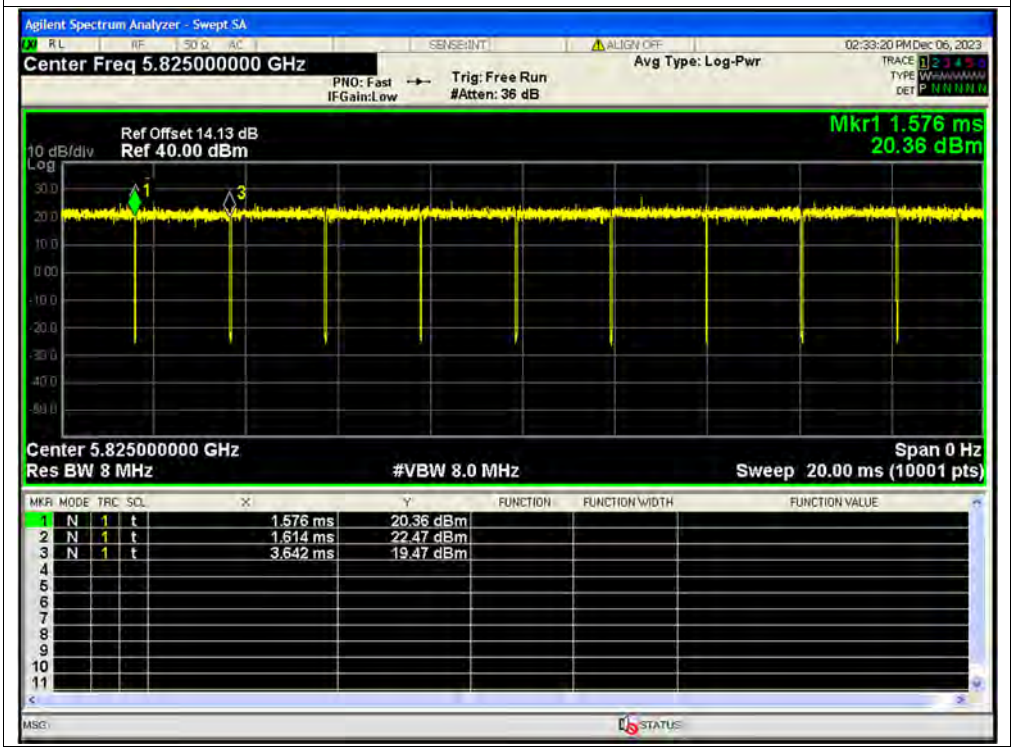
Duty Cycle NVNT a 5745MHz Ant1



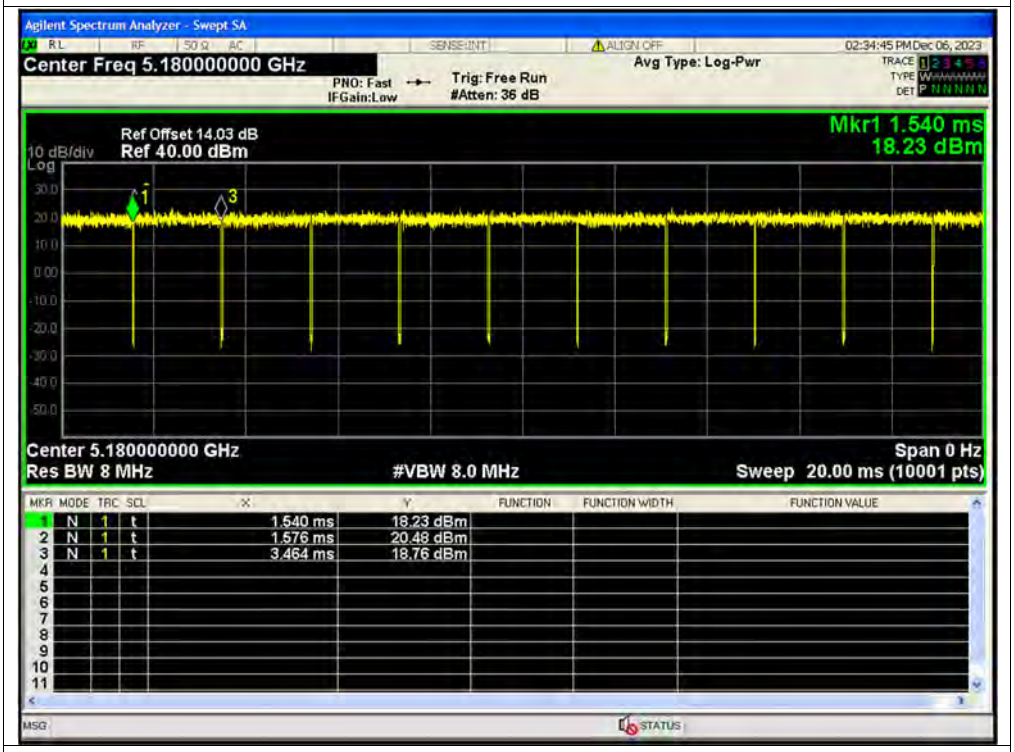
Duty Cycle NVNT a 5785MHz Ant1



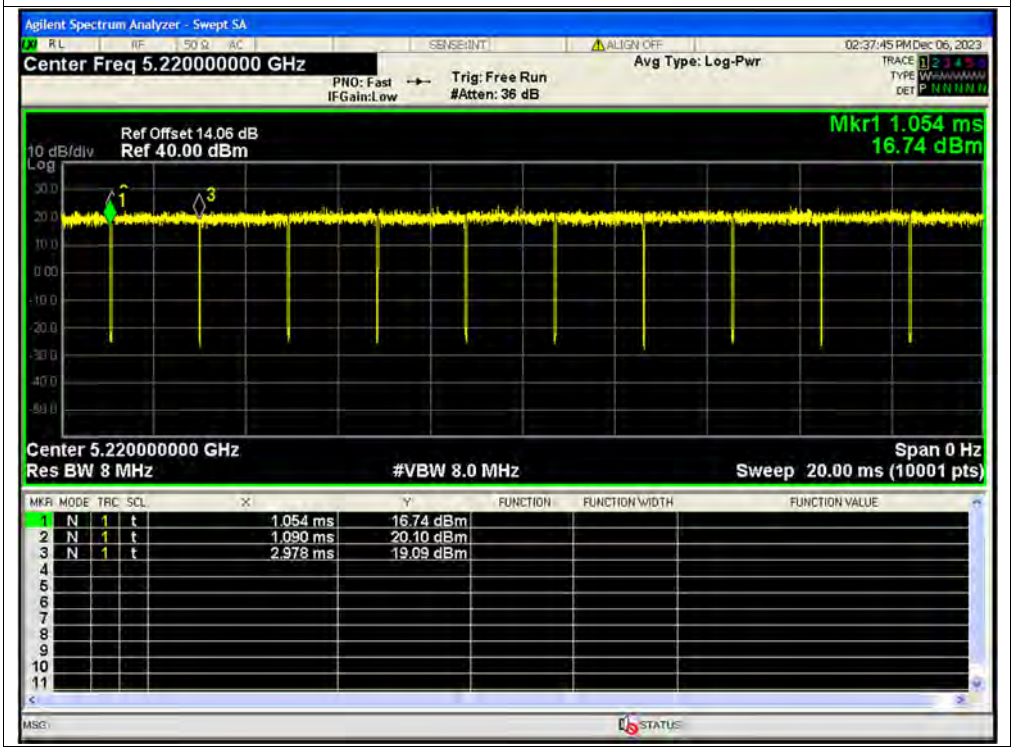
Duty Cycle NVNT a 5825MHz Ant1



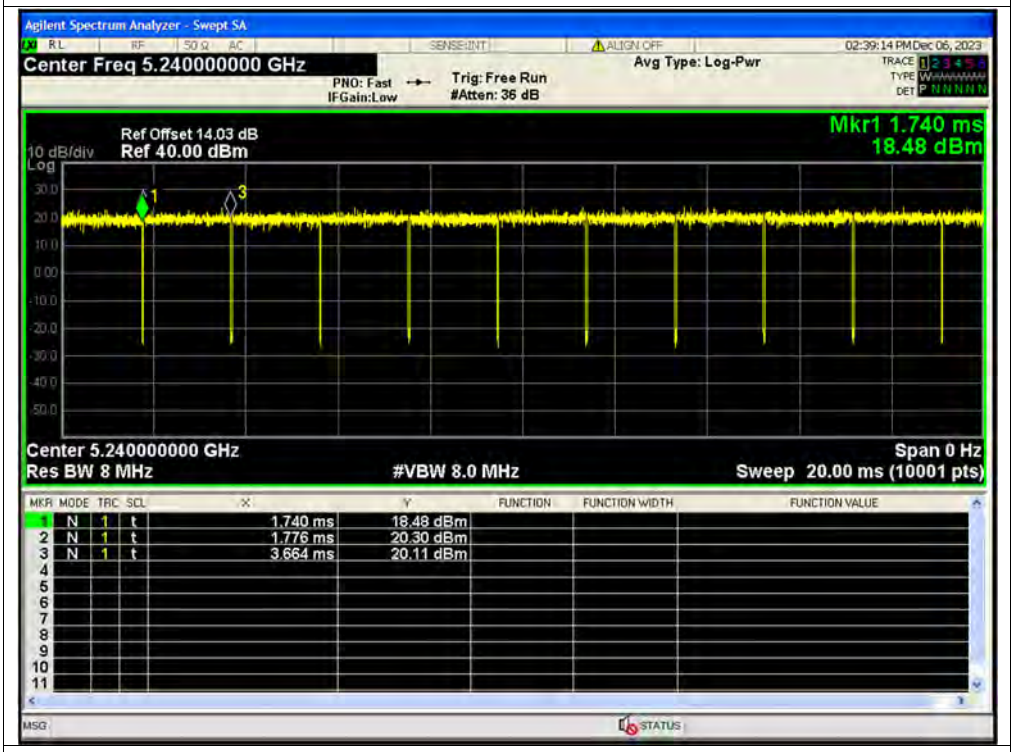
Duty Cycle NVNT n20 5180MHz Ant1



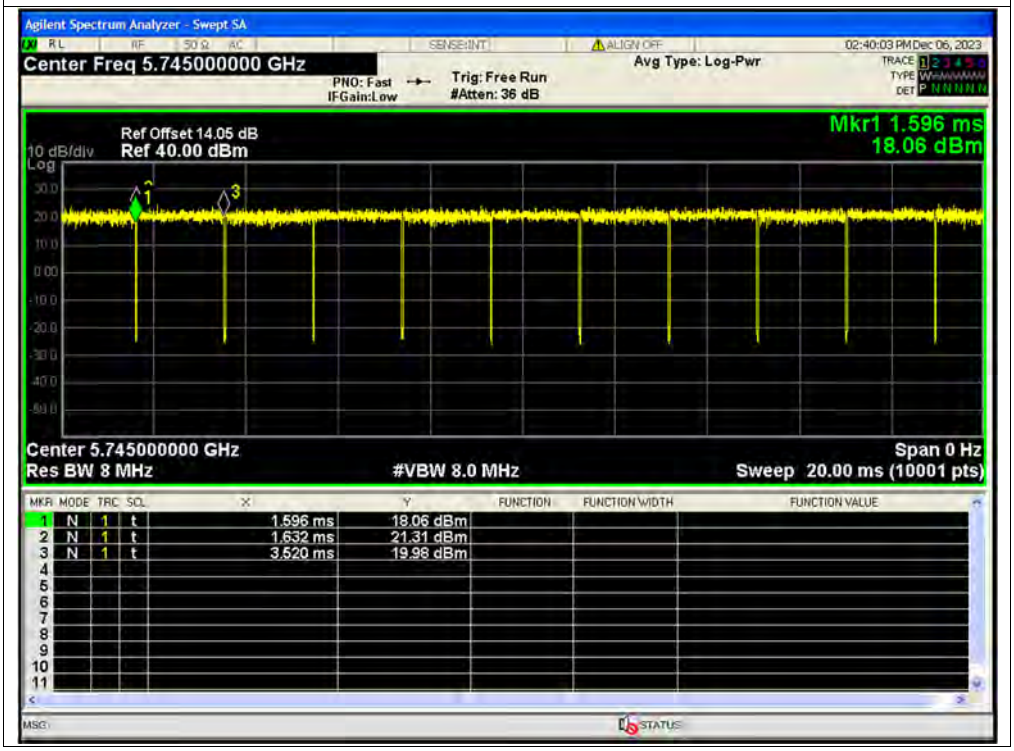
Duty Cycle NVNT n20 5220MHz Ant1



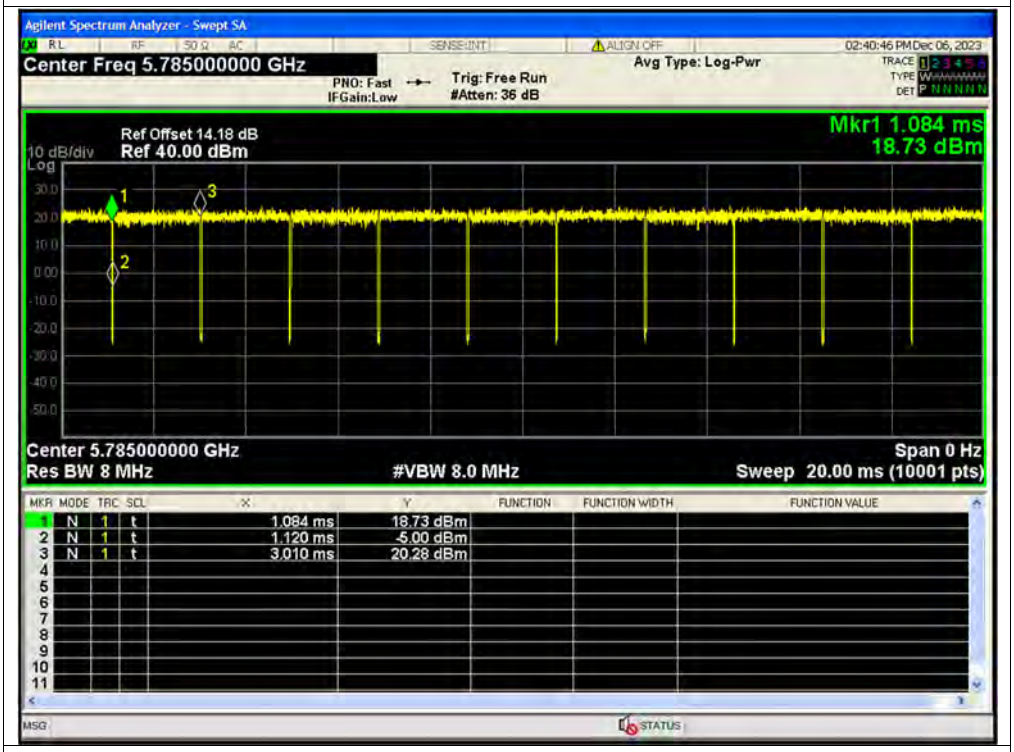
Duty Cycle NVNT n20 5240MHz Ant1



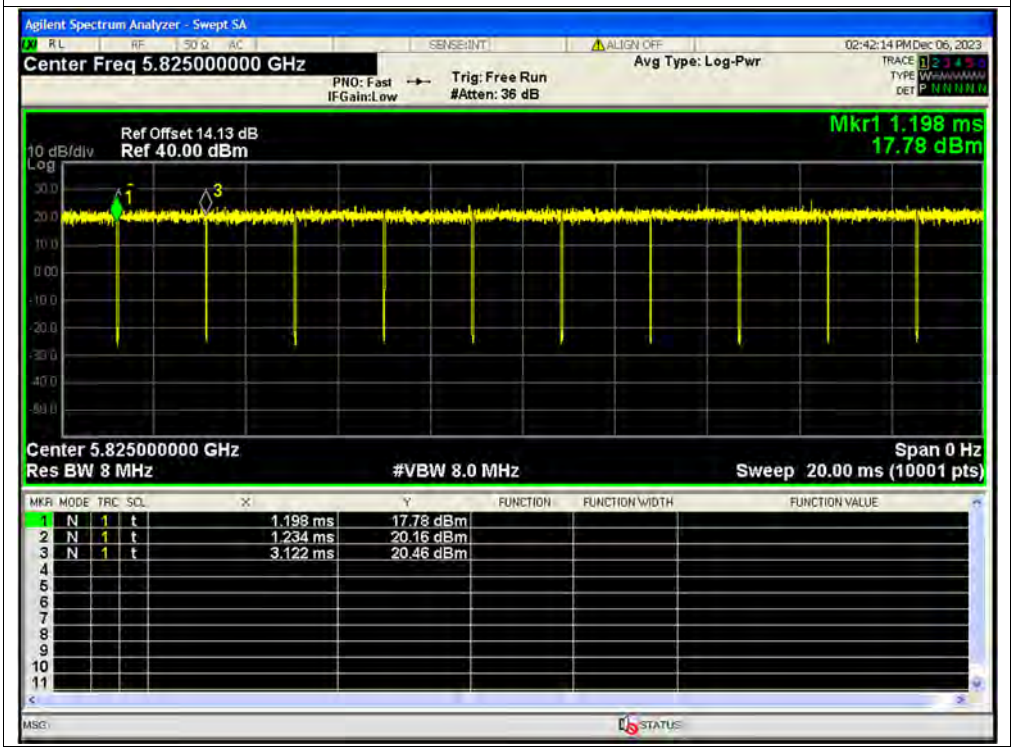
Duty Cycle NVNT n20 5745MHz Ant1



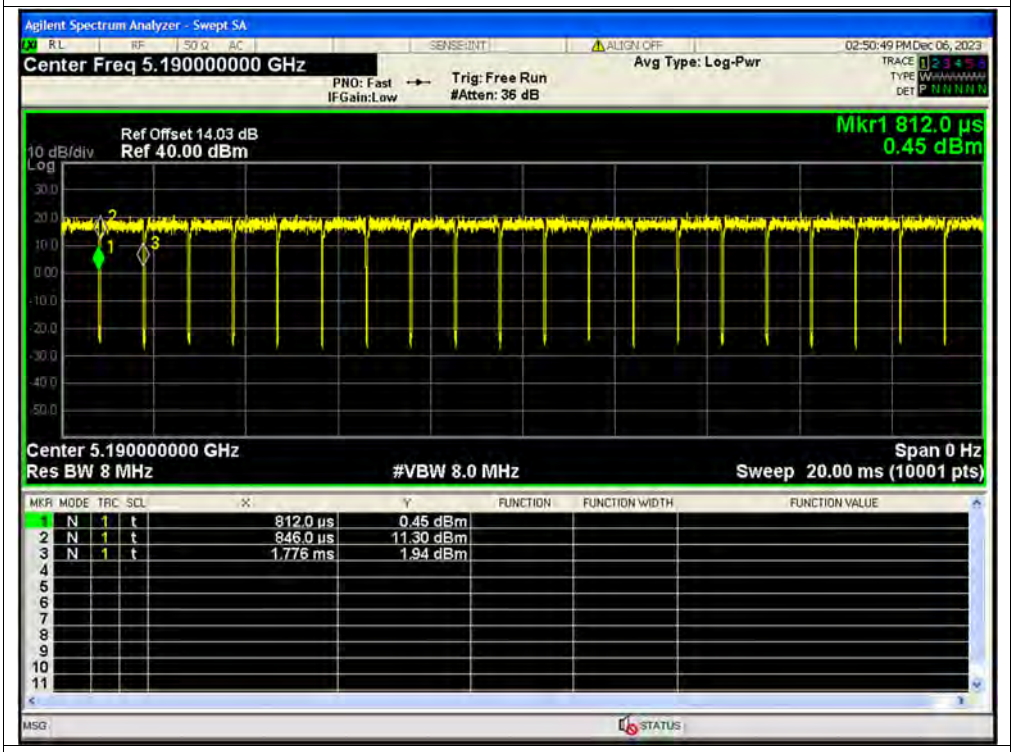
Duty Cycle NVNT n20 5785MHz Ant1



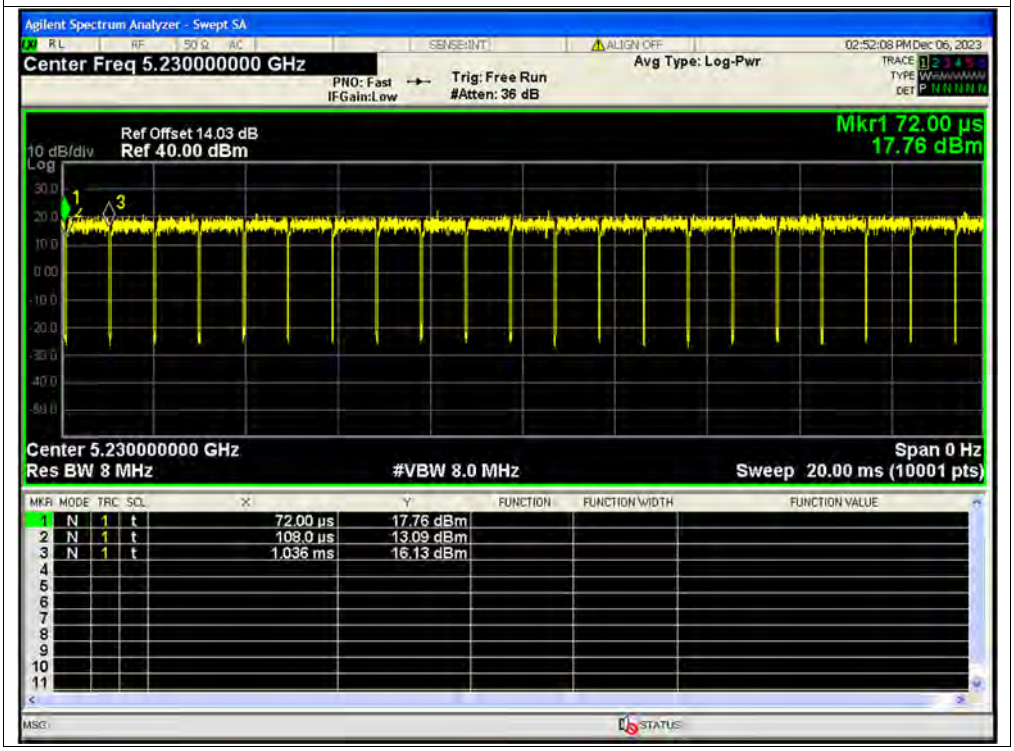
Duty Cycle NVNT n20 5825MHz Ant1



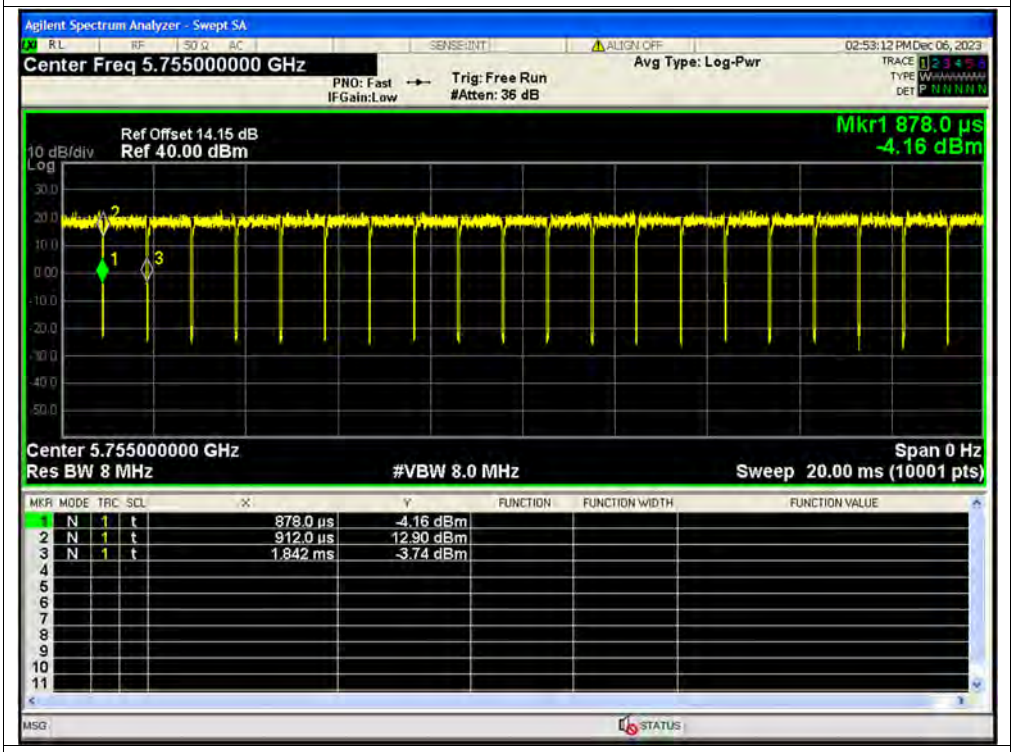
Duty Cycle NVNT n40 5190MHz Ant1



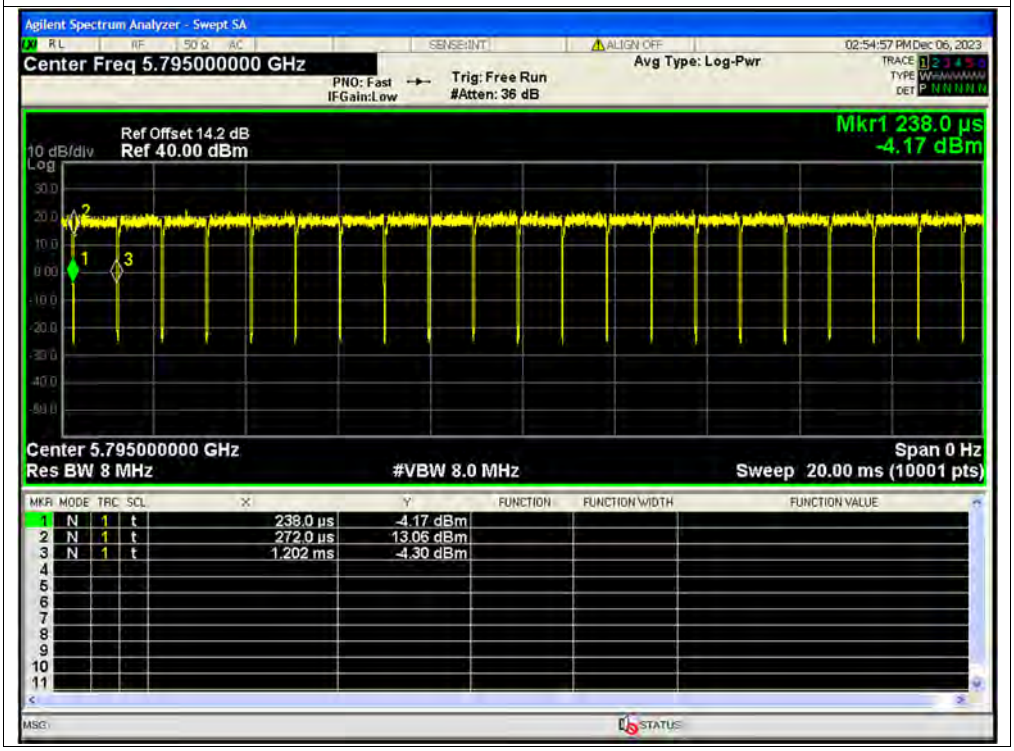
Duty Cycle NVNT n40 5230MHz Ant1



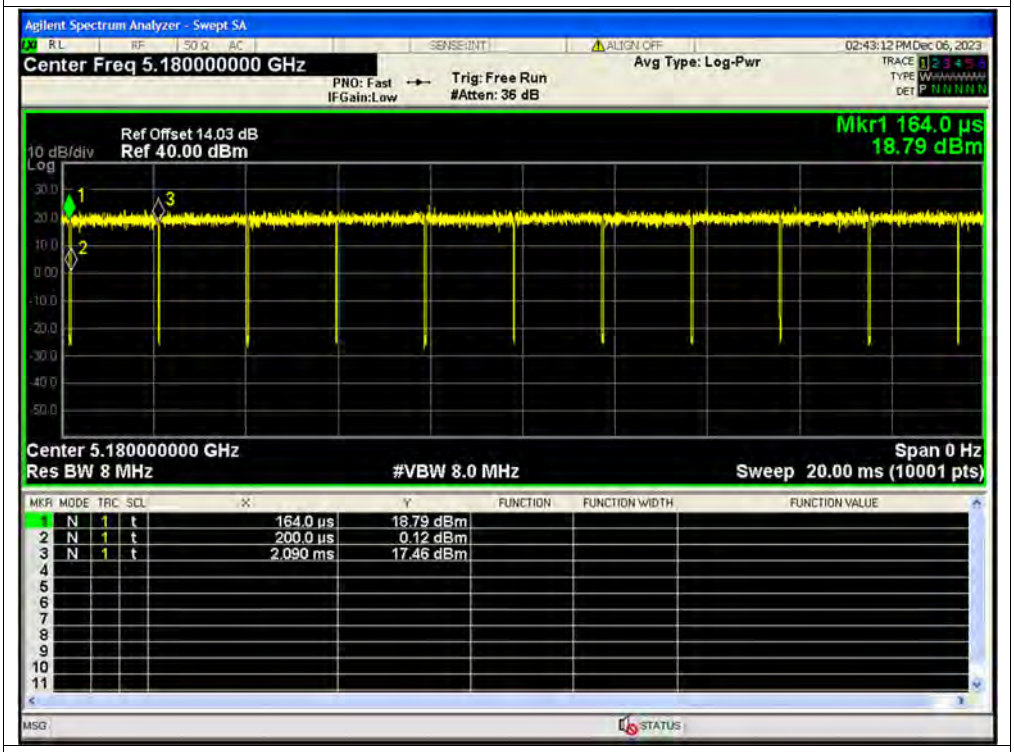
Duty Cycle NVNT n40 5755MHz Ant1



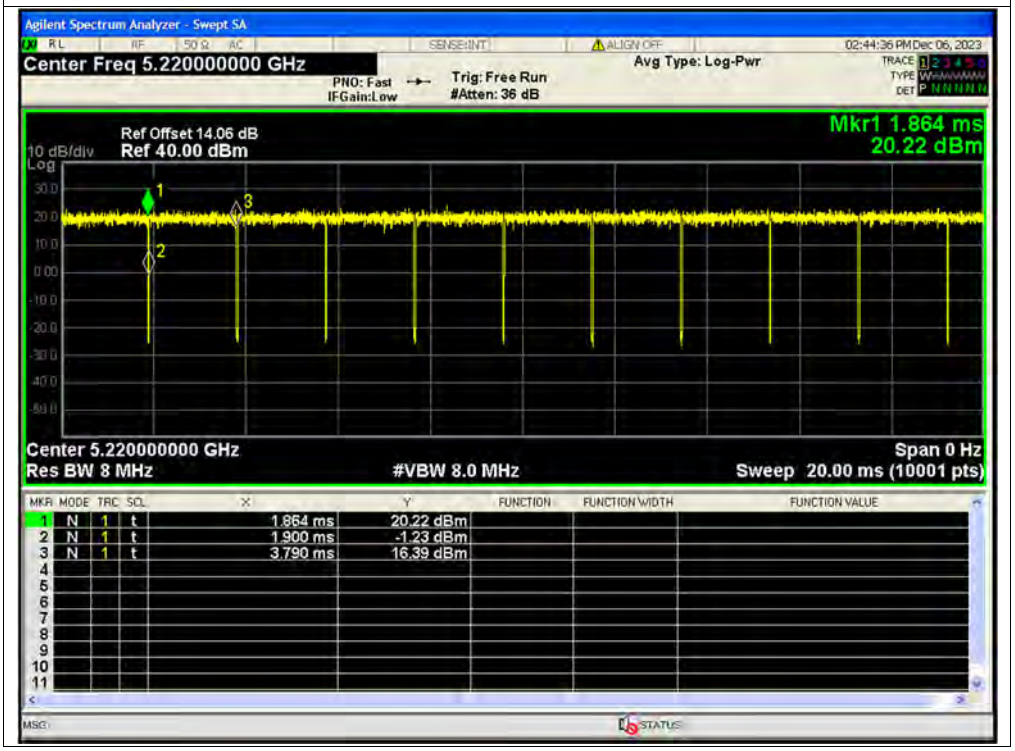
Duty Cycle NVNT n40 5795MHz Ant1



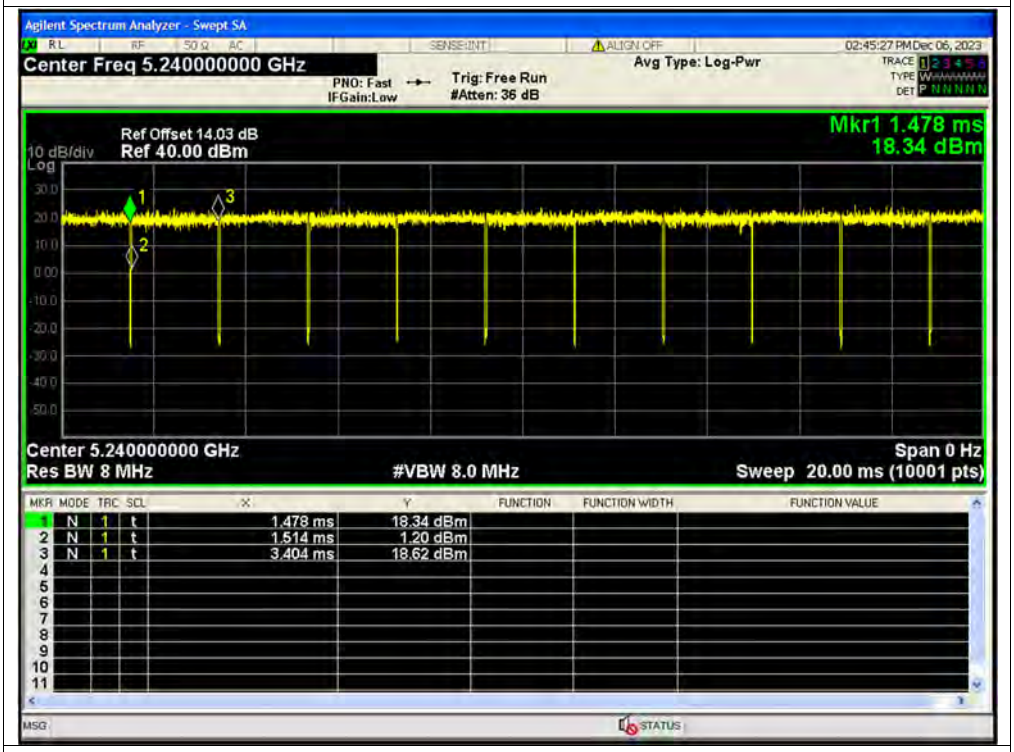
Duty Cycle NVNT ac20 5180MHz Ant1



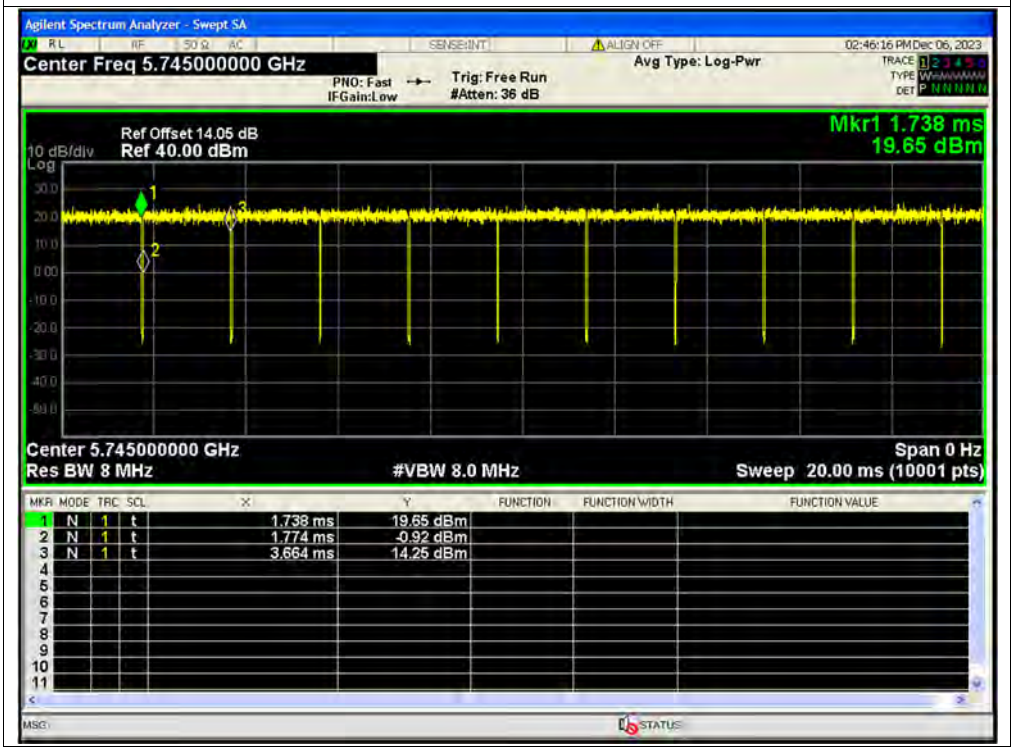
Duty Cycle NVNT ac20 5220MHz Ant1



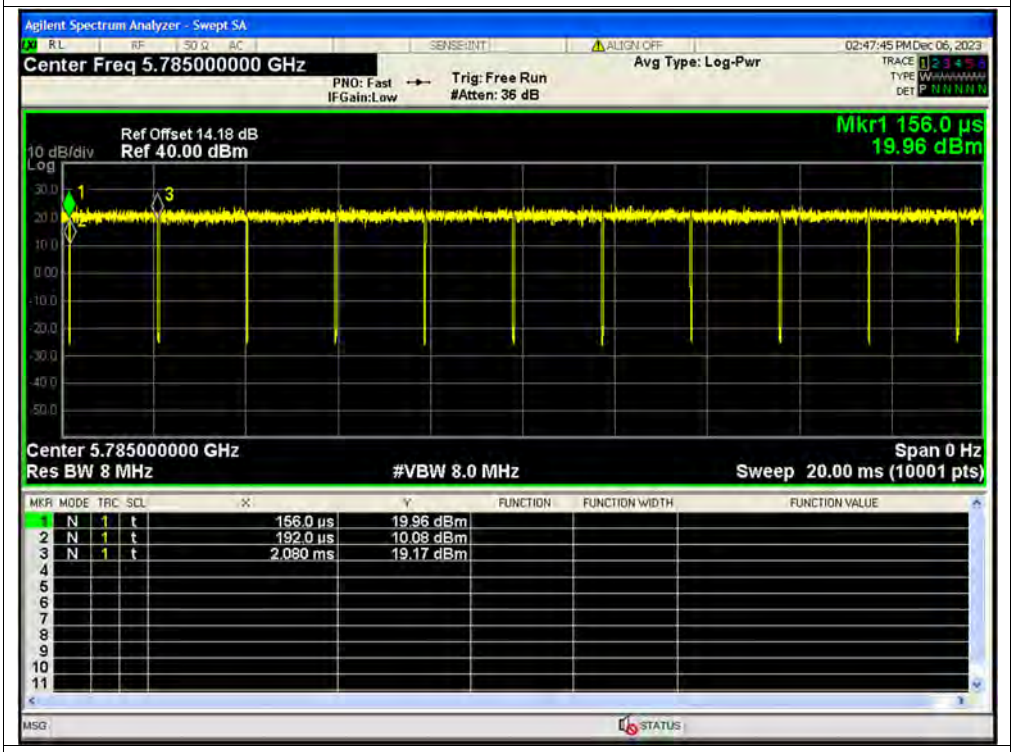
Duty Cycle NVNT ac20 5240MHz Ant1



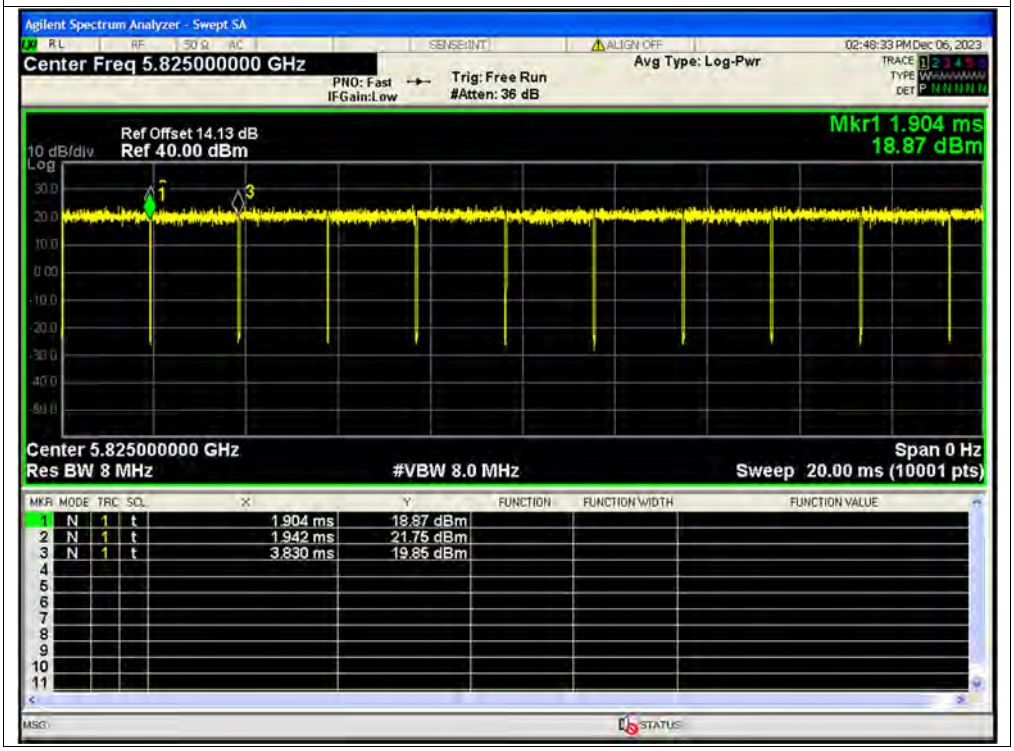
Duty Cycle NVNT ac20 5745MHz Ant1



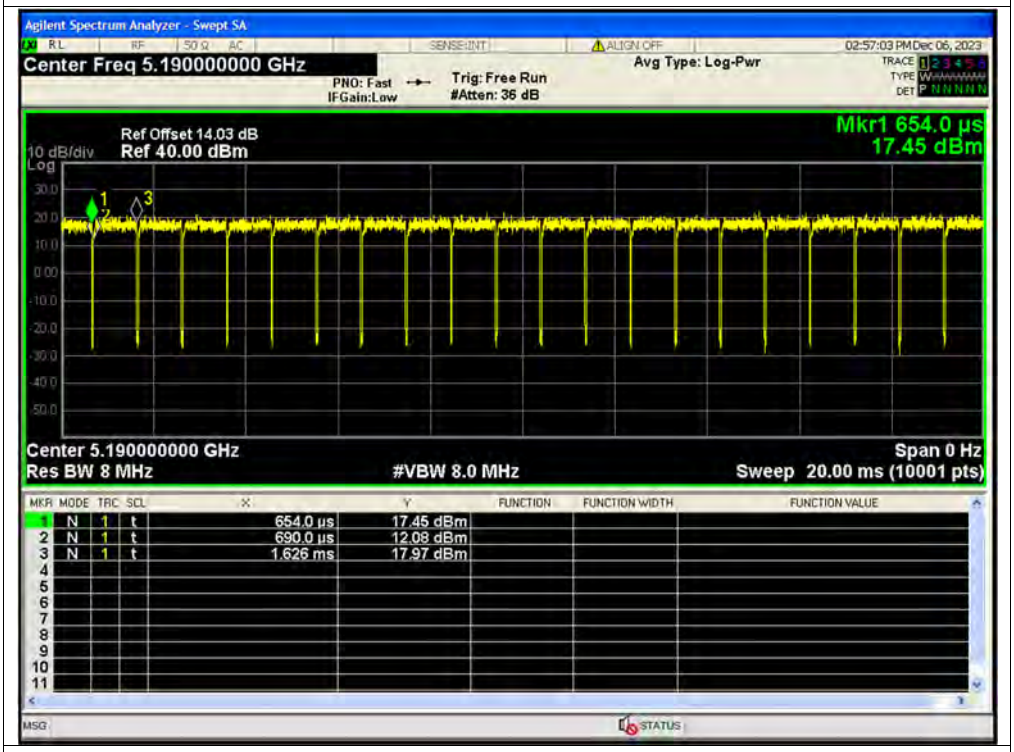
Duty Cycle NVNT ac20 5785MHz Ant1



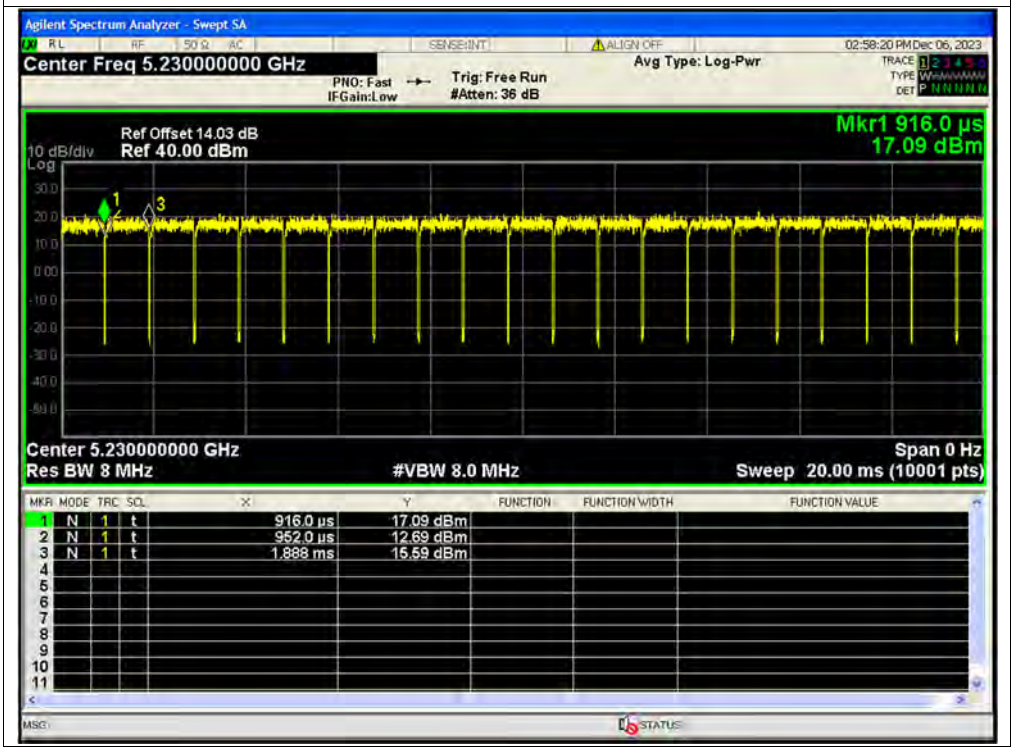
Duty Cycle NVNT ac20 5825MHz Ant1



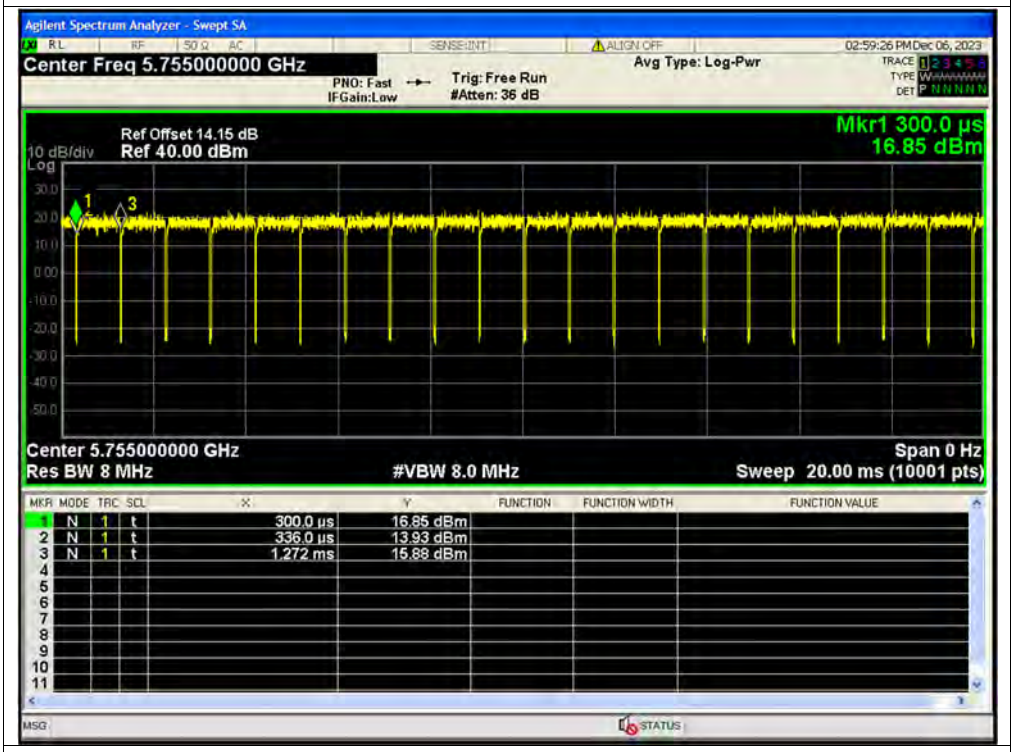
Duty Cycle NVNT ac40 5190MHz Ant1



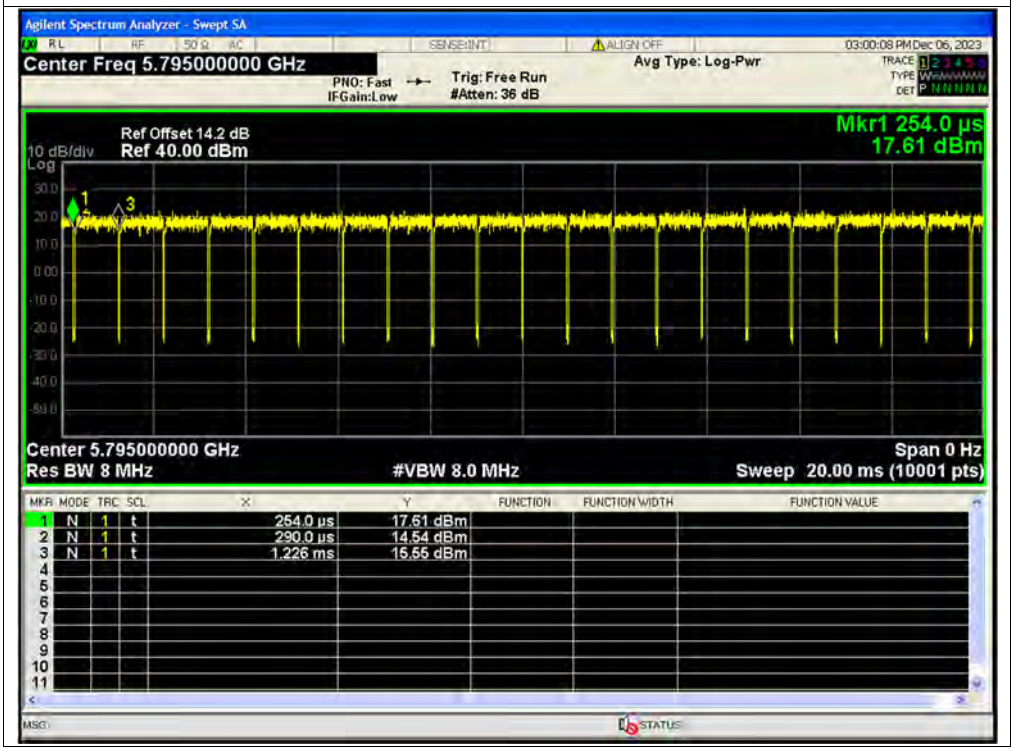
Duty Cycle NVNT ac40 5230MHz Ant1



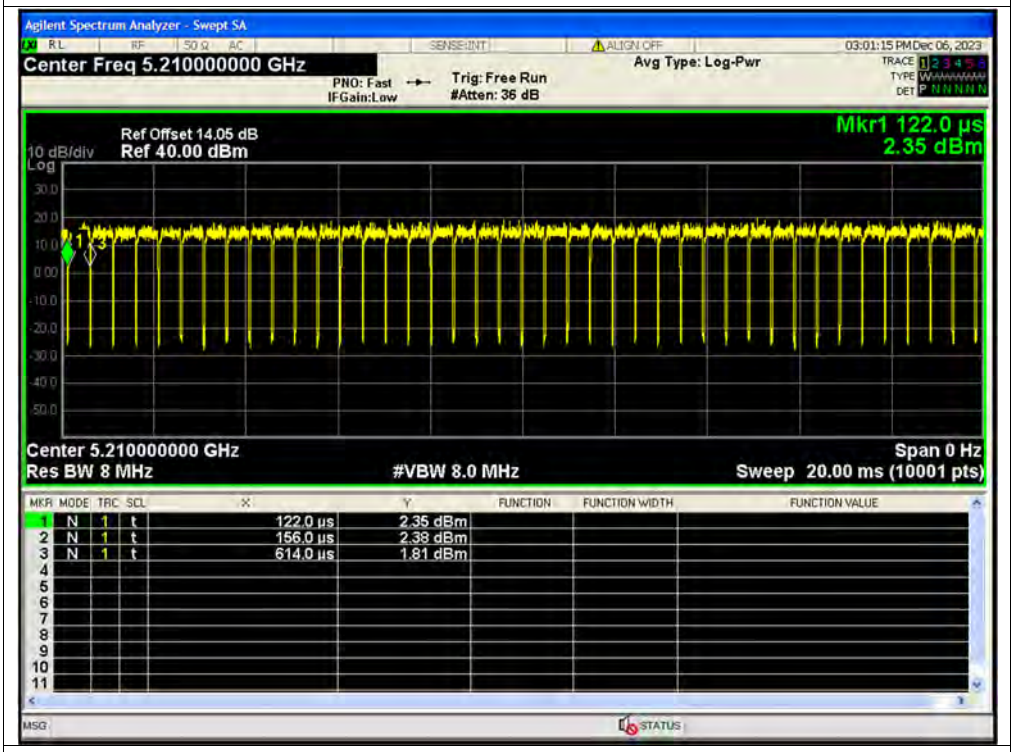
Duty Cycle NVNT ac40 5755MHz Ant1



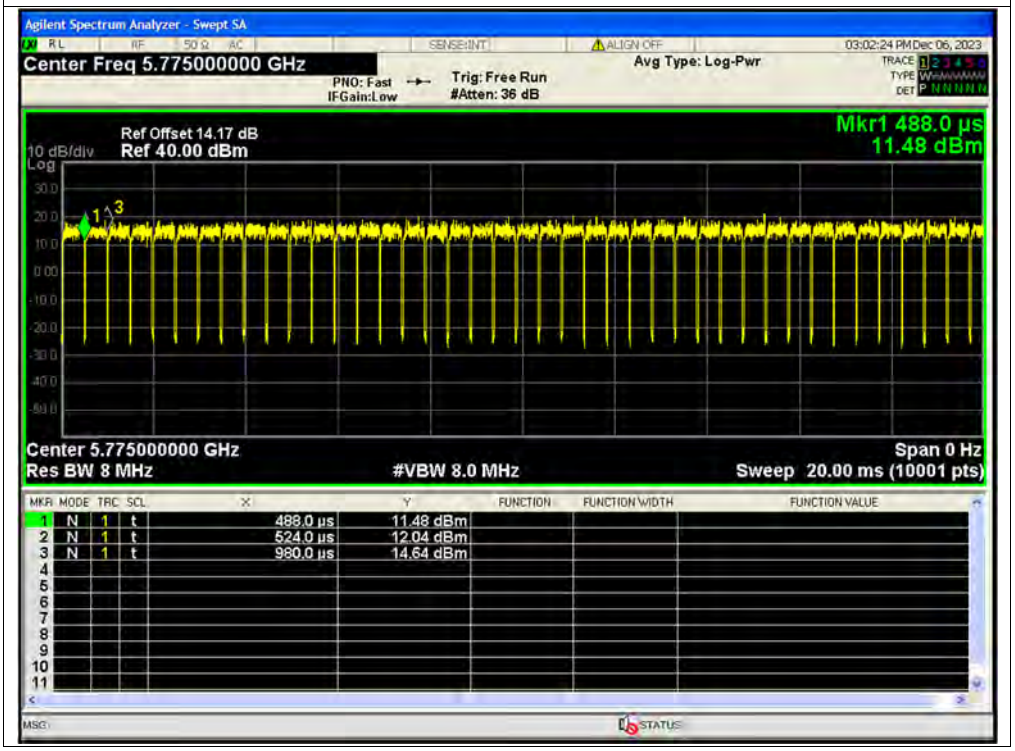
Duty Cycle NVNT ac40 5795MHz Ant1



Duty Cycle NVNT ac80 5210MHz Ant1



Duty Cycle NVNT ac80 5775MHz Ant1



A.2. Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Total Conducted Power (dBm)	Total Conducted Power (W)	Limit (dBm)	Verdict
NVNT	a	5180	Ant1	18.11	0.06471	24	Pass
NVNT	a	5220	Ant1	18.14	0.06516	24	Pass
NVNT	a	5240	Ant1	17.94	0.06223	24	Pass
NVNT	a	5745	Ant1	19.16	0.08241	30	Pass
NVNT	a	5785	Ant1	19.09	0.0811	30	Pass
NVNT	a	5825	Ant1	19.22	0.08356	30	Pass
NVNT	n20	5180	Ant1	17.44	0.05546	24	Pass
NVNT	n20	5220	Ant1	17.54	0.05675	24	Pass
NVNT	n20	5240	Ant1	17.26	0.05321	24	Pass
NVNT	n20	5745	Ant1	18.46	0.07015	30	Pass
NVNT	n20	5785	Ant1	18.44	0.06982	30	Pass
NVNT	n20	5825	Ant1	18.53	0.07129	30	Pass
NVNT	n40	5190	Ant1	18.06	0.06397	24	Pass
NVNT	n40	5230	Ant1	17.94	0.06223	24	Pass
NVNT	n40	5755	Ant1	19.3	0.08511	30	Pass
NVNT	n40	5795	Ant1	19.03	0.07998	30	Pass
NVNT	ac20	5180	Ant1	17.4	0.05495	24	Pass
NVNT	ac20	5220	Ant1	17.56	0.05702	24	Pass
NVNT	ac20	5240	Ant1	17.28	0.05346	24	Pass
NVNT	ac20	5745	Ant1	18.5	0.07079	30	Pass
NVNT	ac20	5785	Ant1	18.42	0.0695	30	Pass
NVNT	ac20	5825	Ant1	18.54	0.07145	30	Pass
NVNT	ac40	5190	Ant1	18.07	0.06412	24	Pass
NVNT	ac40	5230	Ant1	17.94	0.06223	24	Pass
NVNT	ac40	5755	Ant1	19.31	0.08531	30	Pass
NVNT	ac40	5795	Ant1	19.03	0.07998	30	Pass
NVNT	ac80	5210	Ant1	18.36	0.06855	24	Pass
NVNT	ac80	5775	Ant1	19.06	0.08054	30	Pass

A.3. Emission Bandwidth

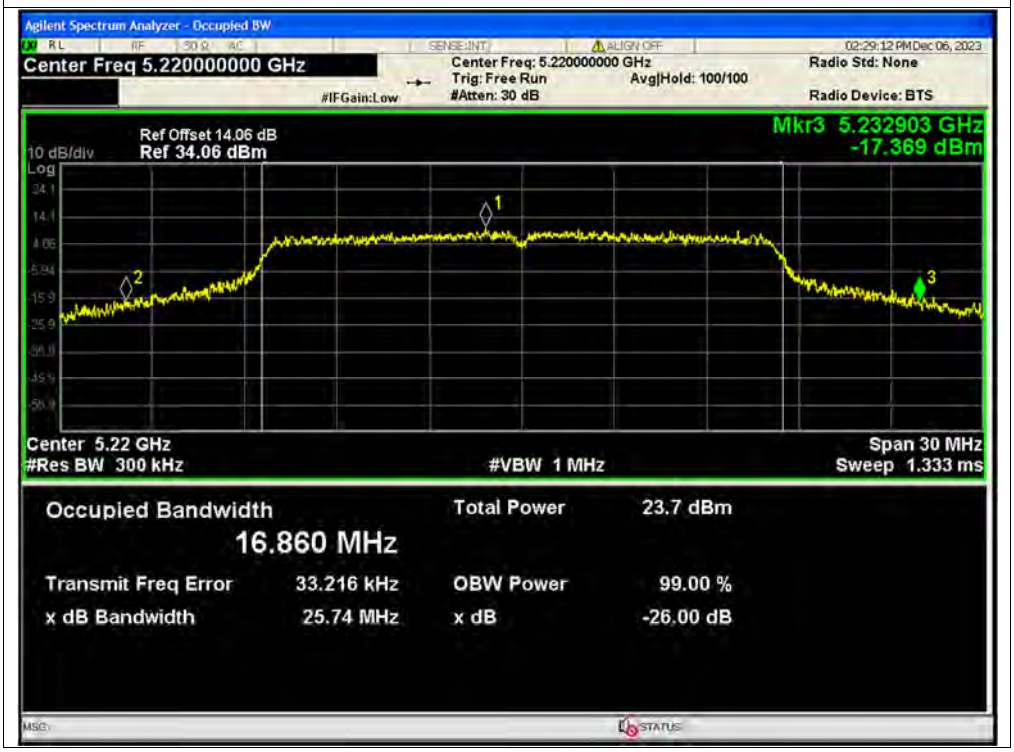
Condition	Mode	Frequency (MHz)	Antenna	-26 dB Bandwidth (MHz)
NVNT	a	5180	Ant1	26.652
NVNT	a	5220	Ant1	25.739
NVNT	a	5240	Ant1	26.062
NVNT	n20	5180	Ant1	27.089
NVNT	n20	5220	Ant1	26.139
NVNT	n20	5240	Ant1	25.92
NVNT	n40	5190	Ant1	42.261
NVNT	n40	5230	Ant1	41.608
NVNT	ac20	5180	Ant1	25.904
NVNT	ac20	5220	Ant1	25.275
NVNT	ac20	5240	Ant1	25.394
NVNT	ac40	5190	Ant1	41.695
NVNT	ac40	5230	Ant1	45.439
NVNT	ac80	5210	Ant1	94.033

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	a	5745	Ant1	16.288	0.5	Pass
NVNT	a	5785	Ant1	15.02	0.5	Pass
NVNT	a	5825	Ant1	15.051	0.5	Pass
NVNT	n20	5745	Ant1	17.271	0.5	Pass
NVNT	n20	5785	Ant1	16.929	0.5	Pass
NVNT	n20	5825	Ant1	16.899	0.5	Pass
NVNT	n40	5755	Ant1	35.125	0.5	Pass
NVNT	n40	5795	Ant1	35.053	0.5	Pass
NVNT	ac20	5745	Ant1	16.654	0.5	Pass
NVNT	ac20	5785	Ant1	15.005	0.5	Pass
NVNT	ac20	5825	Ant1	17.502	0.5	Pass
NVNT	ac40	5755	Ant1	35.039	0.5	Pass
NVNT	ac40	5795	Ant1	35.527	0.5	Pass
NVNT	ac80	5775	Ant1	75.053	0.5	Pass

Test Graphs

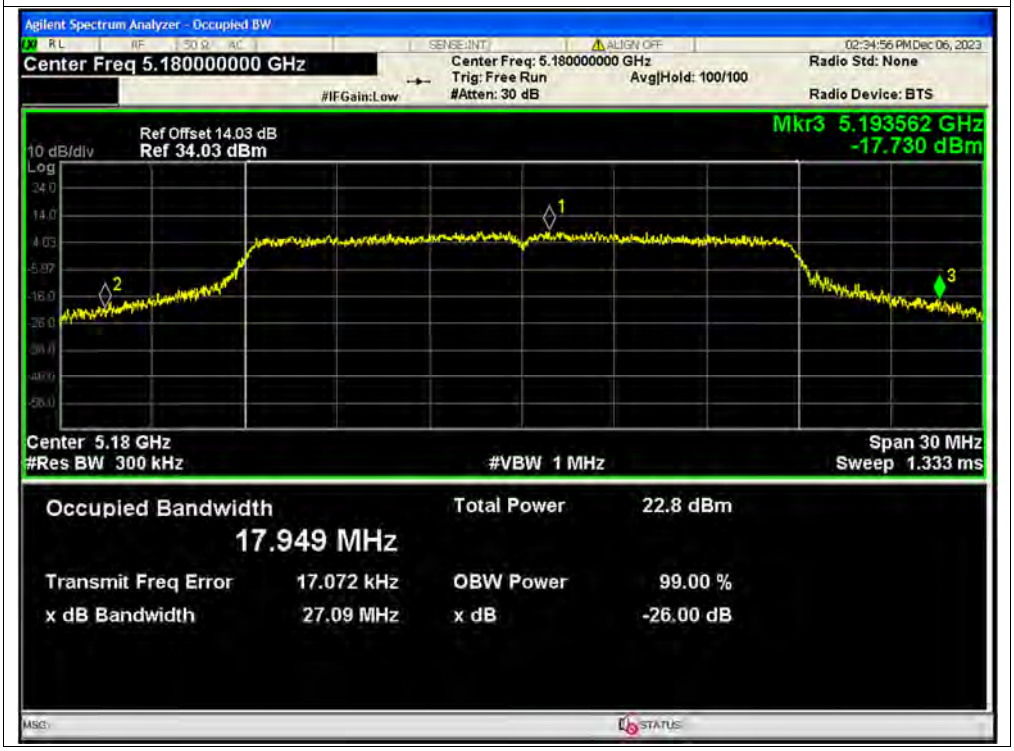
-26dB Bandwidth NVNT a 5180MHz Ant1

-26dB Bandwidth NVNT a 5220MHz Ant1

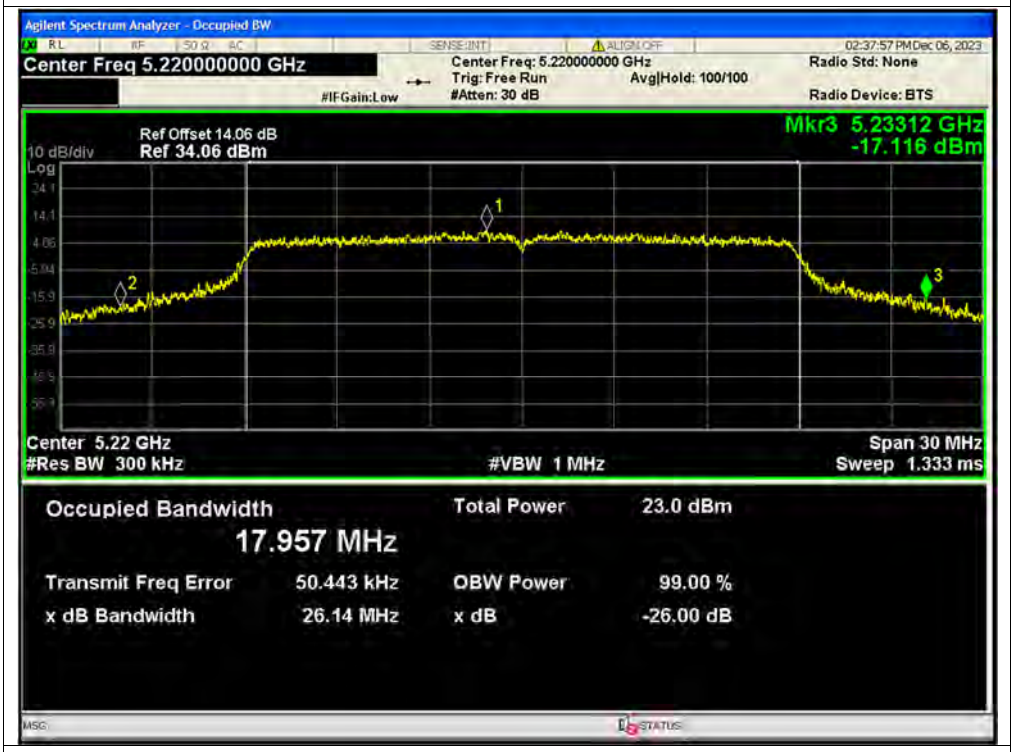


-26dB Bandwidth NVNT a 5240MHz Ant1

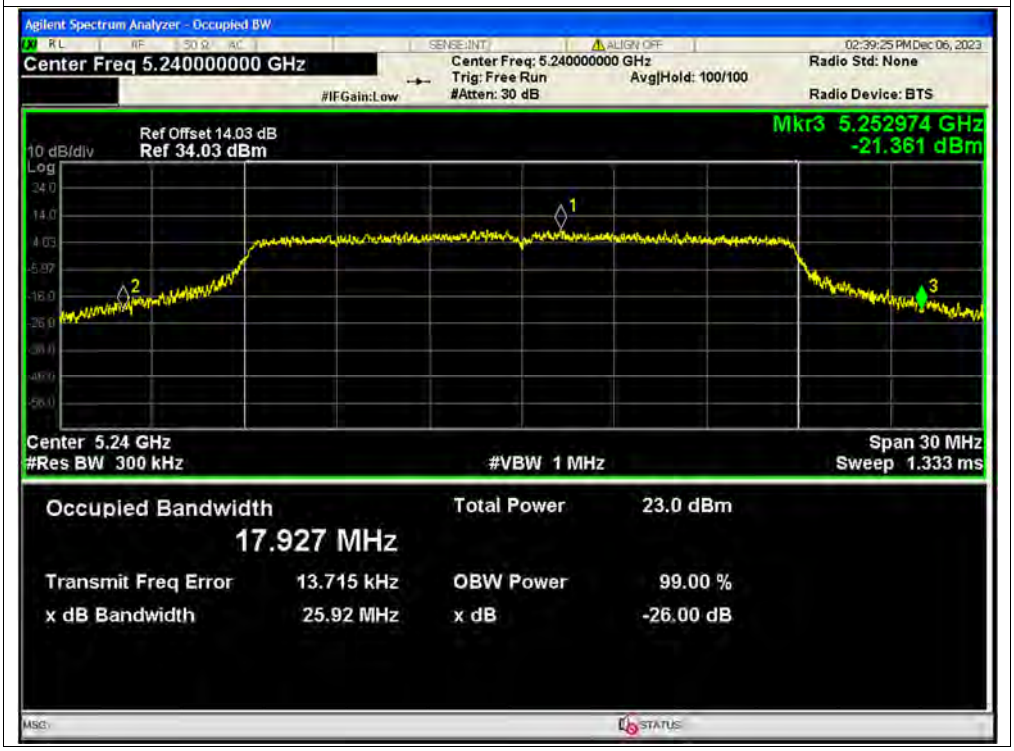
-26dB Bandwidth NVNT n20 5180MHz Ant1



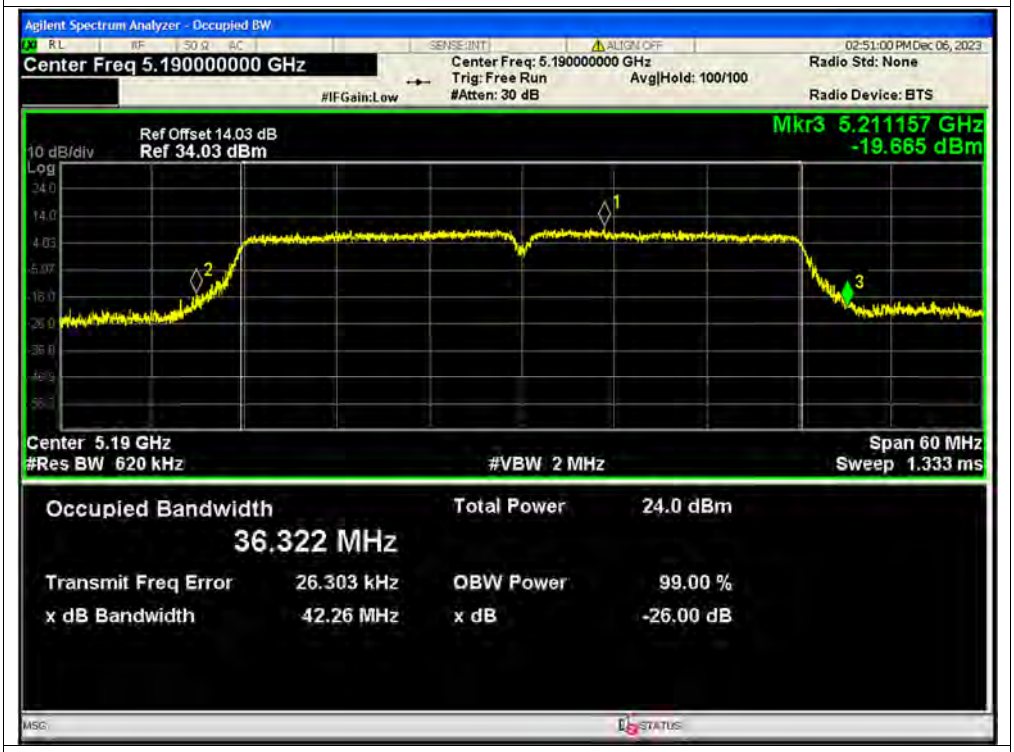
-26dB Bandwidth NVNT n20 5220MHz Ant1



-26dB Bandwidth NVNT n20 5240MHz Ant1

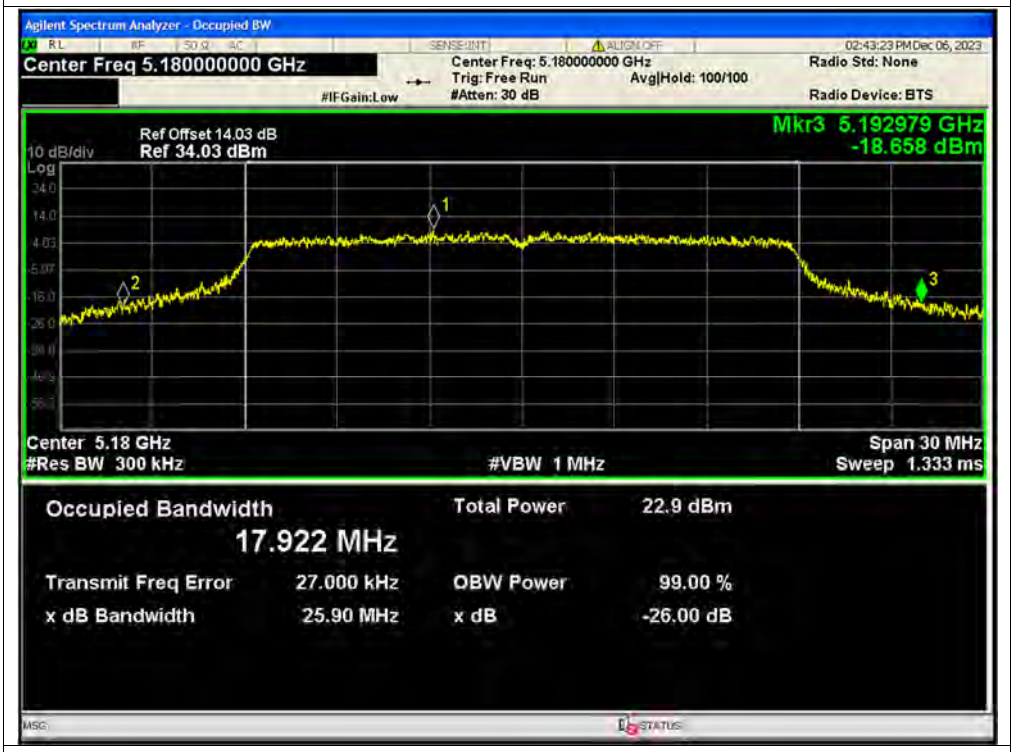


-26dB Bandwidth NVNT n40 5190MHz Ant1

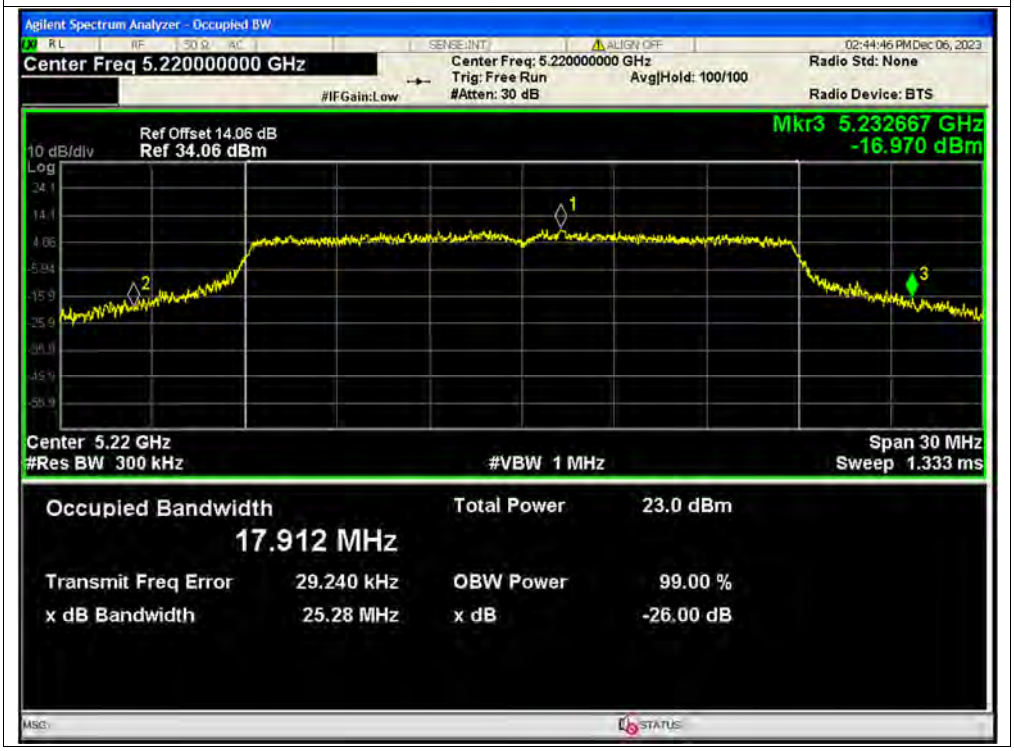


-26dB Bandwidth NVNT n40 5230MHz Ant1

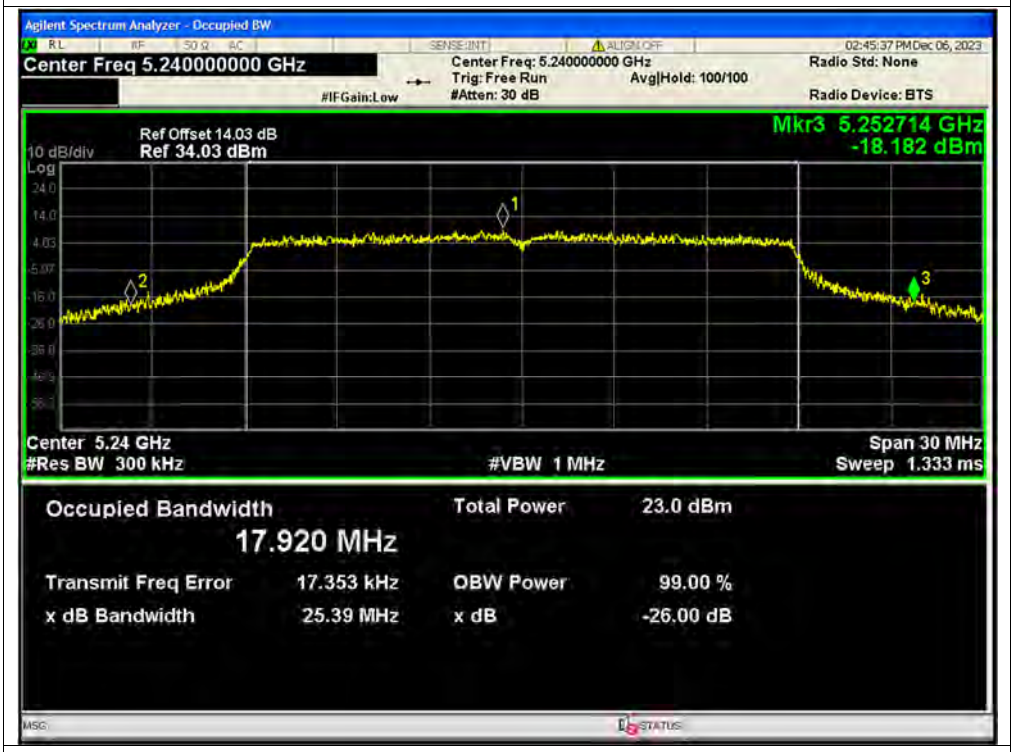
-26dB Bandwidth NVNT ac20 5180MHz Ant1



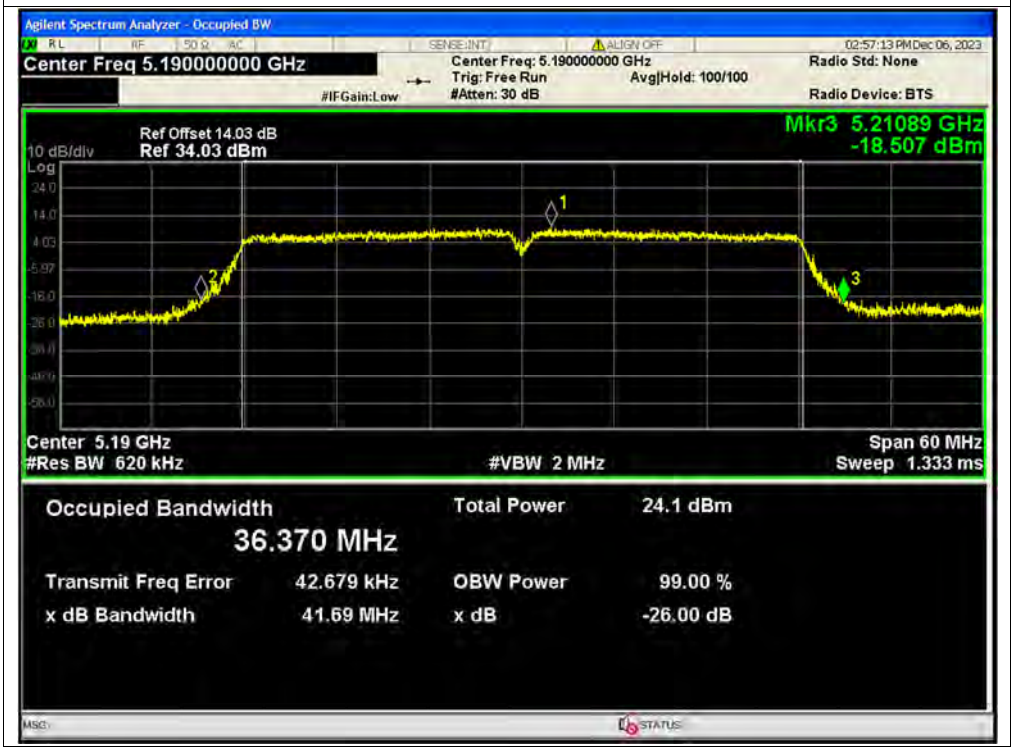
-26dB Bandwidth NVNT ac20 5220MHz Ant1



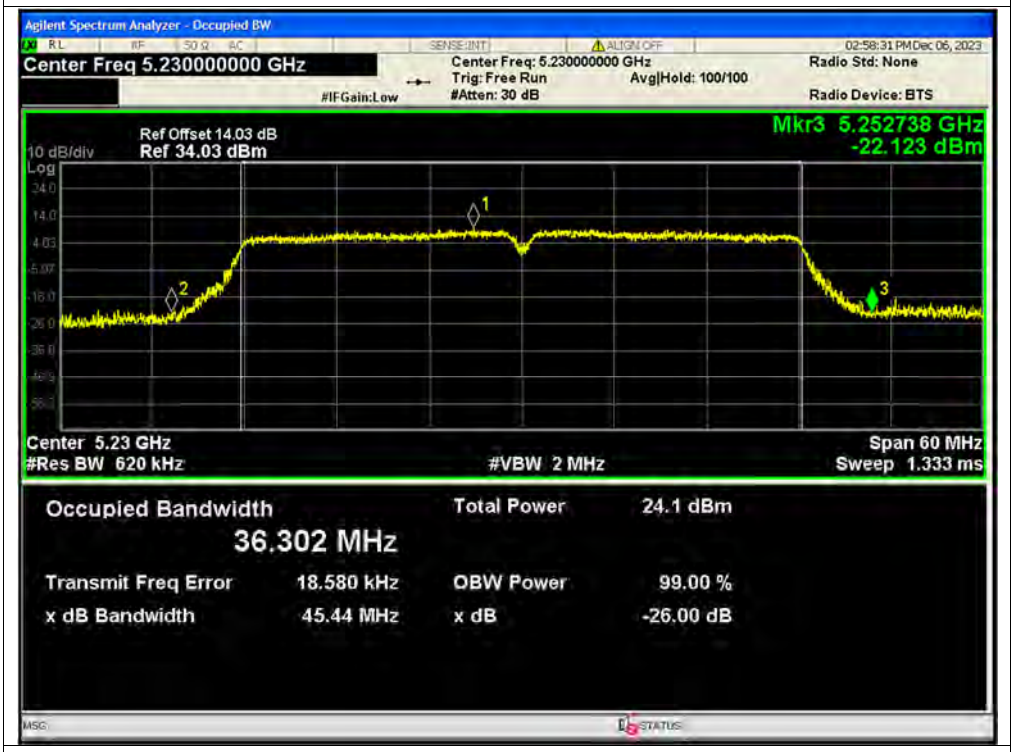
-26dB Bandwidth NVNT ac20 5240MHz Ant1



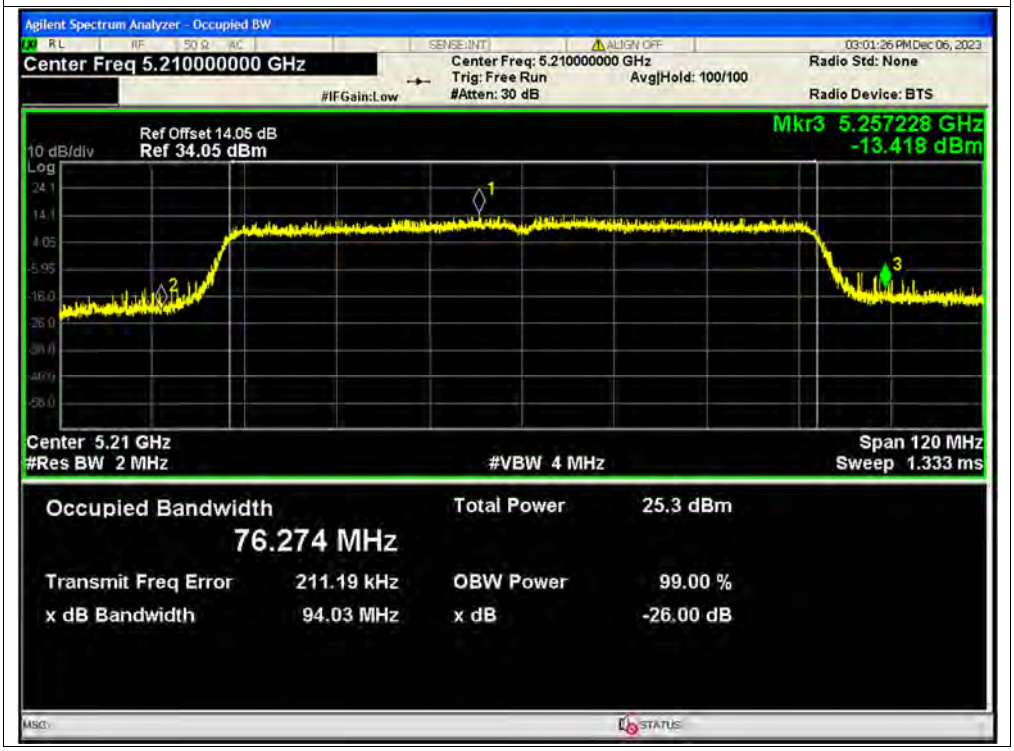
-26dB Bandwidth NVNT ac40 5190MHz Ant1



-26dB Bandwidth NVNT ac40 5230MHz Ant1

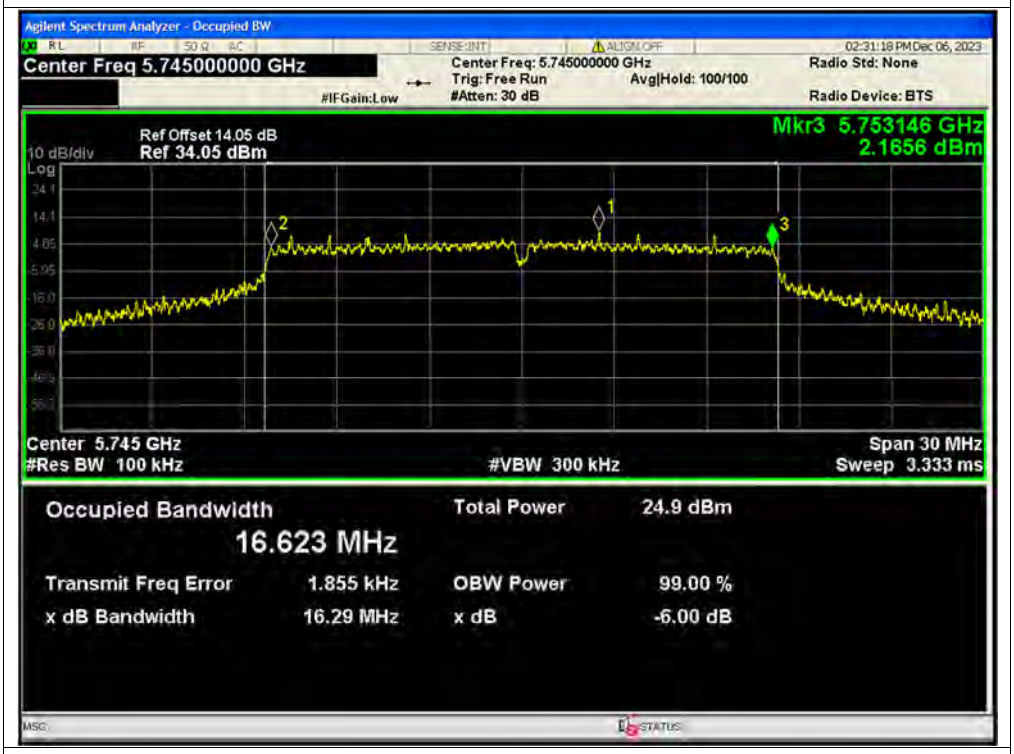


-26dB Bandwidth NVNT ac80 5210MHz Ant1



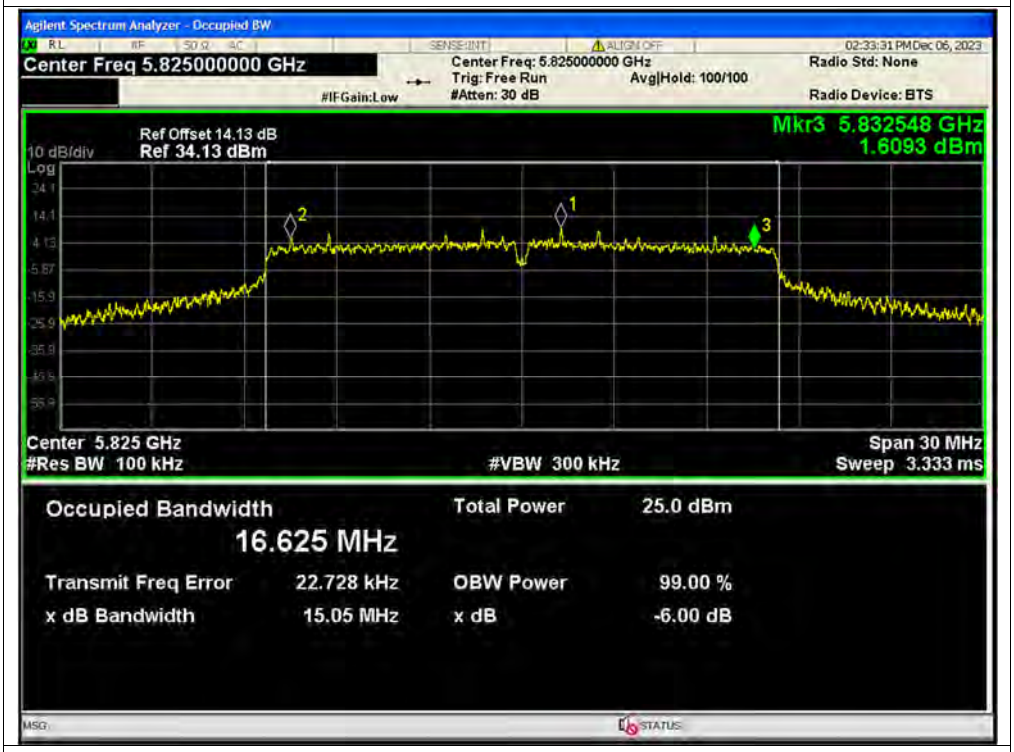
Test Graphs

-6dB Bandwidth NVNT a 5745MHz Ant1

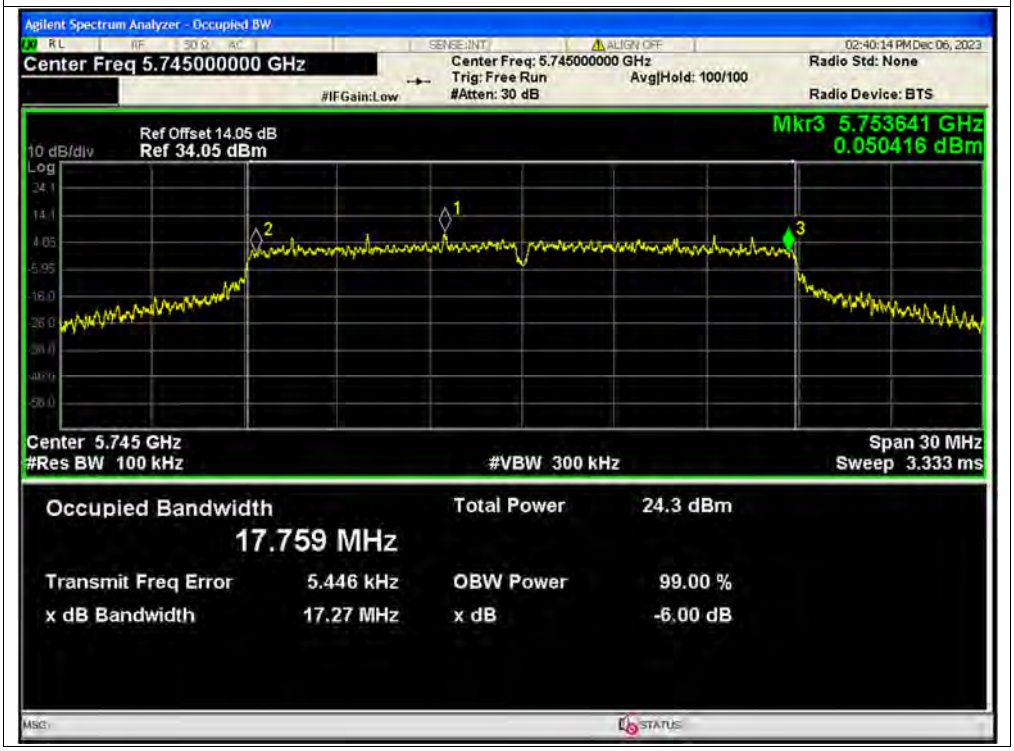


-6dB Bandwidth NVNT a 5785MHz Ant1

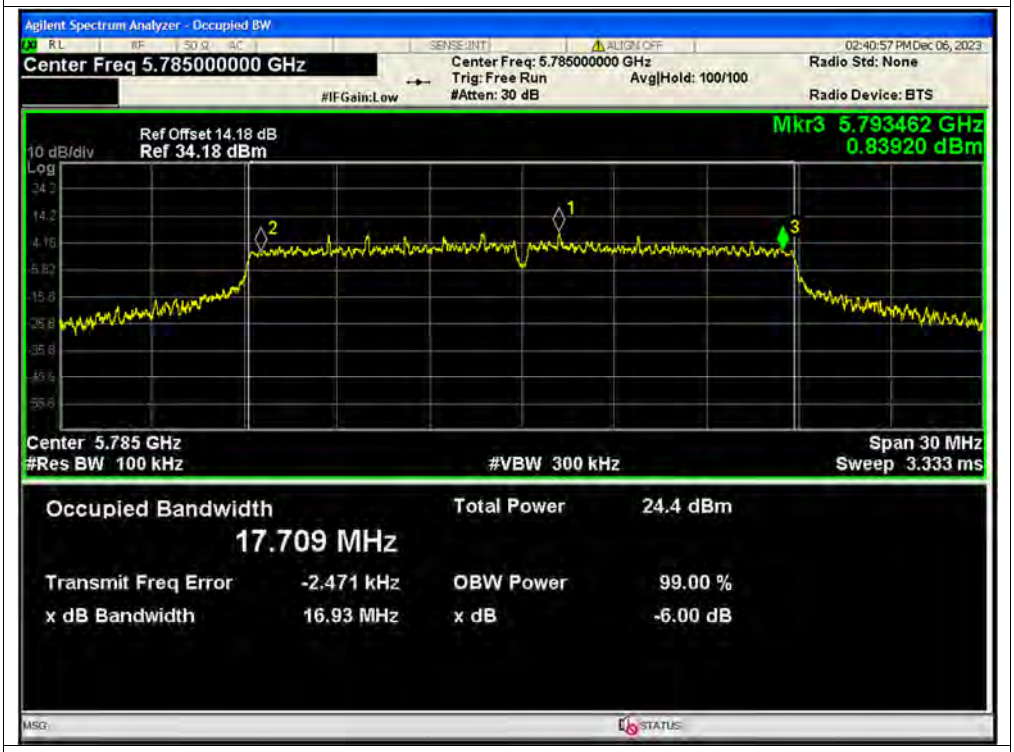
-6dB Bandwidth NVNT a 5825MHz Ant1



-6dB Bandwidth NVNT n20 5745MHz Ant1

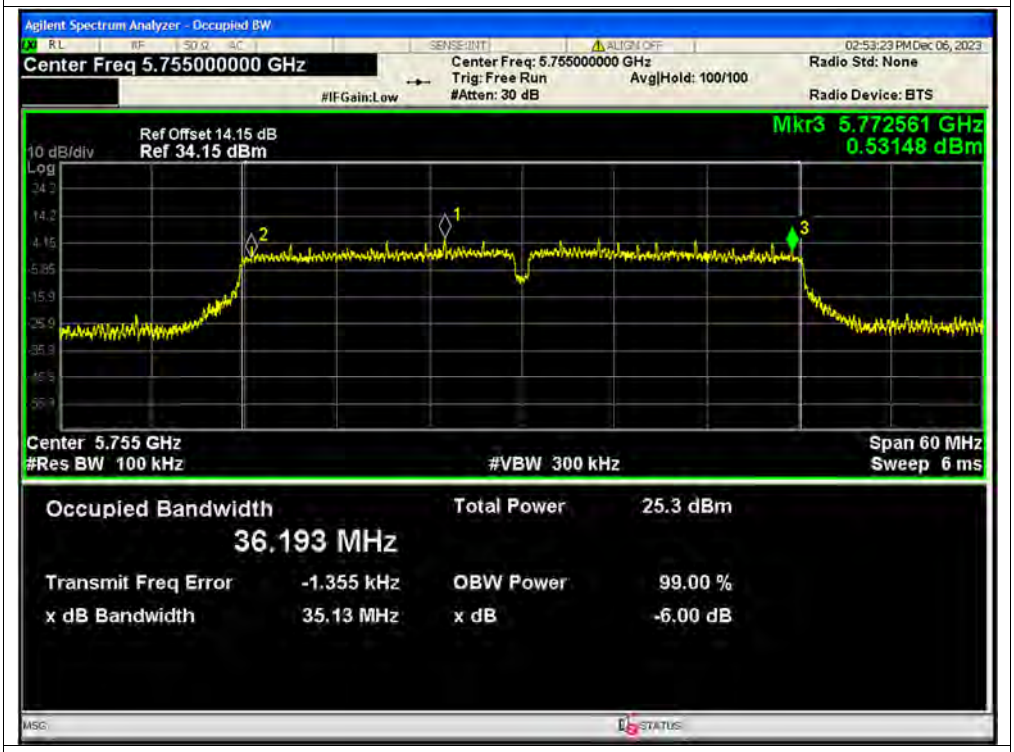


-6dB Bandwidth NVNT n20 5785MHz Ant1

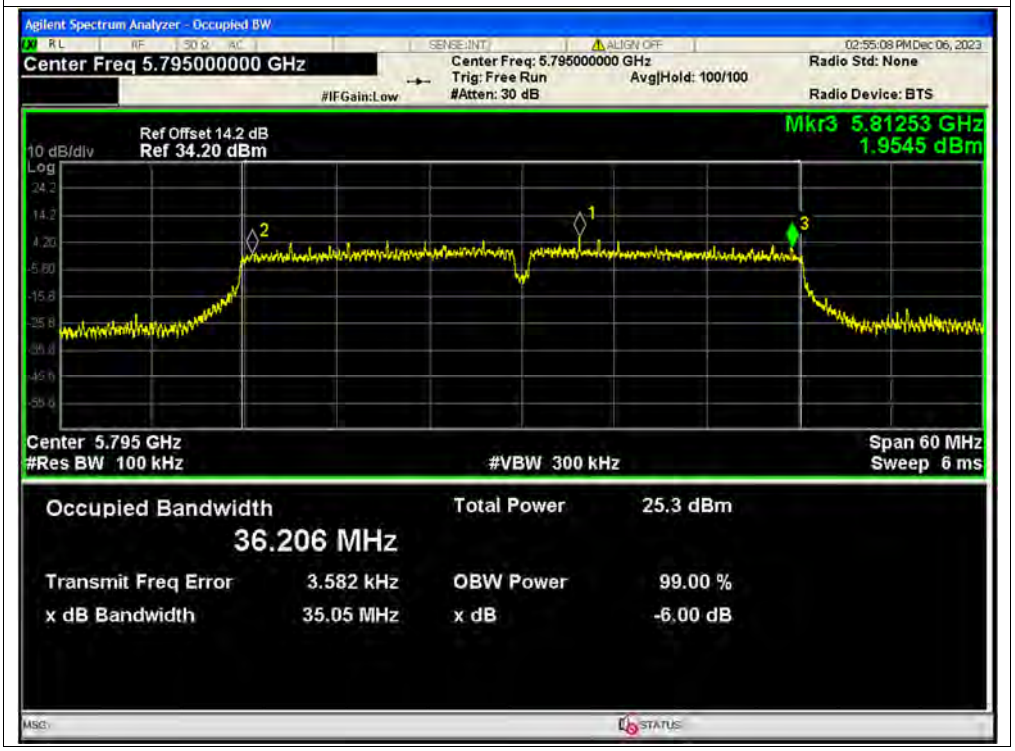


-6dB Bandwidth NVNT n20 5825MHz Ant1

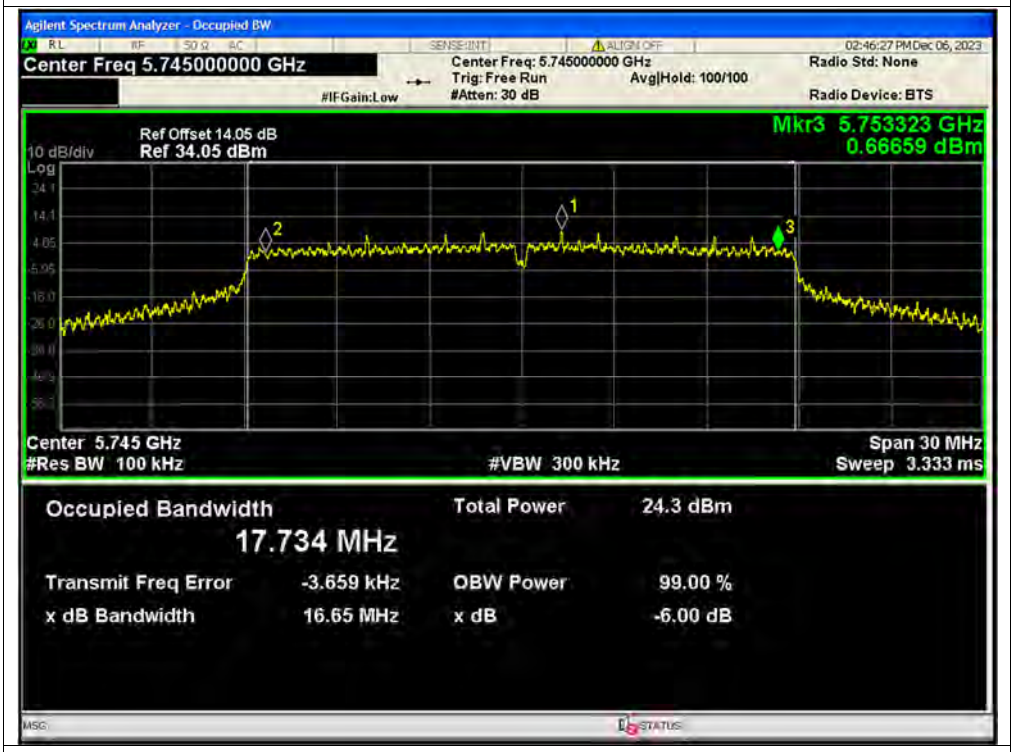
-6dB Bandwidth NVNT n40 5755MHz Ant1



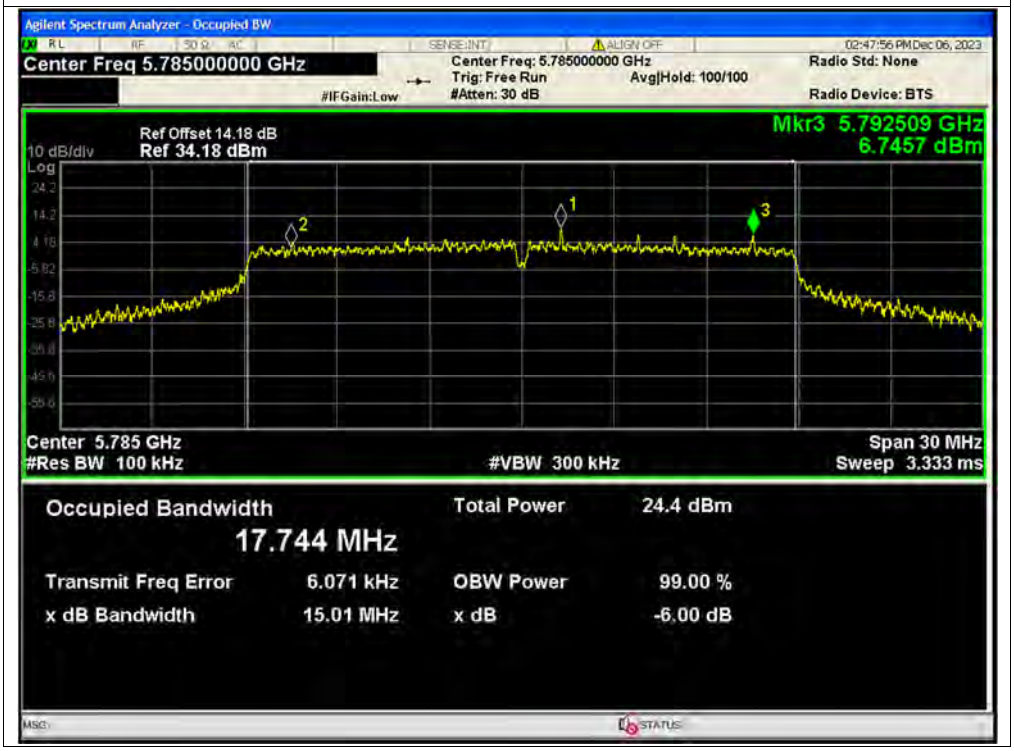
-6dB Bandwidth NVNT n40 5795MHz Ant1



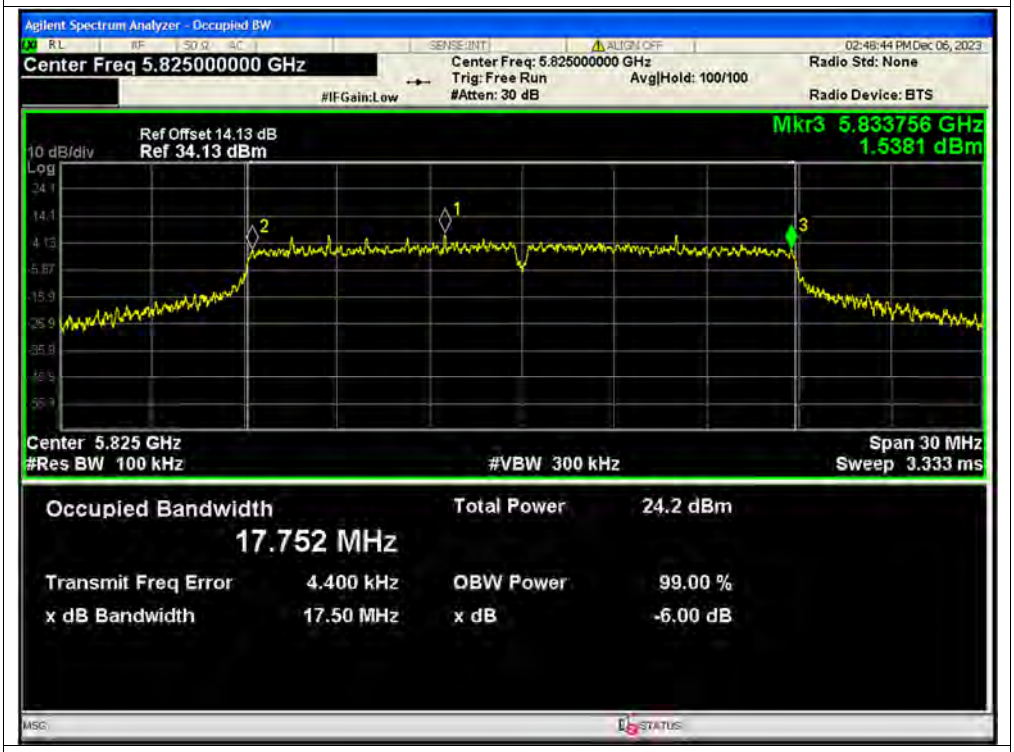
-6dB Bandwidth NVNT ac20 5745MHz Ant1



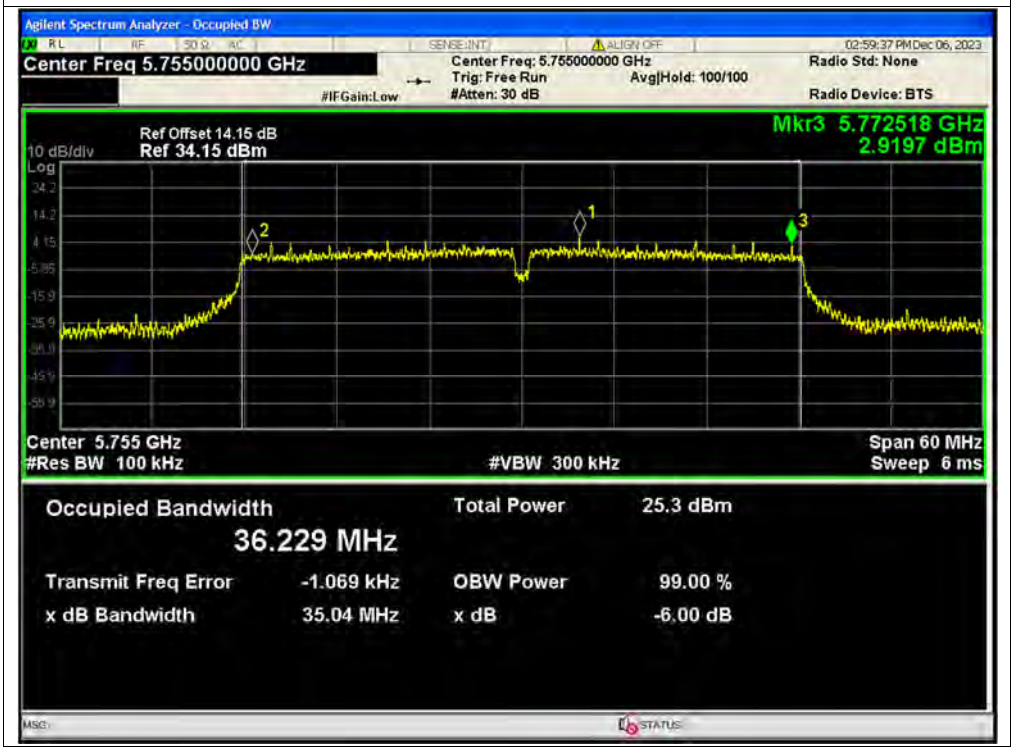
-6dB Bandwidth NVNT ac20 5785MHz Ant1



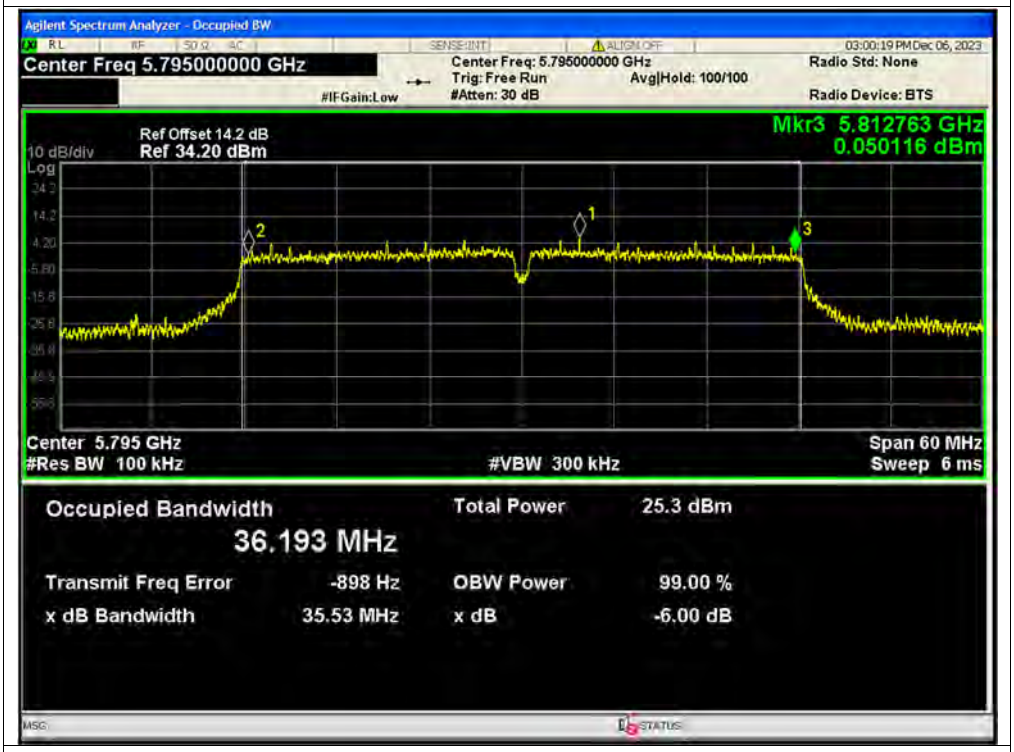
-6dB Bandwidth NVNT ac20 5825MHz Ant1



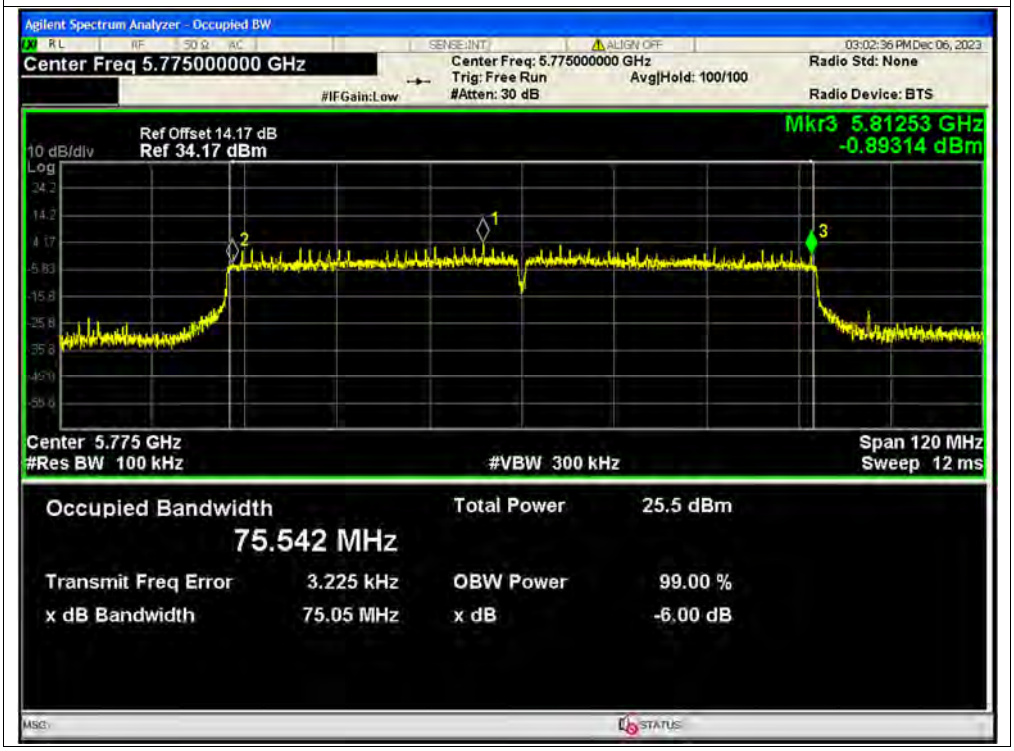
-6dB Bandwidth NVNT ac40 5755MHz Ant1



-6dB Bandwidth NVNT ac40 5795MHz Ant1



-6dB Bandwidth NVNT ac80 5775MHz Ant1

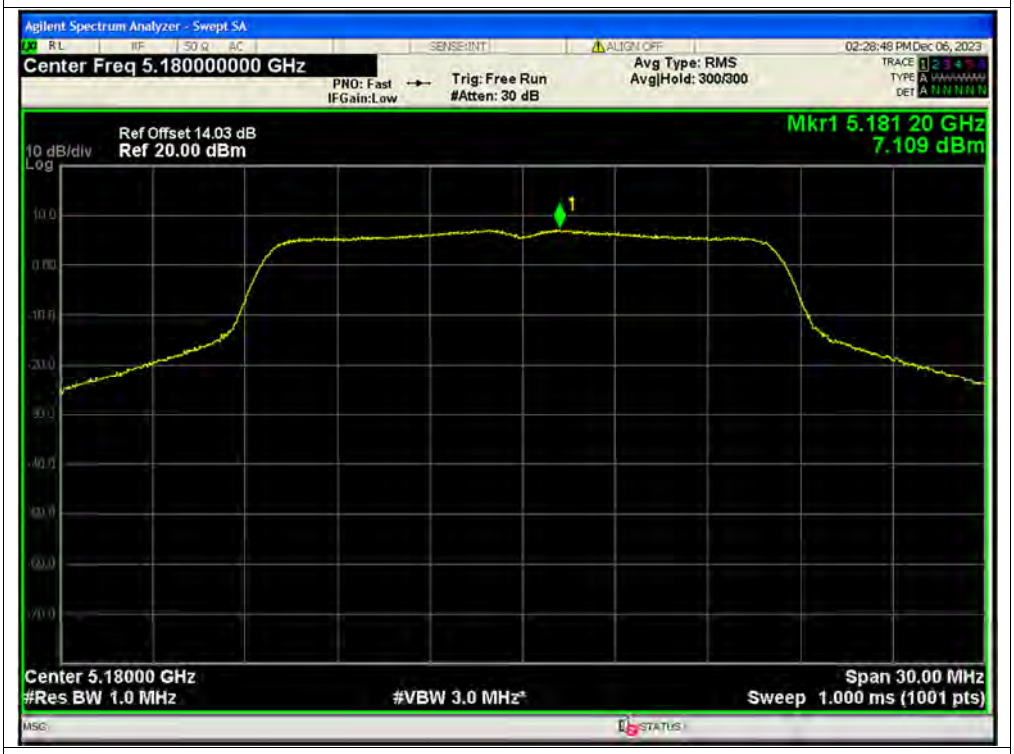


A.4. Peak Power Spectral Density

Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm)	Duty Factor (dB)	Total PSD (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	Ant1	7.11	0.08	7.19	11	Pass
NVNT	a	5220	Ant1	7.17	0.08	7.25	11	Pass
NVNT	a	5240	Ant1	7.15	0.08	7.23	11	Pass
NVNT	a	5745	Ant1	5.4	0.08	5.48	30	Pass
NVNT	a	5785	Ant1	5.37	0.08	5.45	30	Pass
NVNT	a	5825	Ant1	5.31	0.08	5.39	30	Pass
NVNT	n20	5180	Ant1	6.05	0.08	6.13	11	Pass
NVNT	n20	5220	Ant1	6.33	0.08	6.41	11	Pass
NVNT	n20	5240	Ant1	6.15	0.08	6.23	11	Pass
NVNT	n20	5745	Ant1	4.44	0.08	4.52	30	Pass
NVNT	n20	5785	Ant1	4.62	0.08	4.7	30	Pass
NVNT	n20	5825	Ant1	4.39	0.08	4.47	30	Pass
NVNT	n40	5190	Ant1	3.83	0.16	3.99	11	Pass
NVNT	n40	5230	Ant1	4.08	0.17	4.25	11	Pass
NVNT	n40	5755	Ant1	2.24	0.16	2.4	30	Pass
NVNT	n40	5795	Ant1	2.14	0.16	2.3	30	Pass
NVNT	ac20	5180	Ant1	5.91	0.08	5.99	11	Pass
NVNT	ac20	5220	Ant1	6.45	0.08	6.53	11	Pass
NVNT	ac20	5240	Ant1	6.26	0.08	6.34	11	Pass
NVNT	ac20	5745	Ant1	4.33	0.08	4.41	30	Pass
NVNT	ac20	5785	Ant1	4.57	0.08	4.65	30	Pass
NVNT	ac20	5825	Ant1	4.35	0.09	4.44	30	Pass
NVNT	ac40	5190	Ant1	3.86	0.16	4.02	11	Pass
NVNT	ac40	5230	Ant1	3.94	0.16	4.1	11	Pass
NVNT	ac40	5755	Ant1	2.24	0.16	2.4	30	Pass
NVNT	ac40	5795	Ant1	2.18	0.16	2.34	30	Pass
NVNT	ac80	5210	Ant1	1.11	0.31	1.42	11	Pass
NVNT	ac80	5775	Ant1	-0.95	0.33	-0.62	30	Pass

Test Graphs

PSD NVNT a 5180MHz Ant1



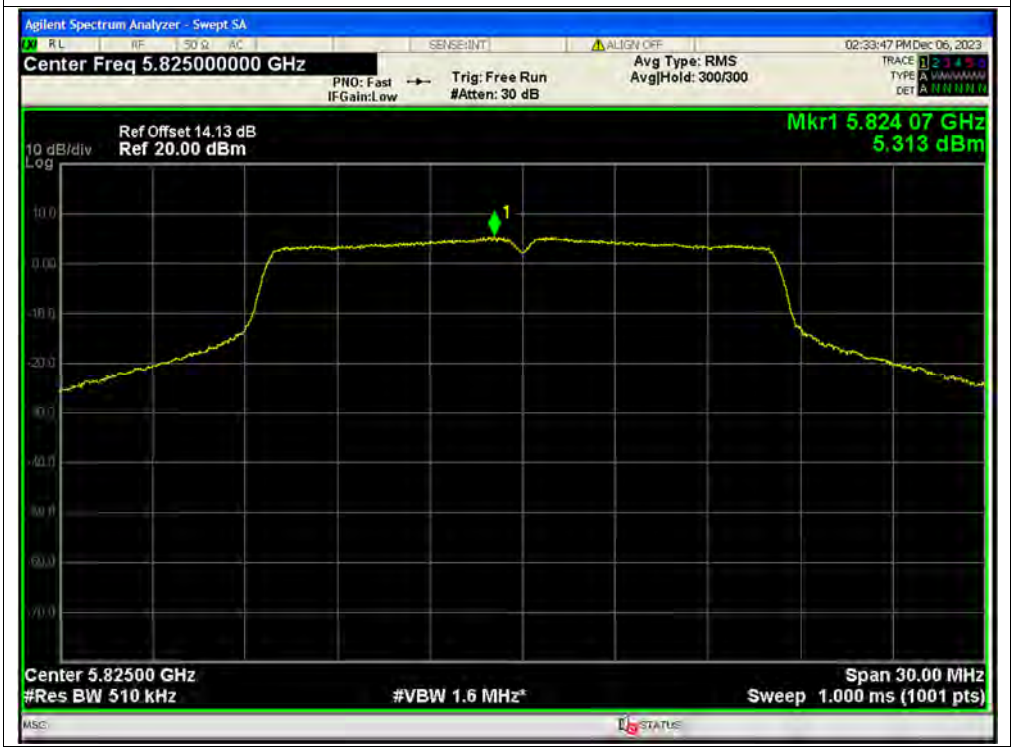
PSD NVNT a 5220MHz Ant1

PSD NVNT a 5240MHz Ant1

PSD NVNT a 5745MHz Ant1

PSD NVNT a 5785MHz Ant1

PSD NVNT a 5825MHz Ant1



PSD NVNT n20 5180MHz Ant1

PSD NVNT n20 5220MHz Ant1

PSD NVNT n20 5240MHz Ant1

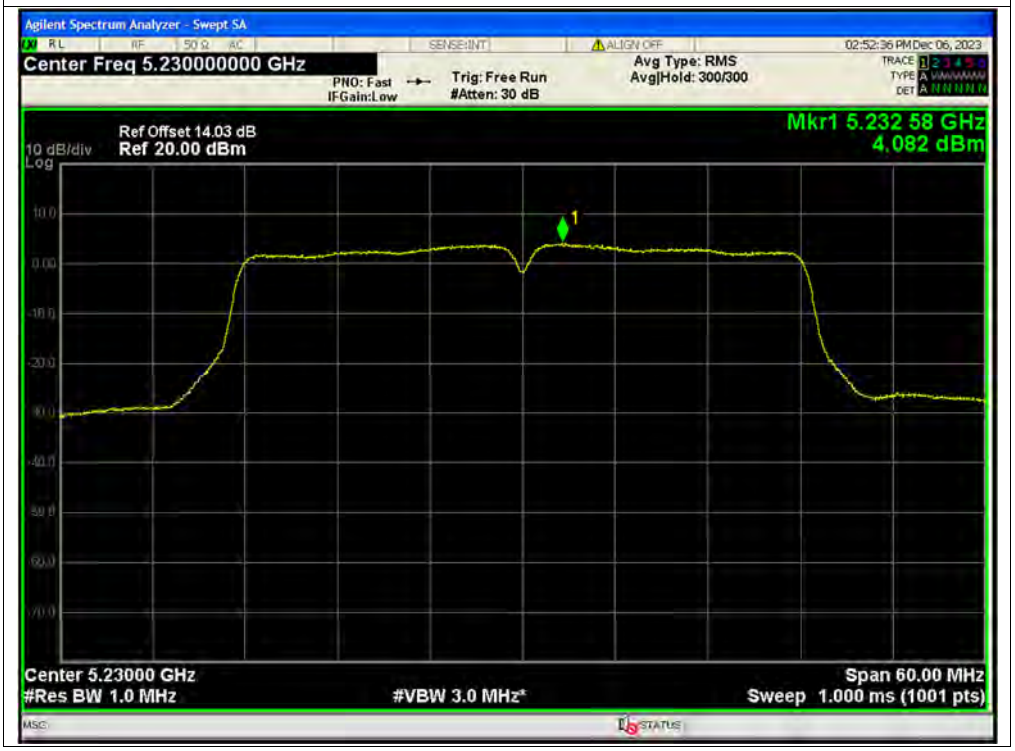
PSD NVNT n20 5745MHz Ant1

PSD NVNT n20 5785MHz Ant1

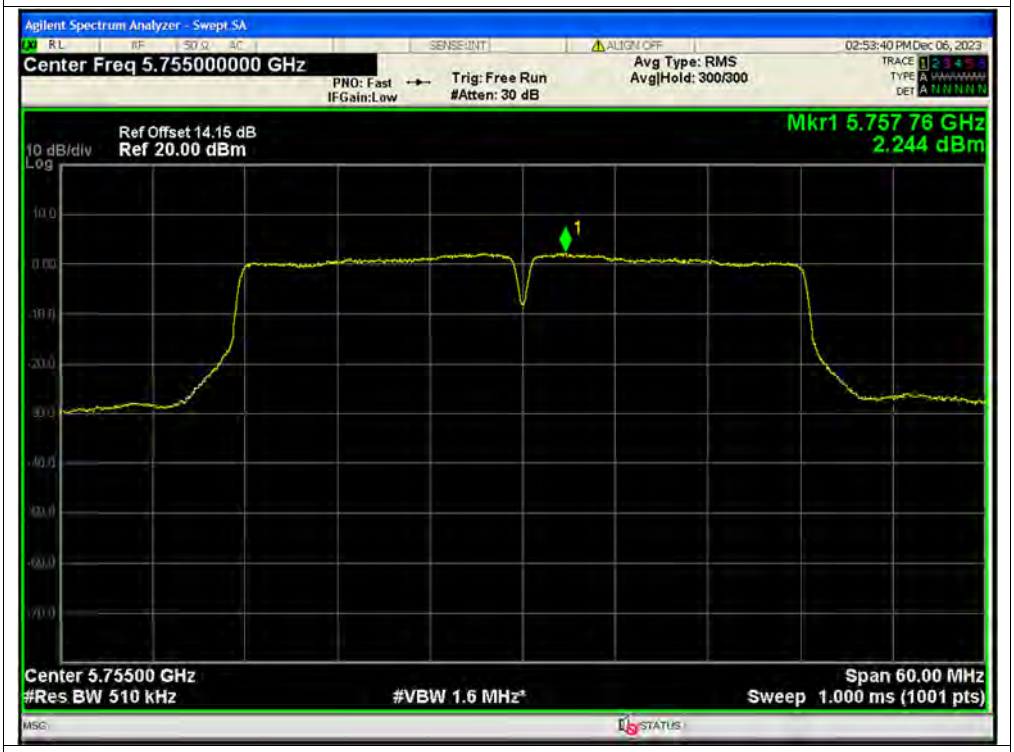
PSD NVNT n20 5825MHz Ant1

PSD NVNT n40 5190MHz Ant1

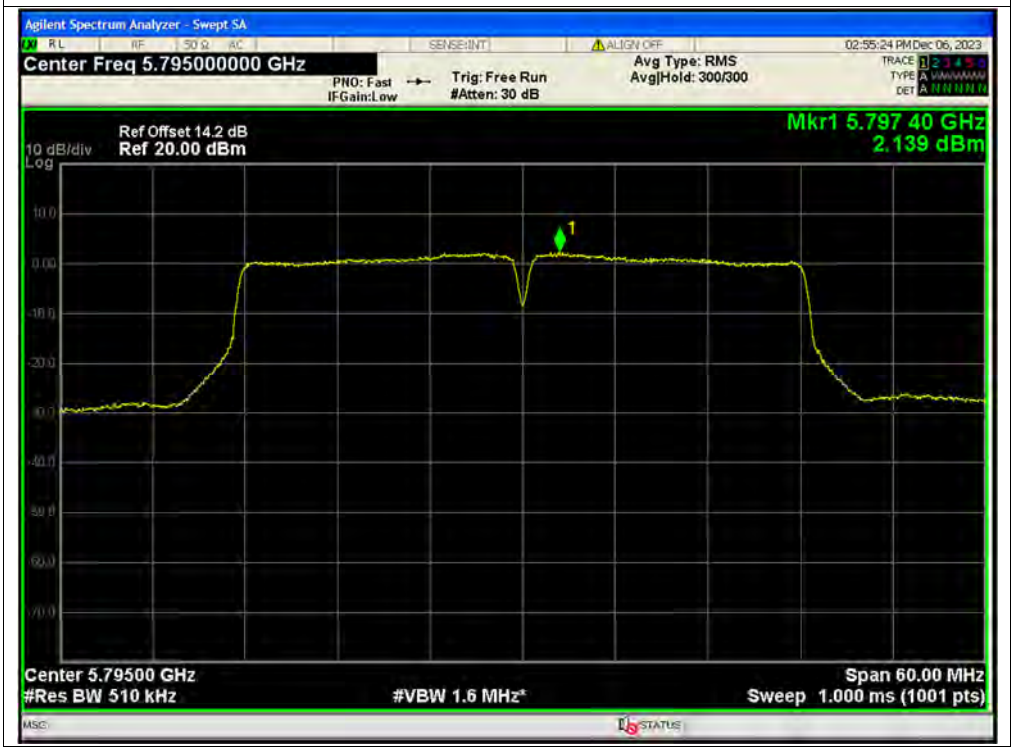
PSD NVNT n40 5230MHz Ant1



PSD NVNT n40 5755MHz Ant1



PSD NVNT n40 5795MHz Ant1



PSD NVNT ac20 5180MHz Ant1

PSD NVNT ac20 5220MHz Ant1

PSD NVNT ac20 5240MHz Ant1

PSD NVNT ac20 5745MHz Ant1

PSD NVNT ac20 5785MHz Ant1

PSD NVNT ac20 5825MHz Ant1

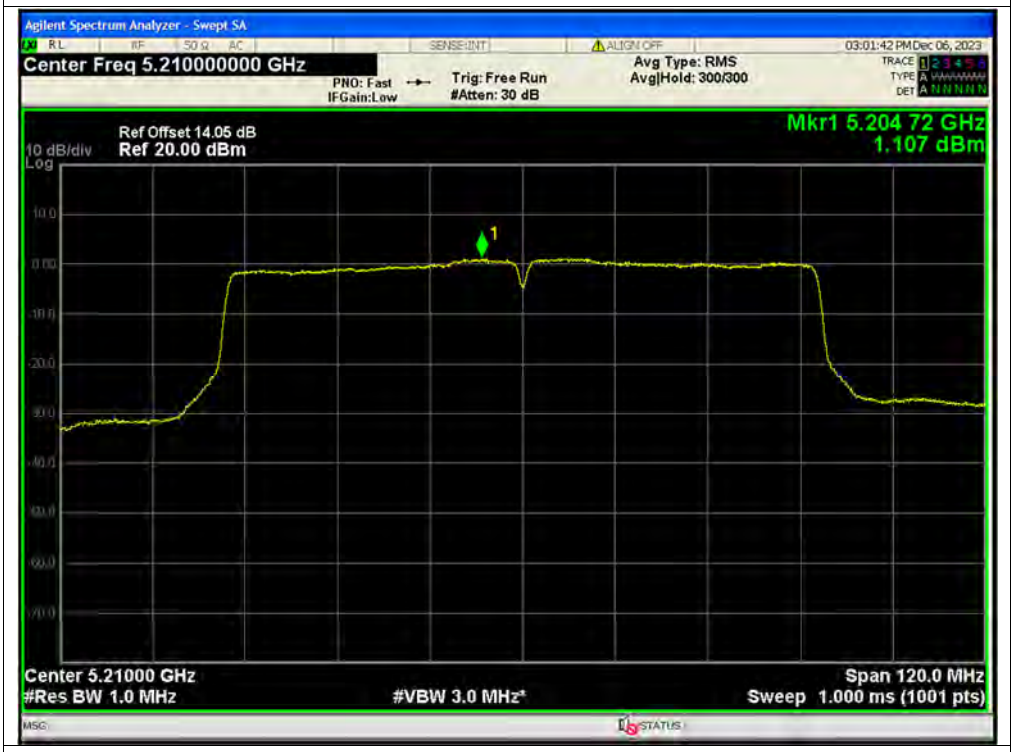
PSD NVNT ac40 5190MHz Ant1

PSD NVNT ac40 5230MHz Ant1

PSD NVNT ac40 5755MHz Ant1

PSD NVNT ac40 5795MHz Ant1

PSD NVNT ac80 5210MHz Ant1



PSD NVNT ac80 5775MHz Ant1

A.5. Frequency Stability

Condition	Mode	Frequency (MHz)	Antenna	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
20C 3.6V	Carrier	5180	Ant1	5179.999	-1000	-0.19	25	Pass
20C 3.87V	Carrier	5180	Ant1	5179.999	-1000	-0.19	25	Pass
20C 4.45V	Carrier	5180	Ant1	5179.999	-1000	-0.19	25	Pass
0C 3.87V	Carrier	5180	Ant1	5179.999	-1000	-0.19	25	Pass
10C 3.87V	Carrier	5180	Ant1	5179.999	-1000	-0.19	25	Pass
30C 3.87V	Carrier	5180	Ant1	5179.999	-1000	-0.19	25	Pass
40C 3.87V	Carrier	5180	Ant1	5179.999	-1000	-0.19	25	Pass
20C 3.6V	Carrier	5745	Ant1	5744.998	-2000	-0.35	25	Pass
20C 3.87V	Carrier	5745	Ant1	5744.998	-2000	-0.35	25	Pass
20C 4.45V	Carrier	5745	Ant1	5744.998	-2000	-0.35	25	Pass
0C 3.87V	Carrier	5745	Ant1	5744.998	-2000	-0.35	25	Pass
10C 3.87V	Carrier	5745	Ant1	5744.998	-2000	-0.35	25	Pass
30C 3.87V	Carrier	5745	Ant1	5744.998	-2000	-0.35	25	Pass
40C 3.87V	Carrier	5745	Ant1	5744.998	-2000	-0.35	25	Pass

A.6. Conducted Emission

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT+ USB Cable + PC +PC Adapter + WIFI TX

Test voltage: AC 120V/60Hz

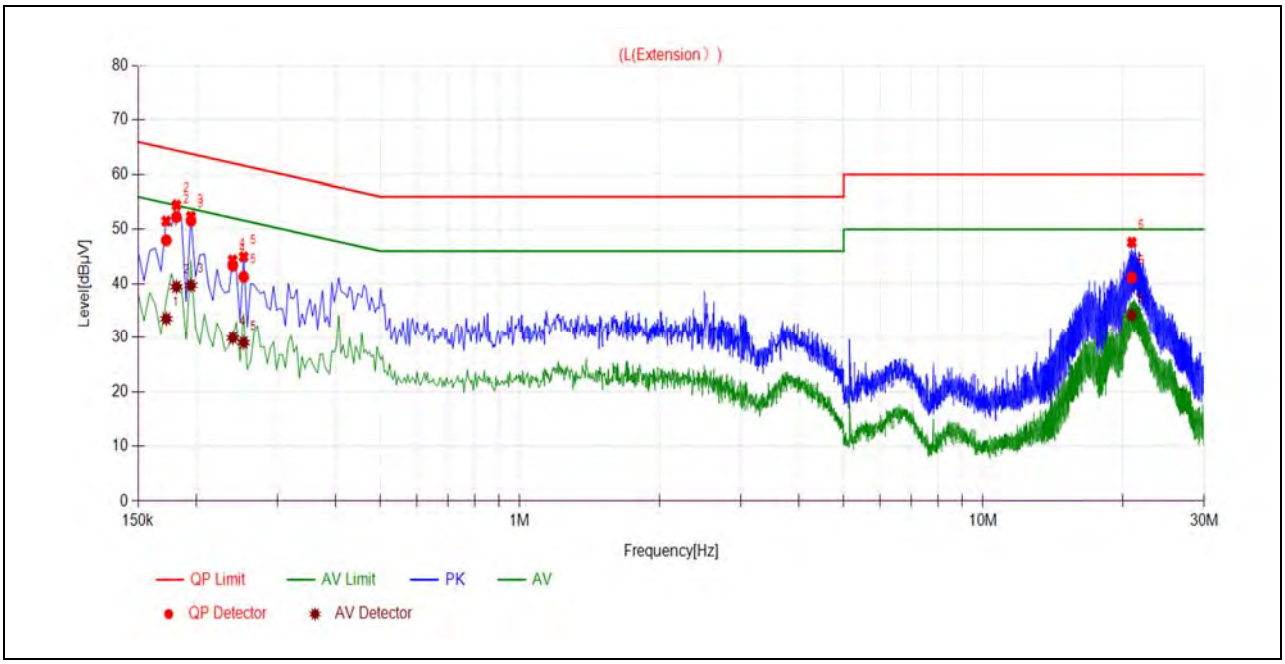
The measurement results are obtained as below:

E [dBμV] $=U_R + L_{Cable\ loss}$ [dB] + A_{Factor}

U_R: Receiver Reading

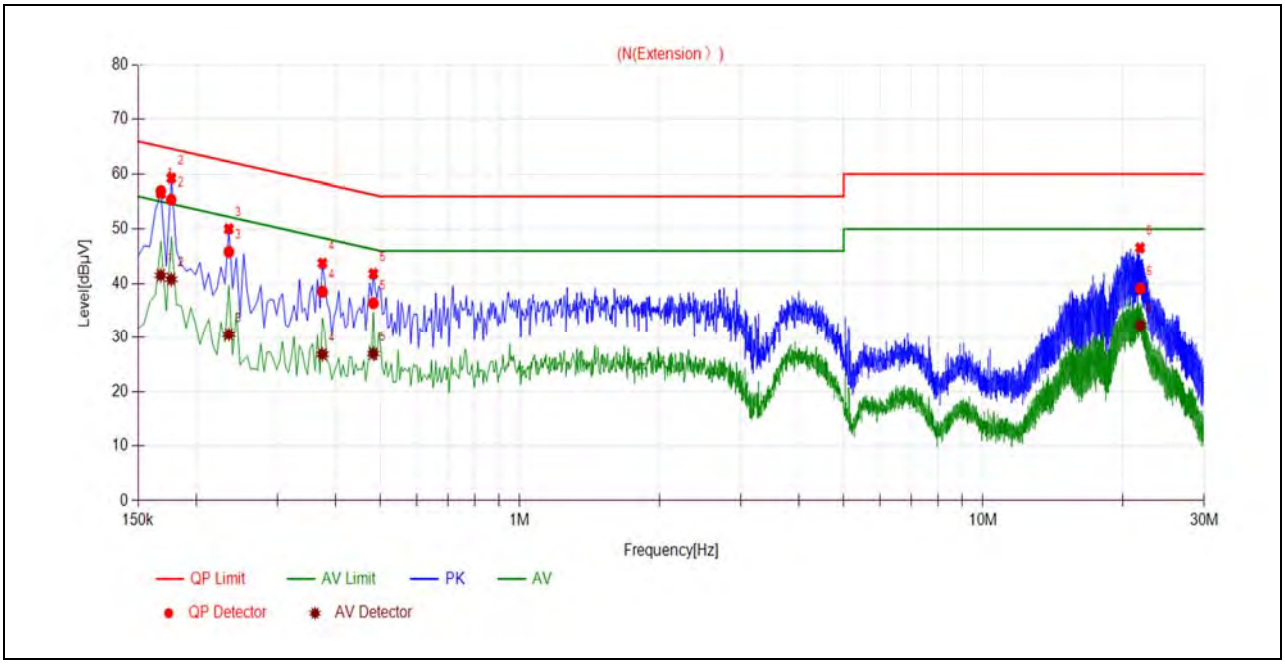
A_{Factor}: Voltage division factor of LISN

B. Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1726	48.00	33.55	64.84	54.84	Line	PASS
2	0.1815	52.30	39.44	64.42	54.42		PASS
3	0.1951	51.60	39.70	63.82	53.82		PASS
4	0.2402	43.33	29.90	62.09	52.09		PASS
5	0.2535	41.28	29.00	61.64	51.64		PASS
6	20.9404	41.13	34.23	60.00	50.00		PASS



(N Phase)

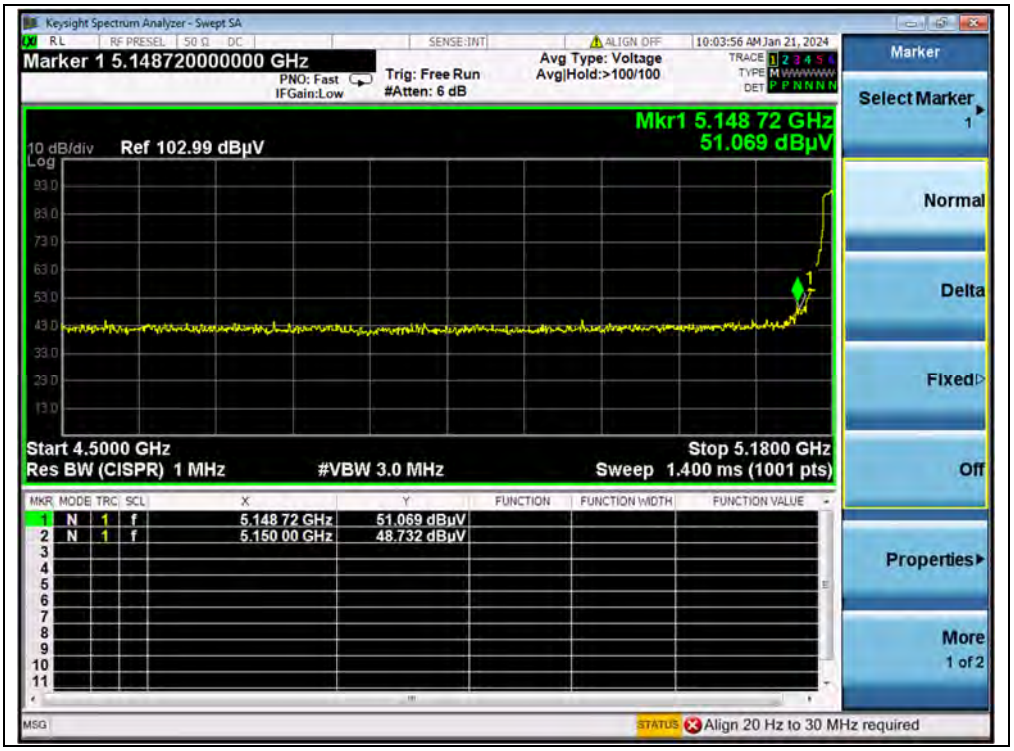
No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1679	56.98	41.52	65.06	55.06	Neutral	PASS
2	0.1768	55.40	40.80	64.63	54.63		PASS
3	0.2355	45.82	30.59	62.25	52.25		PASS
4	0.3750	38.51	26.84	58.39	48.39		PASS
5	0.4831	36.41	26.96	56.29	46.29		PASS
6	21.8281	39.14	32.34	60.00	50.00		PASS

A.7. Restricted Frequency Bands

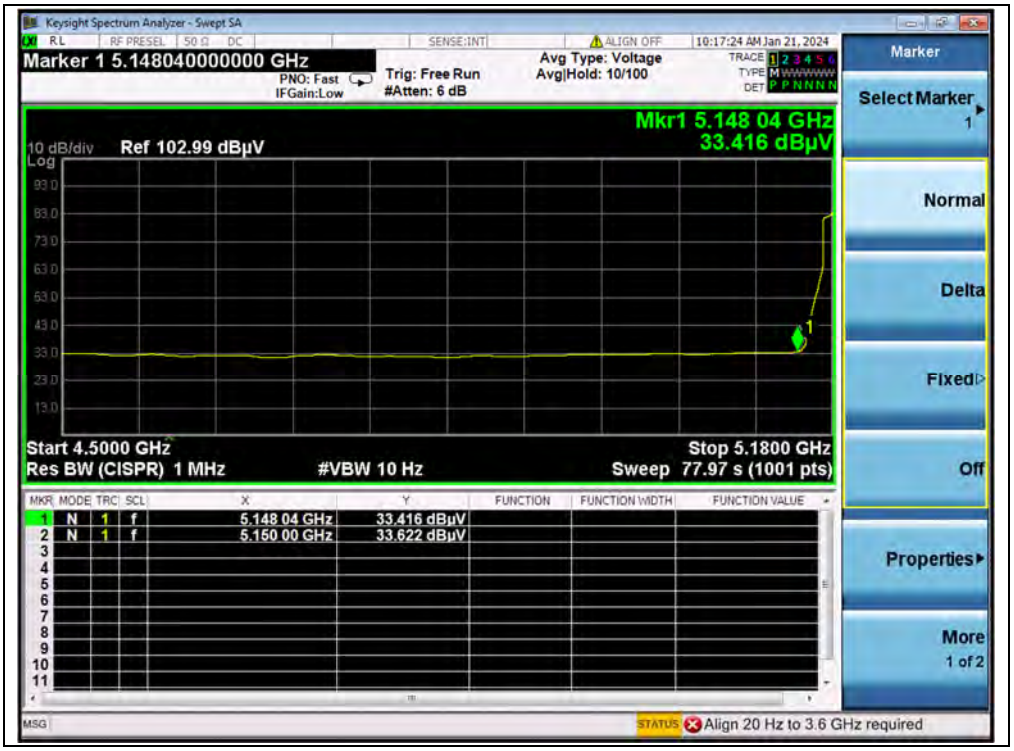
The lowest and highest channels are tested to verify the Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; $A_T = L_{Cable\ loss}$ [dB]$-G_{preamp}$ [dB]
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m
Note 1: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.
Note 2 All test modes and bandwidth were considered and evaluated respectively by performing full test, only the worst data were recorded for each bandwidth.

802.11a Mode

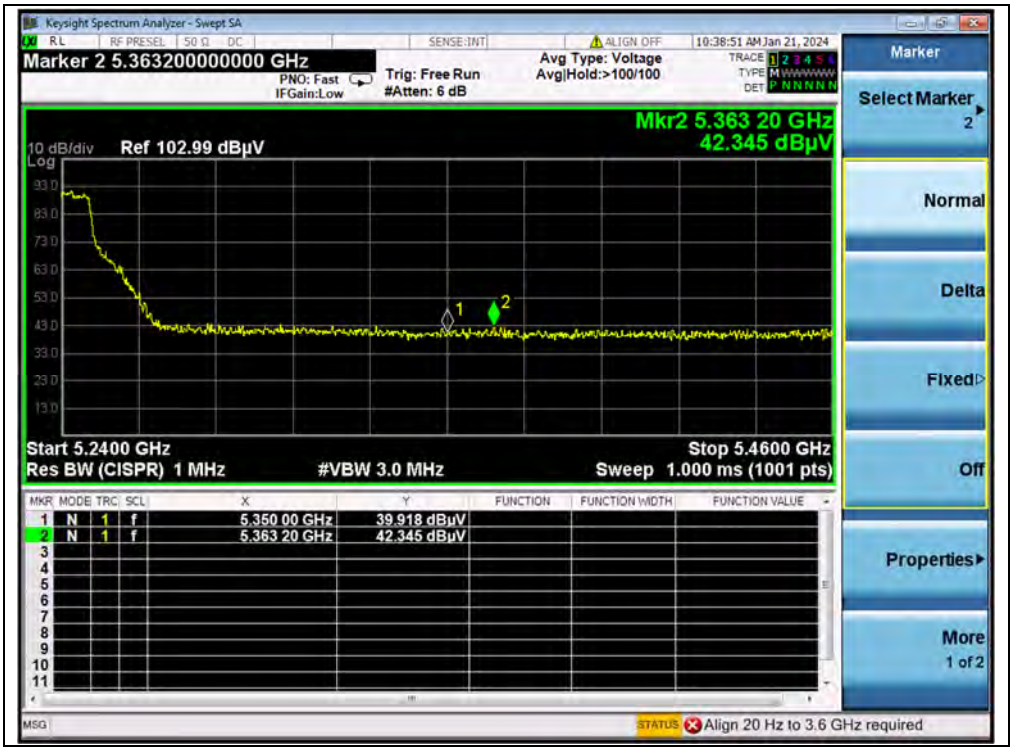
Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@ 3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
36	5148.72	PK	51.07	-21.29	32.20	61.98	74	PASS
36	5150.00	AV	33.62	-21.29	32.20	44.53	54	PASS
48	5363.20	PK	42.35	-21.29	32.20	53.26	74	PASS
48	5354.18	AV	30.95	-21.29	32.20	41.86	54	PASS
149	5725.00	PK	55.11	-21.11	32.20	66.20	122.23	PASS
165	5850.00	PK	42.49	-21.11	32.20	53.58	122.23	PASS



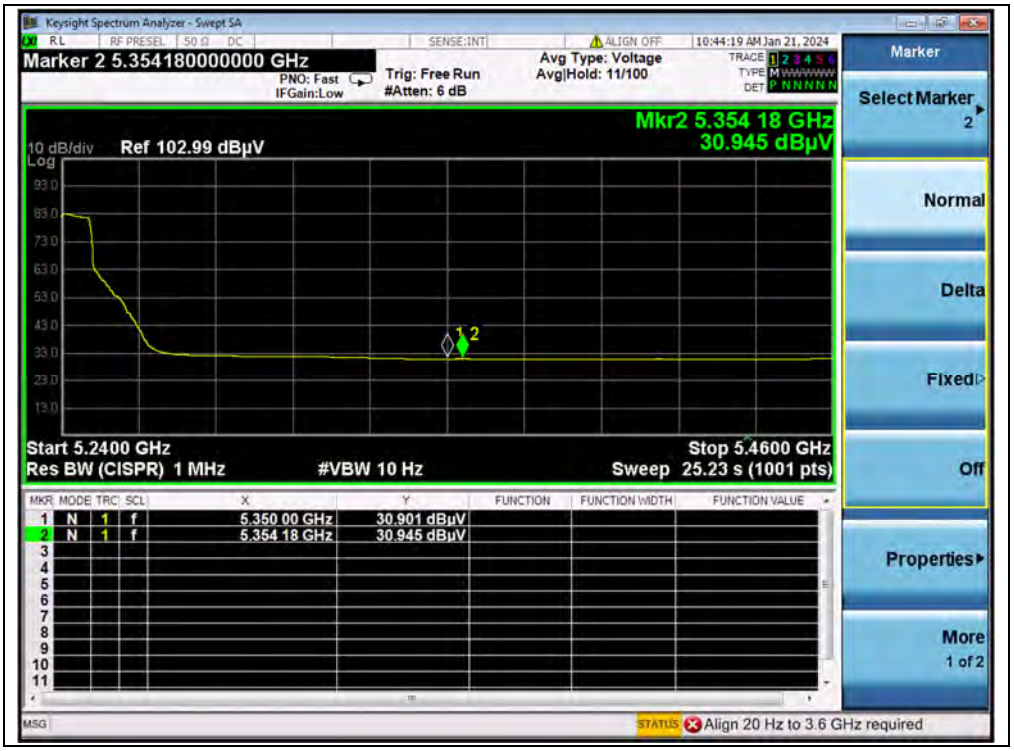
(PEAK, Channel 36, 802.11a)



(AVERAGE, Channel 36, 802.11a)



(PEAK, Channel 48, 802.11a)



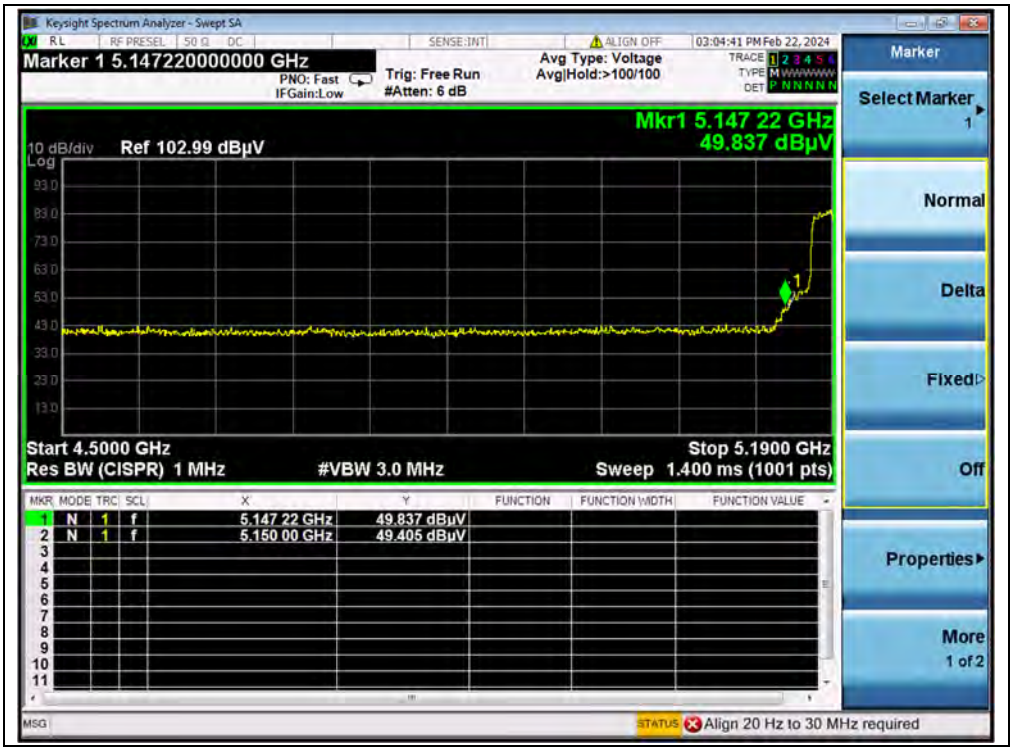
(AVERAGE, Channel 48, 802.11a)

(PEAK, Channel 149, 802.11a)

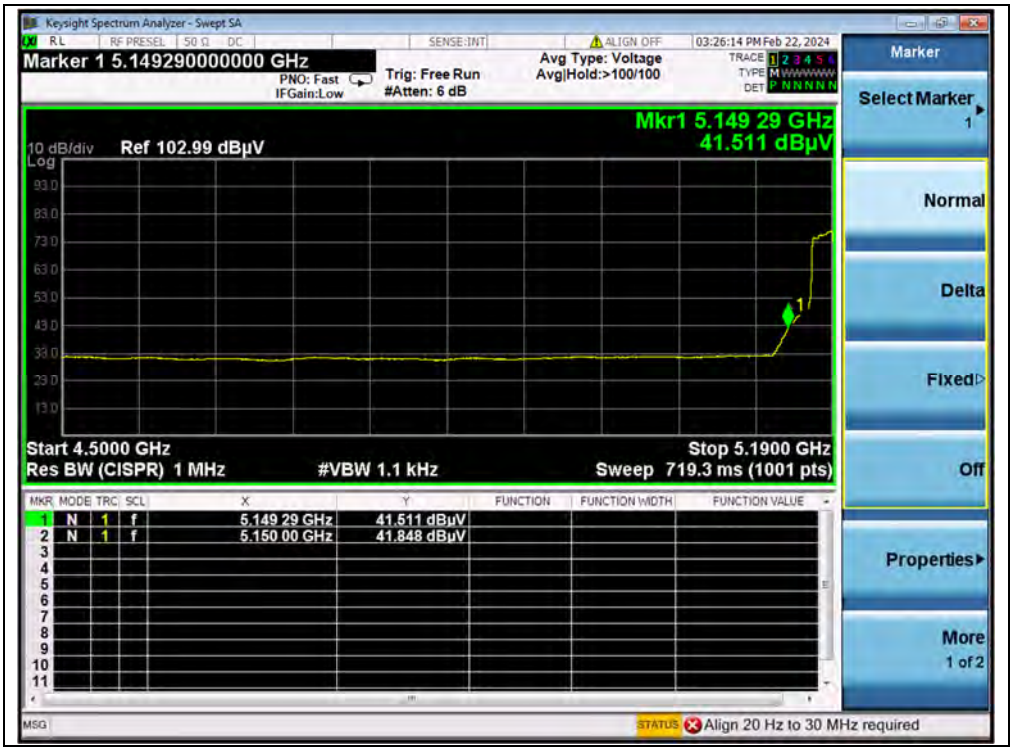
(PEAK, Channel 165, 802.11a)

802.11n (HT40) Mode

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
38	5147.22	PK	49.84	-21.29	32.20	60.75	74	PASS
38	5150.00	AV	41.85	-21.29	32.20	52.76	54	PASS
46	5356.04	PK	42.94	-21.29	32.20	53.85	74	PASS
46	5350.00	AV	31.63	-21.29	32.20	42.54	54	PASS
151	5725.00	PK	58.52	-21.11	32.20	69.61	122.23	PASS
159	5850.00	PK	42.61	-21.11	32.20	53.70	122.23	PASS



(PEAK, Channel 38, 802.11n (HT40))



(AVERAGE, Channel 38, 802.11n (HT40))

(PEAK, Channel 46, 802.11n (HT40))

(AVERAGE, Channel 46, 802.11n (HT40))

(PEAK, Channel 151, 802.11n (HT40))

(PEAK, Channel 159, 802.11n (HT40))

802.11ac (VHT80) Mode

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@ 3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
42	5145.80	PK	53.93	-21.29	32.20	64.84	74	PASS
42	5148.80	AV	39.01	-21.29	32.20	49.92	54	PASS
42	5145.80	PK	53.93	-21.29	32.20	64.84	74	PASS
42	5507.00	AV	35.16	-21.29	32.20	46.07	54	PASS
155	5720.00	PK	55.59	-21.11	32.20	66.68	110.83	PASS
155	5850.00	PK	54.04	-21.11	32.20	65.13	122.23	PASS

(Channel 42, PEAK, 802.11ac (VHT80))

(Channel 42, AVG, 802.11ac (VHT80))

(Channel 155, PEAK, 802.11ac (VHT80))

A.8. Radiated Emission

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:
E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; $A_T = L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m
During the test, the total correction Factor A_T and A_{Factor} were built in test software.
Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.
Note2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.
Note3: For the frequency, which started from 18GHz to 10th harmonic of the highest frequency, was pre-scanned and the result which was 20dB lower than the limit was not recorded.
Note 4: All test modes and bandwidth were considered and evaluated respectively by performing full test, only the worst data were recorded for each bandwidth.

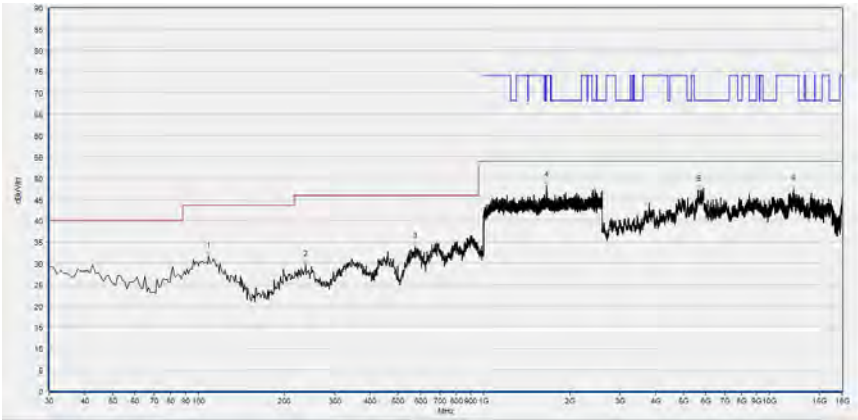
Field strength of fundamental:

Frequency (MHz)	Reading_Peak (dBμV/m)	Antenna Factor (dB)	Path Loss (dB)	Final_Peak (dBμV/m)	Antenna Polarity
5216.80	85.40	27.20	6.74	119.34	Horizontal

The field strength (the lowest) of fundamenta is more than 20dB higher than the unwanted emissions, in accordance with FCC part 15.215(b).

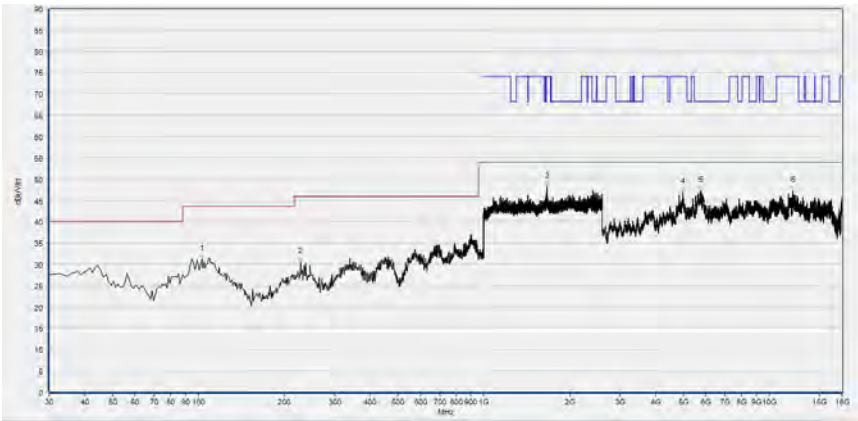
802.11a Mode

Plot for Channel 36



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
108.570	31.69	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
237.580	29.65	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
573.200	33.91	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1660.800	48.22	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5646.120	47.32	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12129.520	47.48	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

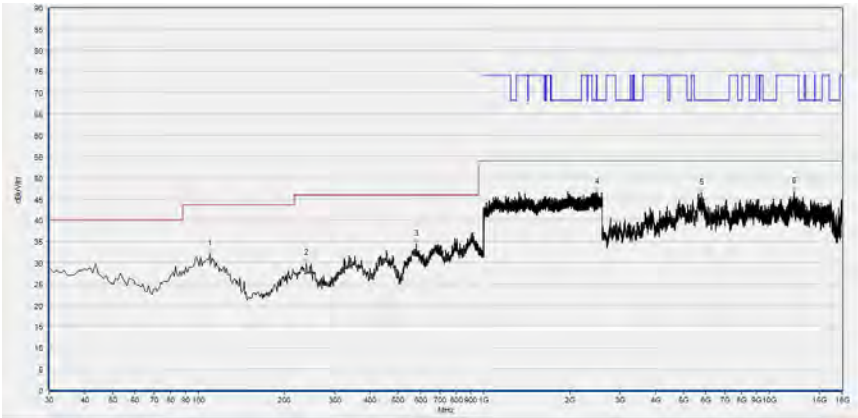
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
102.750	31.12	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
227.880	30.46	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1663.467	48.22	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4987.000	46.85	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5747.760	47.27	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12067.920	47.29	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

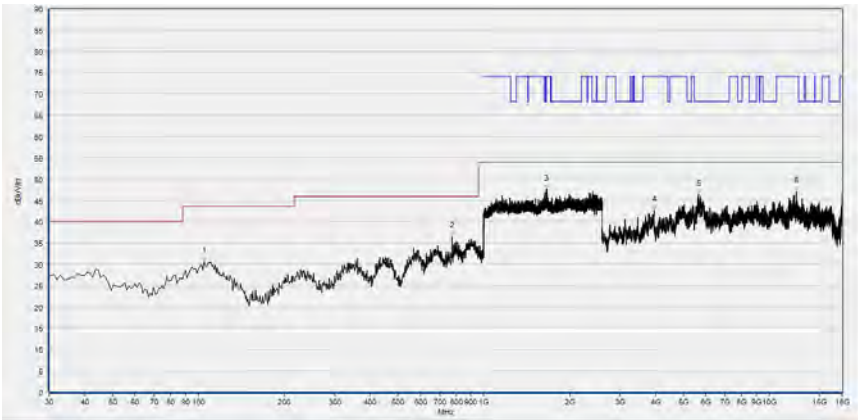
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 44



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
109.540	32.04	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
239.520	29.77	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
579.990	34.36	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2495.467	46.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5769.320	46.48	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12203.440	46.70	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

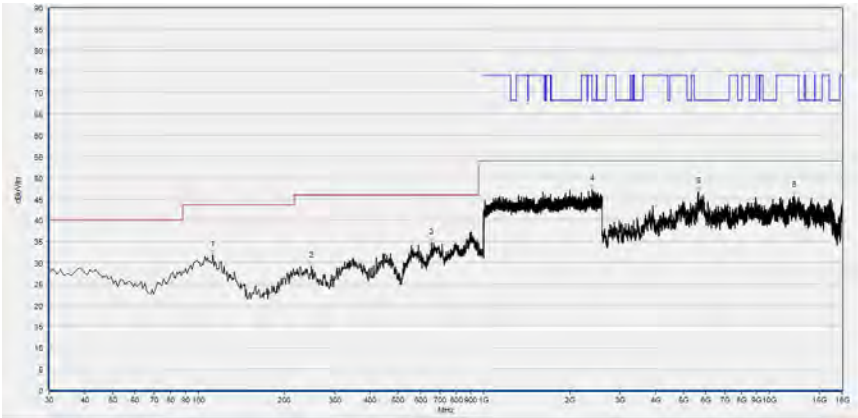
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
104.690	30.61	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
773.990	36.53	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1659.733	47.67	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
3942.880	42.72	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5639.960	46.35	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12471.400	47.02	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

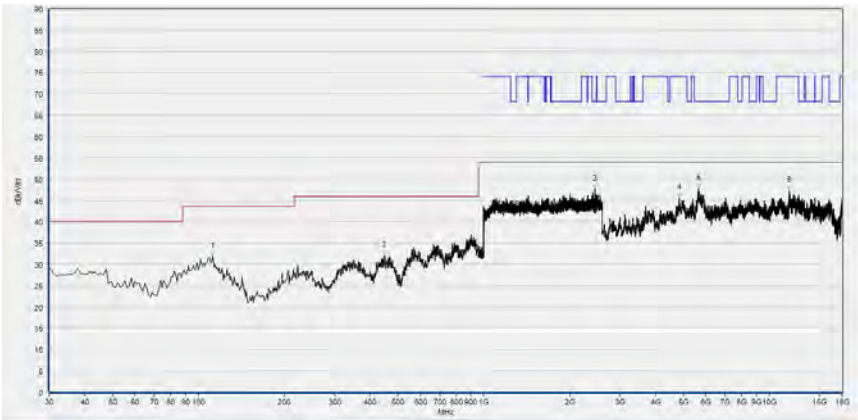
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 48



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
112.450	31.81	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
249.220	29.18	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
656.620	34.76	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2390.933	47.26	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5643.040	46.82	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12212.680	45.78	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

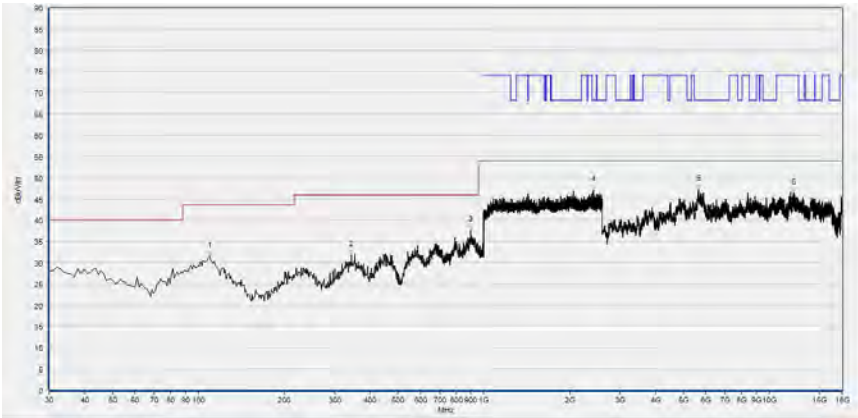
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
112.450	31.91	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
448.070	32.07	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2457.067	47.59	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
4836.080	45.60	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5661.520	47.75	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
11738.360	47.20	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

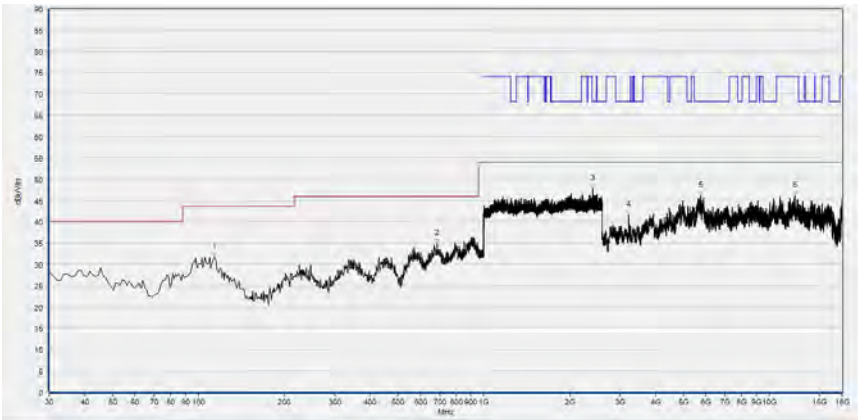
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 149



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
109.540	31.46	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
344.280	31.79	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
898.150	37.79	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2416.533	47.06	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5639.960	47.27	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12178.800	46.35	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

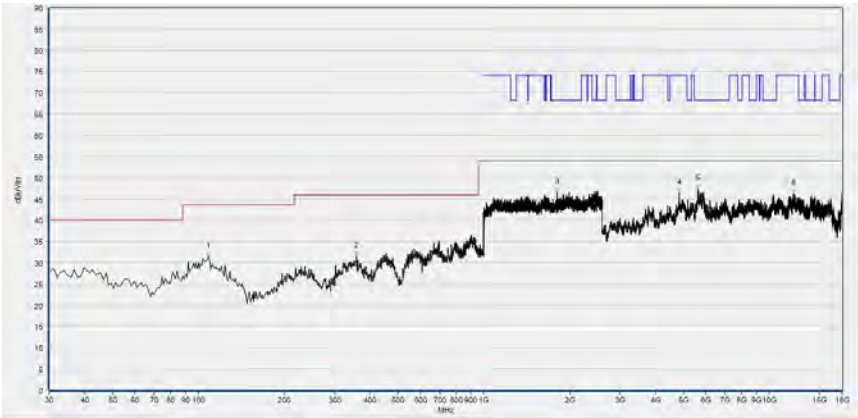
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
113.420	31.65	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
687.660	34.93	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2414.400	47.81	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
3222.160	41.54	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5757.000	46.03	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12277.360	46.10	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

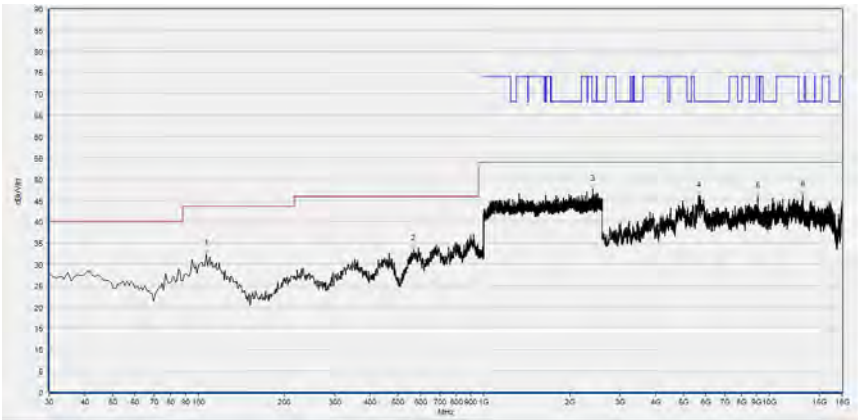
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 157



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
108.570	31.29	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
357.860	31.54	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1804.267	46.55	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
4839.160	46.46	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5633.800	47.45	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12154.160	46.23	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

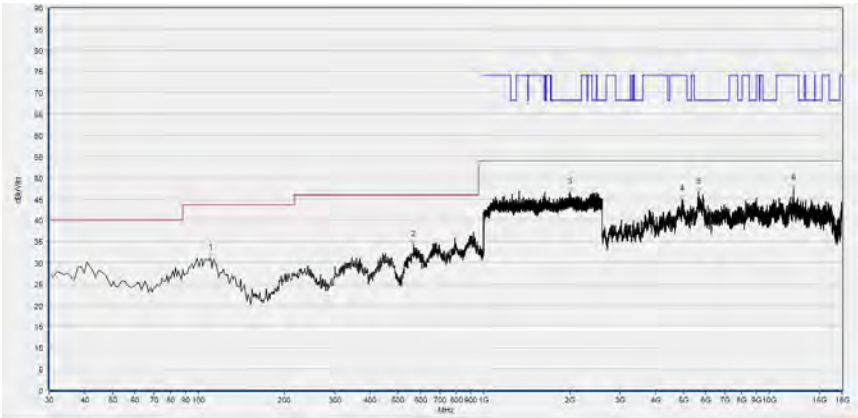
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
106.630	32.30	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
568.350	33.58	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2403.733	47.57	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5639.960	46.05	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
9108.040	45.84	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
13093.560	46.24	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

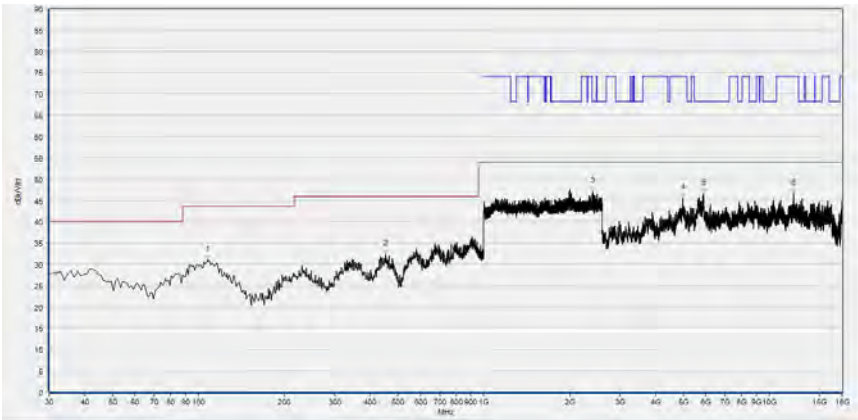
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 165



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
110.510	31.03	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
568.350	34.19	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2003.200	46.54	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
4940.800	44.96	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5643.040	46.62	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12191.120	47.50	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

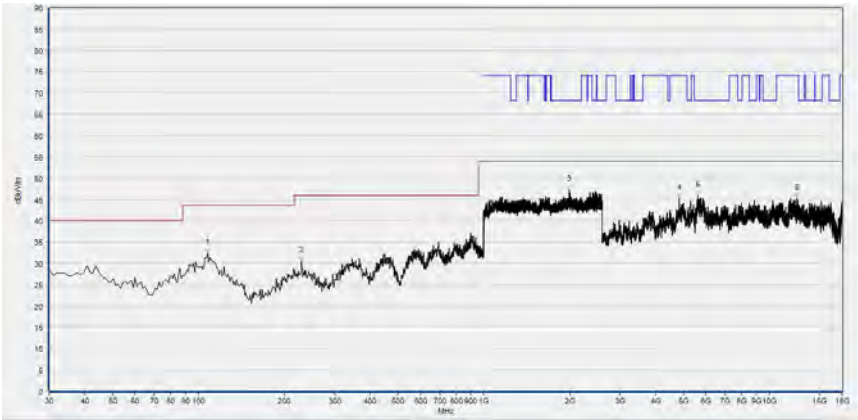


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
107.600	31.04	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
453.890	32.28	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2410.667	47.17	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
4990.080	45.62	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5892.520	46.64	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12191.120	46.60	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

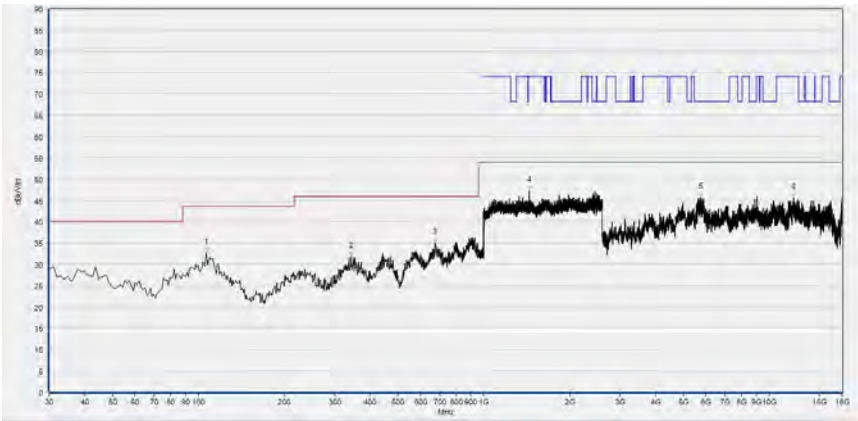
802.11n (HT40) mode

Plot for Channel 38



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
107.600	32.33	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
229.820	30.44	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1996.267	47.24	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
4839.160	45.29	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5615.320	45.99	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12505.280	45.24	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

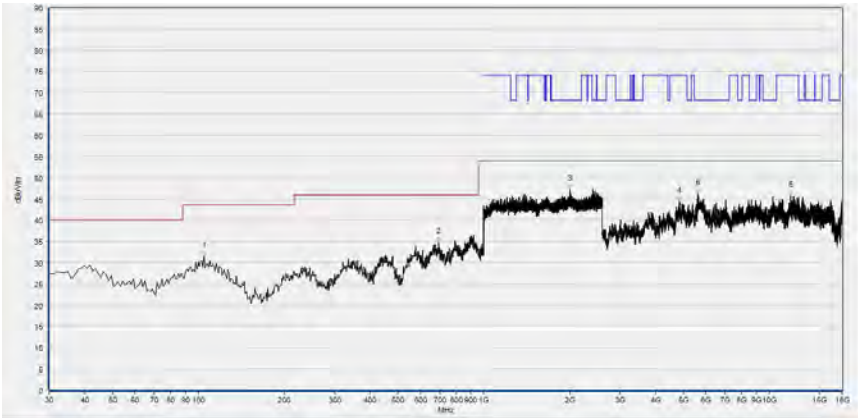
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
106.630	32.75	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
343.310	31.88	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
675.050	35.06	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1439.467	47.19	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5744.680	45.80	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12194.200	45.66	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

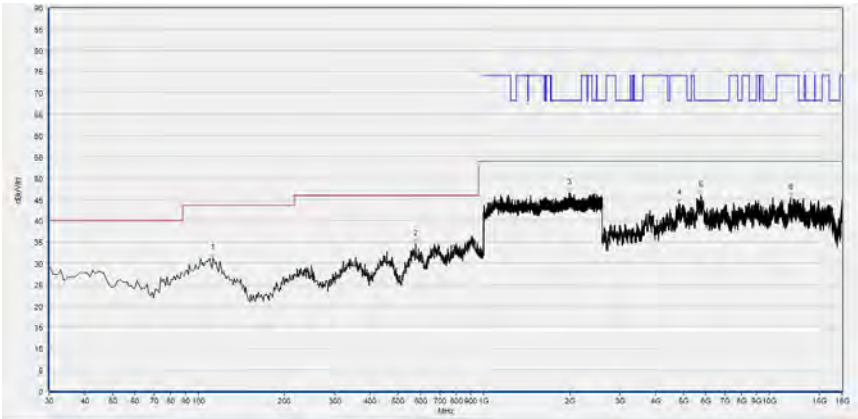
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 46



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
104.690	31.56	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
695.420	34.94	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1998.933	47.31	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
4839.160	44.40	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5630.720	46.29	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11880.040	45.83	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

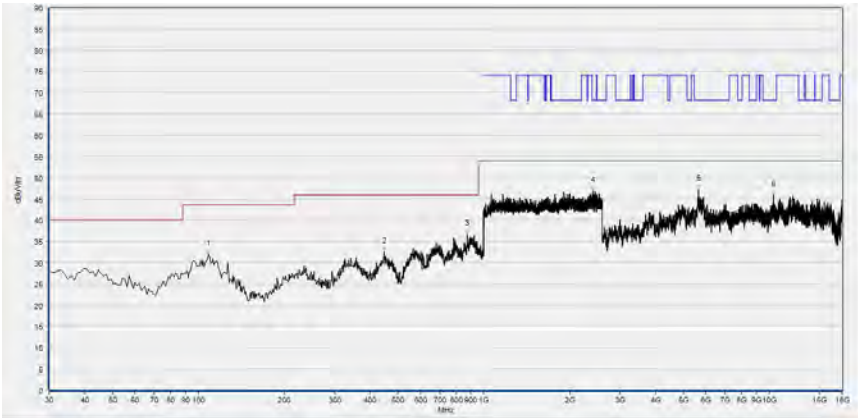
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
112.450	31.16	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
577.080	34.49	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1994.133	46.65	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
4839.160	44.16	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5766.240	45.87	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
11870.800	45.45	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

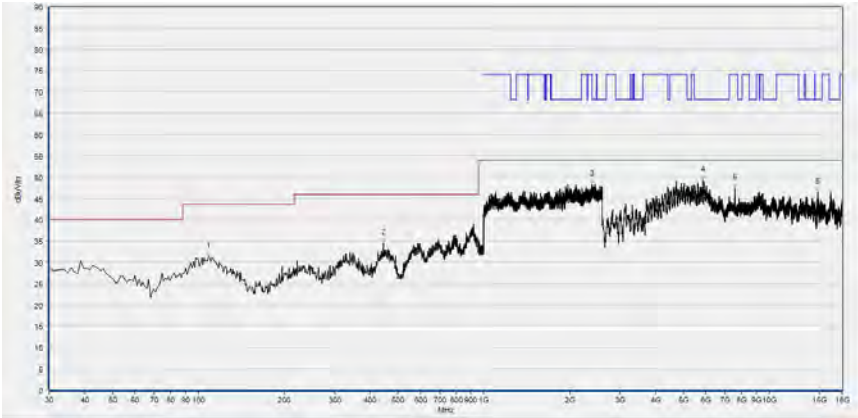
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 151



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
108.570	32.03	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
447.100	32.48	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
875.840	36.70	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2410.667	46.91	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5652.280	47.34	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
10343.120	45.95	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

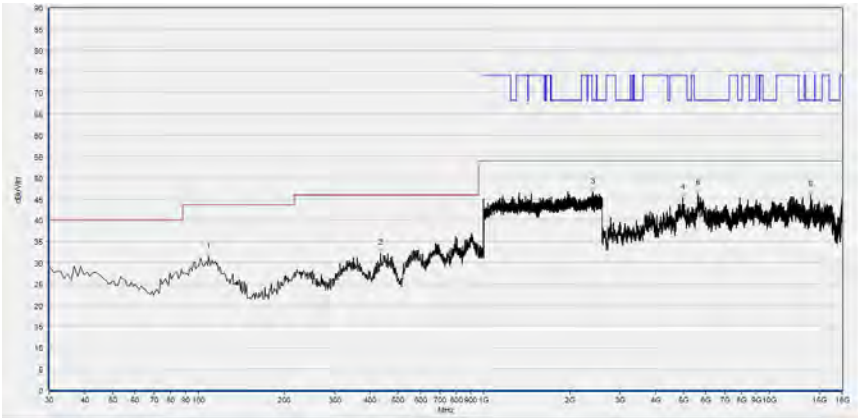
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
108.570	31.29	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
444.190	34.49	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2388.800	48.27	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5843.240	49.27	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
7561.880	47.40	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
14784.480	46.37	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

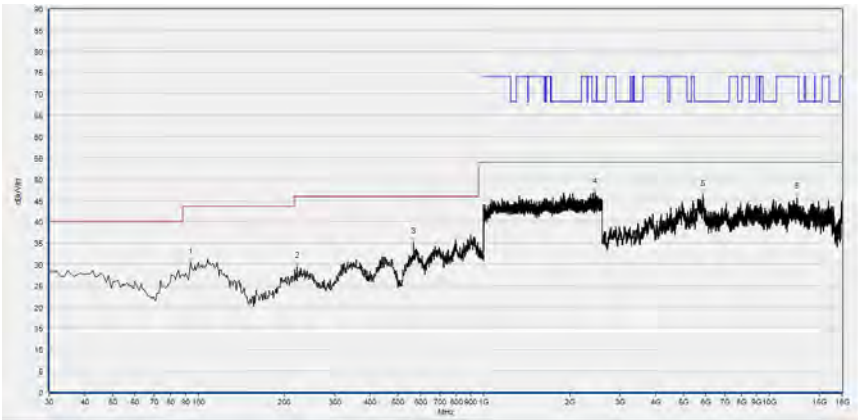
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 159



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
108.570	31.42	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
434.490	32.14	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2409.067	46.66	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
4971.600	45.25	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5627.640	46.32	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
13992.920	45.86	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

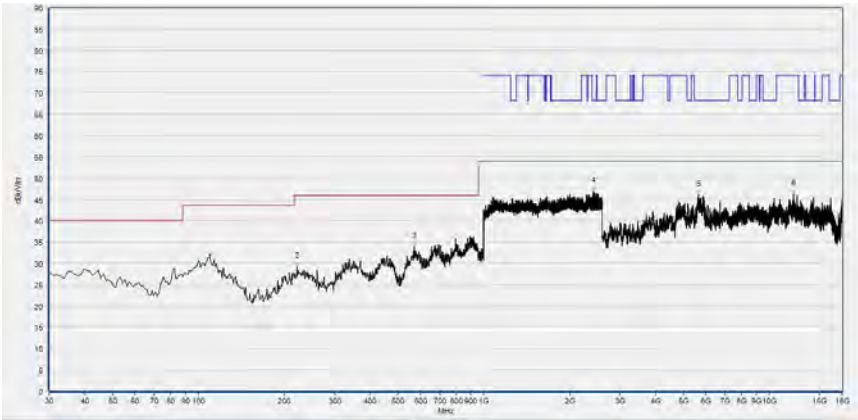


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
94.020	30.57	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
222.060	29.54	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
567.380	35.17	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2453.867	46.90	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5858.640	46.49	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12526.840	45.74	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

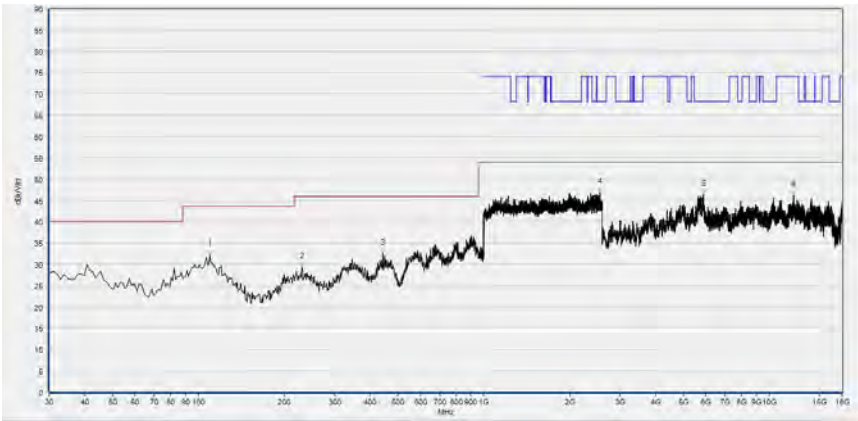
802.11ac (VHT80) Mode

Plot for Channel 42



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
109.540	31.34	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
221.090	29.08	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
571.260	33.82	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2417.067	46.97	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5649.200	46.04	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12184.960	46.32	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

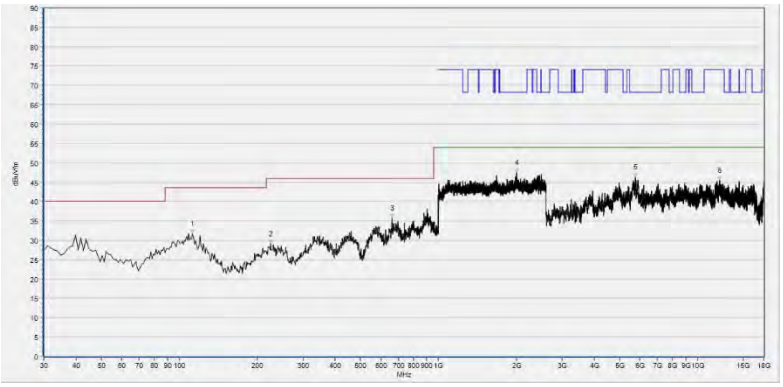
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
109.540	32.19	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
230.790	29.35	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
442.250	32.59	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2555.200	46.91	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5877.120	46.34	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12160.320	46.21	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

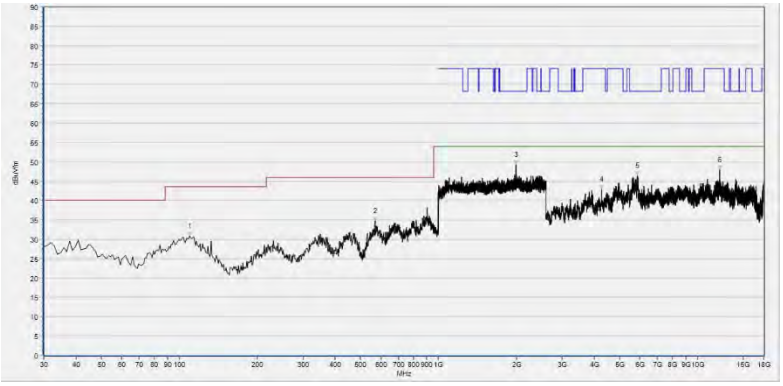
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 155



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
112.450	31.73	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
224.970	29.02	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
661.470	35.76	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1997.333	47.36	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5744.680	46.18	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12148.000	45.50	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
109.540	30.86	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
569.320	34.68	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1996.267	49.32	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
4263.200	42.93	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5849.400	46.42	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12157.240	47.95	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

END OF REPORT