




TEST REPORT

APPLICANT : SHENZHEN EMEET TECHNOLOGY CO., LTD.

PRODUCT NAME : EMEET Meeting Capsule Pro / EMEET Meeting Capsule Plus / EMEET Meeting Capsule Ultra / EMEET Meeting Capsule Pro Room Kit

MODEL NAME : E4102, E410201, E410202, E410203, E4306, E430601, E430602, E430603, E4307, E430701, E430702, E430703, E4305, E430501, E430502, E430503

BRAND NAME :  EMEET

FCC ID : 2ALCN-E4102

STANDARD(S) : 47 CFR Part 15 Subpart E

RECEIPT DATE : 2023-06-13

TEST DATE : 2023-06-19 to 2023-07-11

ISSUE DATE : 2023-07-25



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Change History		
Version	Date	Reason for change
1.0	2023-07-25	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	No deviation
2	ANSI C63.10	Duty Cycle of the Test Signal	Jun. 21, 2023	Su Xiaoxian	PASS	No deviation
3	15.407(a)	Maximum Conducted Output Power	Jun. 21, 2023	Su Xiaoxian	PASS	No deviation
4	15.407(a)(e)	Emission Bandwidth	Jun. 21, 2023	Su Xiaoxian	PASS	No deviation
5	15.407(a)	Peak Power Spectral Density	Jun. 26, 2023	Su Xiaoxian	PASS	No deviation
6	15.407(g)	Frequency Stability	Jun. 26, 2023	Su Xiaoxian	PASS	No deviation
7	15.207	Conducted Emission	Jul. 11, 2023	Fan Zehang	PASS	No deviation
8	15.407(b)	Restricted Frequency Bands	Jun. 27, 2023	Su Zhan	PASS	No deviation
9	15.407(b)	Radiated Emission	Jun. 27, 2023	Su Zhan	PASS	No deviation

Note 1: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.102013.

Note 2: These RF tests were performed according to the method of measurements prescribed in KDB789033 D02 v02r01.

Note 3: These RF tests were performed according to the method of measurements prescribed in KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02.

Note 4: 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 5: 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 Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
EXA Signal Analyzer	MY53470836	N9010A	Agilent	2023.02.27	2024.02.26
USB Wideband Power Sensor	MY54180008	U2021XA	Agilent	2022.10.11	2023.10.10
Temperature Chamber	12108015	DTL-003S 101	YOMA	2022.10.10	2023.10.09
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 Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2023.02.09	2024.02.08
LISN	8127449	NSLK 8127	Schwarzbeck	2023.02.21	2024.02.20
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2022.07.06	2023.07.05
				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 V1.2	Morlab	V1.0
TS+ -[JS32-CE]	Tonscend	V2.5.0.0



1.2.4 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2022.07.06	2023.07.05
				2023.06.21	2024.06.20
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2022.05.25	2025.05.24
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2022.02.11	2025.02.10
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2022.07.13	2025.07.12
Test Antenna – Horn	BBHA9170 #773	BBHA9170	Schwarzbeck	2022.07.14	2025.07.13
Preamplifier (10MHz-6GHz)	46732	S10M100L38 02	LUCIX CORP.	2022.07.08	2023.07.07
				2023.06.27	2024.06.26
Preamplifier (2GHz-18GHz)	61171/61172	S020180L32 03	LUCIX CORP.	2022.07.08	2023.07.07
				2023.06.27	2024.06.26
Preamplifier (18GHz-40GHz)	DS77209	DCLNA0118-40C-S	Decentest	2022.07.23	2023.07.22
RF Coaxial Cable (DC-18GHz)	MRE001	PE330	Pasternack	2022.07.08	2023.07.07
				2023.06.27	2024.06.26
RF Coaxial Cable (DC-18GHz)	MRE002	CLU18	Pasternack	2022.07.08	2023.07.07
				2023.06.27	2024.06.26
RF Coaxial Cable (DC-18GHz)	MRE003	CLU18	Pasternack	2022.07.08	2023.07.07
				2023.06.27	2024.06.26
RF Coaxial Cable (DC-40GHz)	22290045	QA360-40-K K-0.5	Qualwave	2022.07.08	2023.07.07
				2023.06.27	2024.06.26
RF Coaxial Cable (DC-40GHz)	22290046	QA360-40-K KF-2	Qualwave	2022.07.08	2023.07.07
				2023.06.27	2024.06.26
RF Coaxial Cable (DC-18GHz)	22120181	QA500-18-N N-5	Qualwave	2022.07.08	2023.07.07
				2023.06.27	2024.06.26
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	SHENZHEN EMEET TECHNOLOGY CO., LTD.
Applicant Address	Unit 2C, building A6,Guangming Science Park, Guanguang Road 3009, Guangming District, Shenzhen, China
Manufacturer	SHENZHEN EMEET TECHNOLOGY CO., LTD.
Manufacturer Address	Unit 2C, building A6,Guangming Science Park, Guanguang Road 3009, Guangming District, Shenzhen, China

2.2. Information of EUT

Product Name:	EMEET Meeting Capsule Pro / EMEET Meeting Capsule Plus / EMEET Meeting Capsule Ultra / EMEET Meeting Capsule Pro Room Kit	
Sample No.:	12#	
Hardware Version:	V2.0	
Software Version:	EMEET_G1PRO_XY8788_IMX577_V1.0.1_20230602	
Modulation Technology:	OFDM	
Modulation Mode:	802.11n (HT20)	
Operating Frequency Range:	5180MHz-5240MHz; 5745MHz-5825MHz	
Antenna Type:	PCB Antenna	
Antenna Gain:	1.98dBi	
Accessory Information:	Battery	
	Brand Name:	Xinyu Ganfeng Electronics Co., LTD.
	Model No.:	EM18650-1S2P
	Serial No.:	N/A
	Capacity:	5000mAh
	Rated Voltage:	3.65V
	Charge Limit:	4.2V
	Manufacturer:	Xinyu Ganfeng Electronics Co., LTD.



Accessory Information:	Adaptor	
	Brand Name:	Shenzhen Keyu Power Supply Technology Co., Ltd.
	Model No.:	KA2401A-1202000DE
	Serial No.:	N/A
	Rated Output:	11.4V-12.6V \Rightarrow 2A
	Rated Input:	100-240V \sim 50/60Hz, 0.65A
	Manufacturer:	Shenzhen Keyu Power Supply Technology Co., Ltd.
	USB cable	
	Model No.:	TD303
	Manufacturer:	SHENZHEN EMEET TECHNOLOGY CO., LTD.
	Tripod	
	Model No.:	TD303
	Manufacturer:	SHENZHEN EMEET TECHNOLOGY CO., LTD.
	MCX	
	Model No.:	E7004
Manufacturer:	SHENZHEN EMEET TECHNOLOGY CO., LTD.	

Note 1: According to the certificate holder, they declared that the models E4102, E410201, E410202, E410203, E4306, E430601, E430602, E430603, E4307, E430701, E430702, E430703, E4305, E430501, E430502 and E430503 have the same hardware and software, only different in model and product name, the main test model name is E4102, all parameters remain the same. The main measuring model is E4102, only the results for E4102 were recorded in this report.

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
(U-NII-3) 5745MHz-5825MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	149	5745	153	5765
	157	5785	161	5805
	165	5825		

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
802.11n	20 (HT20)	OFDM	BPSK	MCS0~MCS7	N/A
			QPSK		
			16QAM		
			64QAM		

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.

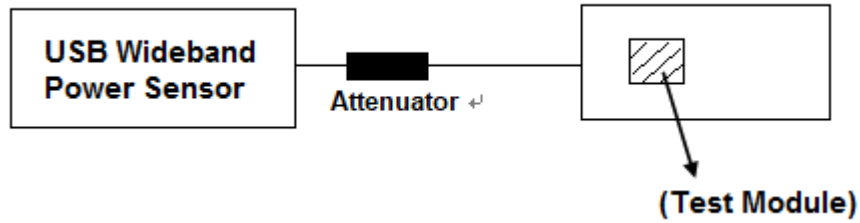
2.5. Test Conditions

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

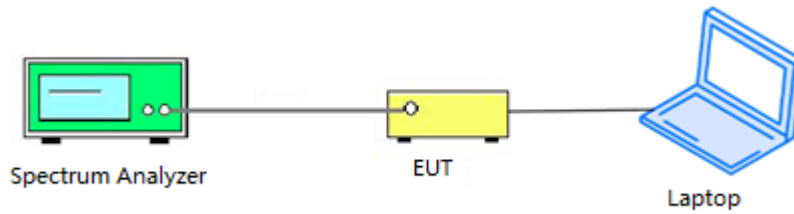
2.6. Test Setup Layout Diagram

2.6.1. Conducted Measurement

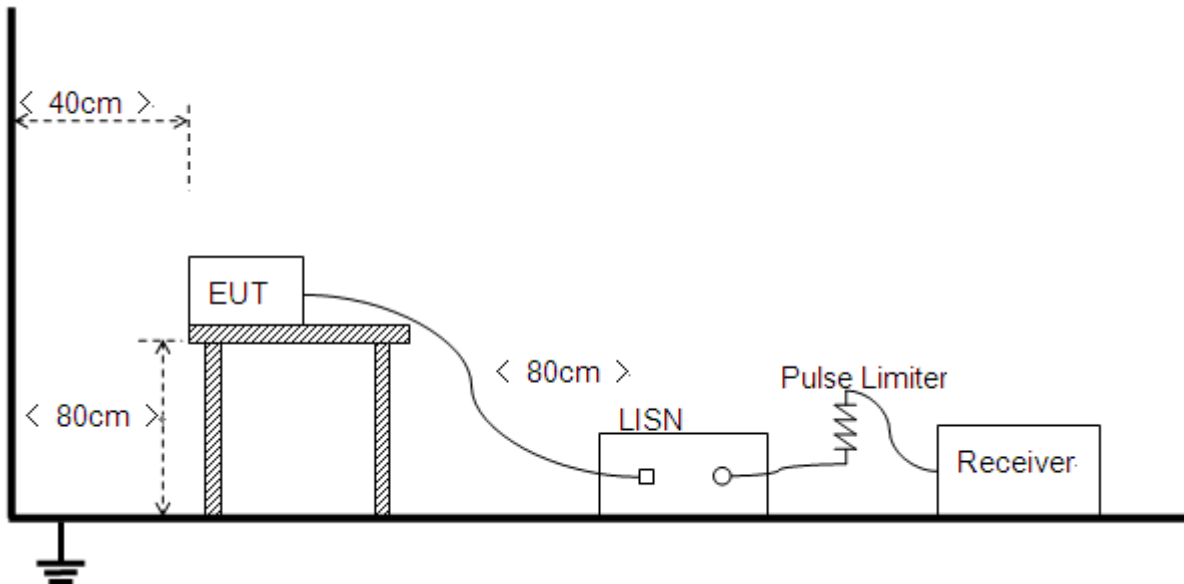
For power item that BW below 80MHz system:



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

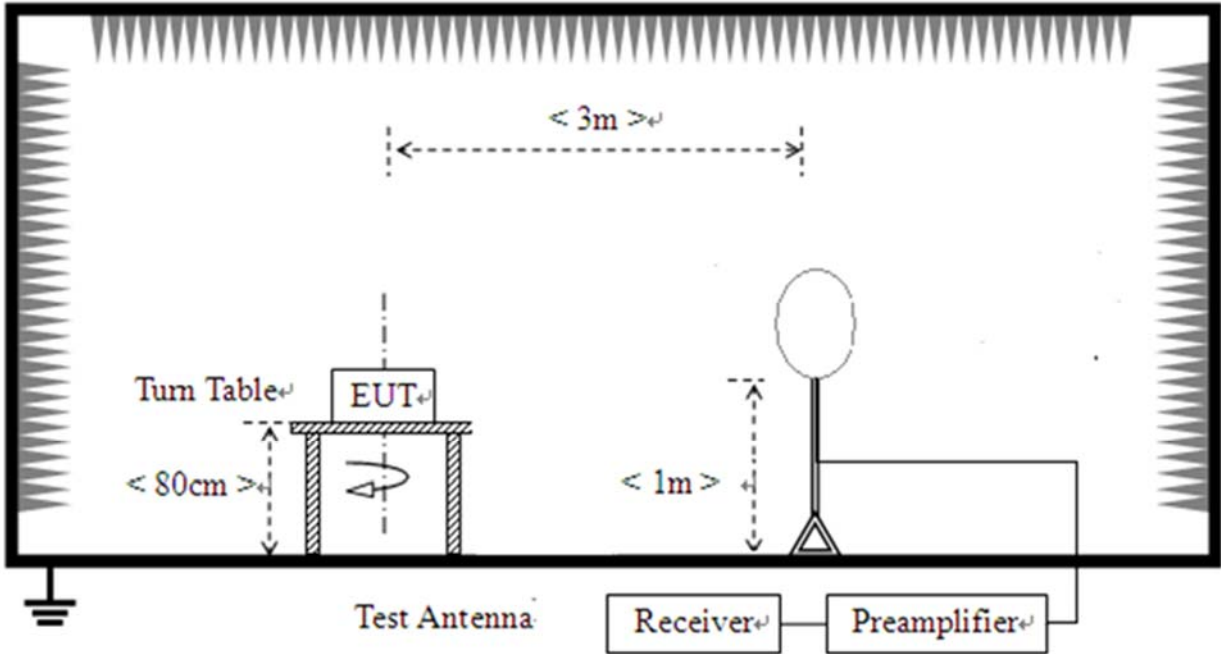


2.6.2. Conducted Emission Measurement

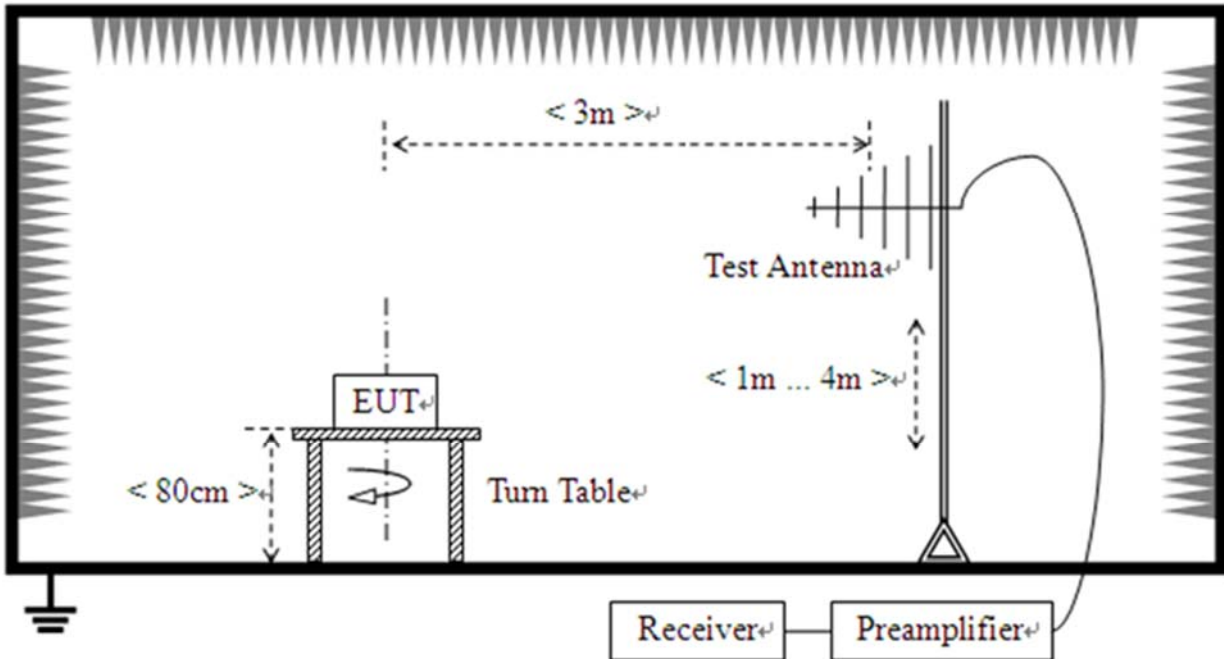


2.6.3.Radiation Measurement

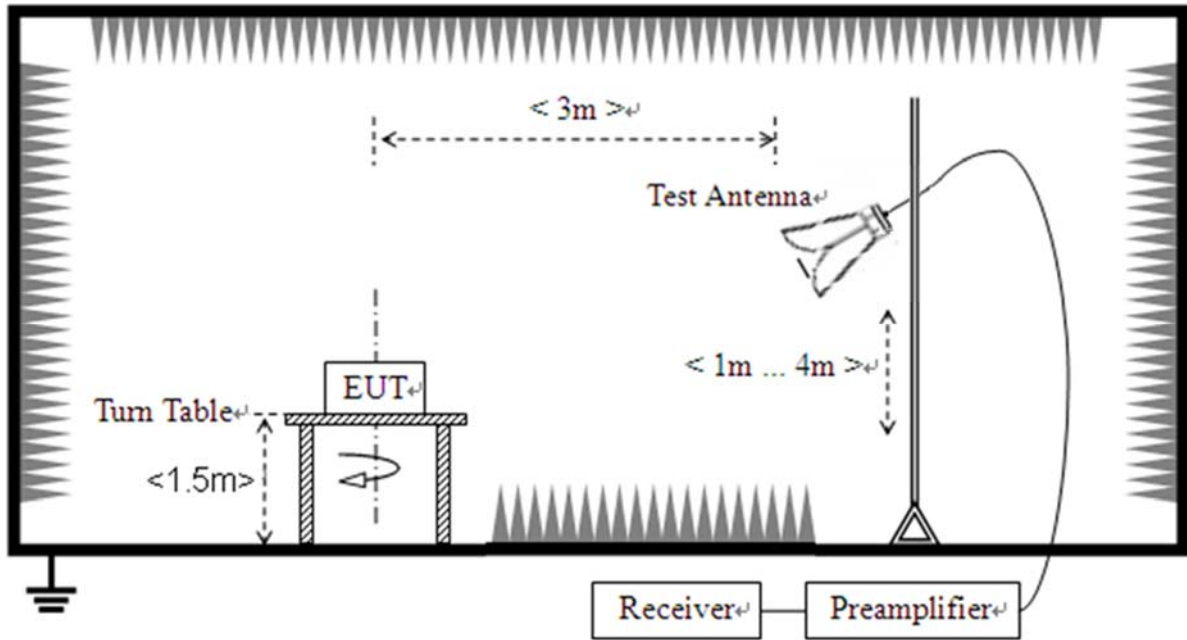
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to 1GHz



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

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal 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 $\pm 2\%$; 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 $11\text{dBm} + 10 \log B$, 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.

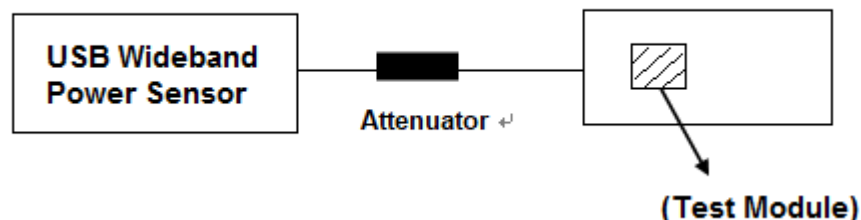
(4) According to KDB662911D01 Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.

(5) According to KDB 662911 D01, the directional gain = $G_{\text{ANT}} + 10\log(N_{\text{ANT}})\text{dBi}$, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

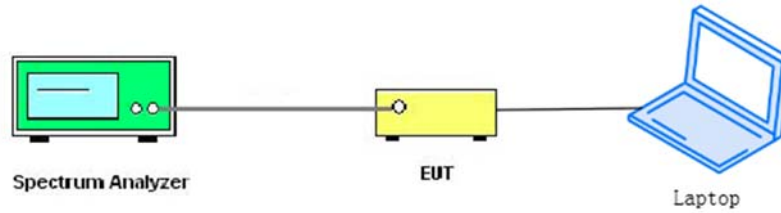
3.3.2. Test Procedures

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) $\geq 3 \times$ 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.



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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 KDB662911D01 Measure-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 = $G_{ANT} + 10\log(N_{ANT})$ 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 \geq 3MHz
- 3) Number of points in sweep \geq 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°C to 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 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dB μ V)	
	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);

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

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 ($\mu\text{V}/\text{m}$)	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);

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

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

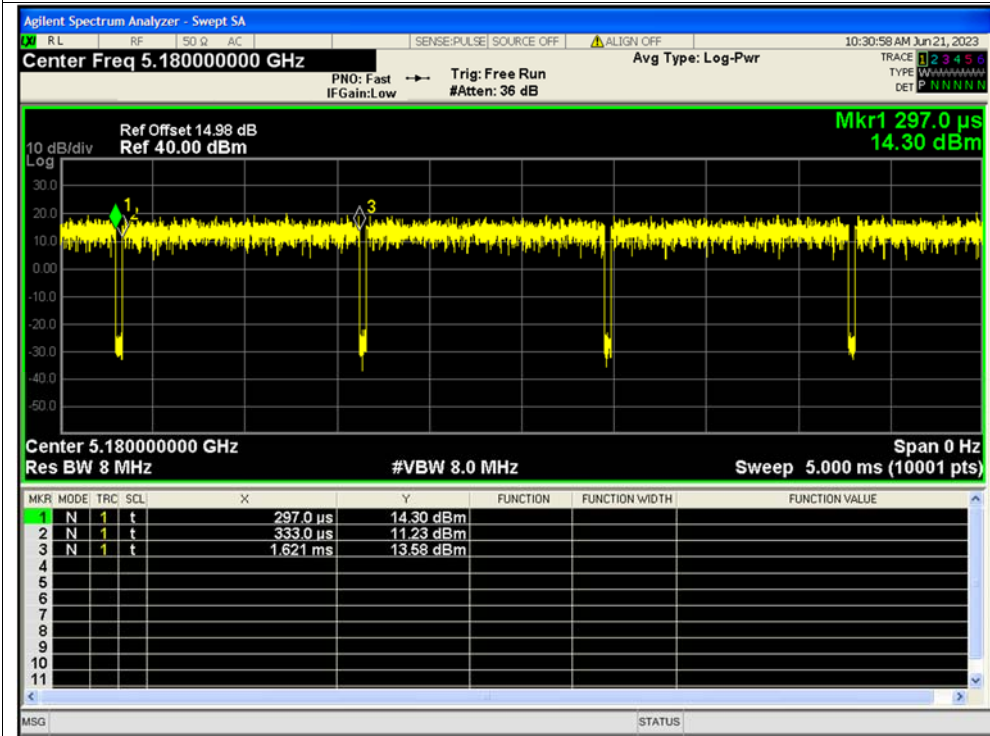
A.1. Duty Cycle of Test Signal

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	n20	5180	Ant1	97.28	0.12	0.78
NVNT	n20	5220	Ant1	97.31	0.12	0.77
NVNT	n20	5240	Ant1	97.31	0.12	0.77
NVNT	n20	5745	Ant1	97.27	0.12	0.77
NVNT	n20	5785	Ant1	97.31	0.12	0.77
NVNT	n20	5825	Ant1	97.27	0.12	0.77

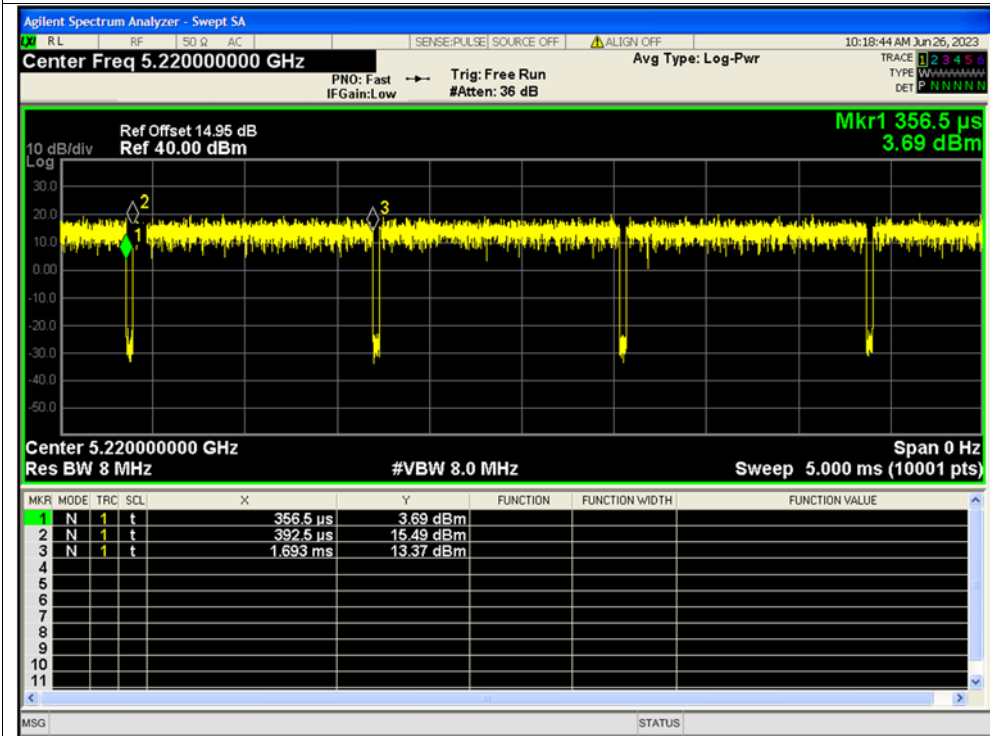


Test Graphs

Duty Cycle NVNT n20 5180MHz Ant1

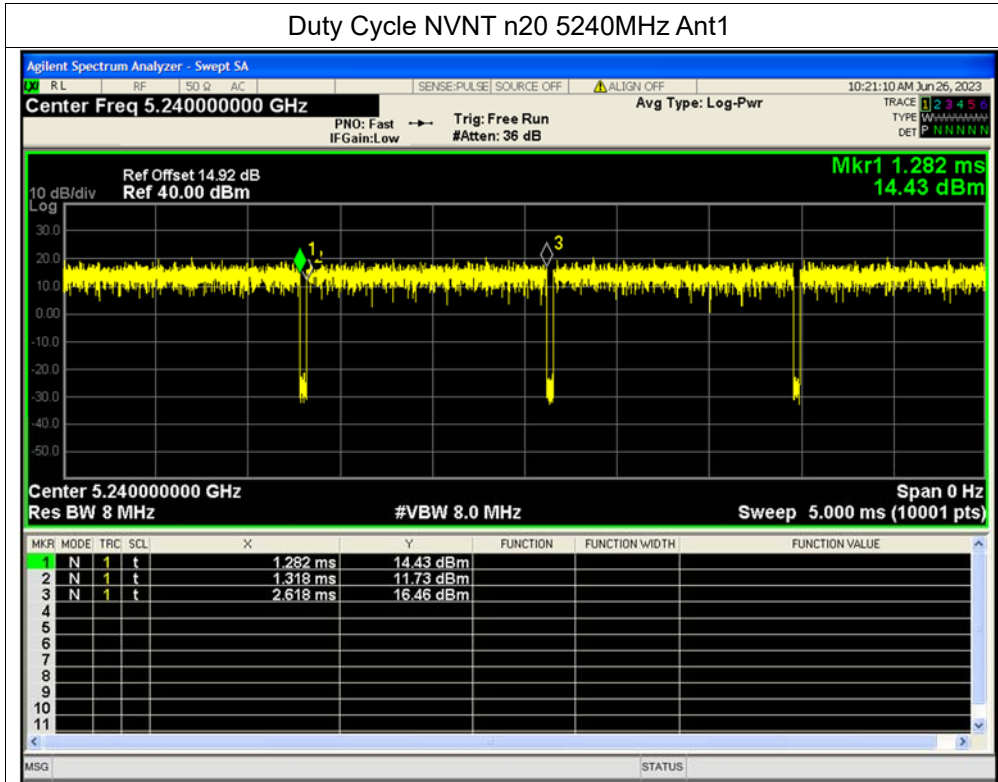


Duty Cycle NVNT n20 5220MHz Ant1

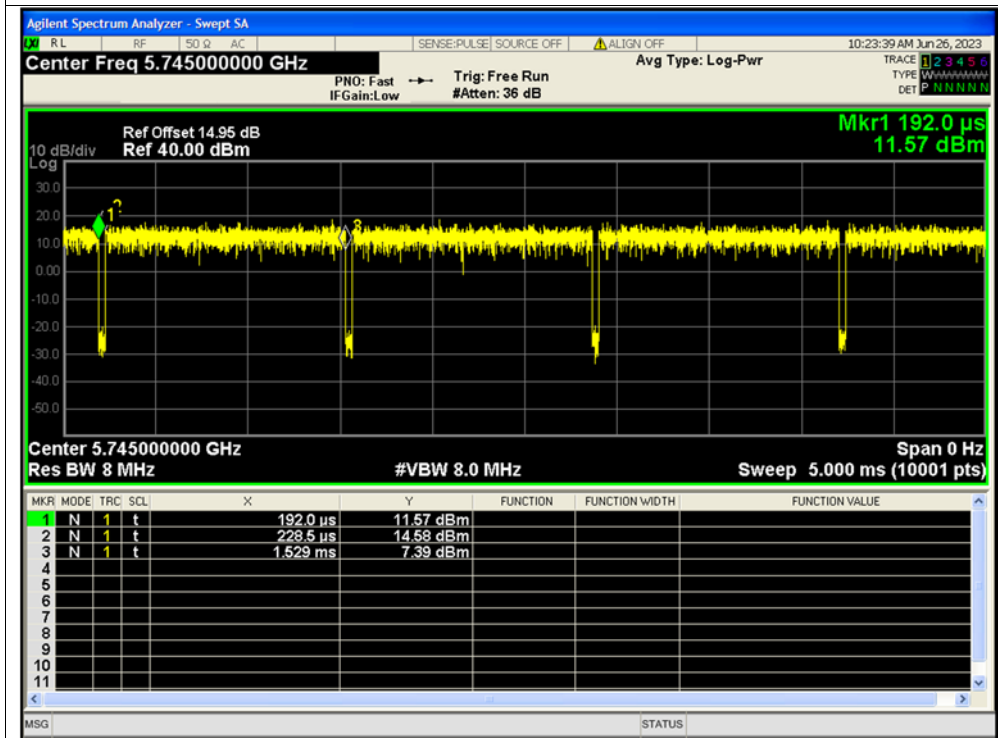




Duty Cycle NVNT n20 5240MHz Ant1

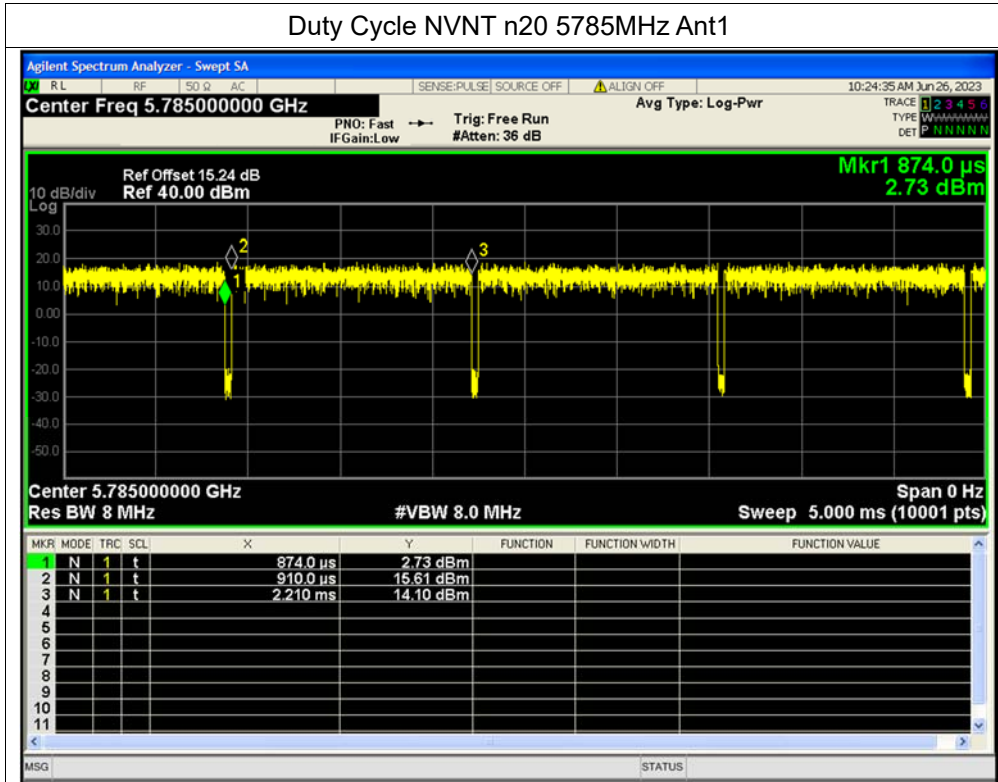


Duty Cycle NVNT n20 5745MHz Ant1

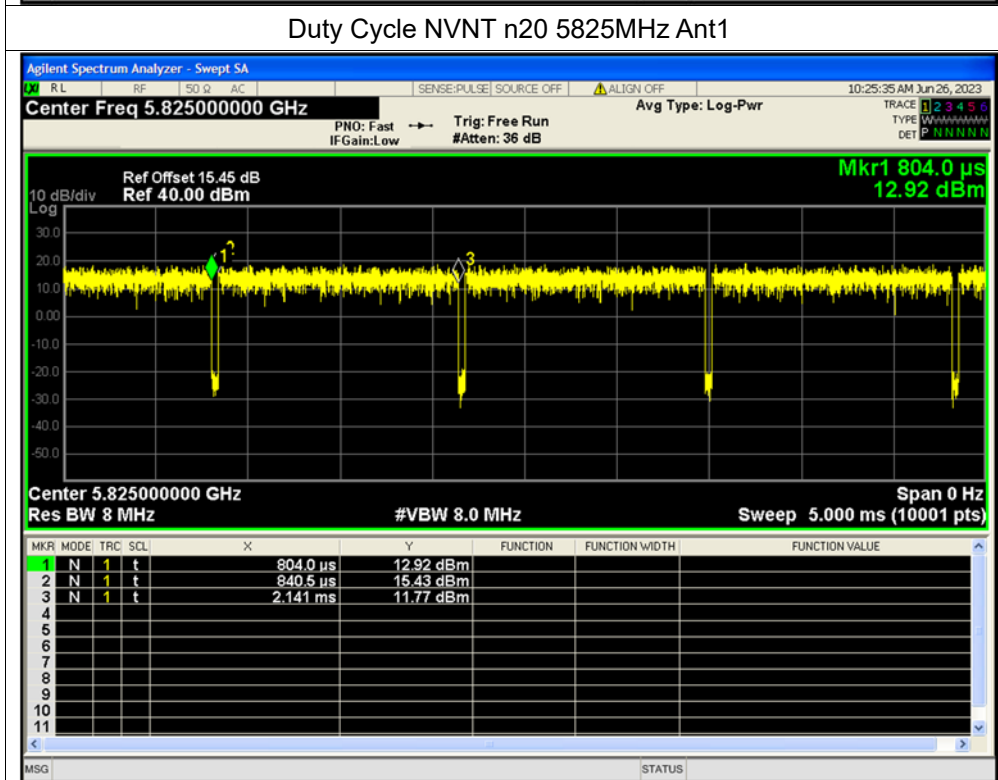




Duty Cycle NVNT n20 5785MHz Ant1



Duty Cycle NVNT n20 5825MHz Ant1





A.2. Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Total Power (mW)	Limit (dBm)	Verdict
NVNT	n20	5180	Ant1	14.29	26.85	24	Pass
NVNT	n20	5220	Ant1	14.40	27.54	24	Pass
NVNT	n20	5240	Ant1	13.63	23.07	24	Pass
NVNT	n20	5745	Ant1	13.17	20.75	30	Pass
NVNT	n20	5785	Ant1	13.72	23.55	30	Pass
NVNT	n20	5825	Ant1	13.27	21.23	30	Pass

**A.3. Emission Bandwidth**

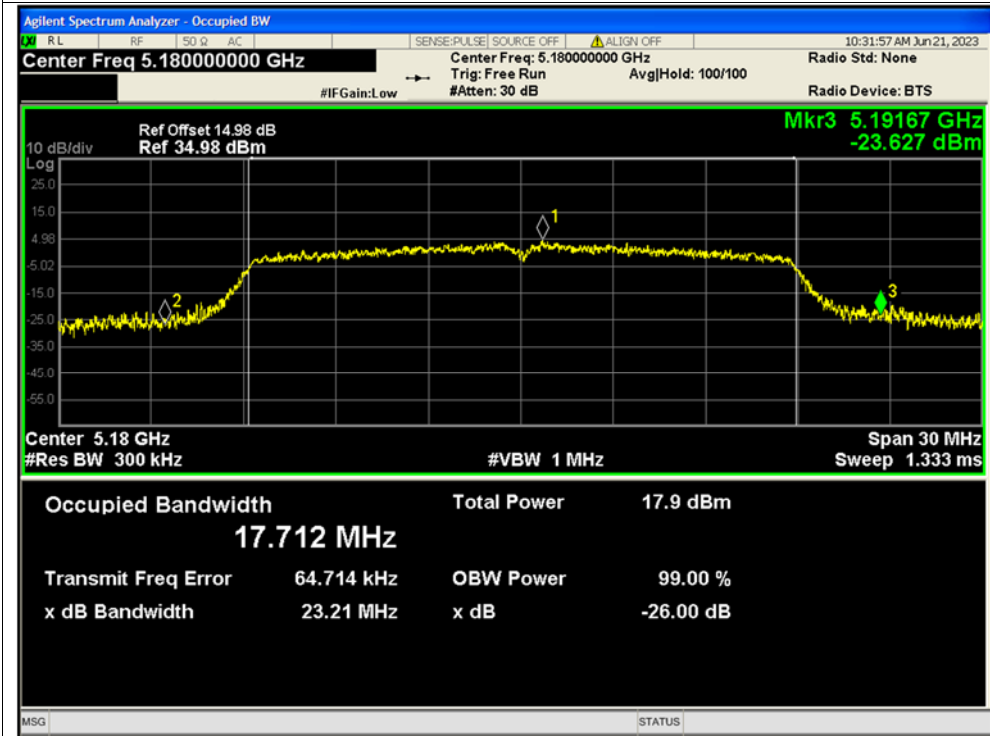
Condition	Mode	Frequency (MHz)	Antenna	-26 dB Bandwidth (MHz)	Verdict
NVNT	n20	5180	Ant1	23.21	Pass
NVNT	n20	5220	Ant1	28.638	Pass
NVNT	n20	5240	Ant1	26.989	Pass

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	n20	5745	Ant1	15.001	0.5	Pass
NVNT	n20	5785	Ant1	15.047	0.5	Pass
NVNT	n20	5825	Ant1	13.851	0.5	Pass

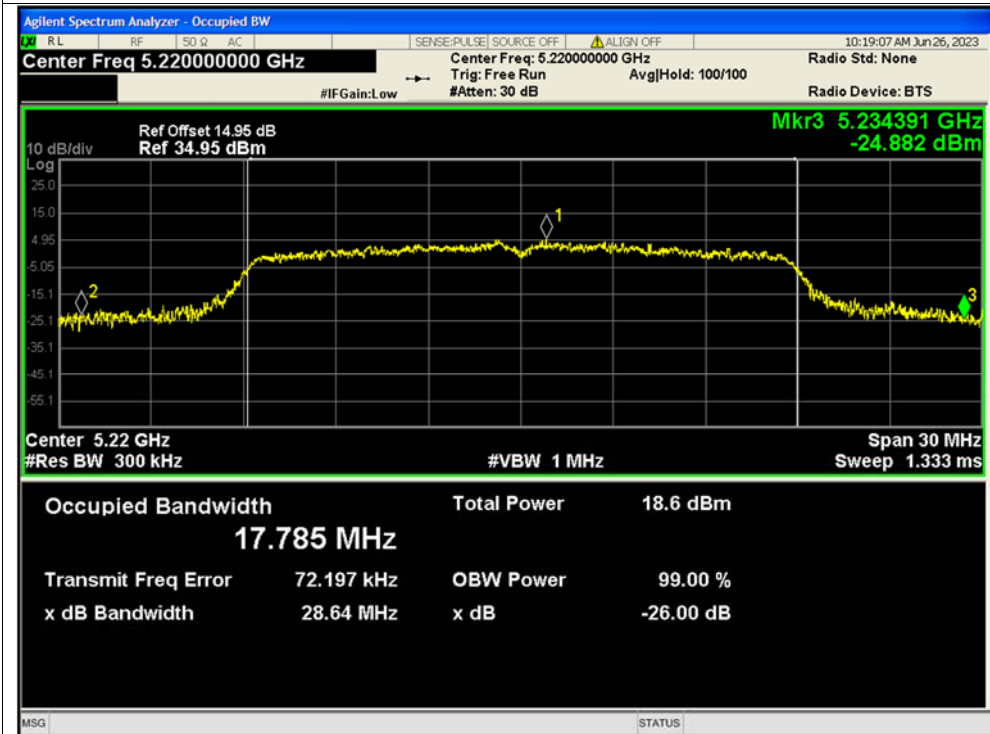


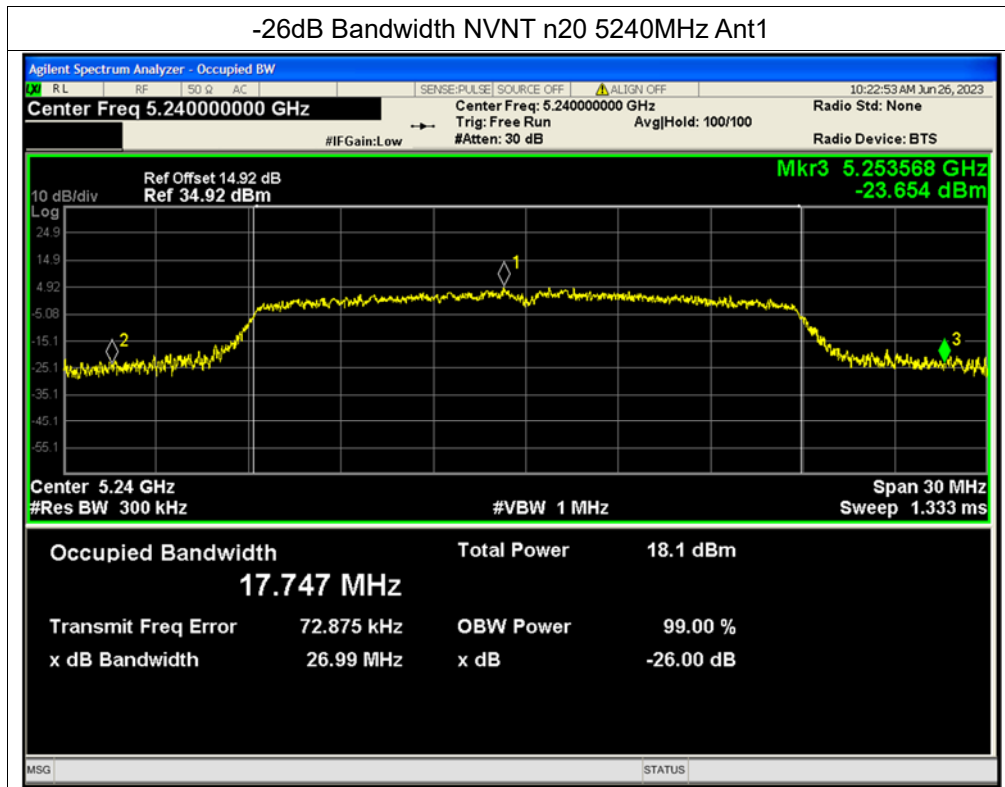
Test Graphs

-26dB Bandwidth NVNT n20 5180MHz Ant1



-26dB Bandwidth NVNT n20 5220MHz Ant1

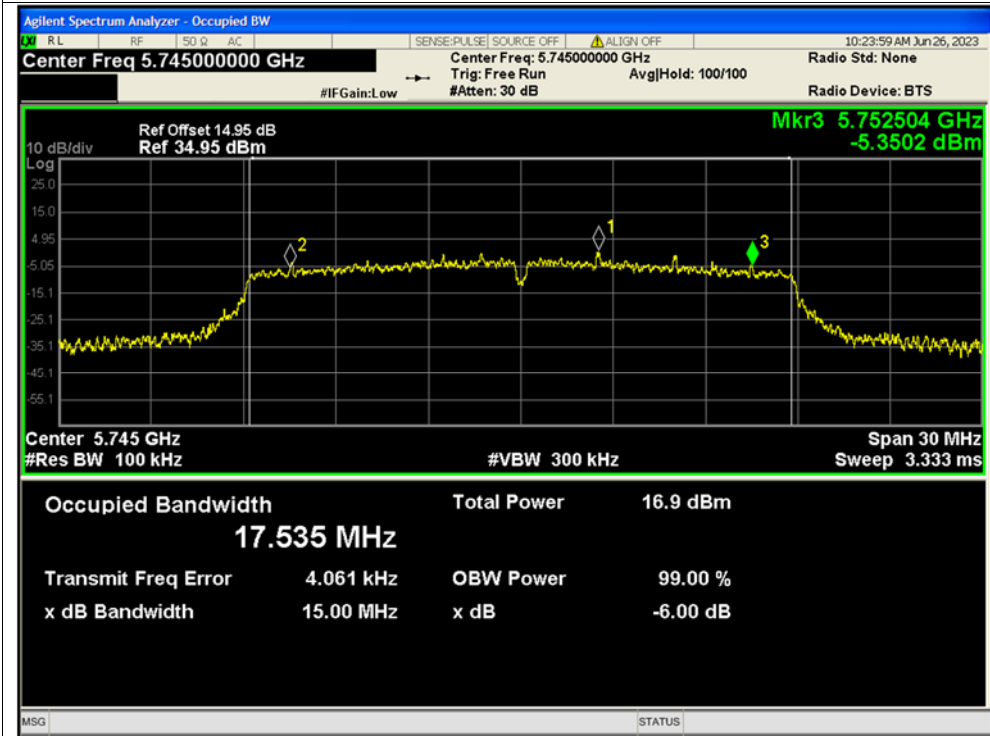




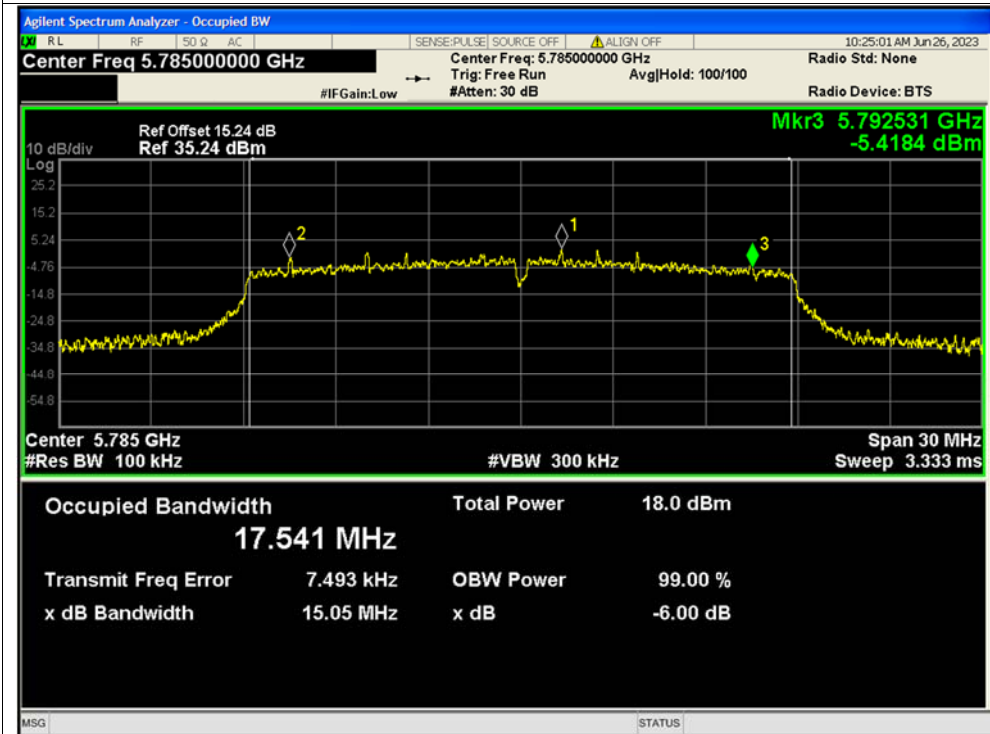


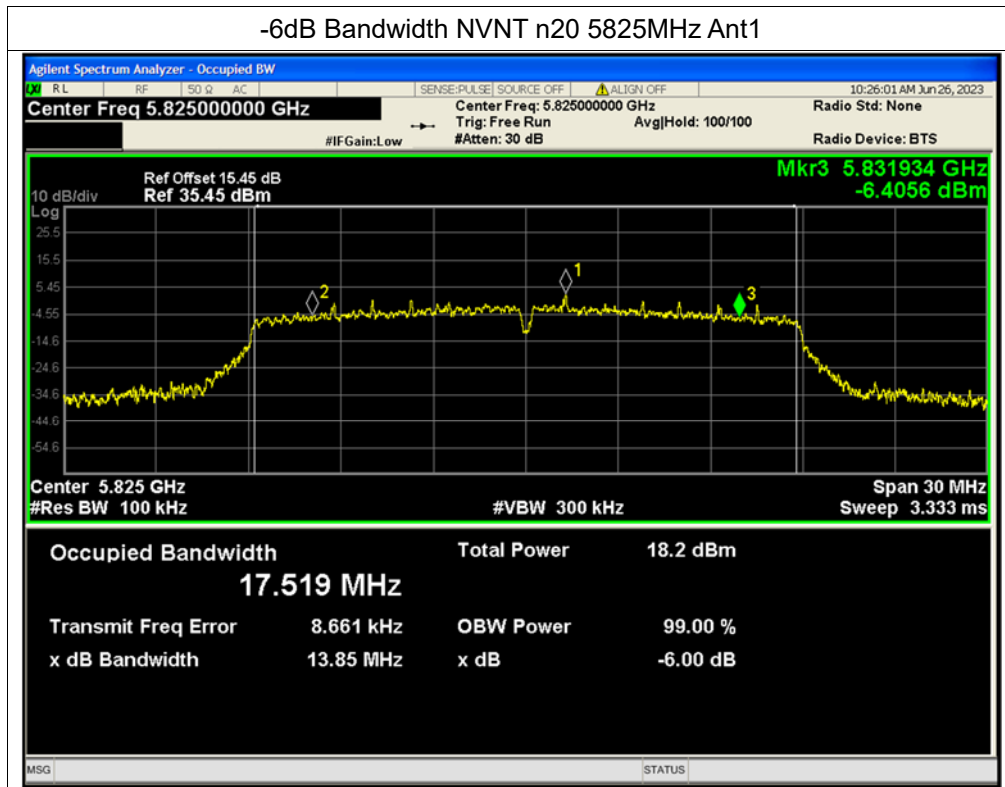
Test Graphs

-6dB Bandwidth NVNT n20 5745MHz Ant1



-6dB Bandwidth NVNT n20 5785MHz Ant1





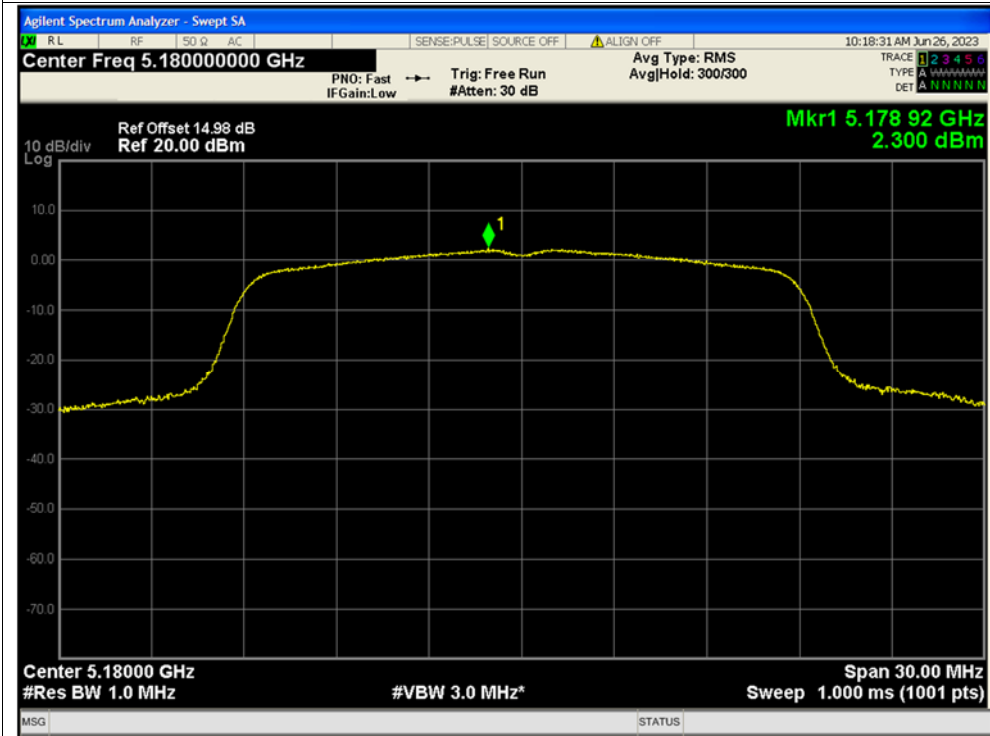
**A.4. Peak Power Spectral Density**

Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm)	Duty Factor (dB)	Total PSD (dBm)	Limit (dBm)	Verdict
NVNT	n20	5180	Ant1	2.3	0.12	2.42	11	Pass
NVNT	n20	5220	Ant1	2.65	0.12	2.77	11	Pass
NVNT	n20	5240	Ant1	2.3	0.12	2.42	11	Pass
NVNT	n20	5745	Ant1	-1.87	0.12	-1.75	30	Pass
NVNT	n20	5785	Ant1	-0.62	0.12	-0.5	30	Pass
NVNT	n20	5825	Ant1	-0.67	0.12	-0.55	30	Pass

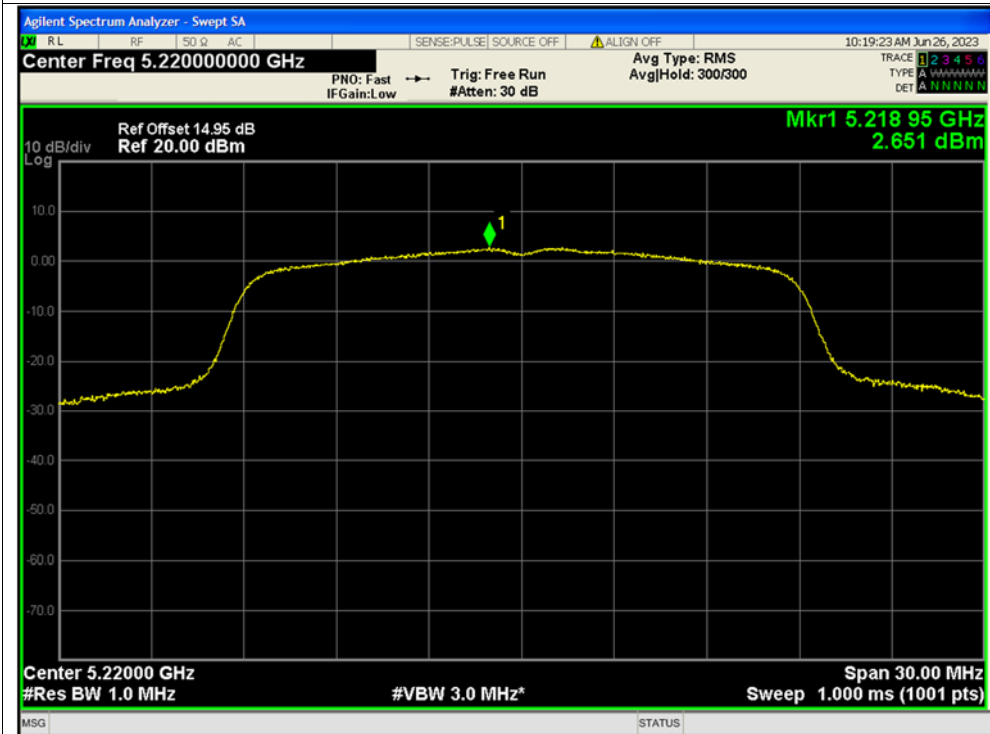


Test Graphs

PSD NVNT n20 5180MHz Ant1

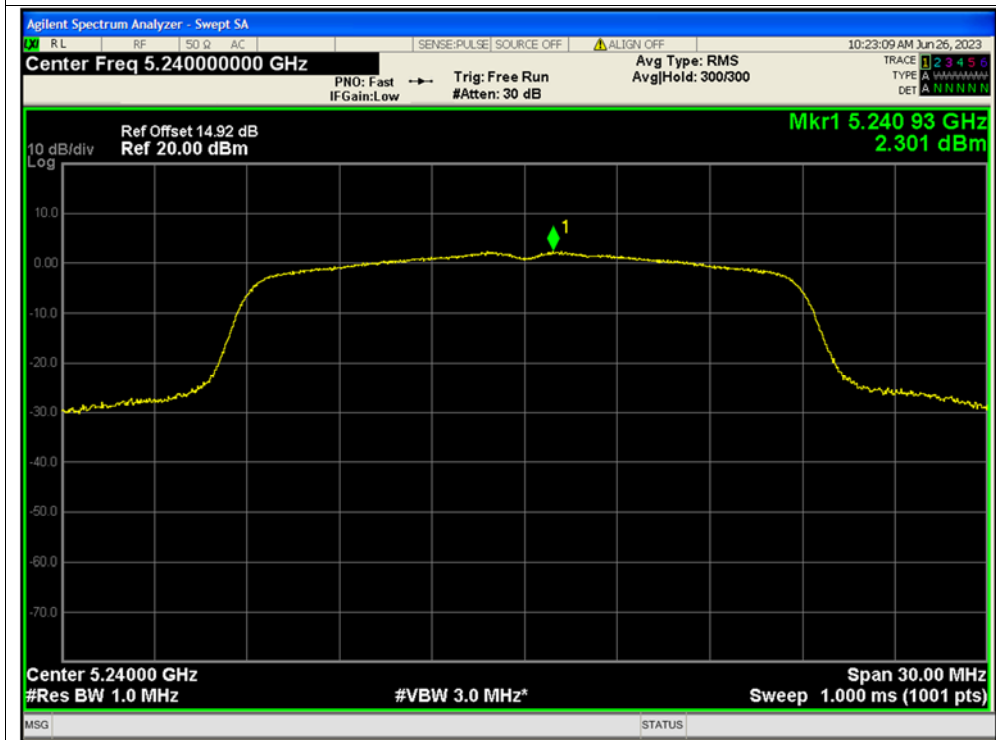


PSD NVNT n20 5220MHz Ant1

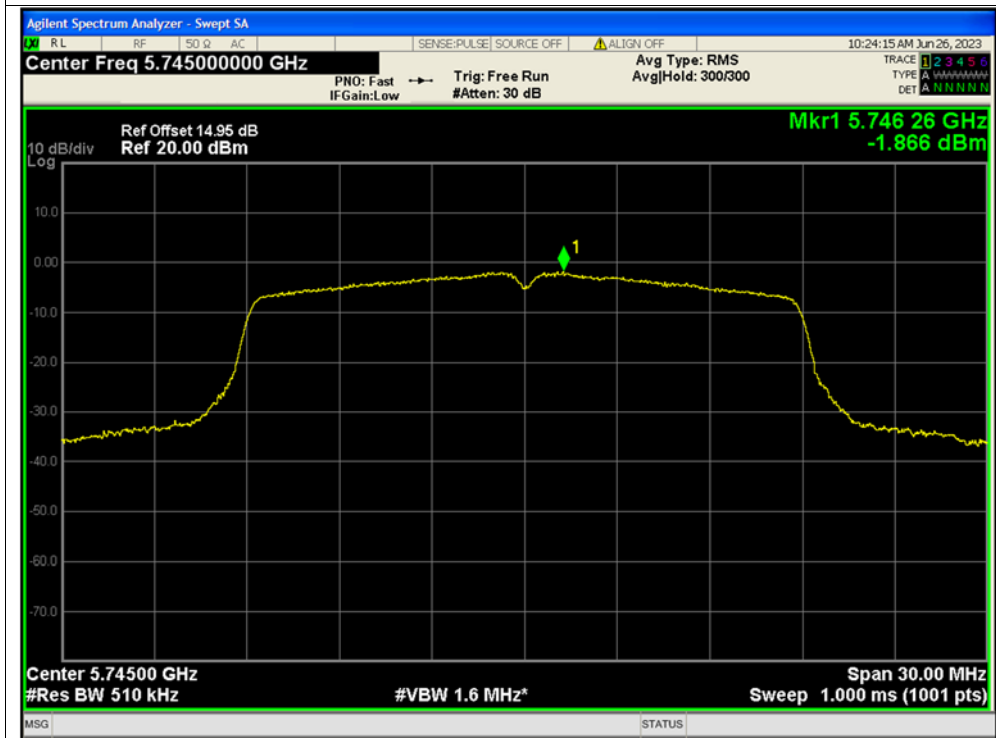




PSD NVNT n20 5240MHz Ant1

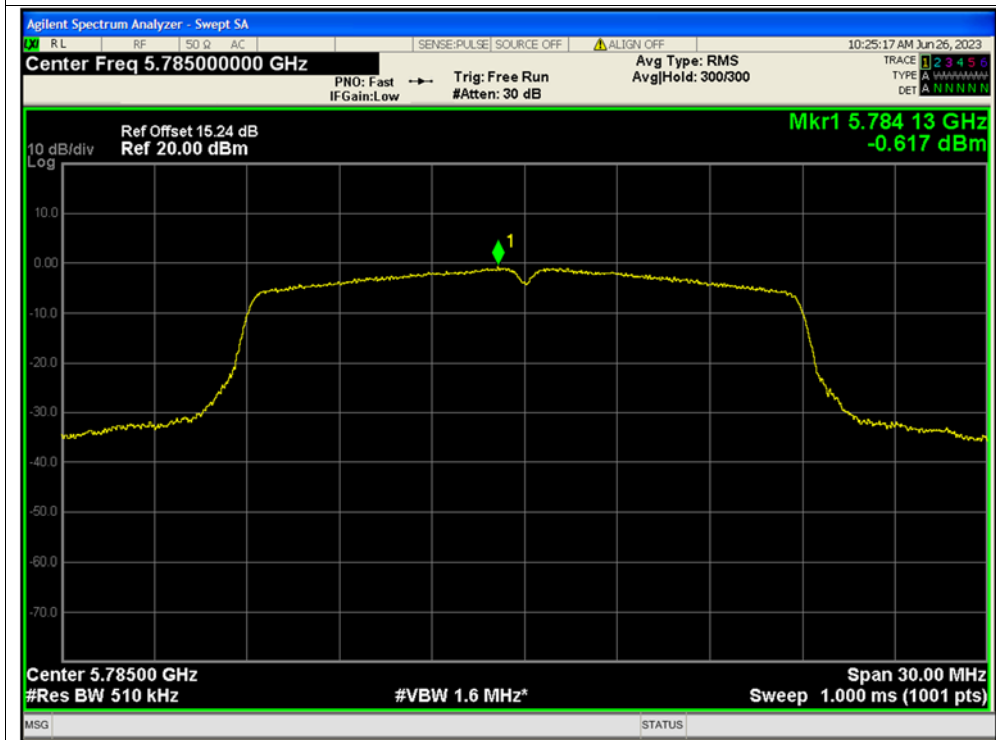


PSD NVNT n20 5745MHz Ant1

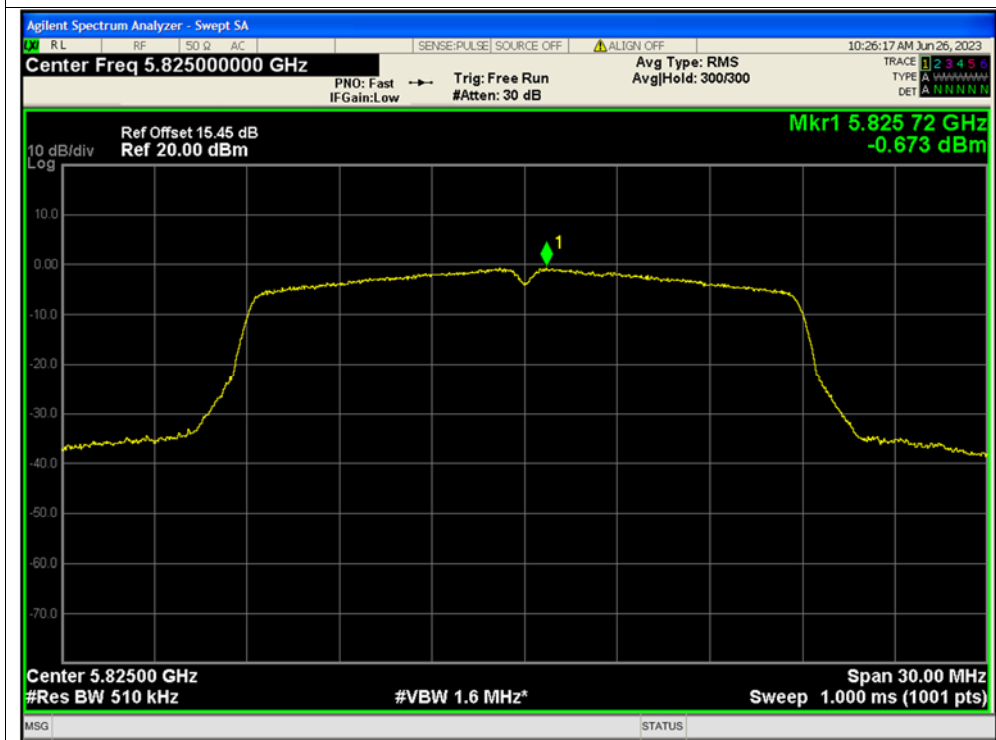




PSD NVNT n20 5785MHz Ant1



PSD NVNT n20 5825MHz Ant1



**A.5. Frequency Stability**

Condition	Mode	Frequency (MHz)	Antenna	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
20C 4.75V	Carrier	5180	Ant1	5179.98	-20000	-3.86	25	Pass
20C 15V	Carrier	5180	Ant1	5179.98	-20000	-3.86	25	Pass
0C 12V	Carrier	5180	Ant1	5179.979	-21000	-4.05	25	Pass
10C 12V	Carrier	5180	Ant1	5179.979	-21000	-4.05	25	Pass
20C 12V	Carrier	5180	Ant1	5179.979	-21000	-4.05	25	Pass
30C 12V	Carrier	5180	Ant1	5179.979	-21000	-4.05	25	Pass
40C 12V	Carrier	5180	Ant1	5179.979	-21000	-4.05	25	Pass
20C 4.75V	Carrier	5745	Ant1	5744.976	-24000	-4.18	25	Pass
20C 15V	Carrier	5745	Ant1	5744.976	-24000	-4.18	25	Pass
0C 12V	Carrier	5745	Ant1	5744.976	-24000	-4.18	25	Pass
10C 12V	Carrier	5745	Ant1	5744.976	-24000	-4.18	25	Pass
20C 12V	Carrier	5745	Ant1	5744.976	-24000	-4.18	25	Pass
30C 12V	Carrier	5745	Ant1	5744.976	-24000	-4.18	25	Pass
40C 12V	Carrier	5745	Ant1	5744.976	-24000	-4.18	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: EEUT + Adapter + USB cable + PC + PC Adapter + WIFI TX

Test voltage: AC 120V/60Hz

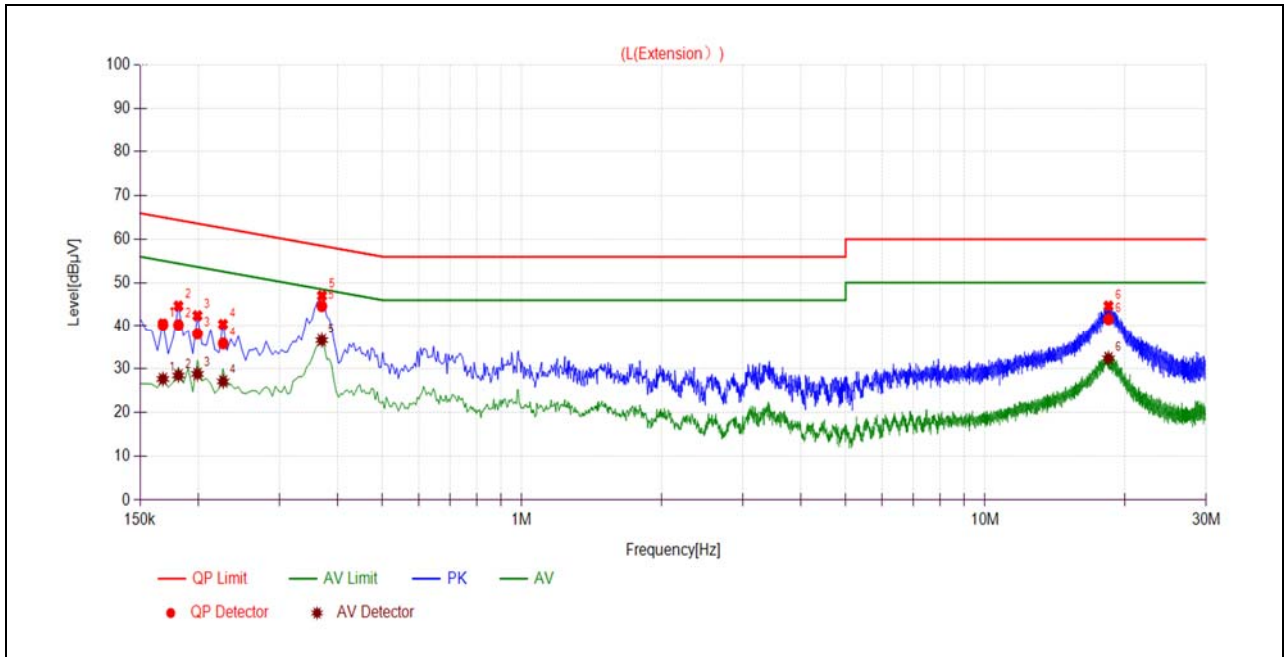
The measurement results are obtained as below:

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

U_R : Receiver Reading

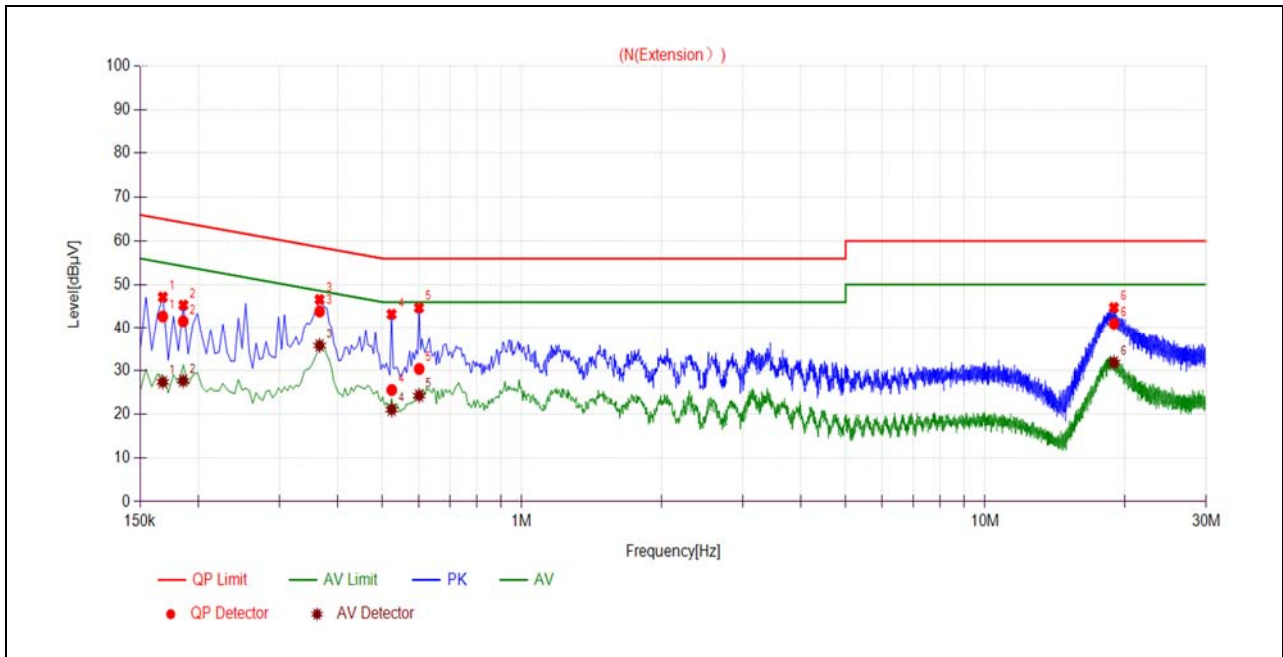
A_{Factor} : Voltage division factor of LISN

B. Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1680	40.27	27.66	65.06	55.06	Line	PASS
2	0.1815	40.24	28.49	64.42	54.42		PASS
3	0.1995	38.13	28.81	63.63	53.63		PASS
4	0.2267	35.84	27.10	62.57	52.57		PASS
5	0.3702	44.61	36.60	58.50	48.50		PASS
6	18.4650	41.58	32.42	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	42.69	27.41	65.06	55.06	Neutral	PASS
2	0.1858	41.58	27.68	64.22	54.22		PASS
3	0.3661	43.84	35.81	58.59	48.59		PASS
4	0.5239	25.56	21.04	56.00	46.00		PASS
5	0.6004	30.41	24.29	56.00	46.00		PASS
6	18.9716	41.03	31.90	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:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

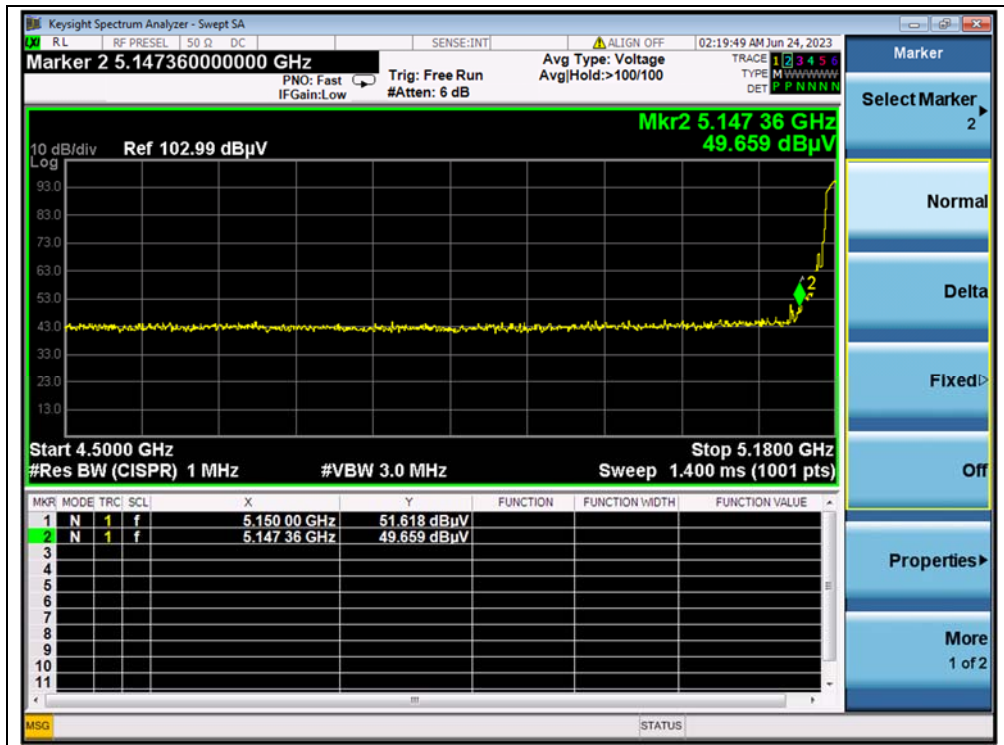
A_{Factor} : Antenna Factor at 3m

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.

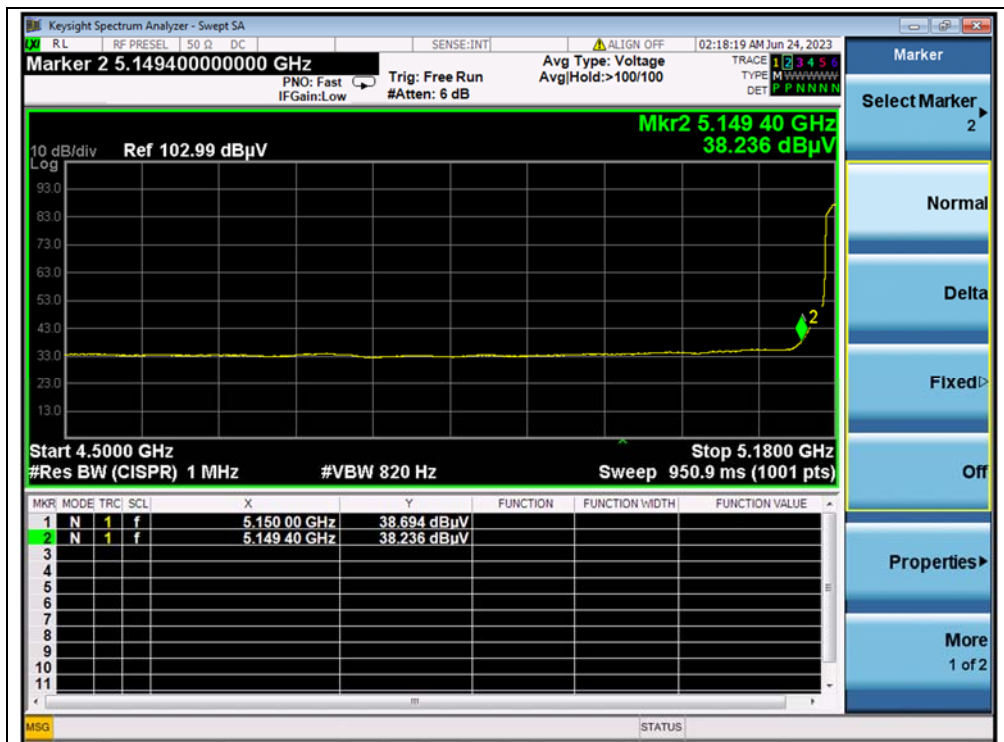
Note 2 All test modes and bandwidth were considered and evaluated respectively by performing full test, only the worst data were recorded for each bandwidth.

802.11n (HT20) Mode

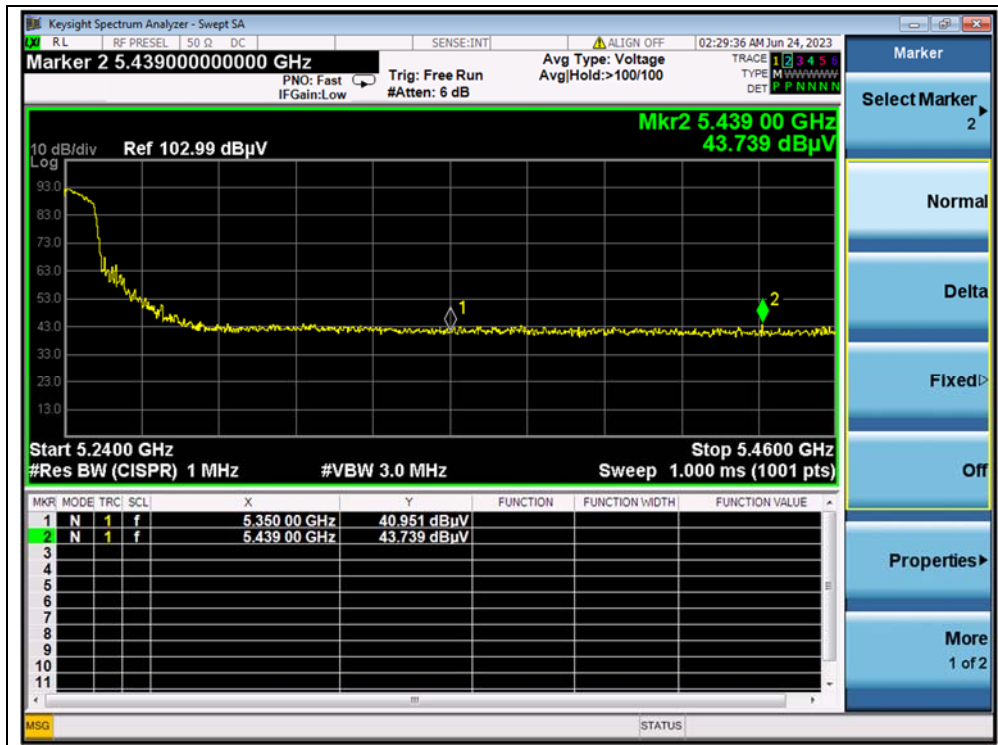
Channel	Frequency (MHz)	Detector	Receiver Reading	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV	U_R (dB μ V)					
36	5150.00	PK	51.62	-19.54	32.20	64.28	74	PASS
36	5150.00	AV	38.69	-19.54	32.20	51.35	54	PASS
48	5439.00	PK	43.74	-19.54	32.20	56.40	74	PASS
48	5352.10	AV	32.86	-19.54	32.20	45.52	54	PASS
149	5725.00	PK	56.99	-19.01	32.20	70.18	122.23	PASS
165	5850.00	PK	44.13	-19.01	32.20	57.32	122.23	PASS



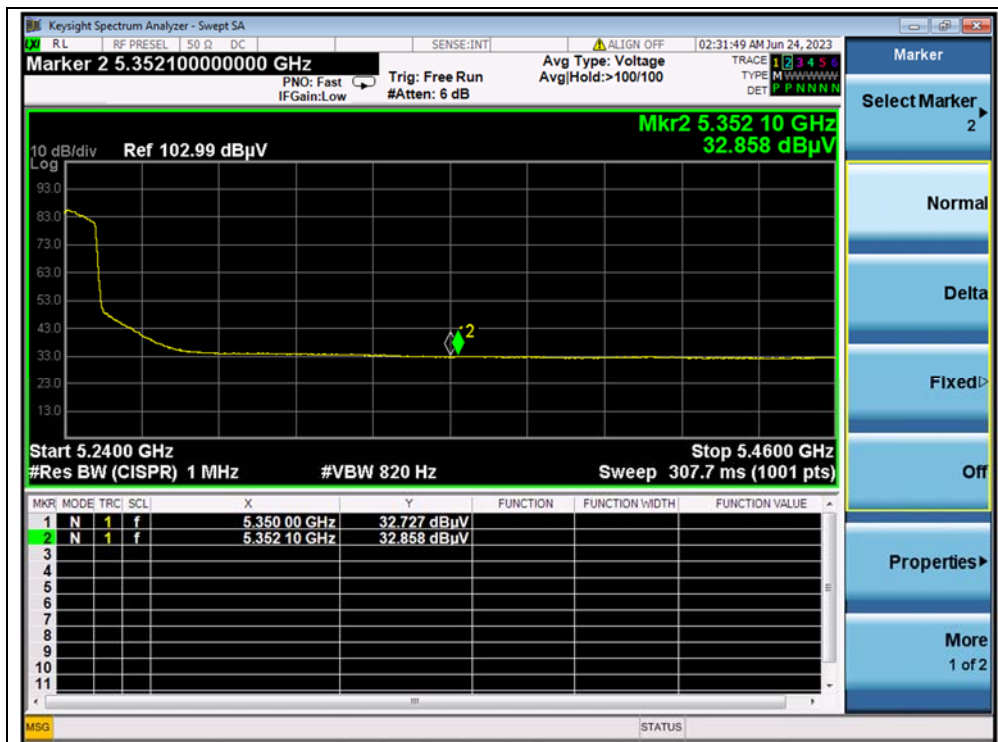
(PEAK, Channel 36, 802.11n (HT20))



(AVERAGE, Channel 36, 802.11n (HT20))



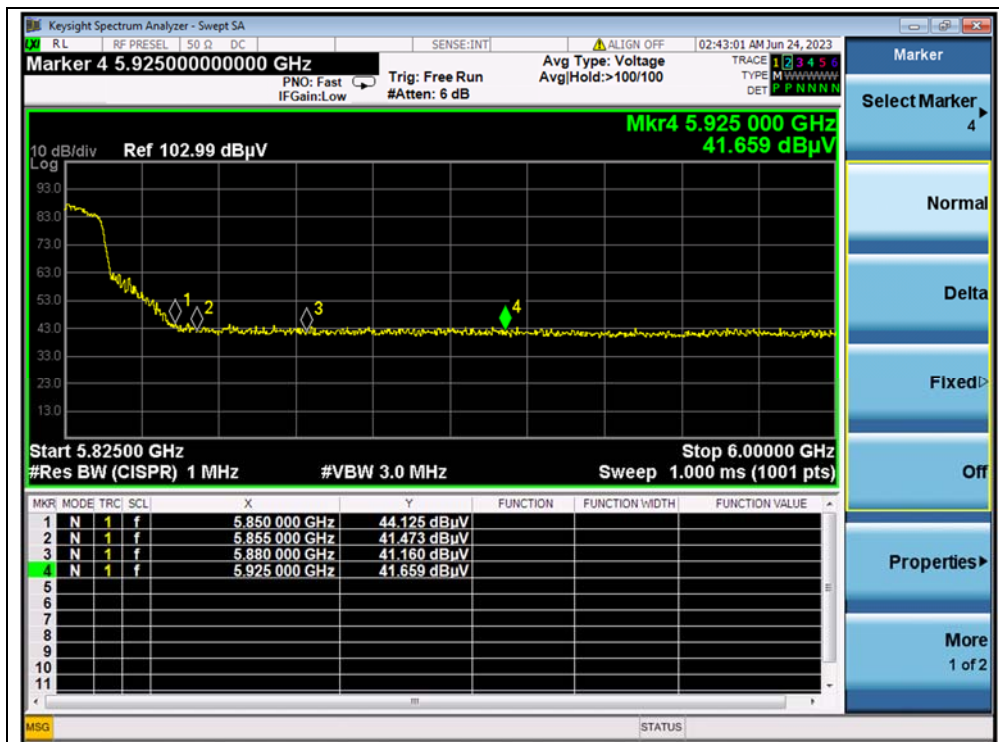
(PEAK, Channel 48, 802.11n (HT20))



(AVERAGE, Channel 48, 802.11n (HT20))



(PEAK, Channel 149, 802.11n (HT20))



(PEAK, Channel 165, 802.11n (HT20))



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:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

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.

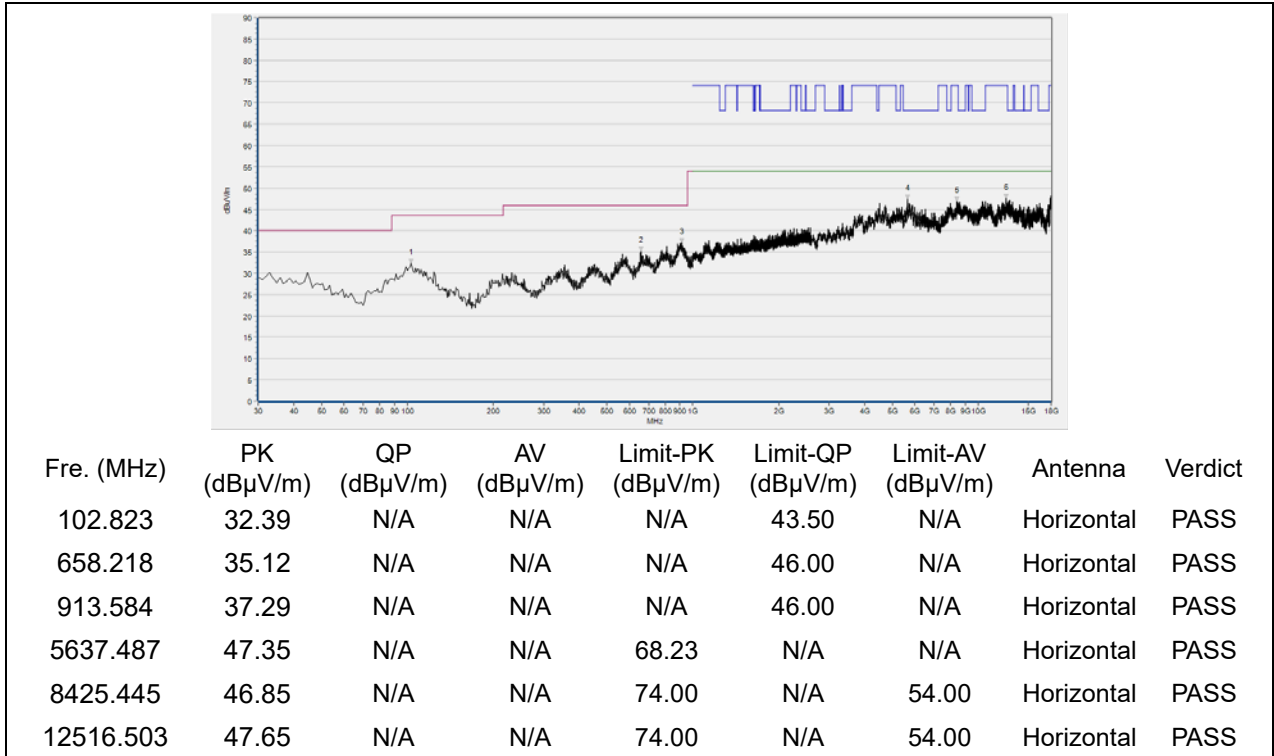
Note3: For the frequency, which started from 18GHz to 10th harmonic of the highest frequency, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

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.

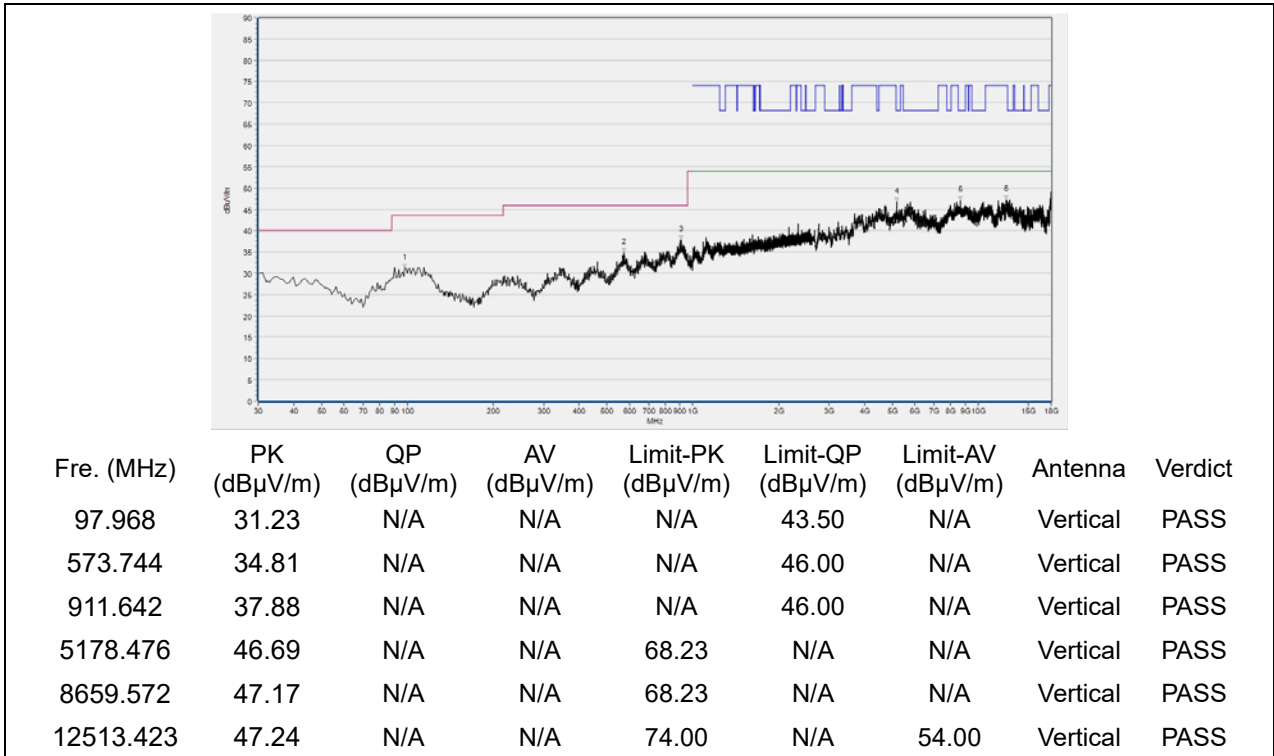


802.11n (HT20) Mode

Plot for Channel 36

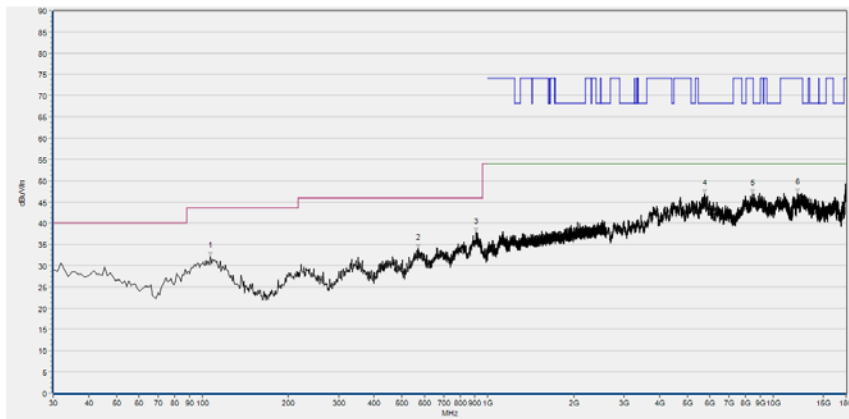


(Antenna Horizontal, 30MHz to 18GHz)



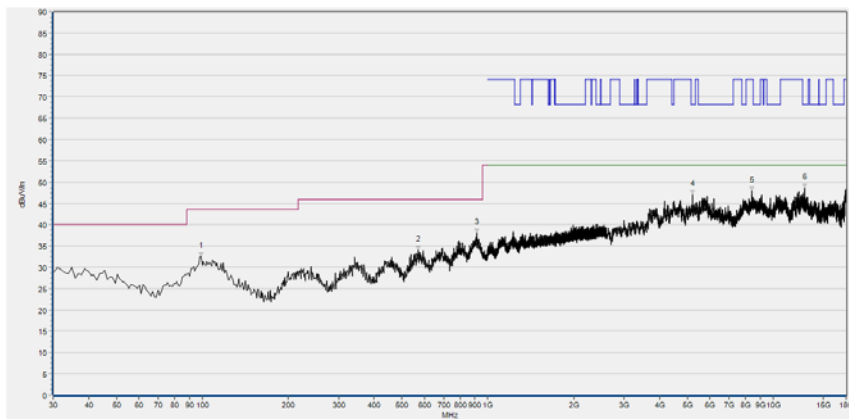
(Antenna Vertical, 30MHz to 18GHz)

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
106.707	32.25	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
568.889	33.99	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
908.729	37.82	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5757.632	46.93	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8443.929	46.89	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12137.588	47.10	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

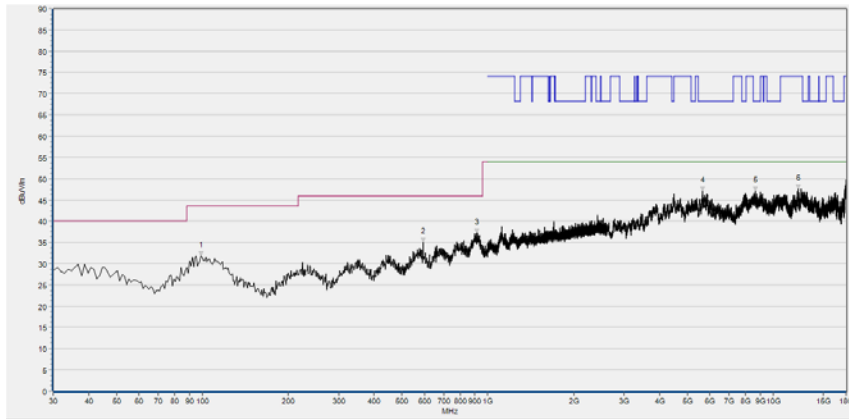
(Antenna Horizontal, 30MHz to 18GHz)



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
98.939	32.53	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
571.802	33.99	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
913.584	37.98	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5218.524	47.03	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8419.284	47.91	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12880.016	48.64	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

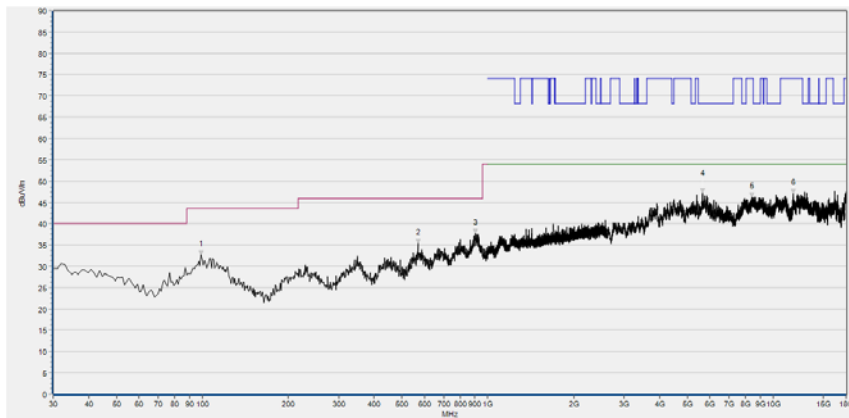
(Antenna Vertical, 30MHz to 18GHz)

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
98.939	31.88	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
594.134	34.99	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
912.613	37.26	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5662.132	47.15	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8656.491	47.04	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12199.200	47.62	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

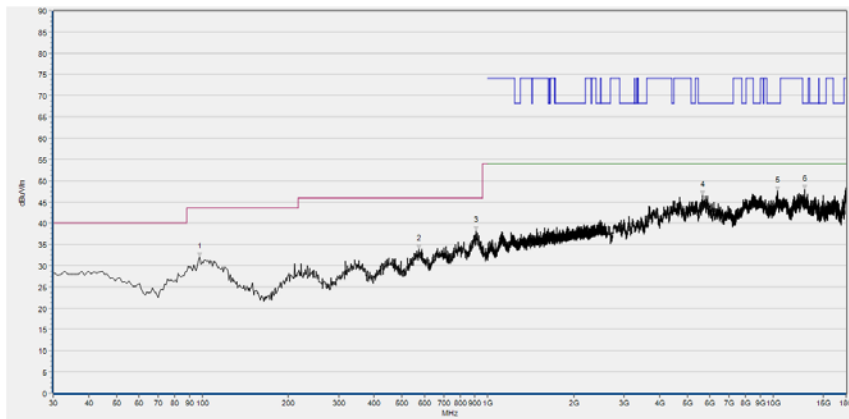
(Antenna Horizontal, 30MHz to 18GHz)



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
98.939	32.62	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
568.889	35.40	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
904.845	37.72	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5640.568	47.27	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8391.558	46.22	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11730.946	47.06	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

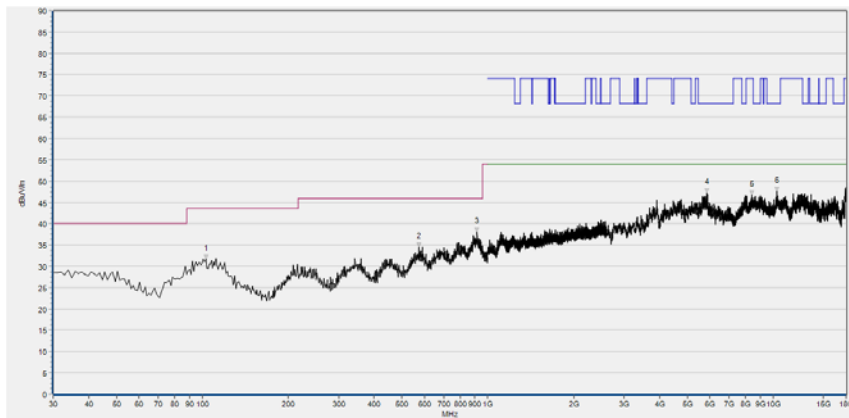
(Antenna Vertical, 30MHz to 18GHz)

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
97.968	32.02	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
572.773	33.91	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
909.700	38.29	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5659.052	46.55	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
10344.669	47.55	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12895.419	48.01	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

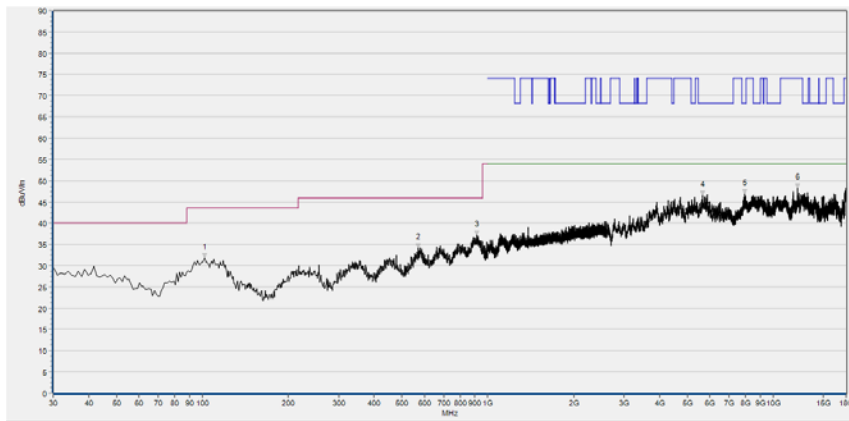
(Antenna Horizontal, 30MHz to 18GHz)



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
102.823	31.76	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
572.773	34.52	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
916.496	38.05	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5853.131	47.29	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8416.203	46.76	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10276.895	47.57	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

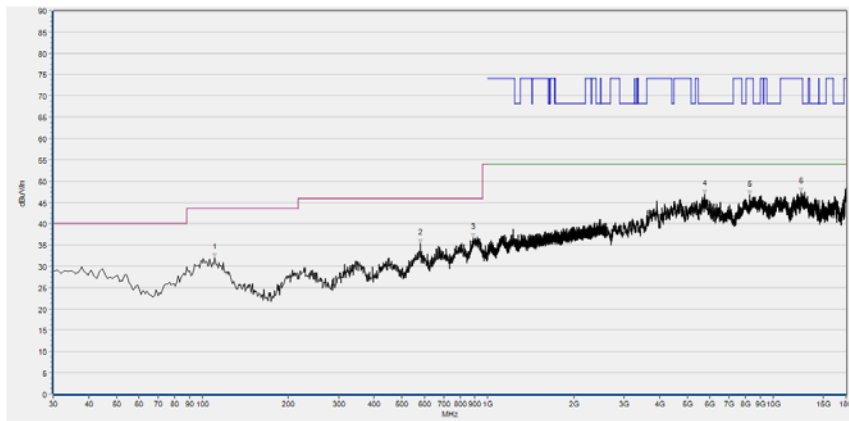
(Antenna Vertical, 30MHz to 18GHz)

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
101.852	31.77	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
569.860	34.21	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
913.584	37.23	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5652.891	46.57	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
7951.030	46.98	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12137.588	48.20	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

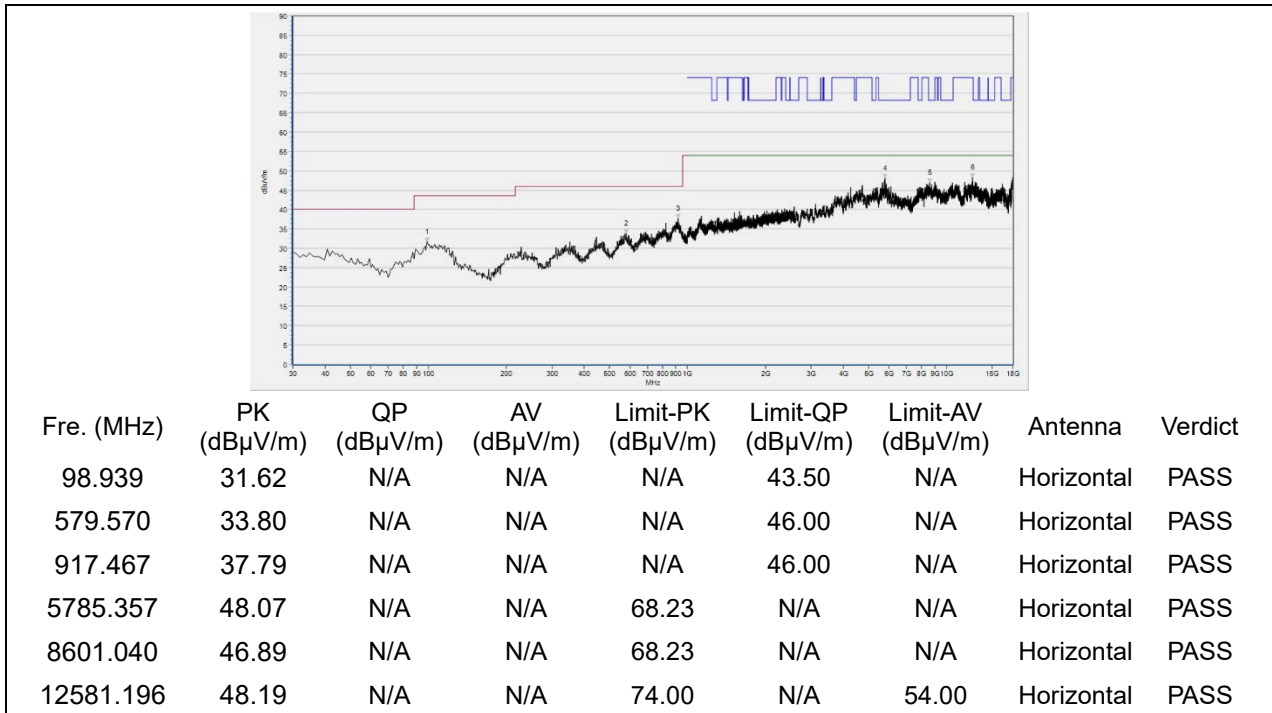


Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
110.591	32.05	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
581.512	35.33	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
891.251	36.68	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5760.712	46.89	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8286.817	46.73	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12513.423	47.44	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

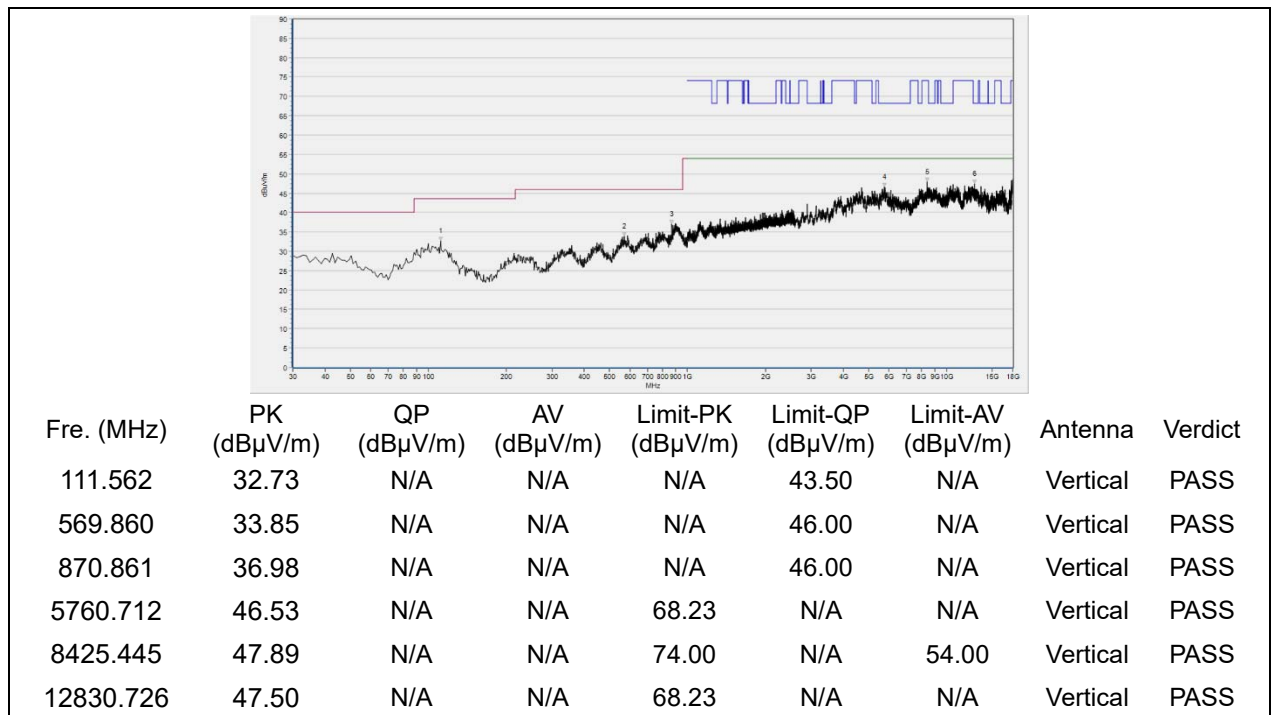
(Antenna Vertical, 30MHz to 18GHz)



Plot for Channel 165



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)

END OF REPORT