



REPORT No.: SZ25070423W04

TEST REPORT

APPLICANT : Anker Innovations Limited

PRODUCT NAME : soundcore Nebula P1

MODEL NAME : D2431

BRAND NAME : soundcore

FCC ID : 2AOKB-D2431

STANDARD(S) : 47 CFR Part 15 Subpart C

RECEIPT DATE : 2025-07-31

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Change History		
Version	Date	Reason for change
1.0	2025-09-10	First edition



1. Summary of Test Result

No.	Section	Description	Test Date	Test Engineer	Result	Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	/
2	N/A	Duty Cycle of Test Signal	Aug. 12, 2025	Li Xinpeng	PASS	/
3	15.247(b)	Maximum Peak Conducted Output Power	Aug. 12, 2025	Li Xinpeng	PASS	/
4	15.247(b)	Maximum Average Conducted Output Power	Aug. 12, 2025	Li Xinpeng	PASS	/
5	15.247(a)	Bandwidth	Aug. 12, 2025	Li Xinpeng	PASS	/
6	15.247(d)	Conducted Spurious Emission and Band Edge	Aug. 12, 2025	Li Xinpeng	PASS	/
7	15.247(e)	Power Spectral Density	Aug. 12, 2025	Li Xinpeng	PASS	/
8	15.207	Conducted Emission	Aug. 07 to 26, 2025	Wang Yapeng Fan Zehang	PASS	/
9	15.247(d)	Restricted Frequency Bands	Aug. 14, 2025 to Sep. 09, 2025	Zhong Xiangyun	PASS	/
10	15.209, 15.247(d)	Radiated Emission	Aug. 14 to 16, 2025	Wang Deyong	PASS	/

Note 1: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2020 and KDB 558074 D01 v05r02.

Note 2: Any additions, deviation, or exclusions from the method shall be noted in the “Remark”.

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 C Radio Frequency Devices



1.2. Test Equipment List

1.2.1 Conducted Test Equipment

Equipment	Serial No.	Type	Manufacturer	Cal. Date	Due Date
EXA Signal Analyzer	MY53470836	N9010A	Agilent	2025.01.15	2026.01.14
RF Cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

1.2.2 Conducted Emission Test Equipment

Equipment	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	101052	ESPI	R&S	2025.05.15	2026.05.14
LISN	103131	ENV 216	R&S	2025.03.20	2026.03.19
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	R&S	2025.05.13	2026.05.12
RF Coaxial Cable (DC-100MHz)	EMC-CE-00514	N/A	N/A	2025.05.06	2026.05.05

1.2.3 List of Software Used

Description	Manufacturer	Software Version
Test System	MaiWei	2.0.0.0
JS32-RE	Tonscend	5.0.0
TS+ -[JS32-CE]	Tonscend	2.5.0.0

**1.2.4 Radiated Test Equipment**

Equipment	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Signal Analyzer	MY56060145	N9020A	Agilent	2025.05.13	2026.05.12
Test Antenna - Bi-Log	9163-274	VULB 9163	Schwarzbeck	2025.06.28	2026.06.27
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2025.05.16	2026.05.15
Test Antenna – Horn	9120D-963	BBHA 9120D	Schwarzbeck	2025.05.16	2026.05.15
Test Antenna – Horn	BBHA9170 #773	BBHA9170	Schwarzbeck	2025.06.20	2026.06.19
Preamplifier (10MHz-6GHz)	46732	S10M100L38 02	LUCIX CORP.	2025.05.13	2026.05.12
Preamplifier (2GHz-18GHz)	61171/61172	S020180L32 03	LUCIX CORP.	2025.05.13	2026.05.12
Preamplifier (18GHz-40GHz)	DS77209	DCLNA0118-40C-S	Decentest	2025.05.13	2026.05.12
RF Coaxial Cable (DC-18GHz)	MRE001	PE330	Pasternack	2025.05.13	2026.05.12
RF Coaxial Cable (DC-18GHz)	MRE002	CLU18	Pasternack	2025.05.13	2026.05.12
RF Coaxial Cable (DC-18GHz)	MRE003	CLU18	Pasternack	2025.05.13	2026.05.12
RF Coaxial Cable (DC-40GHz)	22290045	QA360-40-KK-0.5	Qualwave	2024.09.11	2025.09.10
RF Coaxial Cable (DC-40GHz)	22290046	QA360-40-KKF-2	Qualwave	2024.09.11	2025.09.10
RF Coaxial Cable (DC-18GHz)	22120181	QA500-18-NN-5	Qualwave	2024.09.11	2025.09.10
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	N/A	N/A
Anechoic Chamber	N/A	9m*6m*6m	CRT	2025.06.21	2028.06.20
Anechoic Chamber	N/A	9m*6m*6m	CRT	2022.11.30	2025.11.29



1.3. Measurement Uncertainty

Test Items	Uncertainty	Remark
Peak Output Power	$\pm 2.22\text{dB}$	Confidence levels of 95%
Power Spectral Density	$\pm 2.22\text{dB}$	Confidence levels of 95%
Bandwidth	$\pm 5\%$	Confidence levels of 95%
Conducted Spurious Emission	$\pm 2.77\text{dB}$	Confidence levels of 95%
Restricted Frequency Bands	$\pm 5\%$	Confidence levels of 95%
Radiated Emission	$\pm 2.95\text{dB}$	Confidence levels of 95%
Conducted Emission	$\pm 2.44\text{dB}$	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:	Anker Innovations Limited
Applicant Address:	Unit 56, 8th Floor, Tower 2, Admiralty Centre, 18 Harcourt Road, Hong Kong
Manufacturer:	Anker Innovations Limited
Manufacturer Address:	Unit 56, 8th Floor, Tower 2, Admiralty Centre, 18 Harcourt Road, Hong Kong

2.2. Information of EUT

Product Name:	soundcore Nebula P1	
Sample No.:	1#, 2#, 3#, 6#	
Hardware Version:	V5	
Software Version:	11.0.43	
Module Type:	☐ MTK7663; ☒ BES2710 (The product includes two modules.)	
Equipment Type:	Bluetooth LE	
Bluetooth Version:	5.4	
Modulation Type:	GFSK	
Data Rate:	1Mbps, 2Mbps	
Operating Frequency Range:	2402MHz-2480MHz	
Antenna Type:	FPC Antenna	
Antenna Gain:	4.14dBi	
Accessory Information:	AC Adapter	
	Brand Name:	N/A
	Model No.:	A2672
	Serial No.:	N/A
	Rated Output:	5.0V $\pm$ 3.0A; 9.0V $\pm$ 3.0A; 12.0V $\pm$ 3.0A; 15.0V $\pm$ 3.0A; 20.0V $\pm$ 5.0A;
	Rated Input:	100-240V $\sim$ 50/60Hz, 2.2A
	Manufacturer:	Anker Innovations Limited

Note 1: The EUT description presented in the report are provided by applicant and/or manufacturer, and the test laboratory is not responsible for the accuracy of the information. 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

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

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

2.4. Test Configuration of EUT

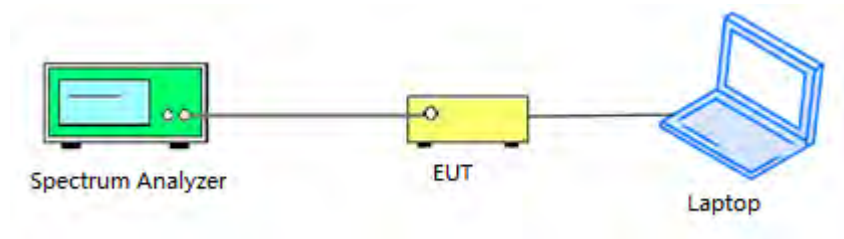
The EUT is controlled by dedicated software to transmit at the default maximum power level.

2.5. Test Conditions

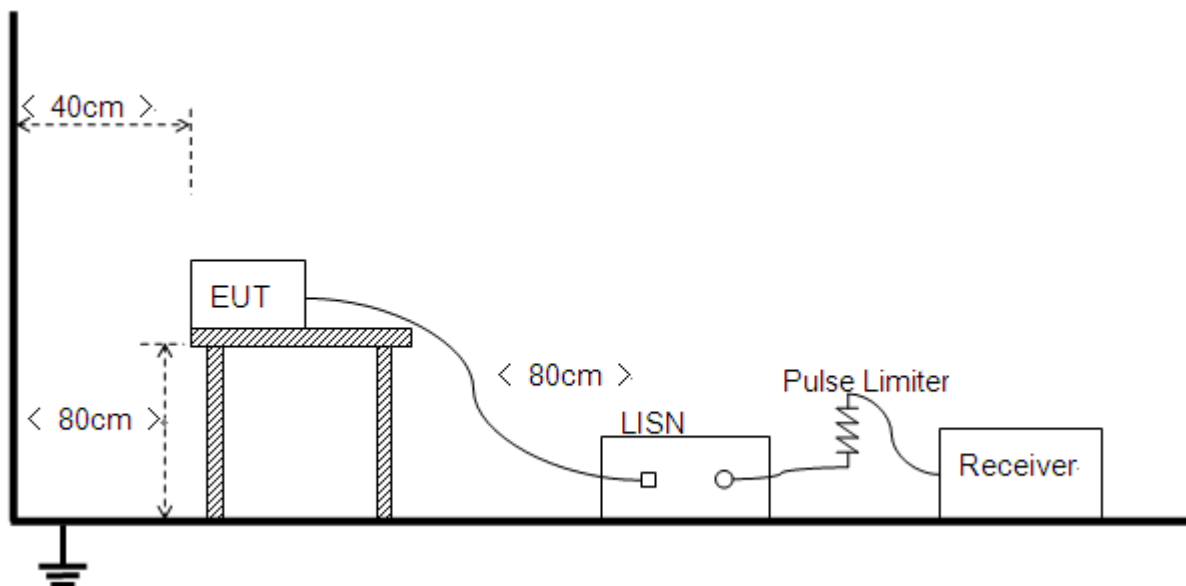
Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106

2.6. Test Setup Layout Diagram

2.6.1. Conducted Measurement

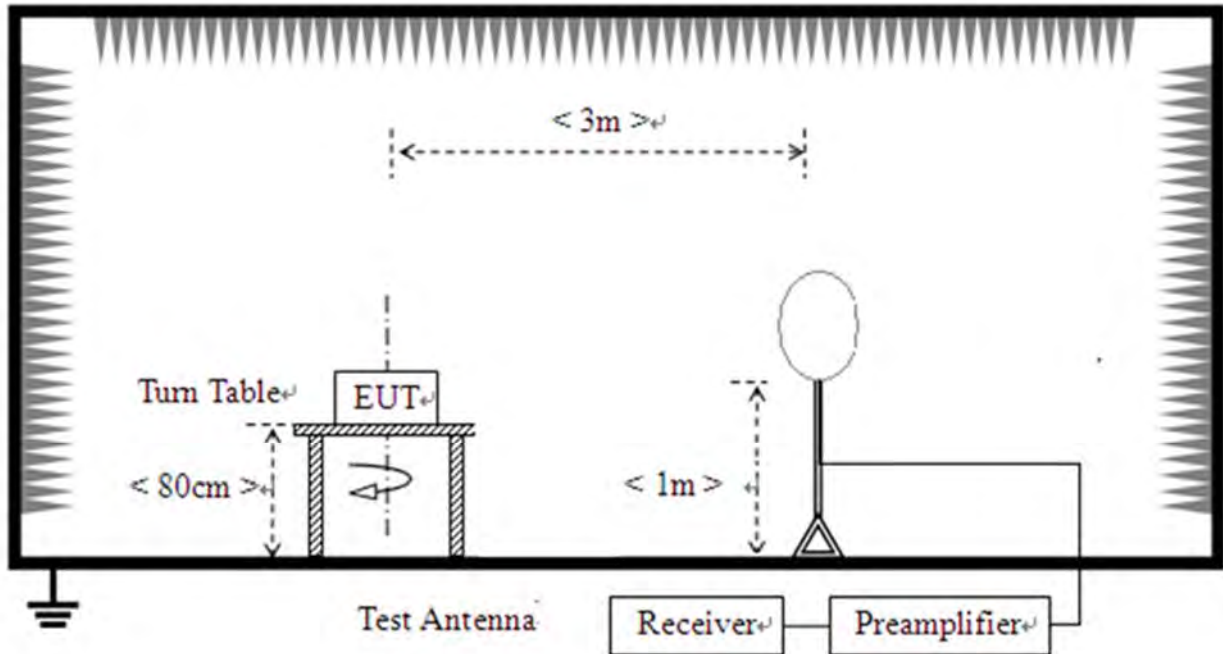


2.6.2. Conducted Emission Measurement

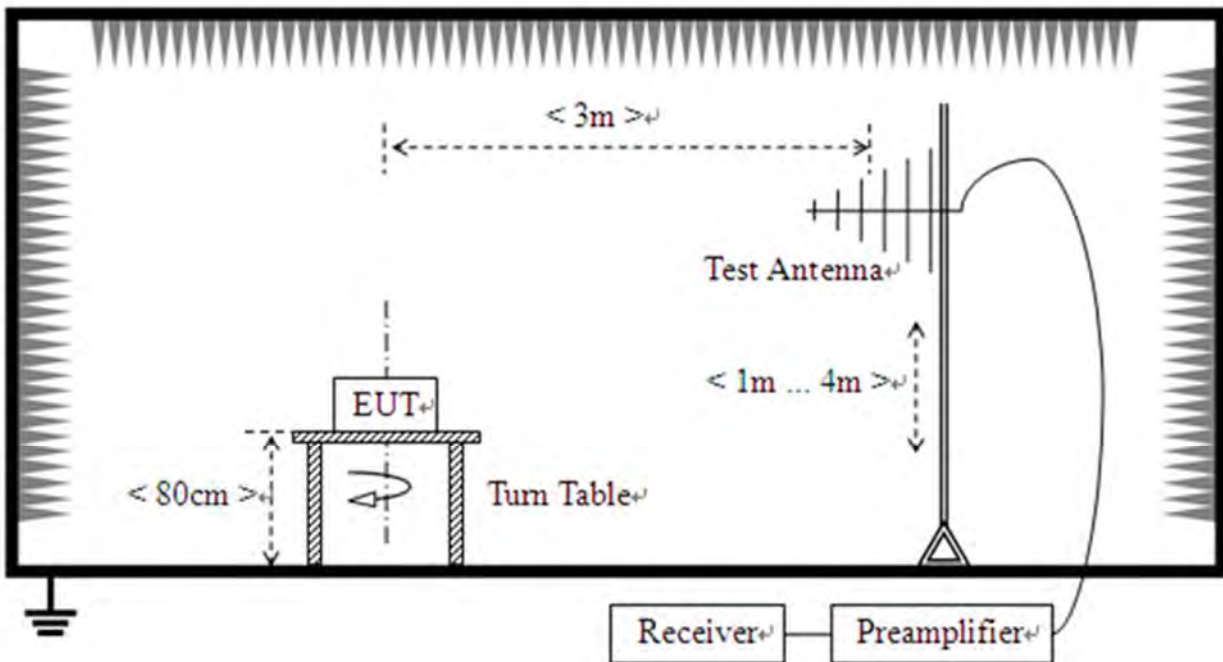


2.6.3.Radiation Measurement

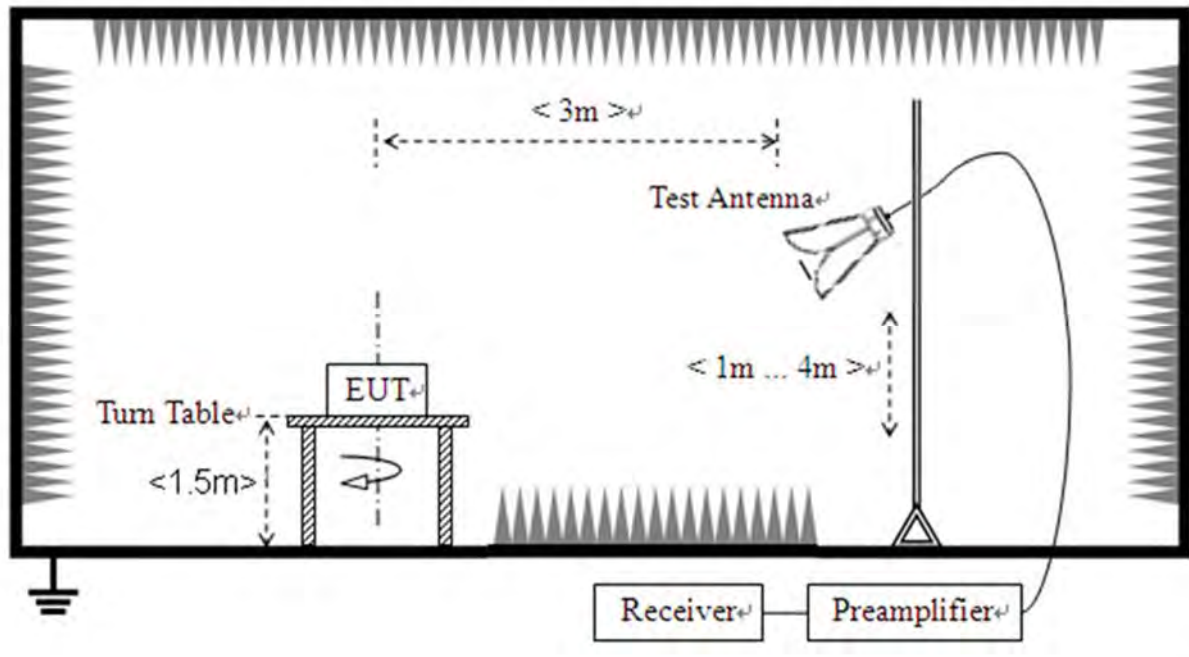
1) For radiated emissions from 9kHz to 30MHz



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

Antenna location	Antenna Type	Coupling Method
☒ Internal ☐ External	☒ FPC Antenna ☐ Spring Antenna ☐ Ceramic Antenna ☐ Integrated Antenna ☐ Dipole Antenna ☐ PCB Antenna ☐ PIFA Antenna ☐ Inverted F Antenna	☒ I-PEX Connector ☐ SMA Connector ☐ RP-SMA Connector ☐ Metal Shrapnel ☐ Layout

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 Peak Conducted Output Power

3.3.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

3.3.2. Test Procedures

KDB 558074 Section 8.3.1 was used in order to prove compliance.

3.3.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.3.4. Test Result

Refer to Annex A.2 in this report.



3.4. Maximum Average Conducted Output Power

3.4.1. Requirement

According to FCC section 15.247(b)(3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum average conducted output power of the intentional radiator shall not exceed 1 Watt.

3.4.2. Test Procedures

KDB 558074 Section 8.3.2 was used in order to prove compliance.

3.4.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.4.4. Test Result

Refer to Annex A.3 in this report.



3.5.6 dB Bandwidth

3.5.1.Requirement

According to FCC section 15.247(a) (2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

3.5.1.Test Procedures

The steps for the first option are as follows:

- a) Set analyzer center frequency to channel center frequency
- b) Set RBW to 100kHz
- c) Set VBW to 300kHz
- d) Detector = peak.
- e) Trace mode = max hold
- f) Sweep time = auto couple
- g) Allow the trace to fully stabilize
- h) 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

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., $RBW = 100\text{ kHz}$, $VBW \geq 3 \times RBW$, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geq 6\text{ dB}$.

3.5.2.Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.5.3.Test Result

Refer to Annex A.4 in this report.



3.6. Conducted Spurious Emissions and Band Edge

3.6.1. Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

3.6.2. Test Procedures

KDB 558074 Section 8.5 and 8.7 was used in order to prove compliance.

3.6.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.6.4. Test Result

Refer to Annex A.5 and A.6 in this report.

3.7. Power Spectral Density

3.7.1. Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

3.7.2. Test Procedures

The measured power spectral density was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for PSD test:

- a) Set analyzer center frequency to channel center frequency
- b) Set span to 1.5 times DTS
- c) Set RBW to 3kHz
- d) Set VBW to 10kHz
- e) Detector = peak
- f) Sweep time = auto couple
- g) Trace mode = max hold
- h) Allow trace to fully stabilize
- i) Use the peak marker function to determine the maximum amplitude level within the RBW

3.7.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.7.4. Test Result

Refer to Annex A.7 in this report.

3.8. Conducted Emission

3.8.1. 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.

3.8.2. 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.

3.8.3. Test Setup Layout

Refer to chapter 2.6.2 in this report.

3.8.4. Test Result

Refer to Annex A.8 in this report.



3.9. Restricted Frequency Bands

3.9.1. Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

3.9.2. 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.

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.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1\text{GHz}$, 100 kHz for $f < 1\text{GHz}$

VBW = 3 MHz

Sweep = auto

Detector function = peak/average

Trace = max hold

Allow the trace to stabilize

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.

3.10. Radiated Emission

3.10.1.Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

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

Note1: 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.

Note2:For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).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).



3.10.2.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.

3.10.3.Test Setup Layout

Refer to chapter 2.6.3 in this report.

3.10.4.Test Result

Refer to Annex A.10 in this report.



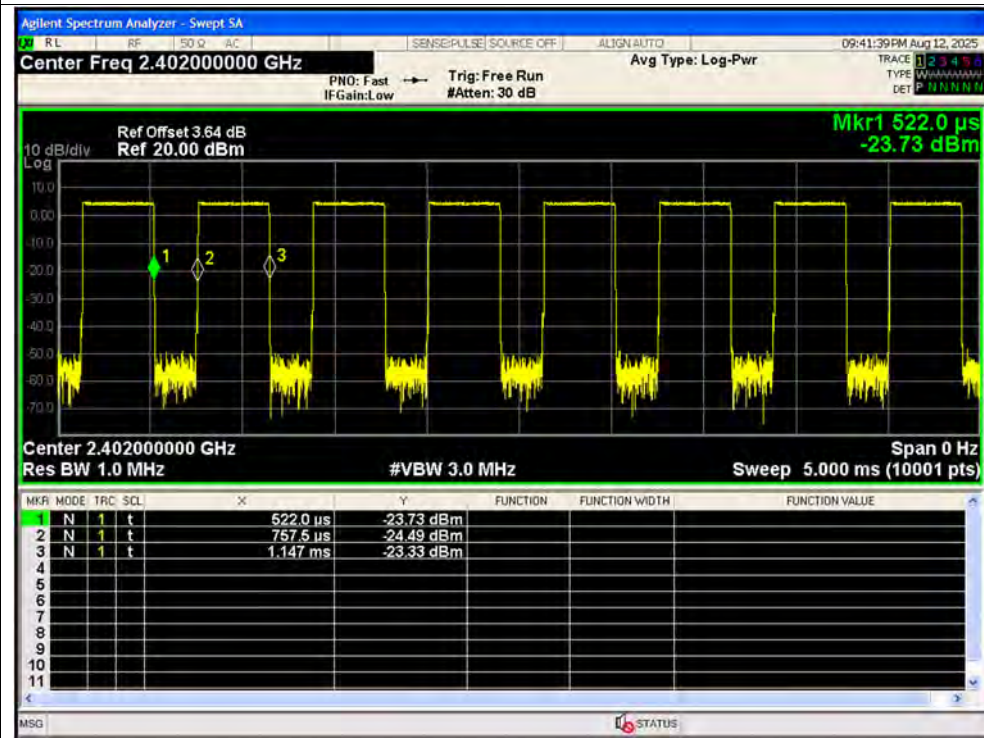
Annex A Test Data and Result

A.1. Duty Cycle of Test Signal

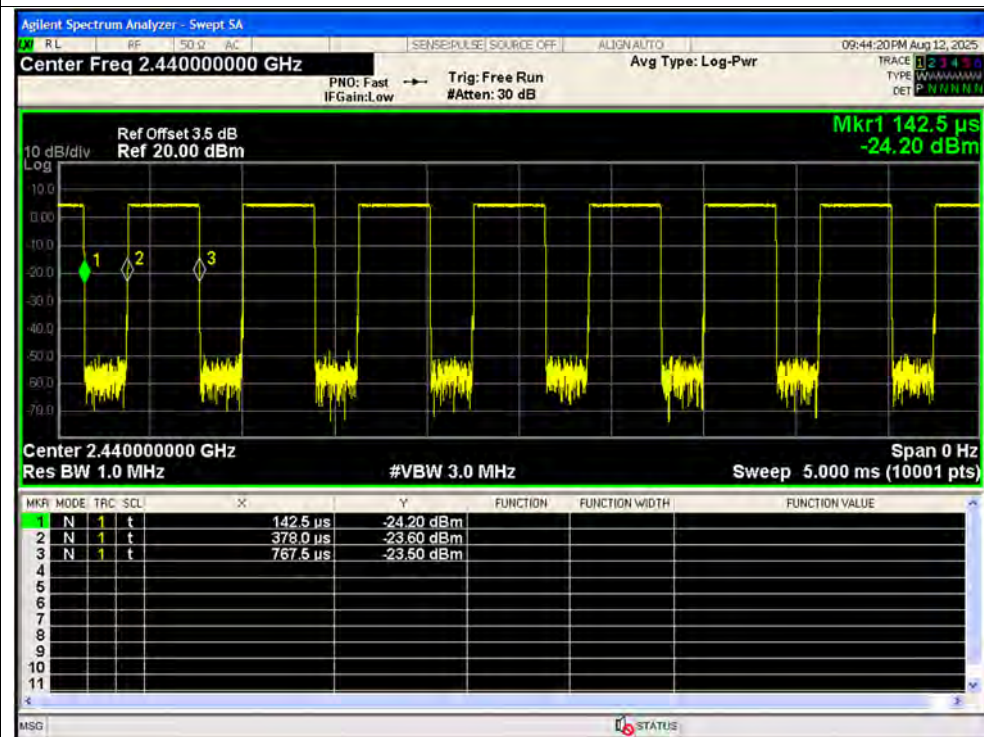
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant1	62.32	2.05	2.57
NVNT	BLE 1M	2440	Ant1	62.32	2.05	2.57
NVNT	BLE 1M	2480	Ant1	62.24	2.06	2.57
NVNT	BLE 2M	2402	Ant1	32.8	4.84	4.88
NVNT	BLE 2M	2440	Ant1	32.88	4.83	4.87
NVNT	BLE 2M	2480	Ant1	32.8	4.84	4.88

Test Graphs

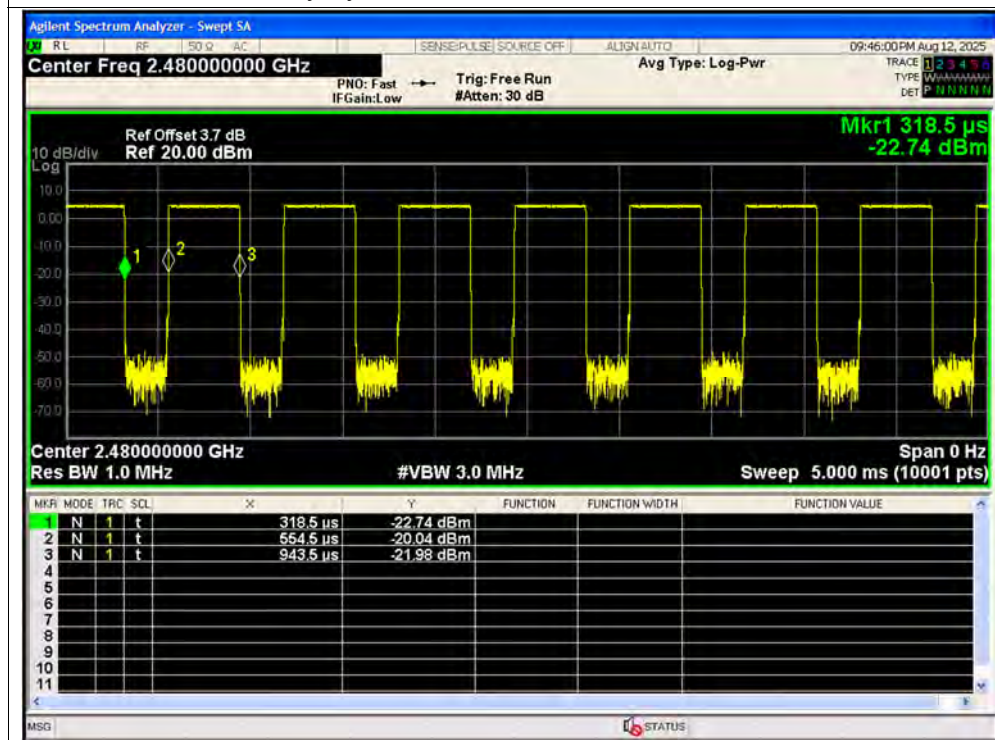
Duty Cycle NVNT BLE 1M 2402MHz Ant1



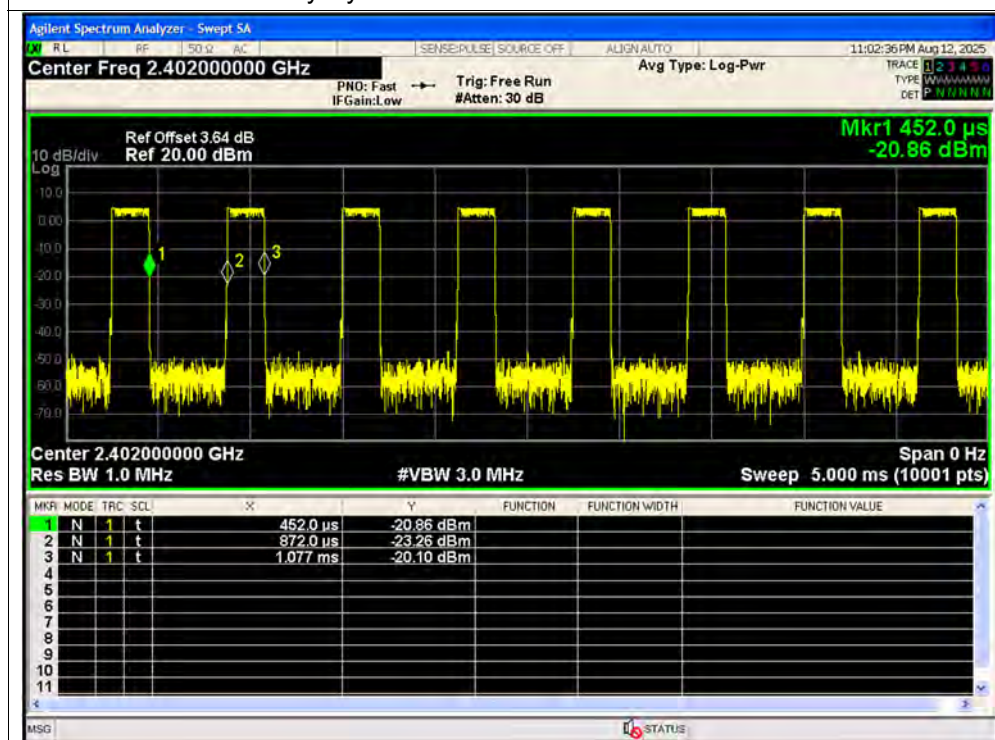
Duty Cycle NVNT BLE 1M 2440MHz Ant1



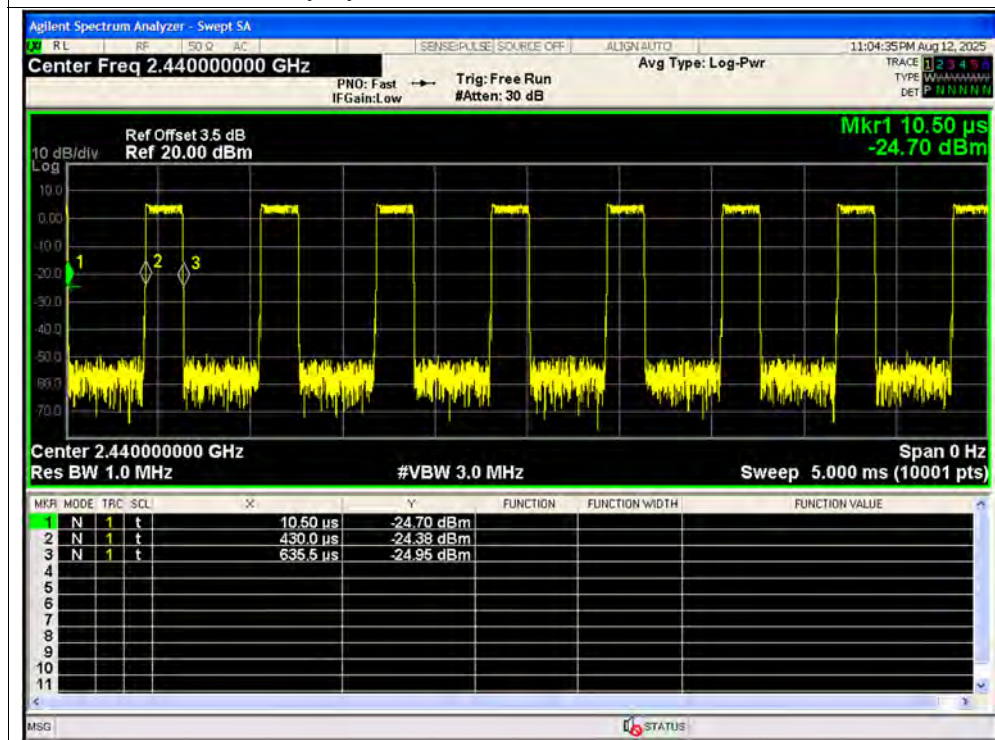
Duty Cycle NVNT BLE 1M 2480MHz Ant1



Duty Cycle NVNT BLE 2M 2402MHz Ant1



Duty Cycle NVNT BLE 2M 2440MHz Ant1



Duty Cycle NVNT BLE 2M 2480MHz Ant1



**A.2. Maximum Peak Conducted Output Power**

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Conducted Power (dBm)	Total Conducted Power (W)	Limit Conducted (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	5	0	5	0.00316	30	Pass
NVNT	BLE 1M	2440	Ant1	5.09	0	5.09	0.00323	30	Pass
NVNT	BLE 1M	2480	Ant1	5.19	0	5.19	0.0033	30	Pass
NVNT	BLE 2M	2402	Ant1	5.18	0	5.18	0.0033	30	Pass
NVNT	BLE 2M	2440	Ant1	5.3	0	5.3	0.00339	30	Pass
NVNT	BLE 2M	2480	Ant1	5.4	0	5.4	0.00347	30	Pass

Test Graphs

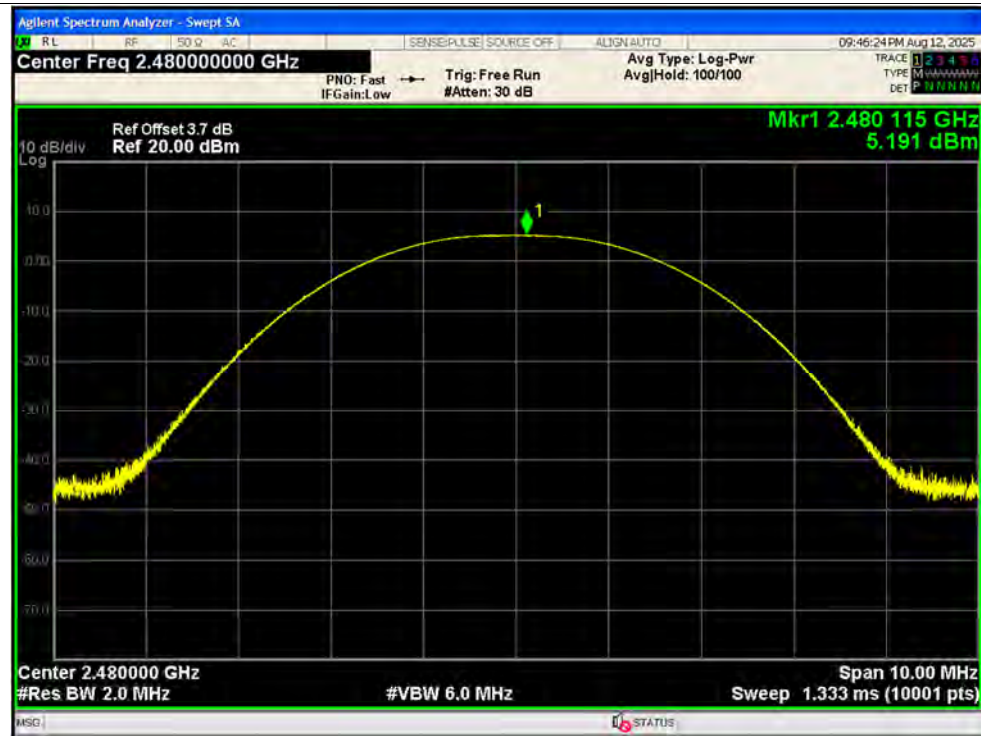
Peak Power NVNT BLE 1M 2402MHz Ant1



Peak Power NVNT BLE 1M 2440MHz Ant1



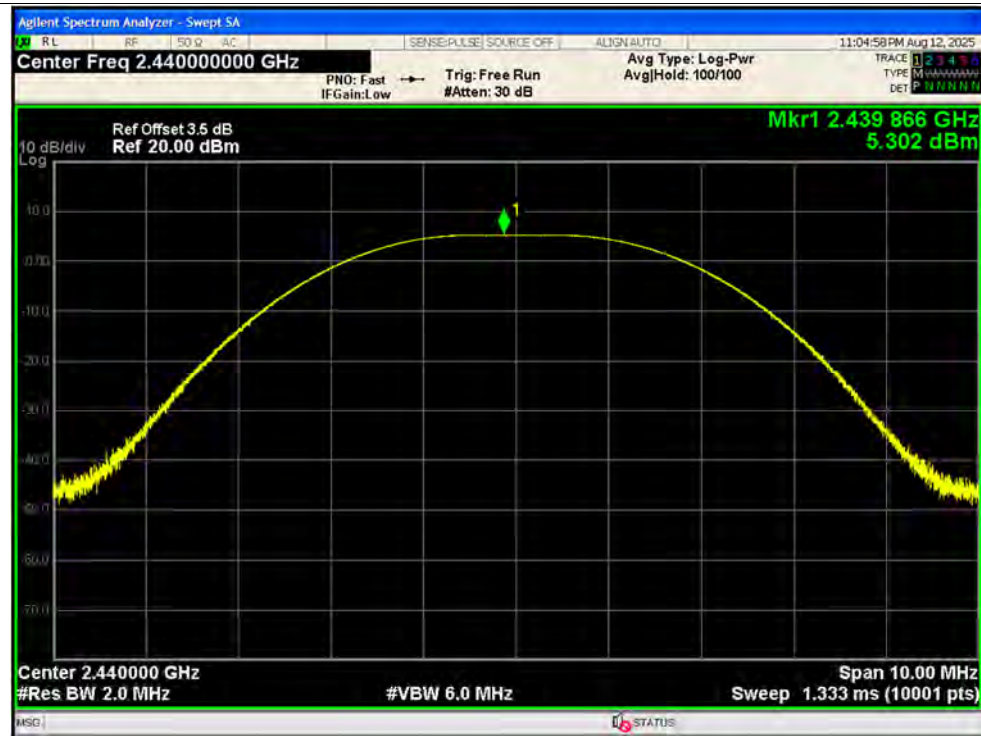
Peak Power NVNT BLE 1M 2480MHz Ant1



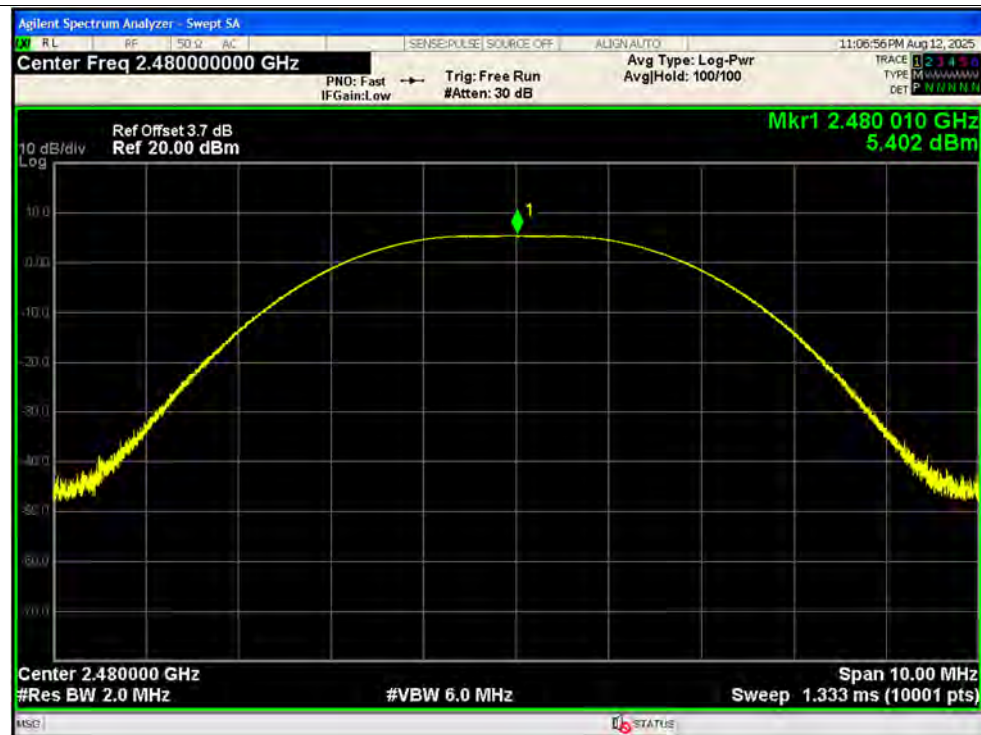
Peak Power NVNT BLE 2M 2402MHz Ant1



Peak Power NVNT BLE 2M 2440MHz Ant1



Peak Power NVNT BLE 2M 2480MHz Ant1



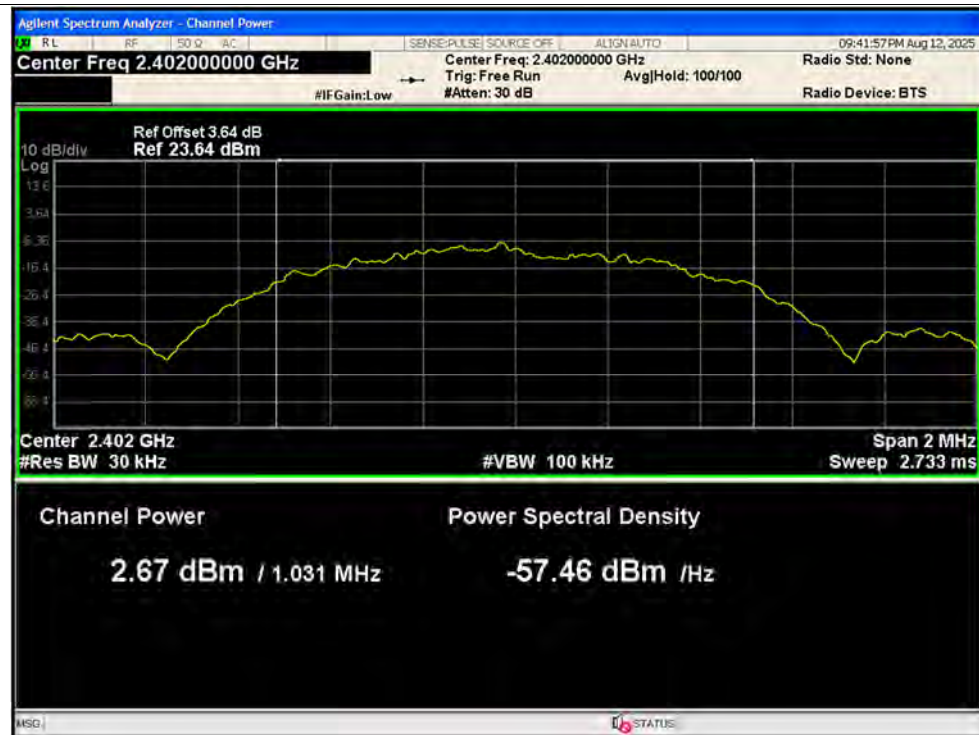
**A.3. Maximum Average Conducted Output Power**

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Conducted Power (dBm)	Total Conducted Power (W)	Limit Conducted (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	2.67	2.05	4.72	0.00296	30	Pass
NVNT	BLE 1M	2440	Ant1	2.76	2.05	4.81	0.00303	30	Pass
NVNT	BLE 1M	2480	Ant1	2.82	2.06	4.88	0.00308	30	Pass
NVNT	BLE 2M	2402	Ant1	-0.16	4.84	4.68	0.00294	30	Pass
NVNT	BLE 2M	2440	Ant1	-0.03	4.83	4.8	0.00302	30	Pass
NVNT	BLE 2M	2480	Ant1	0.12	4.84	4.96	0.00313	30	Pass



Test Graphs

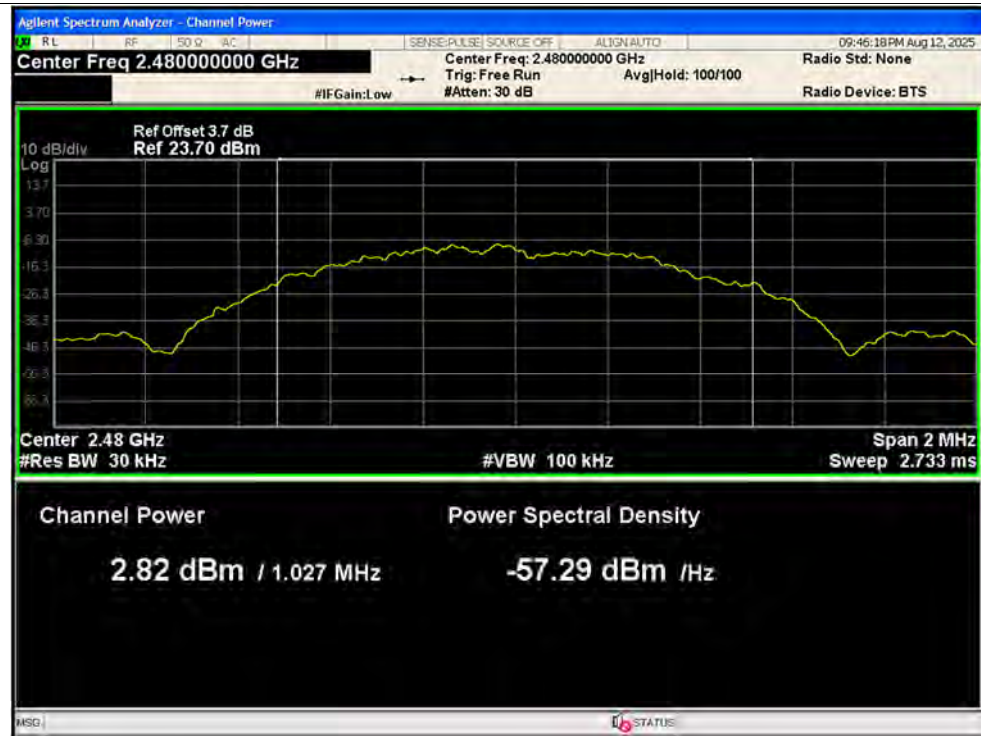
Average Power NVNT BLE 1M 2402MHz Ant1



Average Power NVNT BLE 1M 2440MHz Ant1



Average Power NVNT BLE 1M 2480MHz Ant1



Average Power NVNT BLE 2M 2402MHz Ant1





Average Power NVNT BLE 2M 2440MHz Ant1



Average Power NVNT BLE 2M 2480MHz Ant1



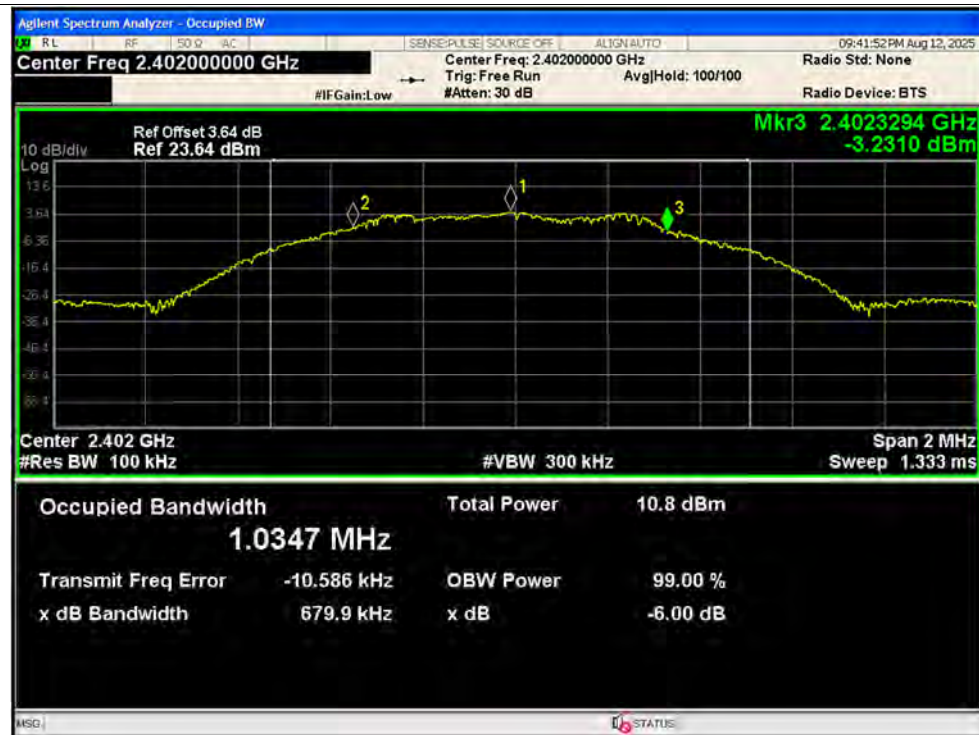
**A.4. 6 dB Bandwidth**

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.6799	0.5	Pass
NVNT	BLE 1M	2440	Ant1	0.6629	0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.6854	0.5	Pass
NVNT	BLE 2M	2402	Ant1	1.153	0.5	Pass
NVNT	BLE 2M	2440	Ant1	1.147	0.5	Pass
NVNT	BLE 2M	2480	Ant1	1.143	0.5	Pass



Test Graphs

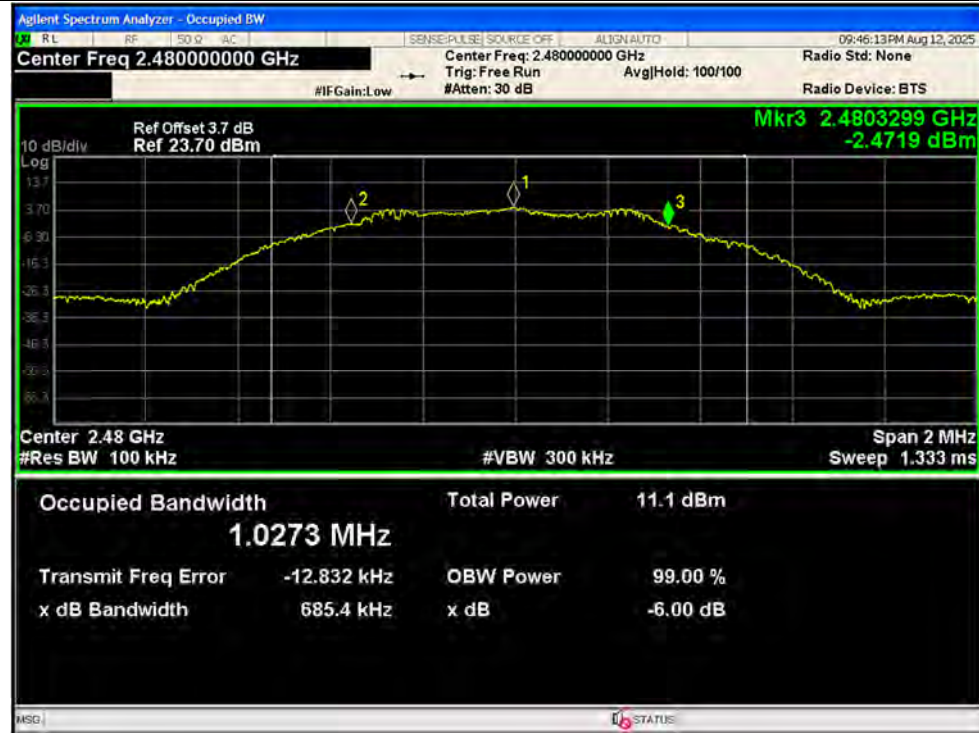
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2480MHz Ant1



**A.5. Conducted Spurious Emissions**

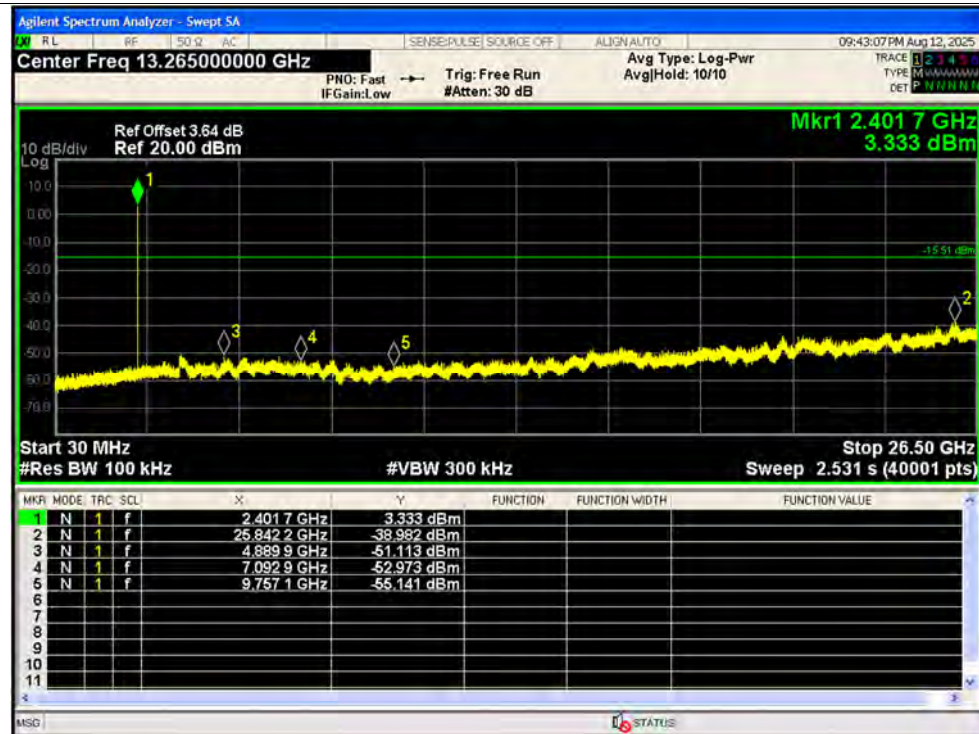
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-43.47	-20	Pass
NVNT	BLE 1M	2440	Ant1	-43.31	-20	Pass
NVNT	BLE 1M	2480	Ant1	-43.97	-20	Pass
NVNT	BLE 2M	2402	Ant1	-42.92	-20	Pass
NVNT	BLE 2M	2440	Ant1	-43.85	-20	Pass
NVNT	BLE 2M	2480	Ant1	-44.14	-20	Pass

Test Graphs

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



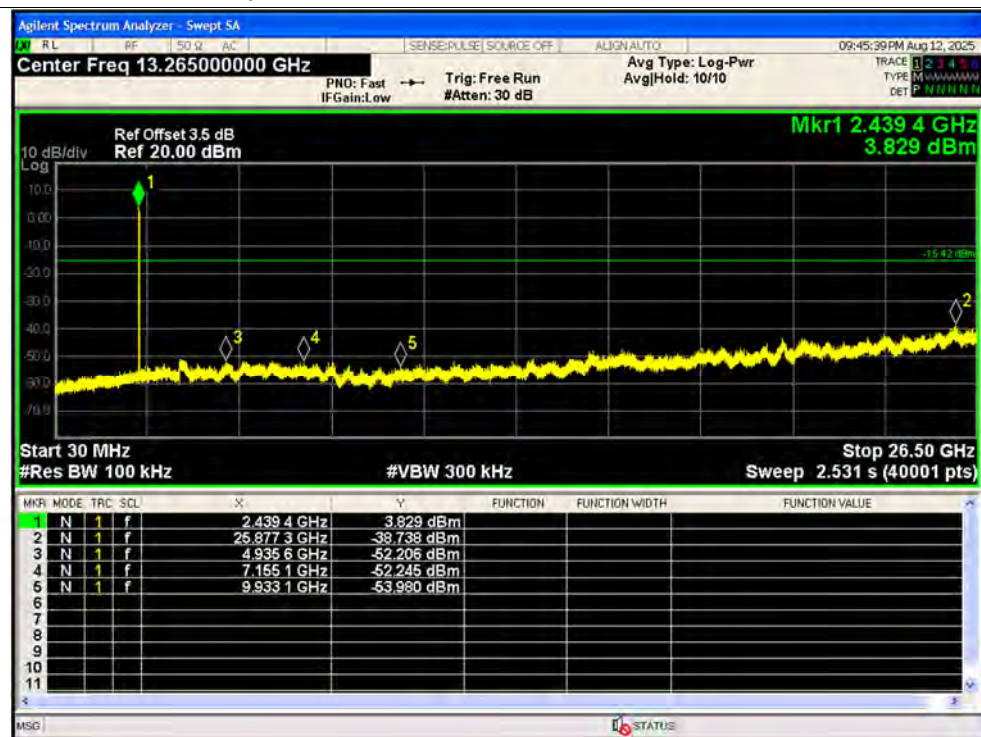
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref



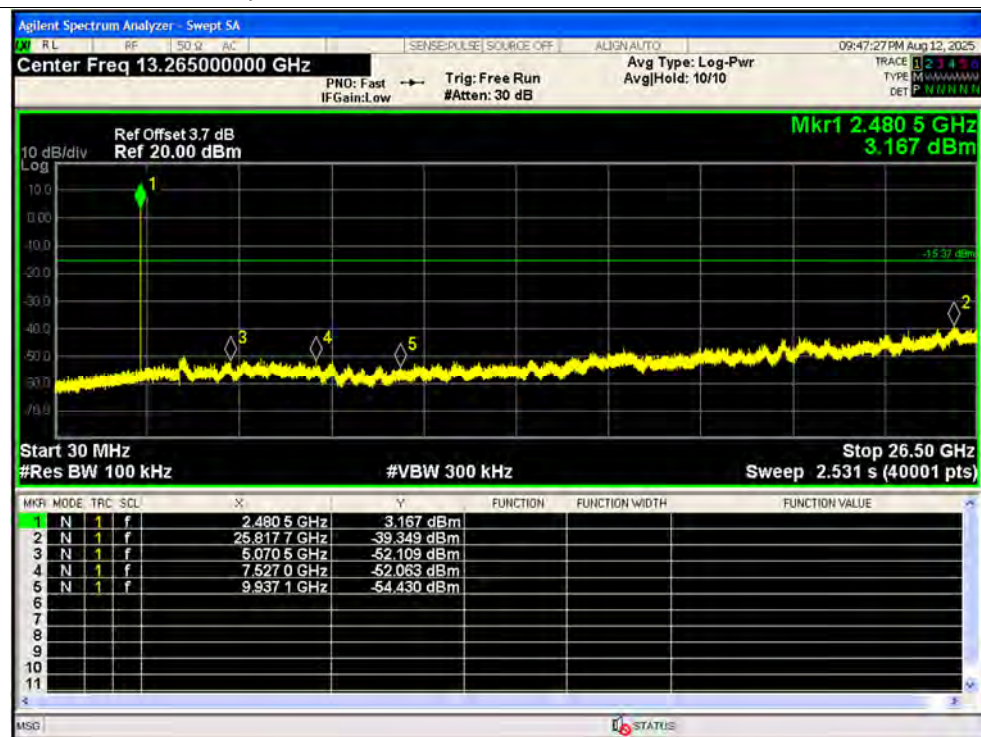
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



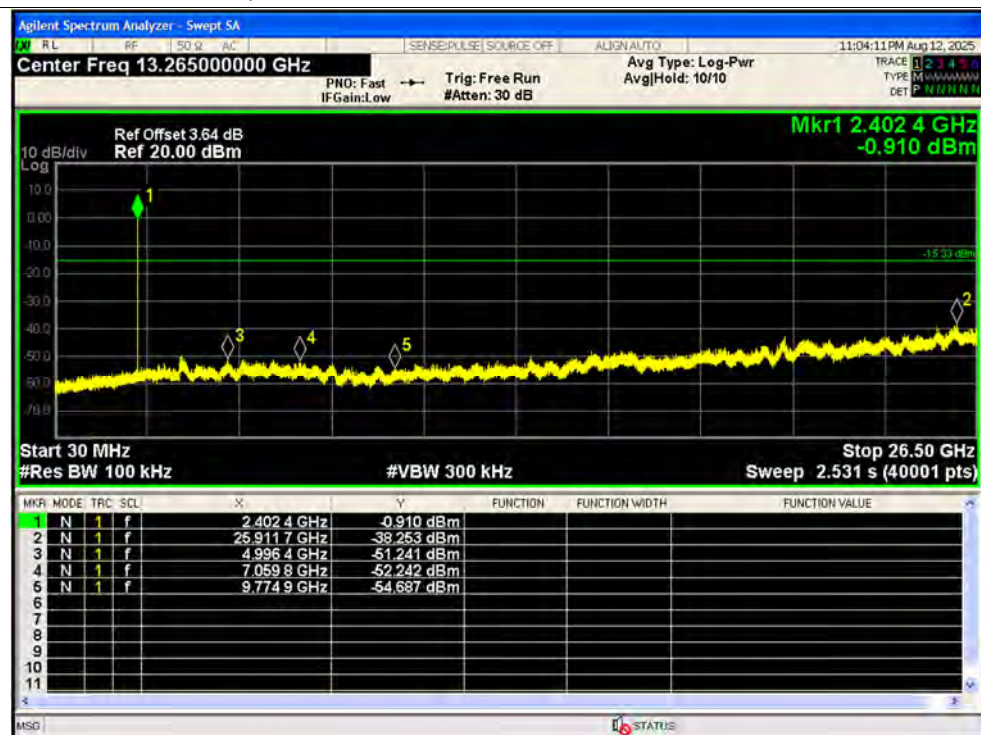
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Ref



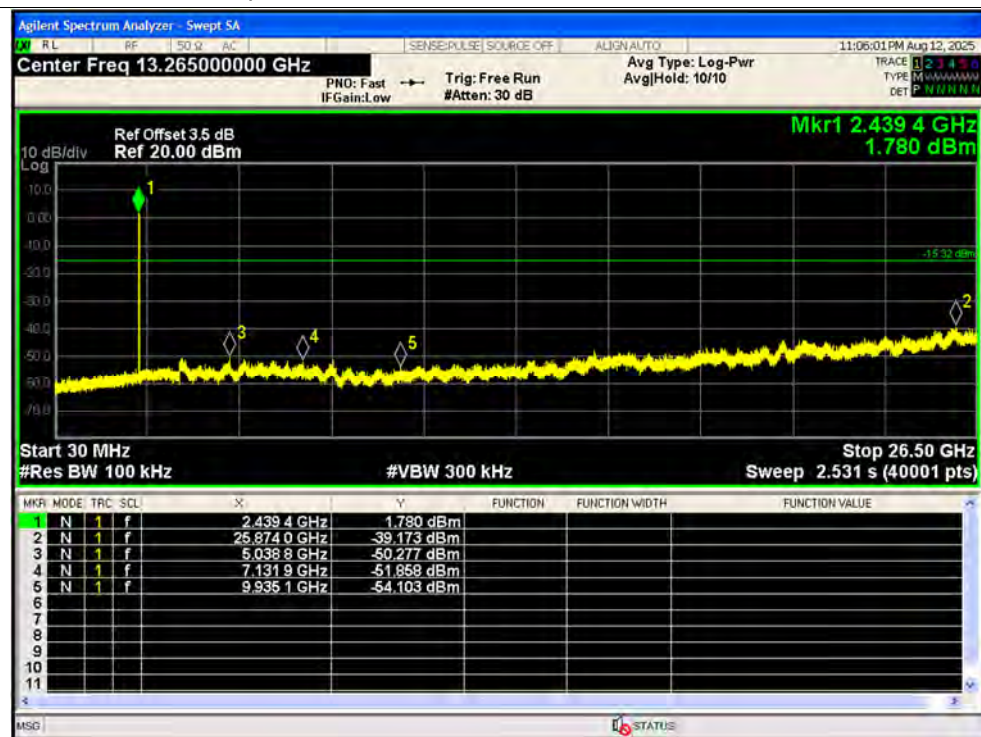
Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Emission



Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Ref



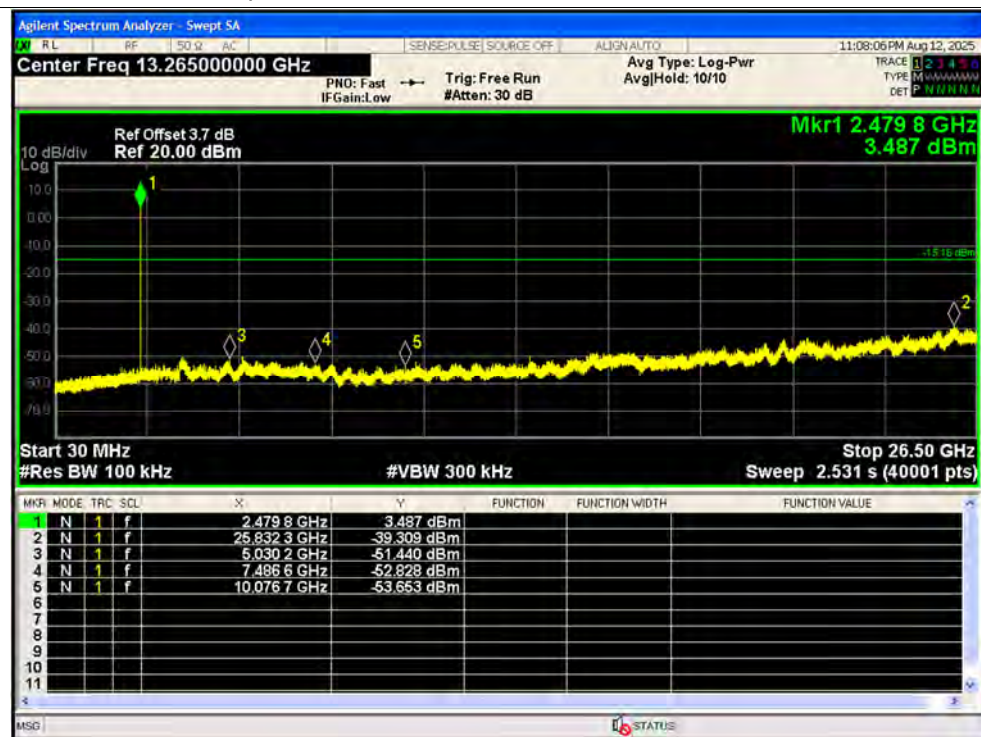
Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Emission



Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Emission





REPORT No.: SZ25070423W04

A.6. Band Edge

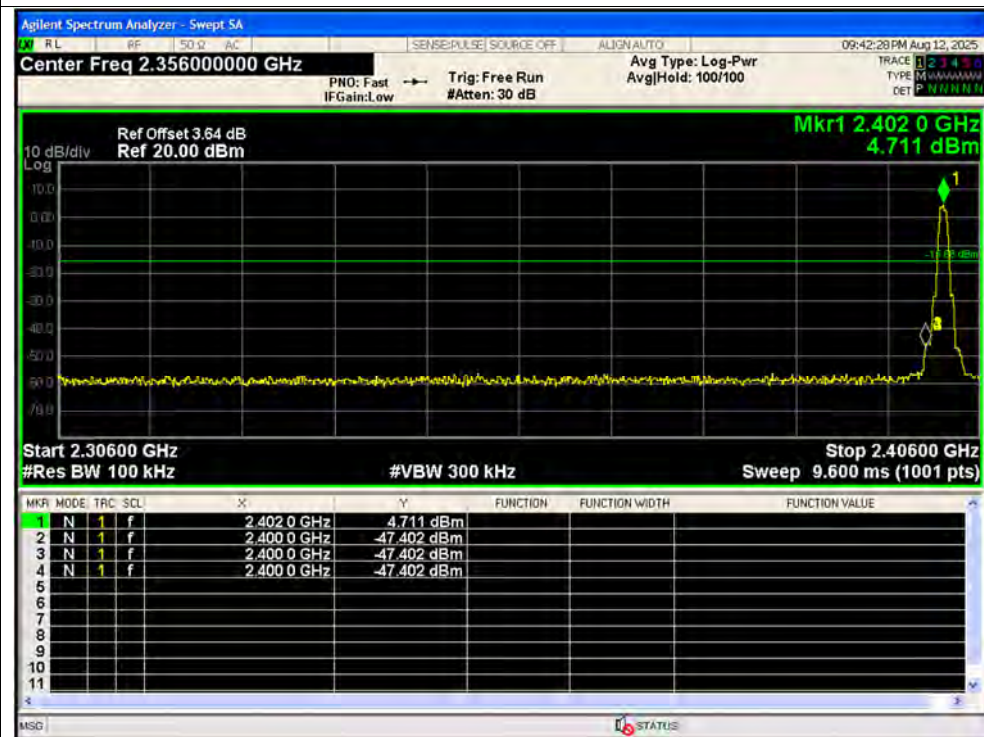
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-51.52	-20	Pass
NVNT	BLE 1M	2480	Ant1	-59.71	-20	Pass
NVNT	BLE 2M	2402	Ant1	-46.94	-20	Pass
NVNT	BLE 2M	2480	Ant1	-61.06	-20	Pass

Test Graphs

Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



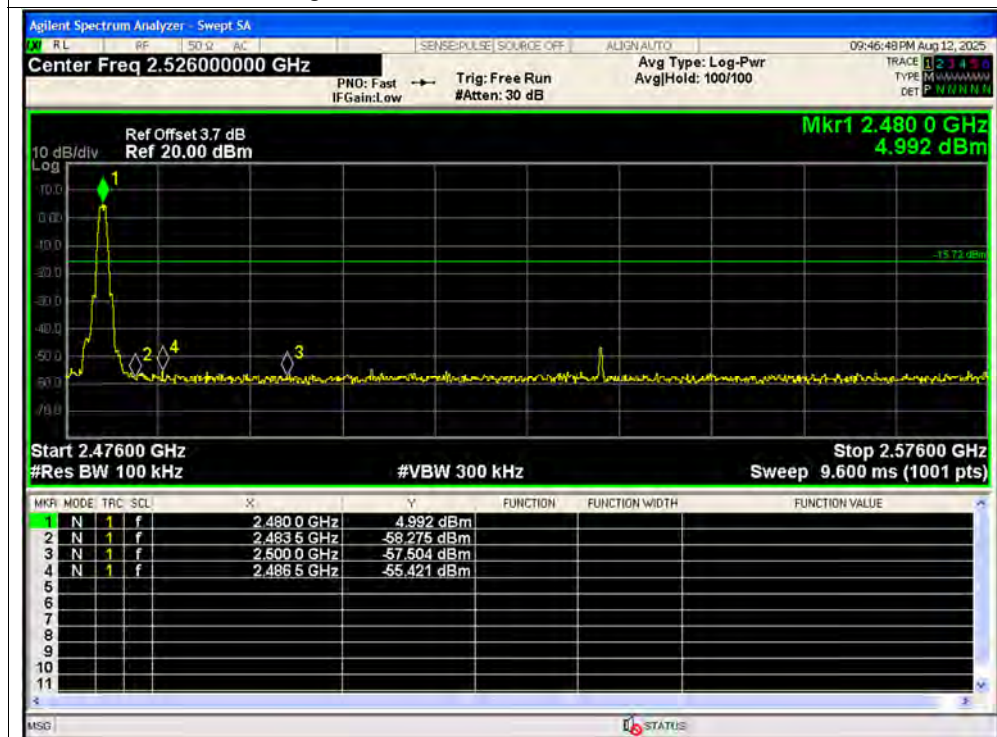
Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



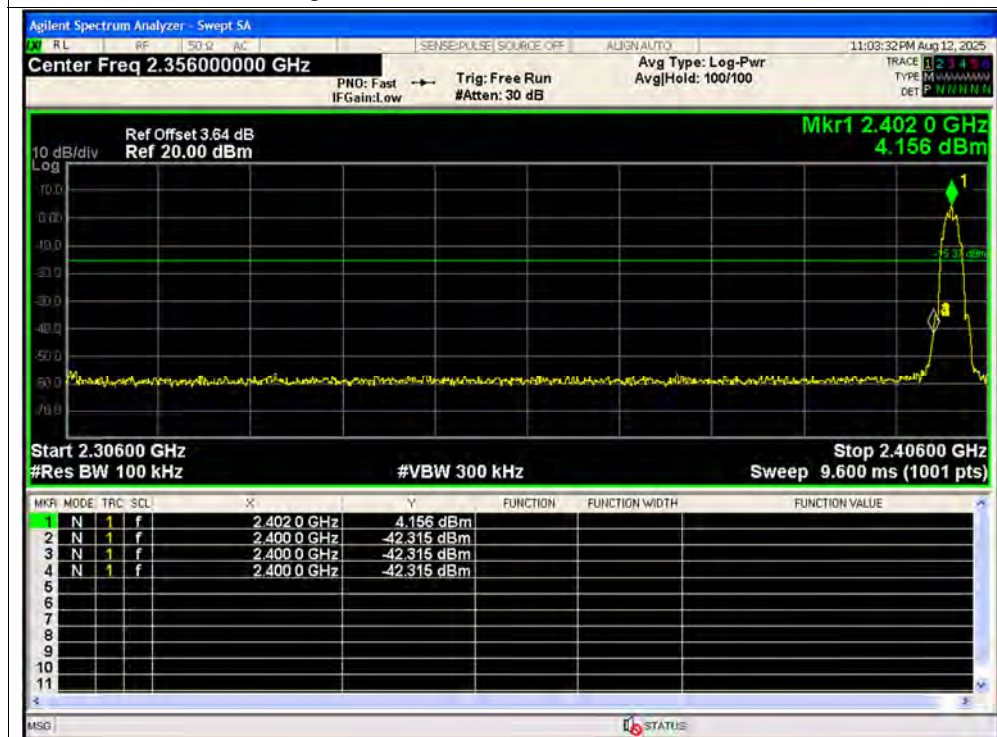
Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



Band Edge NVNT BLE 2M 2402MHz Ant1 Ref



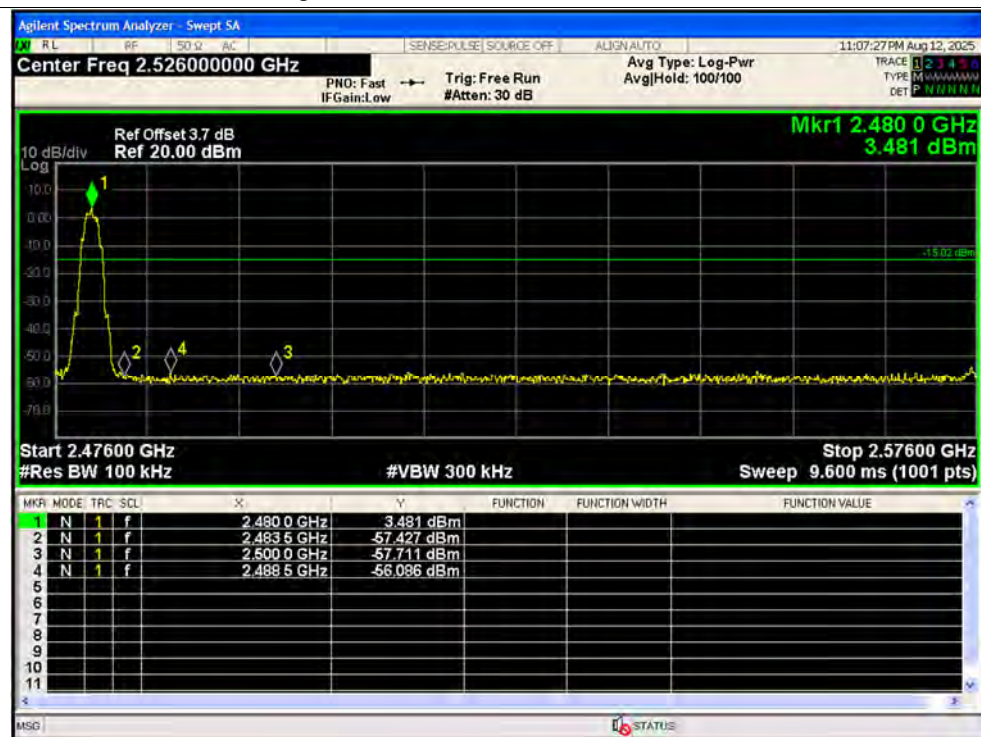
Band Edge NVNT BLE 2M 2402MHz Ant1 Emission



Band Edge NVNT BLE 2M 2480MHz Ant1 Ref



Band Edge NVNT BLE 2M 2480MHz Ant1 Emission

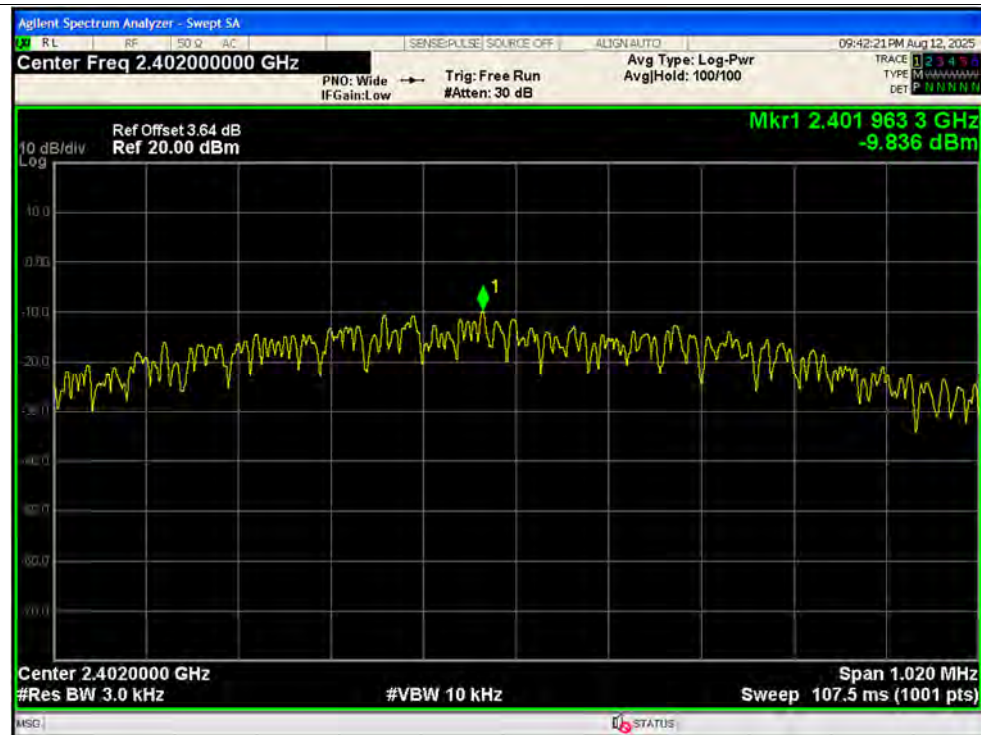


**A.7. Power Spectral Density**

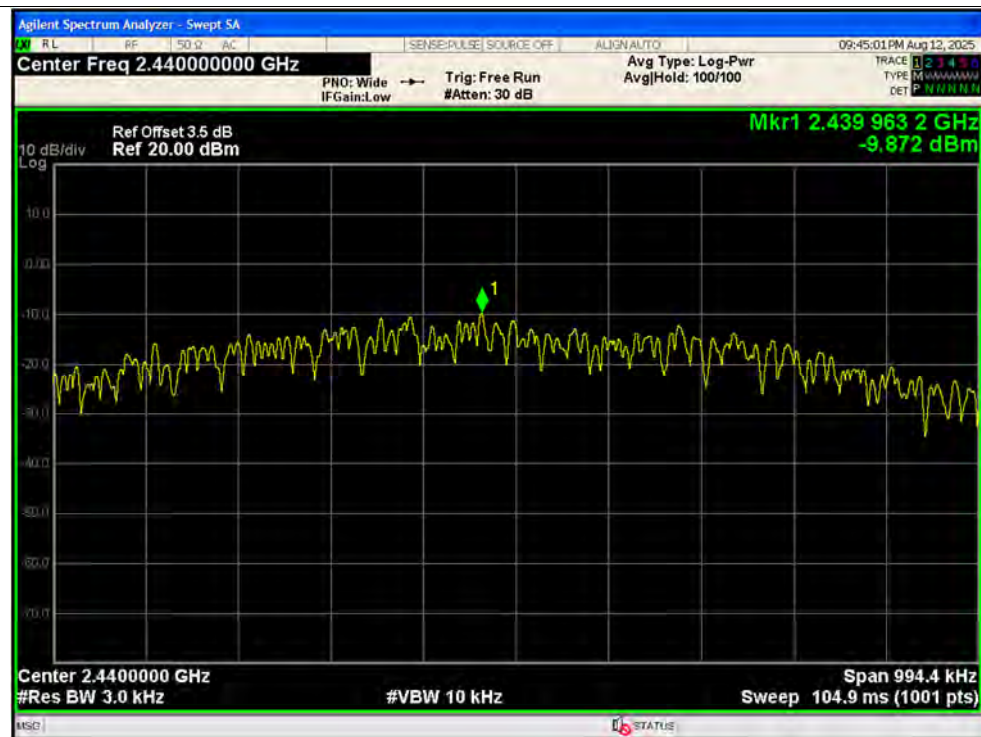
Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm/3kHz)	Duty Factor (dB)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	Ant1	-9.84	0	-9.84	8	Pass
NVNT	BLE 1M	2440	Ant1	-9.87	0	-9.87	8	Pass
NVNT	BLE 1M	2480	Ant1	-9.76	0	-9.76	8	Pass
NVNT	BLE 2M	2402	Ant1	-13.21	0	-13.21	8	Pass
NVNT	BLE 2M	2440	Ant1	-13	0	-13	8	Pass
NVNT	BLE 2M	2480	Ant1	-12.73	0	-12.73	8	Pass

Test Graphs

PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2440MHz Ant1



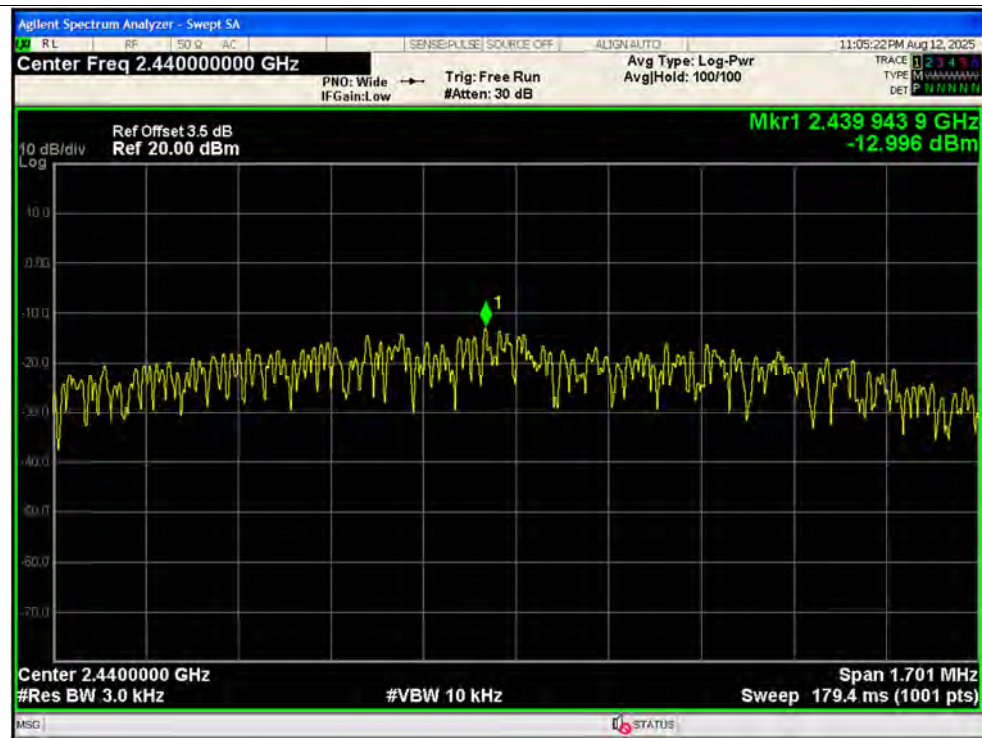
PSD NVNT BLE 1M 2480MHz Ant1



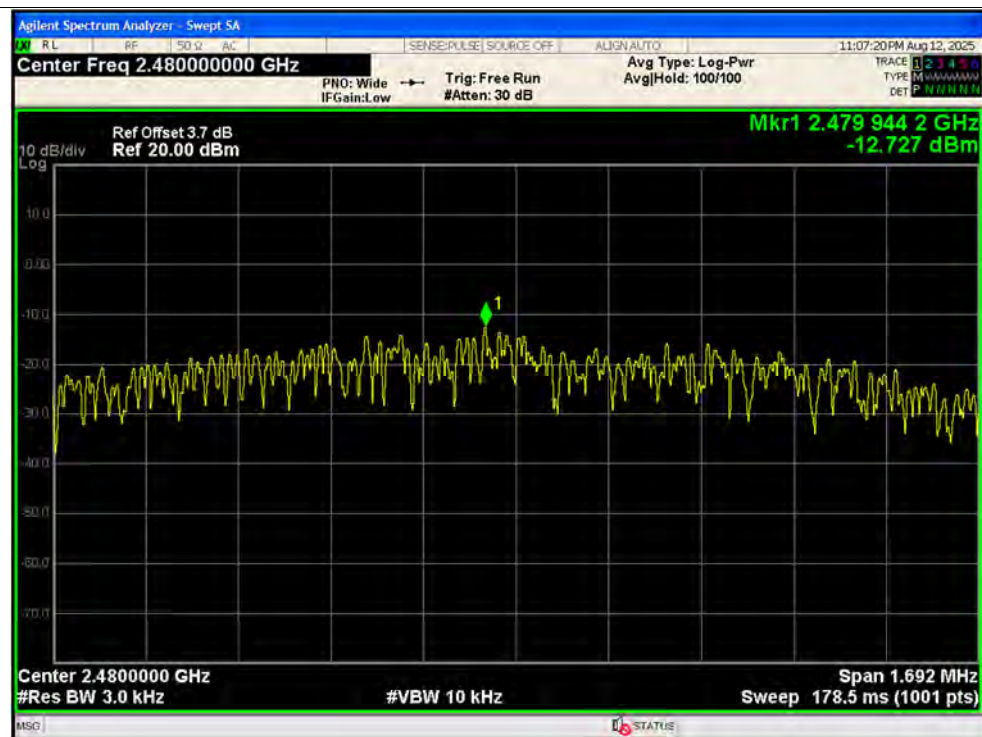
PSD NVNT BLE 2M 2402MHz Ant1



PSD NVNT BLE 2M 2440MHz Ant1



PSD NVNT BLE 2M 2480MHz Ant1





A.8. 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+ Adapter+Data cable+Serial port board+PC+BLE TX

Test voltage: AC 120V/60Hz

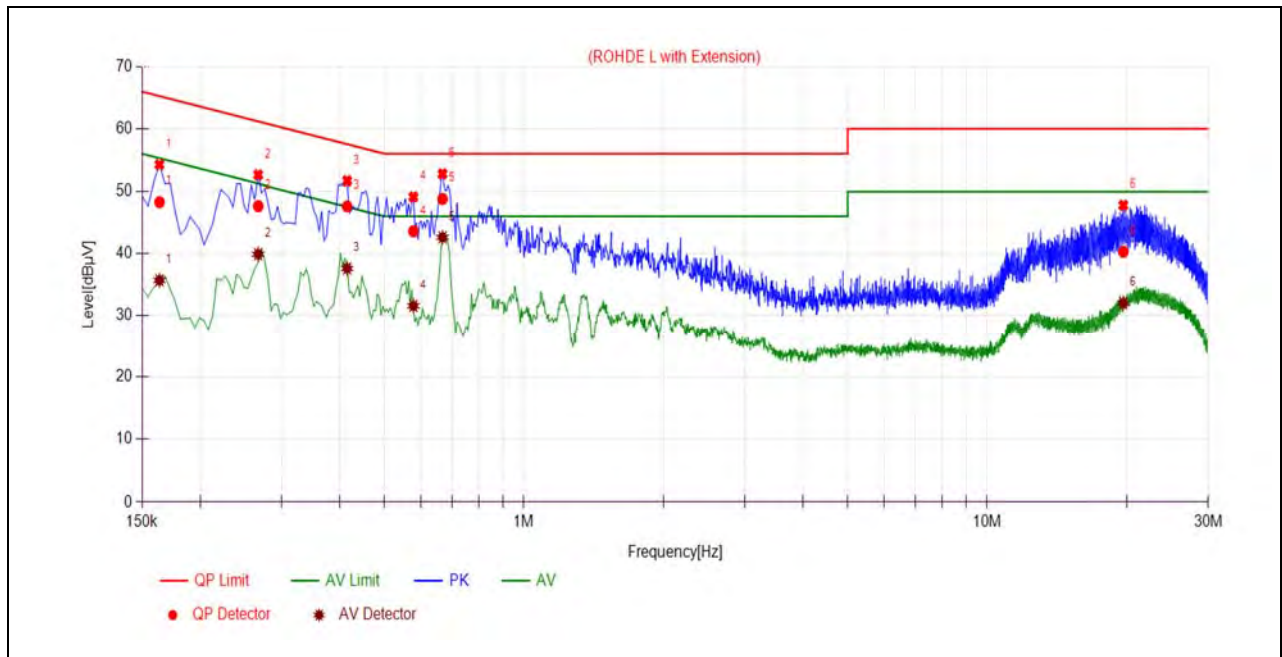
The measurement results are obtained as below:

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

U_R : Receiver Reading

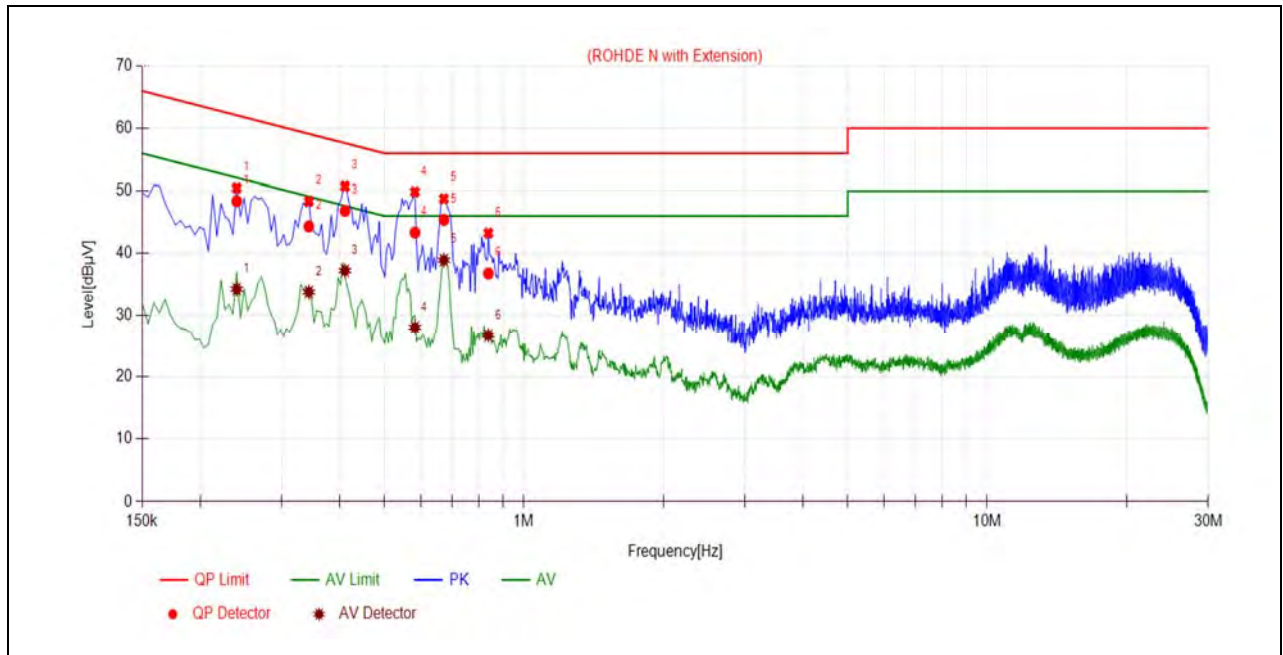
A_{Factor} : Voltage division factor of LISN

B. Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1635	48.30	35.71	65.28	55.28	Line	PASS
2	0.2670	47.66	39.92	61.21	51.21		PASS
3	0.4155	47.62	37.63	57.54	47.54		PASS
4	0.5775	43.62	31.60	56.00	46.00		PASS
5	0.6675	48.82	42.63	56.00	46.00		PASS
6	19.6706	40.32	32.06	60.00	50.00		PASS



(N Phase)

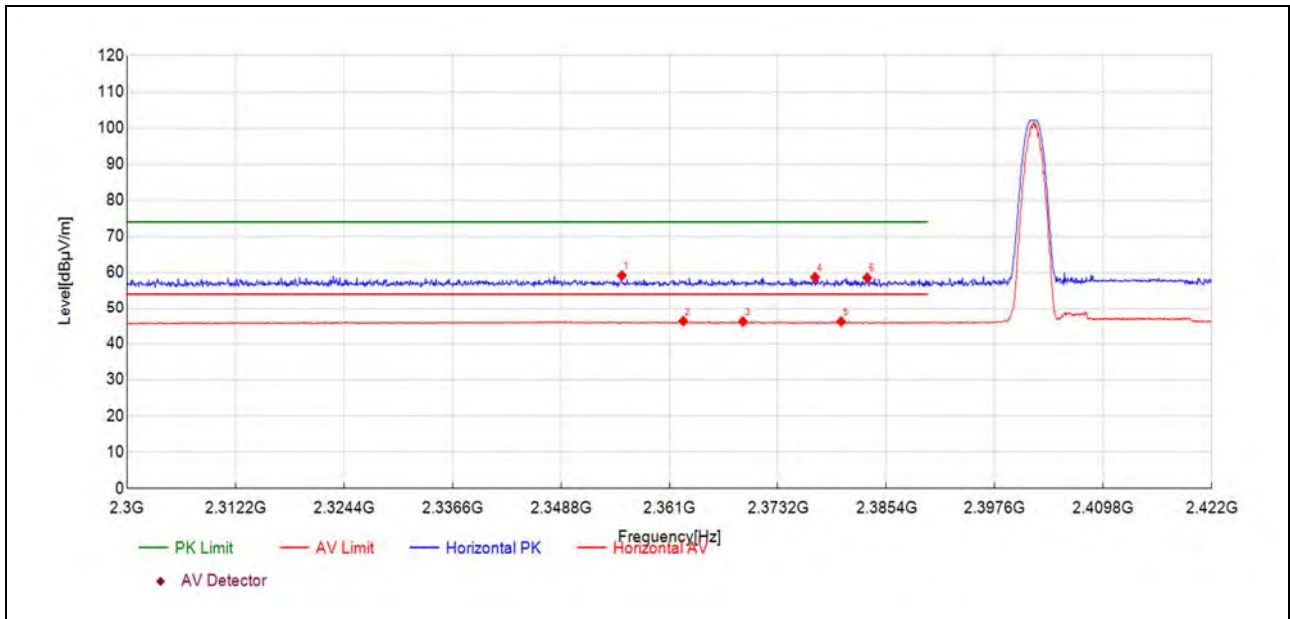
No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.2400	48.38	34.28	62.10	52.10	Neutral	PASS
2	0.3435	44.35	33.82	59.12	49.12		PASS
3	0.4110	46.84	37.25	57.63	47.63		PASS
4	0.5820	43.35	28.10	56.00	46.00		PASS
5	0.6720	45.40	38.94	56.00	46.00		PASS
6	0.8384	36.79	26.78	56.00	46.00		PASS

A.9. Restricted Frequency Bands

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (Horizontal) was recorded in this test report.

1Mbps

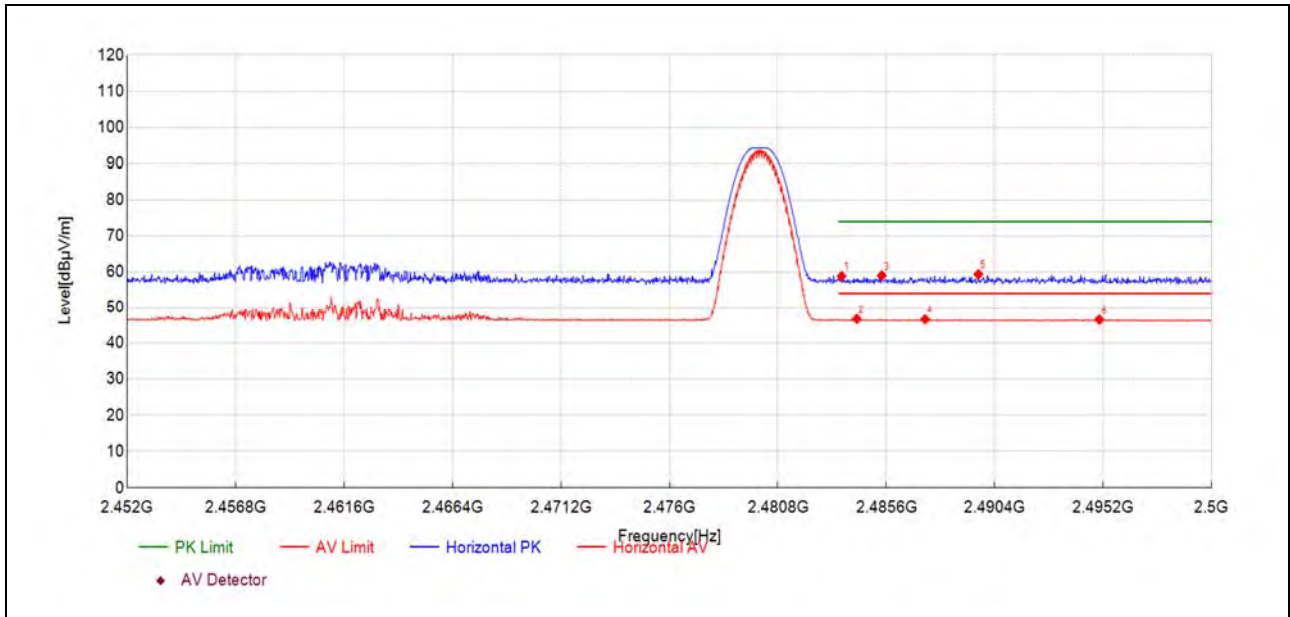
Plot for Channel 0



Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Angle [°]	Detector	Verdict
2355.66	21.8	59.21	37.460	74.00	14.79	37	PK	PASS
2362.56	8.9	46.34	37.470	54.00	7.66	257	AV	PASS
2369.27	8.7	46.19	37.470	54.00	7.81	37	AV	PASS
2377.39	21.3	58.74	37.480	74.00	15.26	122	PK	PASS
2380.32	8.7	46.19	37.480	54.00	7.81	252	AV	PASS
2383.25	21.1	58.57	37.480	74.00	15.43	239	PK	PASS



Plot for Channel 39

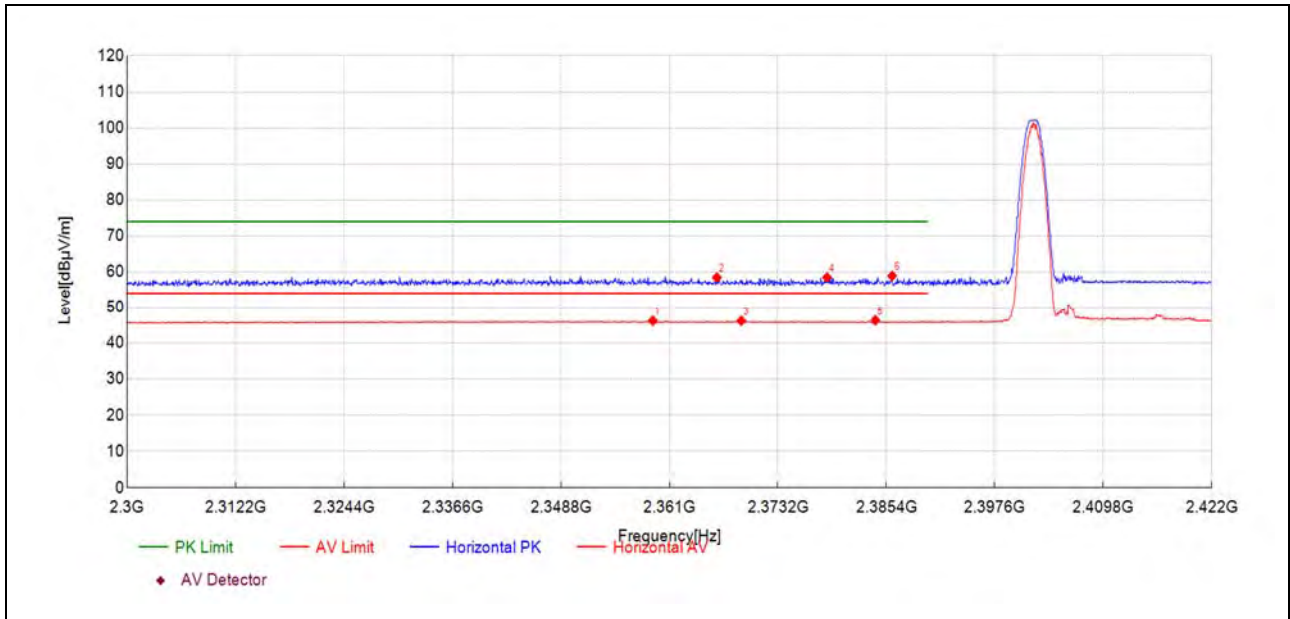


Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Angle [°]	Detector	Verdict
2483.62	20.6	58.85	38.280	74.00	15.15	228	PK	PASS
2484.30	8.5	46.76	38.270	54.00	7.24	205	AV	PASS
2485.40	20.8	59.03	38.270	74.00	14.97	176	PK	PASS
2487.32	8.4	46.63	38.270	54.00	7.37	210	AV	PASS
2489.67	21.1	59.39	38.260	74.00	14.61	36	PK	PASS
2495.03	8.3	46.57	38.260	54.00	7.43	322	AV	PASS



2Mbps

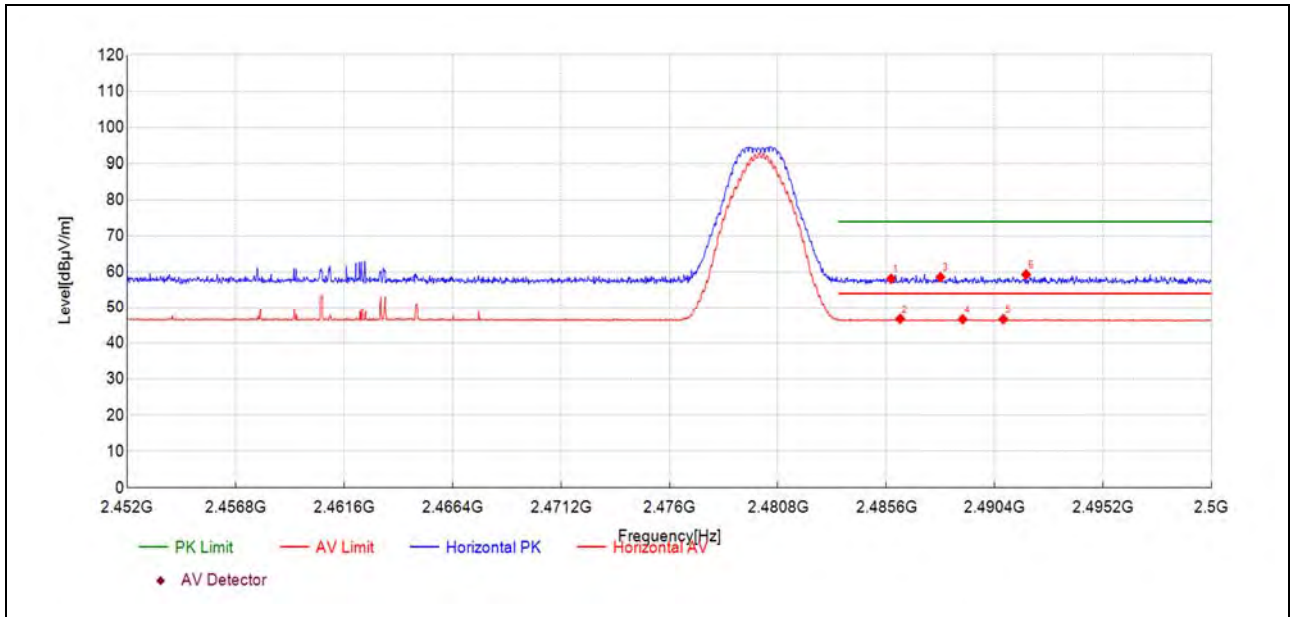
Plot for Channel 0



Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Angle [°]	Detector	Verdict
2359.14	8.8	46.22	37.460	54.00	7.78	112	AV	PASS
2366.34	21.0	58.45	37.470	74.00	15.55	93	PK	PASS
2369.09	8.7	46.21	37.470	54.00	7.79	57	AV	PASS
2378.73	21.0	58.48	37.480	74.00	15.52	168	PK	PASS
2384.16	8.9	46.36	37.490	54.00	7.64	330	AV	PASS
2386.05	21.4	58.93	37.490	74.00	15.07	52	PK	PASS



Plot for Channel 39



Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Angle [°]	Detector	Verdict
2485.81	19.9	58.16	38.270	74.00	15.84	176	PK	PASS
2486.22	8.5	46.76	38.280	54.00	7.24	330	AV	PASS
2487.99	20.3	58.56	38.270	74.00	15.44	330	PK	PASS
2488.98	8.4	46.63	38.260	54.00	7.37	166	AV	PASS
2490.78	8.4	46.66	38.270	54.00	7.34	306	AV	PASS
2491.79	21.1	59.32	38.260	74.00	14.68	133	PK	PASS



A.10. 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.

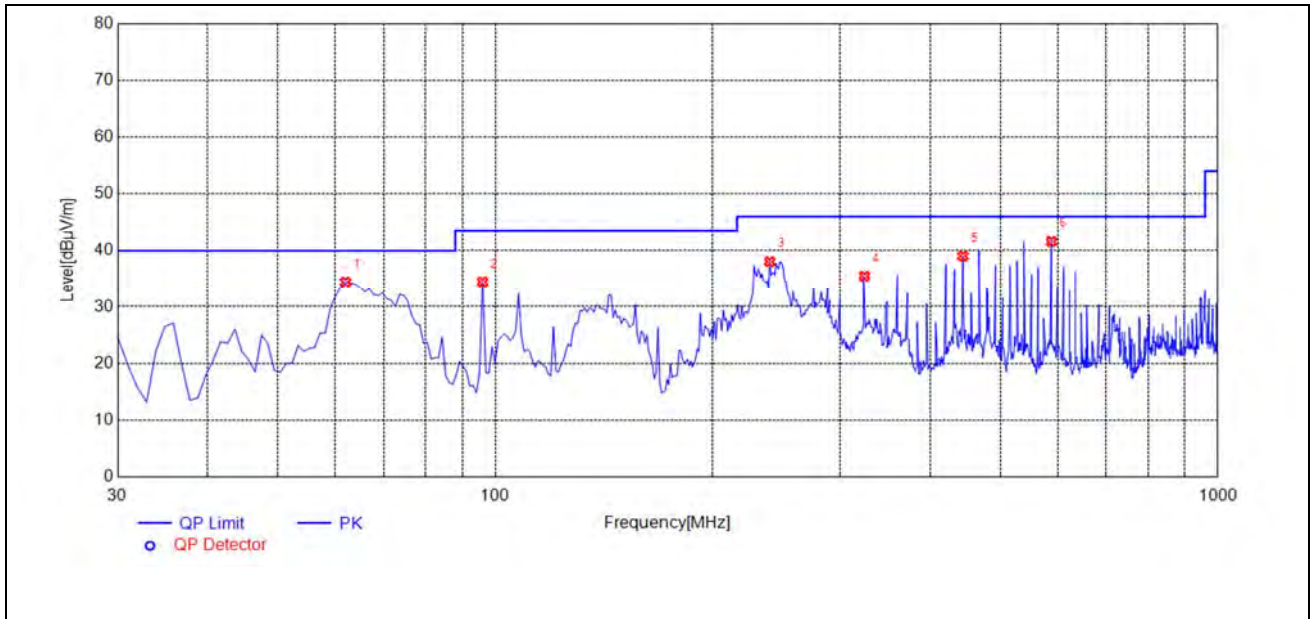
Note3: For the frequency, which started from 18GHz to 10th harmonic of the highest frequency, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

Note 4: All test modes were considered and evaluated respectively by performing full test, only the worst data were recorded.



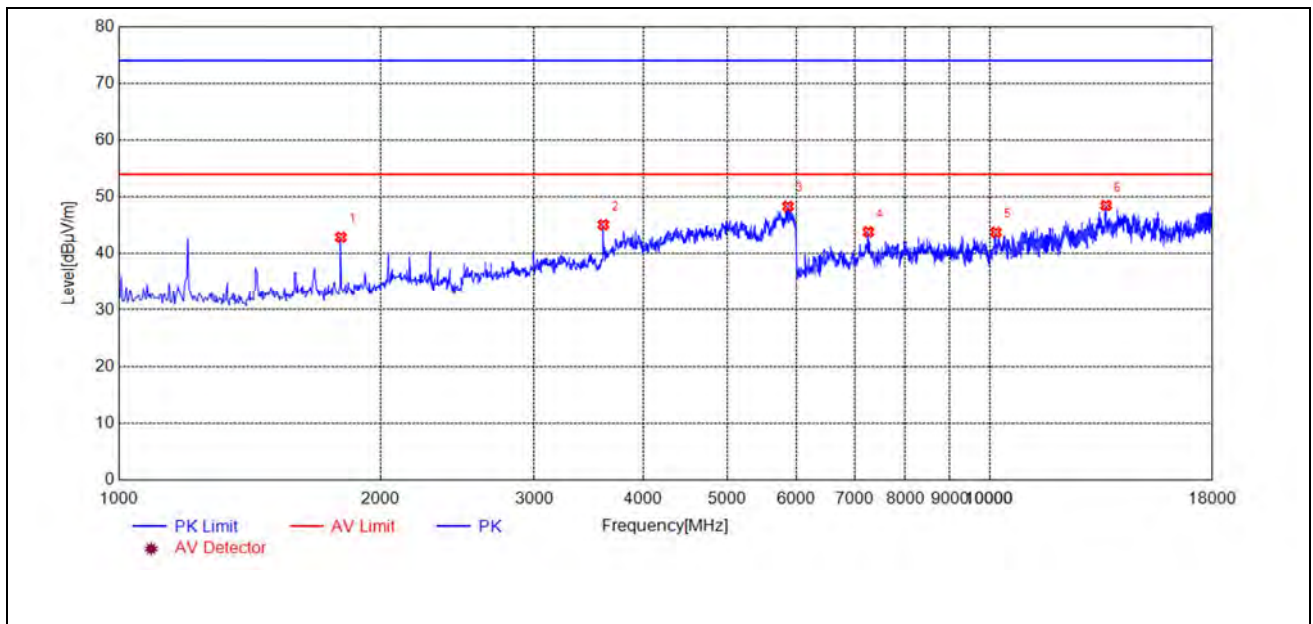
1Mbps

Plot for Channel 0



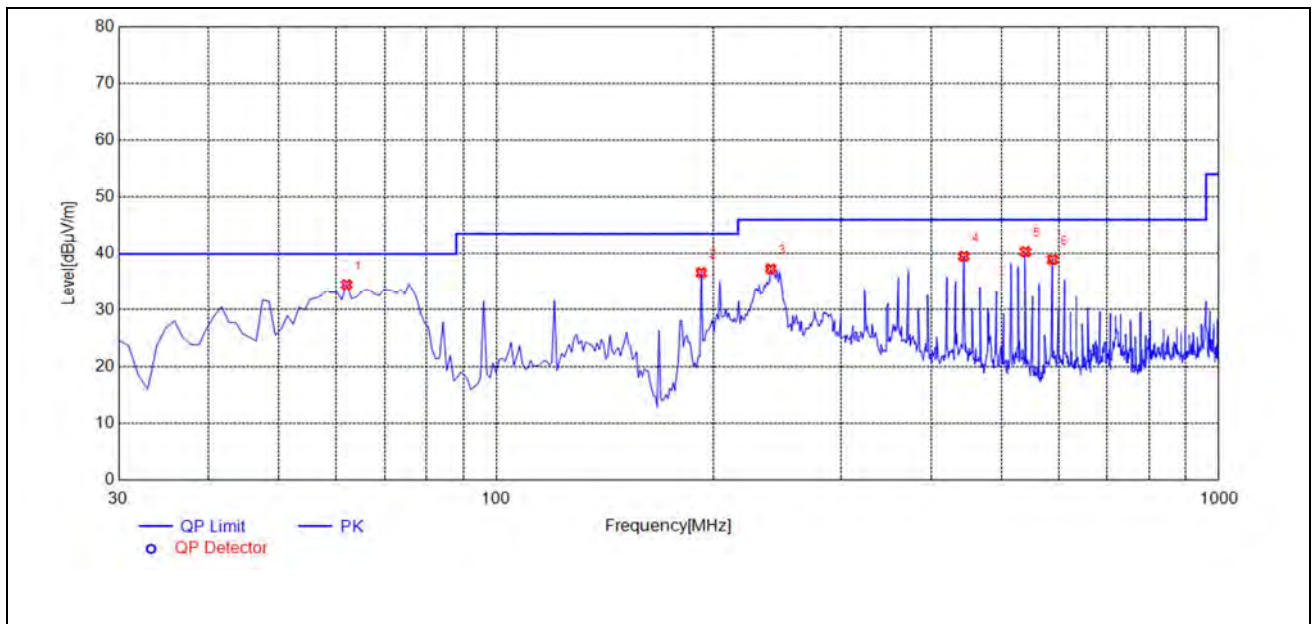
(Antenna Horizontal, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
62.0420	34.45	-29.99	40.00	5.55	150	357	Horizontal	PASS
96.0260	34.46	-31.58	43.50	9.04	150	285	Horizontal	PASS
239.7297	38.04	-31.02	46.00	7.96	150	285	Horizontal	PASS
324.2042	35.51	-28.59	46.00	10.49	150	343	Horizontal	PASS
443.6336	39.05	-24.65	46.00	6.95	150	32	Horizontal	PASS
588.3083	41.63	-22.06	46.00	4.37	150	336	Horizontal	PASS



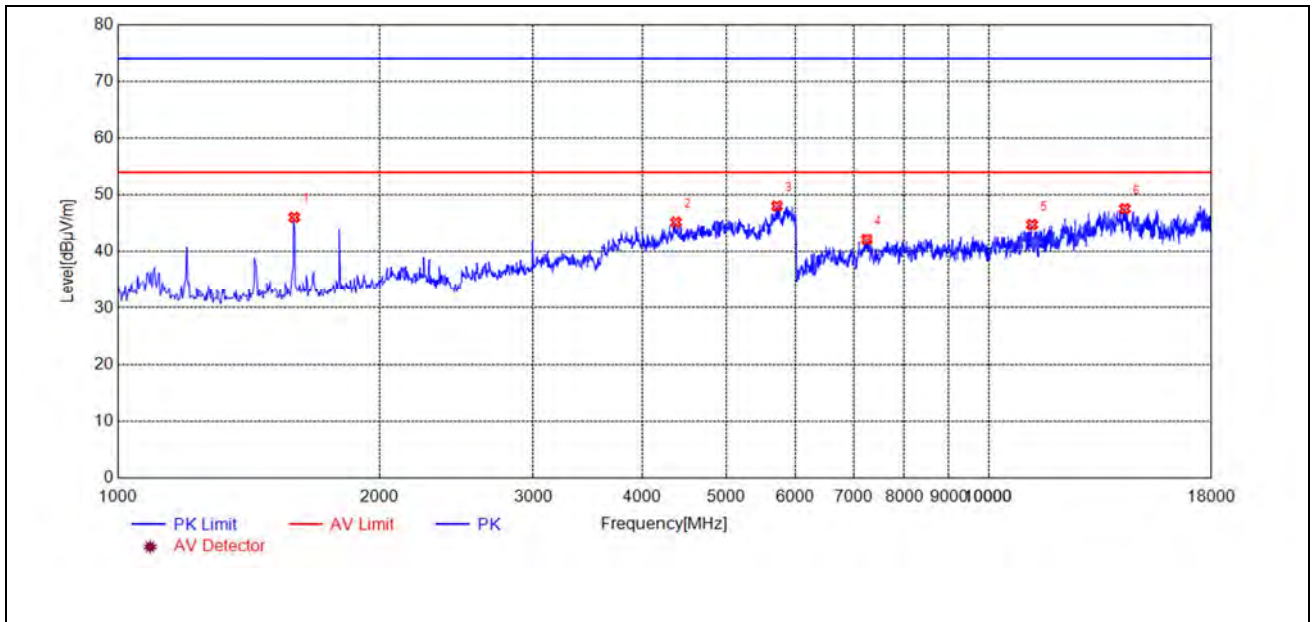
(Antenna Horizontal, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1799.1598	42.93	-22.66	74.00	31.07	150	170	Horizontal	PASS
3601.5203	45.11	-15.69	74.00	28.89	150	229	Horizontal	PASS
5866.3733	48.36	-6.95	74.00	25.64	150	312	Horizontal	PASS
7253.8508	43.86	-2.64	74.00	30.14	150	229	Horizontal	PASS
10164.8330	43.77	1.72	74.00	30.23	150	345	Horizontal	PASS
13599.5199	48.51	7.63	74.00	25.49	150	337	Horizontal	PASS



(Antenna Vertical, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
62.0420	34.55	-29.99	40.00	5.45	150	213	Vertical	PASS
192.1522	36.67	-32.73	43.50	6.83	150	343	Vertical	PASS
239.7297	37.34	-31.02	46.00	8.66	150	213	Vertical	PASS
443.6336	39.57	-24.65	46.00	6.43	150	343	Vertical	PASS
539.7598	40.37	-24.13	46.00	5.63	150	54	Vertical	PASS
588.3083	38.99	-22.06	46.00	7.01	150	321	Vertical	PASS

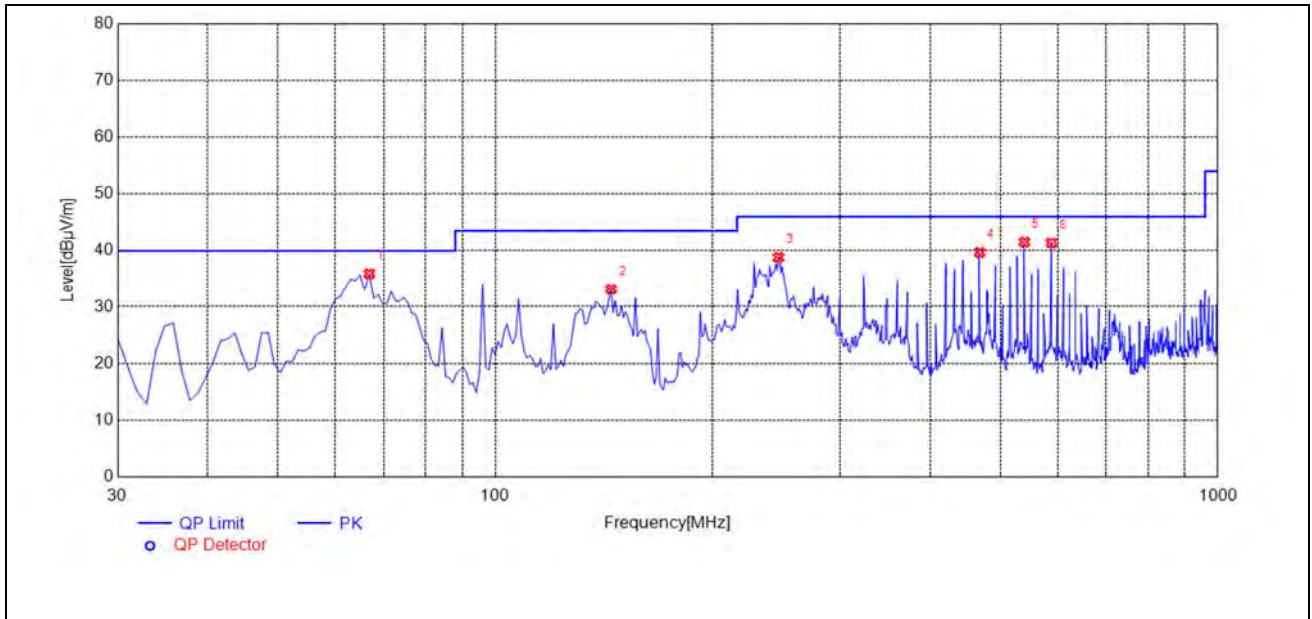


(Antenna Vertical, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1595.1190	46.06	-23.19	74.00	27.94	150	199	Vertical	PASS
4373.4747	45.22	-11.99	74.00	28.78	150	241	Vertical	PASS
5713.3427	48.06	-7.32	74.00	25.94	150	173	Vertical	PASS
7243.6487	42.19	-2.63	74.00	31.81	150	215	Vertical	PASS
11208.8418	44.79	3.85	74.00	29.21	150	257	Vertical	PASS
14327.2655	47.59	7.63	74.00	26.41	150	23	Vertical	PASS

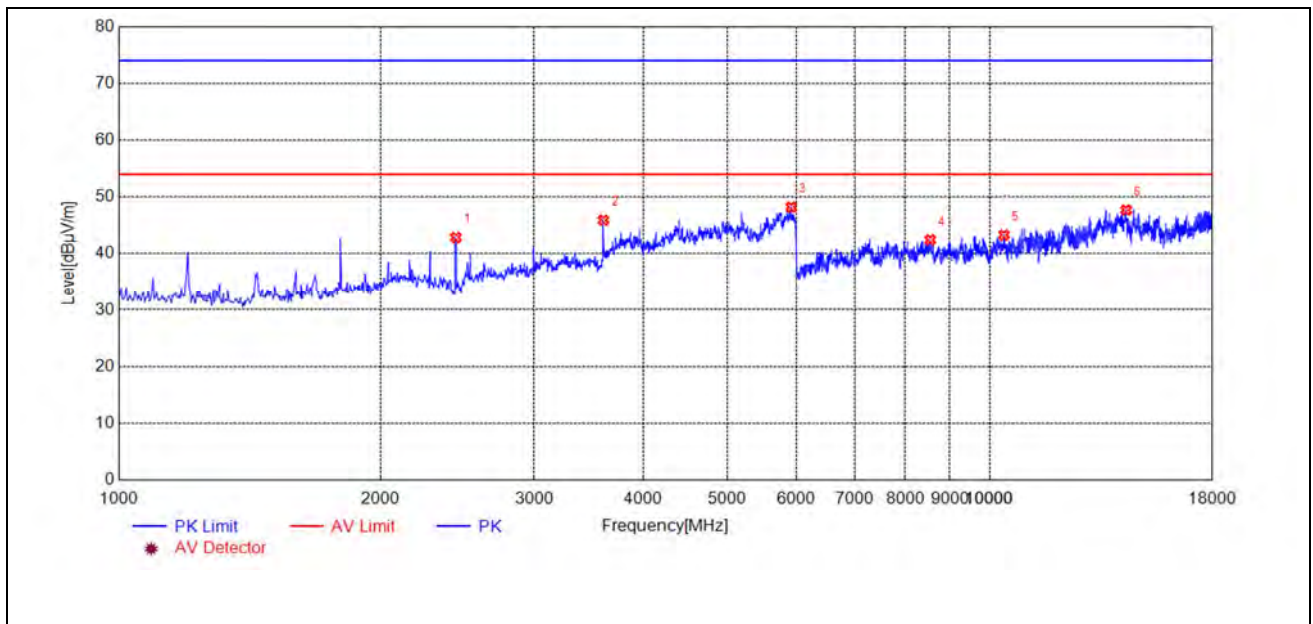


Plot for Channel 19



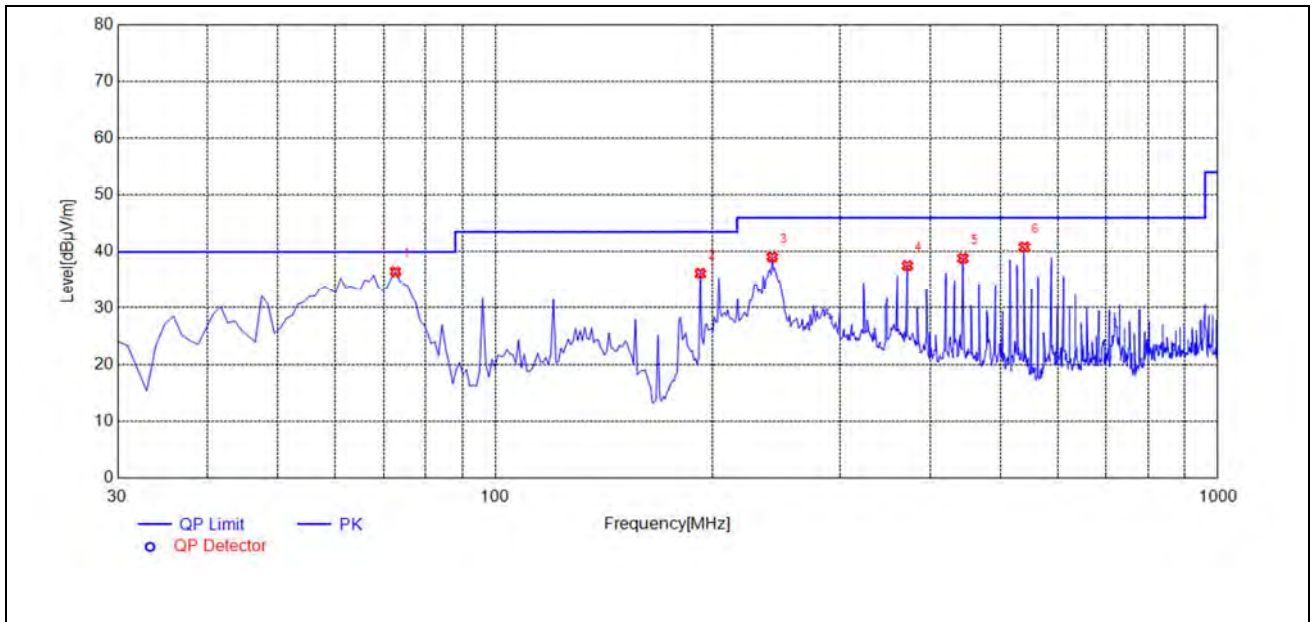
(Antenna Horizontal, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
66.8969	35.94	-30.98	40.00	4.06	150	358	Horizontal	PASS
144.5746	33.15	-34.09	43.50	10.35	150	358	Horizontal	PASS
246.5265	38.85	-30.44	46.00	7.15	150	315	Horizontal	PASS
467.9079	39.71	-23.88	46.00	6.29	150	25	Horizontal	PASS
539.7598	41.52	-24.13	46.00	4.48	150	148	Horizontal	PASS
588.3083	41.39	-22.06	46.00	4.61	150	336	Horizontal	PASS



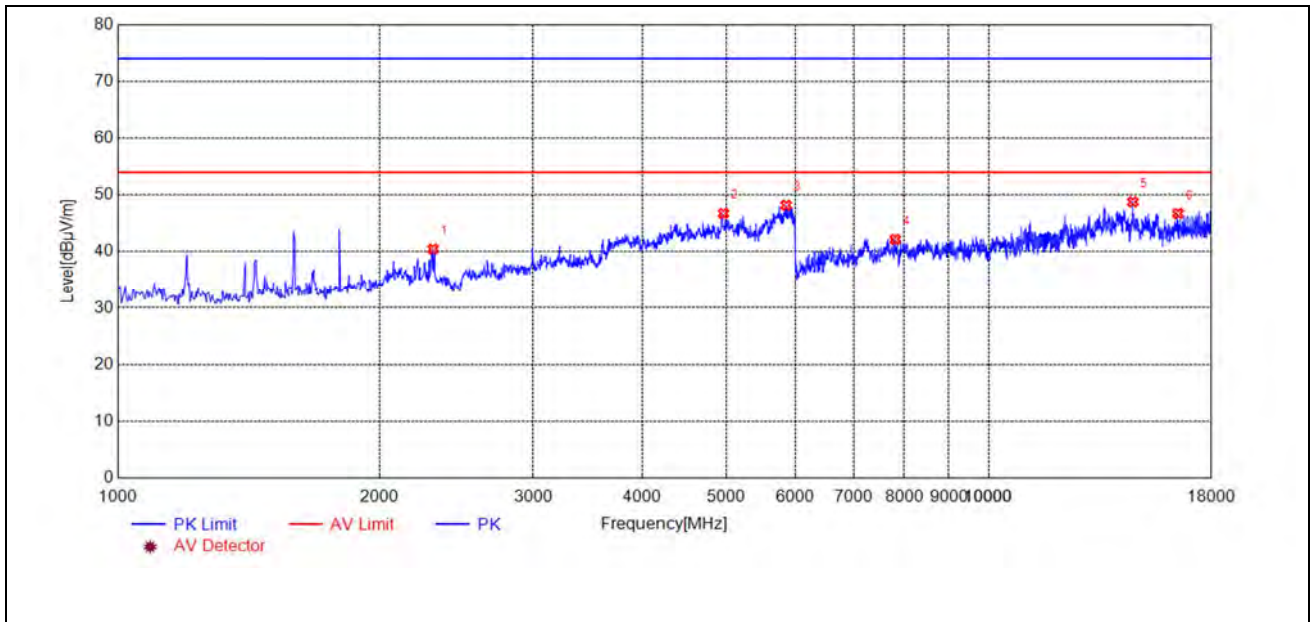
(Antenna Horizontal, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
2438.4877	42.86	-20.88	74.00	31.14	150	54	Horizontal	PASS
3601.5203	45.92	-15.69	74.00	28.08	150	204	Horizontal	PASS
5917.3835	48.23	-6.77	74.00	25.77	150	296	Horizontal	PASS
8542.7085	42.48	-1.35	74.00	31.52	150	262	Horizontal	PASS
10382.4765	43.29	1.96	74.00	30.71	150	196	Horizontal	PASS
14344.2689	47.71	7.53	74.00	26.29	150	229	Horizontal	PASS



(Antenna Vertical, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
72.7227	36.45	-32.73	40.00	3.55	150	177	Vertical	PASS
192.1522	36.20	-32.73	43.50	7.30	150	313	Vertical	PASS
241.6717	39.09	-30.86	46.00	6.91	150	191	Vertical	PASS
371.7818	37.57	-26.20	46.00	8.43	150	350	Vertical	PASS
443.6336	38.85	-24.65	46.00	7.15	150	328	Vertical	PASS
539.7598	40.84	-24.13	46.00	5.16	150	306	Vertical	PASS

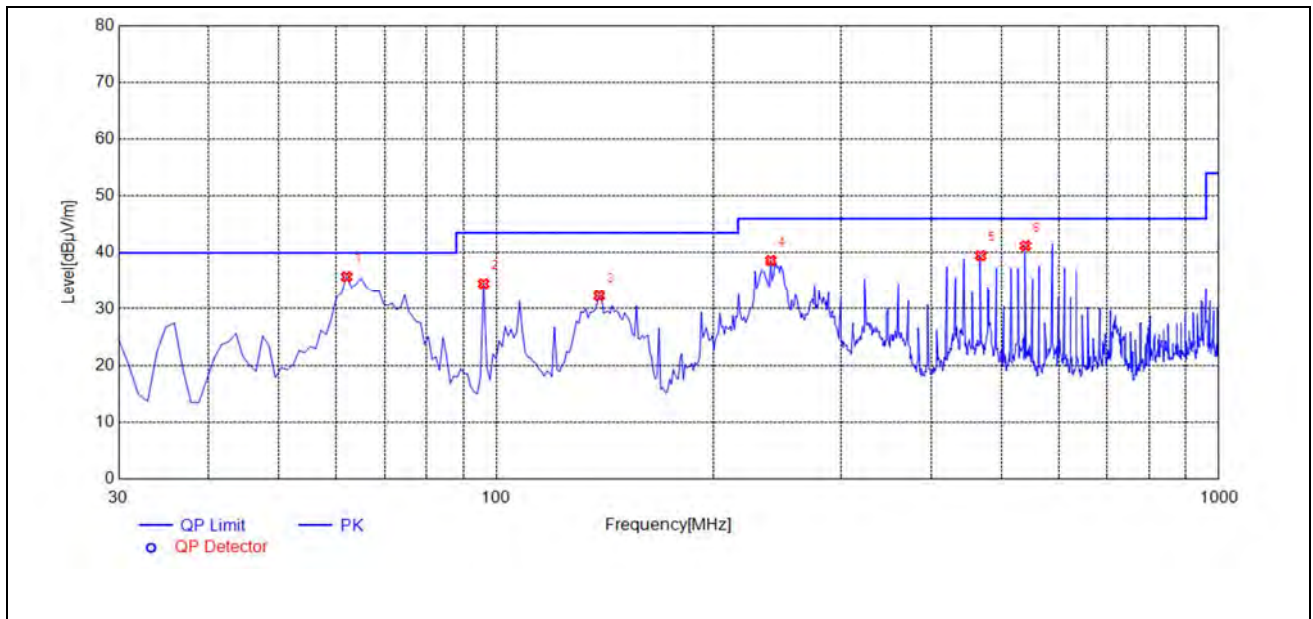


(Antenna Vertical, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
2302.4605	40.50	-21.52	74.00	33.50	150	170	Vertical	PASS
4958.3917	46.78	-9.61	74.00	27.22	150	360	Vertical	PASS
5852.7706	48.20	-6.93	74.00	25.80	150	95	Vertical	PASS
7808.1616	42.17	-2.46	74.00	31.83	150	170	Vertical	PASS
14633.3267	48.79	7.03	74.00	25.21	150	78	Vertical	PASS
16483.2967	46.75	7.34	74.00	27.25	150	62	Vertical	PASS

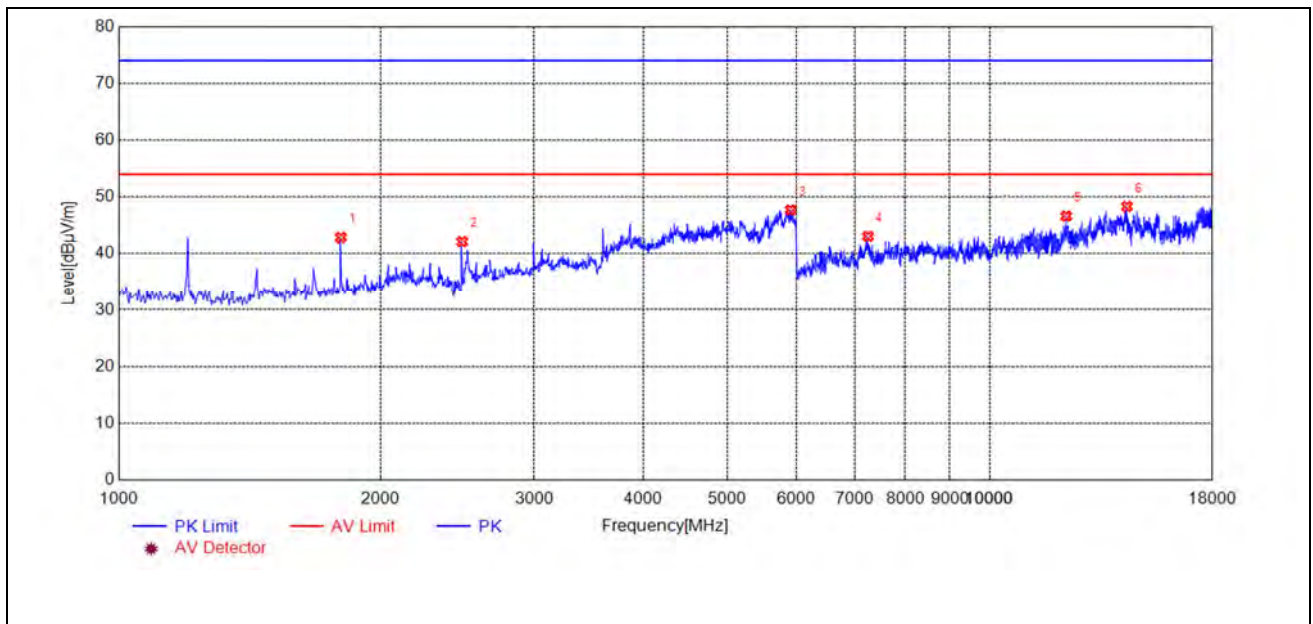


Plot for Channel 39



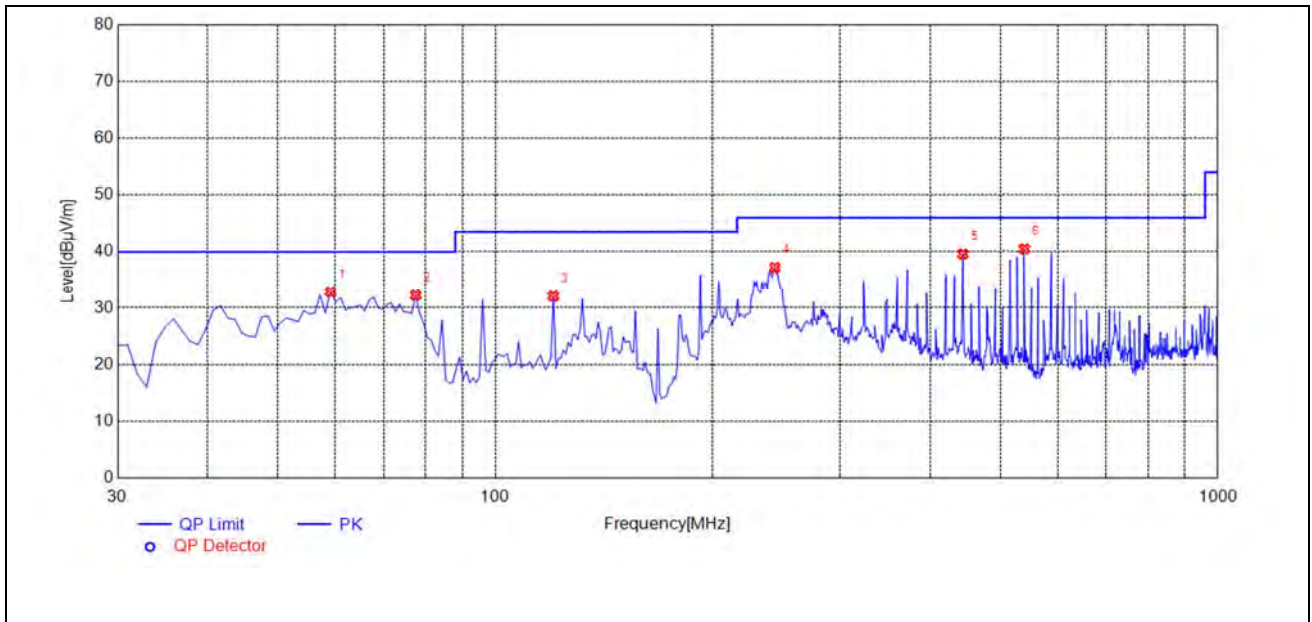
(Antenna Horizontal, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
62.0420	35.76	-29.99	40.00	4.24	150	321	Horizontal	PASS
96.0260	34.52	-31.58	43.50	8.98	150	285	Horizontal	PASS
138.7487	32.30	-34.50	43.50	11.20	150	263	Horizontal	PASS
239.7297	38.64	-31.02	46.00	7.36	150	285	Horizontal	PASS
467.9079	39.47	-23.88	46.00	6.53	150	0	Horizontal	PASS
539.7598	41.23	-24.13	46.00	4.77	150	148	Horizontal	PASS



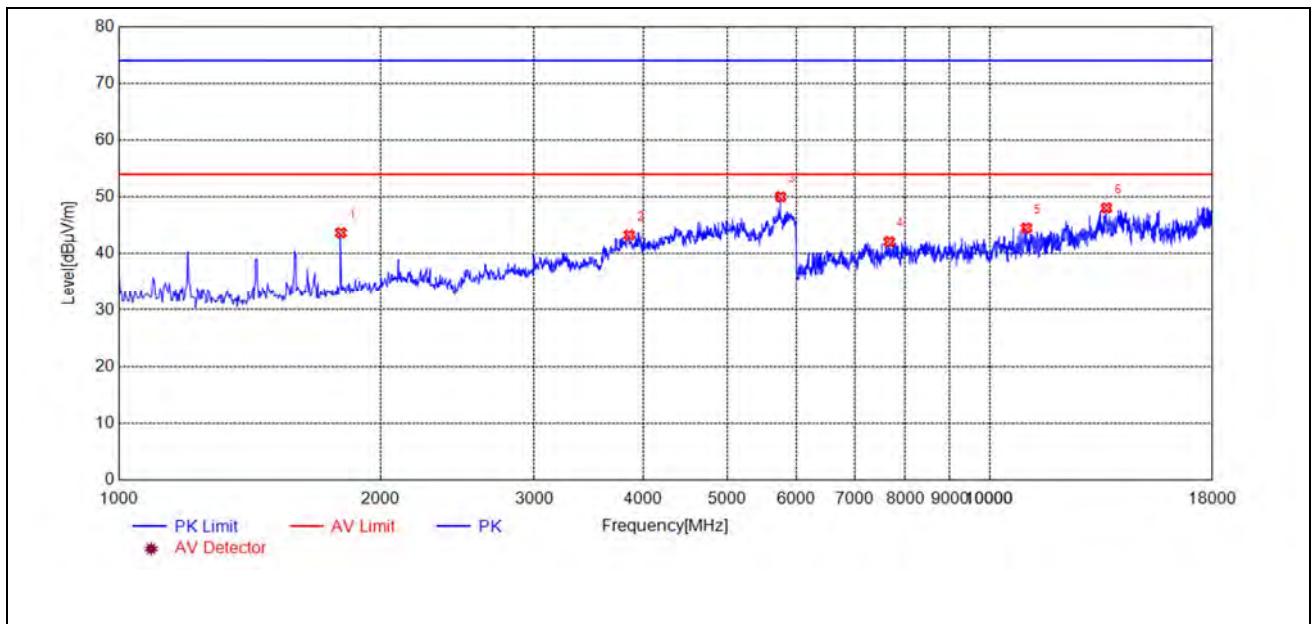
(Antenna Horizontal, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1799.1598	42.86	-22.66	74.00	31.14	150	15	Horizontal	PASS
2479.2959	42.15	-20.17	74.00	31.85	150	81	Horizontal	PASS
5907.1814	47.72	-6.92	74.00	26.28	150	264	Horizontal	PASS
7247.0494	43.06	-2.60	74.00	30.94	150	256	Horizontal	PASS
12235.8472	46.64	5.00	74.00	27.36	150	181	Horizontal	PASS
14371.4743	48.33	6.44	74.00	25.67	150	31	Horizontal	PASS



(Antenna Vertical, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
59.1291	32.86	-30.08	40.00	7.14	150	103	Vertical	PASS
77.5776	32.21	-33.84	40.00	7.79	150	103	Vertical	PASS
120.3003	32.06	-32.49	43.50	11.44	150	205	Vertical	PASS
243.6136	37.19	-30.65	46.00	8.81	150	176	Vertical	PASS
443.6336	39.62	-24.65	46.00	6.38	150	343	Vertical	PASS
539.7598	40.52	-24.13	46.00	5.48	150	292	Vertical	PASS



(Antenna Vertical, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1799.1598	43.70	-22.66	74.00	30.30	150	37	Vertical	PASS
3856.5713	43.28	-14.49	74.00	30.72	150	37	Vertical	PASS
5754.1508	50.04	-6.86	74.00	23.96	150	53	Vertical	PASS
7665.3331	42.13	-2.54	74.00	31.87	150	170	Vertical	PASS
11018.4037	44.54	2.99	74.00	29.46	150	62	Vertical	PASS
13609.7219	48.07	7.12	74.00	25.93	150	212	Vertical	PASS

END OF REPORT