



REPORT No.: SZ25070423W01

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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REPORT No.: SZ25070423W01

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. 18, 2025	Li Xinpeng	PASS	/
3	15.247(b)	Maximum Peak Conducted Output Power	Aug. 18, 2025	Li Xinpeng	PASS	/
4	15.247(b)	Maximum Average Conducted Output Power	Aug. 18, 2025	Li Xinpeng	PASS	/
5	15.247(a)	Bandwidth	Aug. 18, 2025	Li Xinpeng	PASS	/
6	15.247(d)	Conducted Spurious Emission and Band Edge	Aug. 18, 2025	Li Xinpeng	PASS	/
7	15.247(e)	Power Spectral Density	Aug. 18, 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
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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:	5.1	
Modulation Type:	GFSK	
Data Rate:	1Mbps, 2Mbps	
Operating Frequency Range:	2402MHz-2480MHz	
Antenna Type:	FPC Antenna	
Antenna Gain:	3.93dBi	
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

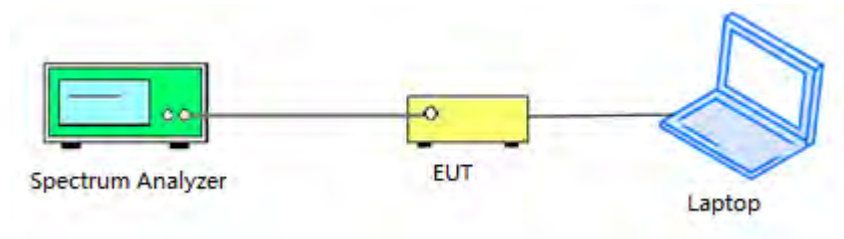
The EUT is controlled by dedicated software to transmit at the default maximum power level.

2.5. Test Conditions

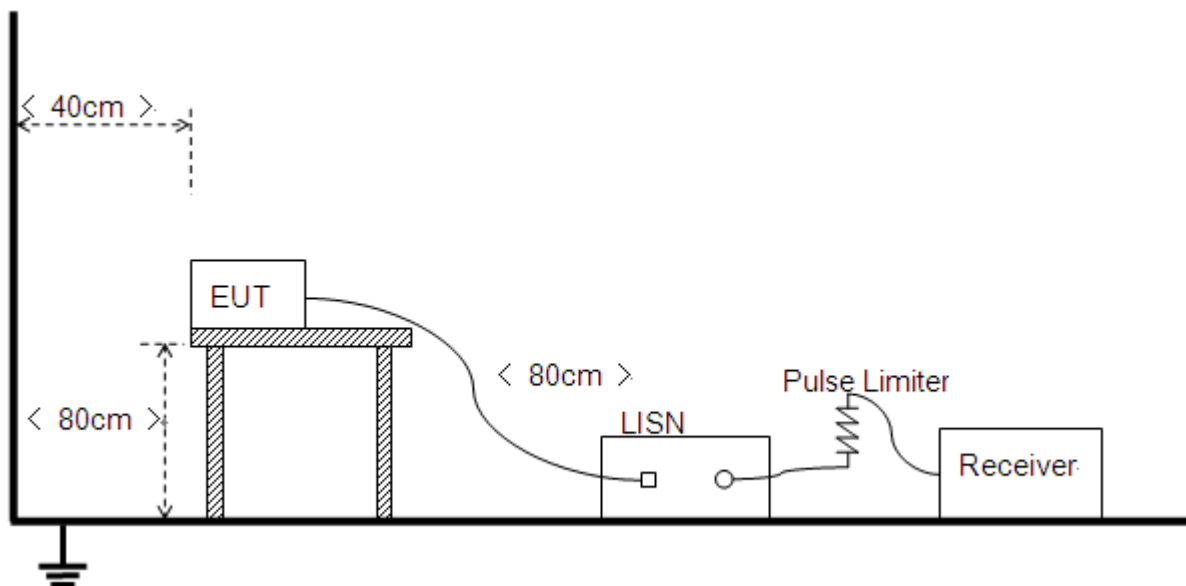
Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106

2.6. Test Setup Layout Diagram

2.6.1. Conducted Measurement

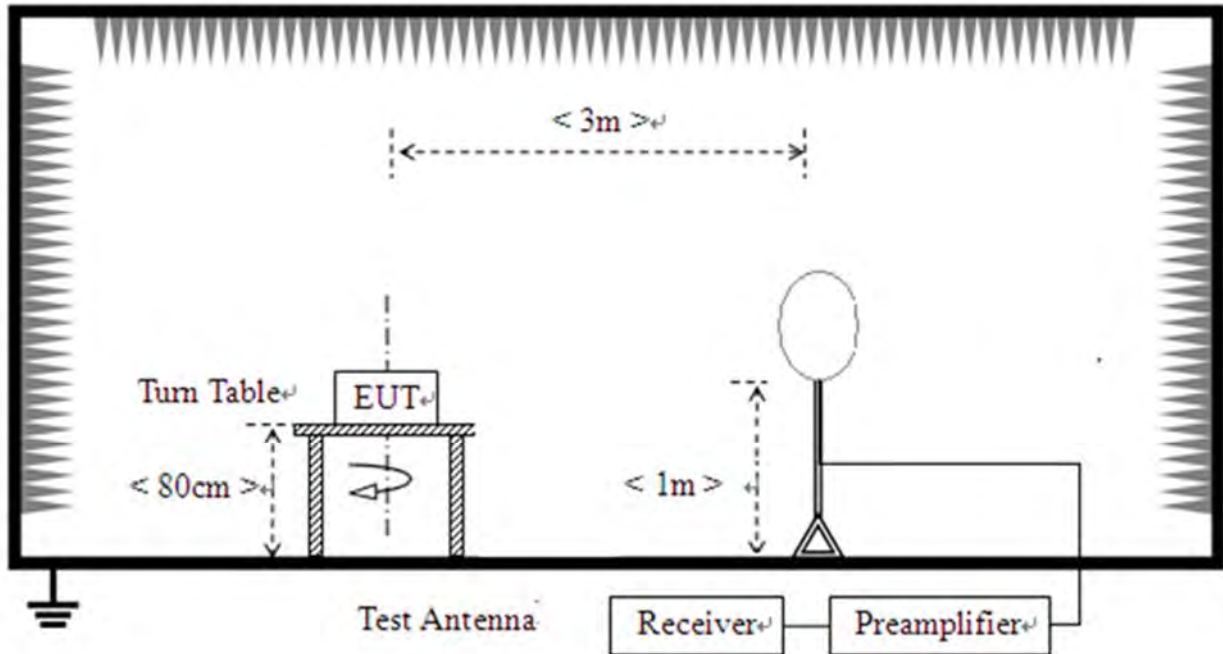


2.6.2. Conducted Emission Measurement

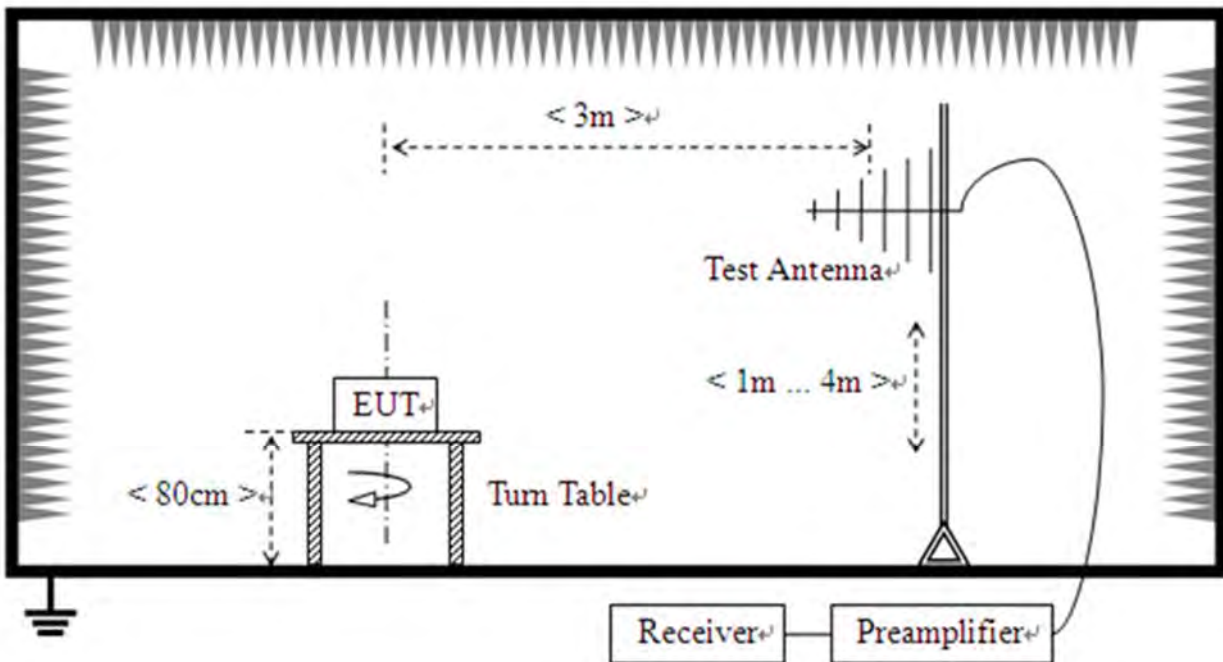


2.6.3.Radiation Measurement

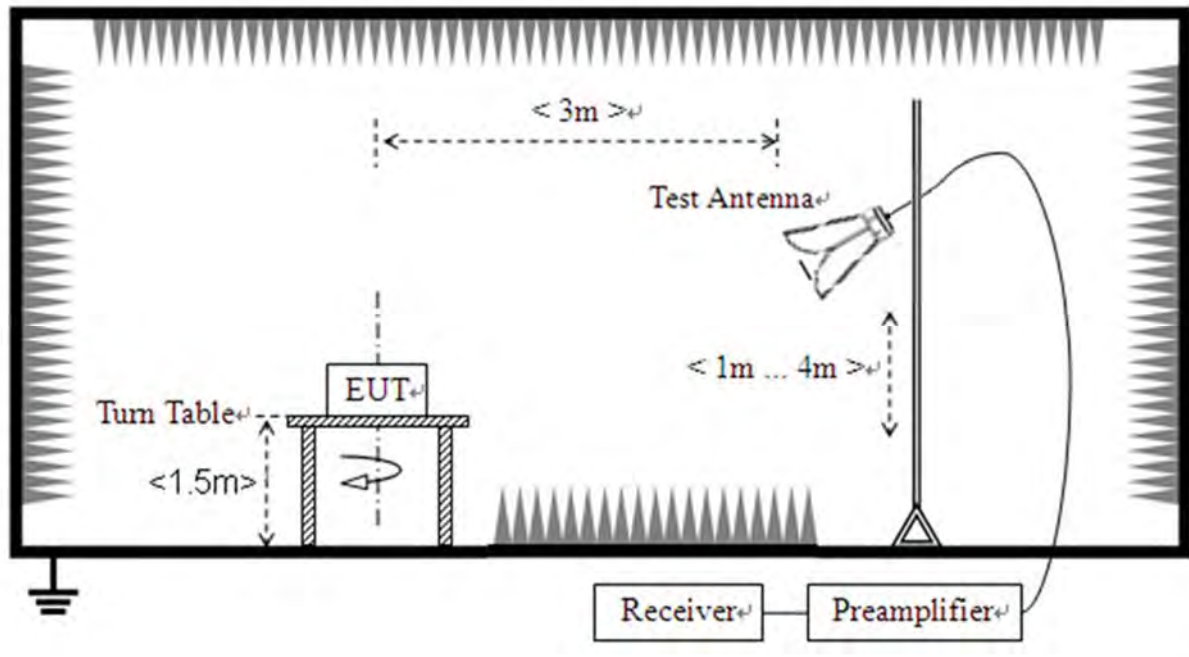
1) For radiated emissions from 9kHz to 30MHz



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

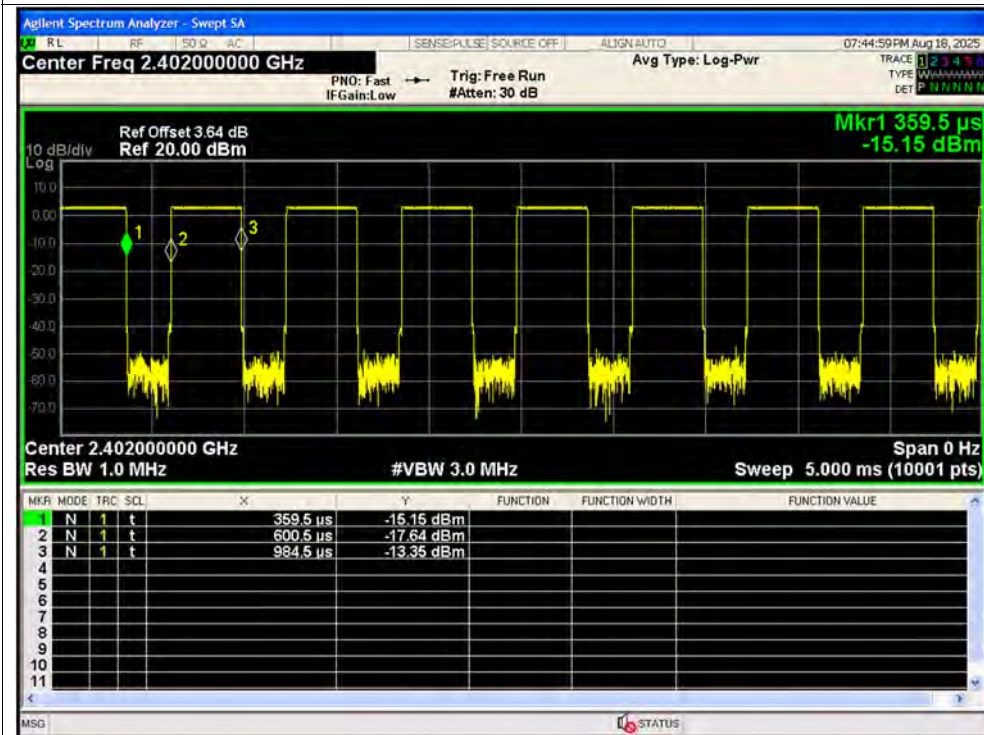
A.1. Duty Cycle of Test Signal

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant1	61.44	2.12	2.6
NVNT	BLE 1M	2440	Ant1	61.44	2.12	2.6
NVNT	BLE 1M	2480	Ant1	61.44	2.12	2.6
NVNT	BLE 2M	2402	Ant1	57.2	2.43	0.93
NVNT	BLE 2M	2440	Ant1	57.17	2.43	0.93
NVNT	BLE 2M	2480	Ant1	57.18	2.43	0.93

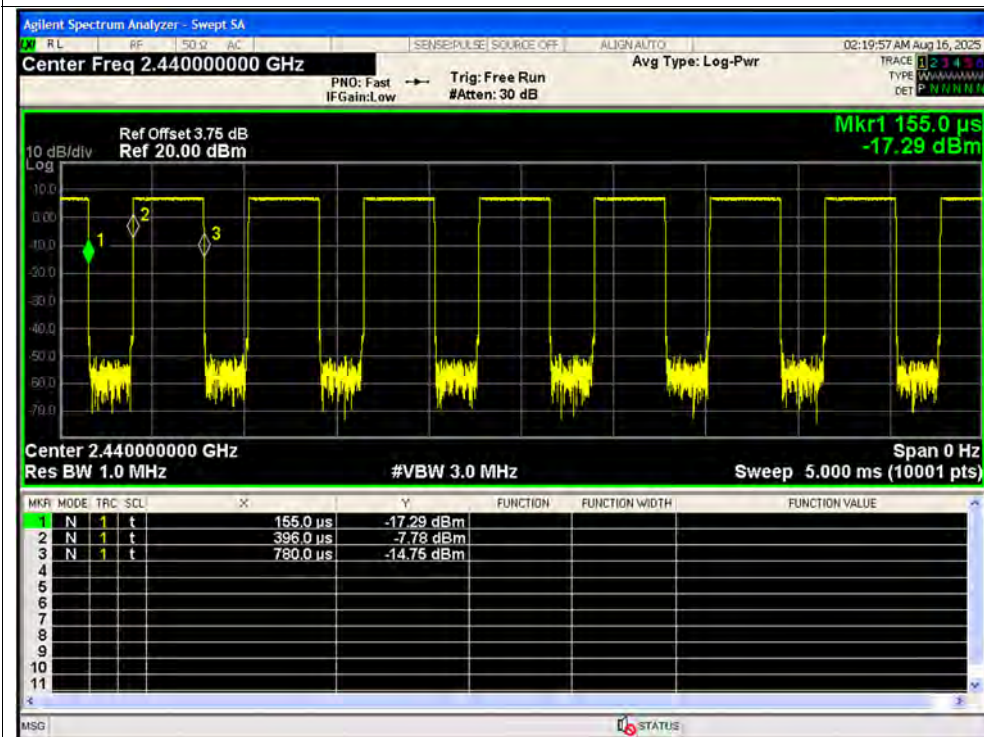


Test Graphs

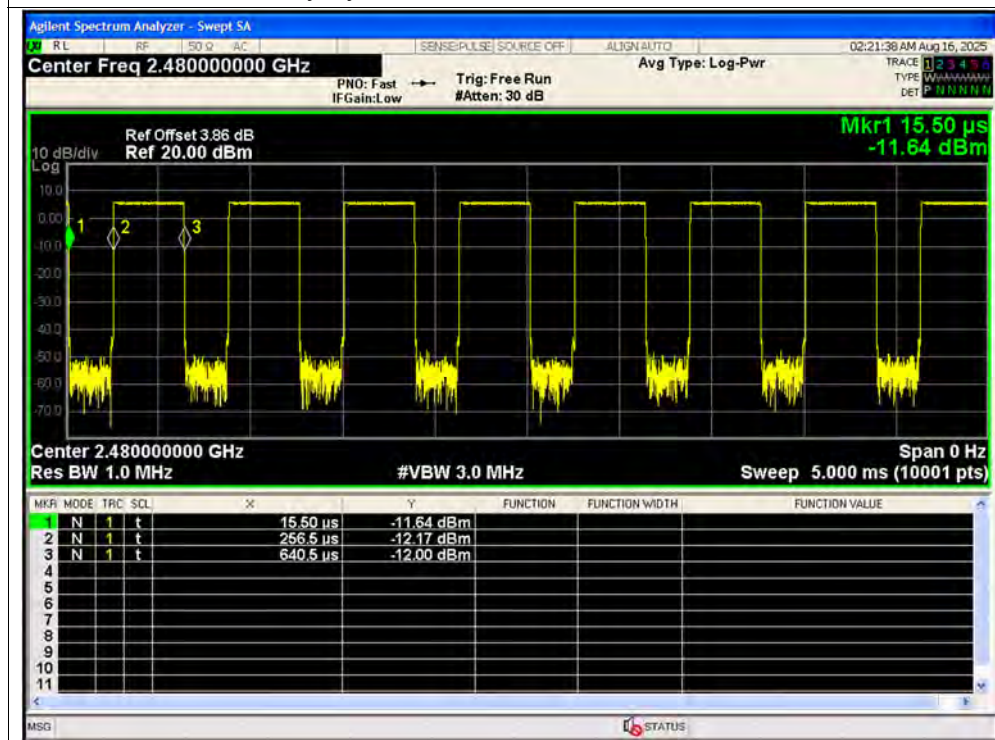
Duty Cycle NVNT BLE 1M 2402MHz Ant1



Duty Cycle NVNT BLE 1M 2440MHz Ant1



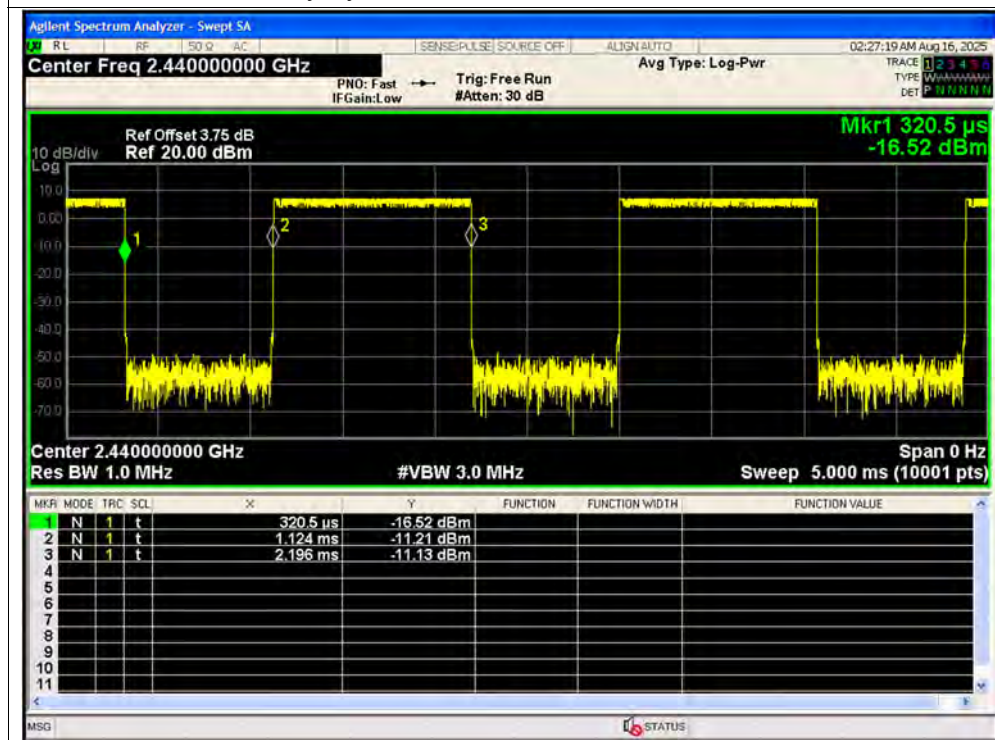
Duty Cycle NVNT BLE 1M 2480MHz Ant1



Duty Cycle NVNT BLE 2M 2402MHz Ant1



Duty Cycle NVNT BLE 2M 2440MHz Ant1



Duty Cycle NVNT BLE 2M 2480MHz Ant1

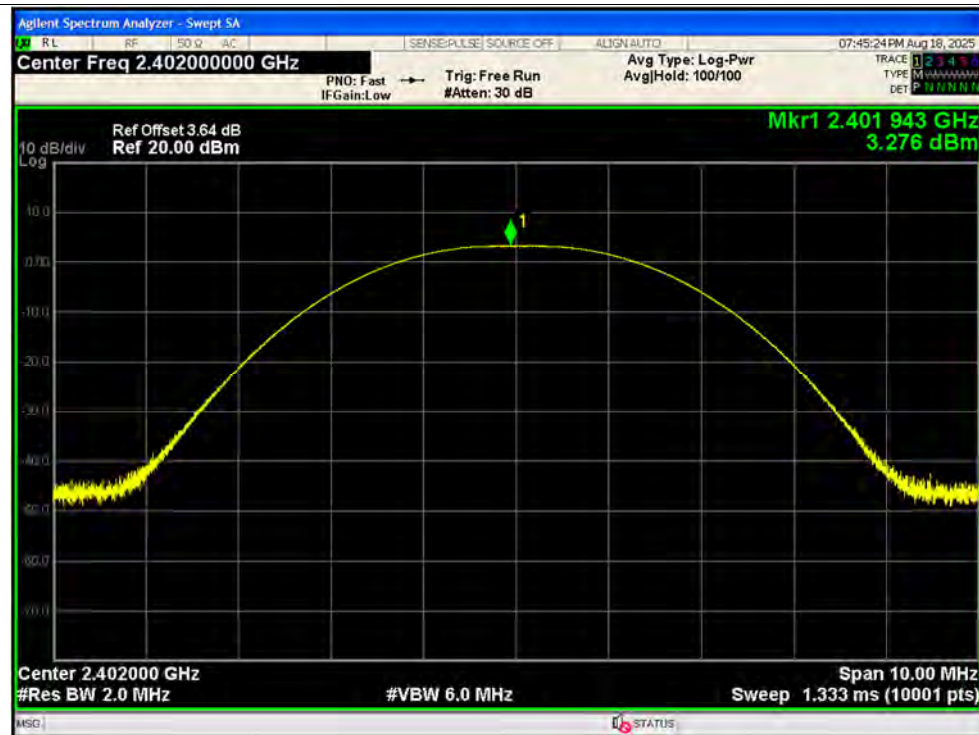


**A.2. Maximum Peak Conducted Output Power**

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	3.28	0	3.28	0.00213	30	Pass
NVNT	BLE 1M	2440	Ant1	3.32	0	3.32	0.00215	30	Pass
NVNT	BLE 1M	2480	Ant1	3.14	0	3.14	0.00206	30	Pass
NVNT	BLE 2M	2402	Ant1	3.21	0	3.21	0.00209	30	Pass
NVNT	BLE 2M	2440	Ant1	3.27	0	3.27	0.00212	30	Pass
NVNT	BLE 2M	2480	Ant1	3.08	0	3.08	0.00203	30	Pass

Test Graphs

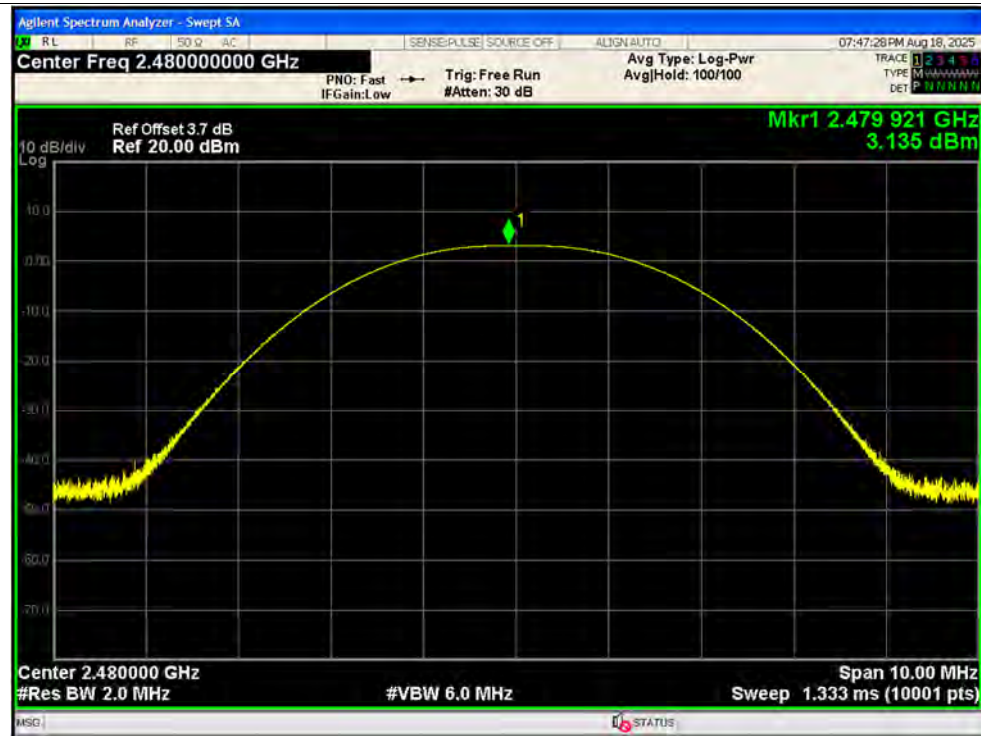
Peak Power NVNT BLE 1M 2402MHz Ant1



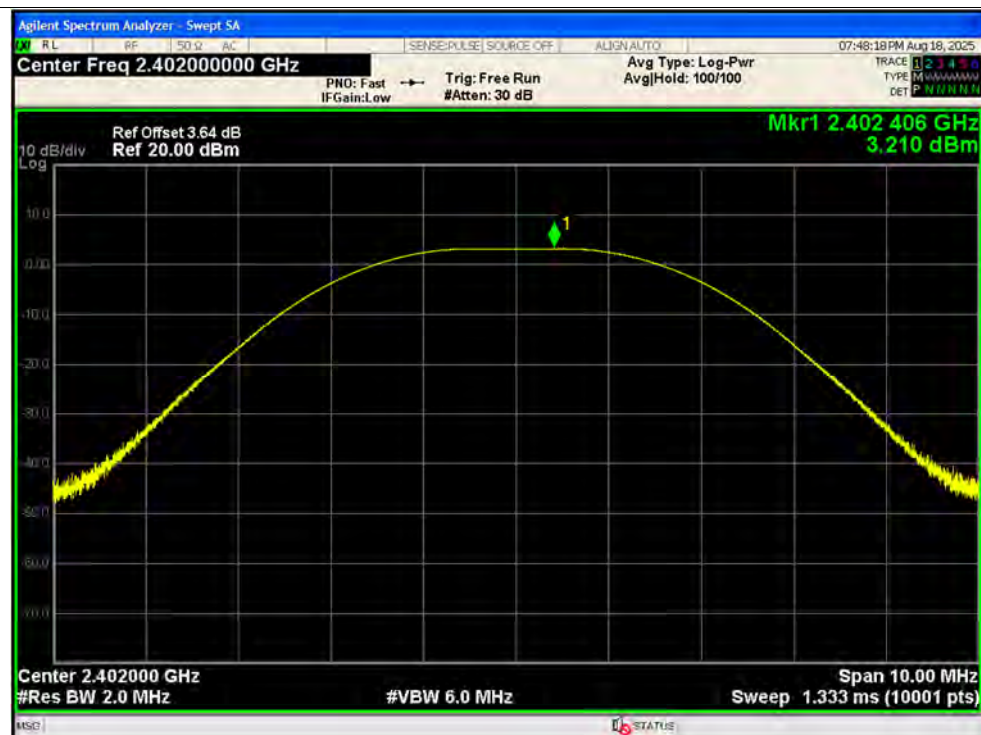
Peak Power NVNT BLE 1M 2440MHz Ant1



Peak Power NVNT BLE 1M 2480MHz Ant1



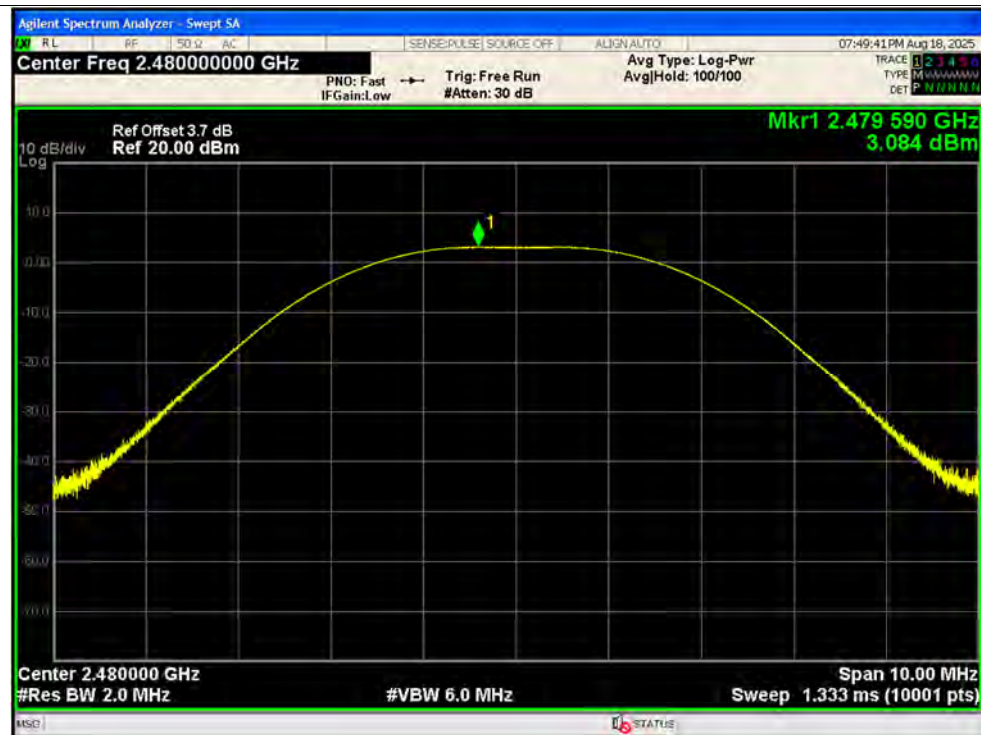
Peak Power NVNT BLE 2M 2402MHz Ant1



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	1.11	2.12	3.23	0.0021	30	Pass
NVNT	BLE 1M	2440	Ant1	0.88	2.12	3	0.002	30	Pass
NVNT	BLE 1M	2480	Ant1	0.69	2.12	2.81	0.00191	30	Pass
NVNT	BLE 2M	2402	Ant1	0.75	2.43	3.18	0.00208	30	Pass
NVNT	BLE 2M	2440	Ant1	0.67	2.43	3.1	0.00204	30	Pass
NVNT	BLE 2M	2480	Ant1	0.51	2.43	2.94	0.00197	30	Pass



Test Graphs

Average Power NVNT BLE 1M 2402MHz Ant1



Average Power NVNT BLE 1M 2440MHz Ant1

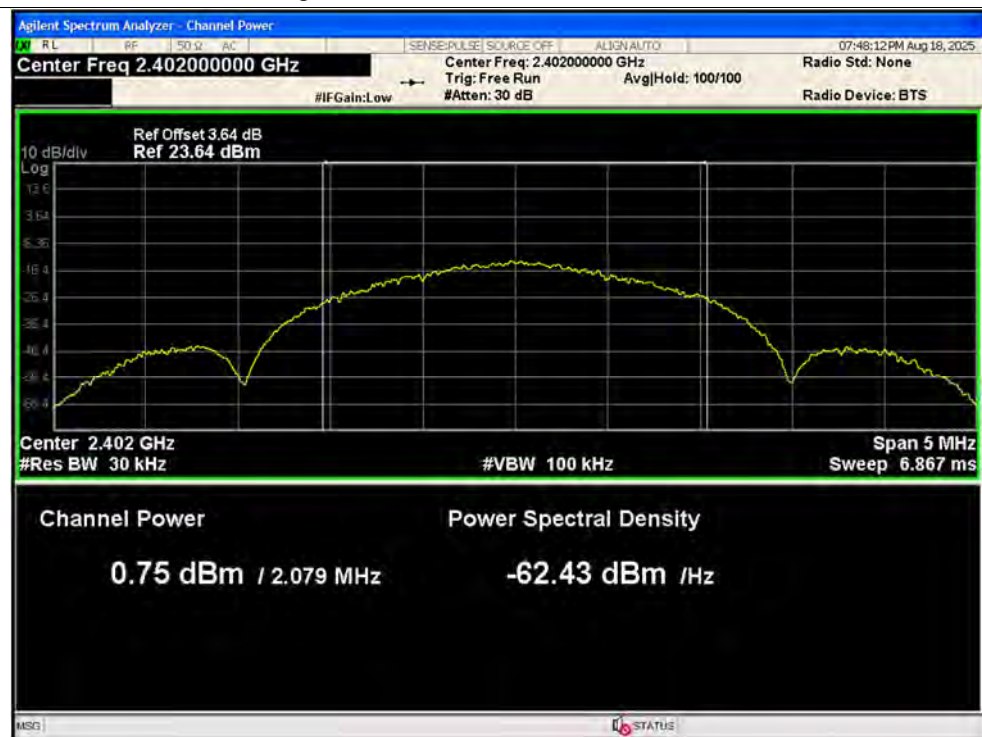




Average Power NVNT BLE 1M 2480MHz Ant1

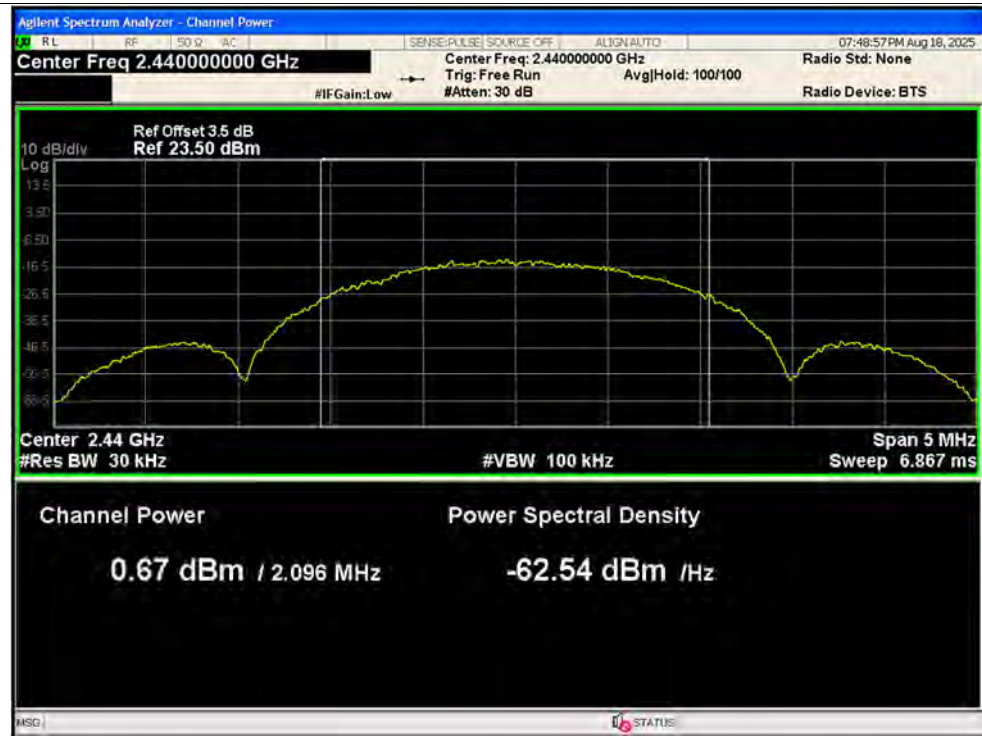


Average Power NVNT BLE 2M 2402MHz Ant1

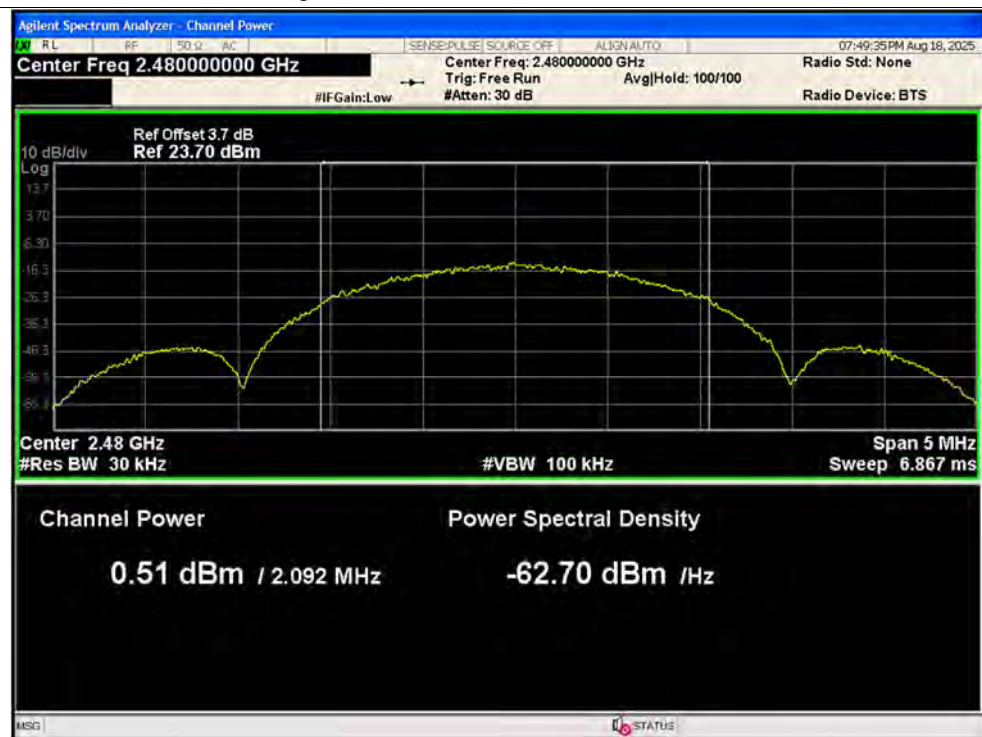




Average Power NVNT BLE 2M 2440MHz Ant1



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	0.6633	0.5	Pass
NVNT	BLE 1M	2440	Ant1	0.6809	0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.677	0.5	Pass
NVNT	BLE 2M	2402	Ant1	1.337	0.5	Pass
NVNT	BLE 2M	2440	Ant1	1.217	0.5	Pass
NVNT	BLE 2M	2480	Ant1	1.121	0.5	Pass



Test Graphs

-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



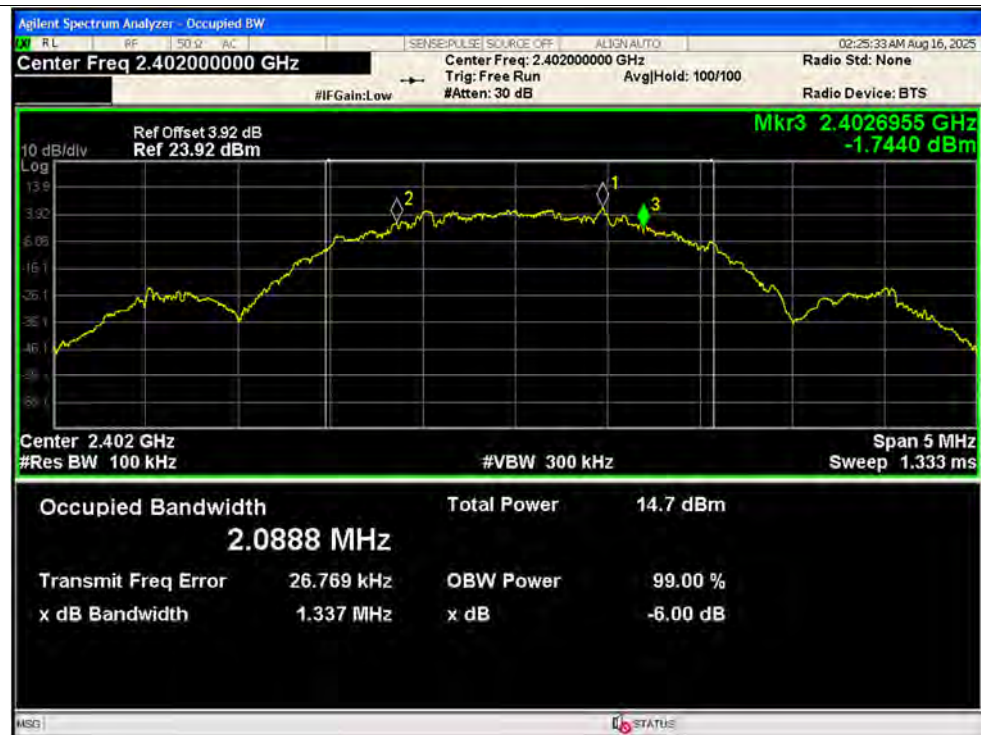
-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



-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**

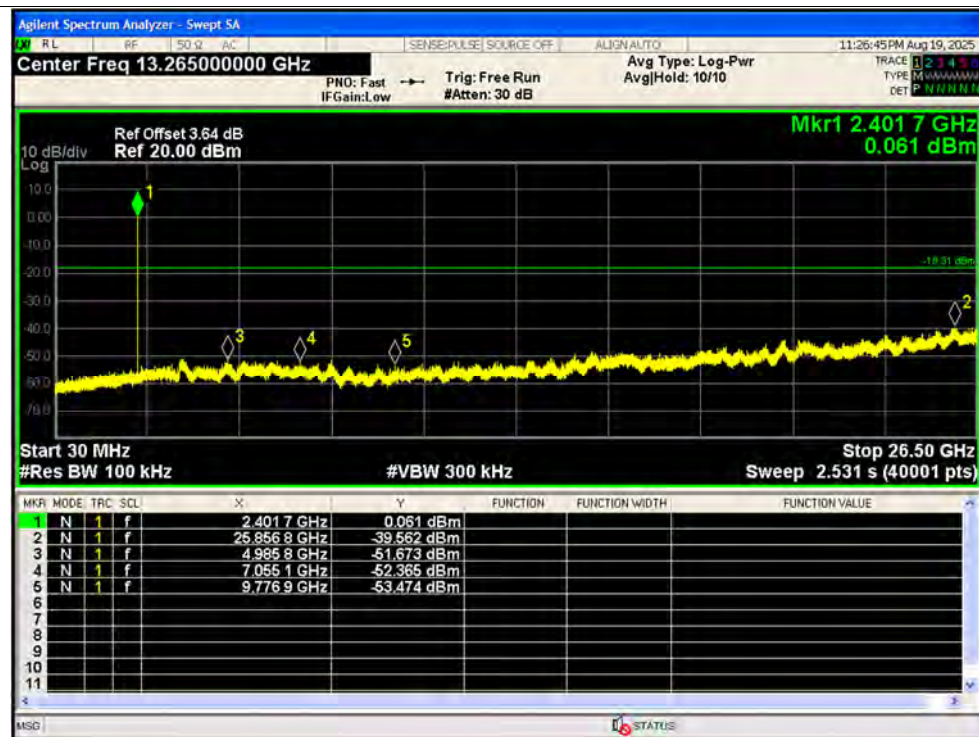
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-41.25	-20	Pass
NVNT	BLE 1M	2440	Ant1	-43.17	-20	Pass
NVNT	BLE 1M	2480	Ant1	-42.42	-20	Pass
NVNT	BLE 2M	2402	Ant1	-42.72	-20	Pass
NVNT	BLE 2M	2440	Ant1	-42.27	-20	Pass
NVNT	BLE 2M	2480	Ant1	-41.84	-20	Pass

Test Graphs

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



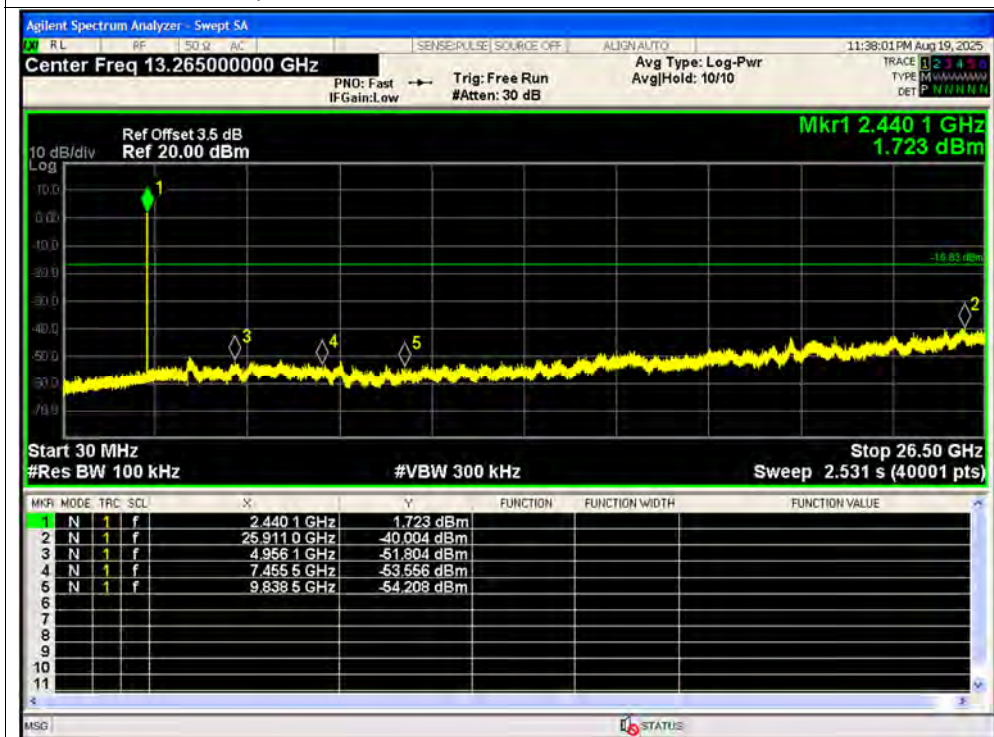
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref



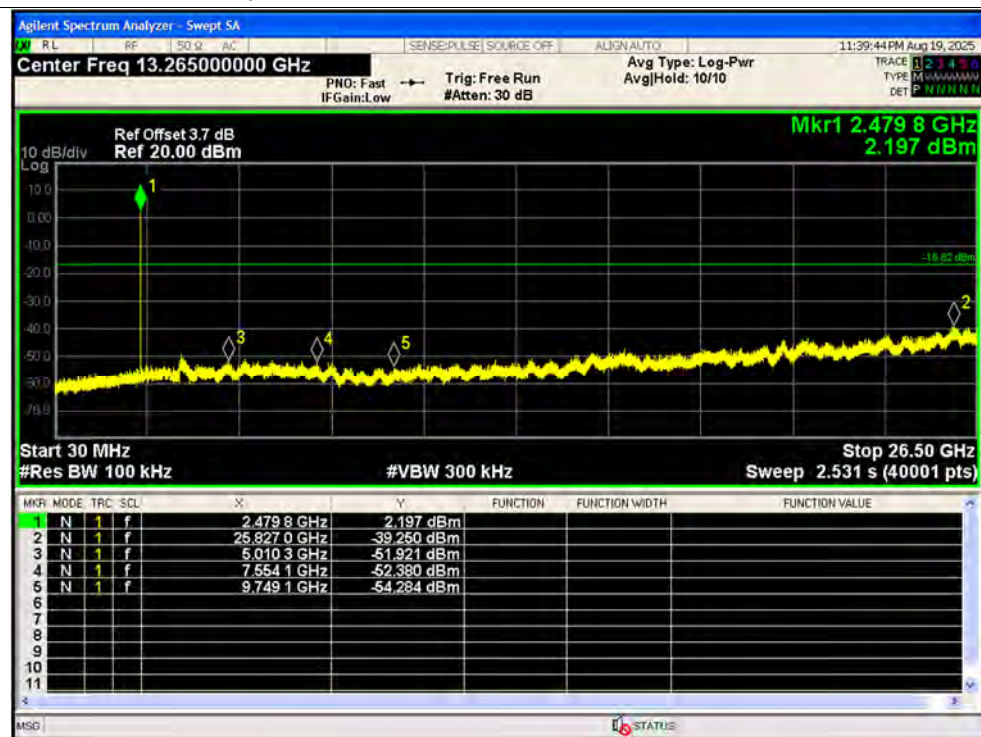
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



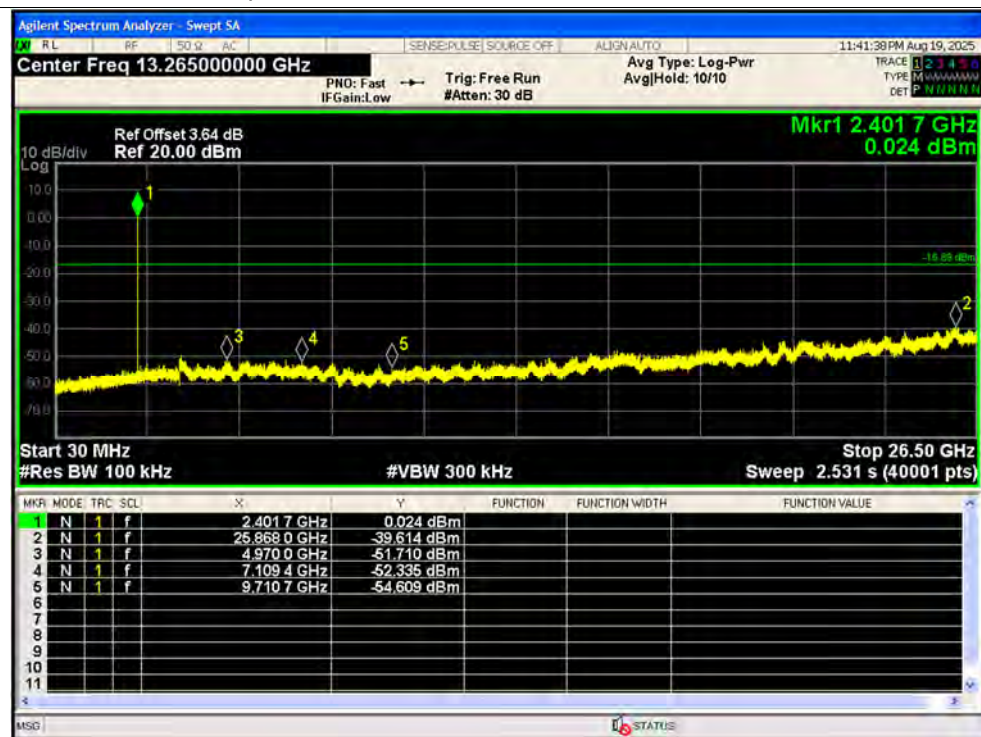
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Ref



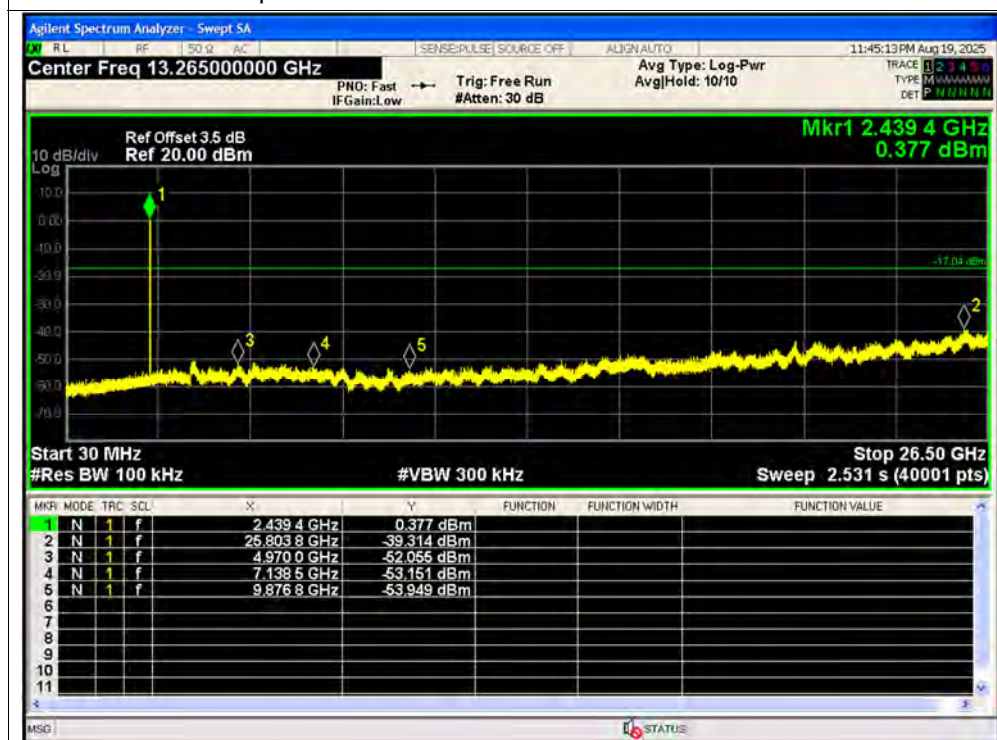
Tx. Spurious NVNT BLE 2M 2402MHz Ant1 Emission



Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Ref



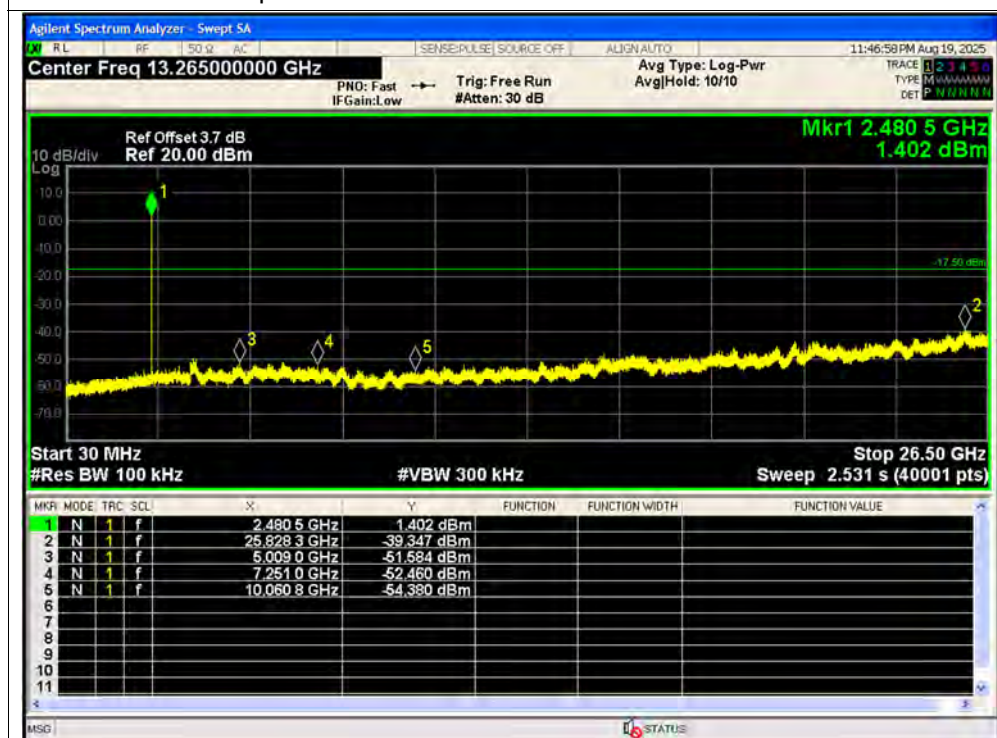
Tx. Spurious NVNT BLE 2M 2440MHz Ant1 Emission



Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 2M 2480MHz Ant1 Emission





REPORT No.: SZ25070423W01

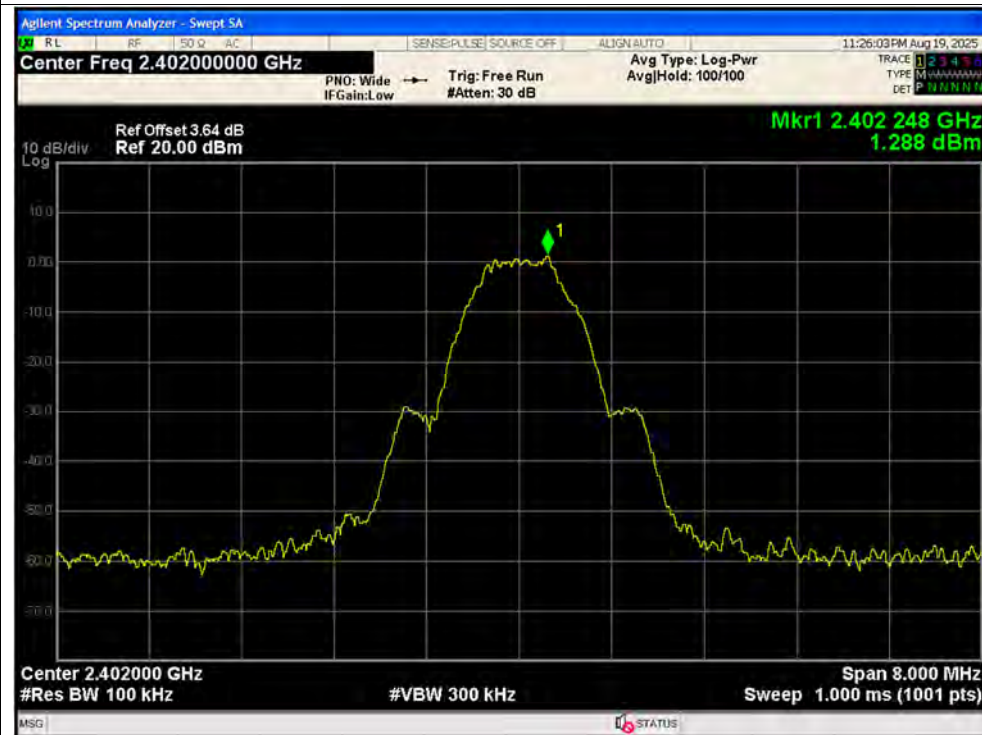
A.6. Band Edge

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-57.1	-20	Pass
NVNT	BLE 1M	2480	Ant1	-58.33	-20	Pass
NVNT	BLE 2M	2402	Ant1	-29.84	-20	Pass
NVNT	BLE 2M	2480	Ant1	-57.92	-20	Pass

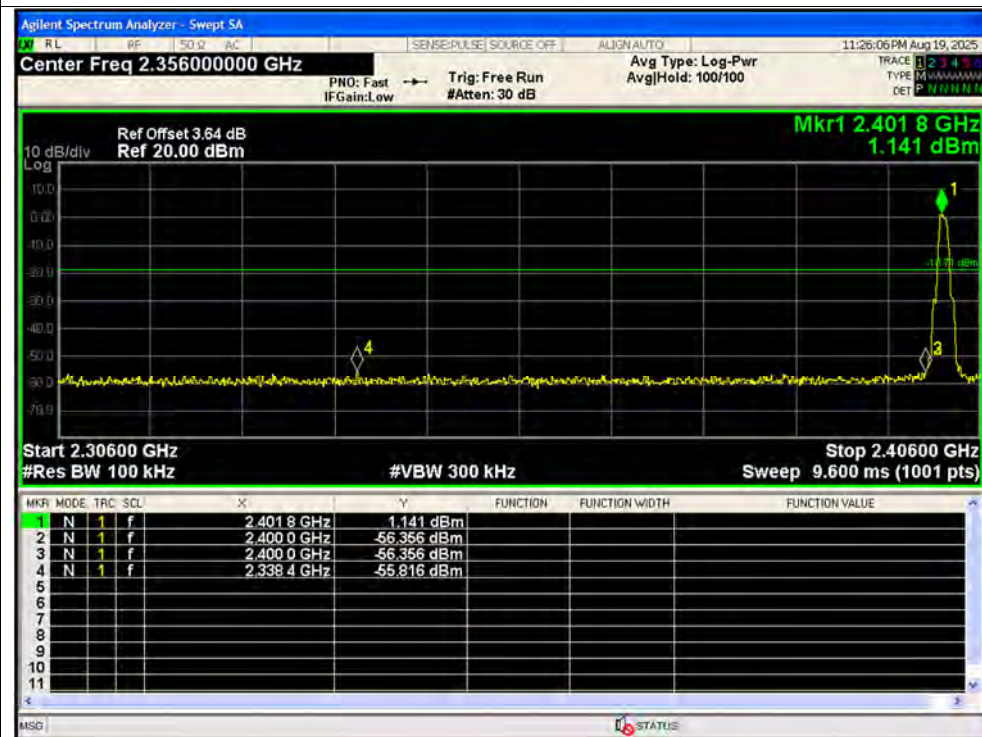


Test Graphs

Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



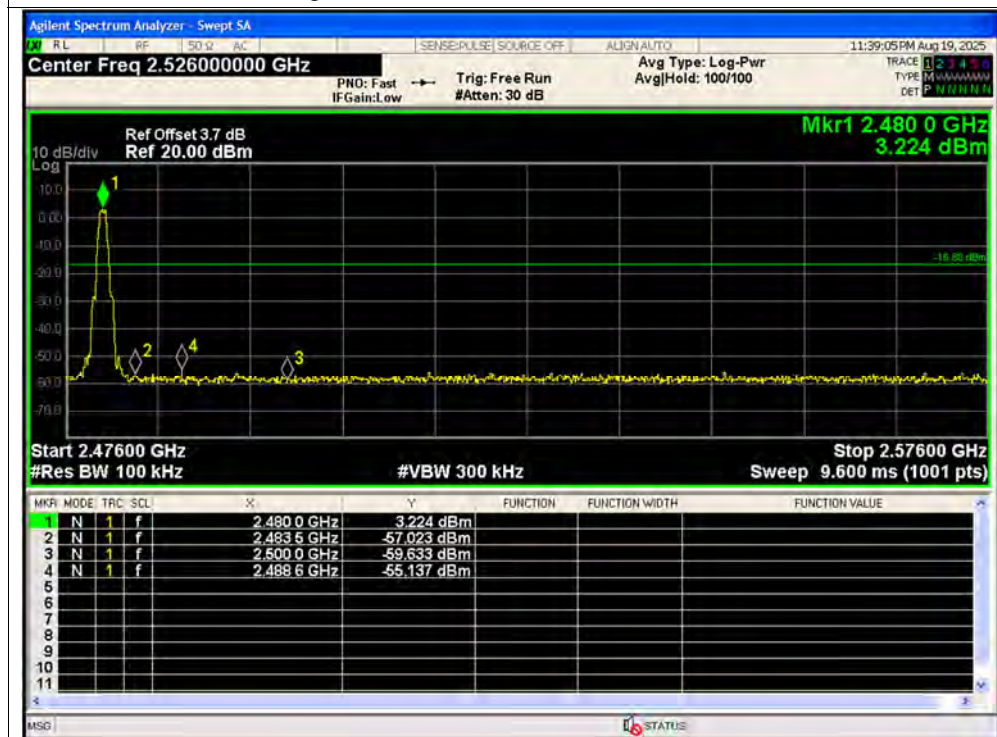
Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



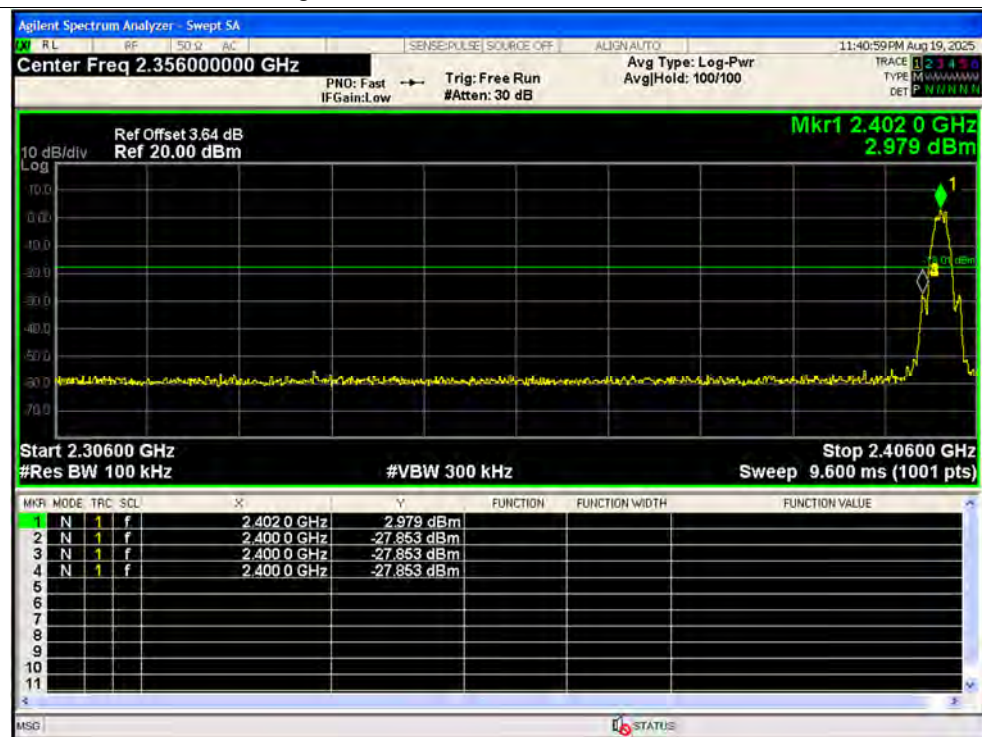
Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



Band Edge NVNT BLE 2M 2402MHz Ant1 Ref



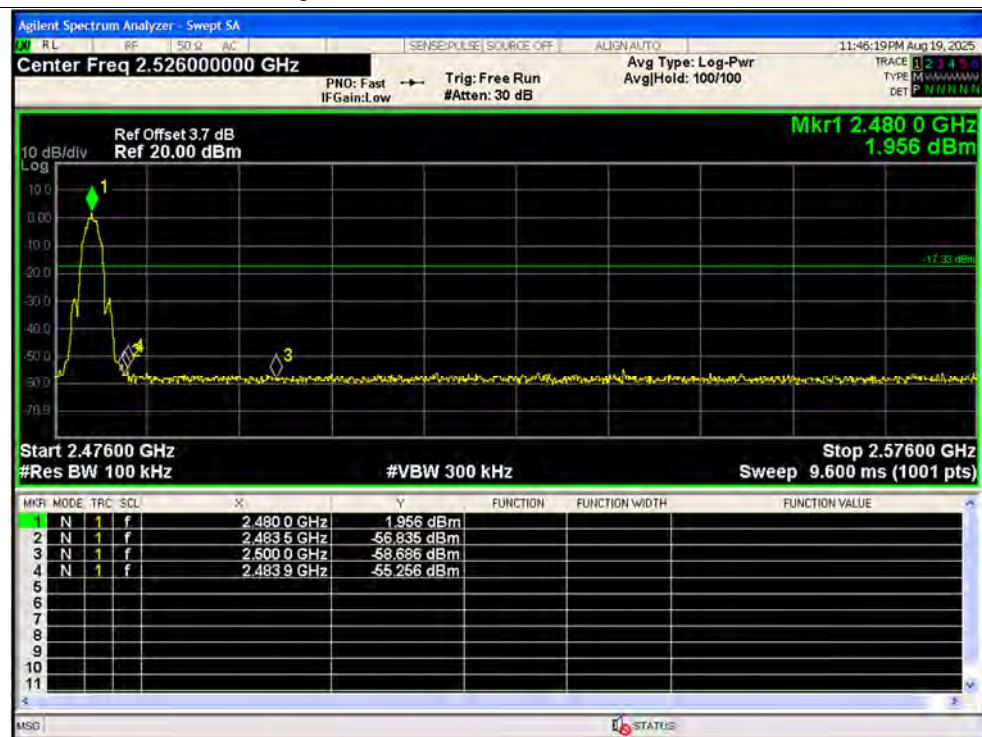
Band Edge NVNT BLE 2M 2402MHz Ant1 Emission



Band Edge NVNT BLE 2M 2480MHz Ant1 Ref



Band Edge NVNT BLE 2M 2480MHz Ant1 Emission

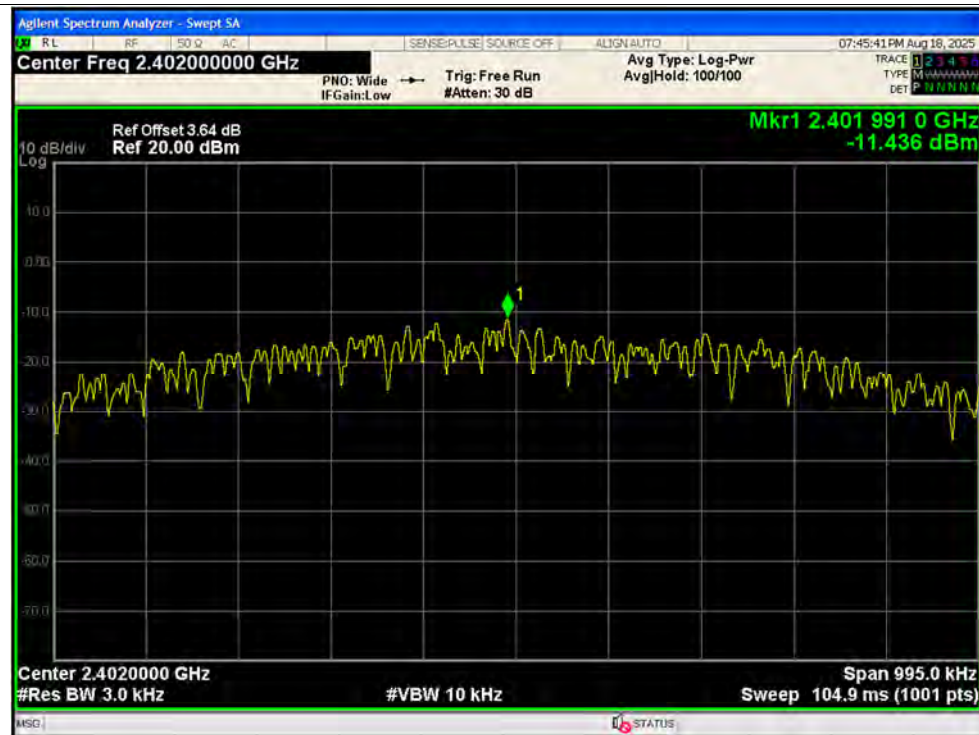


**A.7. Power Spectral Density**

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	-11.44	0	-11.44	8	Pass
NVNT	BLE 1M	2440	Ant1	-10.99	0	-10.99	8	Pass
NVNT	BLE 1M	2480	Ant1	-10.99	0	-10.99	8	Pass
NVNT	BLE 2M	2402	Ant1	-14.84	0	-14.84	8	Pass
NVNT	BLE 2M	2440	Ant1	-14.86	0	-14.86	8	Pass
NVNT	BLE 2M	2480	Ant1	-14.85	0	-14.85	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

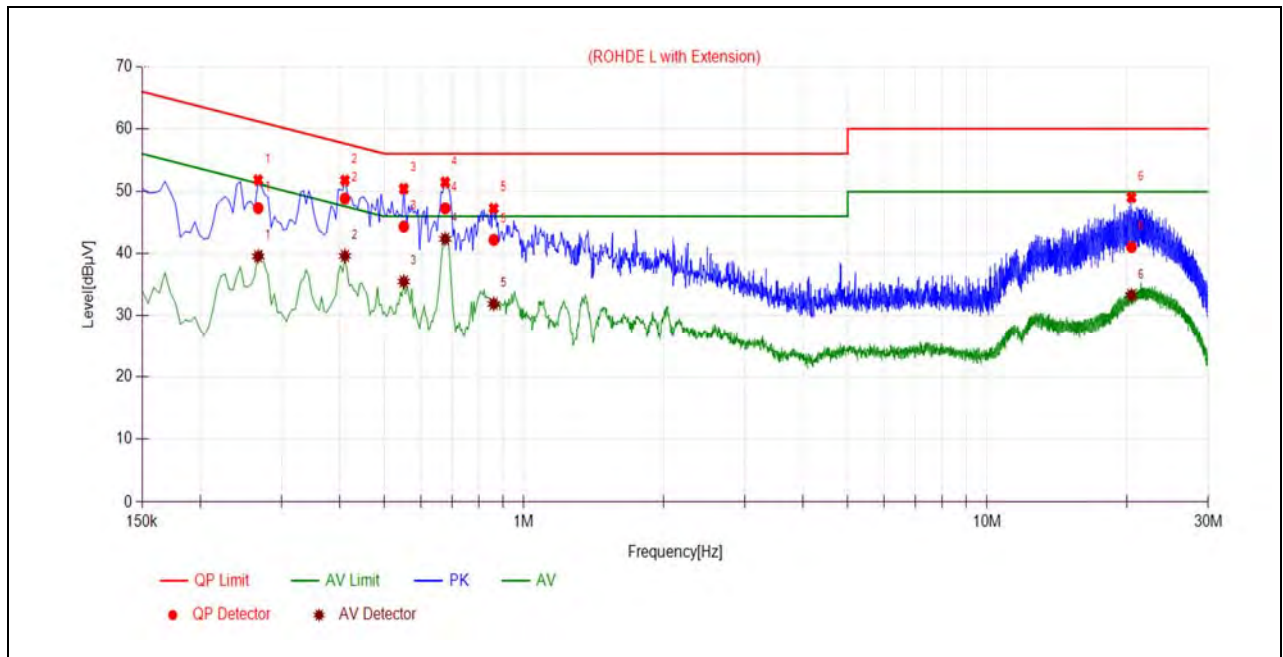
The measurement results are obtained as below:

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

U_R : Receiver Reading

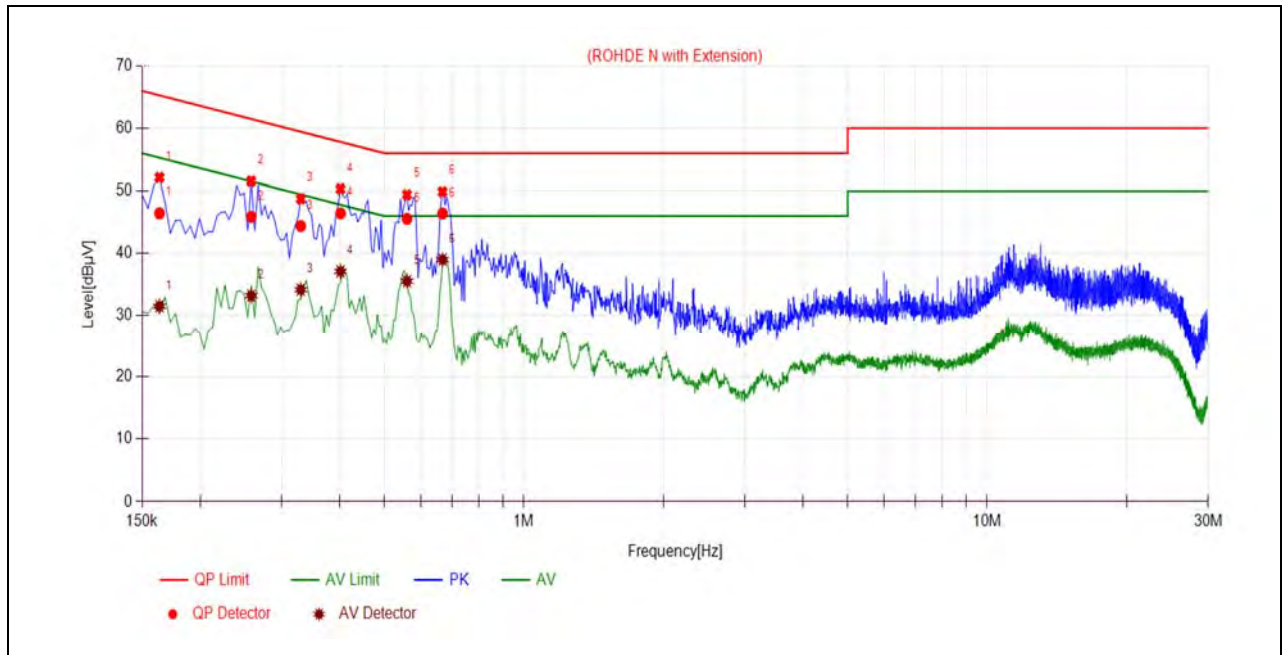
A_{Factor} : Voltage division factor of LISN

B. Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.2670	47.35	39.57	61.21	51.21	Line	PASS
2	0.4110	48.89	39.64	57.63	47.63		PASS
3	0.5505	44.36	35.52	56.00	46.00		PASS
4	0.6765	47.31	42.39	56.00	46.00		PASS
5	0.8610	42.22	31.91	56.00	46.00		PASS
6	20.4918	41.07	33.32	60.00	50.00		PASS



(N Phase)

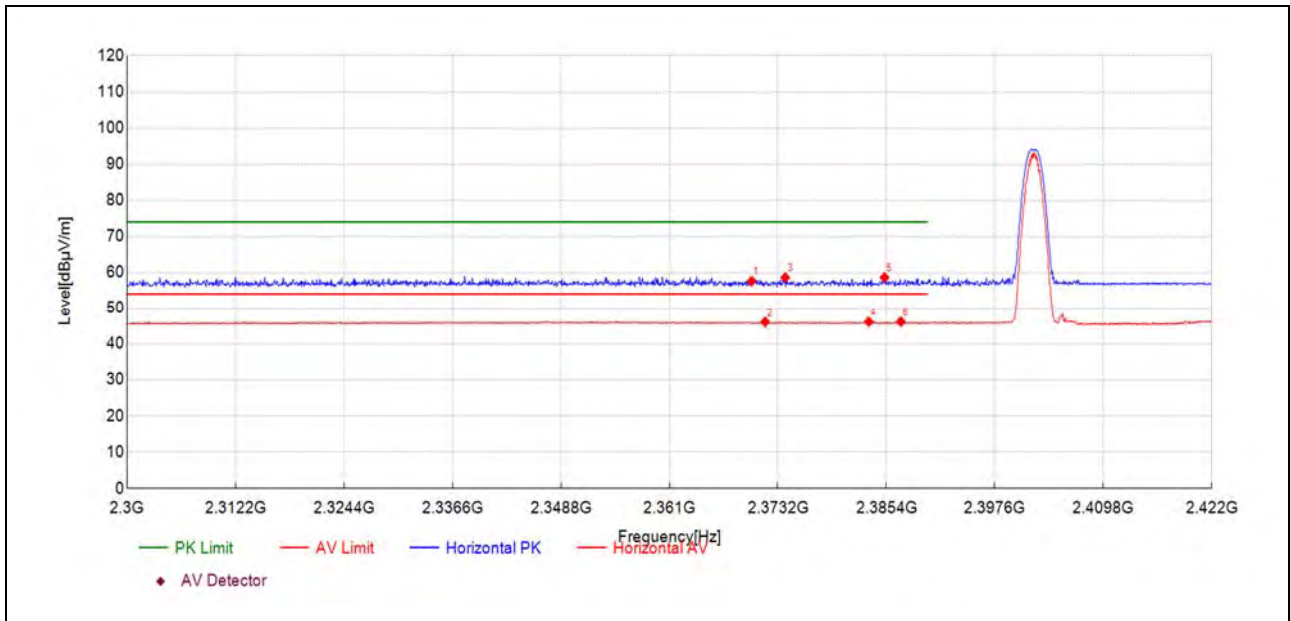
No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1635	46.45	31.54	65.28	55.28	Neutral	PASS
2	0.2580	45.88	33.24	61.50	51.50		PASS
3	0.3300	44.41	34.19	59.45	49.45		PASS
4	0.4020	46.45	37.13	57.81	47.81		PASS
5	0.5595	45.56	35.56	56.00	46.00		PASS
6	0.6675	46.42	39.01	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.

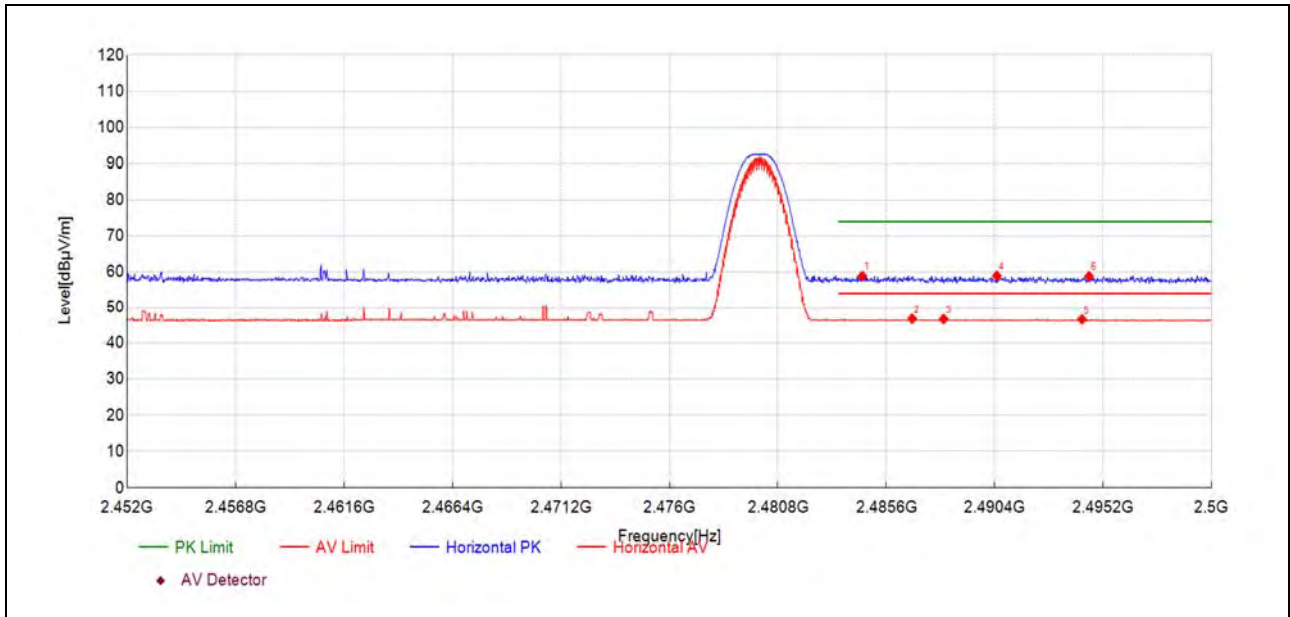
1Mbps

Plot for Channel 0



Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Angle [°]	Detector	Verdict
2370.25	20.1	57.61	37.470	74.00	16.39	61	PK	PASS
2371.77	8.6	46.08	37.470	54.00	7.92	159	AV	PASS
2374.03	21.1	58.61	37.480	74.00	15.39	70	PK	PASS
2383.43	8.7	46.15	37.490	54.00	7.85	235	AV	PASS
2385.20	21.2	58.66	37.490	74.00	15.34	342	PK	PASS
2387.03	8.7	46.17	37.490	54.00	7.83	9	AV	PASS

Plot for Channel 39

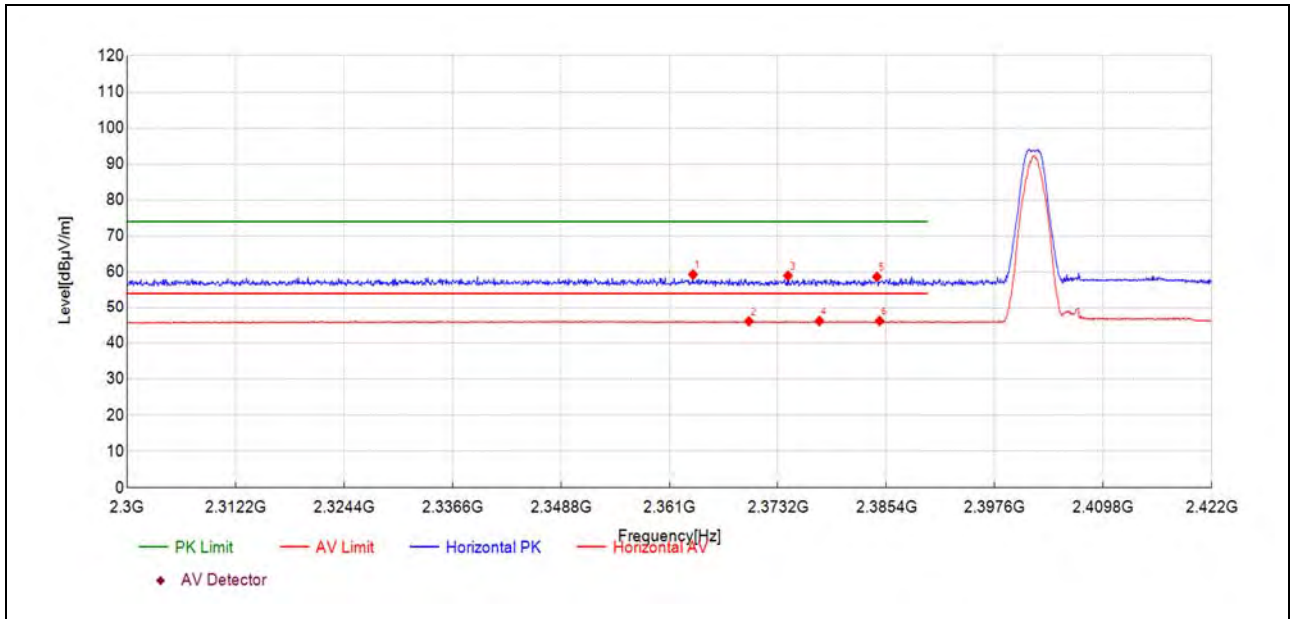


Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Angle [°]	Detector	Verdict
2484.54	20.6	58.89	38.270	74.00	15.11	138	PK	PASS
2486.75	8.5	46.80	38.270	54.00	7.20	138	AV	PASS
2488.14	8.5	46.72	38.270	54.00	7.28	138	AV	PASS
2490.49	20.7	58.94	38.270	74.00	15.06	138	PK	PASS
2494.26	8.4	46.61	38.260	54.00	7.39	138	AV	PASS
2494.57	20.6	58.85	38.260	74.00	15.15	138	PK	PASS



2Mbps

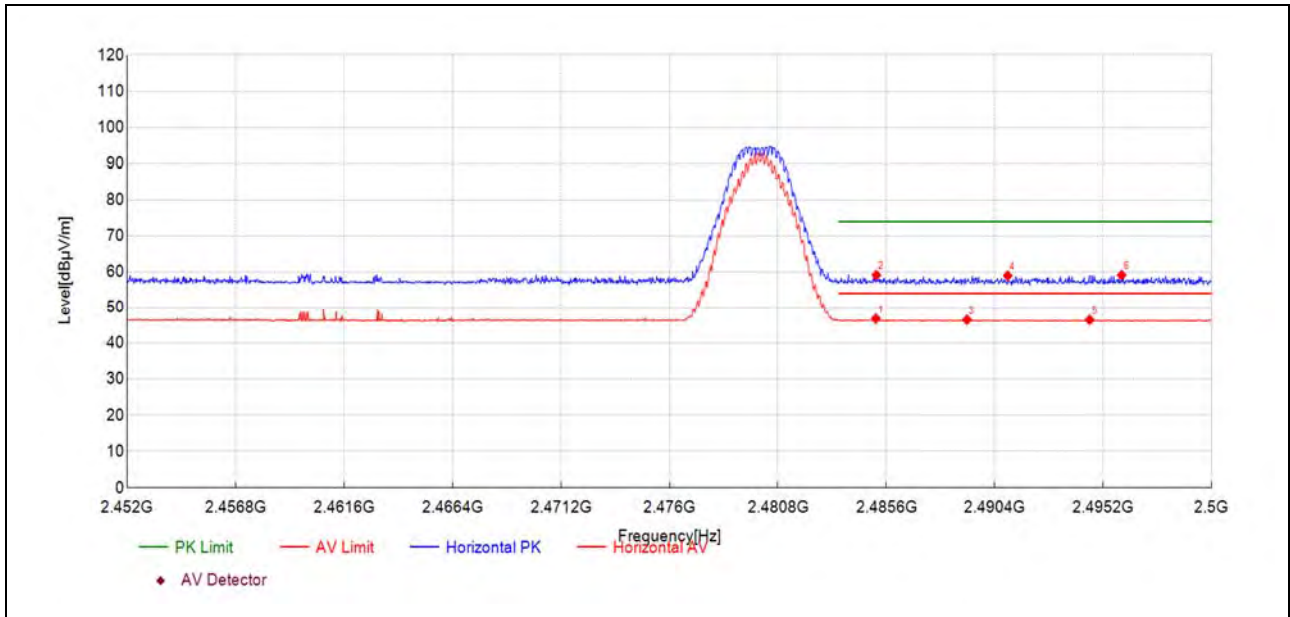
Plot for Channel 0



Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Angle [°]	Detector	Verdict
2363.65	21.8	59.30	37.470	74.00	14.70	178	PK	PASS
2369.94	8.6	46.07	37.470	54.00	7.93	5	AV	PASS
2374.34	21.5	58.96	37.480	74.00	15.04	230	PK	PASS
2377.87	8.7	46.15	37.480	54.00	7.85	94	AV	PASS
2384.34	21.2	58.65	37.490	74.00	15.35	254	PK	PASS
2384.65	8.7	46.14	37.490	54.00	7.86	94	AV	PASS



Plot for Channel 39



Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Angle [°]	Detector	Verdict
2485.14	8.6	46.83	38.270	54.00	7.17	274	AV	PASS
2485.16	20.9	59.13	38.270	74.00	14.87	324	PK	PASS
2489.17	8.3	46.52	38.260	54.00	7.48	192	AV	PASS
2490.97	20.7	58.99	38.270	74.00	15.01	344	PK	PASS
2494.60	8.2	46.48	38.260	54.00	7.52	66	AV	PASS
2496.01	20.9	59.14	38.260	74.00	14.86	306	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.

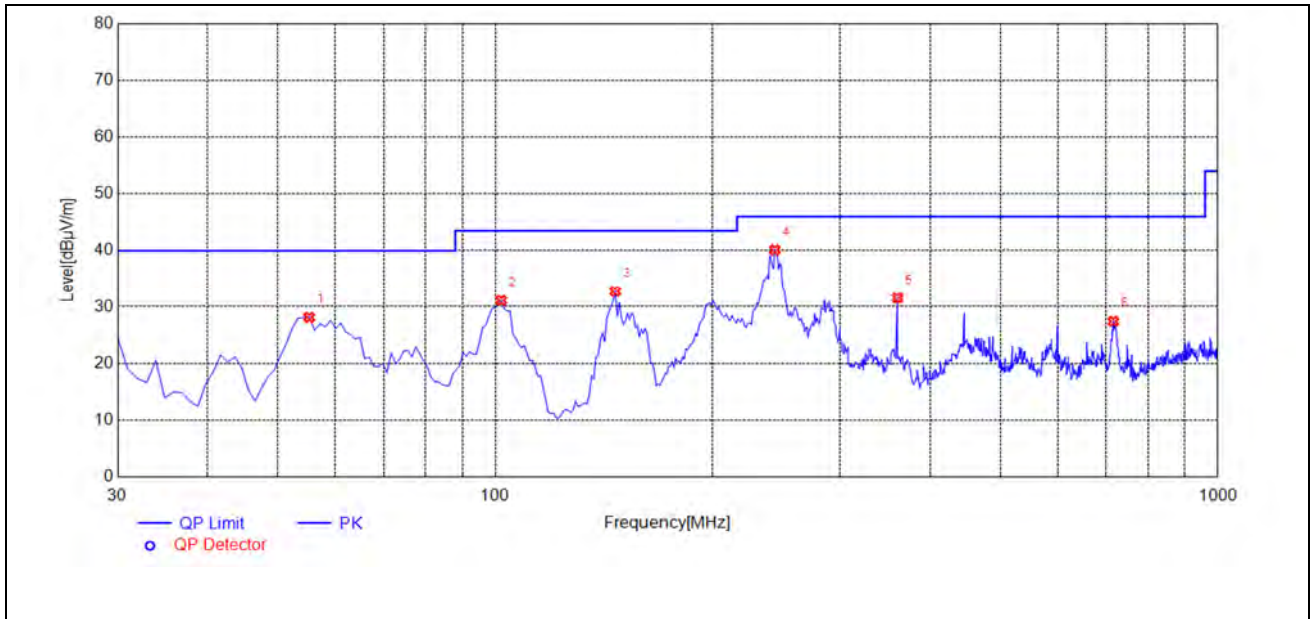
Note3: For the frequency, which started from 18GHz to 10th harmonic of the highest frequency, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

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



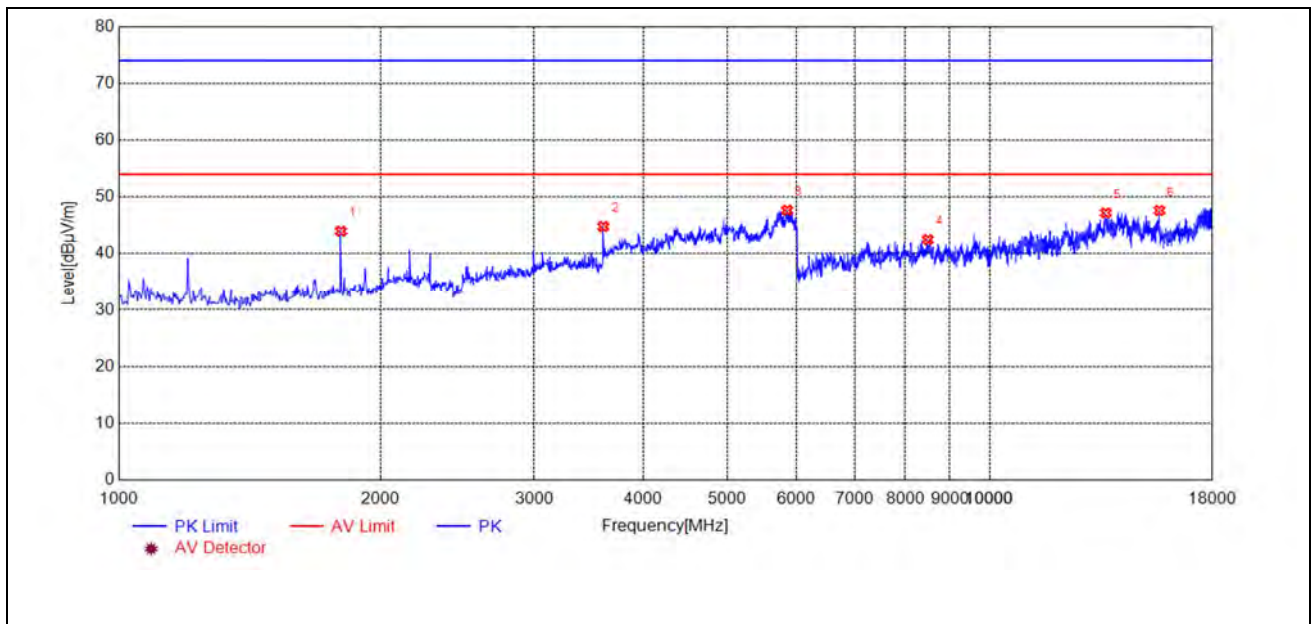
1Mbps

Plot for Channel 0



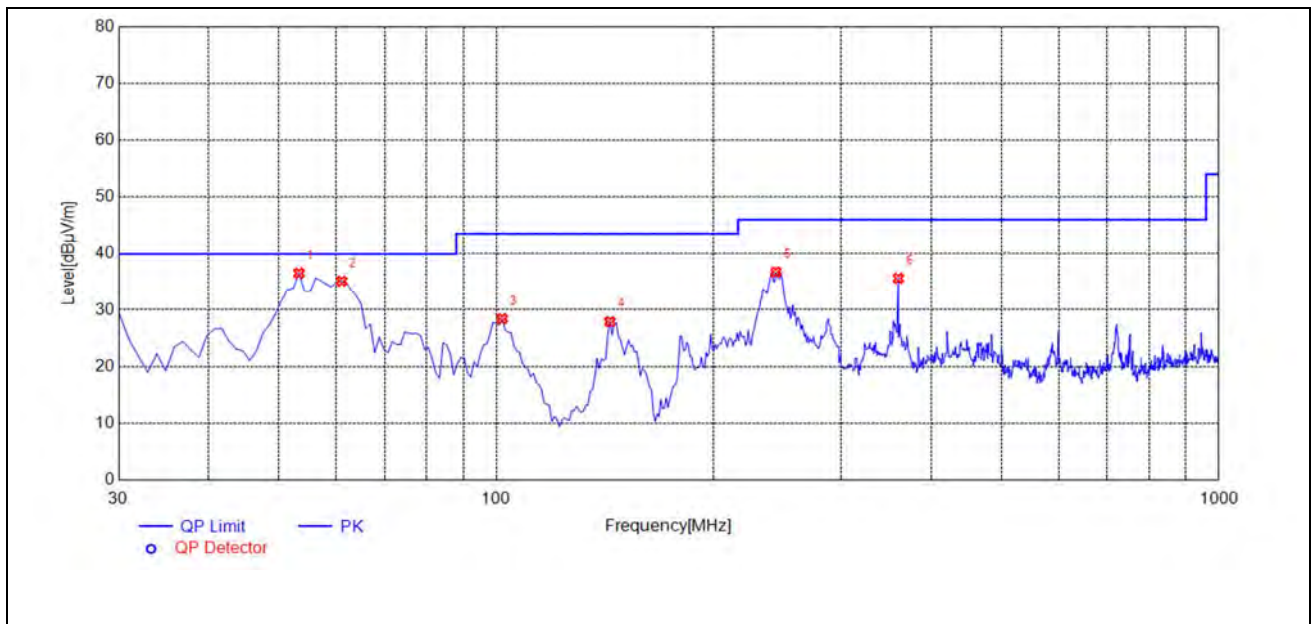
(Antenna Horizontal, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
55.2452	28.09	-28.97	40.00	11.91	150	343	Horizontal	PASS
101.8519	31.10	-30.89	43.50	12.40	150	213	Horizontal	PASS
146.5165	32.75	-34.34	43.50	10.75	150	285	Horizontal	PASS
243.6136	40.13	-30.65	46.00	5.87	150	46	Horizontal	PASS
360.1301	31.57	-26.34	46.00	14.43	150	191	Horizontal	PASS
716.4765	27.39	-21.46	46.00	18.61	150	285	Horizontal	PASS



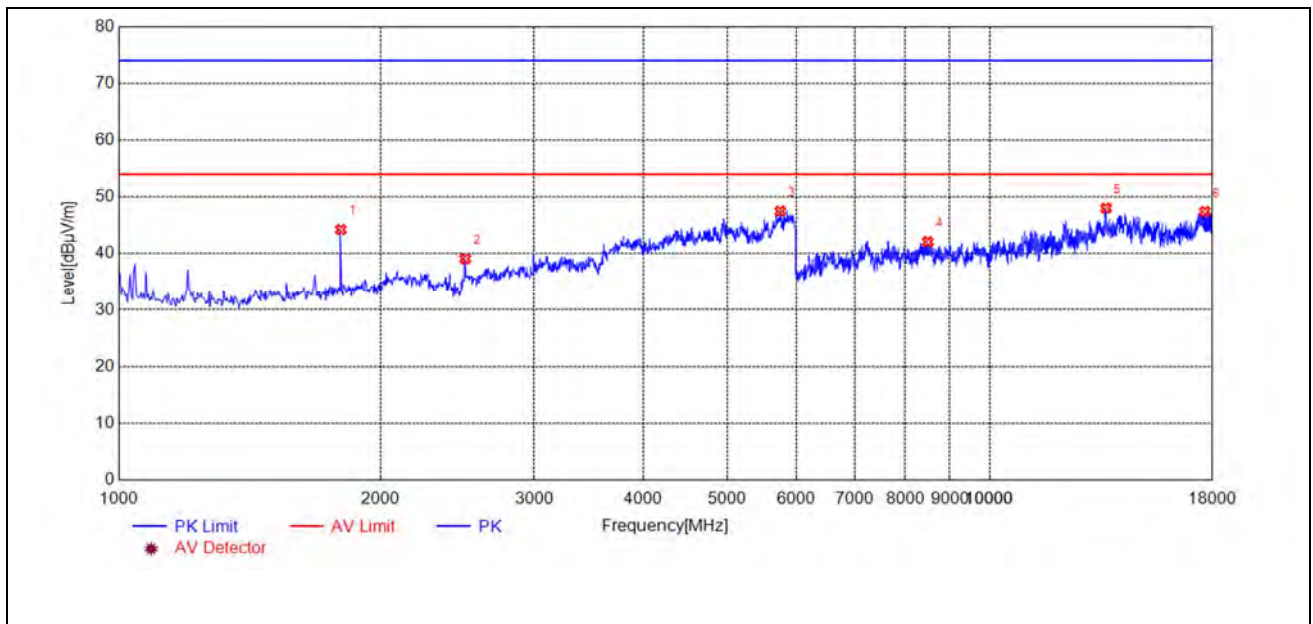
(Antenna Horizontal, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1799.1598	43.98	-22.66	74.00	30.02	150	345	Horizontal	PASS
3601.5203	44.81	-15.69	74.00	29.19	150	187	Horizontal	PASS
5852.7706	47.67	-6.93	74.00	26.33	150	337	Horizontal	PASS
8488.2977	42.50	-1.72	74.00	31.50	150	145	Horizontal	PASS
13592.7185	47.20	7.27	74.00	26.80	150	0	Horizontal	PASS
15656.9314	47.64	6.31	74.00	26.36	150	170	Horizontal	PASS



(Antenna Vertical, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
53.3033	36.60	-28.68	40.00	3.40	150	75	Vertical	PASS
61.0711	35.15	-29.64	40.00	4.85	150	90	Vertical	PASS
101.8519	28.41	-30.89	43.50	15.09	150	300	Vertical	PASS
143.6036	27.89	-34.12	43.50	15.61	150	39	Vertical	PASS
243.6136	36.77	-30.65	46.00	9.23	150	184	Vertical	PASS
360.1301	35.69	-26.34	46.00	10.31	150	32	Vertical	PASS

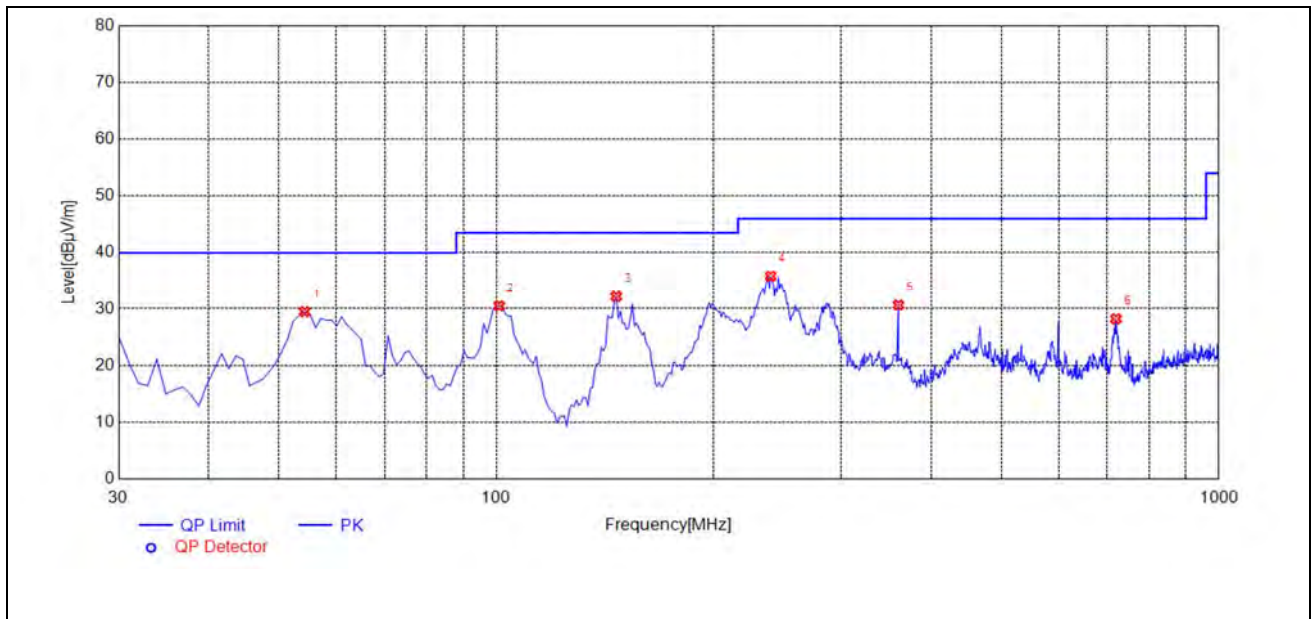


(Antenna Vertical, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1799.1598	44.27	-22.66	74.00	29.73	150	15	Vertical	PASS
2499.6999	39.11	-19.52	74.00	34.89	150	102	Vertical	PASS
5747.3495	47.52	-6.77	74.00	26.48	150	102	Vertical	PASS
8488.2977	42.13	-1.72	74.00	31.87	150	127	Vertical	PASS
13596.1192	48.05	7.45	74.00	25.95	150	110	Vertical	PASS
17656.5313	47.43	9.11	74.00	26.57	150	329	Vertical	PASS

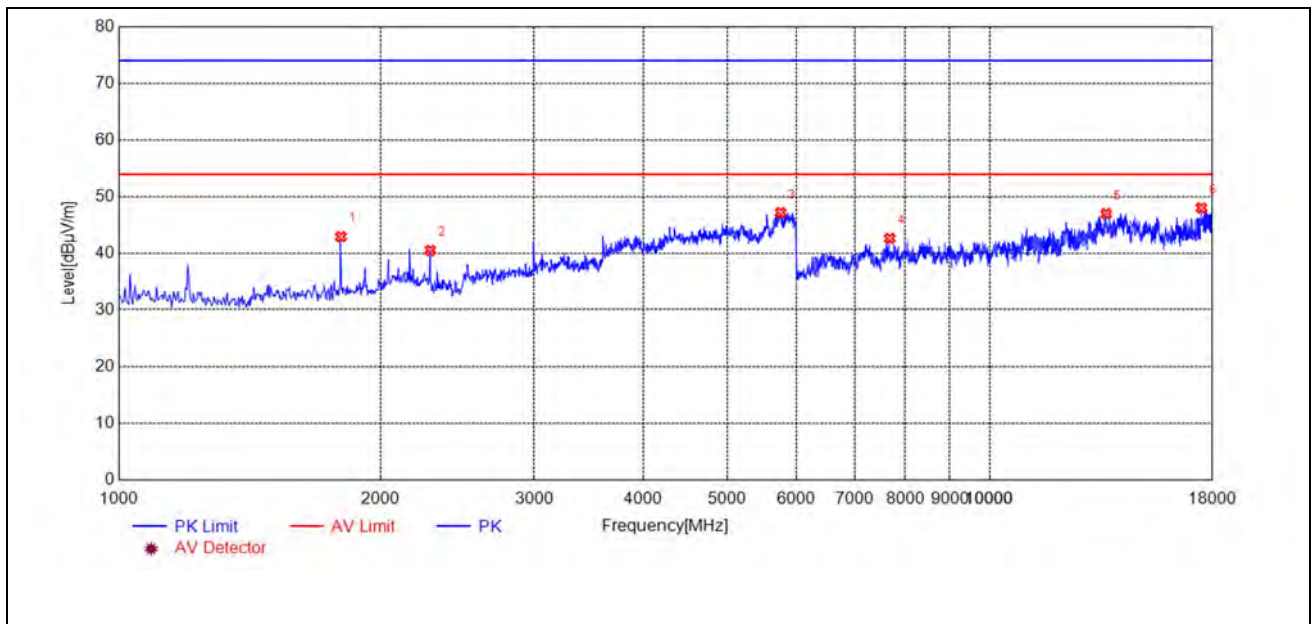


Plot for Channel 19



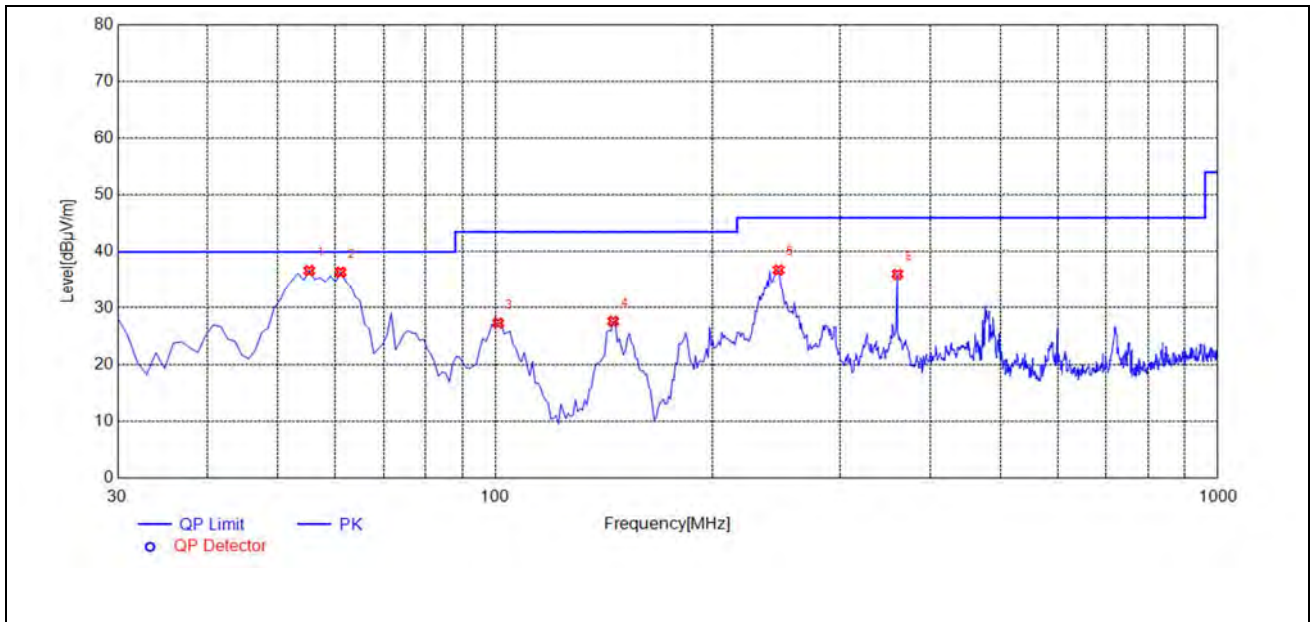
(Antenna Horizontal, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
54.2743	29.46	-29.08	40.00	10.54	150	18	Horizontal	PASS
100.8809	30.49	-31.39	43.50	13.01	150	206	Horizontal	PASS
146.5165	32.17	-34.34	43.50	11.33	150	308	Horizontal	PASS
239.7297	35.86	-31.02	46.00	10.14	150	46	Horizontal	PASS
360.1301	30.64	-26.34	46.00	15.36	150	206	Horizontal	PASS
720.3604	28.19	-21.68	46.00	17.81	150	198	Horizontal	PASS



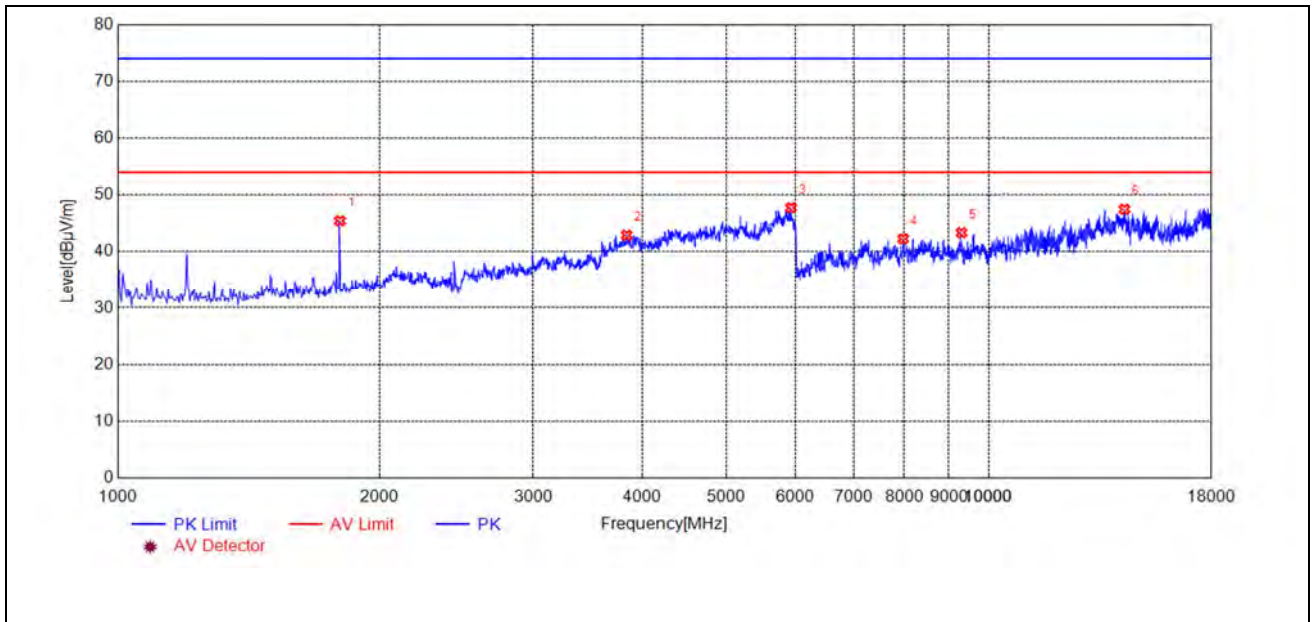
(Antenna Horizontal, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1799.1598	43.02	-22.66	74.00	30.98	150	173	Horizontal	PASS
2278.6557	40.60	-20.87	74.00	33.40	150	140	Horizontal	PASS
5754.1508	47.25	-6.86	74.00	26.75	150	332	Horizontal	PASS
7675.5351	42.71	-2.79	74.00	31.29	150	274	Horizontal	PASS
13602.9206	47.07	7.50	74.00	26.93	150	115	Horizontal	PASS
17493.2987	48.06	8.94	74.00	25.94	150	98	Horizontal	PASS



(Antenna Vertical, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
55.2452	36.68	-28.97	40.00	3.32	150	82	Vertical	PASS
61.0711	36.41	-29.64	40.00	3.59	150	31	Vertical	PASS
100.8809	27.28	-31.39	43.50	16.22	150	2	Vertical	PASS
145.5455	27.61	-34.18	43.50	15.89	150	343	Vertical	PASS
246.5265	36.79	-30.44	46.00	9.21	150	67	Vertical	PASS
360.1301	36.04	-26.34	46.00	9.96	150	38	Vertical	PASS

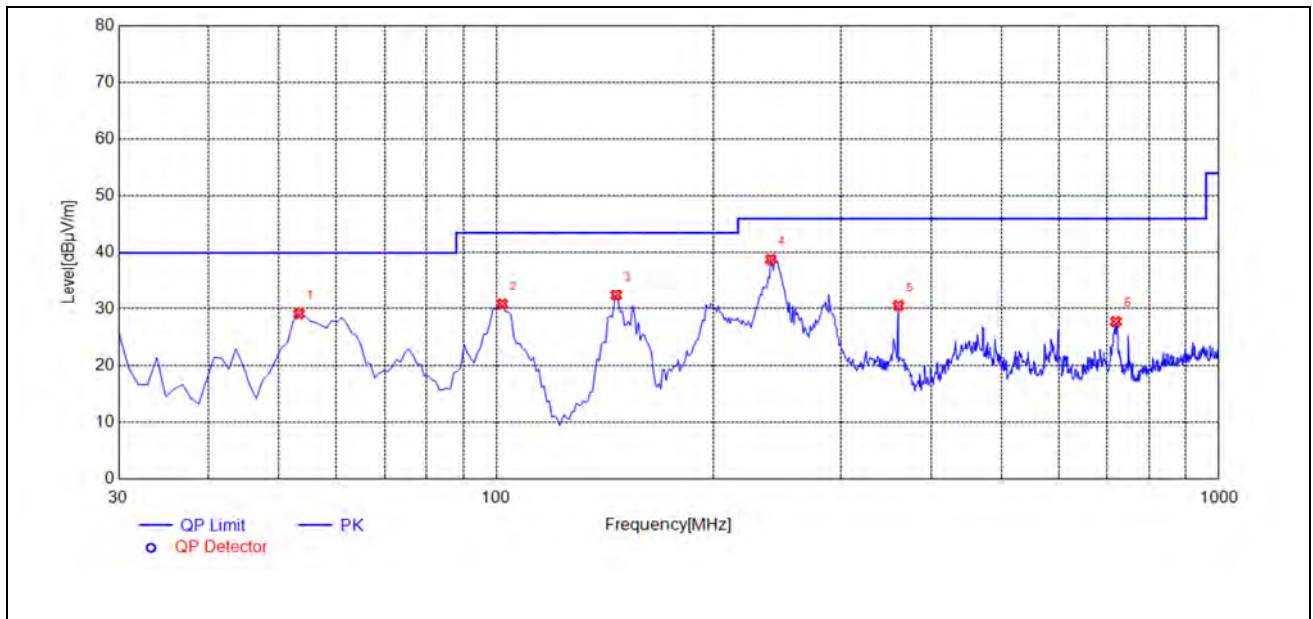


(Antenna Vertical, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1799.1598	45.45	-22.66	74.00	28.55	150	18	Vertical	PASS
3839.5679	42.93	-14.42	74.00	31.07	150	10	Vertical	PASS
5927.5855	47.76	-6.62	74.00	26.24	150	261	Vertical	PASS
7974.7950	42.28	-2.56	74.00	31.72	150	161	Vertical	PASS
9304.4609	43.37	1.26	74.00	30.63	150	286	Vertical	PASS
14310.2621	47.50	7.73	74.00	26.50	150	169	Vertical	PASS

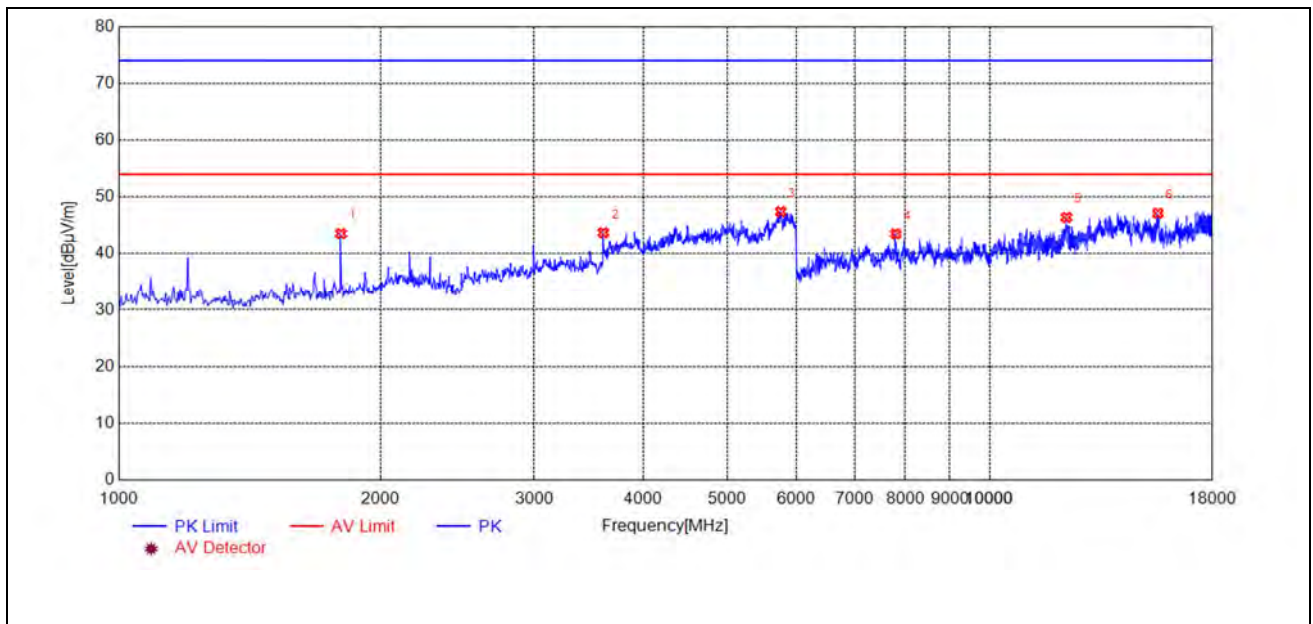


Plot for Channel 39



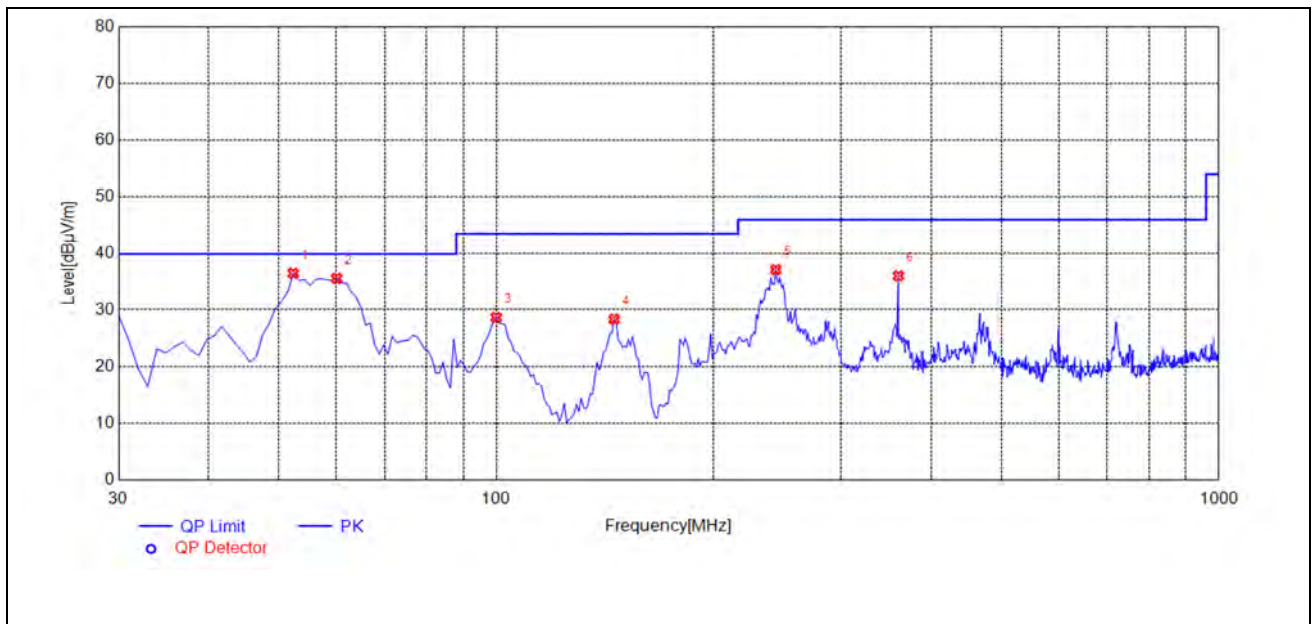
(Antenna Horizontal, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
53.3033	29.09	-28.68	40.00	10.91	150	140	Horizontal	PASS
101.8519	30.80	-30.89	43.50	12.70	150	198	Horizontal	PASS
146.5165	32.39	-34.34	43.50	11.11	150	285	Horizontal	PASS
239.7297	38.85	-31.02	46.00	7.15	150	61	Horizontal	PASS
360.1301	30.54	-26.34	46.00	15.46	150	190	Horizontal	PASS
720.3604	27.71	-21.68	46.00	18.29	150	198	Horizontal	PASS



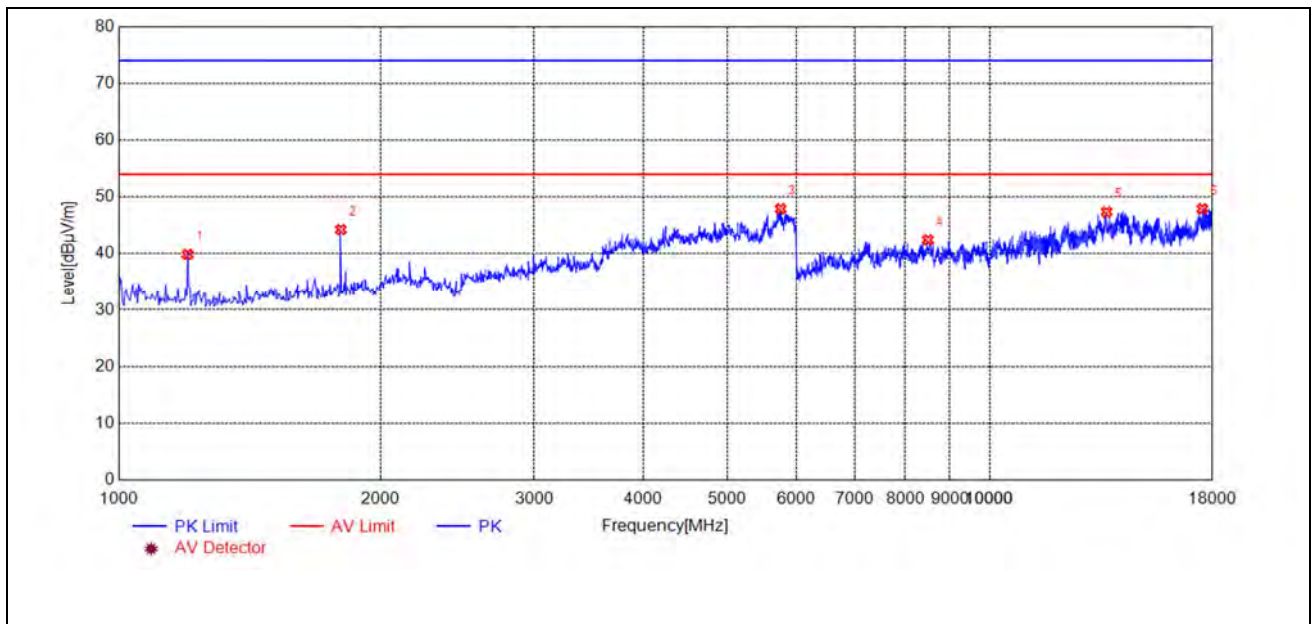
(Antenna Horizontal, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1799.1598	43.55	-22.66	74.00	30.45	150	345	Horizontal	PASS
3601.5203	43.71	-15.69	74.00	30.29	150	231	Horizontal	PASS
5754.1508	47.41	-6.86	74.00	26.59	150	190	Horizontal	PASS
7801.3603	43.51	-2.44	74.00	30.49	150	81	Horizontal	PASS
12246.0492	46.41	5.23	74.00	27.59	150	14	Horizontal	PASS
15592.3185	47.14	6.45	74.00	26.86	150	332	Horizontal	PASS



(Antenna Vertical, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
52.3323	36.59	-28.72	40.00	3.41	150	329	Vertical	PASS
60.1001	35.68	-29.65	40.00	4.32	150	105	Vertical	PASS
99.9099	28.63	-31.35	43.50	14.87	150	293	Vertical	PASS
145.5455	28.32	-34.18	43.50	15.18	150	18	Vertical	PASS
243.6136	37.21	-30.65	46.00	8.79	150	177	Vertical	PASS
360.1301	36.13	-26.34	46.00	9.87	150	360	Vertical	PASS



(Antenna Vertical, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1200.6401	39.89	-24.62	74.00	34.11	150	15	Vertical	PASS
1799.1598	44.26	-22.66	74.00	29.74	150	31	Vertical	PASS
5754.1508	47.93	-6.86	74.00	26.07	150	31	Vertical	PASS
8488.2977	42.47	-1.72	74.00	31.53	150	48	Vertical	PASS
13616.5233	47.36	6.74	74.00	26.64	150	358	Vertical	PASS
17537.5075	47.94	8.30	74.00	26.06	150	224	Vertical	PASS

————— END OF REPORT —————