TEST REPORT

APPLICANT	:	Sound Extreme Inc.
PRODUCT NAME	:	PULSE28
MODEL NAME	:	SEI-PLS2801
BRAND NAME	:	SOUNDEXTREME BY ECOXGEAR
FCC ID	:	2BADE-SEIPLS2801
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2025-07-14
TEST DATE	:	2025-07-18 to 2025-08-14
ISSUE DATE	:	2025-09-12

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

NOTE: This document is issued by Shenzhen Morlab Communications Technology Co., Ltd., the test report shall not be reproduced except in full without prior written permission of the company. The test results apply only to the particular sample(s) tested and to the specific tests carried out which is available on request for validation and information confirmed at our website.

DIRECTORY

1. Summary of Test Result ····· 4
1.1. Testing Applied Standards ····· 5
1.2. Test Equipment List ····· 6
1.3. Measurement Uncertainty ····· 8
1.4. Testing Laboratory ····· 9
2. General Description ····· 9
2.1. Information of Applicant and Manufacturer ····· 9
2.2. Information of EUT ····· 9
2.3. Channel List of EUT ····· 10
2.4. Test Configuration of EUT ····· 11
2.5. Test Conditions ····· 11
2.6. Test Setup Layout Diagram ····· 11
3. Test Results ····· 15
3.1. Antenna Requirement ····· 15
3.2. Duty Cycle of Test Signal ····· 16
3.3. Maximum Peak Conducted Output Power ····· 17
3.4. Maximum Average Conducted Output Power ····· 18
3.5. 6 dB Bandwidth ····· 19
3.6. Conducted Spurious Emissions and Band Edge ····· 20
3.7. Power Spectral Density ····· 21
3.8. Conducted Emission ····· 22
3.9. Restricted Frequency Bands ····· 23
3.10. Radiated Emission ····· 24
Annex A Test Data and Result ····· 26

Change History		
Version	**Date**	**Reason for change**
1.0	2025-09-12	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	Jul. 25, 2025	Li Yue	PASS	/
3	15.247(b)	Maximum Peak Conducted Output Power	Jul. 25, 2025	Li Yue	PASS	/
4	15.247(b)	Maximum Average Conducted Output Power	Jul. 25, 2025	Li Yue	PASS	/
5	15.247(a)	Bandwidth	Jul. 25, 2025	Li Yue	PASS	/
6	15.247(d)	Conducted Spurious Emission and Band Edge	Jul. 25, 2025	Li Yue	PASS	/
7	15.247(e)	Power Spectral Density	Jul. 25, 2025	Li Yue	PASS	/
8	15.207	Conducted Emission	N/A	N/A$_{Note1}$	N/A	/
9	15.247(d)	Restricted Frequency Bands	Jul. 26, 2025	Wang Deyong	PASS	/
10	15.209, 15.247(d)	Radiated Emission	Jul. 26, 2025	Wang Deyong	PASS	/

Note 1: Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

Note 2: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2020 and KDB 558074 D01 v05r02.

Note 3: 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 Analzyer	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 List of Software Used

Description	Manufacturer	Software Version
Test System	MaiWei	2.0.0.0
JS32-RE	Tonscend	5.0.0

1.2.3 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	01774	BBHA 9120D	Schwarzbeck	2025.06.20	2026.06.19
Test Antenna – Horn	BBHA9170 #773	BBHA9170	Schwarzbeck	2025.06.20	2026.06.19
Preamplifier (10MHz-6GHz)	46732	S10M100L3802	LUCIX CORP.	2025.05.13	2026.05.12
Preamplifier (2GHz-18GHz)	61171/61172	S020180L3203	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	±2.22dB	Confidence levels of 95%
Power Spectral Density	±2.22dB	Confidence levels of 95%
Bandwidth	±5%	Confidence levels of 95%
Conducted Spurious Emission	±2.77dB	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%

2. General Description

2.1. Information of Applicant and Manufacturer

Applicant:	Sound Extreme Inc.
Applicant Address:	9212 Fry Road, Suite 105-351, Cypress, TX 77433, United States of America.
Manufacturer:	Xingtel Xiamen Group Co., Ltd.
Manufacturer Address:	Xingtel Building,Chuangxin Road, Torch Hi-Tech Industrial District,Xiamen 3 61006, PR China

2.2. Information of EUT

Product Name:	PULSE28
Sample No.:	3#, 6#
Hardware Version:	BT-385-M-V1.4
Software Version:	BT385_M433SE8AE_70F9
Module Type:	☐BT1; ☒U5 (The product includes two modules.)
Equipment Type:	Bluetooth LE
Bluetooth Version:	5.0
Modulation Type:	GFSK
Data Rate:	1Mbps
Operating Frequency Range:	2402MHz-2480MHz
Antenna Type:	Monopole Antenna
Antenna Gain:	0dBi

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

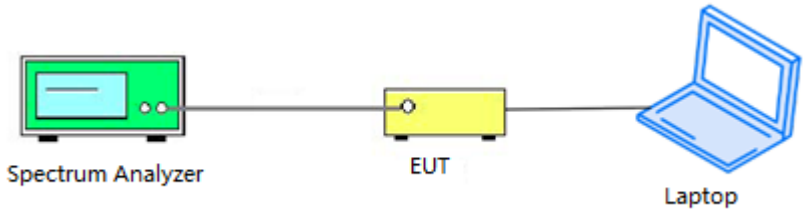
The EUT is controlled by dedicated software to transmit at the default maximum power level.

2.5. Test Conditions

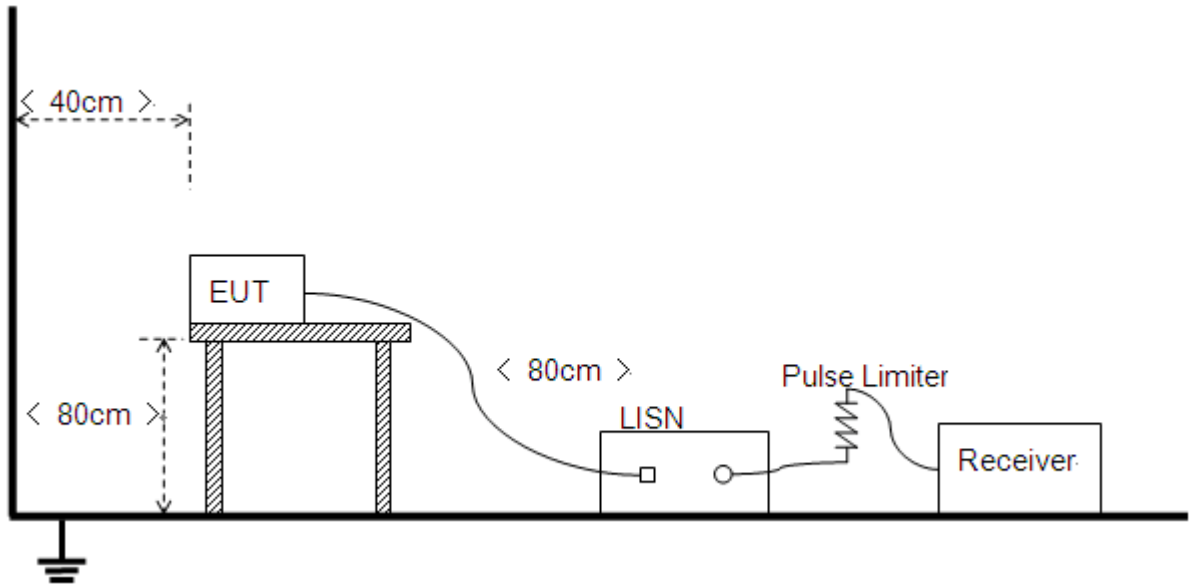
Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106

2.6. Test Setup Layout Diagram

2.6.1.Conducted Measurement

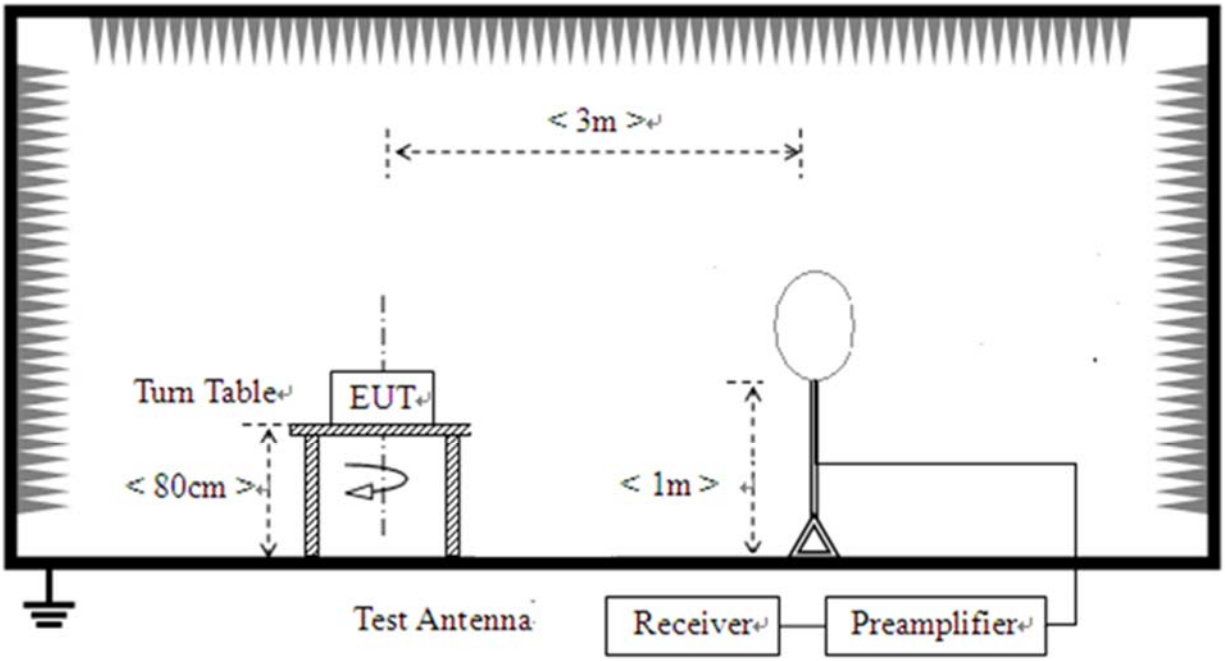


2.6.2.Conducted Emission Measurement

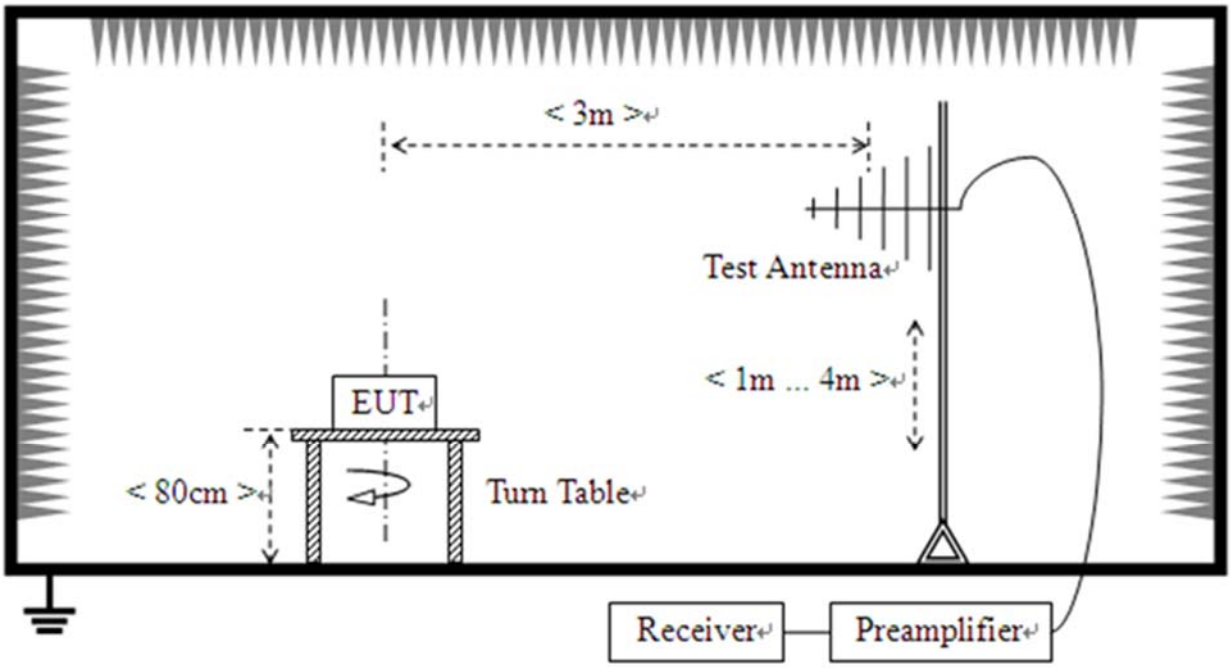


2.6.3.Radiation Measurement

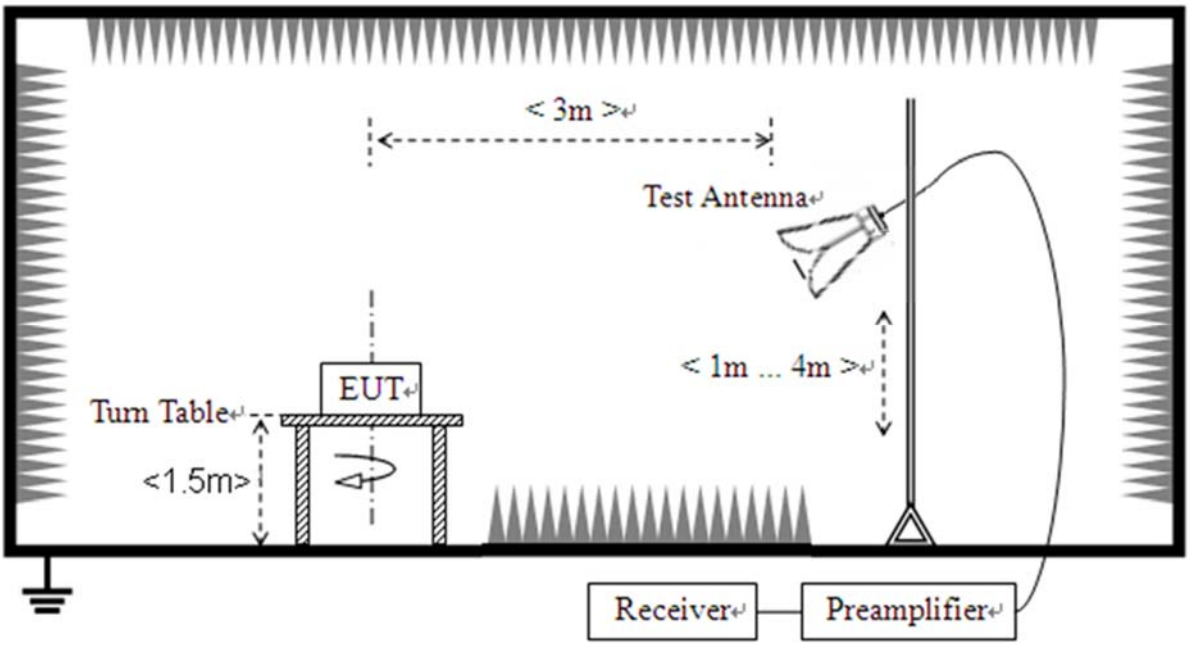
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



2.7. 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

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 ☒Monopole 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 ±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 to100kHz
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 by6 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 kHz, VBW ≥ 3 ×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 ≥6 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 to1.5 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 50μH/50Ω line impedance stabilization network (LISN).

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

Note:

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

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

3.8.2.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

This test case does not apply this kind of EUT.

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 ≥ 1GHz, 100 kHz for f < 1GHz
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.8 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 (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

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.9 in this report.

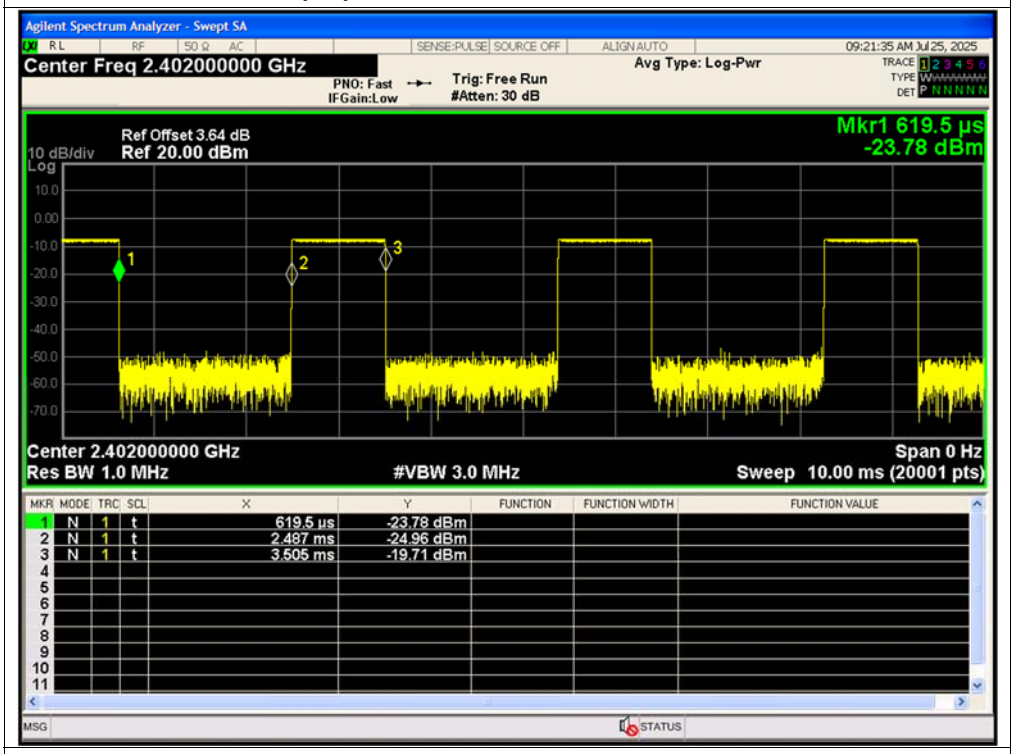
Annex A Test Data and Result

A.1. Duty Cycle of Test Signal

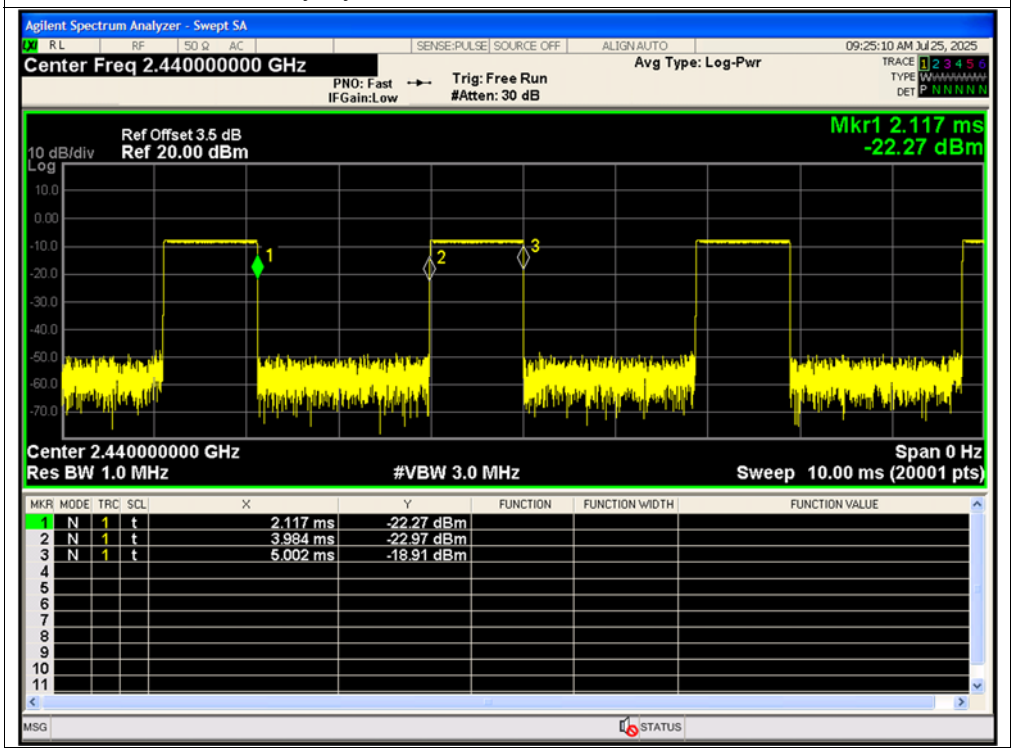
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant1	35.3	4.52	0.98
NVNT	BLE 1M	2440	Ant1	35.28	4.52	0.98
NVNT	BLE 1M	2480	Ant1	35.29	4.52	0.98

Test Graphs

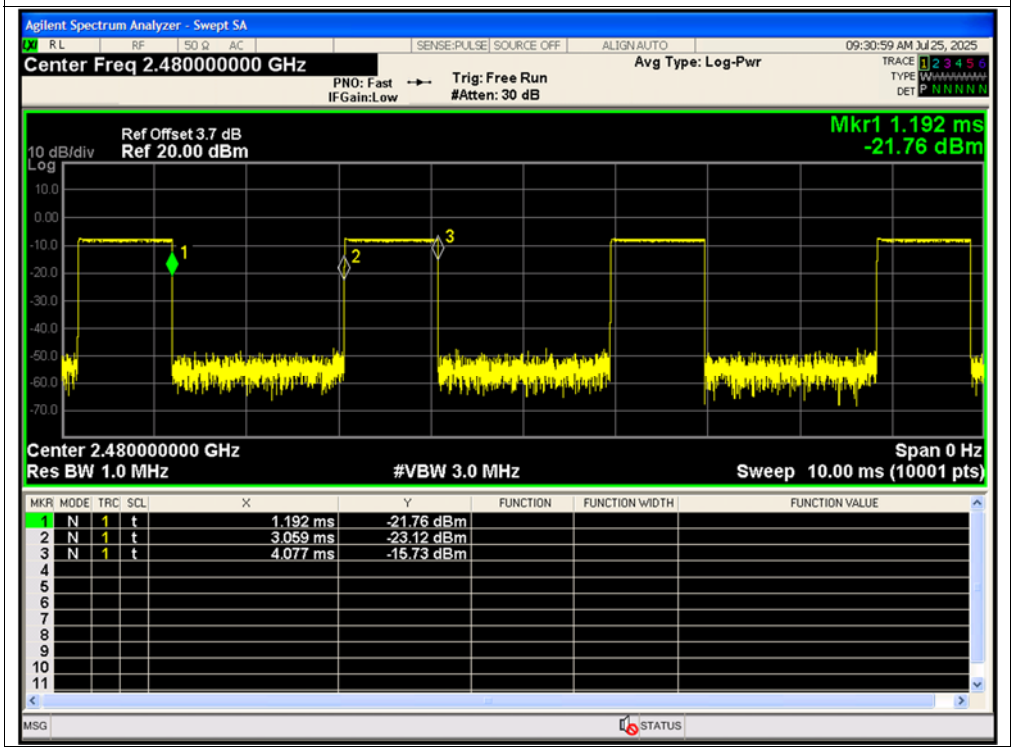
Duty Cycle NVNT BLE 1M 2402MHz Ant1



Duty Cycle NVNT BLE 1M 2440MHz Ant1



Duty Cycle NVNT BLE 1M 2480MHz Ant1

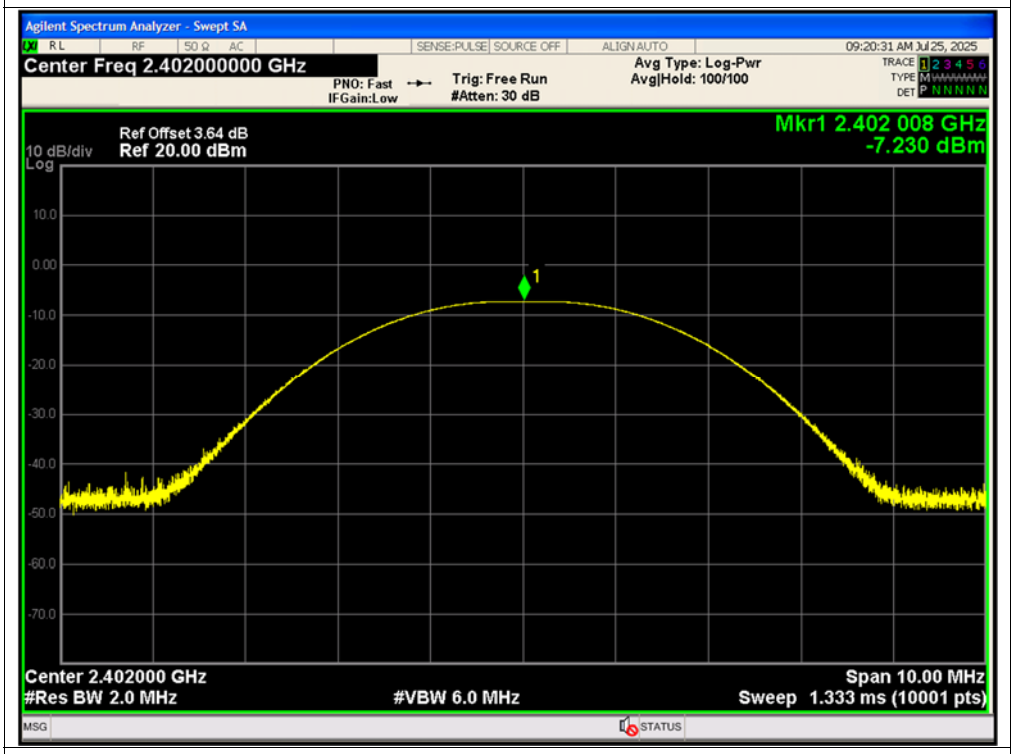


A.2. Maximum Peak Conducted Output Power

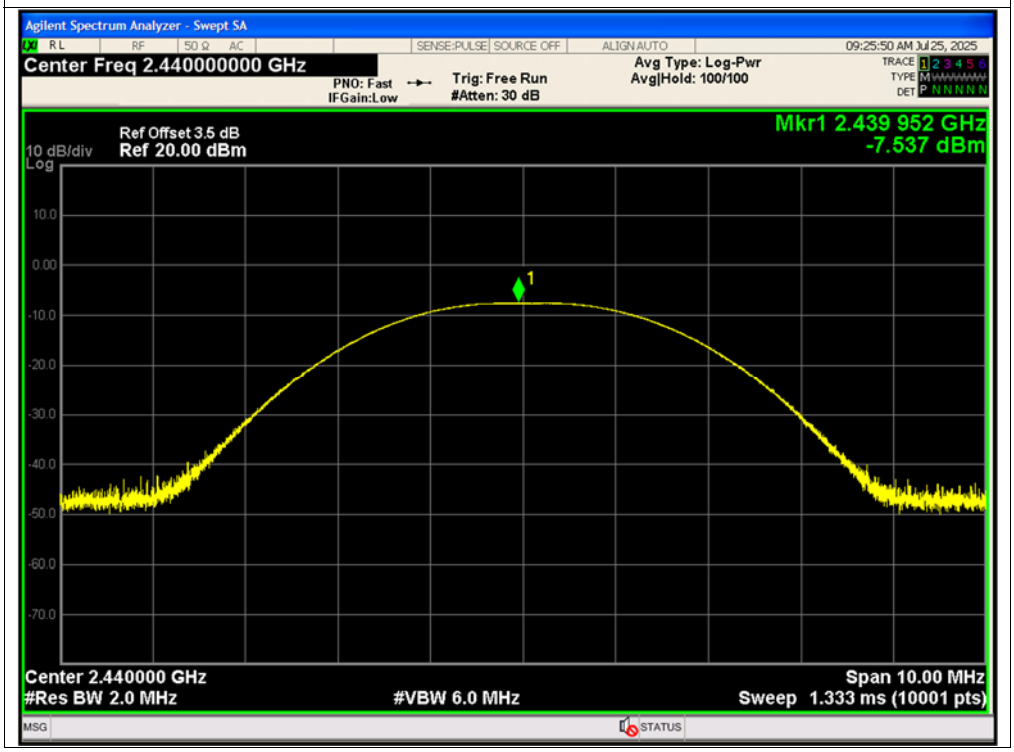
Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Conducted Power (dBm)	Total Conducted Power (W)	Limit Conducted (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-7.23	0	-7.23	0.00019	30	Pass
NVNT	BLE 1M	2440	Ant1	-7.54	0	-7.54	0.00018	30	Pass
NVNT	BLE 1M	2480	Ant1	-7.51	0	-7.51	0.00018	30	Pass

Test Graphs

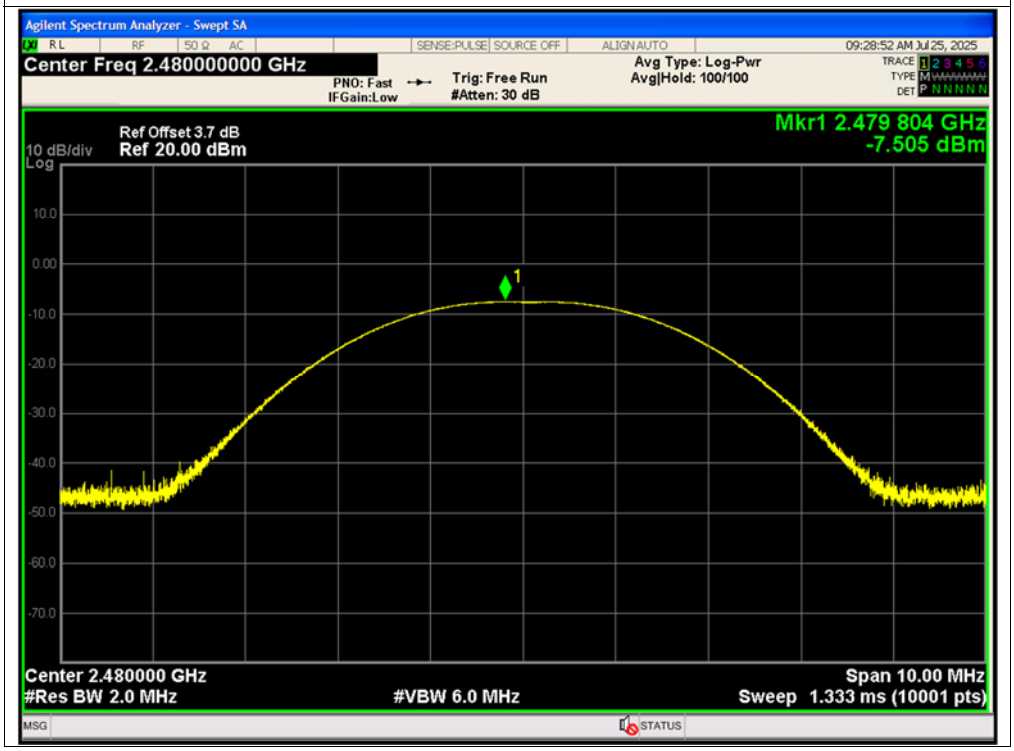
Peak Power NVNT BLE 1M 2402MHz Ant1



Peak Power NVNT BLE 1M 2440MHz Ant1



Peak Power NVNT BLE 1M 2480MHz Ant1

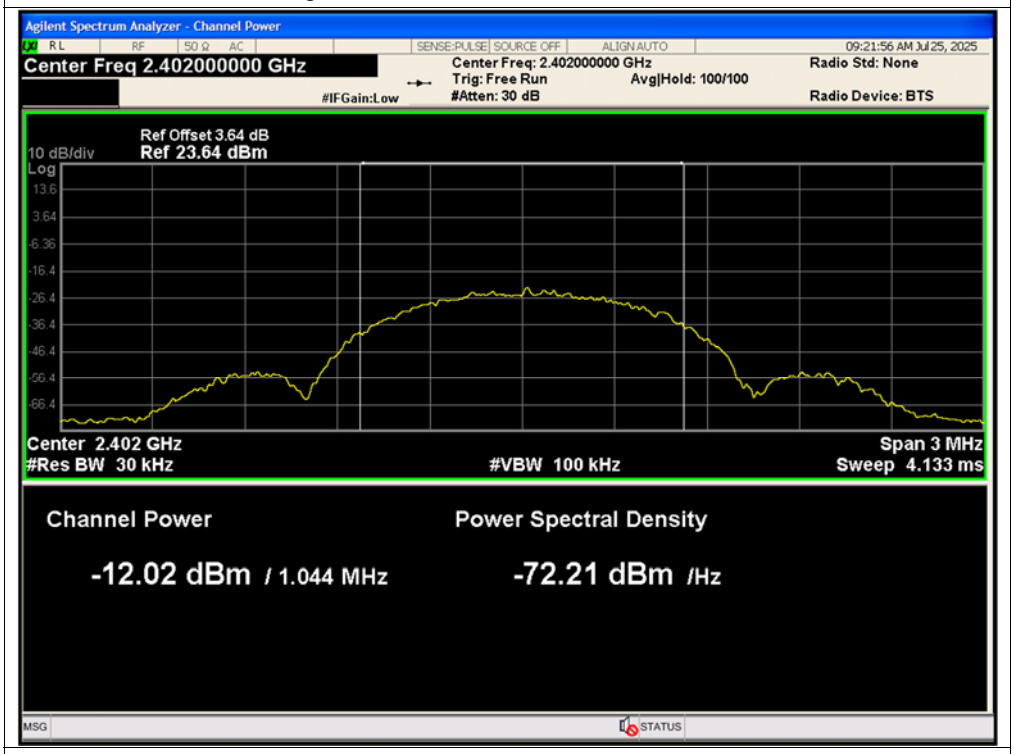


A.3. Maximum Average Conducted Output Power

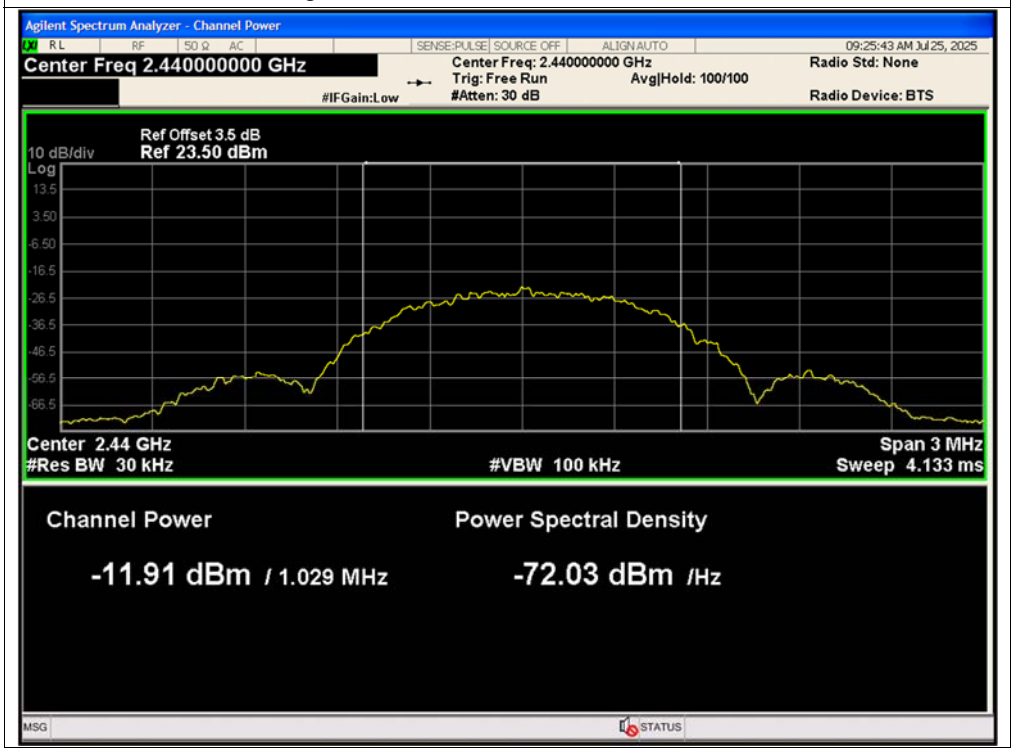
Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Conducted Power (dBm)	Total Conducted Power (W)	Limit Conducted (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-12.02	4.52	-7.5	0.00018	30	Pass
NVNT	BLE 1M	2440	Ant1	-11.91	4.52	-7.39	0.00018	30	Pass
NVNT	BLE 1M	2480	Ant1	-13.52	4.52	-9	0.00013	30	Pass

Test Graphs

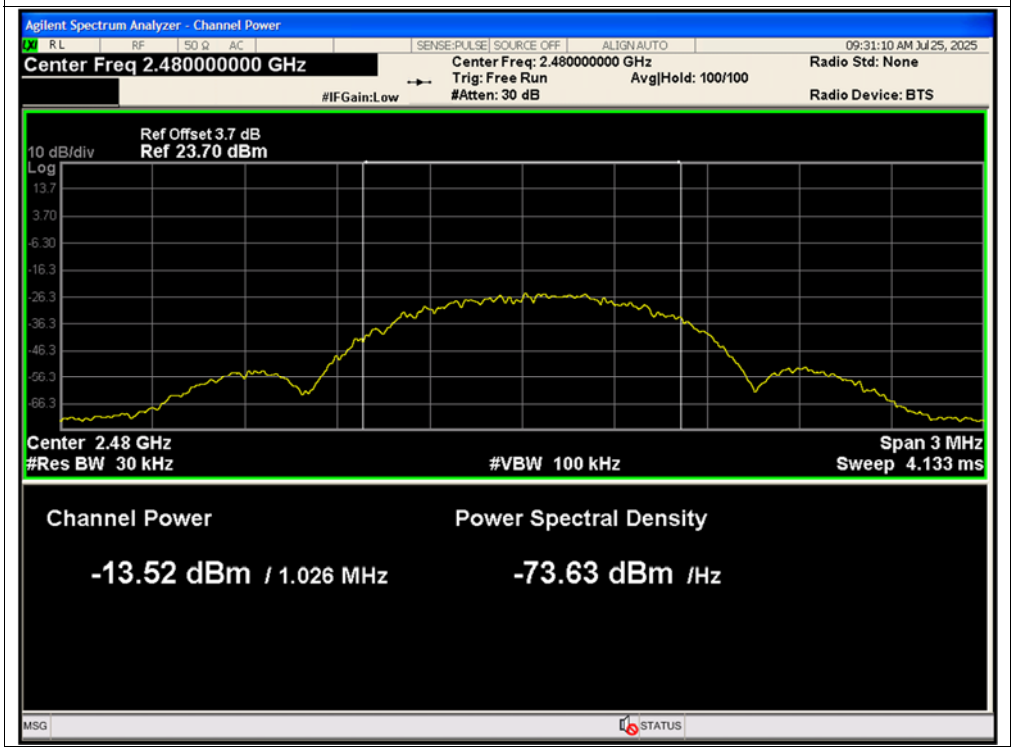
Average Power NVNT BLE 1M 2402MHz Ant1



Average Power NVNT BLE 1M 2440MHz Ant1



Average Power NVNT BLE 1M 2480MHz Ant1

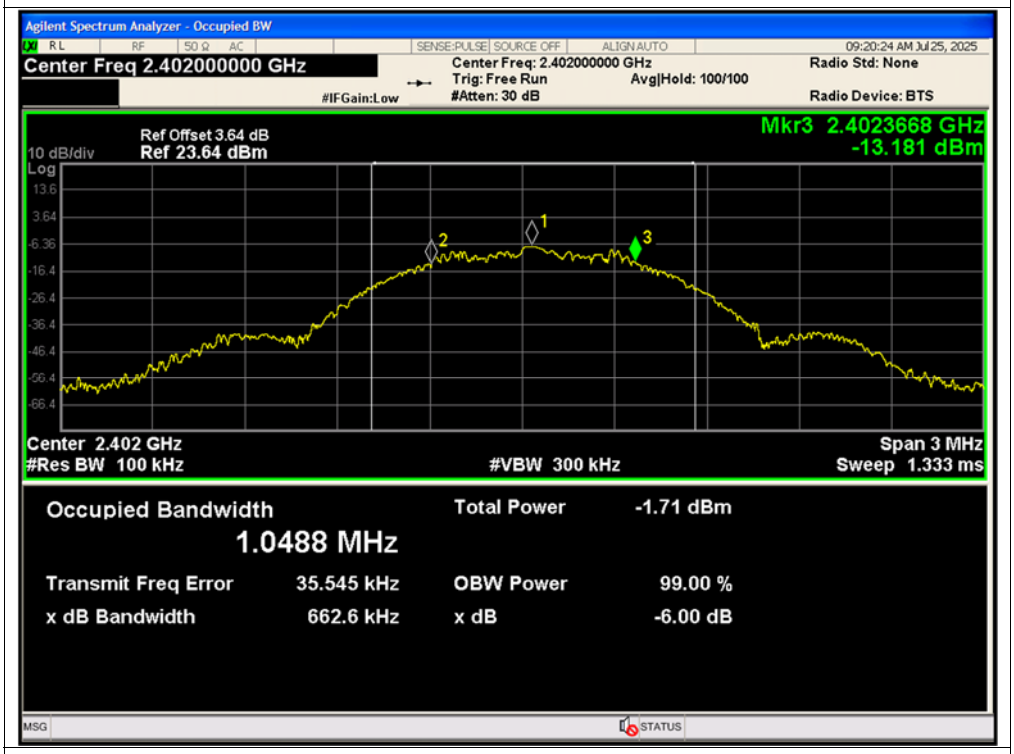


A.4. 6 dB Bandwidth

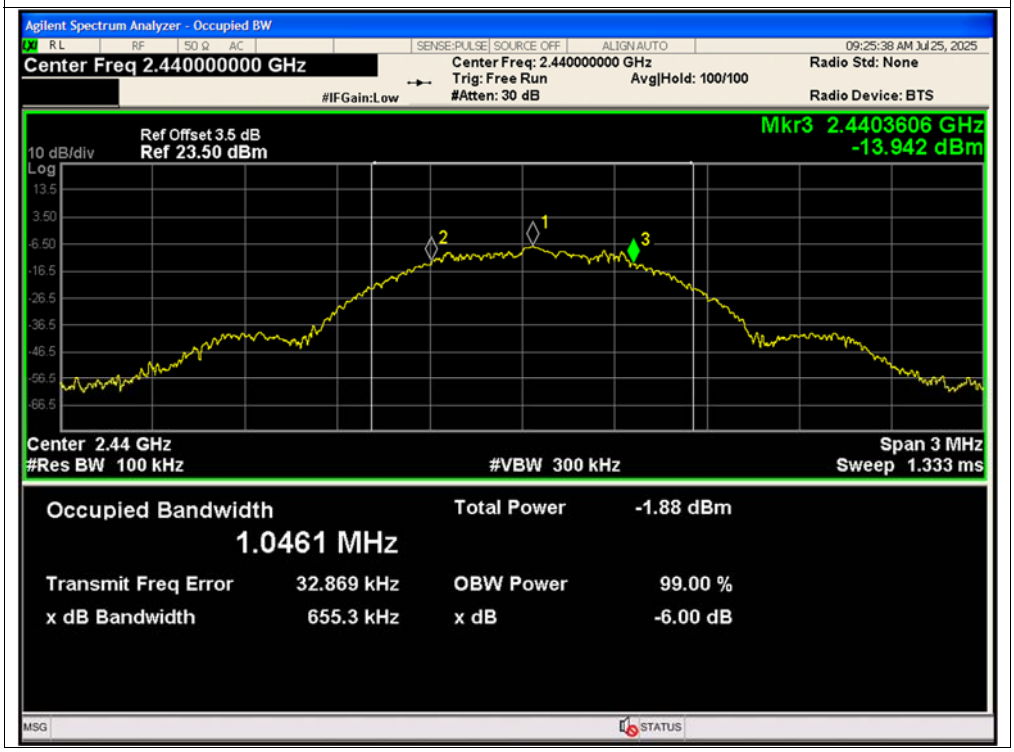
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.6626	0.5	Pass
NVNT	BLE 1M	2440	Ant1	0.6553	0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.7428	0.5	Pass

Test Graphs

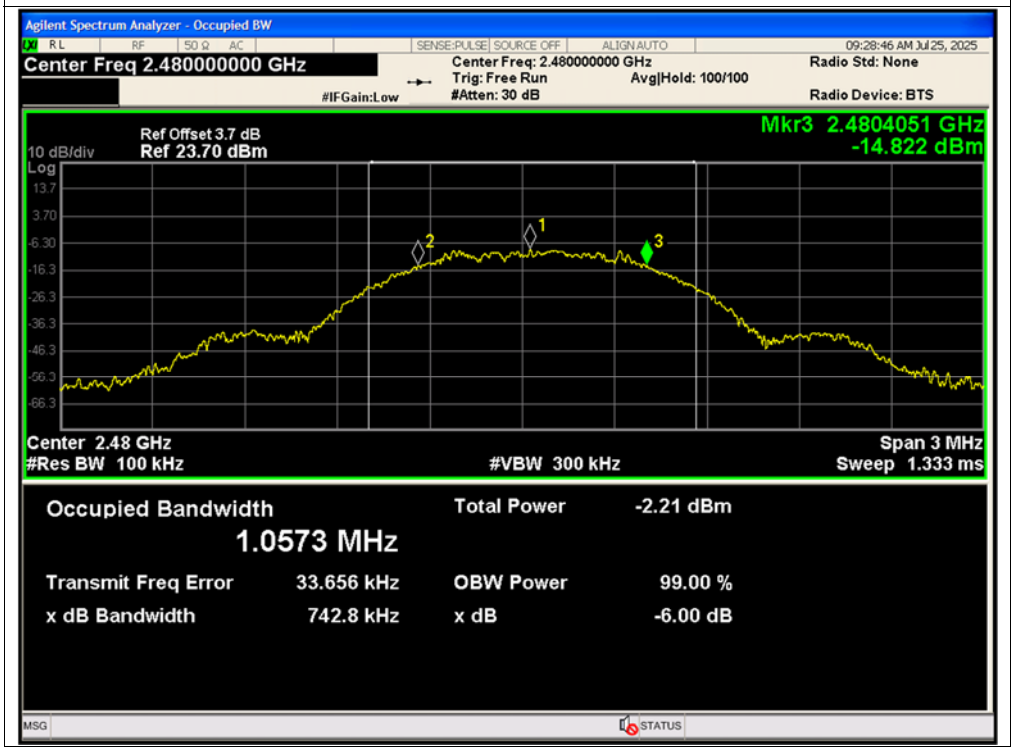
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1

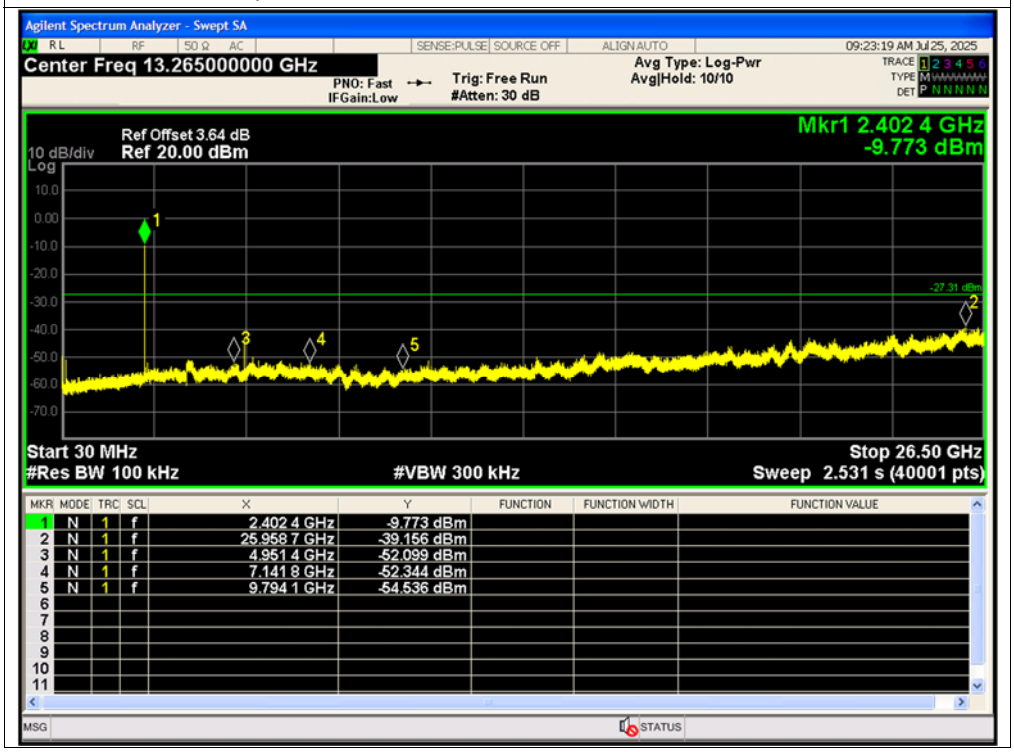


A.5. Conducted Spurious Emissions

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-31.84	-20	Pass
NVNT	BLE 1M	2440	Ant1	-31.35	-20	Pass
NVNT	BLE 1M	2480	Ant1	-31.06	-20	Pass

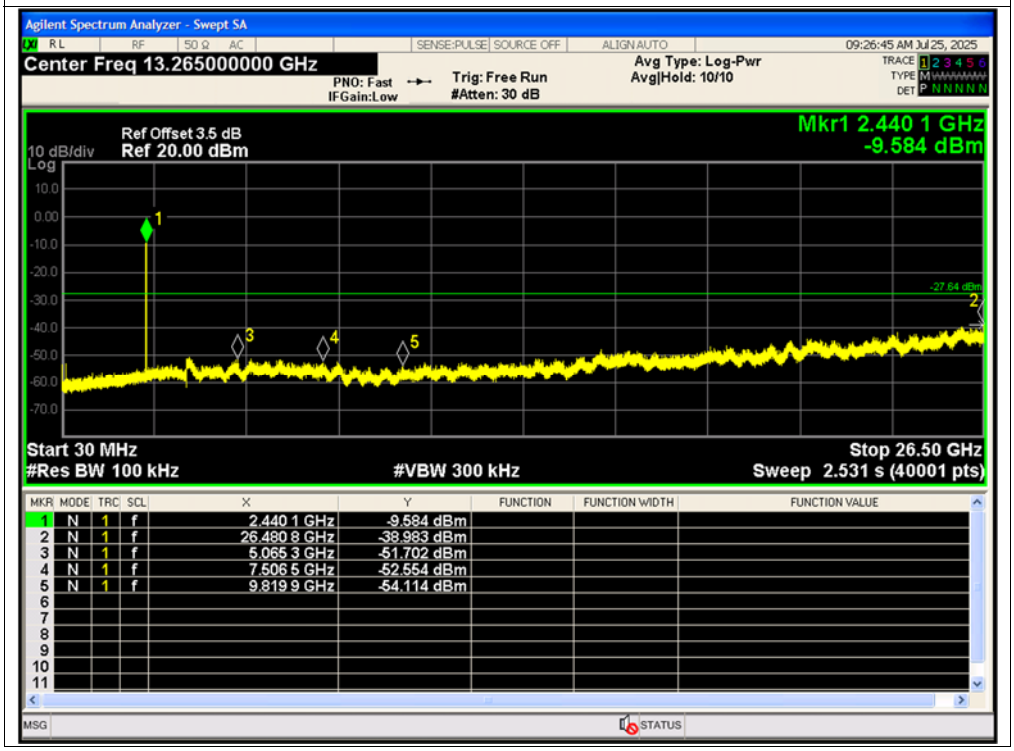
Test Graphs
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref

Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



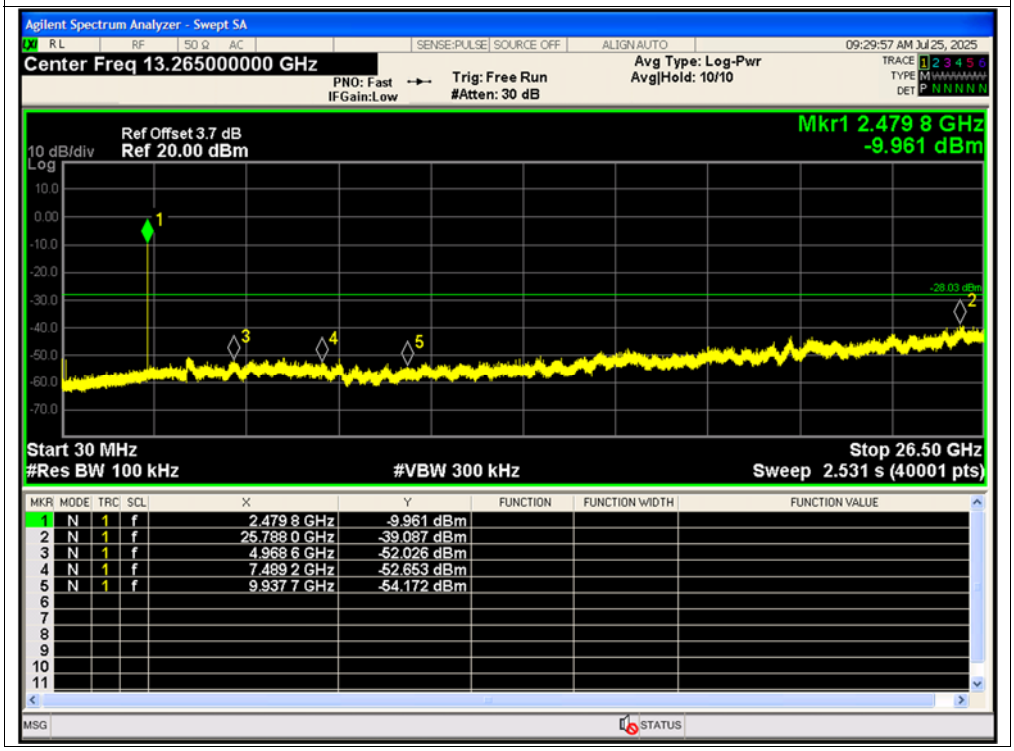
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref

Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref

Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission

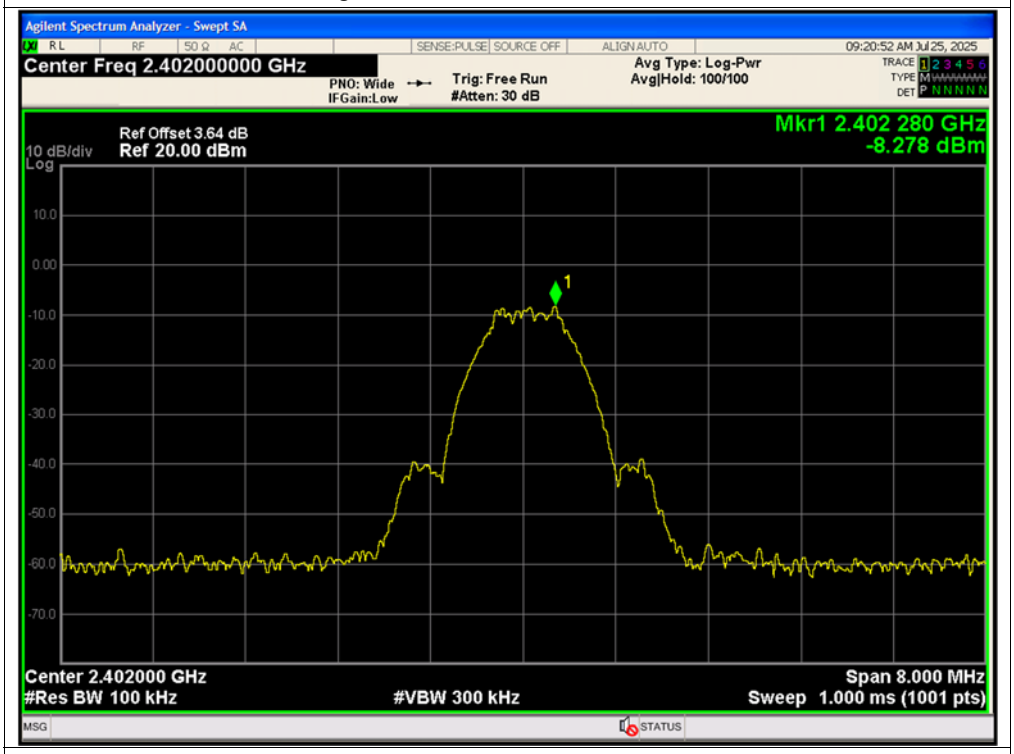


A.6. Band Edge

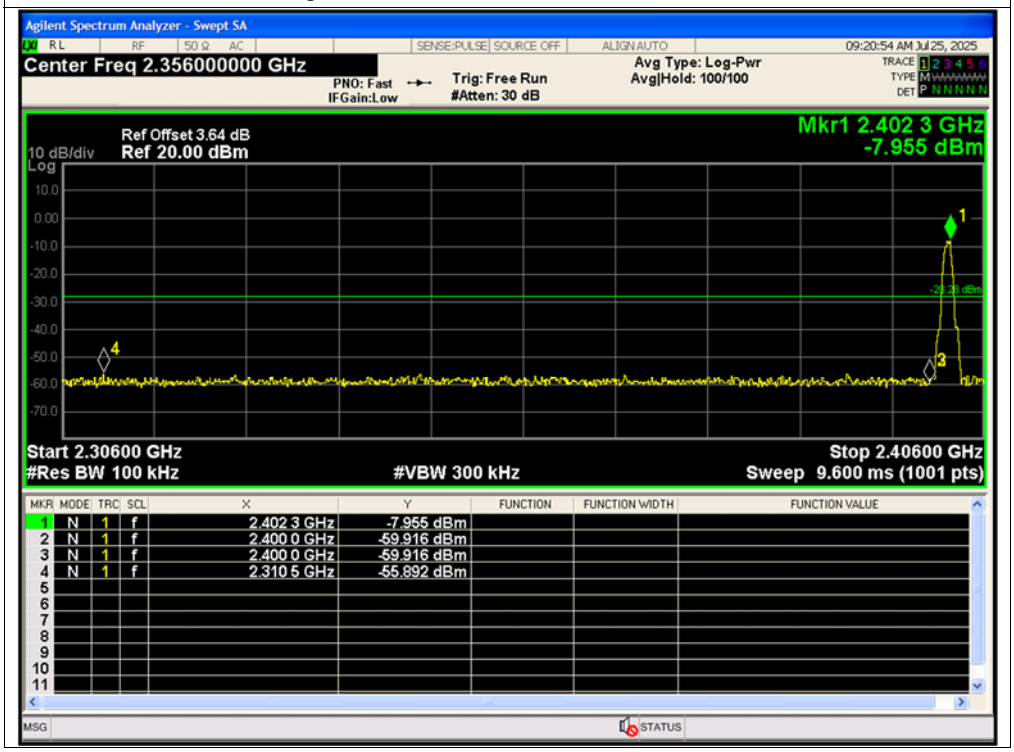
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-47.61	-20	Pass
NVNT	BLE 1M	2480	Ant1	-47.7	-20	Pass

Test Graphs

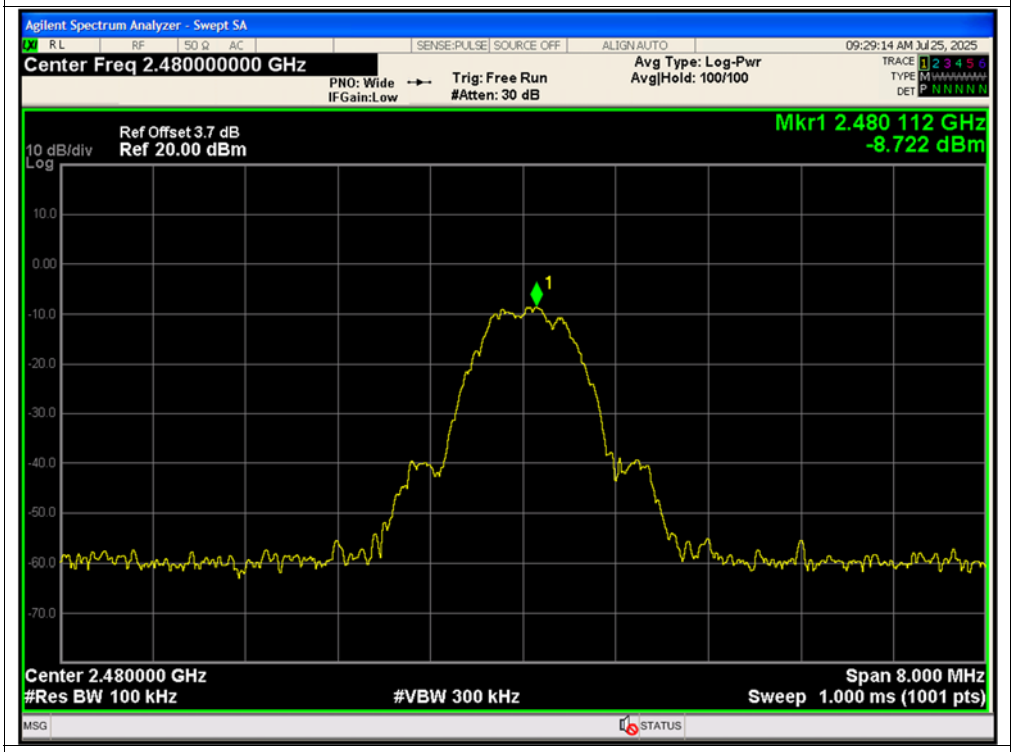
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



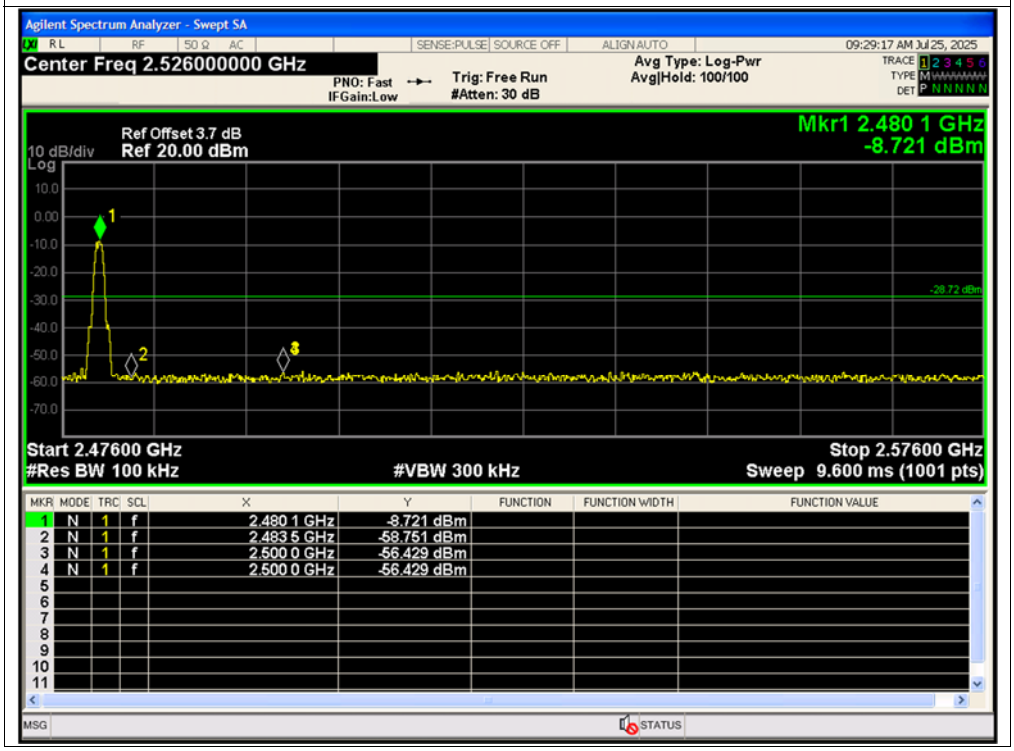
Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



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	-21.63	0	-21.63	8	Pass
NVNT	BLE 1M	2440	Ant1	-21.81	0	-21.81	8	Pass
NVNT	BLE 1M	2480	Ant1	-22.03	0	-22.03	8	Pass

Test Graphs

PSD NVNT BLE 1M 2402MHz Ant1

PSD NVNT BLE 1M 2440MHz Ant1

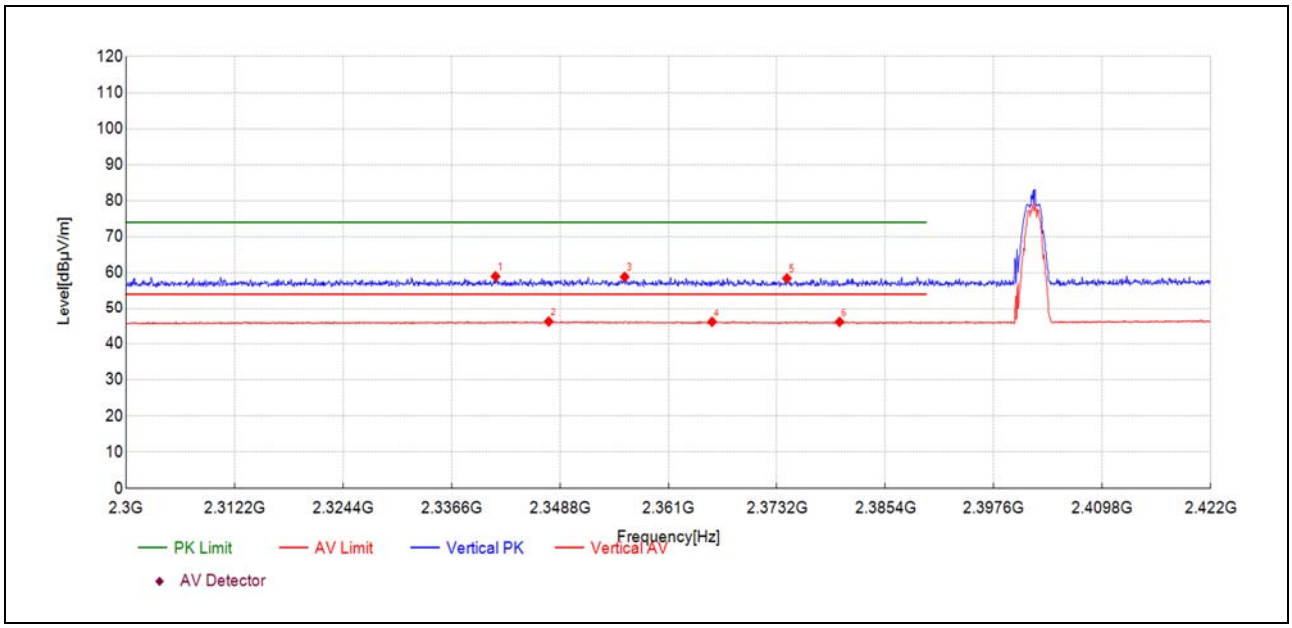
PSD NVNT BLE 1M 2480MHz Ant1

A.8. Restricted Frequency Bands

Note: 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.

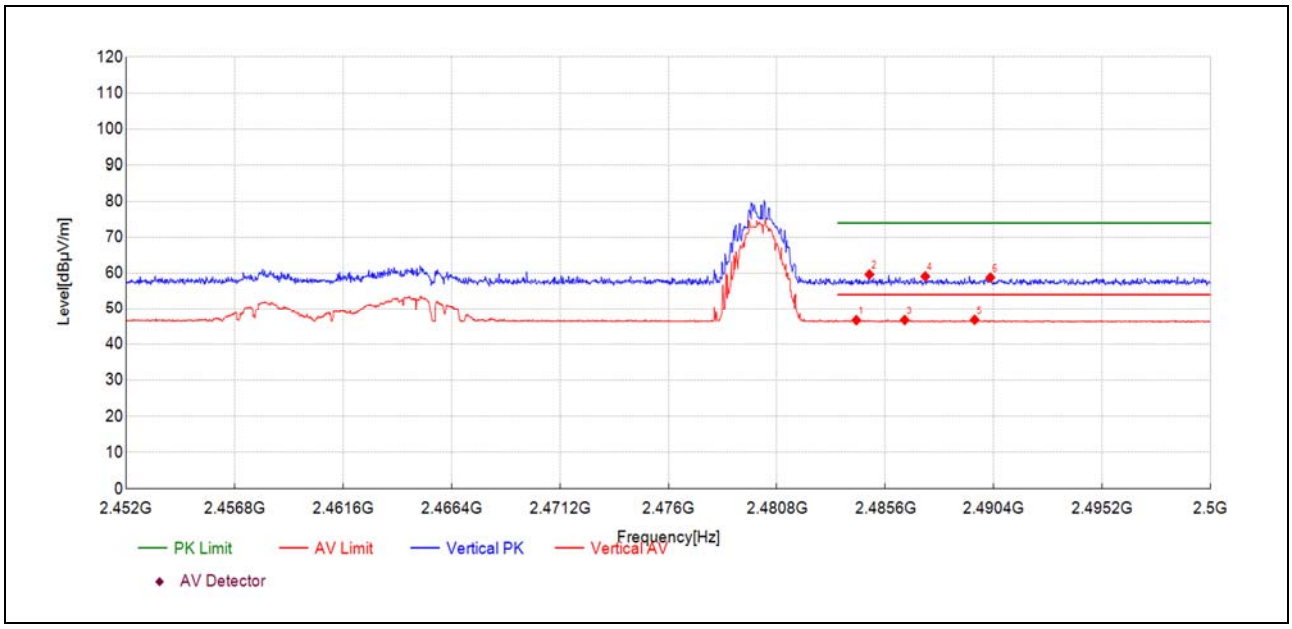
1Mbps

Plot for Channel 0



Frequency [MHz]	Reading [dBµV]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict
2341.56	21.6	58.99	37.380	74.00	15.01	216	PK	PASS
2347.54	8.8	46.19	37.430	54.00	7.81	160	AV	PASS
2356.09	21.4	58.85	37.460	74.00	15.15	155	PK	PASS
2365.91	8.6	46.10	37.470	54.00	7.90	179	AV	PASS
2374.34	21.0	58.43	37.480	74.00	15.57	331	PK	PASS
2380.26	8.6	46.10	37.480	54.00	7.90	236	AV	PASS

Plot for Channel 39



Frequency [MHz]	Reading [dBµV]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict
2484.32	8.4	46.66	38.270	54.00	7.34	259	AV	PASS
2484.90	21.4	59.66	38.270	74.00	14.34	70	PK	PASS
2486.46	8.4	46.71	38.270	54.00	7.29	5	AV	PASS
2487.37	20.8	59.10	38.270	74.00	14.90	221	PK	PASS
2489.55	8.5	46.76	38.260	54.00	7.24	360	AV	PASS
2490.25	20.5	58.78	38.270	74.00	15.22	326	PK	PASS

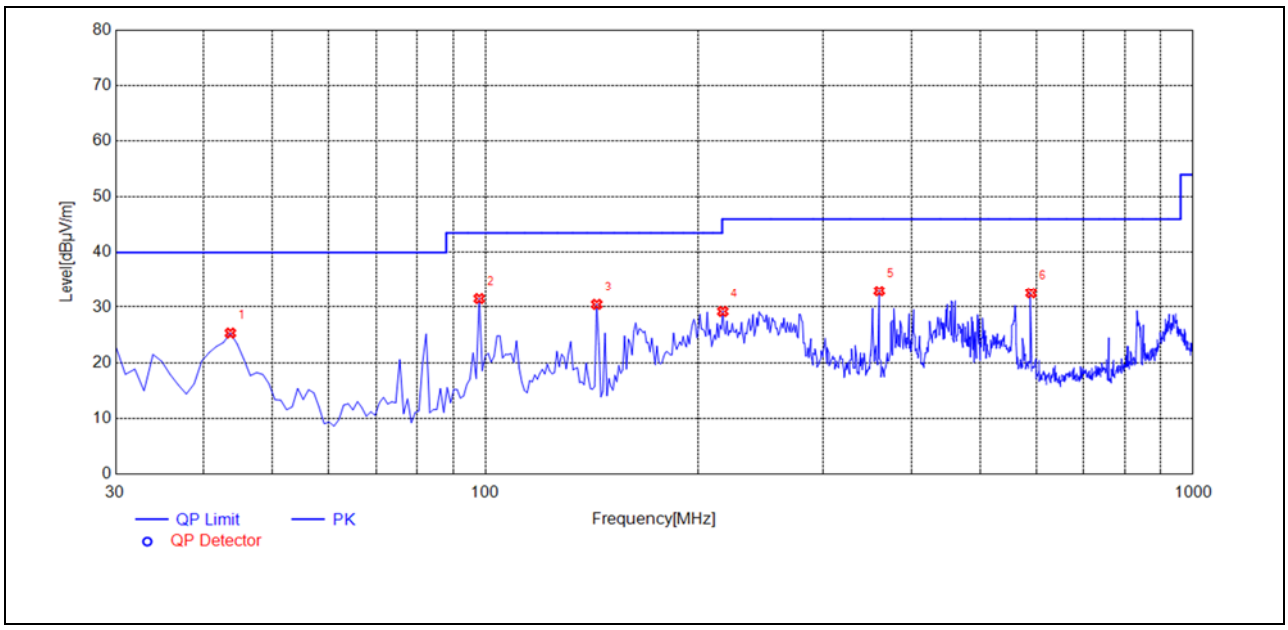
A.9. Radiated Emission

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

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

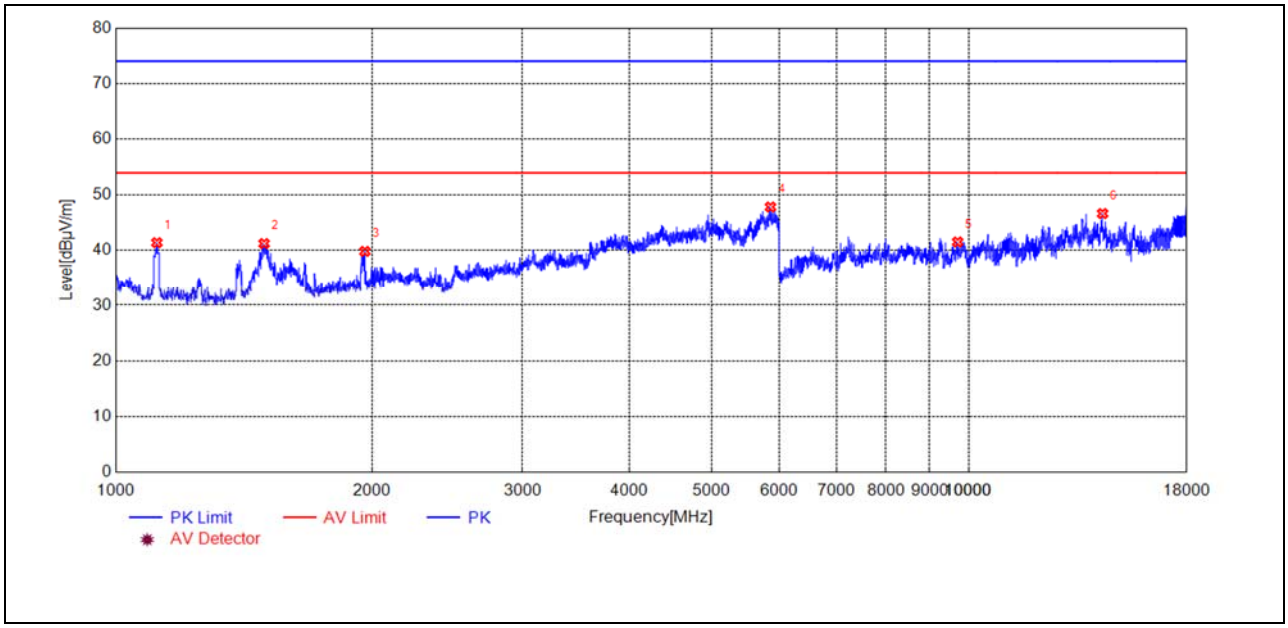
1Mbps

Plot for Channel 0



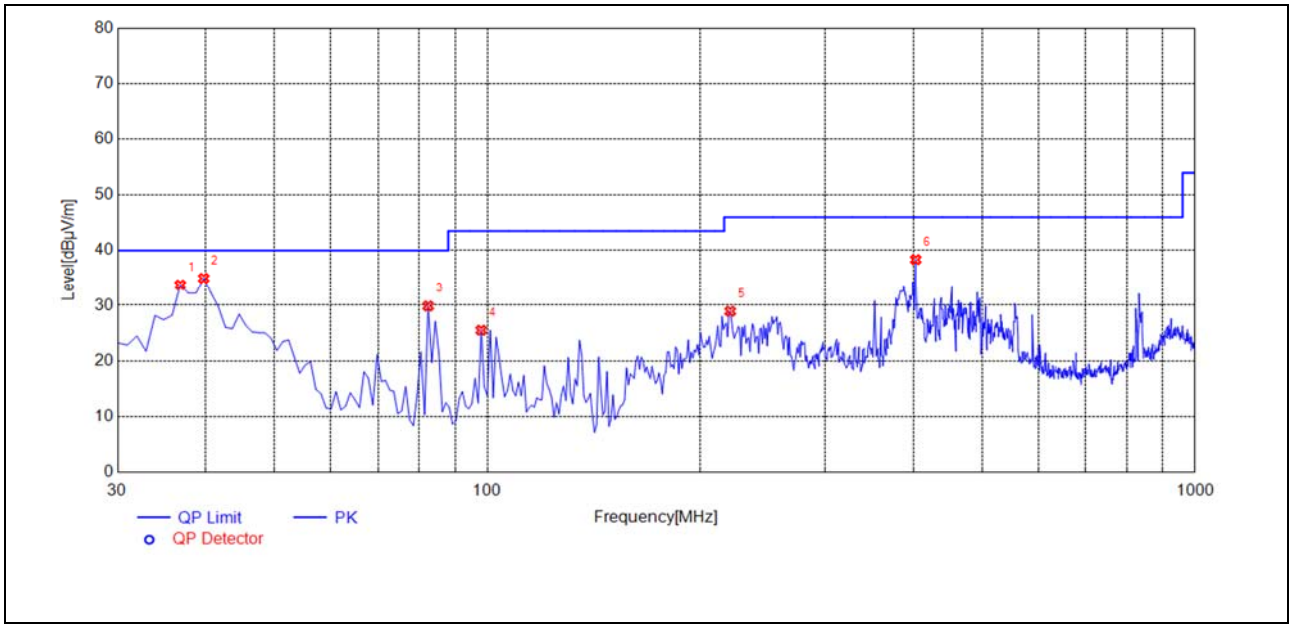
(Antenna Horizontal, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
43.5936	25.31	-30.05	40.00	14.69	150	33	Horizontal	PASS
97.9680	31.50	-32.07	43.50	12.00	150	263	Horizontal	PASS
143.6036	30.47	-34.12	43.50	13.03	150	297	Horizontal	PASS
216.4264	29.20	-31.77	46.00	16.80	150	323	Horizontal	PASS
360.1301	32.91	-26.34	46.00	13.09	150	306	Horizontal	PASS
590.2503	32.55	-21.96	46.00	13.45	150	306	Horizontal	PASS



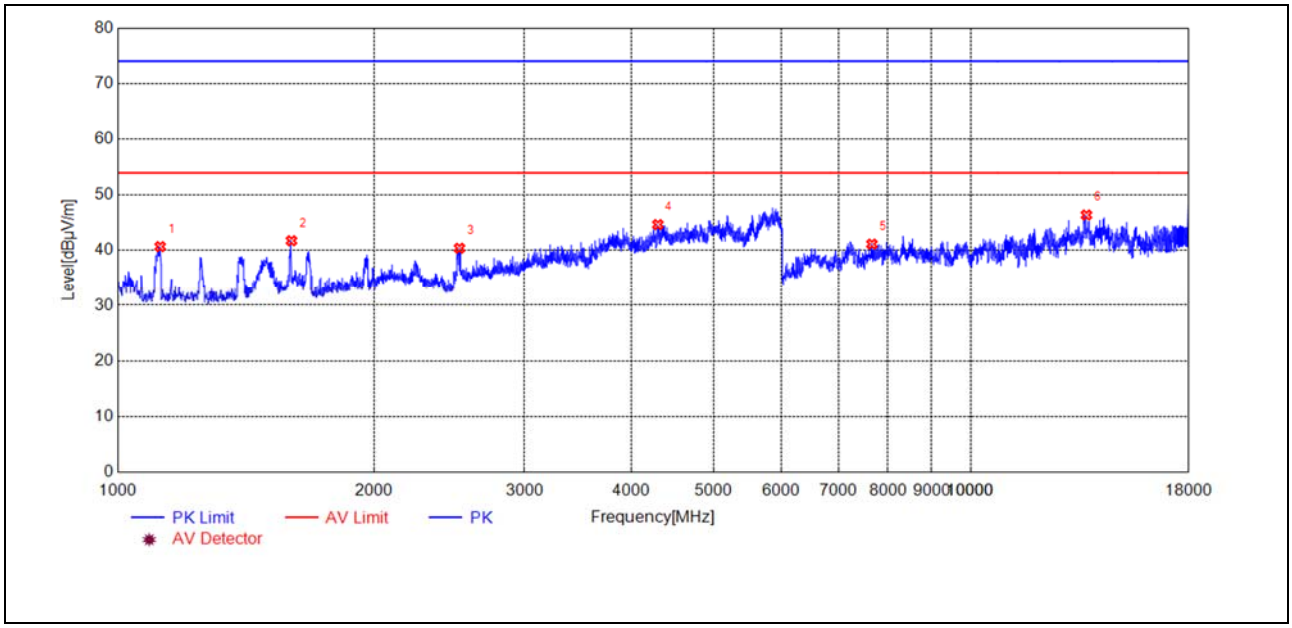
(Antenna Horizontal, 1GHz to 18GHz)

Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1118.0236	41.41	-24.45	74.00	32.59	150	208	Horizontal	PASS
1493.0986	41.25	-23.08	74.00	32.75	150	308	Horizontal	PASS
1960.1920	39.84	-22.30	74.00	34.16	150	308	Horizontal	PASS
5855.9712	47.85	-6.93	74.00	26.15	150	247	Horizontal	PASS
9703.9408	41.54	0.51	74.00	32.46	150	12	Horizontal	PASS
14348.8698	46.66	7.51	74.00	27.34	150	292	Horizontal	PASS



(Antenna Vertical, 30MHz to 1GHz)

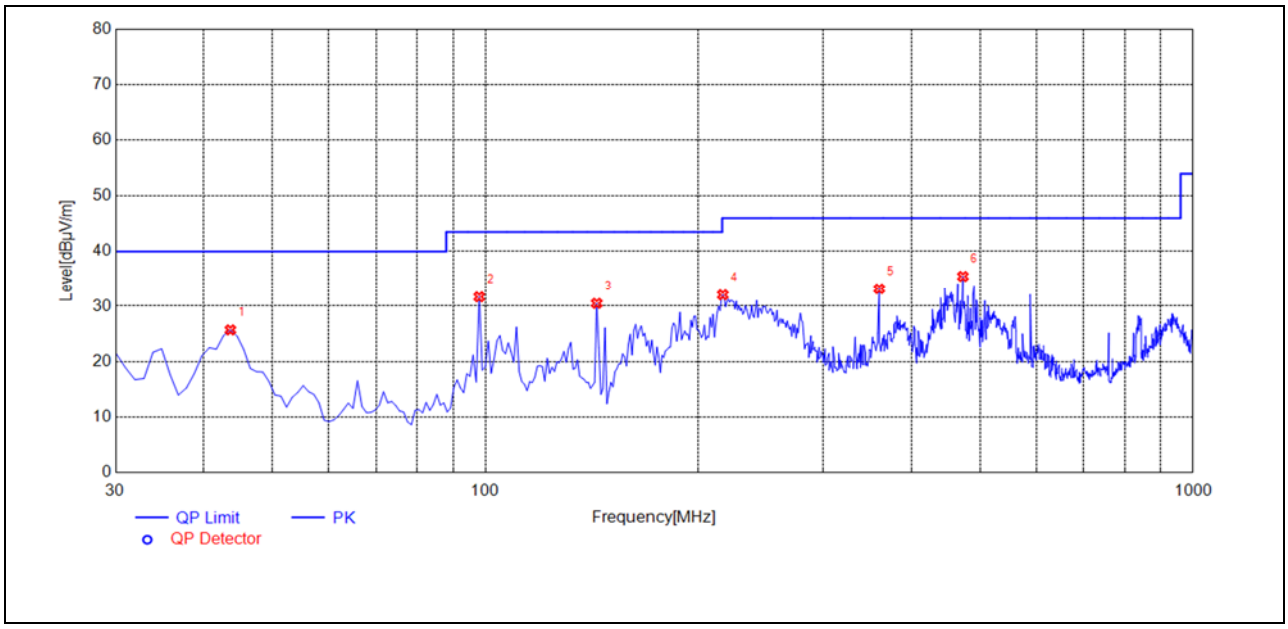
Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
36.7968	33.73	-35.51	40.00	6.27	150	106	Vertical	PASS
39.7097	34.94	-32.97	40.00	5.06	150	64	Vertical	PASS
82.4324	29.85	-33.46	40.00	10.15	150	182	Vertical	PASS
97.9680	25.49	-32.07	43.50	18.01	150	318	Vertical	PASS
220.3103	28.91	-31.39	46.00	17.09	150	301	Vertical	PASS
402.8529	38.34	-25.69	46.00	7.66	150	148	Vertical	PASS



(Antenna Vertical, 1GHz to 18GHz)

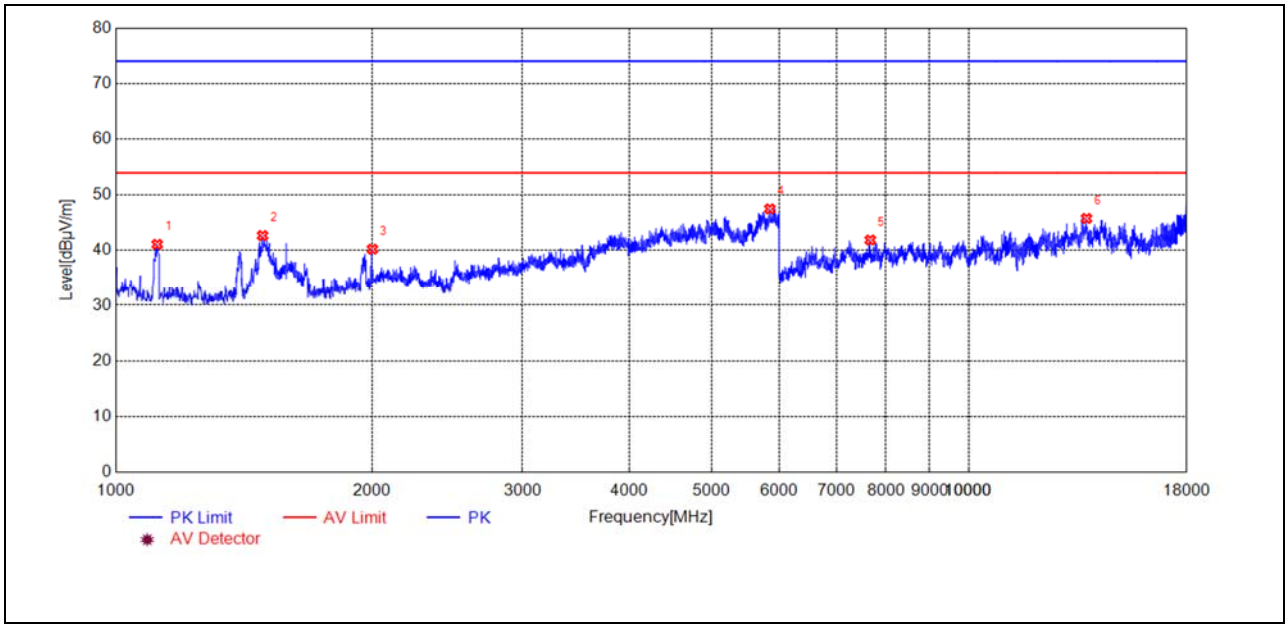
Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1122.0244	40.70	-24.44	74.00	33.30	150	318	Vertical	PASS
1599.1198	41.76	-23.11	74.00	32.24	150	248	Vertical	PASS
2516.3033	40.41	-19.66	74.00	33.59	150	278	Vertical	PASS
4298.6597	44.68	-12.95	74.00	29.32	150	288	Vertical	PASS
7658.7317	41.16	-2.37	74.00	32.84	150	182	Vertical	PASS
13664.7329	46.40	4.88	74.00	27.60	150	192	Vertical	PASS

Plot for Channel 19



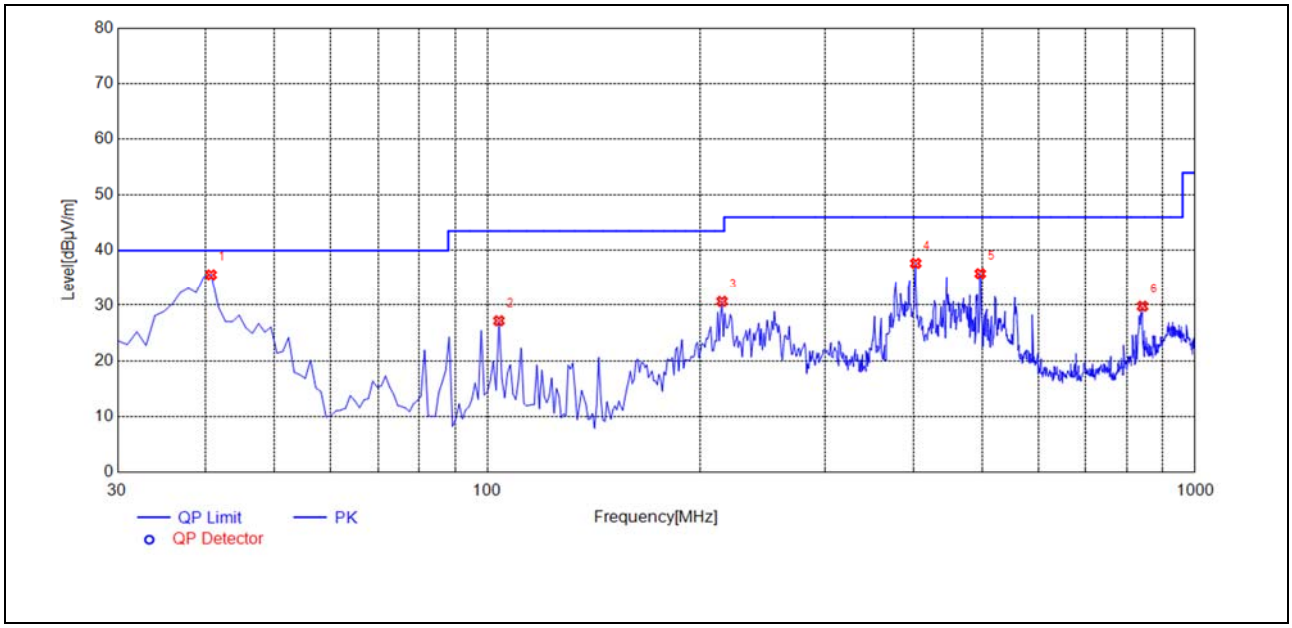
(Antenna Horizontal, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
43.5936	25.69	-30.05	40.00	14.31	150	360	Horizontal	PASS
97.9680	31.67	-32.07	43.50	11.83	150	259	Horizontal	PASS
143.6036	30.49	-34.12	43.50	13.01	150	302	Horizontal	PASS
216.4264	32.04	-31.77	46.00	13.96	150	293	Horizontal	PASS
360.1301	33.17	-26.34	46.00	12.83	150	233	Horizontal	PASS
472.7628	35.46	-24.36	46.00	10.54	150	353	Horizontal	PASS



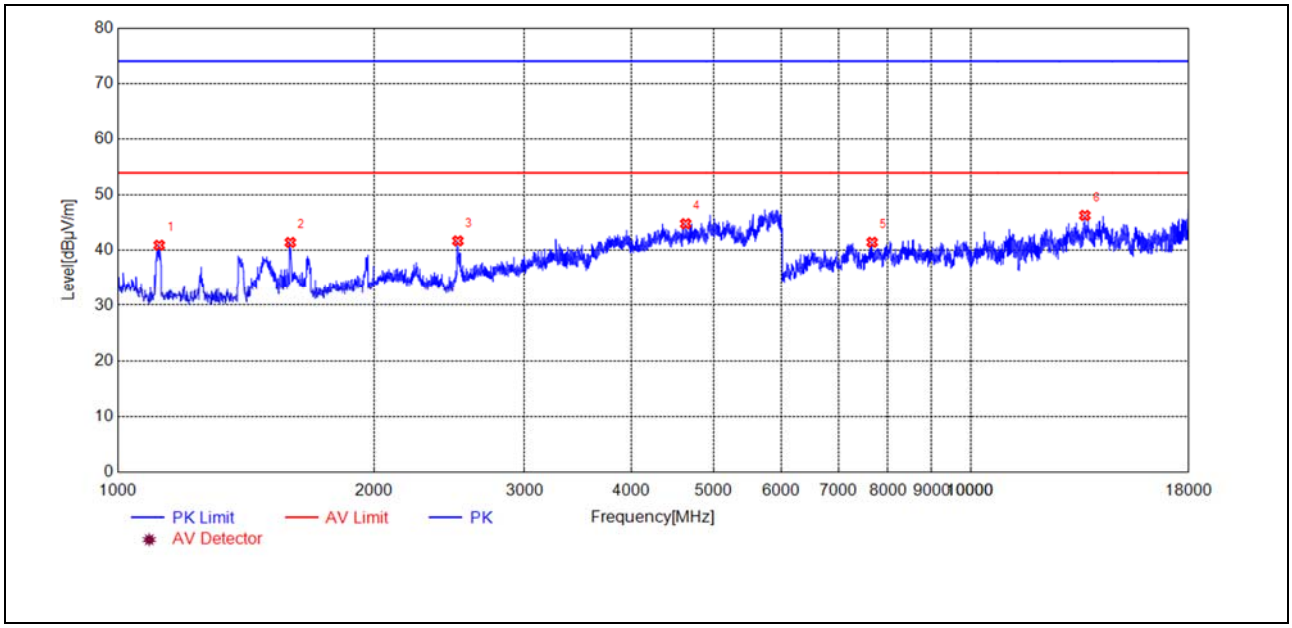
(Antenna Horizontal, 1GHz to 18GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1119.0238	41.11	-24.45	74.00	32.89	150	210	Horizontal	PASS
1487.0974	42.69	-23.18	74.00	31.31	150	320	Horizontal	PASS
2000.2000	40.24	-21.79	74.00	33.76	150	100	Horizontal	PASS
5845.9692	47.50	-7.03	74.00	26.50	150	90	Horizontal	PASS
7665.9332	41.89	-2.55	74.00	32.11	150	262	Horizontal	PASS
13741.5483	45.78	6.85	74.00	28.22	150	161	Horizontal	PASS



(Antenna Vertical, 30MHz to 1GHz)

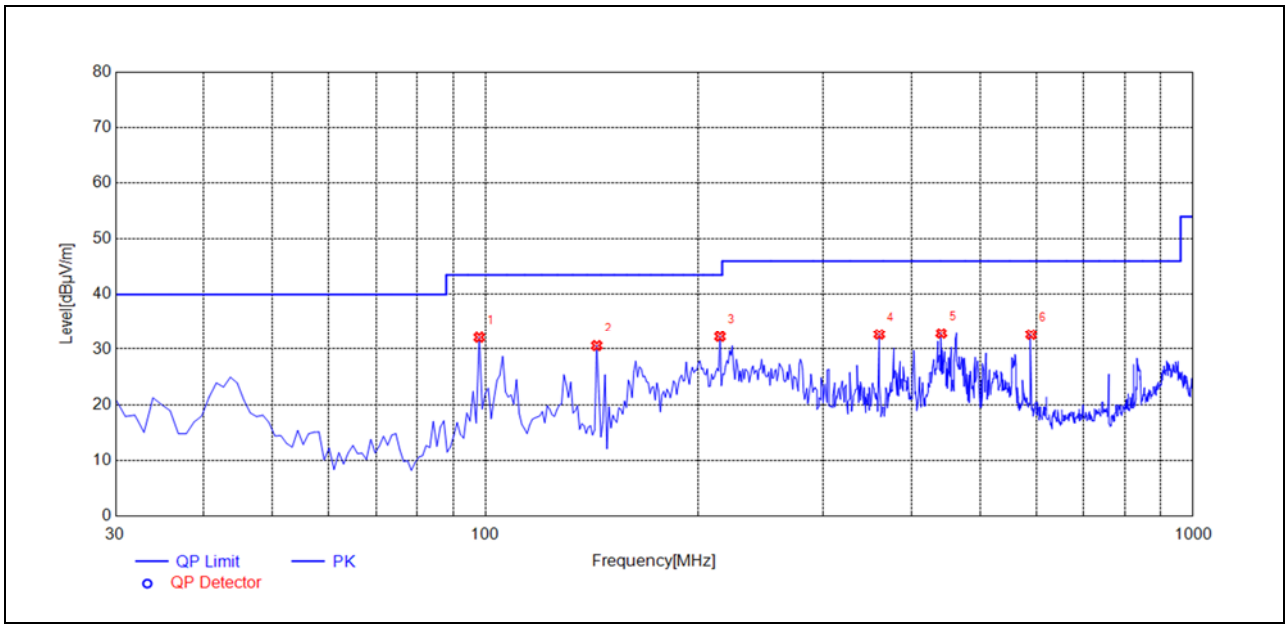
Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
40.6807	35.60	-30.60	40.00	4.40	150	49	Vertical	PASS
103.7938	27.17	-30.69	43.50	16.33	150	7	Vertical	PASS
214.4845	30.67	-31.98	43.50	12.83	150	246	Vertical	PASS
402.8529	37.67	-25.69	46.00	8.33	150	109	Vertical	PASS
497.0370	35.81	-24.81	46.00	10.19	150	280	Vertical	PASS
842.7027	29.79	-19.30	46.00	16.21	150	229	Vertical	PASS



(Antenna Vertical, 1GHz to 18GHz)

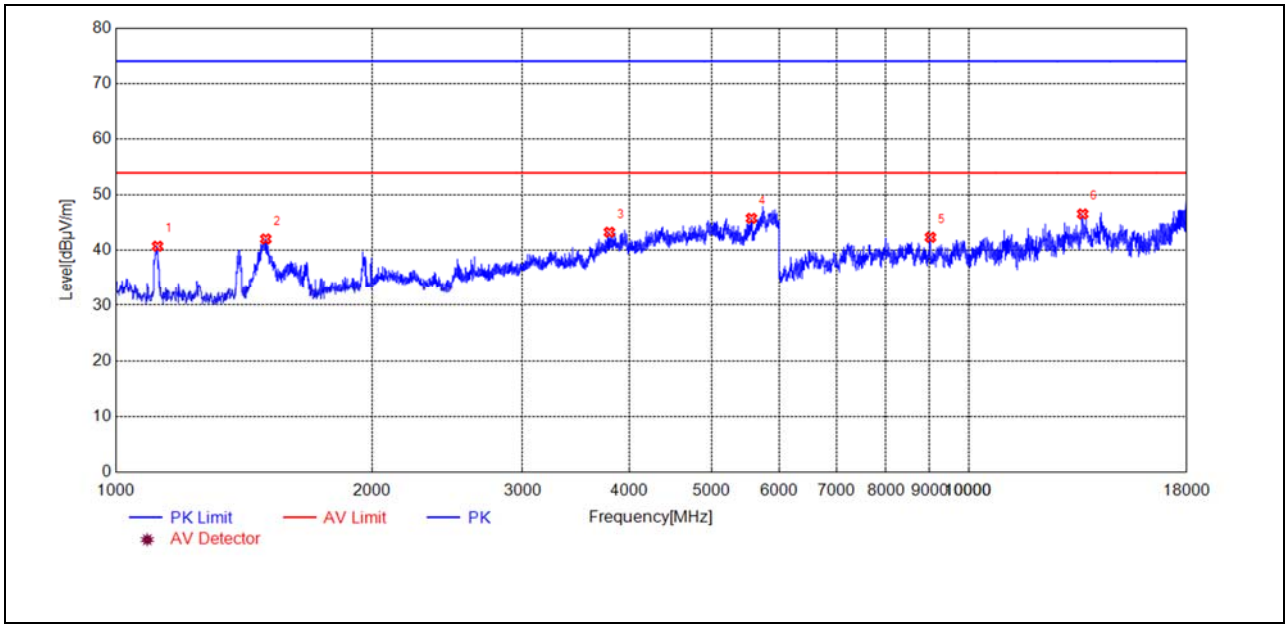
Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1119.0238	40.95	-24.45	74.00	33.05	150	317	Vertical	PASS
1594.1188	41.45	-23.21	74.00	32.55	150	267	Vertical	PASS
2505.3011	41.73	-19.56	74.00	32.27	150	277	Vertical	PASS
4633.7267	44.83	-11.54	74.00	29.17	150	107	Vertical	PASS
7663.5327	41.48	-2.49	74.00	32.52	150	213	Vertical	PASS
13607.1214	46.32	7.27	74.00	27.68	150	22	Vertical	PASS

Plot for Channel 39



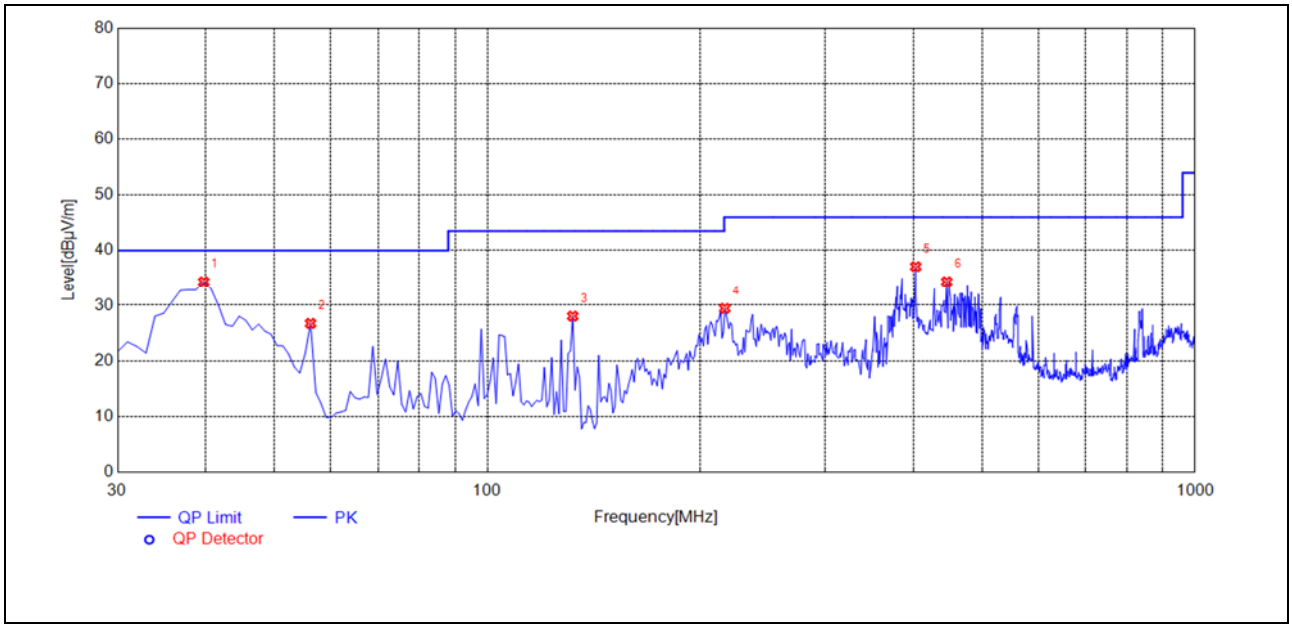
(Antenna Horizontal, 30MHz to 1GHz)

Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
97.9680	32.11	-32.07	43.50	11.39	150	255	Horizontal	PASS
143.6036	30.61	-34.12	43.50	12.89	150	288	Horizontal	PASS
214.4845	32.27	-31.98	43.50	11.23	150	297	Horizontal	PASS
360.1301	32.67	-26.34	46.00	13.33	150	255	Horizontal	PASS
440.7207	32.85	-24.79	46.00	13.15	150	272	Horizontal	PASS
590.2503	32.64	-21.96	46.00	13.36	150	306	Horizontal	PASS



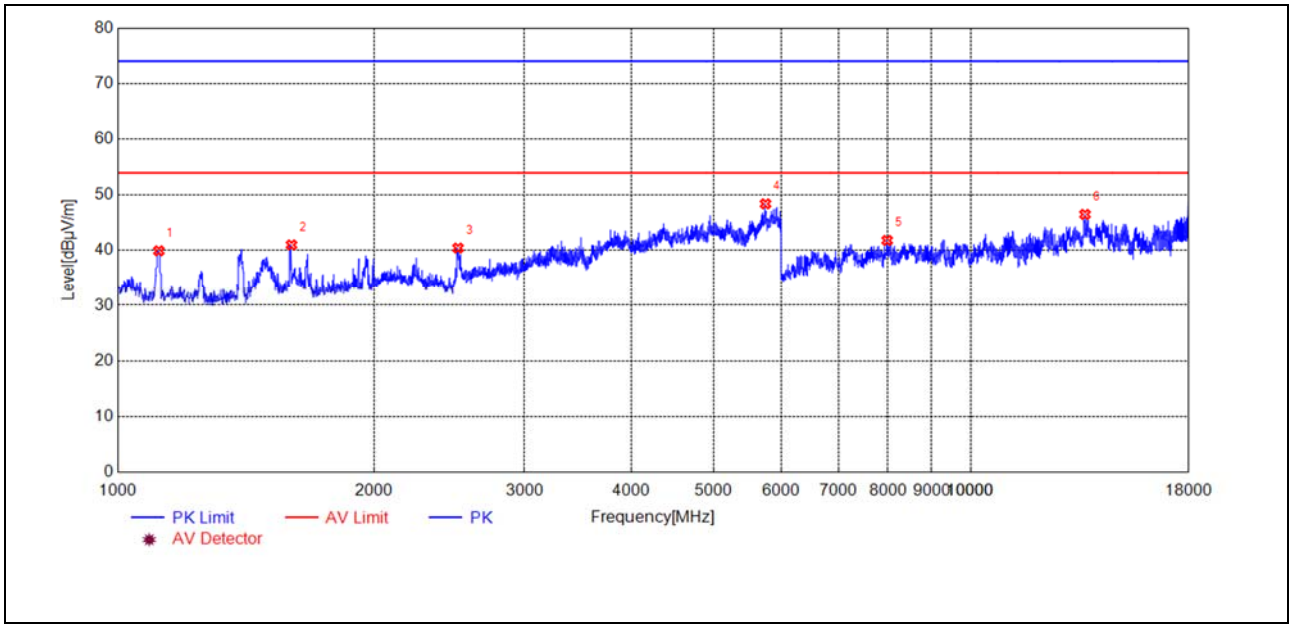
(Antenna Horizontal, 1GHz to 18GHz)

Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1120.0240	40.77	-24.44	74.00	33.23	150	207	Horizontal	PASS
1500.1000	42.08	-22.97	74.00	31.92	150	298	Horizontal	PASS
3791.5583	43.30	-14.58	74.00	30.70	150	287	Horizontal	PASS
5562.9126	45.80	-7.98	74.00	28.20	150	247	Horizontal	PASS
9017.4035	42.38	-1.03	74.00	31.62	150	332	Horizontal	PASS
13599.9200	46.59	7.66	74.00	27.41	150	122	Horizontal	PASS



(Antenna Vertical, 30MHz to 1GHz)

Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
39.7097	34.32	-32.97	40.00	5.68	150	20	Vertical	PASS
56.2162	26.71	-29.38	40.00	13.29	150	353	Vertical	PASS
131.9520	28.02	-33.37	43.50	15.48	150	20	Vertical	PASS
216.4264	29.42	-31.77	46.00	16.58	150	293	Vertical	PASS
402.8529	37.07	-25.69	46.00	8.93	150	139	Vertical	PASS
445.5756	34.32	-24.61	46.00	11.68	150	97	Vertical	PASS



(Antenna Vertical, 1GHz to 18GHz)

Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1118.0236	39.94	-24.45	74.00	34.06	150	324	Vertical	PASS
1599.1198	41.00	-23.11	74.00	33.00	150	274	Vertical	PASS
2506.3013	40.44	-19.57	74.00	33.56	150	284	Vertical	PASS
5746.9494	48.41	-6.78	74.00	25.59	150	144	Vertical	PASS
7980.3961	41.82	-2.60	74.00	32.18	150	323	Vertical	PASS
13611.9224	46.51	7.00	74.00	27.49	150	253	Vertical	PASS

END OF REPORT