FCC/IC - TEST REPORT

Report Number	:	4840125229300B	Date of Issue:	2025.04.17
Model	:	PNUJ4110		
Product Type	:	Robotic Pool Skimmer		
Applicant	:	Quilo Technology (Jiaxing) Co., Ltd.		
Address	:	Room 199, No. 2176 Fanggong Road, Dongzha Street, Nanhu District, Jiaxing City, Zhejiang Province, P.R.China		
Manufacturer	:	Quilo Technology (Jiaxing) Co., Ltd.		
Address	:	Room 199, No. 2176 Fanggong Road, Dongzha Street, Nanhu District, Jiaxing City, Zhejiang Province, P.R.China		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	61		

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2 Details about the Test Laboratory

Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, Jiangsu. China
Test Firm FCC Registration Number:	571980
Designation number:	CN1405
IC Company Number:	33393
CAB identifier:	CN0184
Telephone: Fax:	+86 510 8820 3737 +86 510 8820 3636

3 Description of the Equipment under Test

Description of the Equipment Under Test

Product: Robotic Pool Skimmer

PMN / HVIN / Model no.: PNUJ4110

FCC ID: 2BOBWPNUJ4110

IC: 33430-PNUJ4110

Ratings: DC 14.4V (powered by internal battery)
information of adapter (for charging mode) Model:GM39-200150-1DG
input: AC 100-240V, 50/60Hz
output: DC 20V/1.5A

RF Transmission Frequency: Wi-Fi:
For 802.11b/g/n-HT20: 2412~2462 MHz
For 802.11n-HT40: 2422~2452 MHz

Bluetooth LE:2402~2480MHz

No. of Operated Channel: 2.4GHz WIFI: 1 for 802.11b/802.11g/802.11(H20);
7 for 802.11n(HT40)
2.4GHz BLE: 40

Modulation: Direct Sequence Spread Spectrum (DSSS) for 802.11b
Orthogonal Frequency Division Multiplexing (OFDM) for 802.11g/n;
2.4GHz BLE: GFSK

Channel list:

802.11b/g/n(HT20)					802.11n(HT40)		
Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)
1	2412	7	2442	3	2422	8	2447MHz
2	2417	8	2447	4	2427	9	2452MHz
3	2422	9	2452	5	2432		
4	2427	10	2457	6	2437		
5	2432	11	2462	7	2442		
6	2437						

Bluetooth Low Energy							
Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(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

Antenna Type: Dipole Antenna

Antenna Gain: 1.65dBi

Description of the EUT: The Equipment Under Test (EUT) is a Robotic Pool Skimmer which support 2.4GHz Wi-Fi and BLE 4.2(support 1Mbps data rate). We tested it and listed the worst data in this report.
For the test of Conducted emission AC power port, the EUT is powered by the adapter,
for other tests, the EUT is powered by internal battery.

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5 April 2018 + Amendment 1 March 2019 + Amendment 2 February 2021	General Requirements for Compliance of Radio Apparatus
RSS-247 Issue 3 August 2023	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 and ANSI C63.10 (2020).

5 Summary of Test Results

Technical Requirements						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207 & RSS-GEN 8.8	Conducted emission AC power port	12-16	Site 1	☒	☐	☐
§15.247 (b) (3) & RSS-247 5.4(d)	Conducted peak output power	17-19	Site 1	☒	☐	☐
§15.247(a)(2) & RSS-247 5.2(a) & RSS-GEN 6.7	6dB bandwidth and 99% Occupied Bandwidth	20-24	Site 1	☒	☐	☐
§15.247(e) & RSS-247 5.2(b)	Power spectral density	25-27	Site 1	☒	☐	☐
§15.247(d) & RSS-247 5.5	Spurious RF conducted emissions	28-34	Site 1	☒	☐	☐
§15.247(d) & RSS-247 5.5	Band edge	35-39	Site 1	☒	☐	☐
§15.247(d) & §15.209 & RSS-247 5.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	40-47	Site 1	☒	☐	☐
§15.203 & RSS-Gen 6.8	Antenna requirement	See note 1		☒	☐	☐

Remark 1: N/A – Not Applicable.
Note 1: The EUT uses a Dipole antenna, which gain is 1.65dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2BOBWPNUJ4110, IC: 33430-PNUJ4110, complies with Section 15.207,15.209,15.231,15.247 of the FCC Part 15, Subpart C Rules and RSS-247, RSS-GEN.

This report is only for the 2.4GHz BLE test report, for the 2.4GHz Wi-Fi test report please refer to 4840125229300A.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

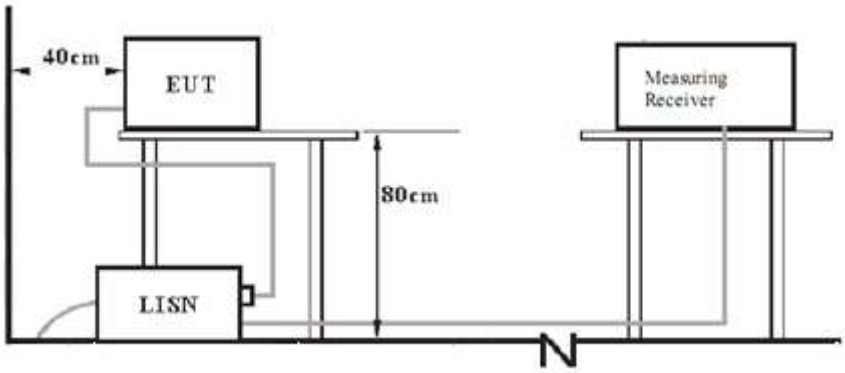
Sample Received Date:	March 4, 2025
Testing Start Date:	March 4, 2025
Testing End Date:	March 11, 2025

-TÜV SÜD Certification and Testing (China) Co., Ltd.

Reviewed by:	Prepared by:	Tested by:
Zhilan Xue Review Engineer	Bo Dai Project Engineer	Xu Zheng Test Engineer

7 Test Setups

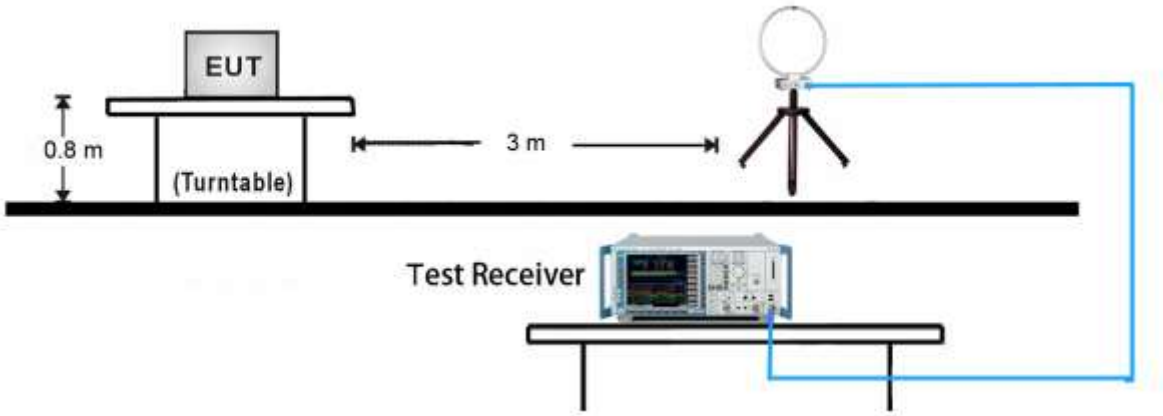
7.1 AC Power Line Conducted Emission test setups



Note: for floor-standing equipment, the supporting table (80 cm) shall be replaced by a insulating material (up to 12 mm thick).

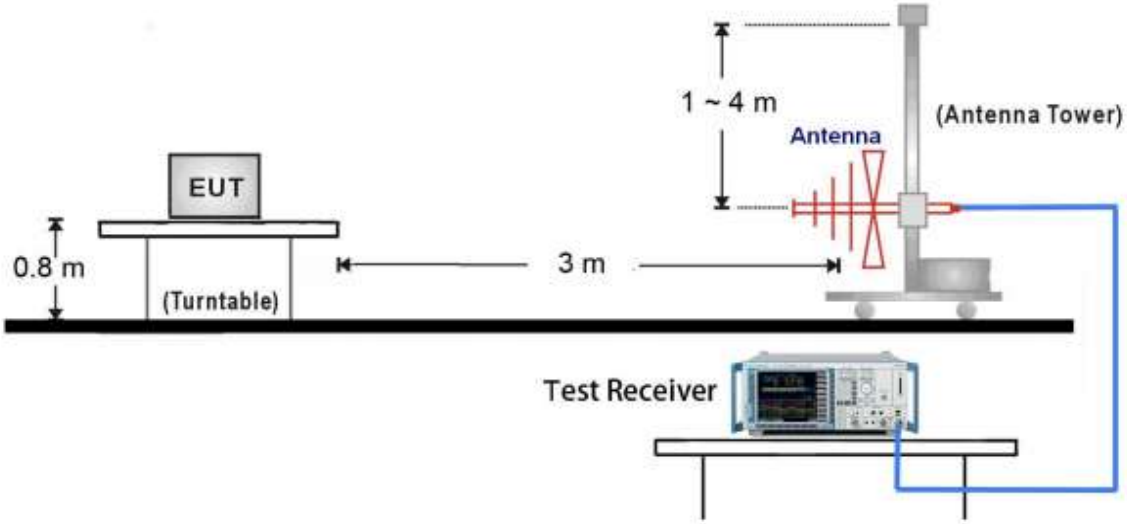
7.2 Radiated test setups

9kHz ~ 30MHz Test Setup:



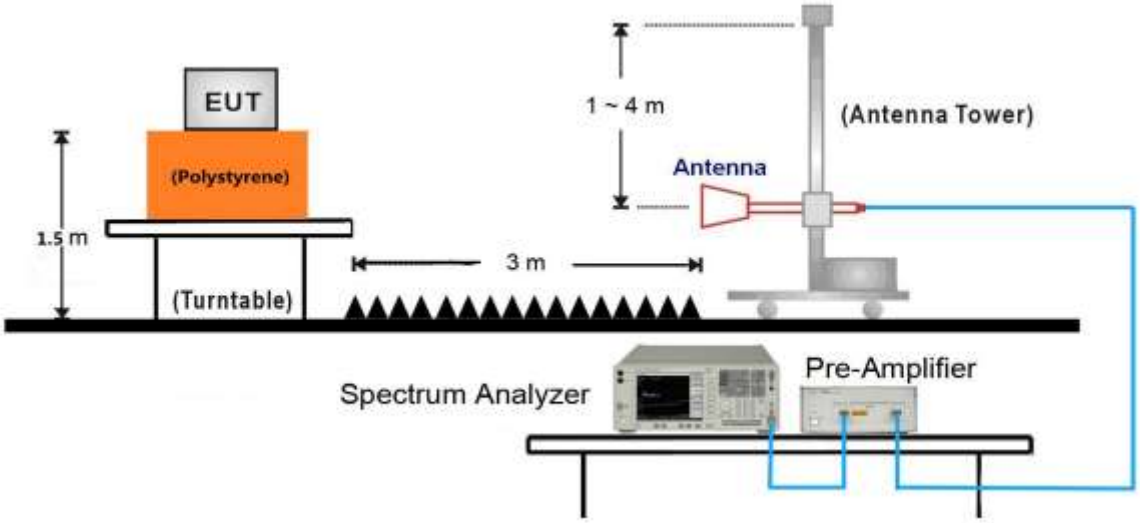
Note: for floor-standing equipment, the supporting table (80 cm) shall be replaced by a insulating material (up to 12 mm thick).

30MHz ~ 1GHz Test Setup:

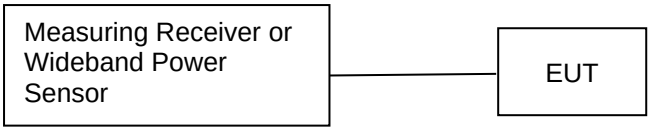


Note: for floor-standing equipment, the supporting table (80 cm) shall be replaced by a insulating material (up to 12 mm thick).

Above 1GHz Test Setup:



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	HONOR	NDR-WFH	ET247
Notebook	HONOR	VLT-W50	ET137
adapter	FOSHAN SHUNDE GUANYUDA POWER SUPPLY CO.,LTD	GM39-200150-1DG	--

Test software: EspRFTestTool_v3.6_Manual

Test Mode Applicability and Tested Channel Detail:

Mode	Tested Channel	Data Rate (Mbps)	Modulation	Power level setting
Bluetooth LE	0	1	GFSK	Auto
	19	1	GFSK	Auto
	39	1	GFSK	Auto

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

Conducted Emission

150k-30MHz Conducted Emission Test

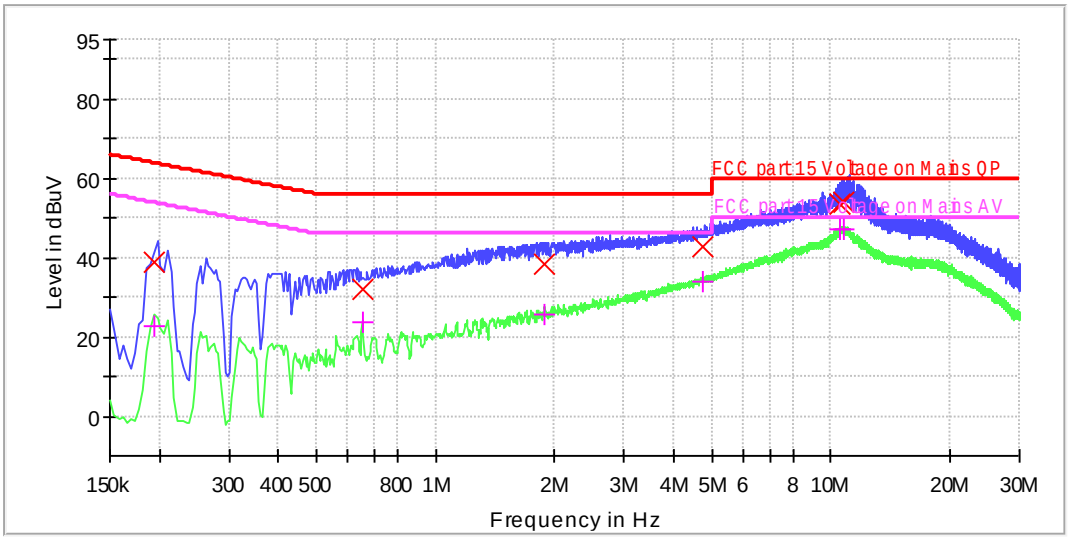
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2480MHz
Operator Name:	Xu Zheng
Input:	AC 120V 60Hz
Test Standard:	FCC Part 15.207(a)
Comment:	Phase L
Comment:	Temp.:20.5℃,Humi.:49.7%,Atm.:1015.3hPa

Scan Setup: FCC Mains Voltage LISN 2 Lines 150kHz-30MHz Pre [EMI conducted]

Hardware Setup:	Mains Voltage LISN 2 Lines 9kHz-30MHz
Receiver:	[ESW 8]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
150 kHz - 30 MHz	4 kHz	PK+ ; AVG	9 kHz	0.01 s	0 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.194000	39.0	22.9	1000.0	9.000	10.1	24.8	63.9	30.9	53.9
0.654000	31.8	23.8	1000.0	9.000	10.1	24.2	56.0	22.3	46.0
1.886000	38.6	25.5	1000.0	9.000	10.2	17.4	56.0	20.5	46.0
4.726000	42.9	34.2	1000.0	9.000	10.3	13.1	56.0	11.8	46.0
10.570000	53.5	47.1	1000.0	9.000	10.5	6.5	60.0	3.0	50.0
10.750000	53.9	47.2	1000.0	9.000	10.5	6.1	60.0	2.8	50.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

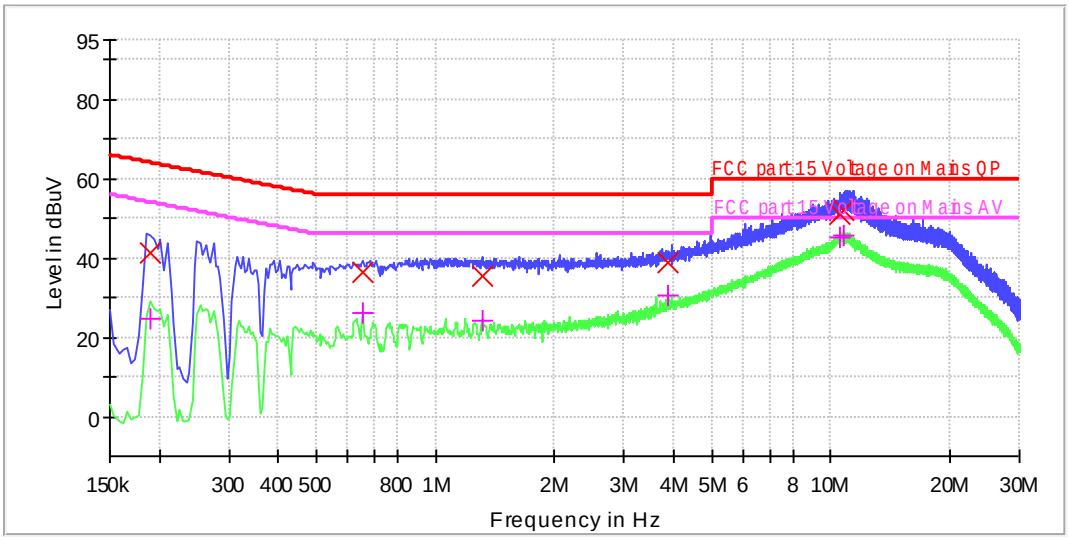
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2480MHz
Operator Name:	Xu Zheng
Input:	AC 120V 60Hz
Test Standard:	FCC Part 15.207(a)
Comment:	Phase N
Comment:	Temp.:20.5℃,Humi.:49.7%,Atm.:1015.3hPa

Scan Setup: FCC Mains Voltage LISN 2 Lines 150kHz-30MHz Pre [EMI conducted]

Hardware Setup:	Mains Voltage LISN 2 Lines 9kHz-30MHz
Receiver:	[ESW 8]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
150 kHz - 30 MHz	4 kHz	PK+ ; AVG	9 kHz	0.01 s	0 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.190000	41.1	24.7	1000.0	9.000	10.4	23.0	64.0	29.4	54.0
0.654000	36.4	26.1	1000.0	9.000	10.4	19.6	56.0	19.9	46.0
1.310000	35.7	24.2	1000.0	9.000	10.4	20.3	56.0	21.8	46.0
3.894000	38.9	30.6	1000.0	9.000	10.5	17.1	56.0	15.4	46.0
10.506000	51.3	45.1	1000.0	9.000	10.7	8.7	60.0	4.9	50.0
10.810000	51.9	45.6	1000.0	9.000	10.8	8.2	60.0	4.4	50.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

9.2 Conducted peak output power

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following test receiver settings:
   Span = approximately 5 times the 6dB bandwidth, centered on a channel need to test, RBW > the 6dB bandwidth of the emission being measured, VBW≥3RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power and record the results in the test report.
5. Repeat above procedures until all frequencies measured were complete.

Limits

According to §15.247 (b) (3) & RSS-247 5.4(d), conducted peak output power limit as below:

Conducted peak output power

Frequency Range MHz	**Limit W**	**Limit dBm**
2400-2483.5	≤1	≤30

e.i.r.p

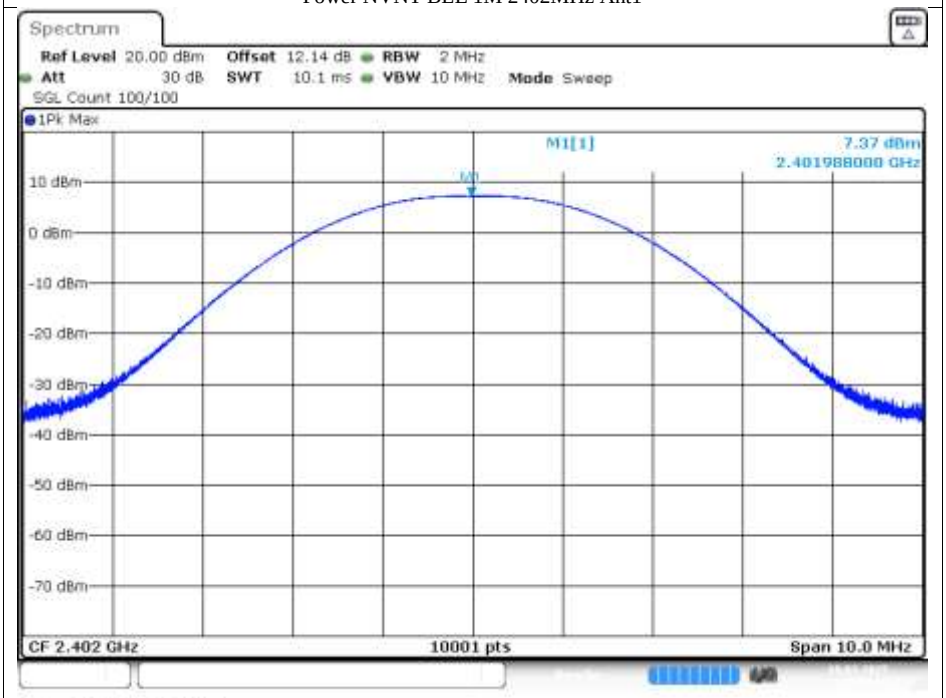
Frequency Range MHz	**Limit W**	**Limit dBm**
2400-2483.5	≤4	≤36

Test result as below table

Antenna gain=1.65dBi				
Frequency MHz	Conducted Peak Output Power(dBm) §15.247 (b) (3)	Result	e.i.r.p.(dBm) RSS-247 5.4(d)	Result
2402MHz	7.37	Pass	9.02	Pass
2440MHz	7.14	Pass	8.79	Pass
2480MHz	7.7	Pass	9.35	Pass

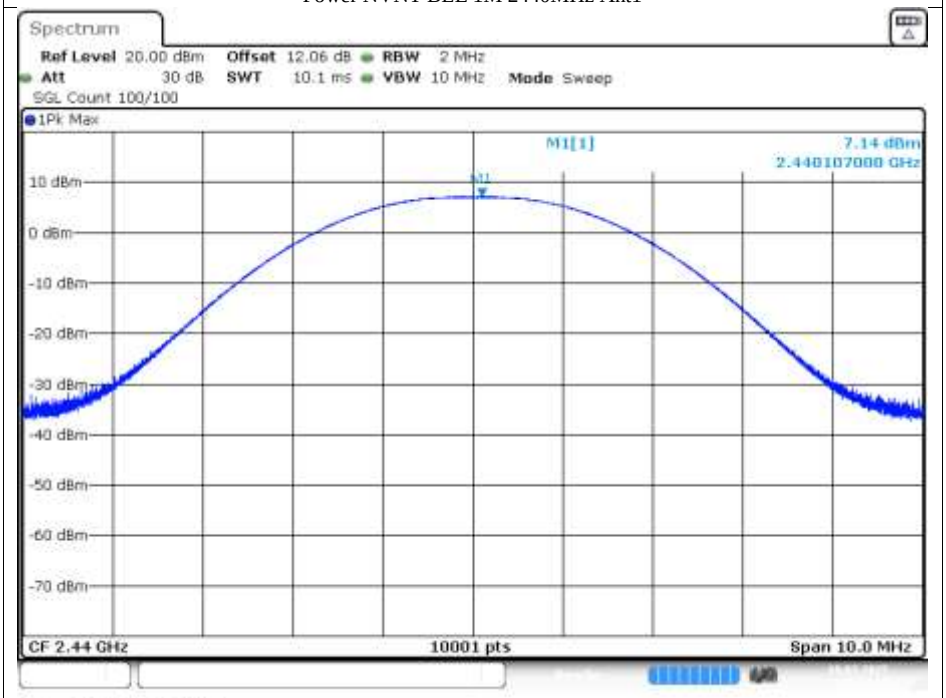
Test Graphs

Power NVNT BLE 1M 2402MHz Ant1



Date: 10.MAR.2025 13:09:13

Power NVNT BLE 1M 2440MHz Ant1



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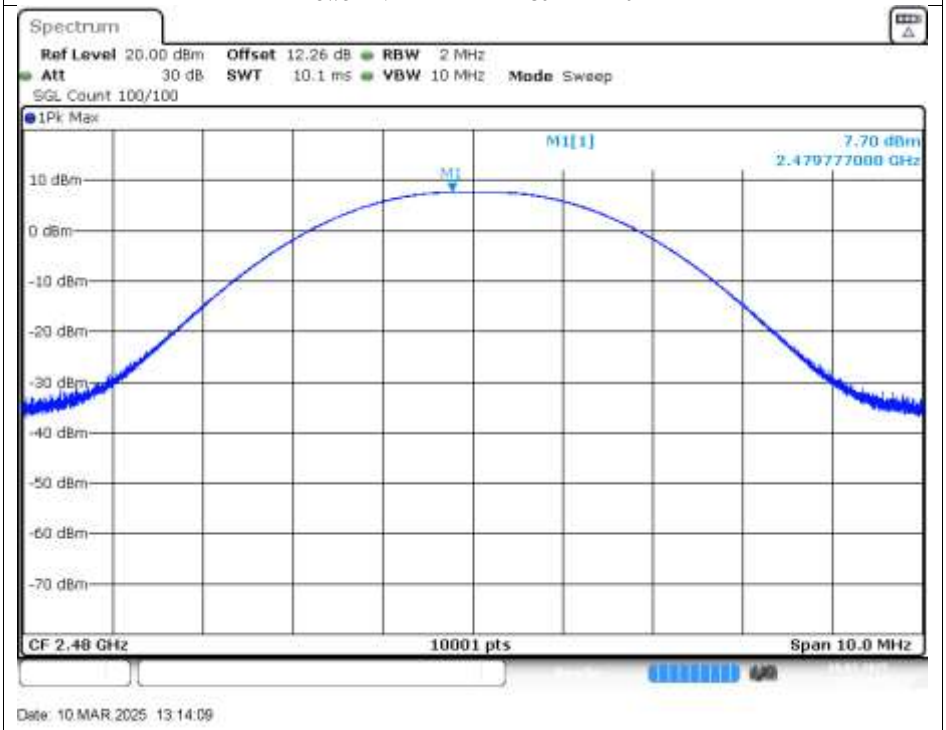
Power NVNT BLE 1M 2480MHz Ant1



9.3 6dB bandwidth and 99% Occupied Bandwidth

Test Method for 6 dB Bandwidth

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
   RBW=1% to 5% of the occupied bandwidth but not less than 100kHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Use the automatic bandwidth measurement capability of an instrument, use the X dB bandwidth mode with X set to 6 dB.
5. Allow the trace to stabilize, record the 6 dB Bandwidth value.

Test Method for 99 % Bandwidth

1. Connect EUT test port to spectrum analyzer.
   Use the following spectrum analyzer settings:
   RBW=1% to 5% of OBW, or a minimum of 1 MHz if this is not possible due to a large OBW, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the occupied bandwidth measurement capability of test receiver.
3. Allow the trace to stabilize, record the occupied bandwidth value.

Limit

6dB bandwidth Limit [kHz]	99% bandwidth Limit [kHz]
≥500	--

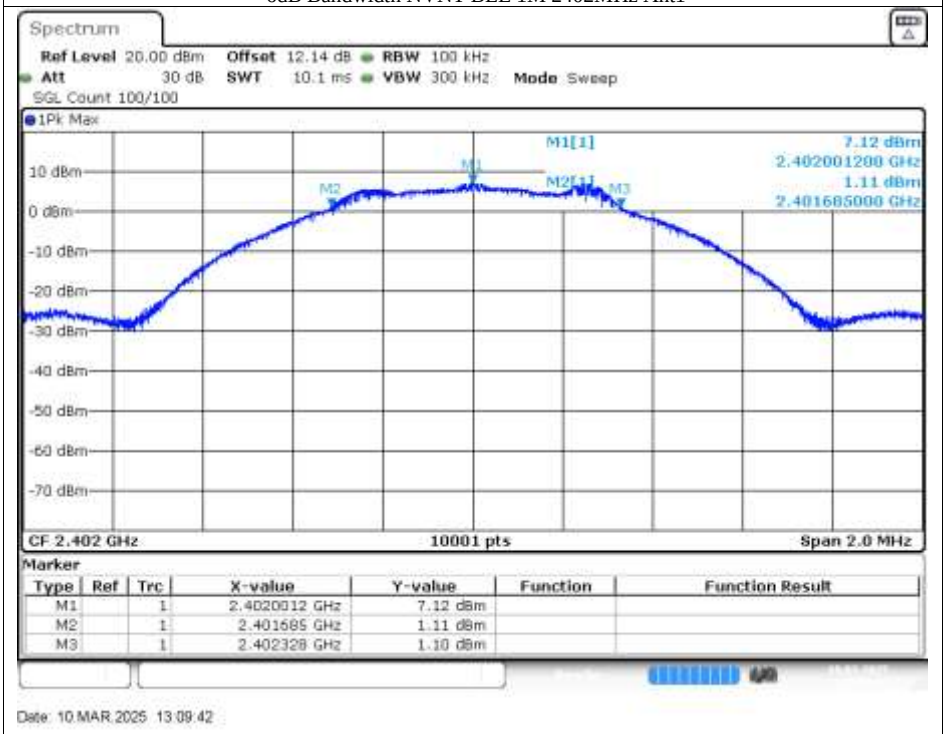
Test result

Frequency MHz	6dB bandwidth (MHz)		Result	99% occupied bandwidth MHz
	result	limit	verdict	
2402	0.643	≥0.5	Pass	1.02
2440	0.642	≥0.5	Pass	1.018
2480	0.641	≥0.5	Pass	1.017

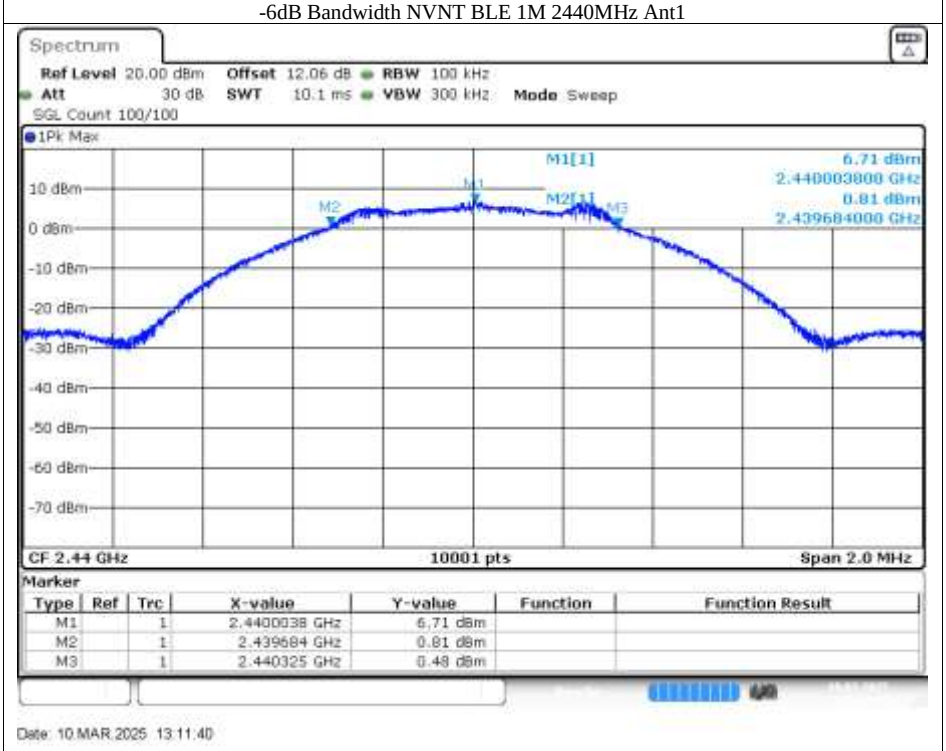
6dB Bandwidth

Test Graphs

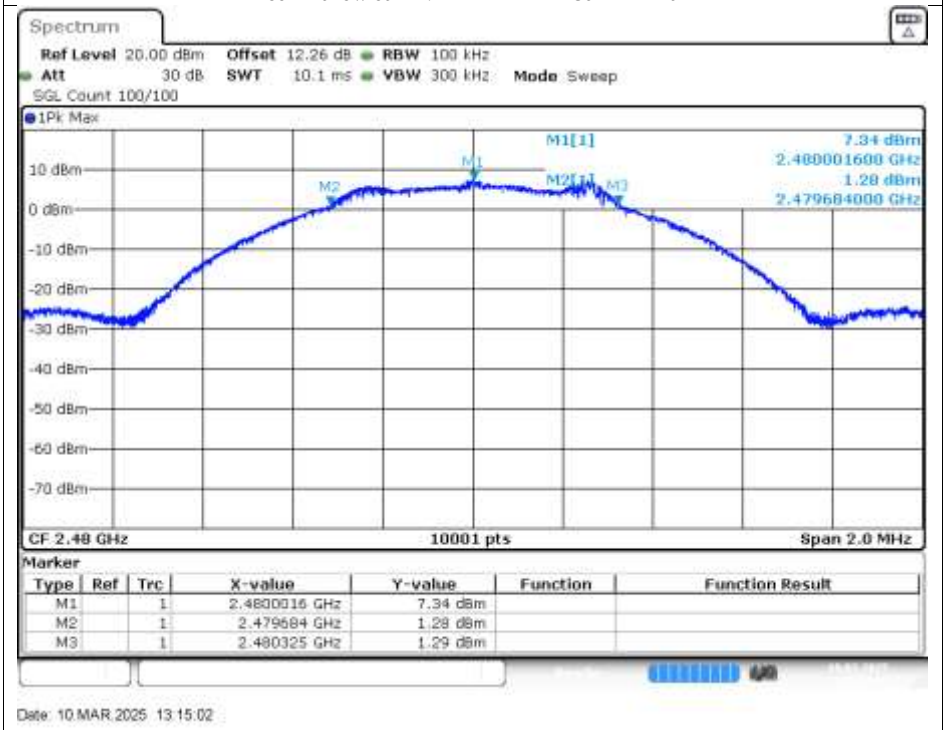
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1

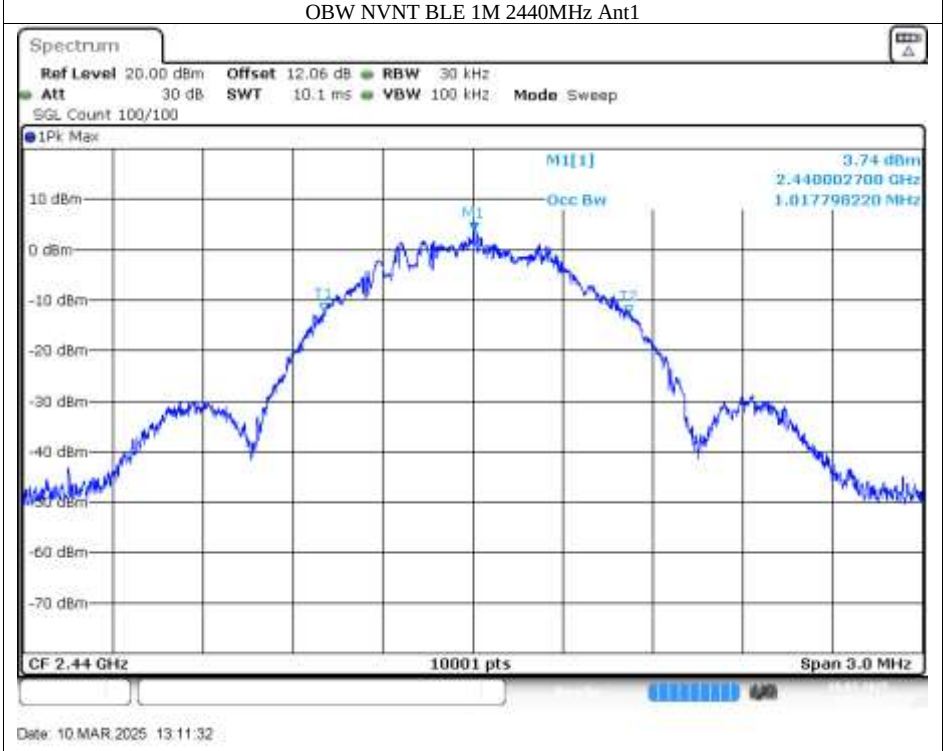


99% Bandwidth

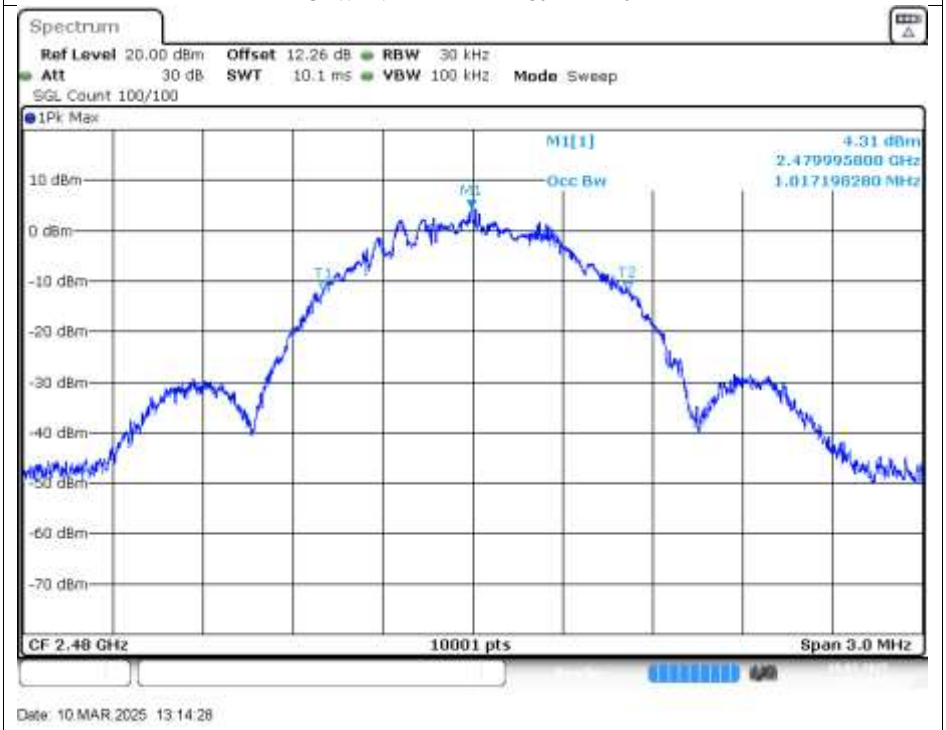
Test Graphs

OBW NVNT BLE 1M 2402MHz Ant1

OBW NVNT BLE 1M 2440MHz Ant1



OBW NVNT BLE 1M 2480MHz Ant1



9.4 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz,VBW≥3RBW,Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

Limit

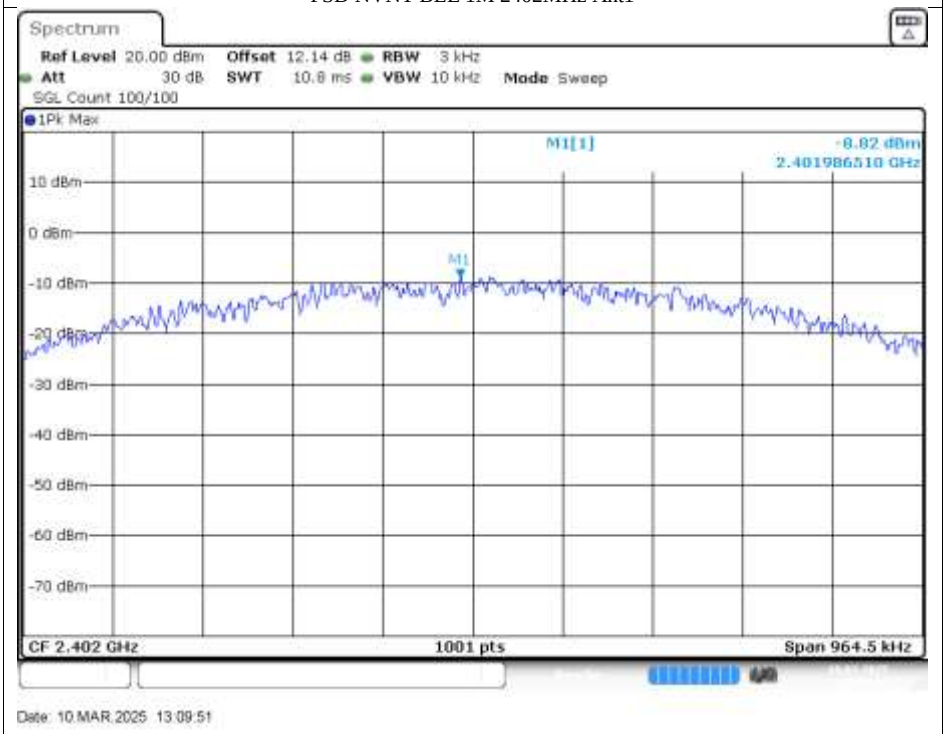
Limit [dBm/3kHz]
≤8

Test result

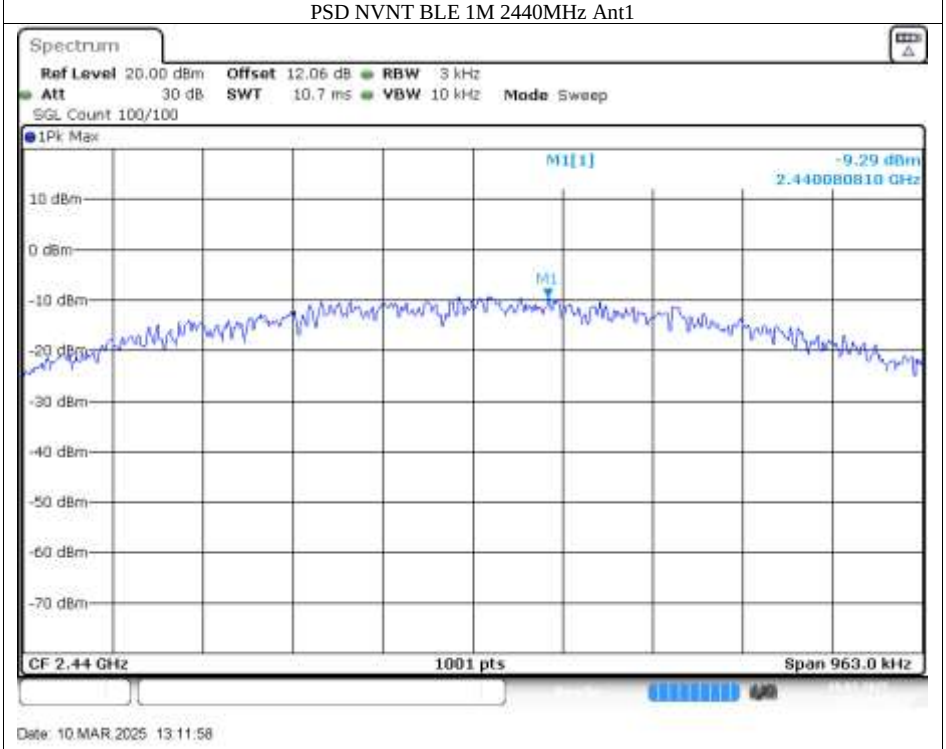
Data transmission rate	Frequency	Power spectral density	Result
1Mbps	MHz	dBm/3kHz	
	Top channel 2402MHz	-8.82	Pass
	Middle channel 2440MHz	-9.29	Pass
	Bottom channel 2480MHz	-8.62	Pass

Test Graphs

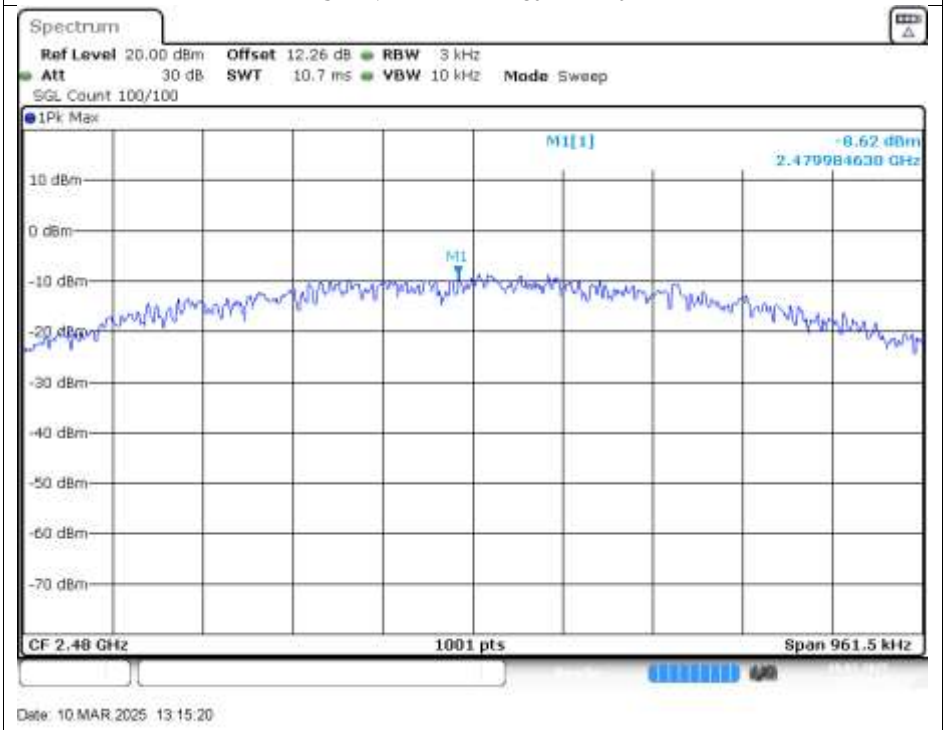
PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2440MHz Ant1



PSD NVNT BLE 1M 2480MHz Ant1



9.5 Spurious RF conducted emissions

Test Method

1. Establish a reference level by using the following procedure:
   a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
   b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
   a. Set the center frequency and span to encompass frequency range to be measured.
   b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

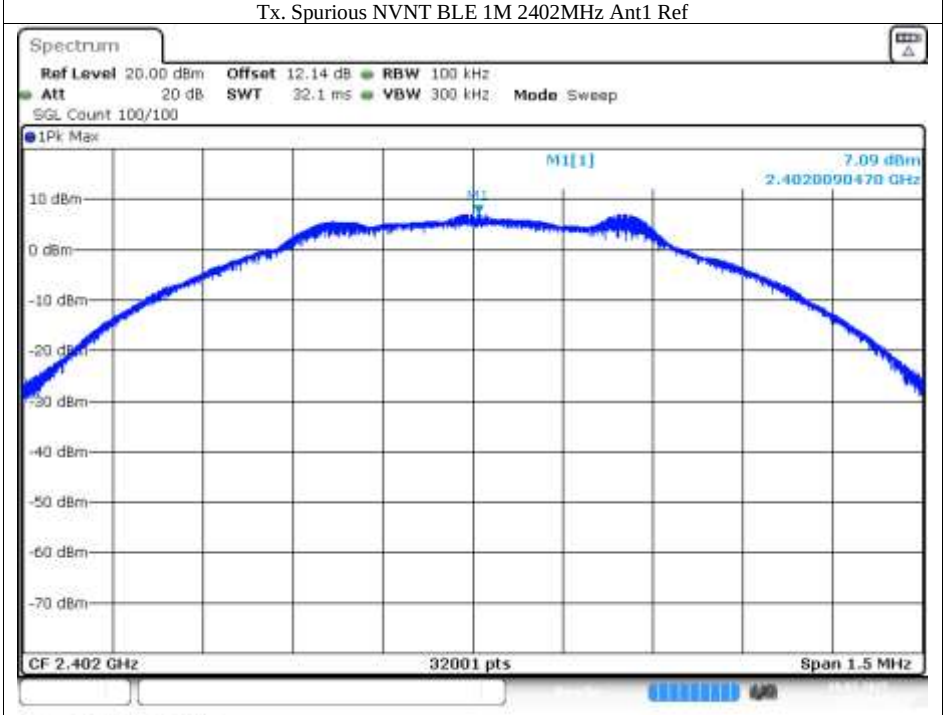
Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

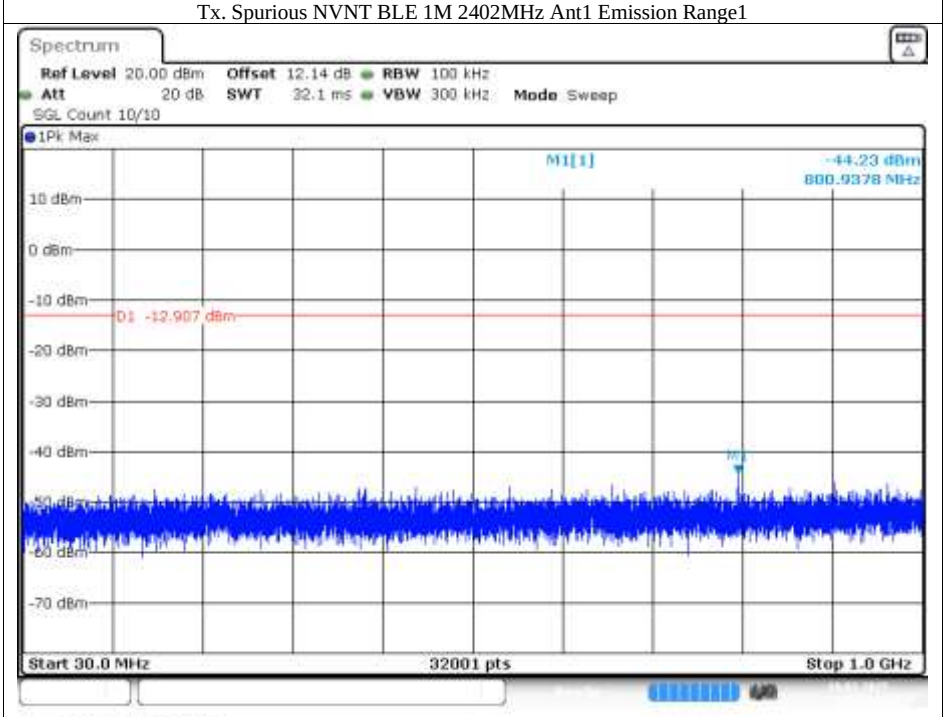
Spurious RF conducted emissions

Test Graphs

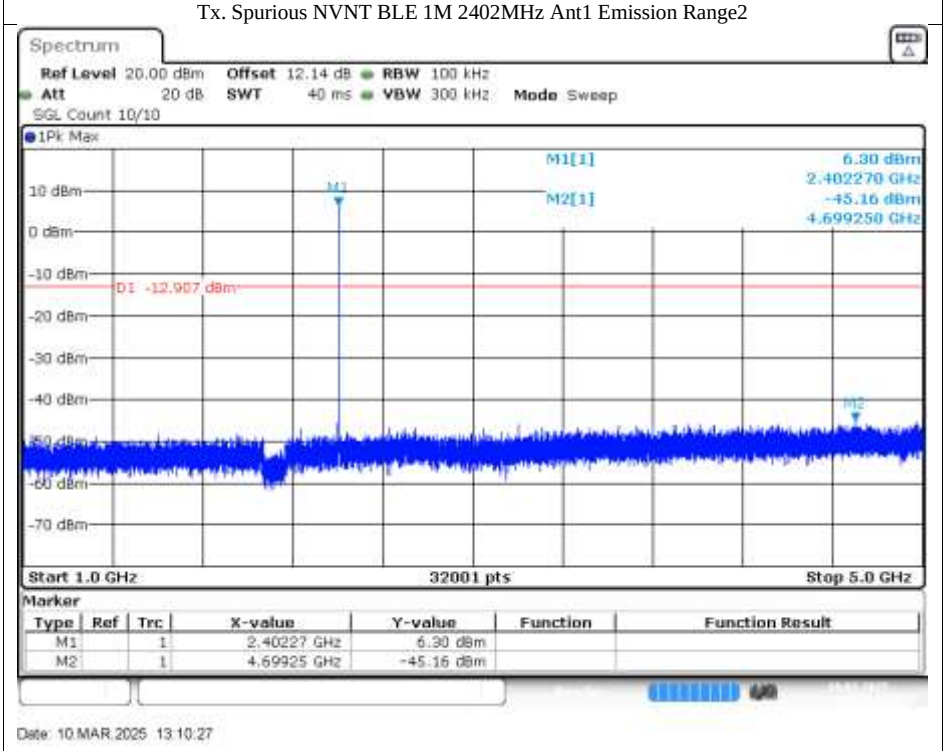
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



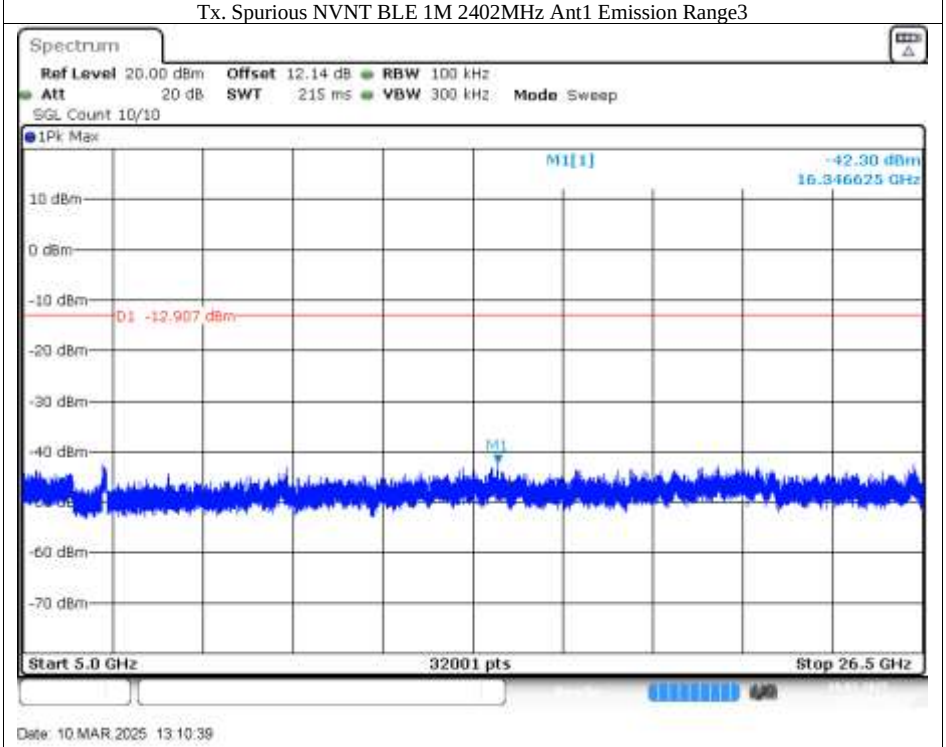
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission Range1



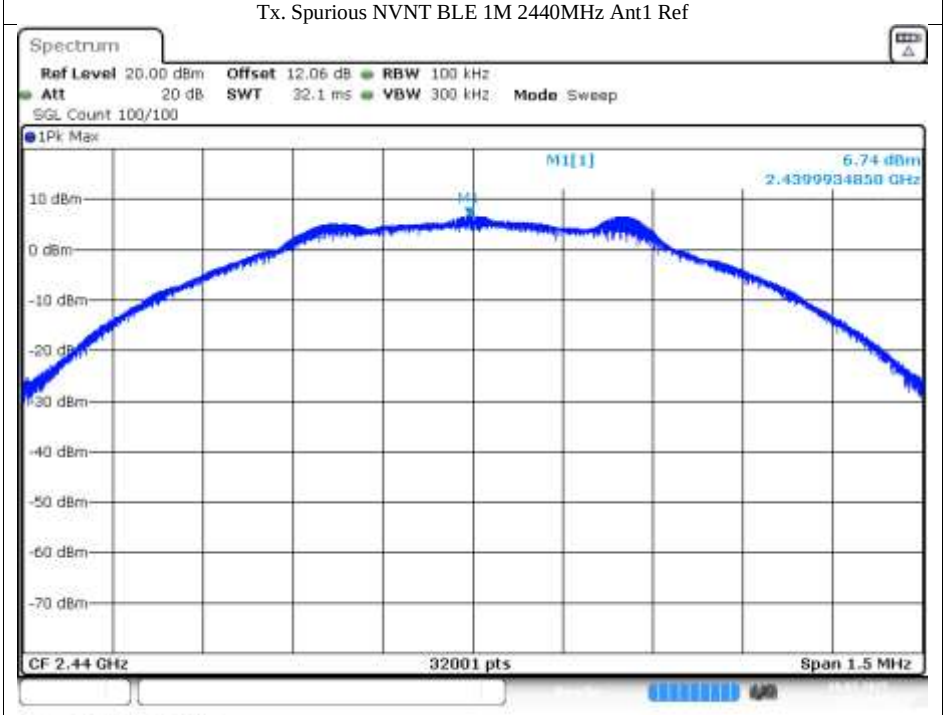
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission Range2



Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission Range3

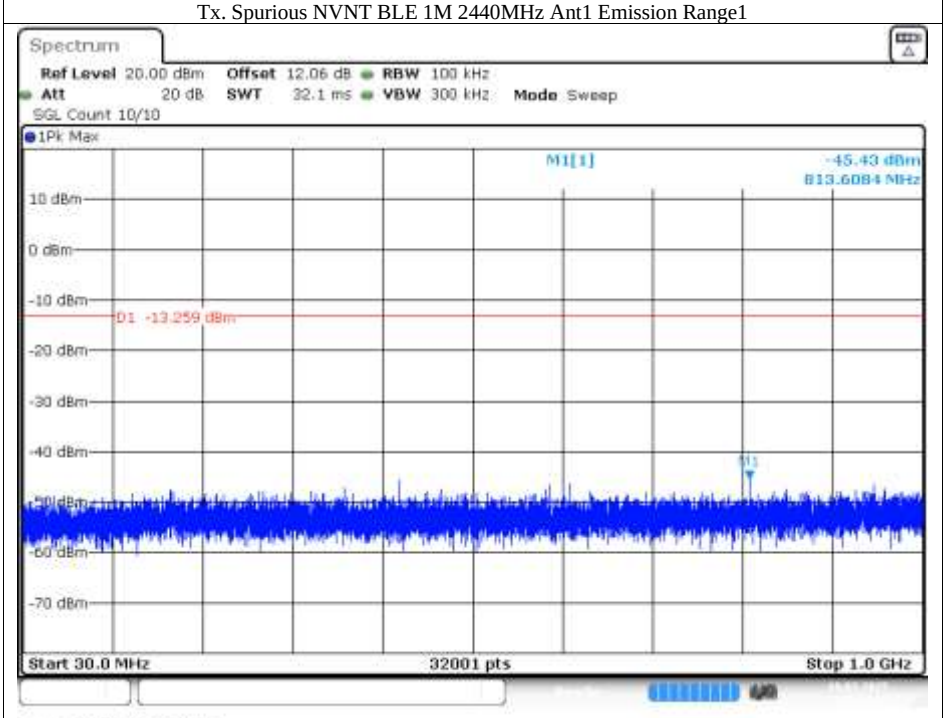


Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref



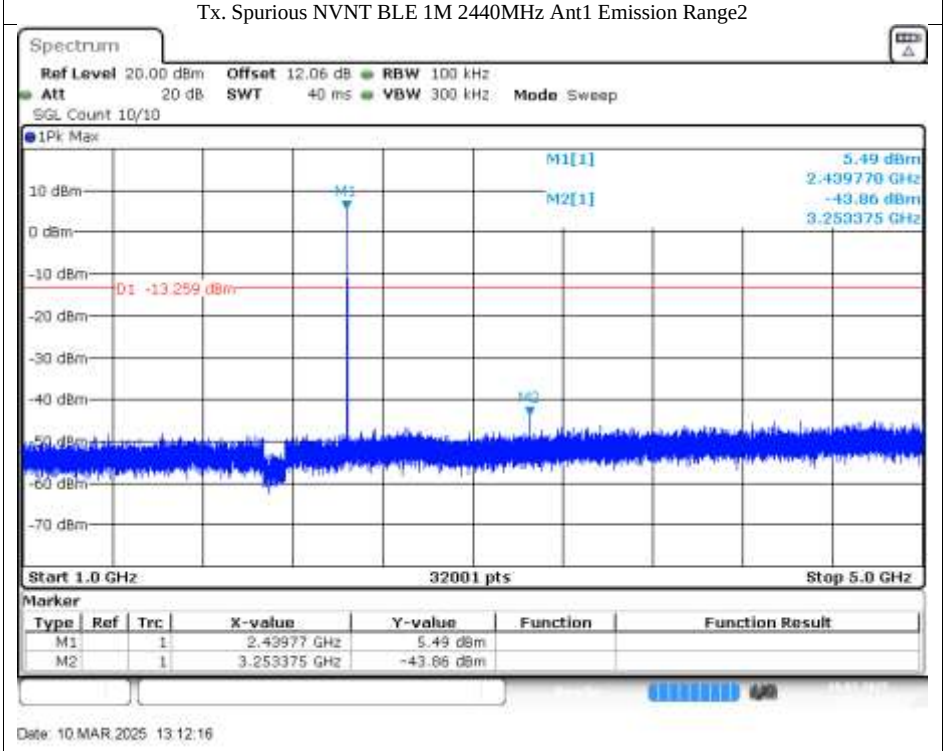
Date: 10.MAR.2025 13:12:10

Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission Range1

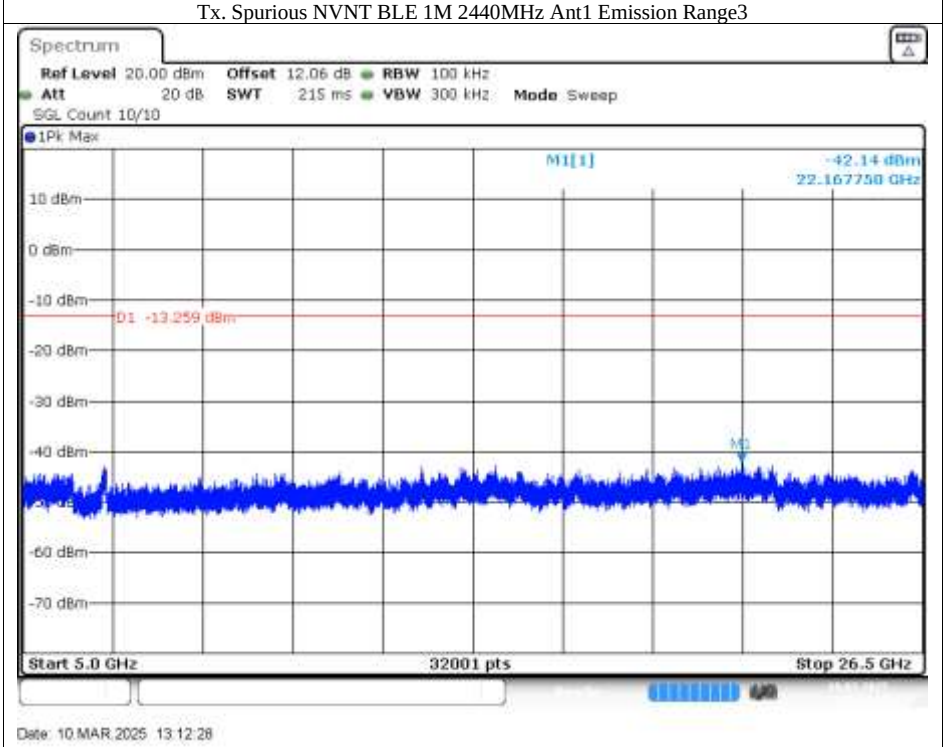


Date: 10.MAR.2025 13:12:13

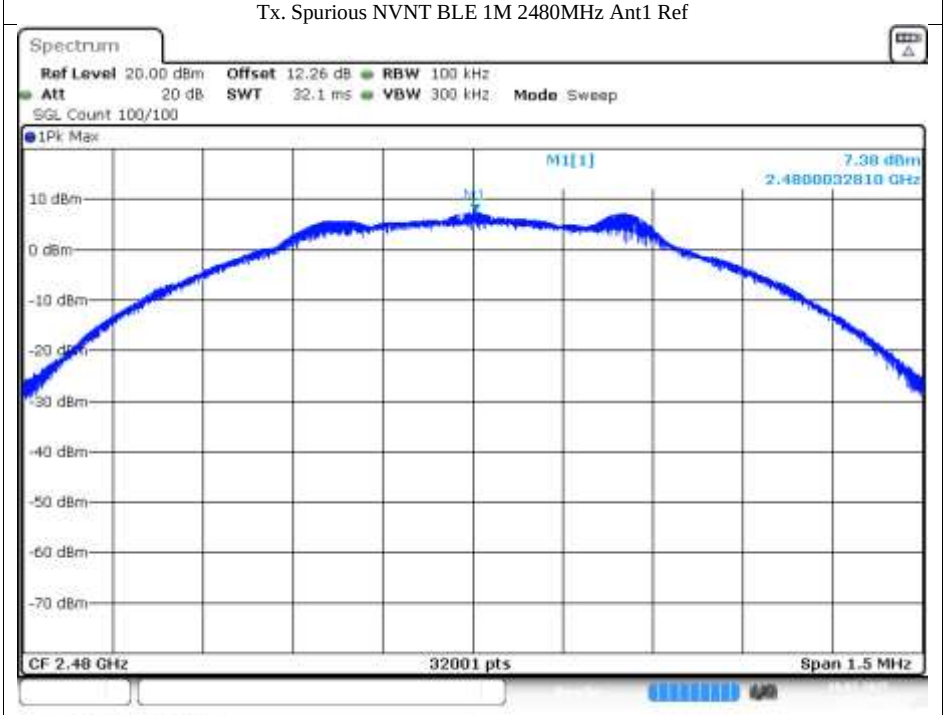
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission Range2



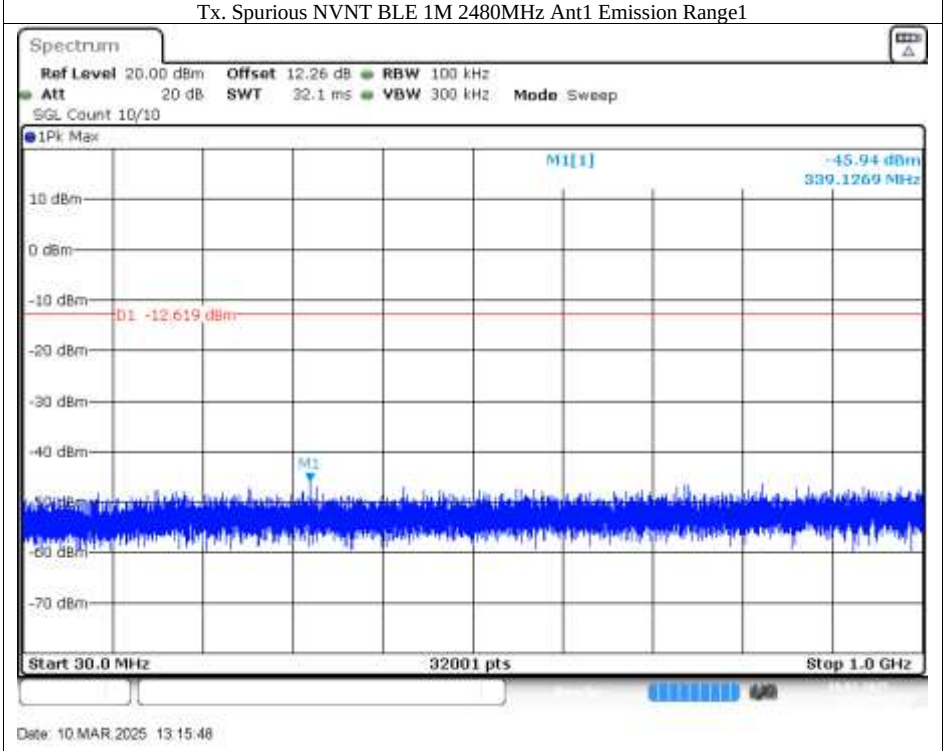
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission Range3



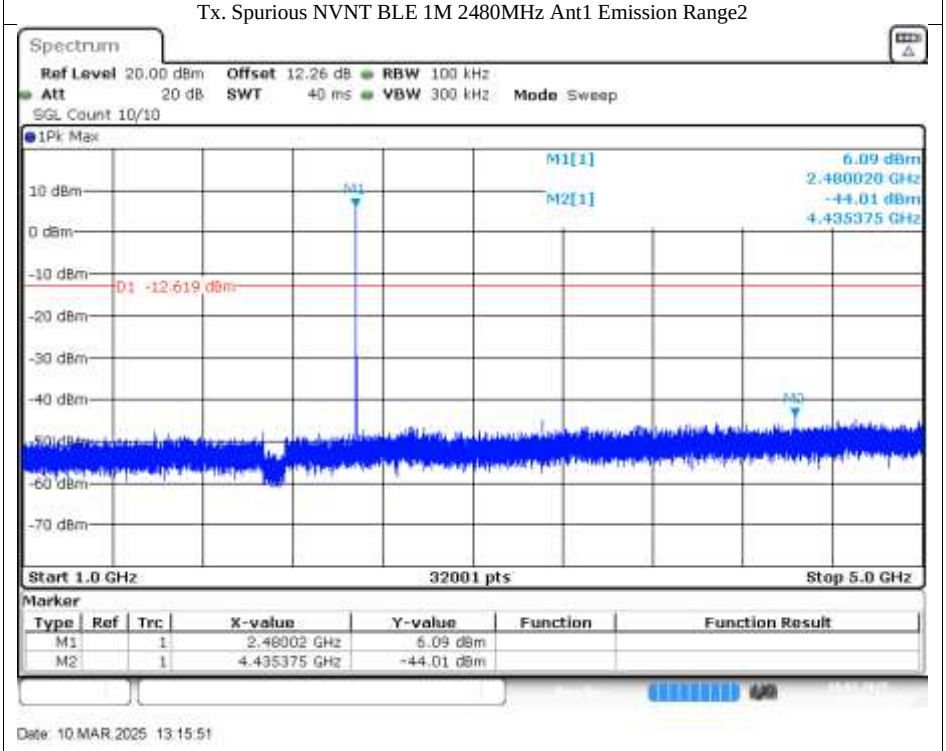
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



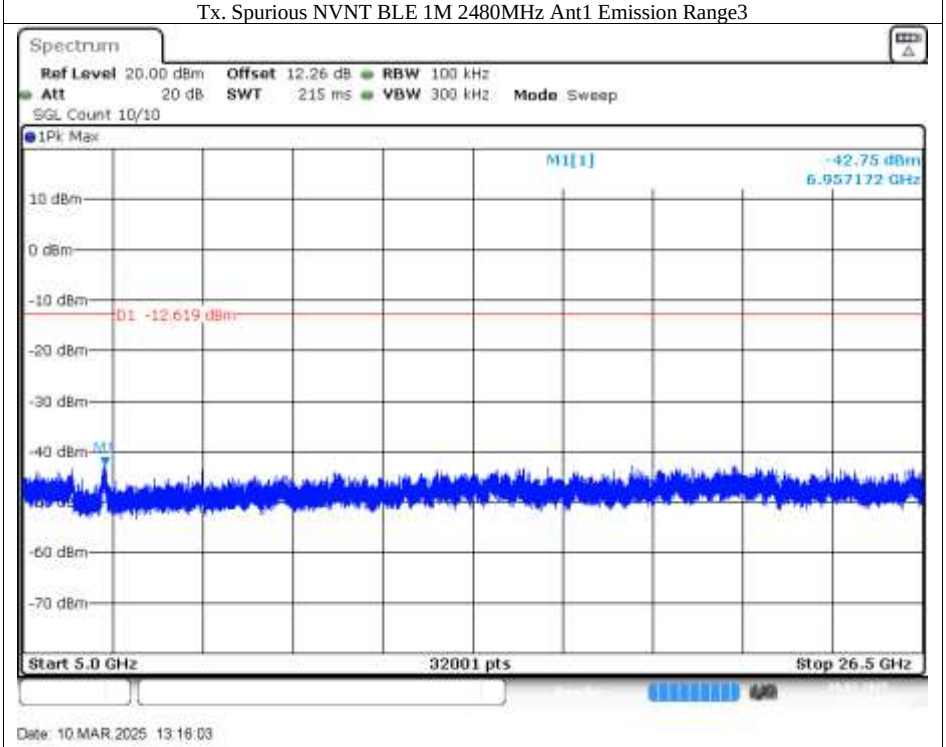
Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission Range1



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission Range2



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission Range3



9.6 Band edge

Test Method

1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold.
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section.

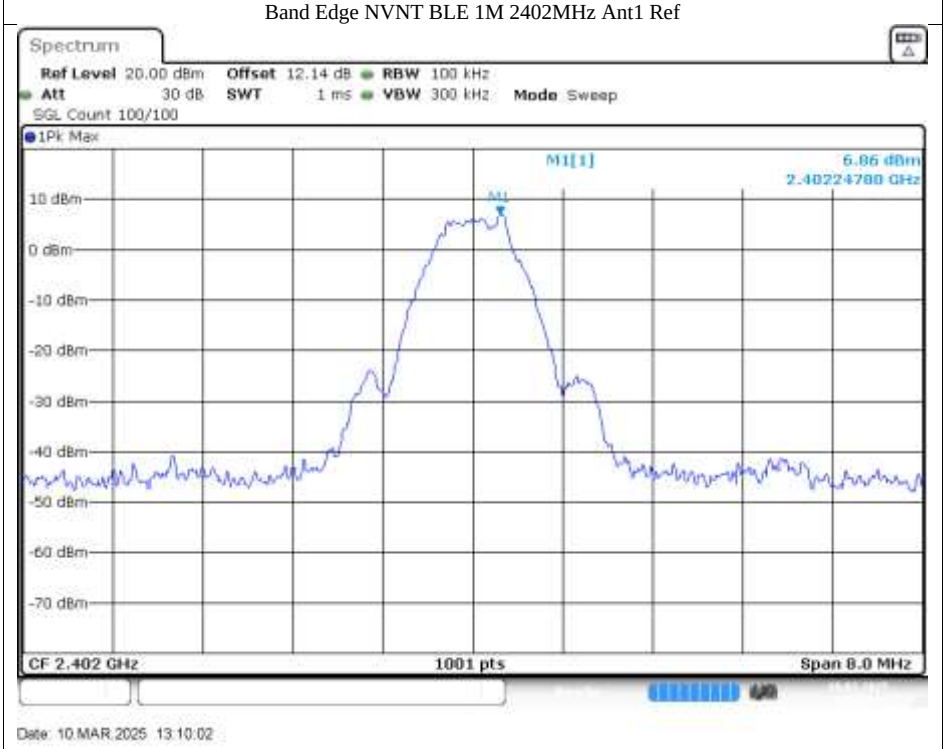
Limit

According to §15.247(d) and RSS-247 5.5, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) and RSS-Gen 8.10, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

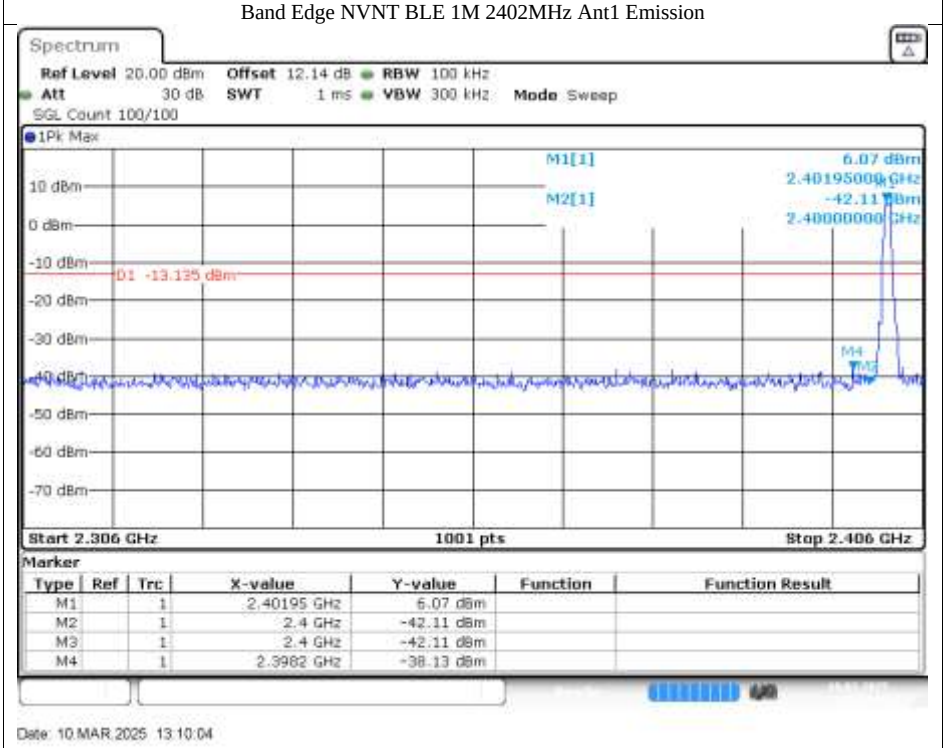
Test result

Test Graphs

Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



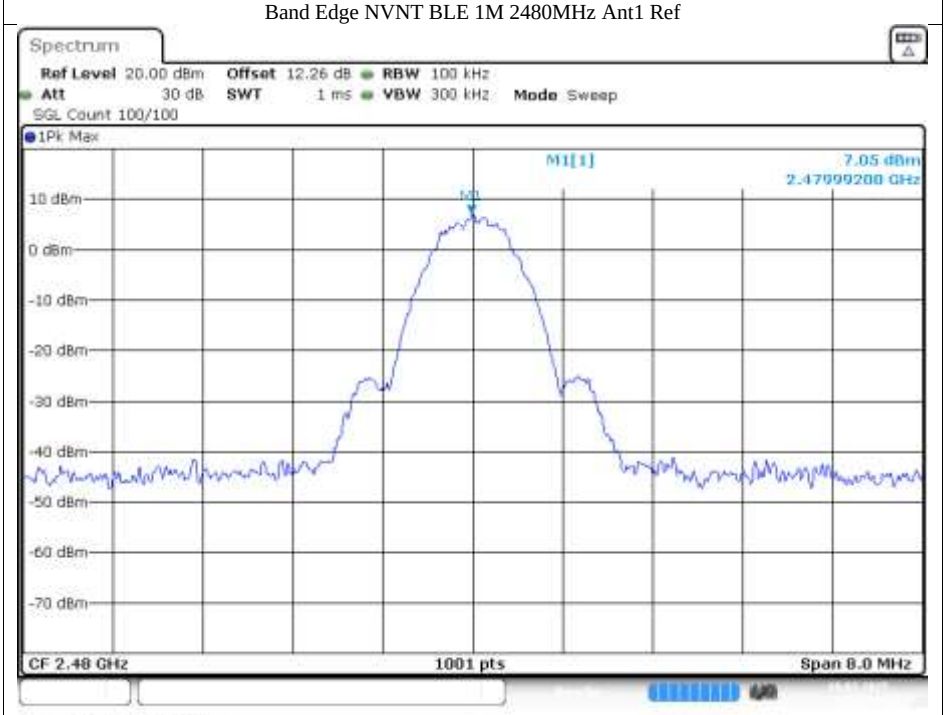
Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



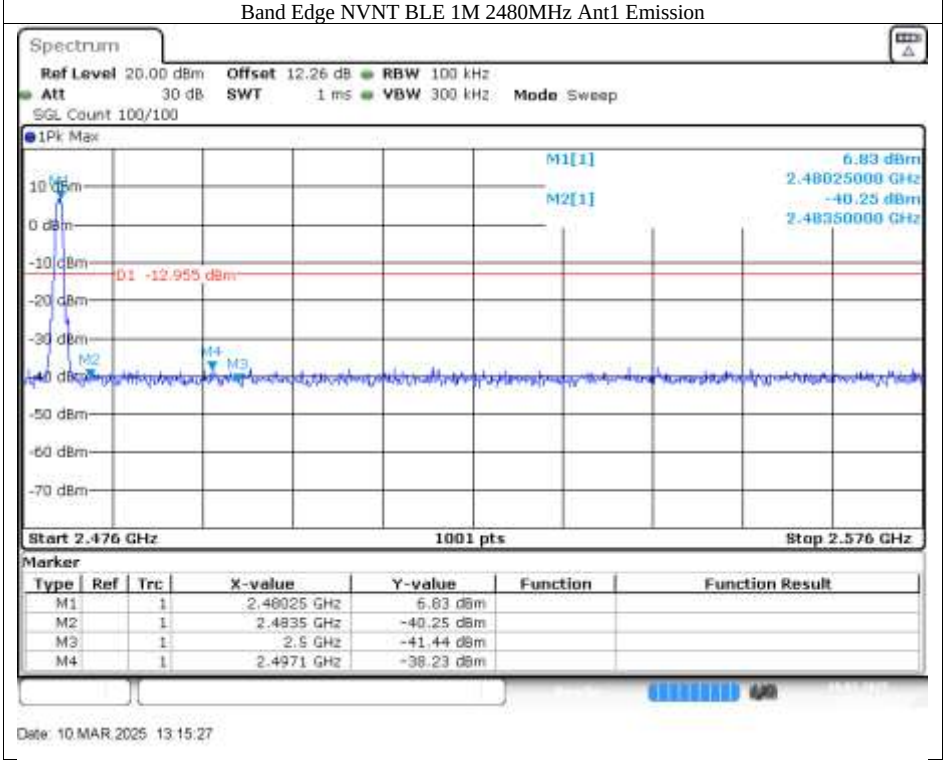
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40195 GHz	6.07 dBm		
M2		1	2.4 GHz	-42.11 dBm		
M3		1	2.4 GHz	-42.11 dBm		
M4		1	2.3982 GHz	-38.13 dBm		

Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



Band Edge NVNT BLE 1M 2480MHz Ant1 Emission



9.7 Spurious radiated emissions for transmitter

Test Method

1. The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. Use the following spectrum analyzer settings According to C63.10:

For Below 1GHz

Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz to 120 kHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz

a) RBW = 1MHz.
b) VBW ≥ [3 × RBW].
c) Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
e) Sweep time = auto.
f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.
2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under § 15.247(b)(3) and RSS 247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in § 15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§ 15.205(a) and RSS-Gen scetion8.9, must also comply with the radiated emission limits specified in § 15.209(a) and RSS-Gen section 8.10.

Below 30MHz
§15.247(d) & §15.209 & §15.205

Frequency MHz	Field Strength uV/m	Detector	Measured Distance Meters
0.009~0.090	2400/F (kHz)	AV	300
0.090~0.110	2400/F (kHz)	QP	300
0.110~0.490	2400/F (kHz)	AV	300
0.490~1.705	24000/F (kHz)	QP	30
1.705~30	30	QP	30

RSS-247 5.5 & RSS-Gen 6.13

Frequency MHz	Field Strength uA/m	Detector	Measured Distance Meters
0.009~0.090	6.37/F (kHz)	AV	300
0.090~0.110	6.37/F (kHz)	QP	300
0.110~0.490	6.37/F (kHz)	AV	300
0.490~1.705	63.7/F (kHz)	QP	30
1.705~30	0.08	QP	30

Note 1: Limit 3m(dBμV/m)=Limit 300m(dBμV/m)+40Log(300m/3m) (Below 30MHz)
Note 2: Limit 3m(dBμV/m)=Limit 30m(dBμV/m)+40Log(30m/3m) (Below 30MHz)

Above 30MHz

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector	Measured Distance Meters
30-88	100	40	QP	3
88-216	150	43.5	QP	3
216-960	200	46	QP	3
960-1000	500	54	QP	3
Above 1000	500	54	AV	3
Above 1000	5000	74	PK	3

Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.The only worse case test result is listed in the report.
For test data in 1-18GHz, the highest emission (over limit) is the Intentional signal which need to be ignored

Test result
worst case listed as below:9kHz-30MHz
for FCC

9k-30MHz Radiated Emission Test

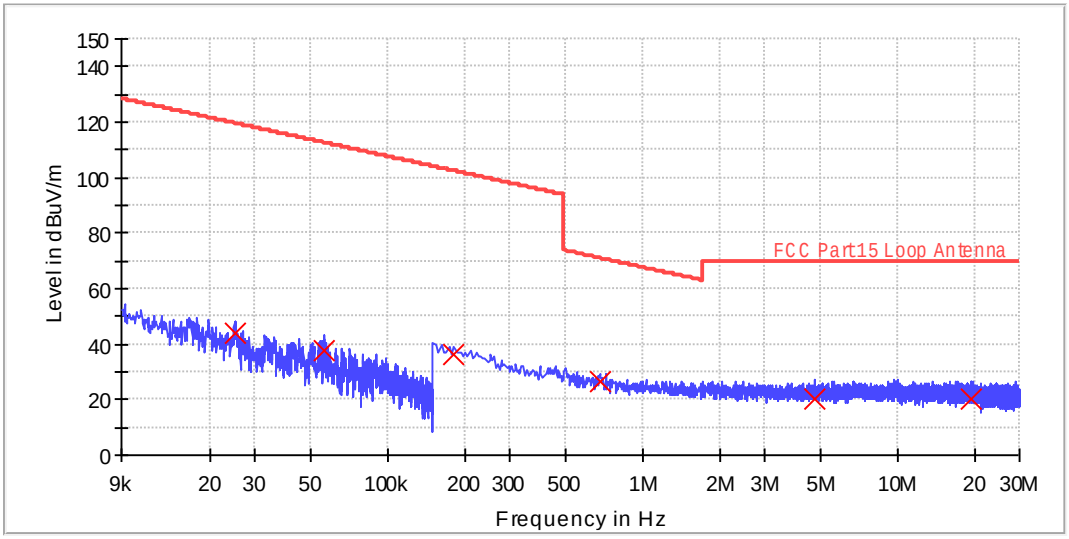
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	X-axis
Comment:	Temp.:21.2℃,Humi.:48.3%,Atm.:1016.1hPa

Scan Setup: FCC_RE_9K-30M_Max_3m [EMI radiated]

Hardware Setup:	Radiated E Field 9K-30MHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	20 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.001 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
0.025160	44.1	1000.0	0.200	100.0	188.0	19.6	75.5	119.6
0.055960	38.0	1000.0	0.200	100.0	0.0	19.5	74.6	112.6
0.182000	36.0	1000.0	9.000	100.0	87.0	19.3	66.4	102.4
0.678000	26.6	1000.0	9.000	100.0	273.0	19.3	44.4	71.0
4.722000	20.6	1000.0	9.000	100.0	148.0	19.2	48.9	69.5
19.526000	20.1	1000.0	9.000	100.0	109.0	18.7	49.4	69.5

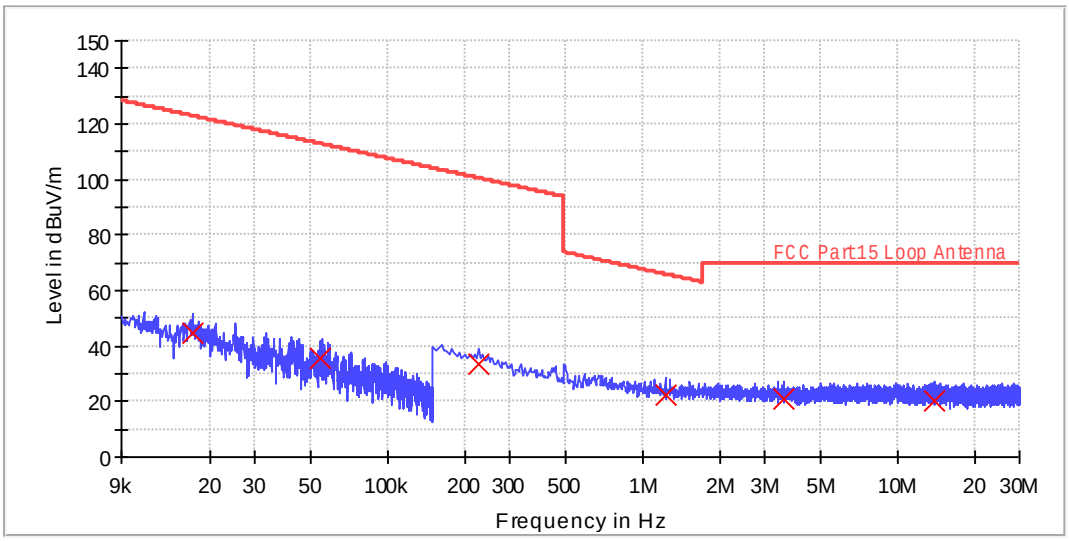
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Y-axis
Comment:	Temp.:21.2℃,Humi.:48.3%,Atm.:1016.1hPa

Scan Setup: FCC_RE_9K-30M_Max_3m [EMI radiated]

Hardware Setup:	Radiated E Field 9K-30MHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	20 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.001 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
0.017160	44.4	1000.0	0.200	100.0	109.0	19.7	78.5	122.9
0.054520	35.4	1000.0	0.200	100.0	210.0	19.5	77.5	112.9
0.226000	33.8	1000.0	9.000	100.0	34.0	19.3	66.7	100.5
1.222000	22.2	1000.0	9.000	100.0	145.0	19.3	43.7	65.9
3.558000	20.7	1000.0	9.000	100.0	150.0	19.2	48.8	69.5
13.850000	20.5	1000.0	9.000	100.0	109.0	18.7	49.0	69.5

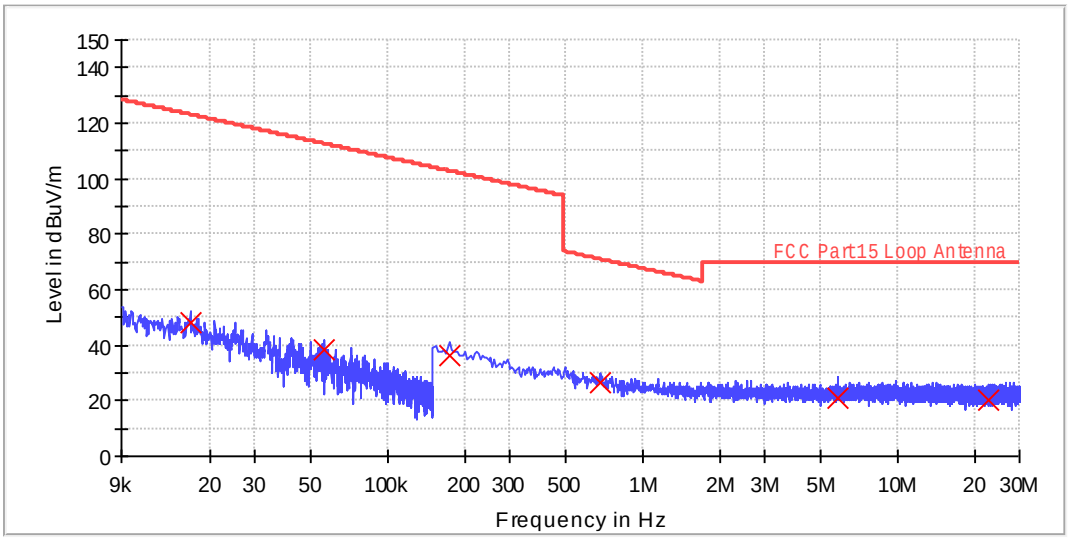
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Z-axis
Comment:	Temp.:21.2℃,Humi.:48.3%,Atm.:1016.1hPa

Scan Setup: FCC_RE_9K-30M_Max_3m [EMI radiated]

Hardware Setup:	Radiated E Field 9K-30MHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	20 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.001 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
0.016760	48.2	1000.0	0.200	100.0	207.0	19.8	75.0	123.1
0.056200	38.4	1000.0	9.000	100.0	147.0	19.5	74.2	112.6
0.174000	36.4	1000.0	9.000	100.0	73.0	19.3	66.4	102.8
0.678000	26.7	1000.0	9.000	100.0	159.0	19.3	44.3	71.0
5.858000	20.8	1000.0	9.000	100.0	211.0	19.1	48.8	69.5
22.718000	20.3	1000.0	9.000	100.0	138.0	18.9	49.2	69.5

For IC

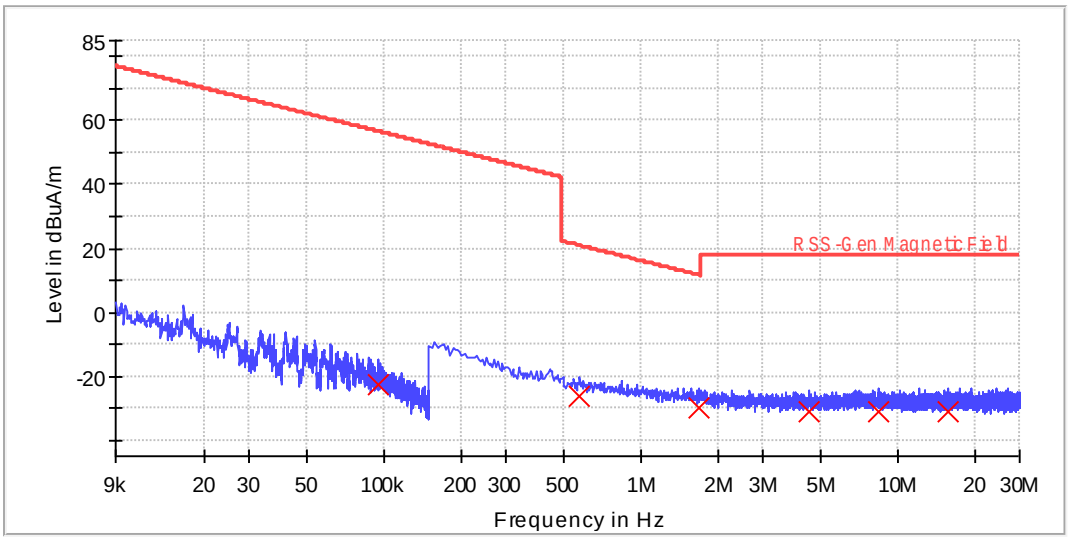
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Sample No.:	WUX-0890446-002
Test Standard:	RSS-GEN 8.9
Comment:	X-axis
Comment:	Temp.:21.2℃,Humi.:48.3%,Atm.:1016.1hPa

Scan Setup: IC_RE_9K-30M_Max_3m [EMI radiated]

Hardware Setup:	Radiated H Field 9K-30MHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuA/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	20 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.005 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuA/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuA/m)
0.095640	-22.7	1000.0	0.200	100.0	118.0	-32.1	79.2	56.5
0.578000	-26.4	1000.0	9.000	100.0	283.0	-32.2	47.3	20.9
1.690000	-30.1	1000.0	9.000	100.0	143.0	-32.4	41.6	11.6
4.534000	-30.8	1000.0	9.000	100.0	107.0	-32.7	48.8	18.0
8.442000	-31.1	1000.0	9.000	100.0	258.0	-32.7	49.1	18.0
15.870000	-31.0	1000.0	9.000	100.0	162.0	-32.8	49.0	18.0

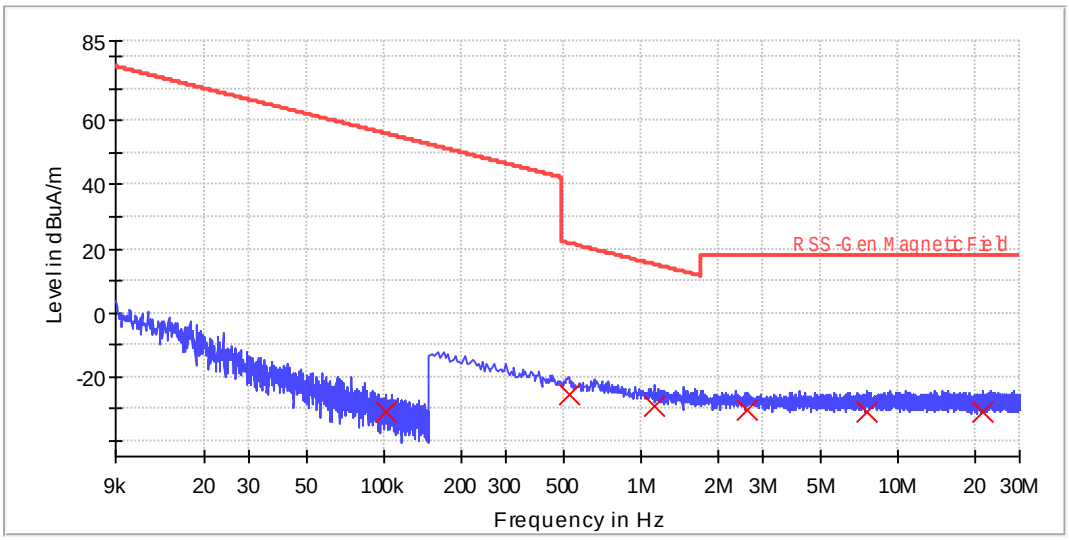
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Sample No.:	WUX-0890446-002
Test Standard:	RSS-GEN 8.9
Comment:	Y-axis
Comment:	Temp.:21.2℃,Humi.:48.3%,Atm.:1016.1hPa

Scan Setup: IC_RE_9K-30M_Max_3m [EMI radiated]

Hardware Setup:	Radiated H Field 9K-30MHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuA/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	20 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.005 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuA/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuA/m)
0.101800	-31.0	1000.0	0.200	100.0	78.0	-32.1	86.9	55.9
0.526000	-25.9	1000.0	9.000	100.0	244.0	-32.2	47.6	21.7
1.130000	-29.1	1000.0	9.000	100.0	118.0	-32.2	44.2	15.1
2.598000	-30.6	1000.0	9.000	100.0	167.0	-32.5	48.6	18.0
7.614000	-30.9	1000.0	9.000	100.0	21.0	-32.7	48.9	18.0
21.658000	-31.3	1000.0	9.000	100.0	193.0	-32.7	49.3	18.0

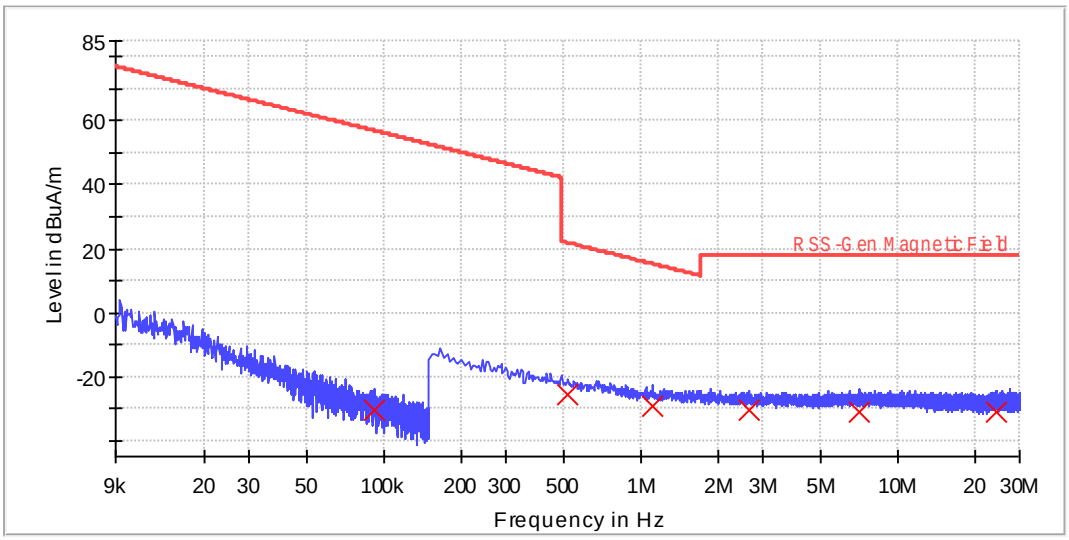
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Sample No.:	WUX-0890446-002
Test Standard:	RSS-GEN 8.9
Comment:	Z-axis
Comment:	Temp.:21.2℃,Humi.:48.3%,Atm.:1016.1hPa

Scan Setup: IC_RE_9K-30M_Max_3m [EMI radiated]

Hardware Setup:	Radiated H Field 9K-30MHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuA/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
9 kHz - 150 kHz	80 Hz	PK+	200 Hz	0.01 s	20 dB
150 kHz - 30 MHz	4 kHz	PK+	9 kHz	0.005 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuA/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuA/m)
0.091480	-30.4	1000.0	0.200	100.0	130.0	-32.1	87.3	56.9
0.522000	-25.7	1000.0	9.000	100.0	216.0	-32.2	47.5	21.8
1.118000	-29.1	1000.0	9.000	100.0	276.0	-32.2	44.2	15.2
2.650000	-30.6	1000.0	9.000	100.0	28.0	-32.5	48.6	18.0
7.106000	-30.9	1000.0	9.000	100.0	192.0	-32.7	48.9	18.0
24.226000	-31.1	1000.0	9.000	100.0	245.0	-32.5	49.1	18.0

30-1000MHz Radiated Emission Test

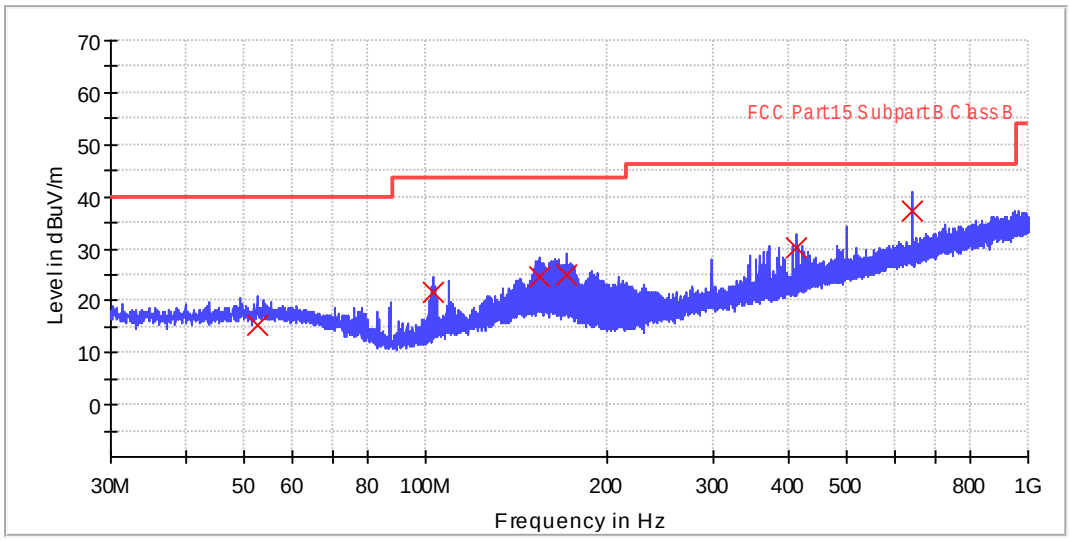
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Horizontal
Comment:	Temp.:21.2℃,Humi.:48.3%,Atm.:1016.1hPa

Sweep Setup: RE_30M-1G_Sweep_3m [EMI radiated]

Hardware Setup:	Radiated E Field 30MHz-1GHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	120 kHz	1.5 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
52.440000	15.3	1000.0	120.000	200.0	126.0	20.9	24.7	40.0
103.040000	21.8	1000.0	120.000	200.0	270.0	16.9	21.7	43.5
154.000000	24.7	1000.0	120.000	200.0	161.0	21.5	18.9	43.5
171.360000	25.0	1000.0	120.000	200.0	159.0	21.0	18.5	43.5
413.440000	30.0	1000.0	120.000	200.0	135.0	25.6	16.0	46.0
640.040000	37.3	1000.0	120.000	200.0	174.0	31.0	8.8	46.0

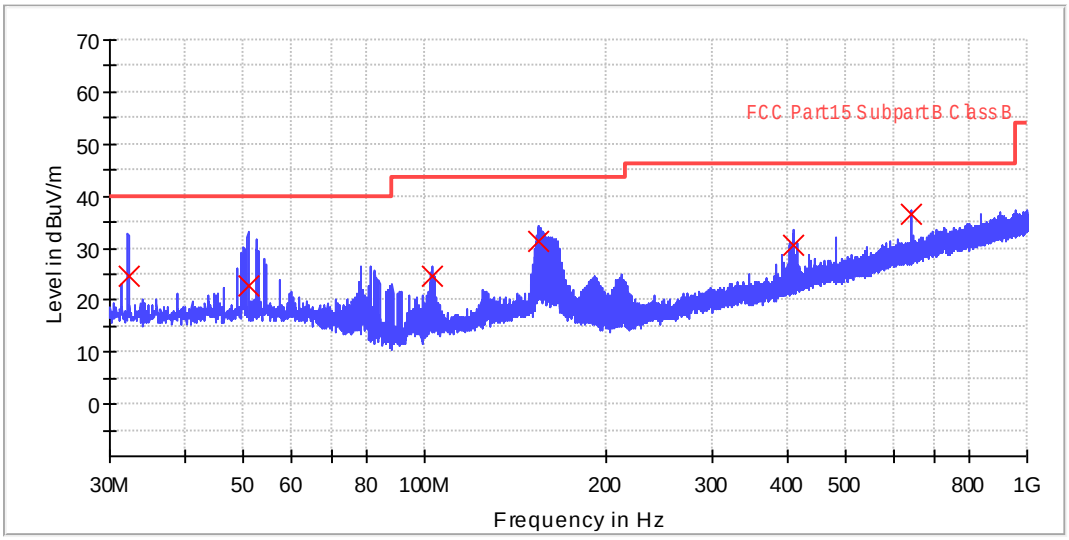
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Vertical
Comment:	Temp.:21.2℃,Humi.:48.3%,Atm.:1016.1hPa

Sweep Setup: RE_30M-1G_Sweep_3m [EMI radiated]

Hardware Setup:	Radiated E Field 30MHz-1GHz_3m
Receiver:	[ESR 3]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	120 kHz	1.5 s	20 dB



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
32.200000	24.7	1000.0	120.000	100.0	157.0	19.6	15.4	40.0
50.920000	22.7	1000.0	120.000	100.0	60.0	20.9	17.3	40.0
103.000000	24.5	1000.0	120.000	100.0	243.0	16.9	19.0	43.5
154.480000	31.4	1000.0	120.000	100.0	204.0	21.6	12.1	43.5
410.640000	30.6	1000.0	120.000	100.0	96.0	25.5	15.4	46.0
640.040000	36.4	1000.0	120.000	100.0	188.0	31.0	9.6	46.0

1-18G Radiated Emission Test

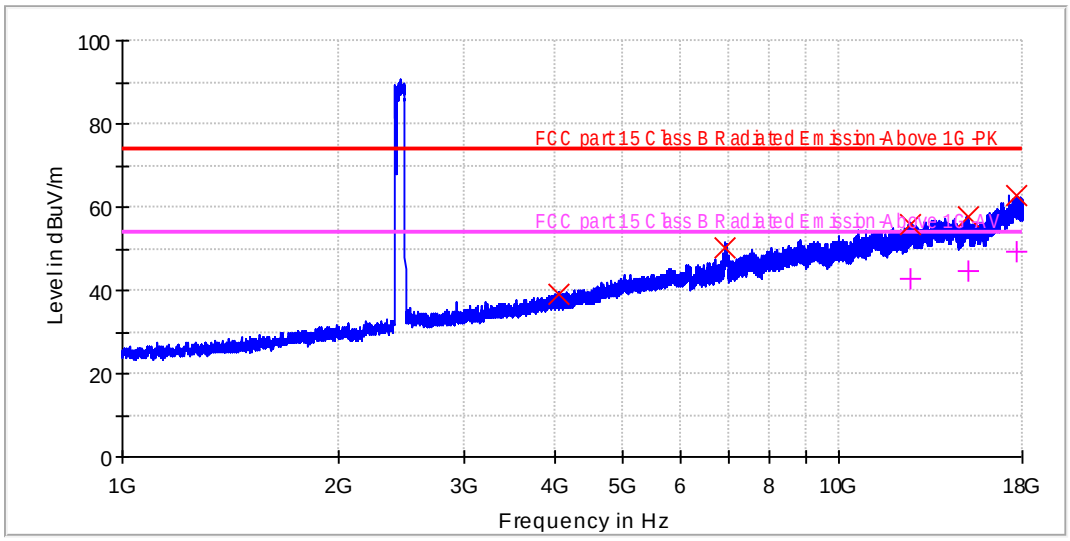
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Horizontal
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_RE_1-18G Sweep 3m_bonn [EMI radiated]

Hardware Setup:	FCC part15C Radiated E Field 1GHz-18GHz_3m_BONN
Receiver:	[FSV 40]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
1 GHz - 6.3 GHz	441.667 kHz	PK+	1 MHz	1 s	0 dB
6.3 GHz - 18 GHz	487.5 kHz	PK+	1 MHz	1 s	0 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	AVG (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)	Limit - AVG (dBuV/m)
4061.500000	38.9	---	1000.0	150.0	H	226.0	-3.3	35.1	74.0	---	---
6946.500000	50.1	---	1000.0	150.0	H	205.0	7.2	23.9	74.0	---	---
12546.500000	56.0	42.8	1000.0	150.0	H	161.0	15.4	18.0	74.0	11.2	54.0
15083.500000	57.5	44.5	1000.0	150.0	H	149.0	16.3	16.5	74.0	9.5	54.0
17622.000000	62.9	49.5	1000.0	150.0	H	122.0	22.0	11.2	74.0	4.6	54.0

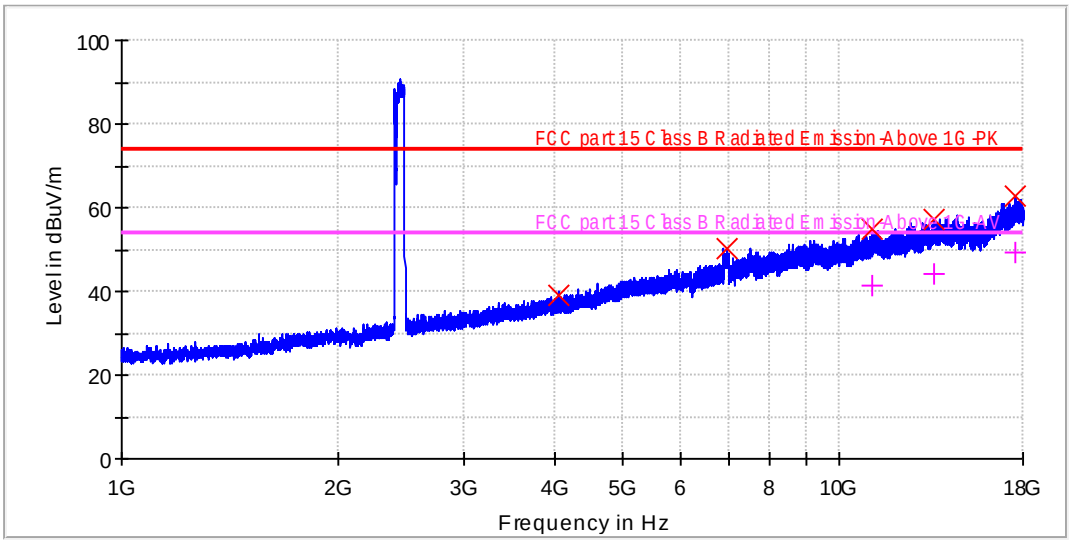
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Vertical
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_RE_1-18G Sweep 3m_bonn [EMI radiated]

Hardware Setup:	FCC part15C Radiated E Field 1GHz-18GHz_3m_BONN
Receiver:	[FSV 40]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
1 GHz - 6.3 GHz	441.667 kHz	PK+	1 MHz	1 s	0 dB
6.3 GHz - 18 GHz	487.5 kHz	PK+	1 MHz	1 s	0 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	AVG (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)	Limit - AVG (dBuV/m)
4064.000000	38.8	---	1000.0	150.0	V	214.0	-3.4	35.2	74.0	---	---
6959.000000	50.2	---	1000.0	150.0	V	190.0	7.2	23.8	74.0	---	---
11117.000000	54.9	41.2	1000.0	150.0	V	273.0	13.8	19.1	74.0	12.8	54.0
13531.500000	57.3	44.4	1000.0	150.0	V	158.0	17.2	16.7	74.0	9.7	54.0
17571.000000	62.6	49.4	1000.0	150.0	V	141.0	21.9	11.4	74.0	4.6	54.0

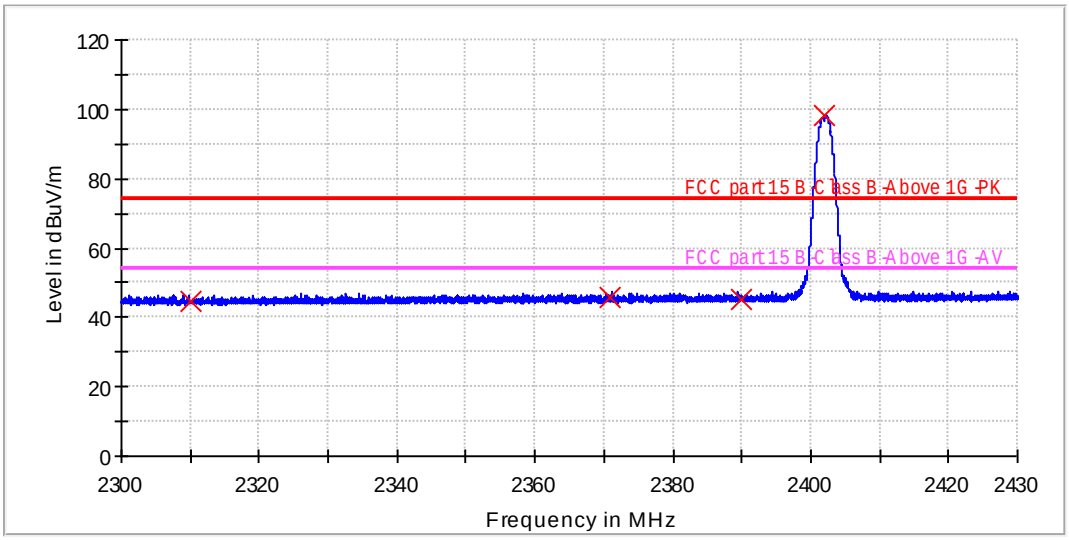
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Horizontal
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_Band edge-2300-2430 Sweep 3m_without PA [EMI radiated]

Hardware Setup:	1-18G_3m_without PA
Receiver:	[ESR 7]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
2.3 GHz - 2.43 GHz	26 kHz	PK+	1 MHz	1 s	20 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
2310.000000	44.8	1000.0	150.0	H	154.0	34.1	29.2	74.0
2371.000000	45.9	1000.0	150.0	H	115.0	34.3	28.1	74.0
2390.000000	45.5	1000.0	150.0	H	78.0	34.4	28.5	74.0
2402.000000	98.5	1000.0	150.0	H	286.0	34.5		

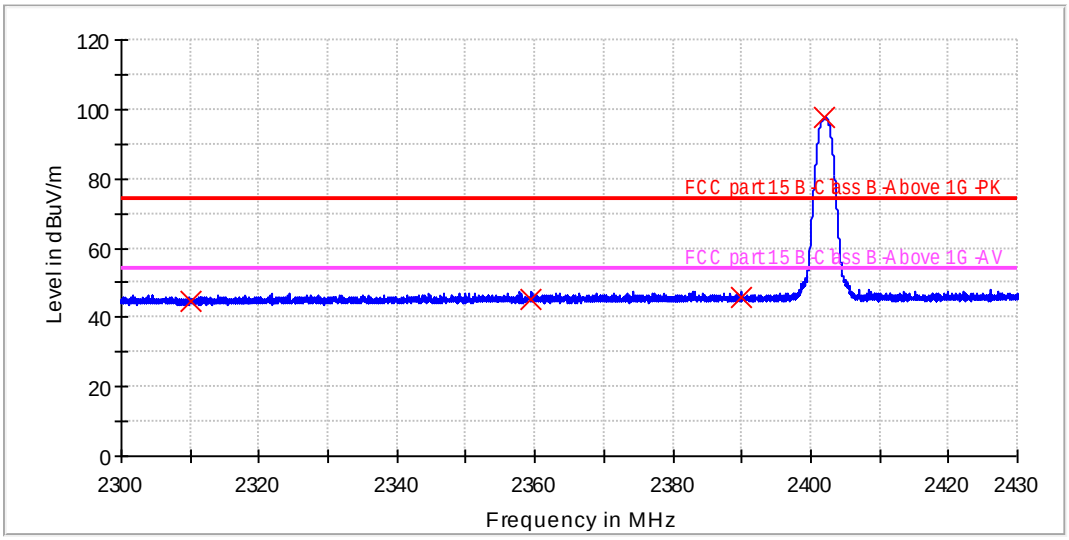
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2402MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Vertical
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_Band edge-2300-2430 Sweep 3m_without PA [EMI radiated]

Hardware Setup:	1-18G_3m_without PA
Receiver:	[ESR 7]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
2.3 GHz - 2.43 GHz	26 kHz	PK+	1 MHz	1 s	20 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
2310.000000	44.8	1000.0	150.0	V	138.0	34.1	29.3	74.0
2359.500000	45.5	1000.0	150.0	V	246.0	34.3	28.6	74.0
2390.000000	45.7	1000.0	150.0	V	41.0	34.4	28.3	74.0
2402.000000	97.9	1000.0	150.0	V	133.0	34.5		

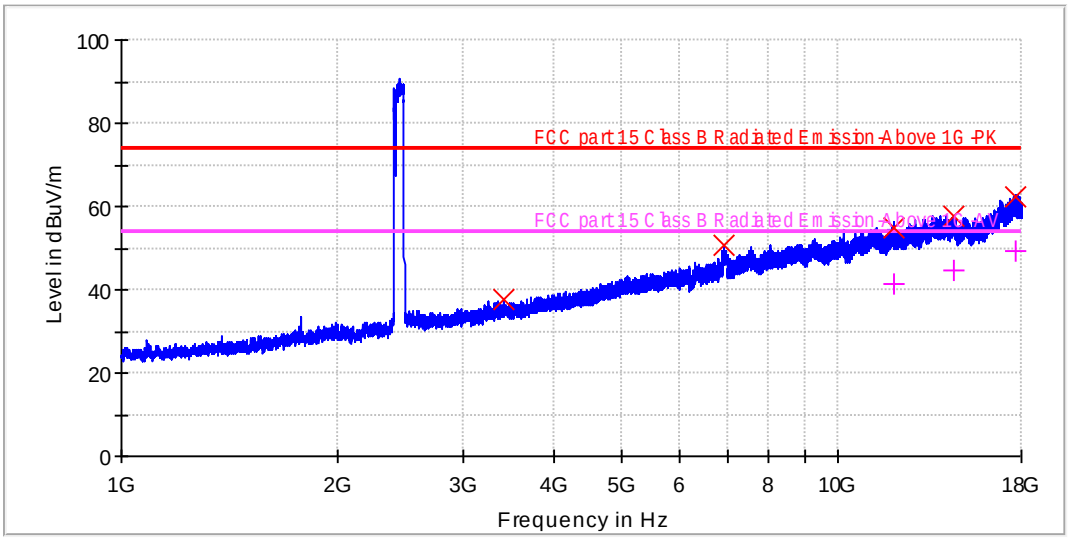
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2440MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Horizontal
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_RE_1-18G Sweep 3m_bonn [EMI radiated]

Hardware Setup:	FCC part15C Radiated E Field 1GHz-18GHz_3m_BONN
Receiver:	[FSV 40]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
1 GHz - 6.3 GHz	441.667 kHz	PK+	1 MHz	1 s	0 dB
6.3 GHz - 18 GHz	487.5 kHz	PK+	1 MHz	1 s	0 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	AVG (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)	Limit - AVG (dBuV/m)
3406.000000	37.5	---	1000.0	150.0	H	257.0	-5.2	36.5	74.0	---	---
6940.000000	50.7	---	1000.0	150.0	H	213.0	7.2	23.3	74.0	---	---
11935.500000	54.9	41.4	1000.0	150.0	H	77.0	14.3	19.1	74.0	12.7	54.0
14463.500000	57.8	44.5	1000.0	150.0	H	129.0	16.6	16.2	74.0	9.5	54.0
17658.000000	62.4	49.1	1000.0	150.0	H	120.0	22.0	11.7	74.0	4.9	54.0

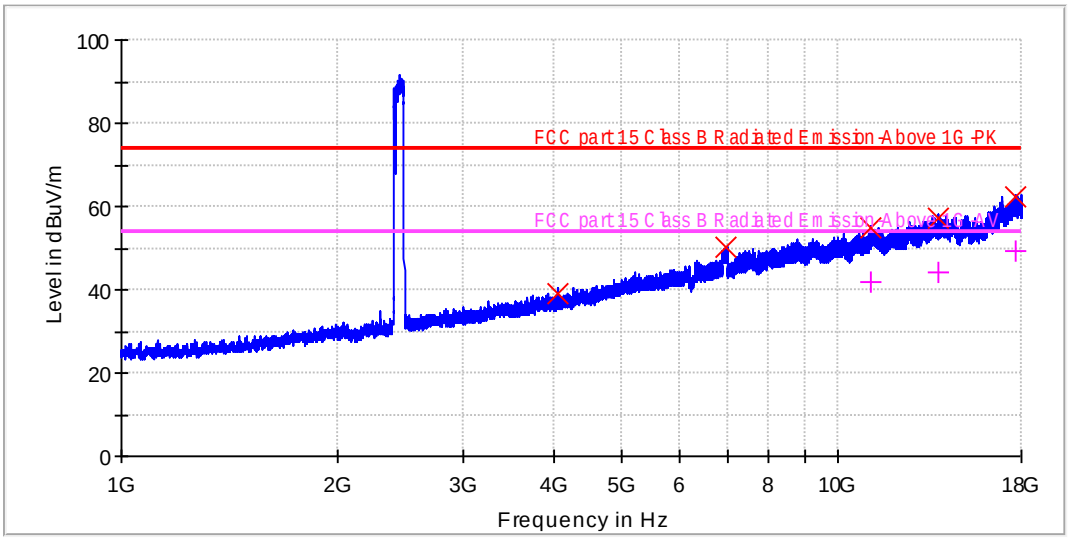
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2440MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Vertical
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_RE_1-18G Sweep 3m_bonn [EMI radiated]

Hardware Setup:	FCC part15C Radiated E Field 1GHz-18GHz_3m_BONN
Receiver:	[FSV 40]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
1 GHz - 6.3 GHz	441.667 kHz	PK+	1 MHz	1 s	0 dB
6.3 GHz - 18 GHz	487.5 kHz	PK+	1 MHz	1 s	0 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	AVG (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)	Limit - AVG (dBuV/m)
4065.500000	39.0	---	1000.0	150.0	V	263.0	-3.3	35.0	74.0	---	---
6981.500000	50.4	---	1000.0	150.0	V	164.0	7.3	23.6	74.0	---	---
11112.500000	54.8	41.7	1000.0	150.0	V	176.0	13.8	19.2	74.0	12.3	54.0
13820.000000	57.4	44.0	1000.0	150.0	V	75.0	17.0	16.6	74.0	10.0	54.0
17639.000000	62.2	49.3	1000.0	150.0	V	148.0	22.0	11.8	74.0	4.7	54.0

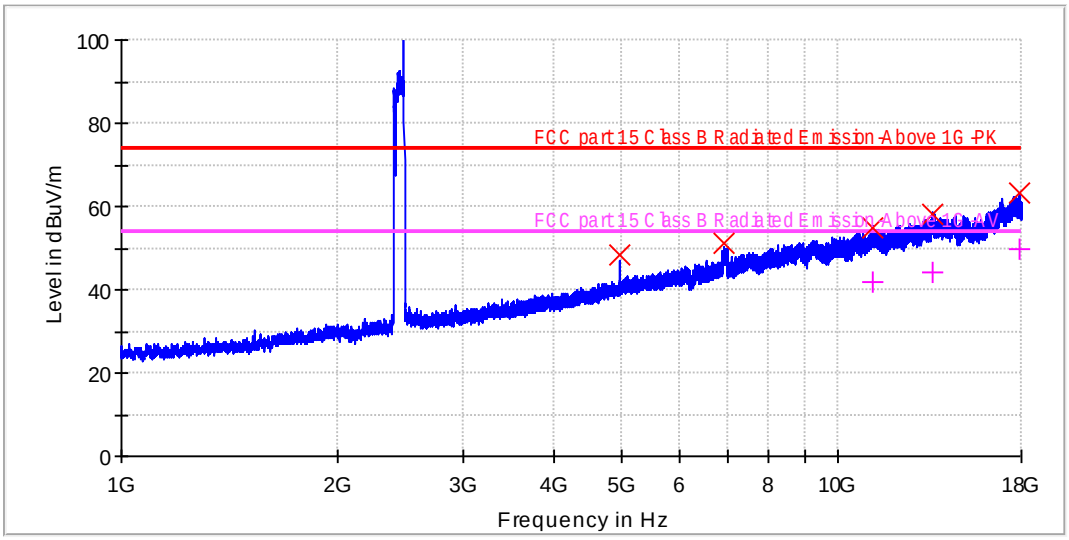
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2480MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Horizontal
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_RE_1-18G Sweep 3m_bonn [EMI radiated]

Hardware Setup:	FCC part15C Radiated E Field 1GHz-18GHz_3m_BONN
Receiver:	[FSV 40]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
1 GHz - 6.3 GHz	441.667 kHz	PK+	1 MHz	1 s	0 dB
6.3 GHz - 18 GHz	487.5 kHz	PK+	1 MHz	1 s	0 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	AVG (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)	Limit - AVG (dBuV/m)
4960.500000	48.4	---	1000.0	150.0	H	71.0	0.0	25.6	74.0	---	---
6907.000000	51.0	---	1000.0	150.0	H	159.0	7.3	23.0	74.0	---	---
11155.000000	55.0	41.8	1000.0	150.0	H	285.0	13.8	19.0	74.0	12.2	54.0
13554.000000	58.3	44.3	1000.0	150.0	H	198.0	17.1	15.7	74.0	9.7	54.0
17835.500000	63.3	49.8	1000.0	150.0	H	97.0	22.1	10.7	74.0	4.2	54.0

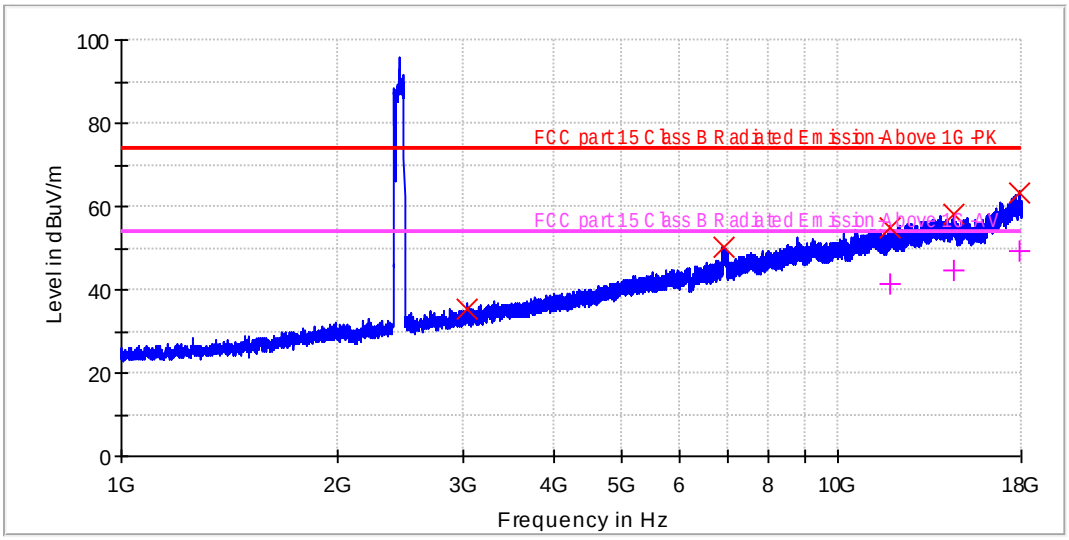
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2480MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Vertical
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_RE_1-18G Sweep 3m_bonn [EMI radiated]

Hardware Setup:	FCC part15C Radiated E Field 1GHz-18GHz_3m_BONN
Receiver:	[FSV 40]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
1 GHz - 6.3 GHz	441.667 kHz	PK+	1 MHz	1 s	0 dB
6.3 GHz - 18 GHz	487.5 kHz	PK+	1 MHz	1 s	0 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	AVG (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)	Limit - AVG (dBuV/m)
3026.500000	35.6	---	1000.0	150.0	V	182.0	-6.4	38.4	74.0	---	---
6918.000000	50.2	---	1000.0	150.0	V	179.0	7.3	23.8	74.0	---	---
11789.000000	54.9	41.4	1000.0	150.0	V	267.0	14.2	19.2	74.0	12.6	54.0
14485.000000	58.3	44.5	1000.0	150.0	V	229.0	16.6	15.7	74.0	9.5	54.0
17848.000000	63.4	49.5	1000.0	150.0	V	113.0	22.1	10.6	74.0	4.5	54.0

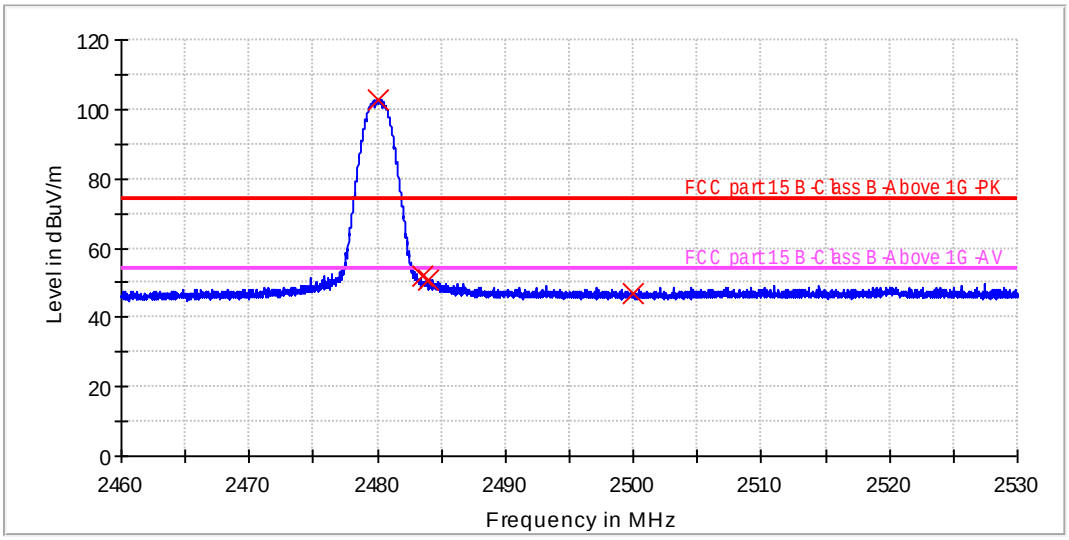
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2480MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Horizontal
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_Band edge-2440-2530 Sweep 3m_without PA [EMI radiated]

Hardware Setup:	1-18G_3m_without PA
Receiver:	[ESR 7]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
2.46 GHz - 2.53 GHz	14 kHz	PK+	1 MHz	1 s	20 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
2480.000000	102.8	1000.0	150.0	H	152.0	34.8		
2483.500000	51.7	1000.0	150.0	H	273.0	34.8	22.3	74.0
2484.000000	50.9	1000.0	150.0	H	16.0	34.8	23.1	74.0
2500.000000	46.7	1000.0	150.0	H	177.0	34.8	27.3	74.0

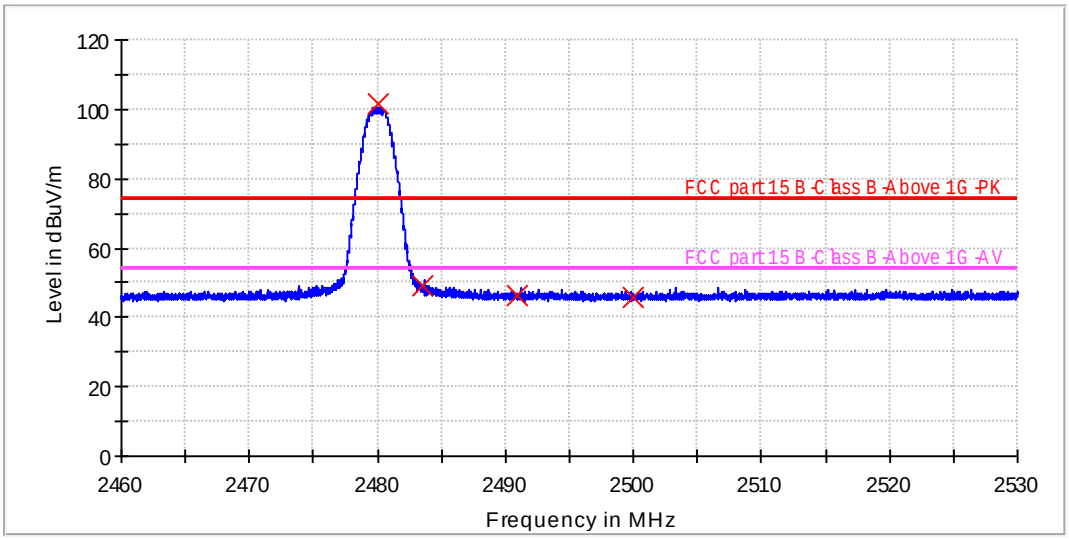
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2440MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Vertical
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_Band edge-2440-2530 Sweep 3m_without PA [EMI radiated]

Hardware Setup:	1-18G_3m_without PA
Receiver:	[ESR 7]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
2.46 GHz - 2.53 GHz	14 kHz	PK+	1 MHz	1 s	20 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)
2480.000000	101.5	1000.0	150.0	V	234.0	34.8		
2483.500000	49.2	1000.0	150.0	V	117.0	34.8	24.8	74.0
2491.000000	46.6	1000.0	150.0	V	81.0	34.8	27.4	74.0
2500.000000	45.9	1000.0	150.0	V	200.0	34.8	28.1	74.0

worst case listed as below:18GHz-25GHz

18-25G Radiated Emission Test

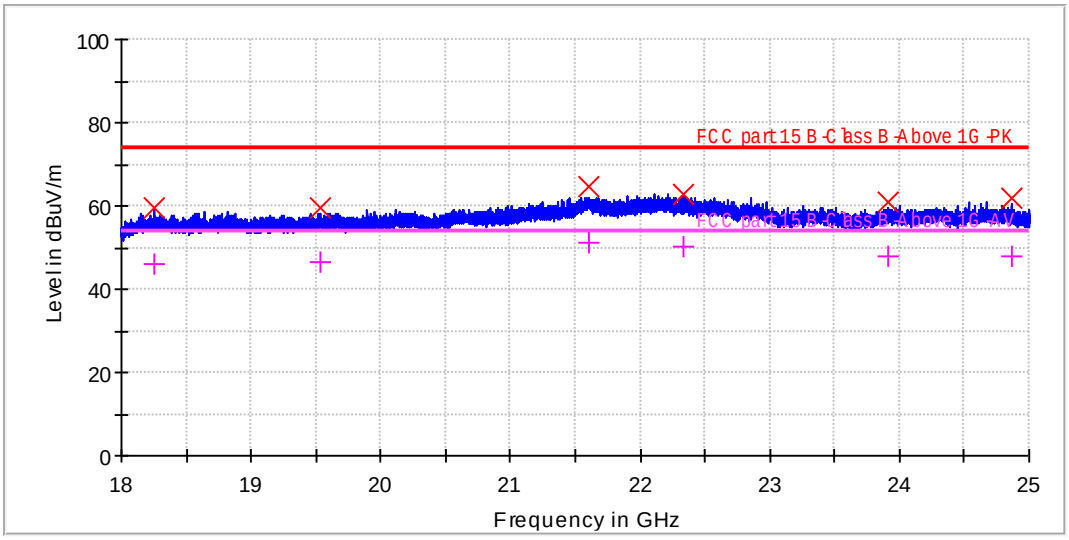
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2440MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Horizontal
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_RE_18-25G_Sweep_3m [EMI radiated]

Hardware Setup:	18-40GHz_3m
Receiver:	[FSV 40]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
18 GHz - 25 GHz	500 kHz	PK+	1 MHz	1 s	0 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	AVG (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)	Limit - AVG (dBuV/m)
18247.500000	59.7	46.2	1000.0	150.0	H	280.0	13.6	14.3	74.0	7.8	54.0
19536.000000	59.6	46.3	1000.0	150.0	H	263.0	14.5	14.5	74.0	7.7	54.0
21605.000000	64.5	51.0	1000.0	150.0	H	82.0	17.7	9.5	74.0	3.0	54.0
22338.500000	63.0	50.2	1000.0	150.0	H	113.0	18.0	11.0	74.0	3.8	54.0
23907.000000	60.9	47.8	1000.0	150.0	H	122.0	15.9	13.1	74.0	6.2	54.0
24869.500000	61.8	48.1	1000.0	150.0	H	190.0	16.1	12.2	74.0	5.9	54.0

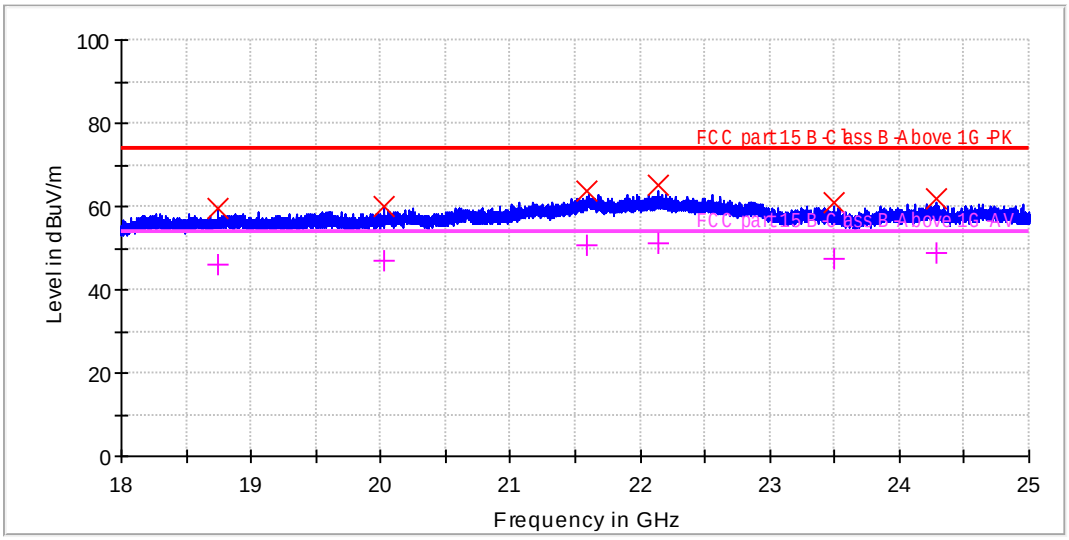
Common Information

EUT:	Robotic Pool Skimmer
Model:	PNUJ4110
Client:	Quilo
Operating Conditions:	Power on, TX_2440MHz
Operator Name:	Xu Zheng
Input:	Powered by Battery, DC 14.4V
Test Standard:	FCC Part 15.209(a)
Comment:	Vertical
Comment:	Temp.:20.7℃,Humi.:49.1%,Atm.:1014.9hPa

Sweep Setup: FCC_RE_18-25G_Sweep_3m [EMI radiated]

Hardware Setup:	18-40GHz_3m
Receiver:	[FSV 40]
Level Unit:	dBuV/m

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
18 GHz - 25 GHz	500 kHz	PK+	1 MHz	1 s	0 dB



Limit and Margin

Frequency (MHz)	MaxPeak (dBuV/m)	AVG (dBuV/m)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Margin - AVG (dB)	Limit - AVG (dBuV/m)
18747.500000	59.4	46.2	1000.0	150.0	V	213.0	14.2	14.6	74.0	7.8	54.0
20021.500000	60.0	46.8	1000.0	150.0	V	291.0	15.0	14.0	74.0	7.3	54.0
21584.000000	63.5	50.8	1000.0	150.0	V	69.0	17.6	10.5	74.0	3.3	54.0
22144.000000	65.0	51.2	1000.0	150.0	V	84.0	18.1	9.0	74.0	2.8	54.0
23492.000000	61.0	47.6	1000.0	150.0	V	263.0	15.8	13.0	74.0	6.4	54.0
24282.000000	61.8	48.6	1000.0	150.0	V	177.0	16.1	12.3	74.0	5.4	54.0

10 Test Equipment List

List of Test Instruments
Test Site1

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	487/641405	2024-04-08	2025-04-07
	Power Probe	Rohde & Schwarz	NRP-Z81	487/431819	2024-11-23	2025-11-22
	RF Test System	Rohde & Schwarz	TS8997	487/391835	2024-11-23	2025-11-22
RE	EMI Test Receiver	Rohde & Schwarz	ESR7	487/632315	2024-04-08	2025-04-07
	EMI Test Receiver	Rohde & Schwarz	ESR7	487/632316	2024-04-08	2025-04-07
	Spectrum analyzer	Rohde & Schwarz	FSV3044	487/642307	2024-04-08	2025-04-07
	Broadband Test Antenna	Schwarzbeck	VULB 9168	487/622345	2024-03-15	2025-03-14
	Horn Antenna	Rohde & Schwarz	3115PB	487/622346	2025-01-08	2026-01-08
	Pre-amplifier	Rohde & Schwarz	SCU-18D	487/402318	2024-04-08	2025-04-07
	Pre-amplifier	Rohde & Schwarz	BLMA0118-1M	487/401411	2024-04-08	2025-04-07
	Loop antenna	Rohde & Schwarz	HFH2-Z2	487/621128	2024-11-23	2025-11-22
	DOUBLE-RIDGED WAVEGUIDE HORN WITH PRE-AMPLIFIER (18 GHZ - 40 GHZ)	ETS-Lindgren	3116C-PA	487/622347	2024-08-19	2025-08-18
	3m Semi-anechoic chamber	TDK	9.2mx6.2mx6.2m	487/772307	2023-02-24	2026-02-23
	3m Fully anechoic chamber	TDK	9.2mx6.2mx6.2m	487/772304	2023-03-30	2026-03-29
CE	EMI Test Receiver	Rohde & Schwarz	ESW8	487/631911	2024-04-08	2025-04-07
	LISN	Rohde & Schwarz	NSLK8127	487/601428	2024-09-02	2025-09-01

Measurement Software Information			
Test Item	Software	Manufacturer	Version
C	MTS 8310	MAXWELL	2.0.0.0
RE	EMC 32	Rohde & Schwarz	V10.50.40
CE	EMC 32	Rohde & Schwarz	V9.15.03

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth and 99% Occupied Bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Band edge

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, 3.07dB
Radiated Disturbance	9kHz to 30MHz, 2.83dB 30MHz to 1GHz, 4.12dB (Horizontal) 4.30dB (Vertical) 1GHz to 18GHz, 5.04dB 18GHz to 40GHz, 5.42dB
RF Conducted Measurement	Power related： 1.32dB Frequency related：5.6x10-6 or 1%

Measurement Uncertainty Decision Rule:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2023, clause 4.3.3.

12 Photographs of Test Set-ups

Refer to the < Test Setup photos >.

13 Photographs of EUT

Refer to the < External Photos > & < Internal Photos >.

----------End of Test Report----------

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