



MEASUREMENT REPORT

FCC PART 15.247 Thread

Report No.: S20251023113102E03

Issue Date: 2025-12-12

Applicant: Lumi United Technology Co., Ltd
B1, Chongwen Park, Nanshan iPark, Liuxian Avenue,
Taoyuan Residential District, Nanshan District
Address: Shenzhen Guangdong 518000 China (Peoples
Republic Of)
FCC ID: 2AKIT-VBS03
Product: Multi-State Sensor P100
Model No.: VB-S03E, VB-S03D
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (15.247)
Test Procedure(s): ANSI C63.10-2020, KDB 558074 D01v05r02
Result: Pass
Item Receipt Date: Nov. 05, 2025
Test Date: Nov. 06, ~ Nov. 28, 2025



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The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2020. Test results reported herein relate only to the item(s). The test report shall not be reproduced except in full without the written approval of Fangguang Inspection & Testing Co., Ltd. Wuxi Branch.

The test report must not be used by the client to claim product certifications, approval, or endorsement by NVLAP, NIST or any agency of U.S. Government.

Revision History

Report No.	Version	Description	Issue Date
S20251023113102E03	Rev. 01	/	2025-12-12

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§2.1033 General Information

Applicant:	Lumi United Technology Co., Ltd
Applicant Address:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District Shenzhen Guangdong 518000 China (Peoples Republic Of)
Manufacturer:	Lumi United Technology Co., Ltd
Manufacturer Address:	B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District Shenzhen Guangdong 518000 China (Peoples Republic Of)
Test Site:	Fanguang Inspection & Testing Co., Ltd.
LAB ID:	CN5037
LAB registration number:	600222-0
Test Site Address:	No.8 Ningyun Rd.,Xinwu District Wuxi,Jiangsu 214000 China
FCC Rule Part(s):	Part 15 Subpart C (15.247)
FCC ID:	2AKIT-VBS03
Test Device Serial No.:	S/N.: S20251023113102-1-1 ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Digital Transmission System (DTS)

1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2. Fangguang Test Location

These measurement tests were performed at the Fangguang Inspection and testing Co.,LTD located at No.8 Ningyun Rd.,Xinwu District Wuxi,Jiangsu 214000 China. The detailed description of the measurement facility was found to be in compliance with the requirements of ANSI C63.10-2020.

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	Multi-State Sensor P100				
Main Test Model:	VB-S03E				
Additional Model:	VB-S03D				
Model Description:	This EUT (Multi-State Sensor P100) the model No. VB-S03E, VB-S03D, have the same technical construction including circuit diagram, PCB LAYOUT, hardware version and software version identical, except sales area and packaging are different.				
	Trade mark	Product Name	Model No.	Colors	Sales Area
	Aqara	Multi-State Sensor P100	VB-S03E	Grey,White	Sales on line
			VB-S03D	Grey,White	in store sales
Trade Mark:	Aqara				
Input Voltage Range:	DC 3V from battery				
Software Version:	1.0.0.0				
Hardware Version:	1.0.0.0				
EUT sample number:	S20251023113102-1-1 (Conducted)				
	S20251023113102-1-2 (Radiated)				

2.2. Product Specification Subjective to this Report

Frequency Range	2405-2480 MHz
Number of Channels	Thread: 16
Channel Spacing	Thread: 5MHz
Antenna Type:	PIFA antenna
Antenna Gain	0dBi
Type of Modulation	Thread: O-QPSK

2.3. Operation Frequency / Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
11	2405 MHz	12	2410 MHz	13	2415 MHz
14	2420 MHz	15	2425 MHz	16	2430 MHz
17	2435 MHz	18	2440 MHz	19	2445 MHz
20	2450 MHz	21	2455 MHz	22	2460 MHz
23	2465 MHz	24	2470 MHz	25	2475 MHz
26	2480 MHz				

EUT was tested with Channel 11, 18 and 26.

2.4. Device Capabilities

This device contains the following capabilities: Thread

Note: The maximum achievable duty cycle was determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 8MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Test Mode	Antenna	Freq(MHz)	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
Thread	Ant1	2405	0.00	0.00	100.00
		2440	0.00	0.00	100.00
		2480	0.00	0.00	100.00

Test Graphs

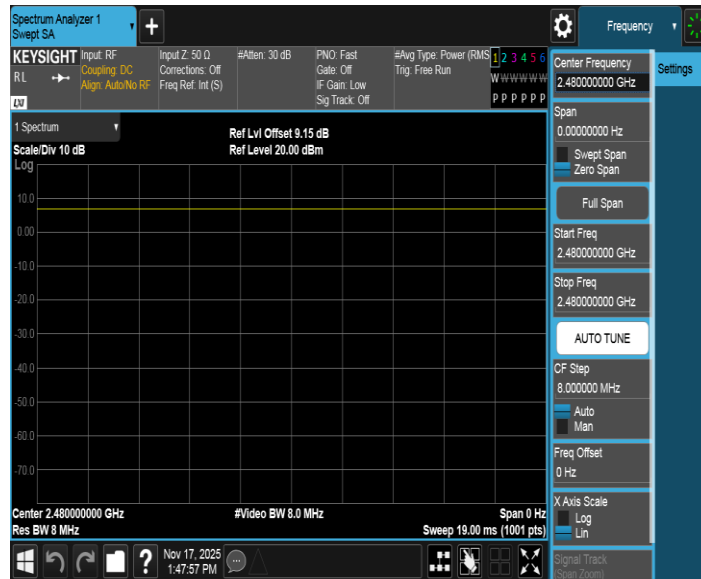
Thread_Ant1_2405



Thread_Ant1_2440



Thread_Ant1_2480



2.5. Description of Test Software

The test utility software used during testing was "QCOM_V1.0.exe", Power Parameter Value:

Software Version	Test Mode	Software Power Setting
QCOM_V1.0.exe	Thread	80

2.6. Test Mode

Test Mode	Mode 1: Transmit by Thread
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2.7. Test Configuration

The EUT was tested per the guidance of KDB 558074 D01 v05r02. ANSI C63.10-2020 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.8. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.9. EUT Photo

The EUT external photo, internal photo and test setup photo, please refer to the plots in the S20251023113102-A1/A2/A3.

2.10. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.

However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

2.11. Calculation with all conversion and correction factors used

For AC Line Conducted Emissions Test:

Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

For Radiated Emissions Below 1GHz Test:

Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

For Radiated Emissions Above 1GHz Test:

Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2020), and the guidance provided in KDB 558074 D01 v05r02 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2020.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. The turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-25GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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.”

- Use a unique coupling to the intentional radiator.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	FWXGJC-2016-181	1 year	2026/07/08
Two-Line V-Network	R&S	ENV 216	FWXGJC-2016-182	1 year	2026/07/09
Thermohygrometer	Yuhuaze	HTC-1	FWXDA-2016-385	1 year	2026/08/24

Radiated Emission

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Loop Antenna	Schwarzbeck	FMZB 1519B	FWXGJC-2018-015	3 year	2026/06/21
Bi-Log Antenna	R&S	VULB 9168	FWXGJC-2024-055	1 year	2026/06/21
Broadband Antenna	Horn R&S	HF907	FWXGJC-2016-267-07	1 year	2026/06/21
Broadband Antenna	Horn Schwarzbeck	BBHA9170	FWXGJC-2018-016	3 year	2026/06/21
EMI Receiver	R&S	ESR26	FWXGJC-2016-267-01	1 year	2026/07/16
Pre-Amplifier	Tonscend	TAP0118048	FWXGJC-2024-056	1 year	2026/06/21
Pre-Amplifier	R&S	EMC184055SE	FWXGJC-2018-018	3 year	2026/06/21
Hygrothermograph	Mittel	HTC-1	FWXDA-2016-387	1 year	2026/08/24
Anechoic Chamber	SAEMC	FSAC318	FGZZ-2024-035	3 year	2027/06/02

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Keysight	N9010B	FWXGJC-2018-010	1 year	2026/07/16
RF Control Unit	Toncend	JS0806-2	FWXGJC-2018-013	1 year	2026/07/16
Thermohygrometer	Yuhuaze	HTC-1	FWXDA-2016-385	1 year	2026/08/24

Auxiliary Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
Filter	Toncend	ZBSF6	07247867	2026/07/16
Filter	Toncend	ZHPF6	07233297	2026/07/16
Attenuator	Toncend	10dB	/	2026/07/16
RF Cable	Toncend	T-1	/	2026/07/16

Test Software

Test Software	Manufacturer	Version	Asset No.	Function
JS32	Tonscend	V5.0.0	FWXWA-2019-004	RE
RF Test Software	Tonscend	3.3.10	/	/

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 2.68dB
Radiated Emission Measurement (9kHz - 30MHz)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 3.06dB
Radiated Emission Measurement (30MHz -1GHz)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 4.01dB
Radiated Emission Measurement (1-18GHz)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 4.97dB
Radiated Emission Measurement (18-40GHz)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 5.32dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 30MHz-1GHz: 1.00 dB 1GHz-12.75GHz: 1.30 dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.60dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.80dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.20MHz
Frequency Stability
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.1×10^{-6} MHz

7. TEST RESULT

7.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	$\geq 500\text{kHz}$	Conducted	Pass	Section 7.2
15.247(b)(3)	Output Power	$\leq 30\text{dBm}$		Pass	Section 7.3
15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$		Pass	Section 7.4
15.247(d)	Band Edge	$\geq 20\text{dBc}$		Pass	Section 7.5
15.247(d)	Out-of-Band Emissions	$\geq 20\text{dBc}$		Pass	Section 7.5
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS GEN [8.9])	Radiated	Pass	Section 7.6&7.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits (RSS GEN [8.8])	Line Conducted	NA	Section 7.8

Notes:

- 1) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. 6dB Bandwidth Measurement

7.2.1. Test Limit

The minimum permissible 6dB bandwidth is 500 kHz.

7.2.2. Test Procedure used

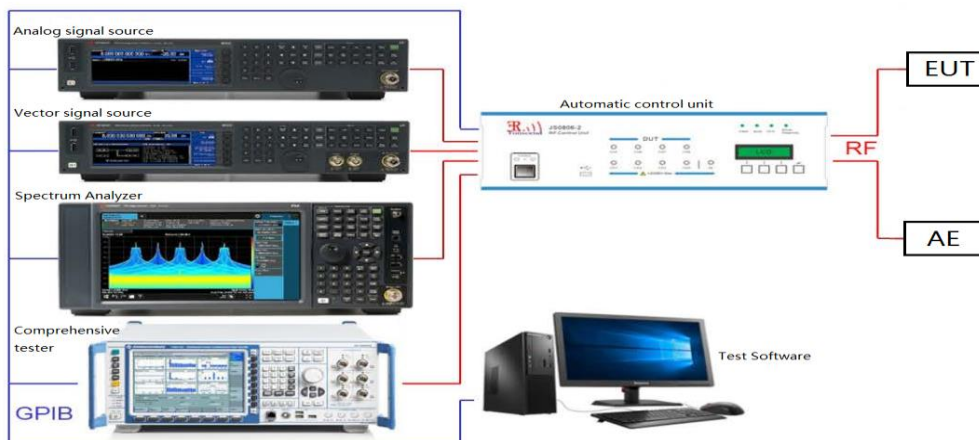
ANSI C63.10-2020 Section 11.8.1 Option 1

KDB 558074 D01 v05r02 – Section 8.2

7.2.3. Test Setting

1. Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz
2. Set the VBW $\geq [3 \times \text{RBW}]$
3. Detector = peak
4. Trace mode = max hold
5. Sweep = No faster than coupled (auto) time
6. Allow the trace to stabilize
7. Measure the maximum width of the emission by placing two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.2.4. Test Setup



7.2.5. Test Result

Test Mode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	99% BW[MHz]	Verdict
Thread	Ant1	2405	1.660	2404.160	2405.820	≥0.5	2.2685	PASS
		2440	1.660	2439.160	2440.820	≥0.5	2.2683	PASS
		2480	1.630	2479.170	2480.800	≥0.5	2.2797	PASS

Test Graphs of 6dB Bandwidth

Thread_Ant1_2405



Thread_Ant1_2440

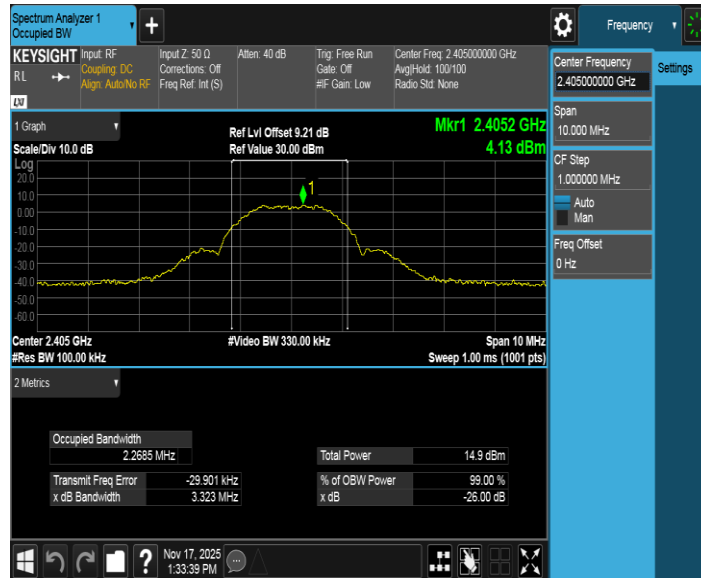


Thread_Ant1_2480

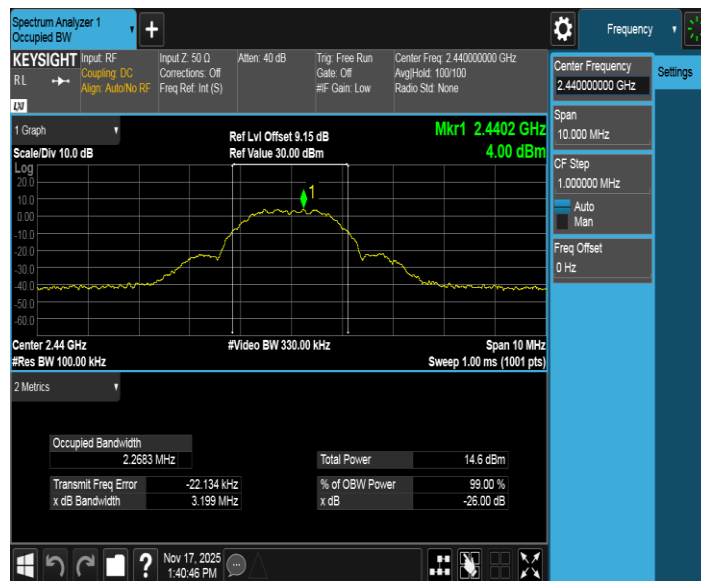


Test Graphs of Occupied Channel Bandwidth

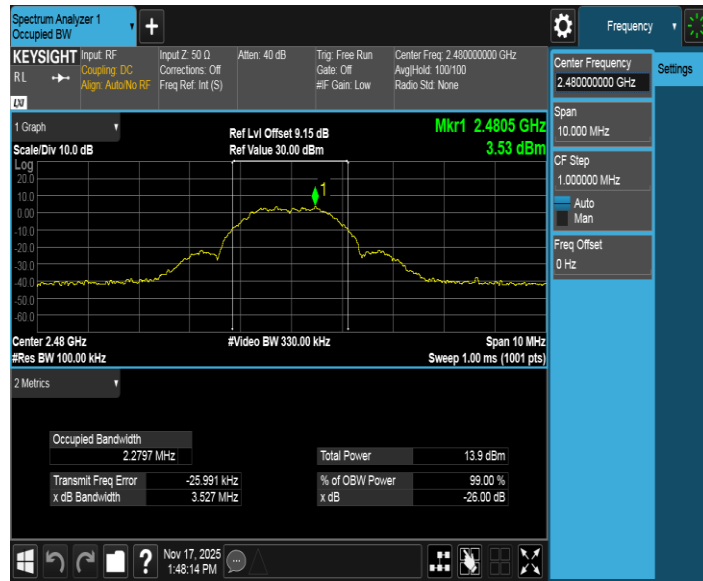
Thread_Ant1_2405



Thread_Ant1_2440



Thread_Ant1_2480



7.3. Output Power Measurement

7.3.1. Test Limit

The maximum permissible conducted output power is 1 Watt (30dBm).

The maximum permissible conducted EIRP is 4 Watt (36.02dBm).

And for antenna gain greater than 6dBi the limit shall reduce by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.3.2. Test Procedure Used

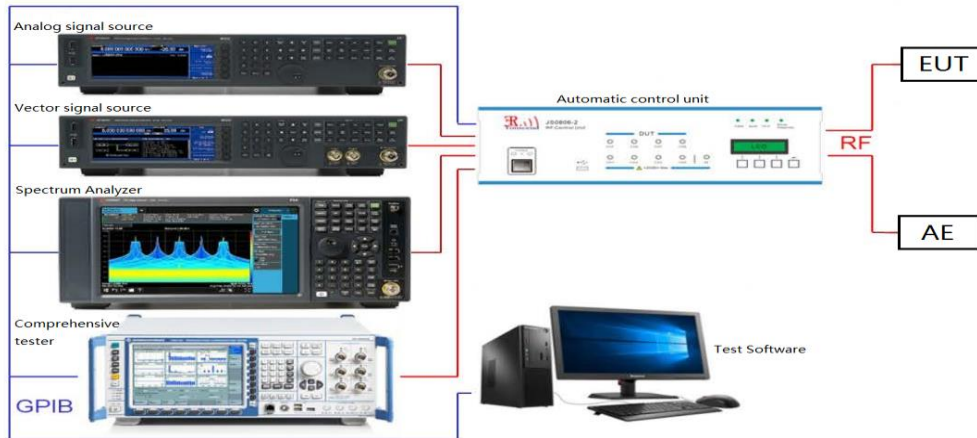
ANSI C63.10-2020 – Section 11.9.1.1

KDB 558074 D01 v05r02 – Section 8.3.1.2

7.3.3. Test Setting

1. Set the RBW $\geq$ DTS bandwidth.
2. Set the VBW $\geq [3 \times \text{RBW}]$.
3. Set the span $\geq [3 \times \text{RBW}]$.
4. Detector = peak.
5. Sweep time = No faster than coupled (auto) time.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.

7.3.4. Test Setup



7.3.5. Test Result

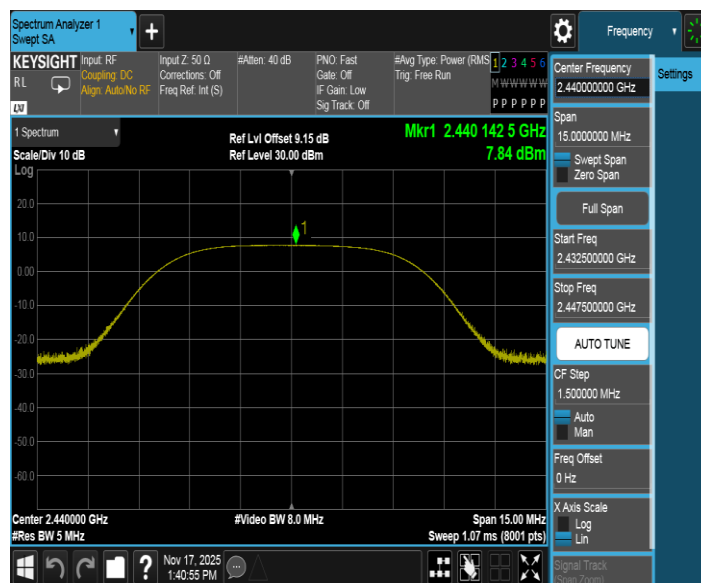
Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
Thread	Ant1	2405	8.28	≤30	PASS
		2440	7.84	≤30	PASS
		2480	7.15	≤30	PASS

Test Graphs

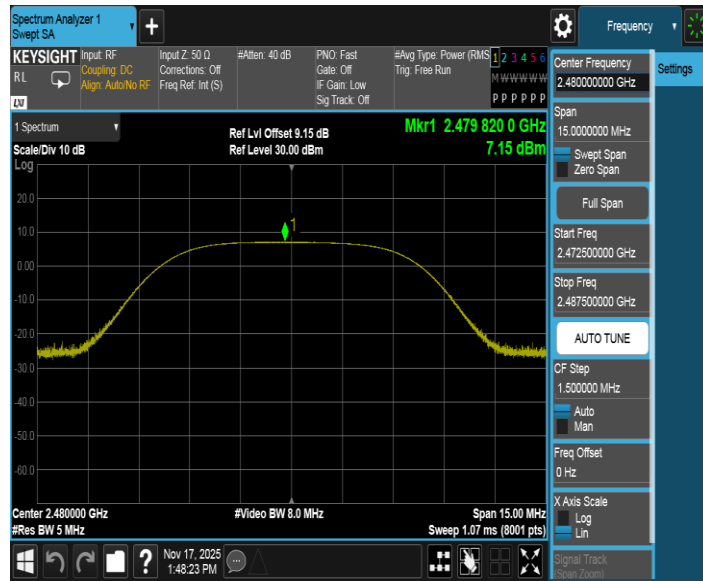
Thread_Ant1_2405



Thread_Ant1_2440



Thread_Ant1_2480



7.4. Power Spectral Density Measurement

7.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band. And for antenna gain greater than 6dBi the limit shall reduce by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.4.2. Test Procedure Used

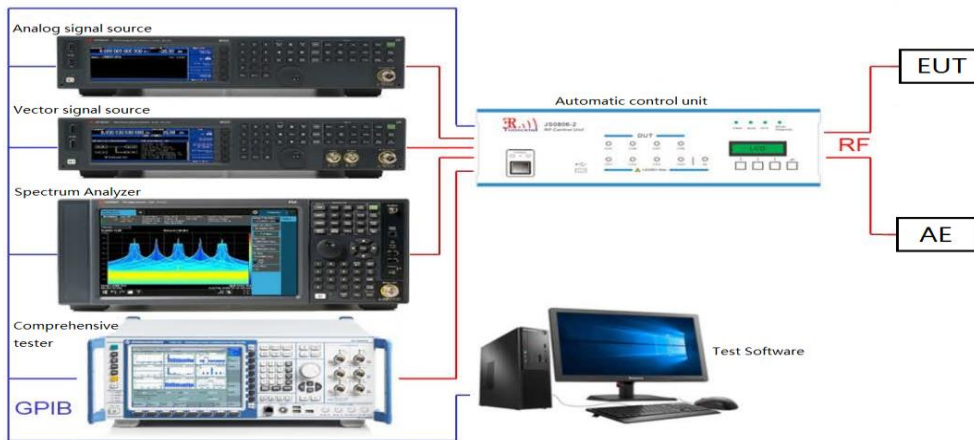
KDB 558074 D01 v05r02 - Section 8.4

ANSI C63.10 – Section 11.10.2

7.4.3. Test Setting

1. Set analyzer center frequency to DTS channel center frequency.
2. Set span to > 1.5 times the DTS bandwidth.
3. Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq [3 \times \text{RBW}]$.
5. Detector = peak.
6. Sweep time = No faster than coupled (auto) time.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

7.4.4. Test Setup



7.4.5. Test Result

Test Mode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
Thread	Ant1	2405	-6.83	≤8.00	PASS
		2440	-7.31	≤8.00	PASS
		2480	-8.07	≤8.00	PASS

Test Graphs

Thread_Ant1_2405



Thread_Ant1_2440



Thread_Ant1_2480



7.5. Conducted Band Edge and Out-of-Band Emissions

7.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

7.5.2. Test Procedure Used

KDB 558074 D01 v05r02 - Section 8.5 & Section 8.6

ANSI C63.10 – Section 11.11&11.12

7.5.3. Test Setting

Reference level measurement:

Establish a reference level by using the following procedure:

- (a) Set instrument center frequency to DTS channel center frequency.
- (b) Set the span to ≥ 1.5 times the DTS bandwidth.
- (c) Set the RBW = 100 kHz.
- (d) Set the VBW $\geq [3 \times \text{RBW}]$.
- (e) Detector = peak.
- (f) Sweep time = No faster than coupled (auto) time.
- (g) Trace mode = max-hold.
- (h) Allow trace to fully stabilize.
- (i) Use the peak marker function to determine the maximum PSD level.

Emission level measurement:

Establish an emission level by using the following procedure:

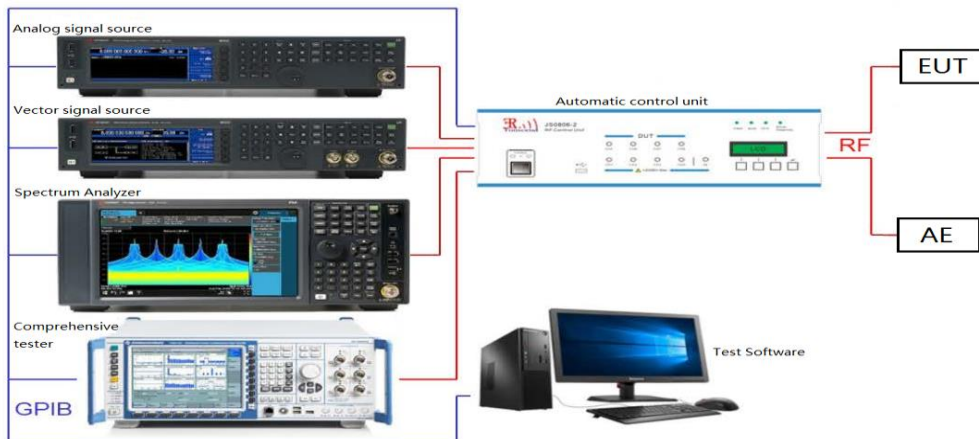
- (a) Set the center frequency and span to encompass frequency range to be measured. Note that the frequency range might need to be divided into multiple frequency ranges to retain frequency resolution.

NOTE—the number of points can also be increased for large spans to retain frequency resolution

- (b) Set the RBW = 100 kHz.
- (c) Set the VBW $\geq [3 \times \text{RBW}]$.
- (d) Detector = peak.
- (e) Sweep time = No faster than coupled (auto) time.
- (f) Trace mode = max-hold.
- (g) Allow trace to fully stabilize.
- (h) 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) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

7.5.4. Test Setup



7.5.5. Test Result

The conducted Out-of-Band Emissions test data:

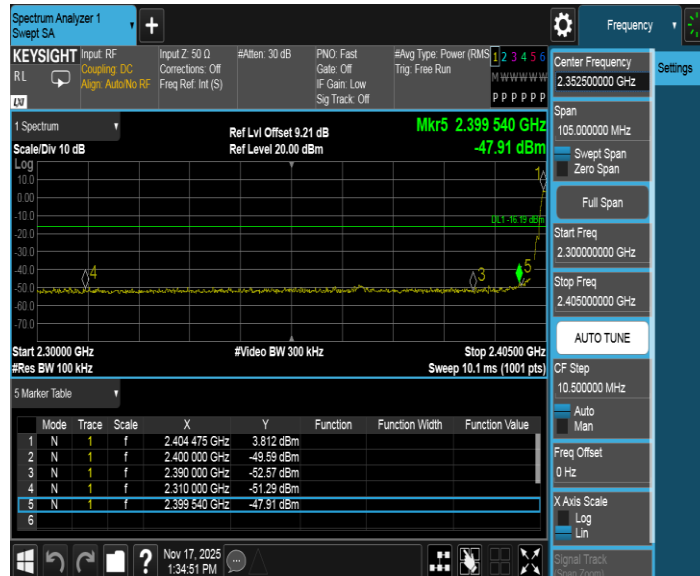
Test Mode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
Thread	Ant1	2405	Reference	4.66	4.66	---	PASS
			30~1000	4.66	-50.16	≤-15.34	PASS
			1000~26500	4.66	-41.59	≤-15.34	PASS
		2440	Reference	4.02	4.02	---	PASS
			30~1000	4.02	-49.56	≤-15.98	PASS
			1000~26500	4.02	-41.17	≤-15.98	PASS
		2480	Reference	3.26	3.26	---	PASS
			30~1000	3.26	-50.97	≤-16.74	PASS
			1000~26500	3.26	-36.69	≤-16.74	PASS

The conducted Band Edge test data:

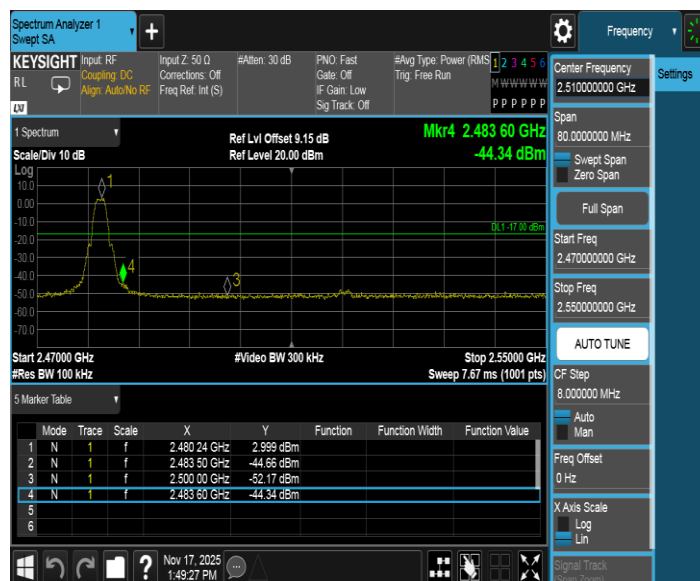
Test Mode	Antenna	ChName	Frequency (MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
Thread	Ant1	Low	2405	3.81	-47.91	≤-16.19	PASS
		High	2480	3.00	-44.35	≤-17.00	PASS

Test Graphs of Band Edge

Thread_Ant1_Low_2405



Thread_Ant1_High_2480

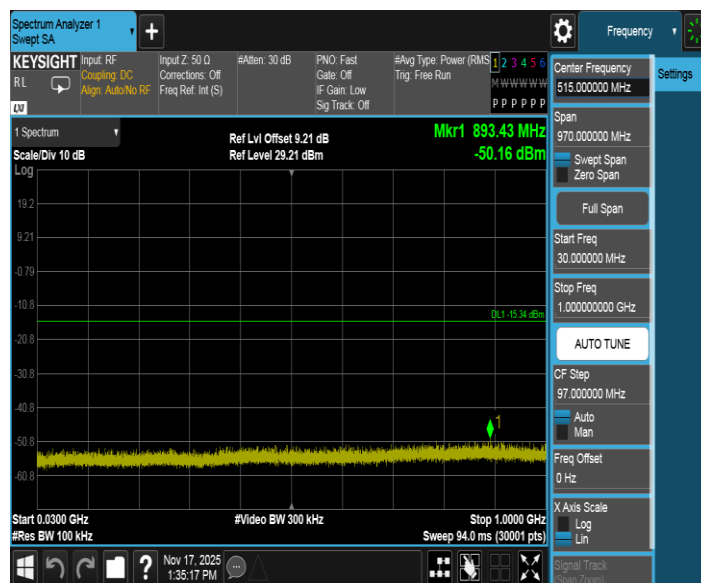


Test Graphs of Out-of-Band Emissions

Thread_Ant1_2405_0~Reference



Thread_Ant1_2405_30~1000



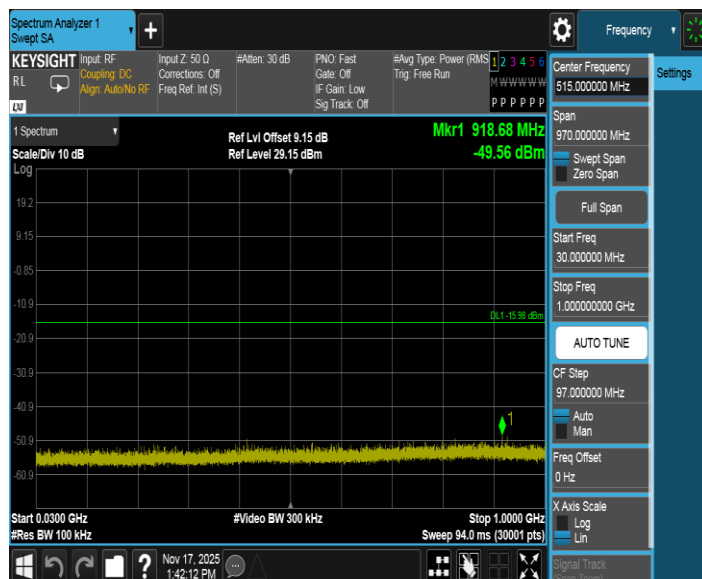
Thread_Ant1_2405_1000~26500



Thread_Ant1_2440_0~Reference



Thread_Ant1_2440_30~1000



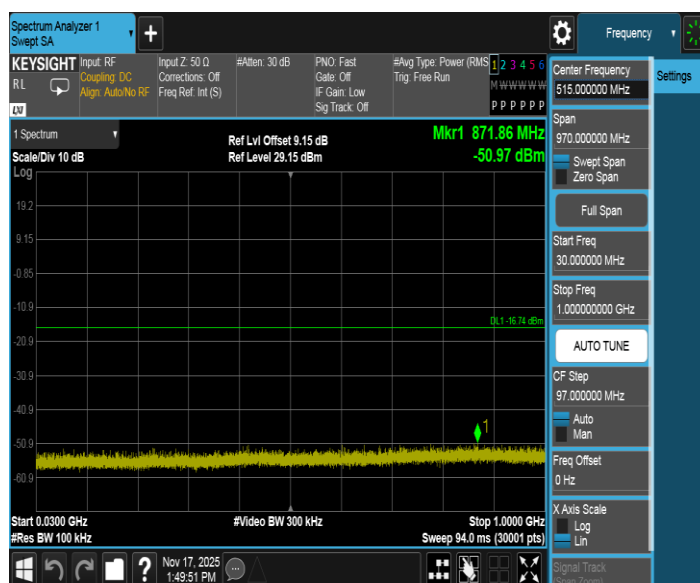
Thread_Ant1_2440_1000~26500



Thread_Ant1_2480_0~Reference



Thread_Ant1_2480_30~1000



Thread_Ant1_2480_1000~26500



7.6. Radiated Spurious Emission Measurement

7.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.6.2. Test Procedure Used

ANSI C63.10-2020 – Section 6.6.4.3

7.6.3. Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold

- Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

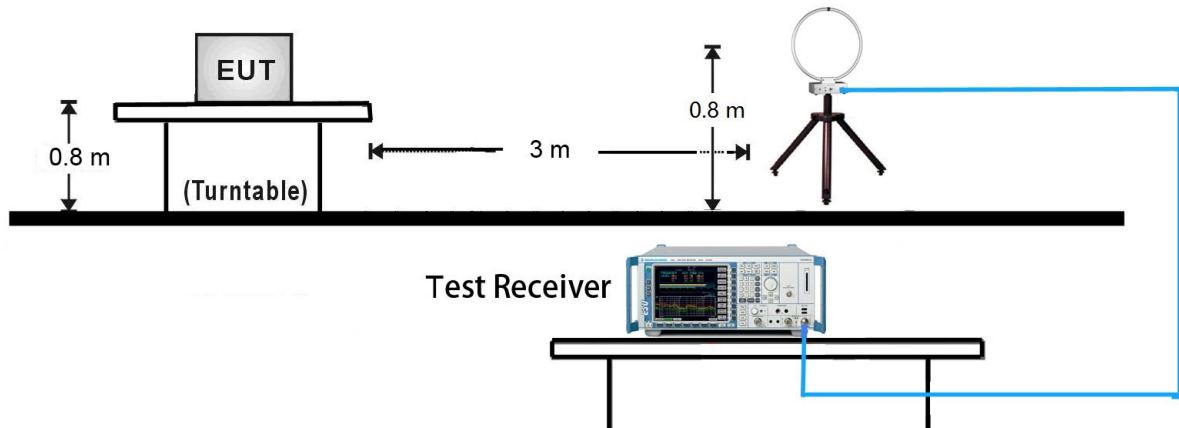
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

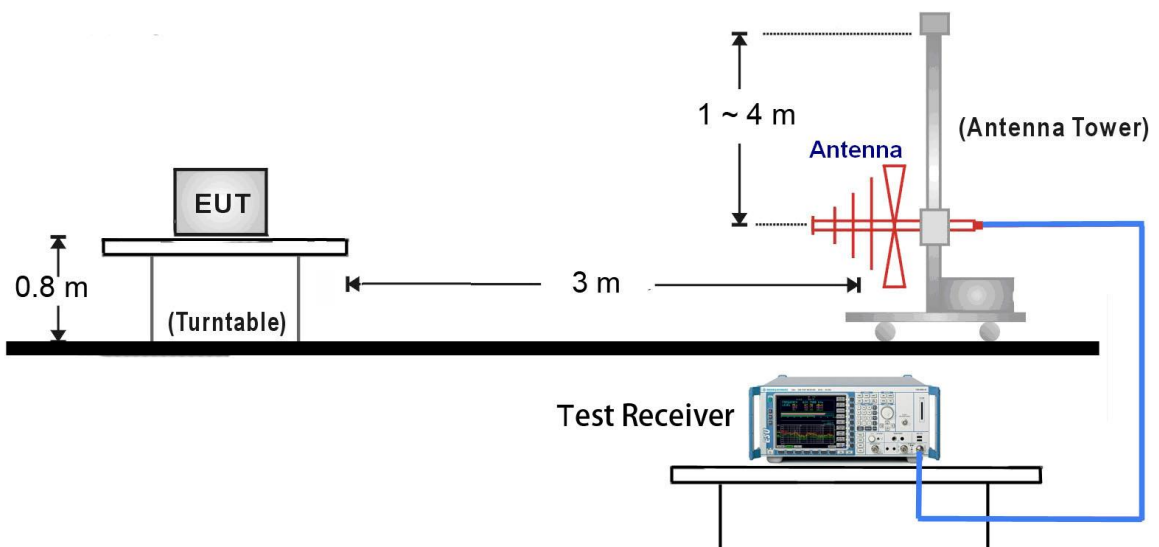
- Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- RBW = 1MHz
- VBW = 3MHz
- Detector = Power Average (RMS)
- Number of sweep point = 2001 (Number of sweep points must be $\geq 2 \times \text{span} / \text{RBW}$)
- Sweep time = auto
- Trace (RMS) averaging was performed over at least 100 traces.

7.6.4. Test Setup

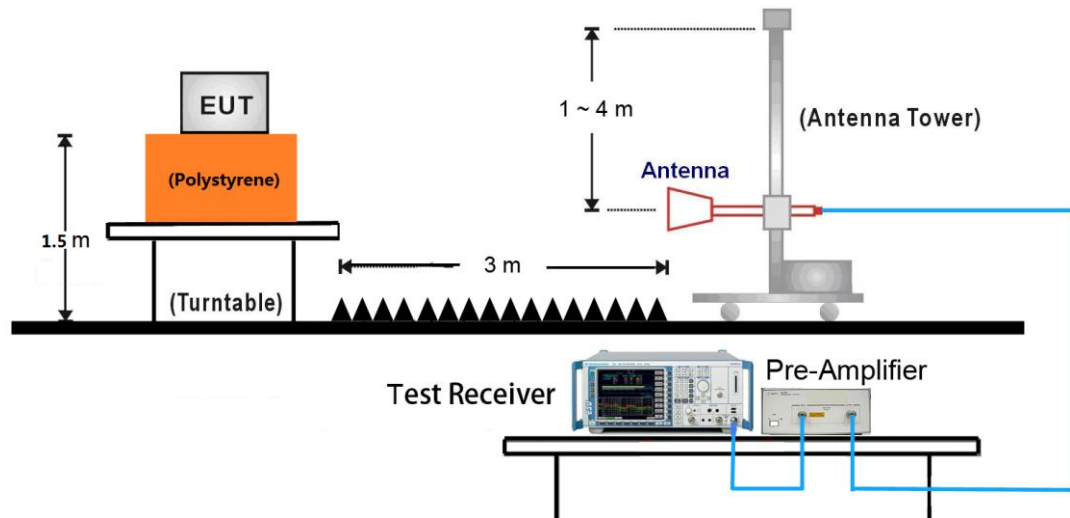
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



1GHz ~ 26.5GHz Test Setup:



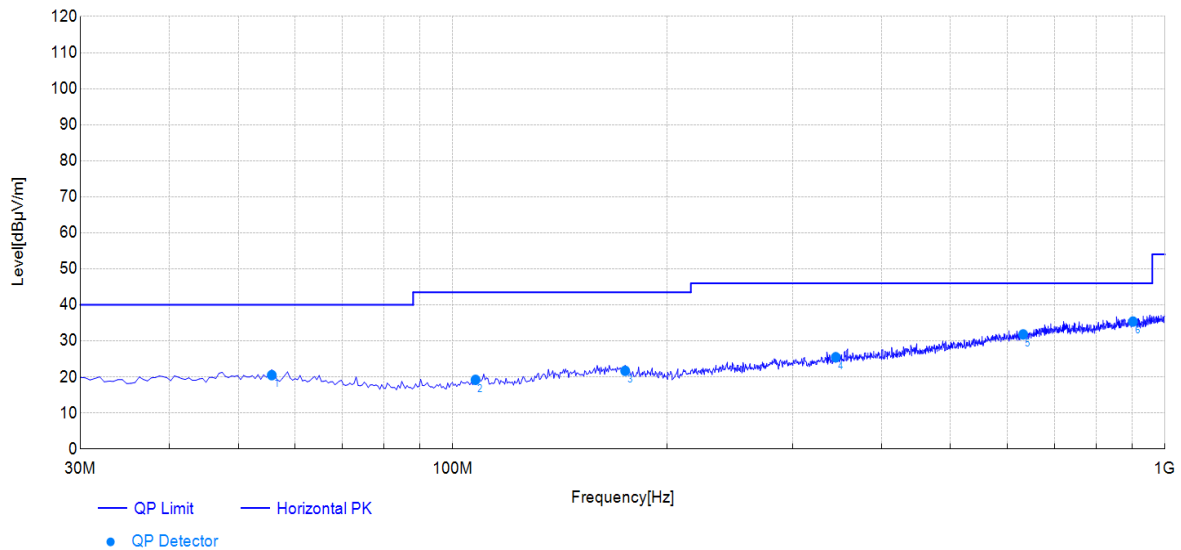
7.6.5. Test Result

The worst case of Radiated Emission below 1GHz:

30MHz – 1GHz Test Data

EUT:	Multi-State Sensor P100	Polarity:	Horizontal
Model:	VB-S03E	Test Engineer:	Stone Zhang
Mode:	Transmit at Thread Channel 11	Voltage:	DC 3.3V
Environment:	Temp: 21.8~29.6°C; Humi:	Test Date:	2025-11-18 ~ 2025-11-25

Test Graph



Final Data List										
NO.	Frequency [MHz]	Factor [dB/m]	QP Reading [dBμV]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	55.72	14.06	6.44	20.50	40.00	19.50	100	184	Horizontal	PASS
2	107.64	13.03	6.18	19.21	43.50	24.29	100	184	Horizontal	PASS
3	174.60	15.43	6.28	21.71	43.50	21.79	100	148	Horizontal	PASS
4	344.92	18.17	7.31	25.48	46.00	20.52	100	188	Horizontal	PASS
5	632.19	24.01	7.81	31.82	46.00	14.18	100	318	Horizontal	PASS
6	901.50	27.40	6.67	35.38	46.00	10.62	100	16	Horizontal	PASS

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 26.5GHz), therefore no data appear in the report.