FCC TEST REPORT

FCC ID: 2BTFF-BASE99

On Behalf of

Einperr (Huizhou) Culture Media Co., Ltd.

Einperr Multi-layer Casing Decorative Wireless Mechanical Keyboard

Model No.: Base99 Canvas Mechanical Keyboard

Prepared for	:	Einperr (Huizhou) Culture Media Co., Ltd.
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Prepared By	:	Shenzhen PSI Testing Co., Ltd.
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Report Number	:	psi2511165-C01-R03
Date of Receipt	:	November 24, 2025
Date of Test	:	November 24, 2025- November 29, 2025
Date of Report	:	November 29, 2025
Version Number	:	V0

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TEST REPORT DECLARATION

Applicant	:	Einperr (Huizhou) Culture Media Co., Ltd.
Address	:	801,8th Floor, R&D Building3, No.7 Songnan Road, ZhongkaiHigh-Tech District, Huizhou City, Guangdong Province, China
Manufacturer	:	libros (Guangdong) Electrical Technology.Co.,Lta
Address	:	1-8F, building No.2, 2F&3F building No.3, No.7 Songnan RoadChina-Korea Huizhou Industrial Park, Zhongkai High-tech Zone, Huizhou, Guangdong, China
EUT Description	:	Einperr Multi-layer Casing Decorative Wireless Mechanical Keyboard
		(A) Model No. : Base99 Canvas Mechanical Keyboard
		(B) Trademark : **Einperr**

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247,

ANSI C63.10-2020

Test Result: PASS

The device described above is tested by Shenzhen PSI Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen PSI Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the FCC Part15 requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen PSI Testing Co., Ltd.

Tested by (name + signature).....…..:	Jensen Wang Test Engineer	Jensen Wang
Approved by (name + signature)…....:	Simple Guan Project Manager	Simple Guan
Date of issue……..:	November 29, 2025	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	November 29, 2025	Initial released Issue	Jensen Wang

1. Summary Of Standards And Results

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Test Item	Standards Paragraph	Result
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1), ANSI C63.10-2020	P
Bandwidth	FCC Part 15: 15.215(c), ANSI C63.10-2020	P
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1), ANSI C63.10-2020	P
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii), ANSI C63.10-2020	P
Dwell Time	FCC Part 15: 15.247(a)(1)(iii), ANSI C63.10-2020	P
Radiated Spurious Emission	FCC Part 15: 15.209, FCC Part 15: 15.247(d), ANSI C63.10-2020	P
Out-of-band Emissions	FCC Part 15: 15.247(d), ANSI C63.10-2020	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d), ANSI C63.10-2020	P
Power Line Conducted Emissions	FCC Part 15: 15.207(a), ANSI C63.10-2020	P
Antenna requirement	FCC Part 15: 15.203	P

Note:

1. P is an abbreviation for Pass.
2. F is an abbreviation for Fail.
3. N/A is an abbreviation for Not Applicable.
4. Conclusion determination rules of this report: Unless there are clear provisions on measurement uncertainty in the standard or customer requirements, decision by actual test data without considering measurement uncertainty.
5. Measurement method usage KDB 558074 D01 15.247 Meas Guidance v05r02.

2. General Information

2.1. Description of Device (EUT)

Description/PMN	:	Einperr Multi-layer Casing Decorative Wireless Mechanical Keyboard
Model List	:	Base99 Canvas Mechanical Keyboard
Diff	:	N/A
Test Voltage	:	DC 5V from USB, DC 3.7V from battery
Radio Technology	:	2.4G_FHSS
Operation frequency	:	2402MHz-2479MHz
Modulation	:	GFSK
Channel No.	:	78 Channels
Channel Separation	:	1MHz
Antenna Type	:	Internal antenna, Maximum Gain is 1.58dBi.
Software version	:	V1.0
Hardware version	:	V1.0
Intend use environment	:	Residential, commercial and light industrial environment
Note	:	Antenna information is provided by applicant. Testing lab is not responsible for the accuracy of the information.

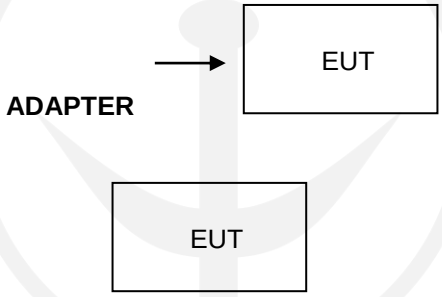
2.2. Accessories of Device (EUT)

Accessories	:	USB Cable
Manufacturer	:	Einperr (Huizhou) Culture Media Co., Ltd.
Model	:	N/A
Input	:	N/A
Output	:	N/A

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number
1	Adapter	Baseus	CCXFK65CC	N/A
2	N/A	N/A	N/A	N/A

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

The test software used to control EUT work in Continuous TX mode, and select test channel, wireless mode

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
GFSK Carrier Tx Mode	CH0	2402
	CH44	2446
	CH77	2479
GFSK hopping on Tx Mode	CH0 to CH77	2402 to 2479
GFSK hopping off Tx Mode	CH0	2402
	CH44	2446
	CH77	2479

Channel list:					
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
CH0	2402	CH26	2428	CH52	2454
CH1	2403	CH27	2429	CH53	2455
CH2	2404	CH28	2430	CH54	2456
CH3	2405	CH29	2431	CH55	2457
CH4	2406	CH30	2432	CH56	2458
CH5	2407	CH31	2433	CH57	2459
CH6	2408	CH32	2434	CH58	2460
CH7	2409	CH33	2435	CH59	2461
CH8	2410	CH34	2436	CH60	2462
CH9	2411	CH35	2437	CH61	2463
CH10	2412	CH36	2438	CH62	2464
CH11	2413	CH37	2439	CH63	2465
CH12	2414	CH38	2440	CH64	2466
CH13	2415	CH39	2441	CH65	2467
CH14	2416	CH40	2442	CH66	2468
CH15	2417	CH41	2443	CH67	2469
CH16	2418	CH42	2444	CH68	2470
CH17	2419	CH43	2445	CH69	2471
CH18	2420	CH44	2446	CH70	2472
CH19	2421	CH45	2447	CH71	2473
CH20	2422	CH46	2448	CH72	2474
CH21	2423	CH47	2449	CH73	2475
CH22	2424	CH48	2450	CH74	2476
CH23	2425	CH49	2451	CH75	2477
CH24	2426	CH50	2452	CH76	2478
CH25	2427	CH51	2453	CH77	2479

2.6. Software test version and power setting information

Software testing version	Keyboard EMI Fixed Frequency Mode		
Mode	The client 's preset testing software is used to control the operation of EUT in continuous transmission mode and select the testing channel, wireless mode:		
Power level setup by client			
Mode	Channel	Frequency (MHz)	Soft Set
GFSK	CH0	2402	TX level is set as defaults value.
	CH44	2446	TX level is set as defaults value.
	CH77	2479	TX level is set as defaults value.

2.7. Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	26℃
Humidity range:	25-75%	54%
Pressure range:	86-106kPa	101kPa

2.8. Test Facility

Shenzhen PSI Testing Co., Ltd.

1-2/F., Building 5, Yudafu Industrial Park, No.10, Xingye West Road, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China

September 13, 2023 File on Federal Communication Commission
Registration Number: 916281

2.9. Measurement Uncertainty

(95% confidence levels, k=2)

Item	**Uncertainty**
Power Line Conducted Emissions Test	2.13dB
Radiation Emission test in 3m chamber(Below 30MHz)	4.07dB
Radiation Emission test in 3m chamber(30MHz to 1GHz)	4.51dB
Radiation Emission test in 3m chamber(1GHz to 18GHz)	5.07dB
Radiation Emission test in 3m chamber(18GHz to 40GHz)	5.21dB
Radio Frequency	48.24KHz
Conducted RF Power	0.41dB
Power Spectral Density	0.39 dB
Occupied-Bandwidth	968Hz
Duty Cycle	1%
Conducted-Spurious Emission	1.26dB

2.10.Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware Version	Last Cal.	Cal. Interval
1.	9*6*6 anechoic chamber	SKET	9*6*6	N/A	/	2022.12.20	3 Year
2.	Test Receiver	Rohde&Schwarz	ESCI 7	101032/003	4.42 SP3	2024.12.18	1 Year
3.	L.I.S.N.#1	Rohde&Schwarz	ENV216	102282	/	2024.12.18	1 Year
4.	L.I.S.N.#2	RFT	NNB111	13835240	/	2024.12.18	1 Year
5.	Loop Antenna	Schwarz beck	FMZB 1519B	00128	/	2025.01.02	2 Year
6.	Bilog Antenna	Schwarz beck	VULB 9168	01448	/	2025.01.02	2 Year
7.	Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101648	3.70	2024.12.18	1 Year
8.	Horn Antenna	Schwarz beck	BBHA 9120 D	02706	/	2025.01.02	2 Year
9.	Amplifier	SKET	LAPA_01G18G-45dB	SK2022032901	/	2024.12.18	1 Year
10.	Horn Antenna	Schwarz beck	BBHA 9170	00946	/	2024.12.31	2 Year
11.	Amplifier	SKET	LNPA_0118G-45	SK2020010801	/	2024.12.18	1 Year
12	RF Power Probe	Rohde&Schwarz	NRP-Z11	1138.3004.02-111533-Fz	/	2024.12.18	1 Year
13	RF Sensor Unit	Tachoy	TR1029-2	20220428P008	/	2024.12.18	1 Year
14	Spectrum Analyzer	Agilent	N9020A	MY51281067	A.14.03	2024.12.18	1 Year
15	Temp. & Humid Chamber	Auchno	9606	/	/	2024.12.18	1 Year
16	Regulated DC Power Supply	Xinouhua	ADC120V10A	202211251638		2024.12.18	1 Year
17.	Cable	SKET	Cable-RE-1	#02/#03	/	2024.12.18	1 Year
18.	Cable	SKET	Cable-RE-2	#01	/	2024.12.18	1 Year
19.	Cable	SKET	Cable-RE-3	#04	/	2024.12.18	1 Year
20.	Cable	SKET	Cable-CE-1	A-E-24	/	2024.12.18	1 Year
21.	6dB Attenuator	Schwarzbeck	DGA 9552N 6dB	CK4186	/	2024.12.18	1 Year
22.	Power meter	Agilent	E4419B	GB40202121	/	2024.12.18	1 Year
23.	Comprehensive Test Instrument	Rohde&Schwarz	CMW 500	145266	/	2024.12.18	1 Year

For Test Software Information

Item	Software Name	Manufacturer	Version
RE	EZ_EMC	Farad	PSI-3A1
CE	EZ_EMC	Farad	PSI-3A1
RF	RTS	TACHOY	V1.0.0

3. Maximum Peak Output Power

3.1. Test Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

3.2. Test Procedure

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

a) Use the following spectrum analyzer settings:

1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
2) RBW > 20 dB bandwidth of the emission being measured.
3) VBW >= RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.

b) Allow trace to stabilize.

c) Use the marker-to-peak function to set the marker to the peak of the emission.

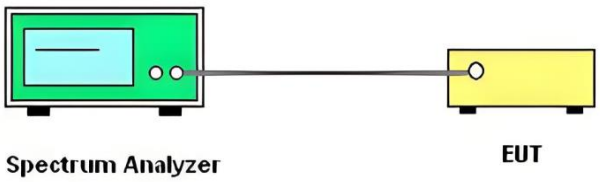
d) The indicated level is the peak output power, after any corrections for external attenuators and cables.

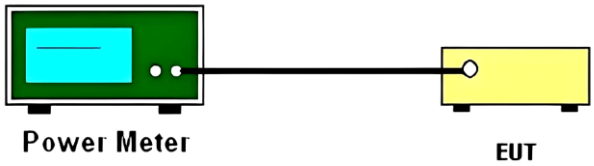
e) A plot of the test results and setup description shall be included in the test report.

Note: A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

The transmitter output is connected to the RF Power meter. The Power meter is set to the peak power detection.

3.3. Test Setup





3.4. Test Result

Condition	Antenna	Modulation	Frequency (MHz)	Max. Conducted Power(dBm)	Max. Conducted Power(mW)	Limit(mW)	Result
NVNT	ANT1	GFSK	2402.00	4.81	3.03	1000	Pass
NVNT	ANT1	GFSK	2446.00	**4.93**	3.11	1000	Pass
NVNT	ANT1	GFSK	2479.00	4.67	2.93	1000	Pass

4. Bandwidth

4.1. Test Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

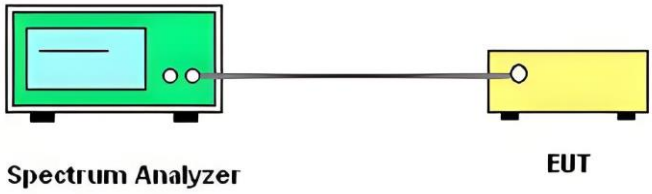
4.2. Test Procedure

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Steps a) through c) might require iteration to adjust within the specified tolerances.
e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
f) Set detection mode to peak and trace mode to max hold.
g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).
j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "-xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "-xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

l) The test receiver set RBW =1-5%BW, VBW>3*RBW, Sweep time set auto, detail see the test plot for 99%Bandwidth.

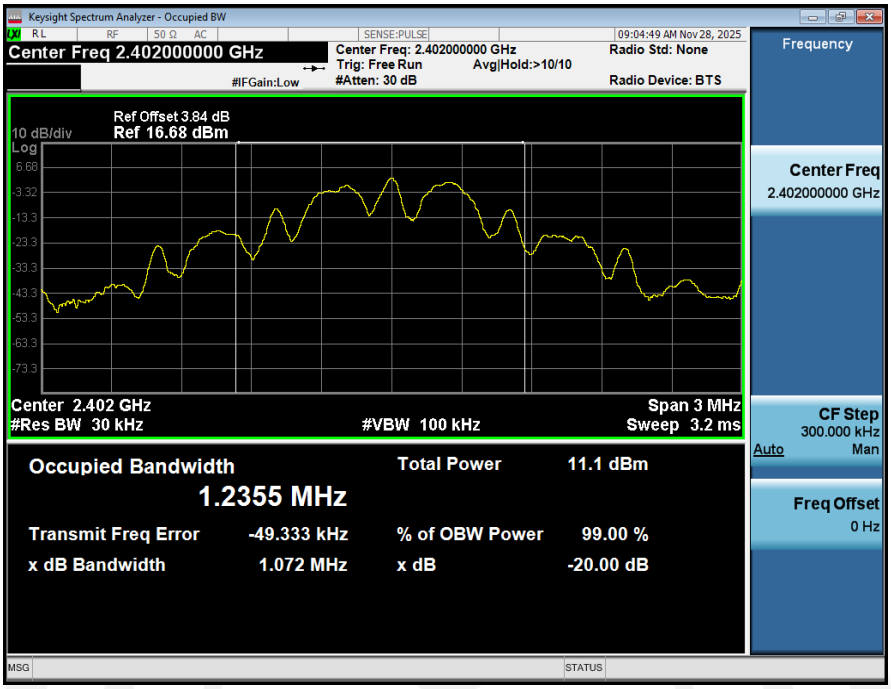
4.3. Test Setup



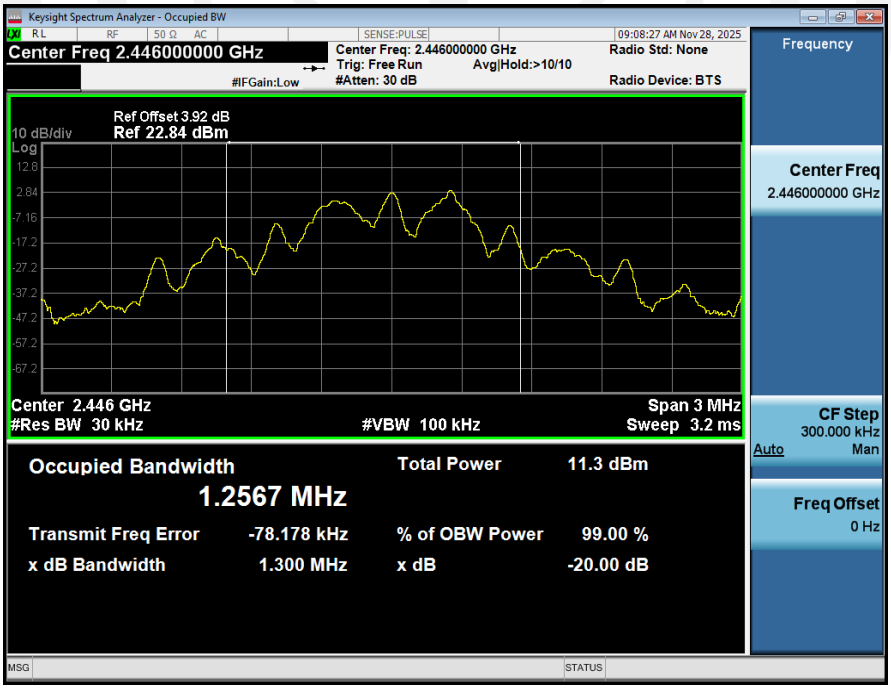
4.4. Test Result

Condition	Antenna	Modulation	Frequency (MHz)	-20dB BW(MHz)	if larger than CFS
NVNT	ANT1	GFSK	2402.00	1.072	Yes
NVNT	ANT1	GFSK	2446.00	1.300	Yes
NVNT	ANT1	GFSK	2479.00	1.305	Yes

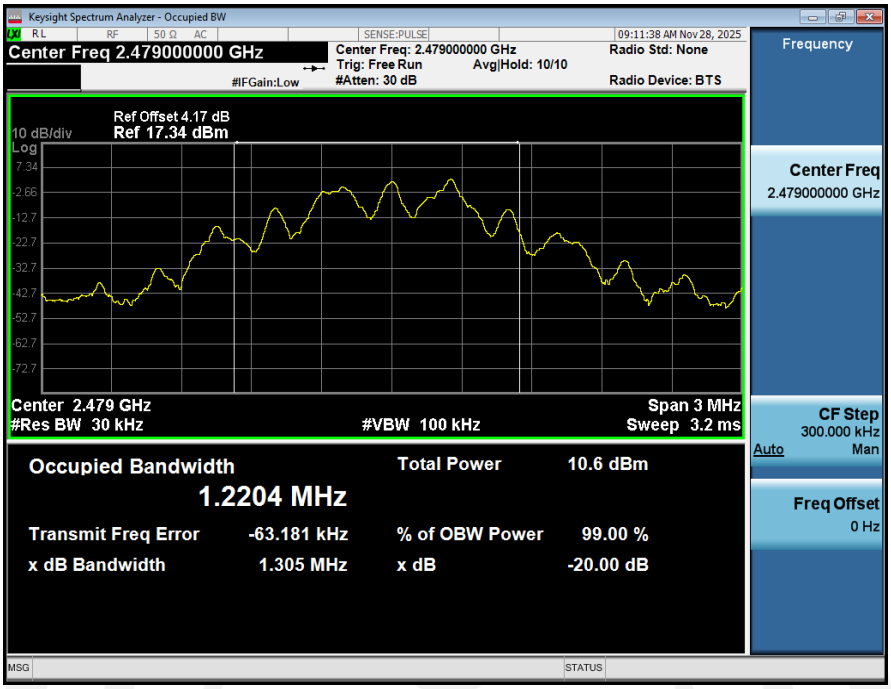
-20dB_Bandwidth_NVNT_ANT1_1-DH1_2402_00



-20dB_Bandwidth_NVNT_ANT1_1-DH1_2446_00

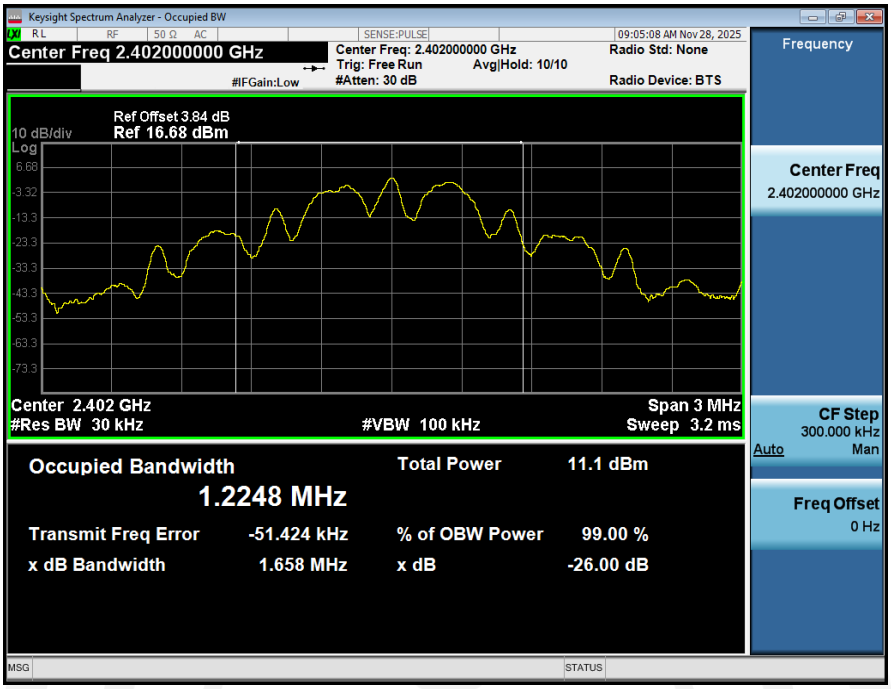


-20dB_Bandwidth_NVNT_ANT1_1-DH1_2479_00

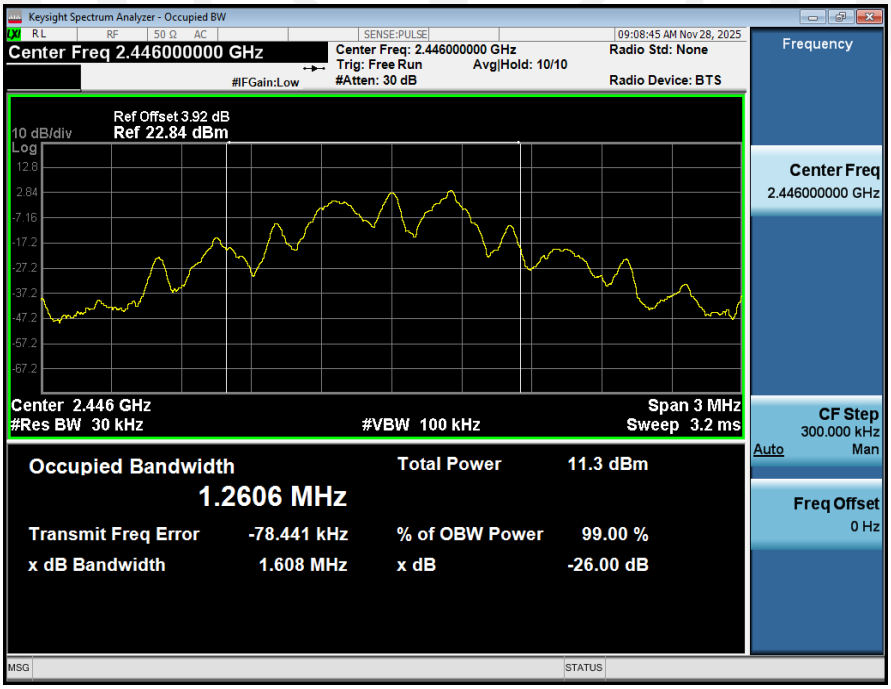


Condition	Antenna	Modulation	Frequency (MHz)	99%%BW(MHz)
NVNT	ANT1	GFSK	2402.00	1.225
NVNT	ANT1	GFSK	2446.00	1.261
NVNT	ANT1	GFSK	2479.00	1.219

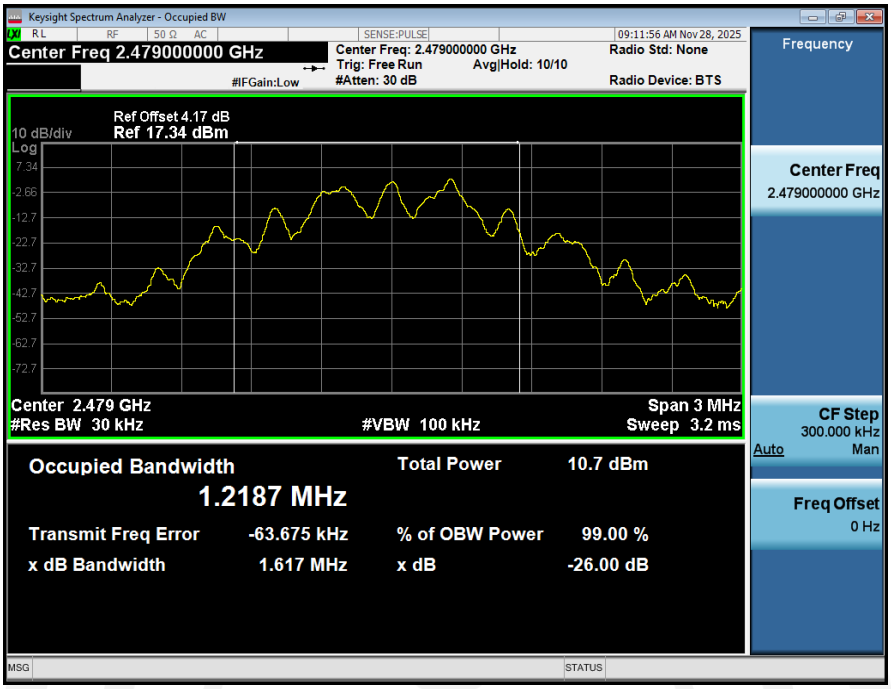
99%_Occupied_Bandwidth_NVNT_ANT1_1-DH1_2402_00



99%_Occupied_Bandwidth_NVNT_ANT1_1-DH1_2446_00



99%_Occupied_Bandwidth_NVNT_ANT1_1-DH1_2479_00



5. Carrier Frequency Separation

5.1. Test Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

5.2. Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a) Span: Wide enough to capture the peaks of two adjacent channels.

b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.

c) Video (or average) bandwidth (VBW) ⩾ RBW.

d) Sweep: Auto.

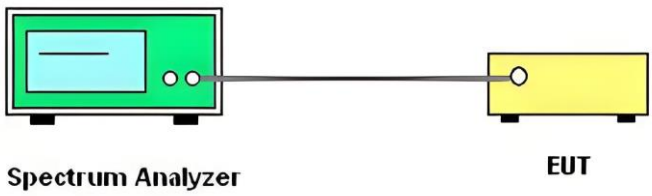
e) Detector function: Peak.

f) Trace: Max hold.

g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.

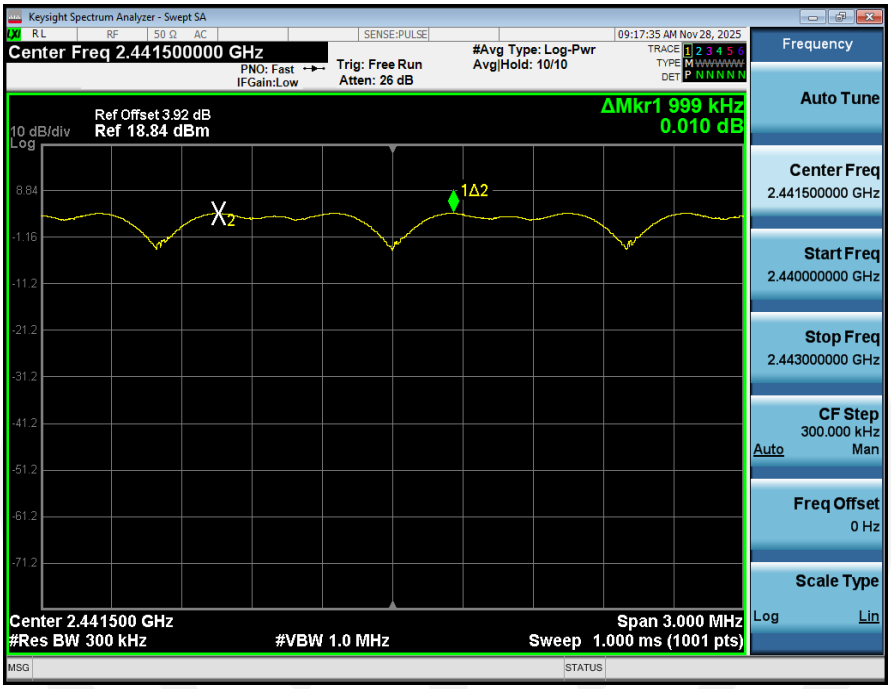
5.3. Test Setup



5.4. Test Result

Condition	Antenna	Modulation	Frequency(MHz)	Hopping NO.0 (MHz)	Hopping NO.1 (MHz)	Carrier Frequencies Separation(MHz)	Limit(MHz)	Result
NVNT	ANT1	GFSK	2446.00	2440.759	2441.758	1.00	0.867	Pass

Carrier_Frequencies_Separation_(Hopping)_NVNT_ANT1_1-DH1_Hopping



6. Number Of Hopping Channel

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

6.2. Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.

b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

c) VBW ⩾ RBW.

d) Sweep: Auto.

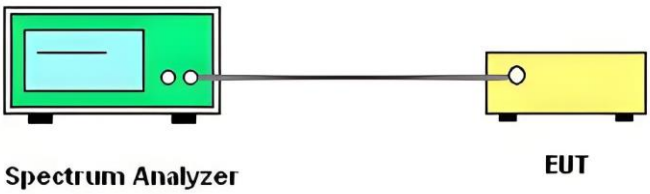
e) Detector function: Peak.

f) Trace: Max hold.

g) Allow the trace to stabilize.

It might prove necessary to break the span up into sub ranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

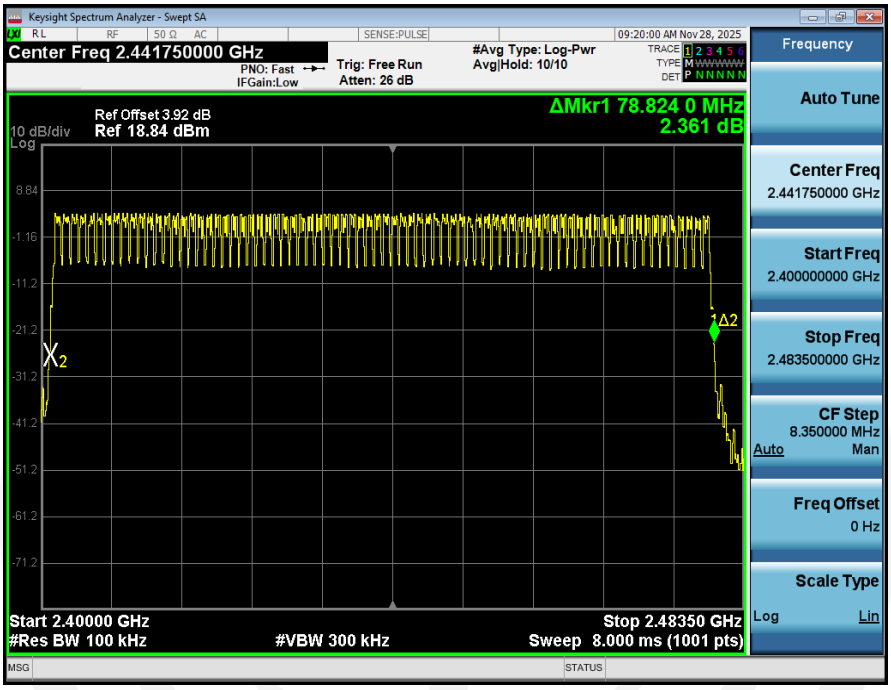
6.3. Test Setup



6.4. Test Result

Condition	Antenna	Modulation	Hopping Num	Limit	Result
NVNT	ANT1	GFSK	78	15	Pass

Number_of_Hopping_Channel_(Hopping)_NVNT_ANT1_1-DH1_Hopping



7. Dwell Time

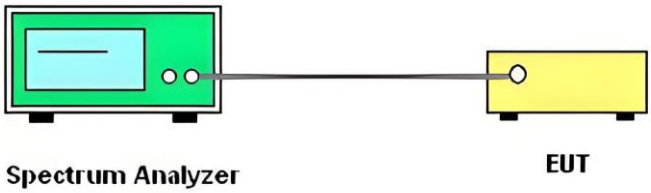
7.1. Test limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

7.2. Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
a) Span: Zero span, centered on a hopping channel.
b) RBW shall be <= channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
d) Detector function: Peak.
e) Trace: Max hold.
Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test
for each variation in transmit time.
Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:
(Number of hops in the period specified in the requirements) =
(number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)
The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.
The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

7.3. Test Setup



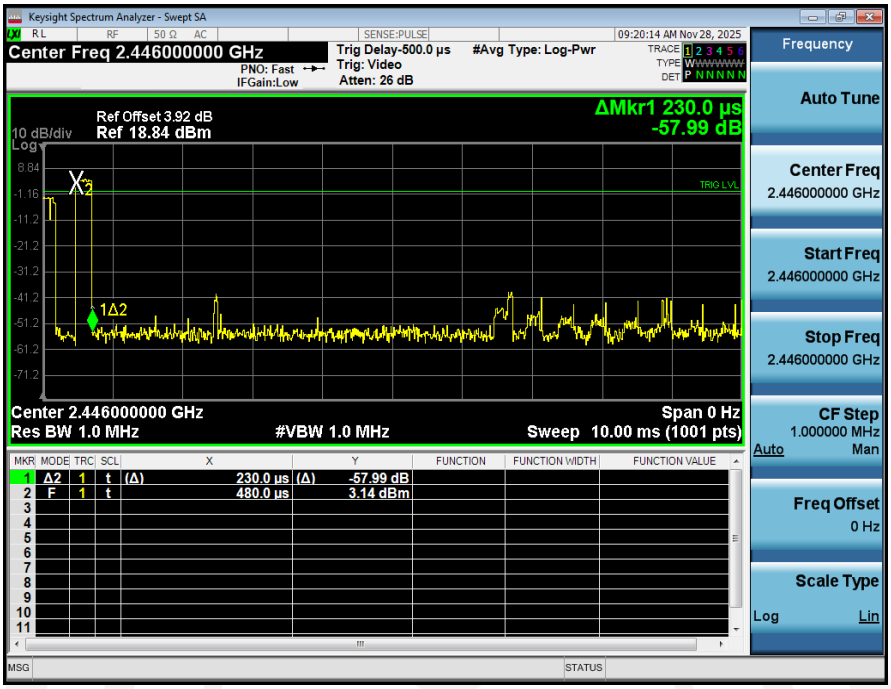
7.4. Test Result

Note:

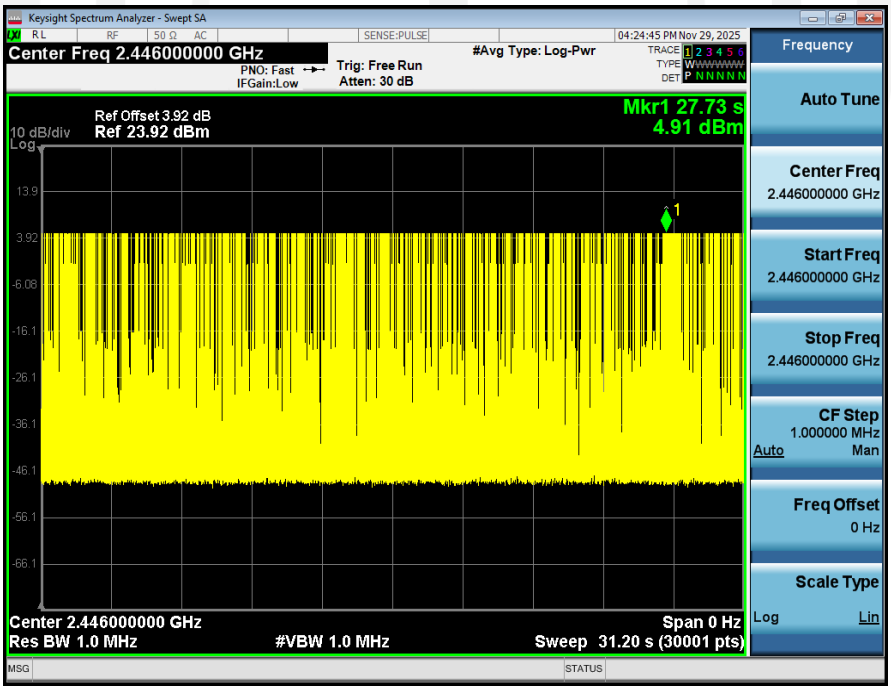
1. The test period: T= 0.4 Second/Channel x 78 Channel = 31.2 s
2. Dwell Time=Pulse Time* Hops Number

Condition	Antenna	Packet Type	Pulse Time(ms)	Hops	Dwell Time(ms)	Limit(s)	Result
NVNT	ANT1	GFSK	0.230	772.00	177.560	0.40	Pass

Dwell_Time_(Hopping)_NVNT_ANT1_GFSK_2446_00_One_Burst_Time



Dwell_Time_(Hopping)_NVNT_ANT1_GFSK_2440_00_Accumulated



8. Out-of-band Emissions

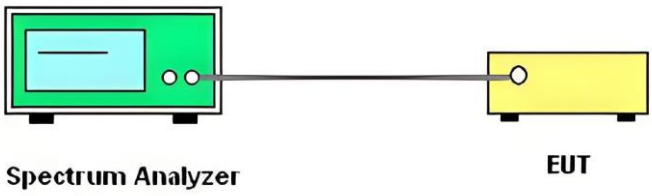
8.1. Test Limits

In any 100 kHz 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 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in FCC Part 15.209(a) is not required.

8.2. Test Procedure

Conducted spurious emissions shall be measured for the transmit frequency, per 5.5 and 5.6, and at the maximum transmit powers. Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The instrument shall span 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector. The band 30 MHz to the highest frequency may be split into smaller spans, as long as the entire spectrum is covered.

8.3. Test Setup



8.4. Test Results

PASS.

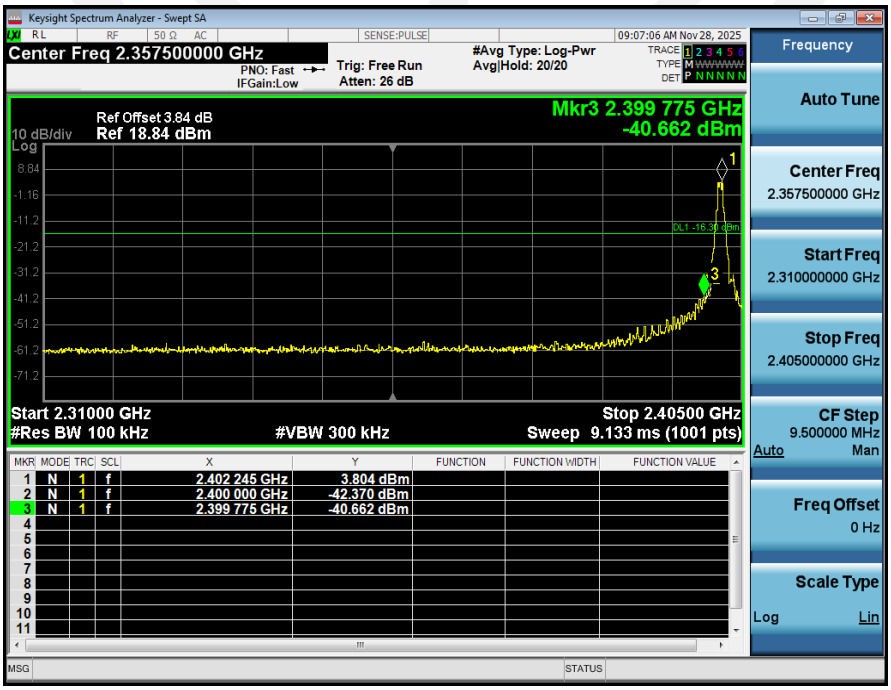
The test results are listed in next pages.

Band Edge: Pass

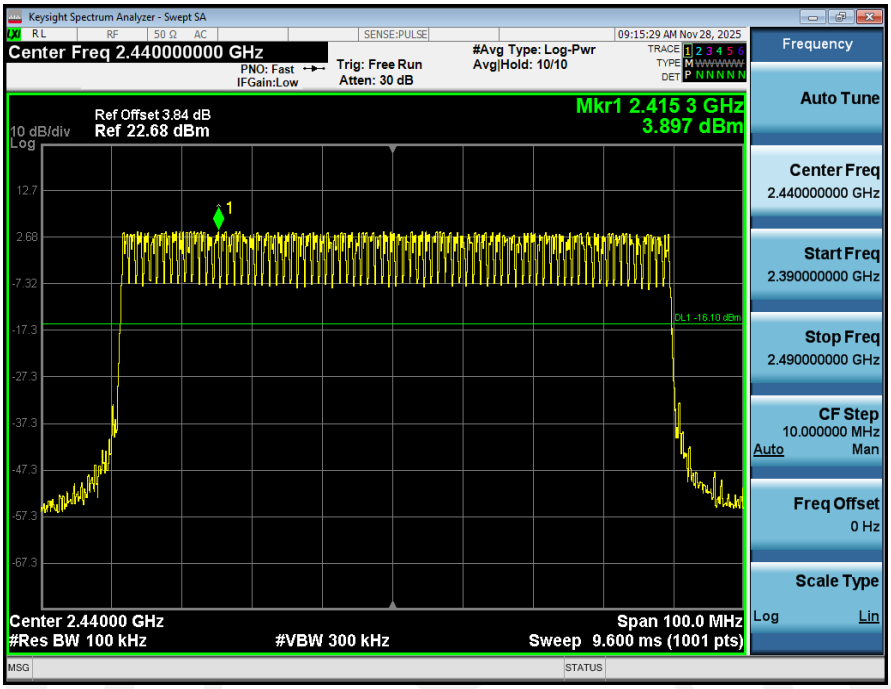
Condition	Antenna	Modulation	TX Mode	Ref_level(dBm)	Bandedge MAX.Value	Limit	Result
NVNT	ANT1	1-DH1	2402.00	3.700	-40.662	-16.300	Pass
NVNT	ANT1	1-DH1	Hopping_LCH	3.897	-41.438	-16.103	Pass
NVNT	ANT1	1-DH1	2479.00	3.604	-48.011	-16.396	Pass
NVNT	ANT1	1-DH1	Hopping_HCH	4.238	-48.941	-15.762	Pass

1_Reference_Level_NVNT_ANT1_1-DH1_2402_00

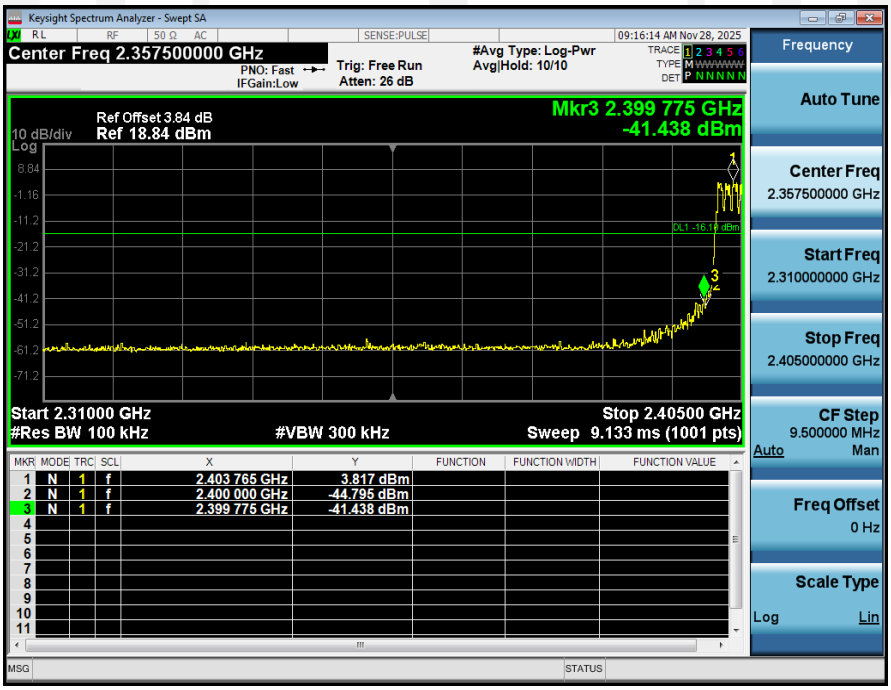
2_Bandedge_NVNT_ANT1_1-DH1_2402_00



1_Reference_Level_Hopping_NVNT_ANT1_1-DH1_Hopping

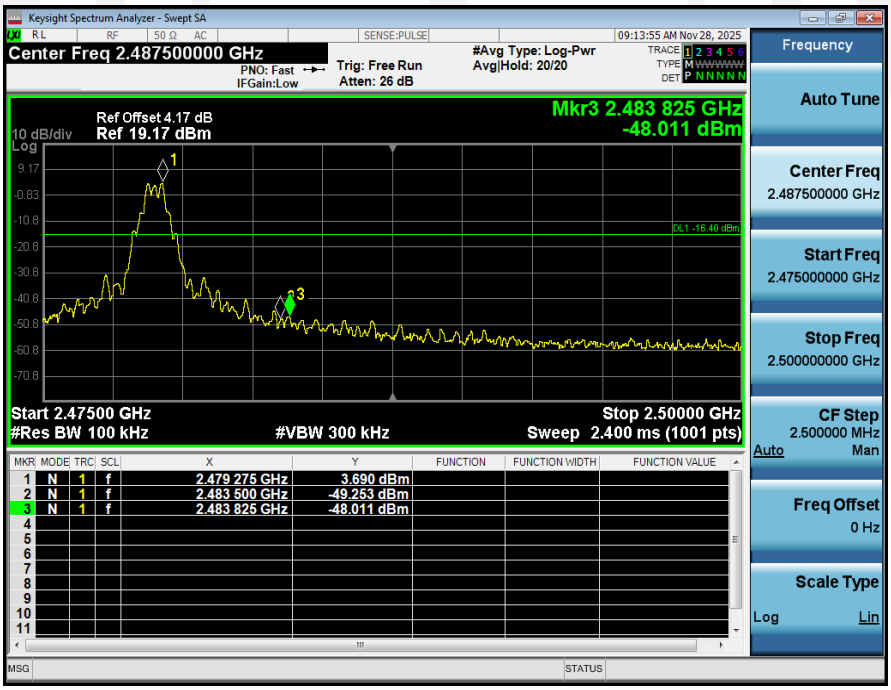


2_Band_Edge_(Hopping)_NVNT_ANT1_1-DH1_Hopping

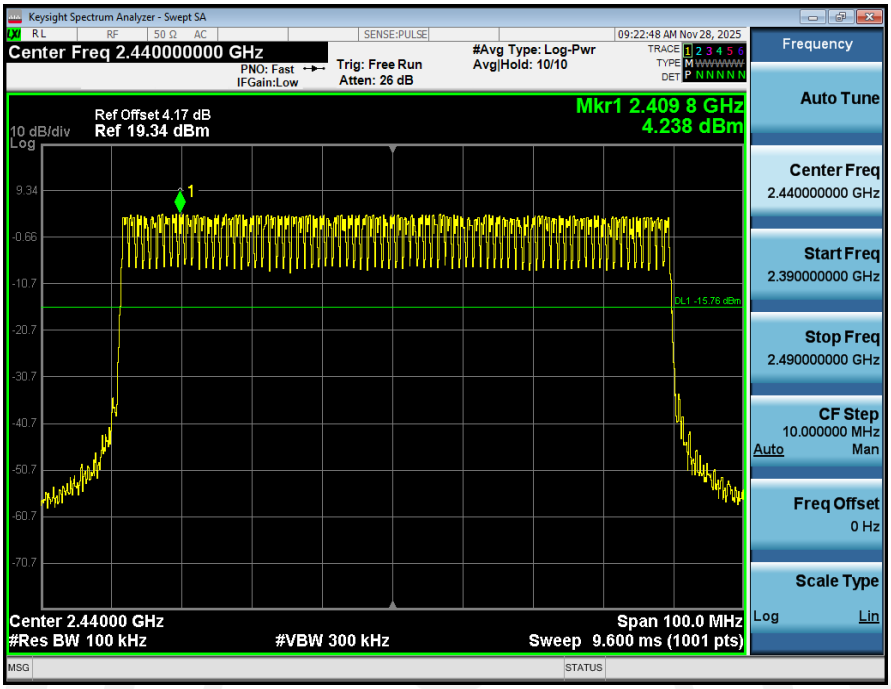


1_Reference_Level_NVNT_ANT1_1-DH1_2479_00

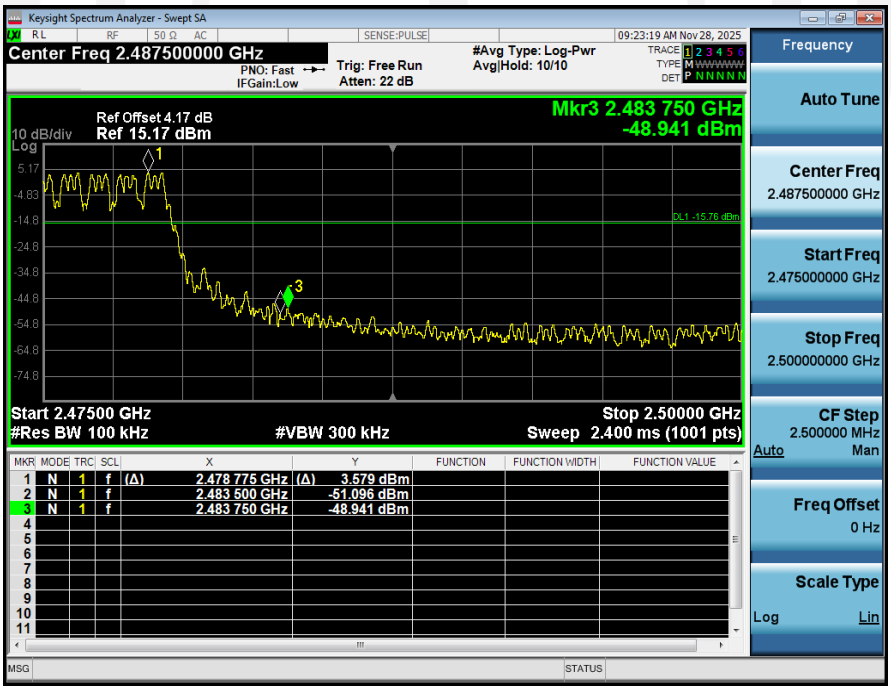
2_Bandedge_NVNT_ANT1_1-DH1_2479_00



1_Reference_Level_Hopping_NVNT_ANT1_1-DH1_Hopping



2_Band_Edge_(Hopping)_NVNT_ANT1_1-DH1_Hopping

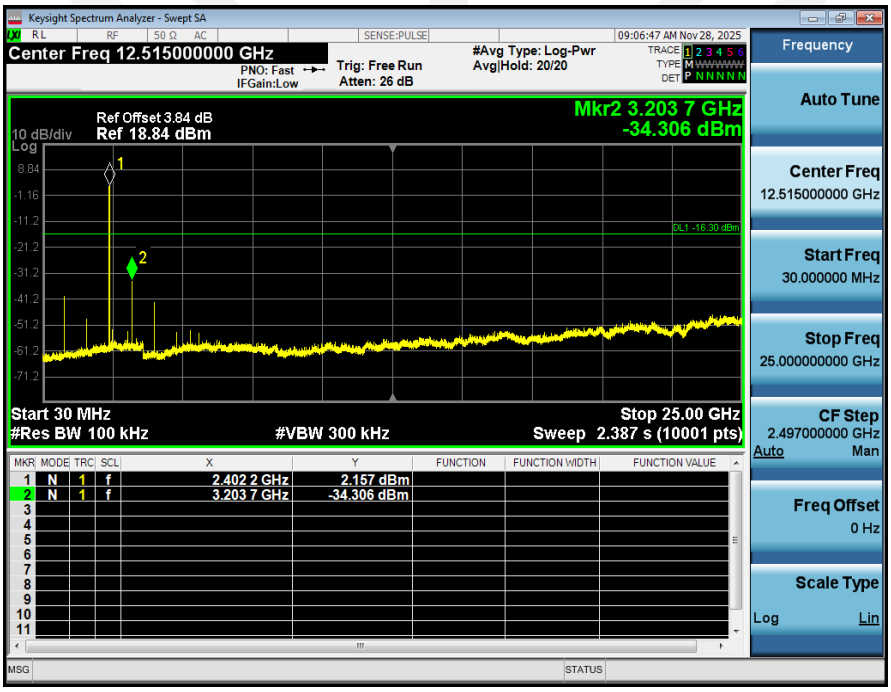


Conducted spurious emission: Pass

Condition	Antenna	Modulation	TX Mode	Ref_level(dBm)	Spurious MAX.Value(dBm)	Limit	Result
NVNT	ANT1	1-DH1	2402.00	3.700	-34.306	-16.300	Pass
NVNT	ANT1	1-DH1	2446.00	3.872	-36.010	-16.128	Pass
NVNT	ANT1	1-DH1	2479.00	3.604	-37.483	-16.396	Pass

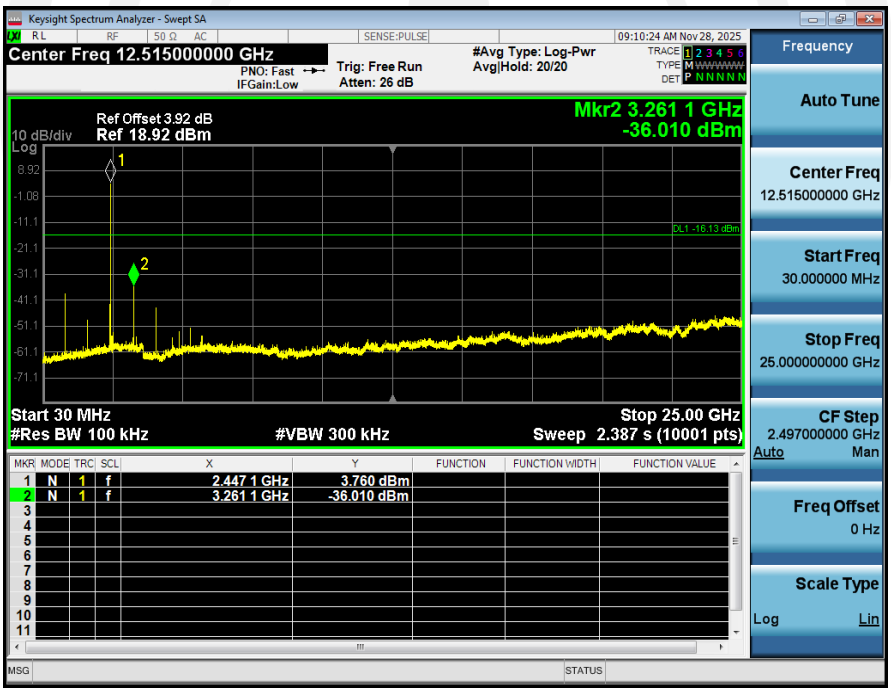
1_Reference_Level_NVNT_ANT1_1-DH1_2402_00

2_Spurious_Emissions_NVNT_ANT1_1-DH1_2402_00



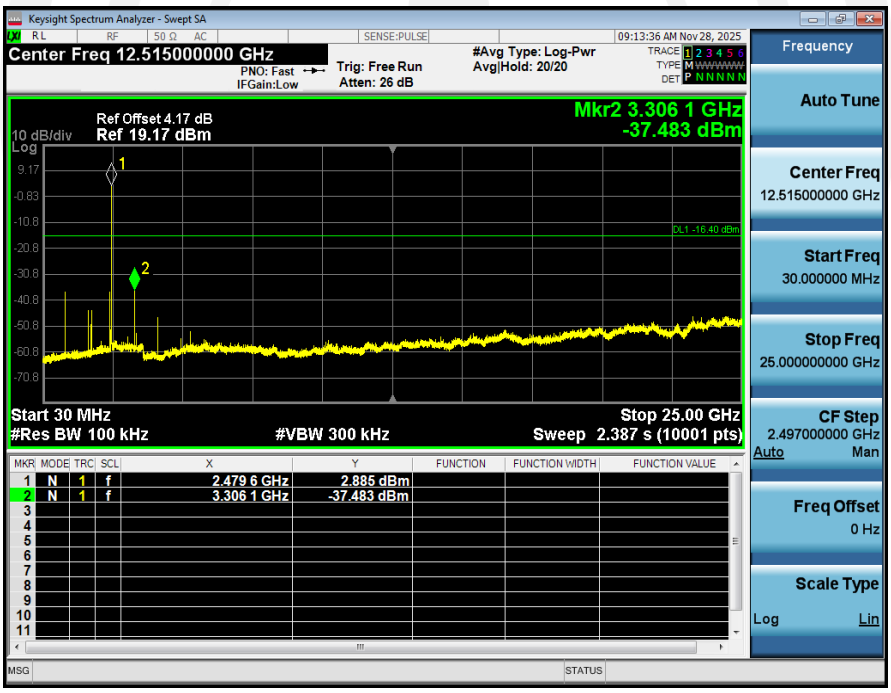
1_Reference_Level_NVNT_ANT1_1-DH1_2446_00

2_Spurious_Emissions_NVNT_ANT1_1-DH1_2446_00



1_Reference_Level_NVNT_ANT1_1-DH1_2479_00

2_Spurious_Emissions_NVNT_ANT1_1-DH1_2479_00



9. Radiated Emissions

9.1. Test Limits

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
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

Note: The peak limit is 20 dB higher than the average limit

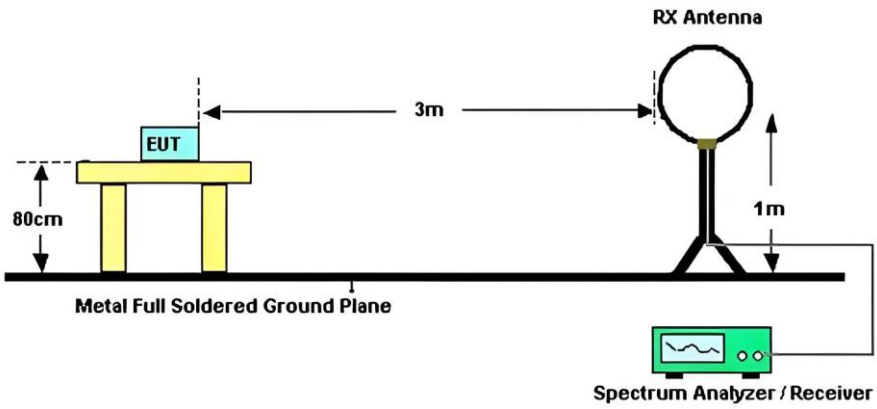
All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

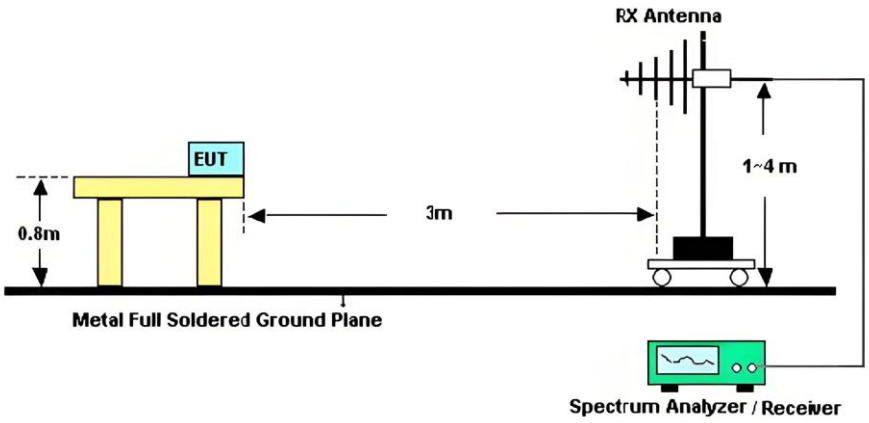
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

9.2. Block Diagram of Test setup

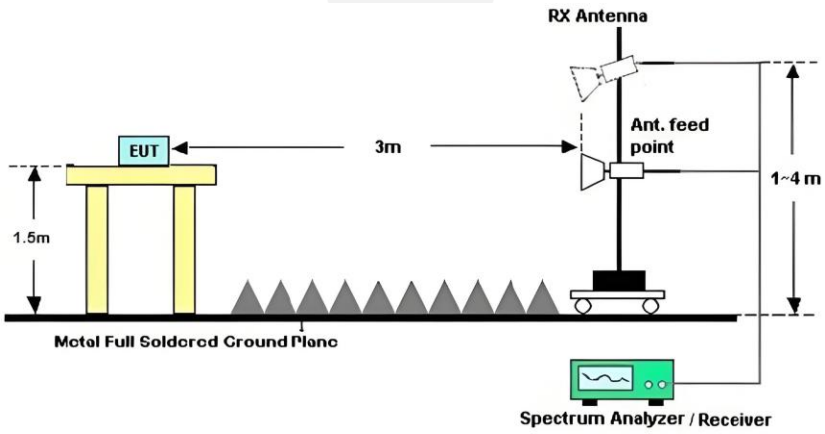
a. In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



b. In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



c. In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



9.3. Test Procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
(2) Setup EUT and simulator
(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
(a) Change work frequency or channel of device if practicable.
(b) Change modulation type of device if practicable.
(c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
(4) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated
(5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10-2020 on Radiated Emission test.
(6) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure.
Test setup information:

9KHz~150KHz	RBW 200Hz	VBW 1KHz
150KHz~30MHz	RBW 9KHz	VBW 30KHz
30MHZ~1GHz	RBW 120KHz	VBW 300KHz
Above1GHz	RBW 1MHz	VBW 3MHz

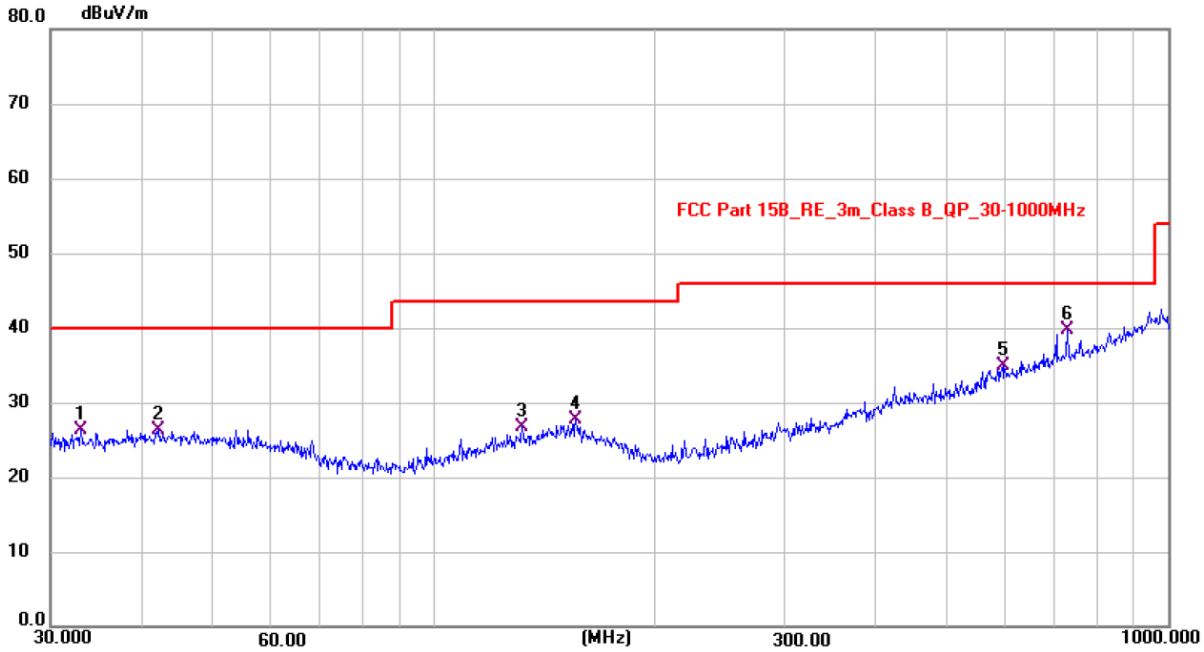
9.4. Test Results

We have scanned from 9kHz to the 10th harmonic of the EUT's highest frequency.
Detailed information please see the following page.

From 9KHz to 30MHz:			
Test Date	: 2025.11.29	Temperature	: 26℃
Test Engineer	: Jensen Wang	Humidity	: 54%
Test Mode	: GFSK mode		
Test Results	: **PASS**		
Note:	The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.		

From 30MHz to 1000MHz:					
Test Date	:	2025.11.29	Temperature	:	26℃
Test Engineer	:	Jensen Wang	Humidity	:	54%
Test Mode	:	GFSK mode			
Test Results	:	**PASS**			
Note:	1. The test results are listed in next pages. 2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out. 3. All modes have been tested, and only worst data of GFSK mode, Channel 2402MHz (DC 3.7V) was listed in this report.				

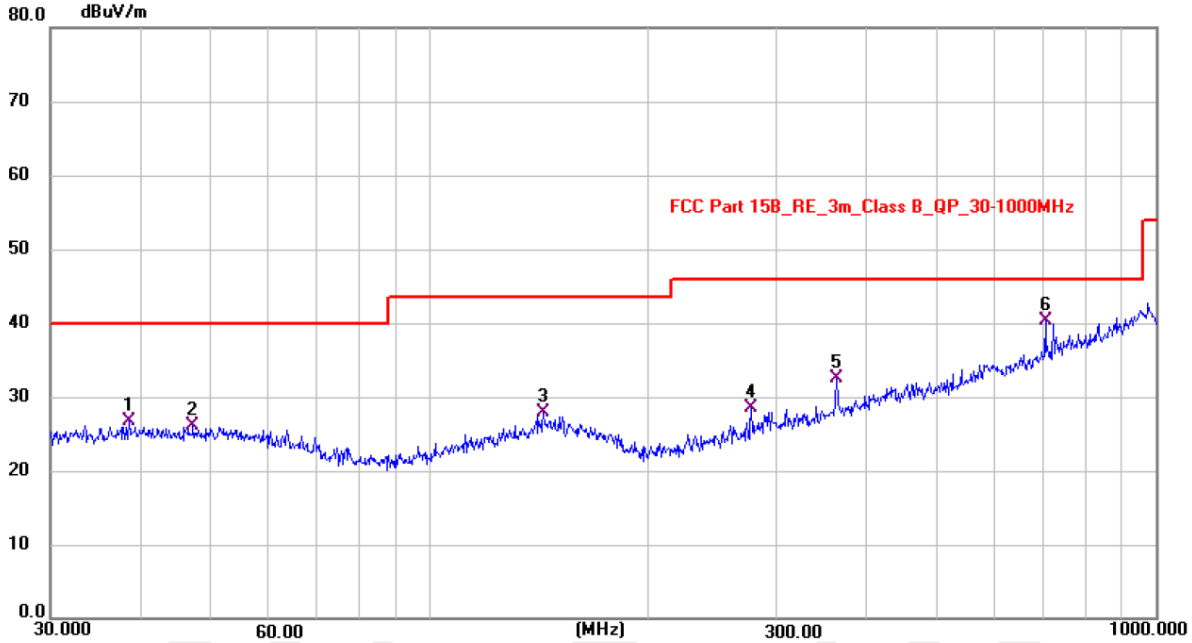
Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	33.0660	12.17	14.17	26.34	40.00	-13.66	QP
2	42.2467	11.75	14.55	26.30	40.00	-13.70	QP
3	131.8155	12.57	14.17	26.74	43.50	-16.76	QP
4	155.9785	12.77	15.02	27.79	43.50	-15.71	QP
5	596.1772	12.76	22.09	34.85	46.00	-11.15	QP
6 *	730.6382	15.07	24.64	39.71	46.00	-6.29	QP

Note: Level = Reading + Factor Margin = Level - Limit

Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	38.5485	12.17	14.50	26.67	40.00	-13.33	QP
2	47.2840	11.68	14.38	26.06	40.00	-13.94	QP
3	143.4517	13.05	14.78	27.83	43.50	-15.67	QP
4	277.9450	14.33	14.08	28.41	46.00	-17.59	QP
5	364.0999	16.12	16.42	32.54	46.00	-13.46	QP
6 *	705.4619	16.19	24.13	40.32	46.00	-5.68	QP

Note: Level = Reading + Factor Margin = Level - Limit

From 1GHz to 25GHz:			
Test Date	: 2025.11.29	Temperature	: 26℃
Test Engineer	: Jensen Wang	Humidity	: 54%
Test Mode	: GFSK mode		
Test Results	: **PASS**		
Note:	1. The test results are listed in next pages. 2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out. 3. If the limits for the measurement with the average detector are met when using a receiver with a quasi-peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.		

Test Mode : GFSK TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4804	V	56.80	-13.25	43.55	74.00	-30.45	Peak
2	4804	V	50.05	-13.25	36.80	54.00	-17.20	Avg
3	7206	--	--	--	--	--	--	--
4	9608	--	--	--	--	--	--	--
5	4804	H	57.71	-13.25	44.46	74.00	-29.54	Peak
6	4804	H	48.29	-13.25	35.04	54.00	-18.96	Avg
7	7206	--	--	--	--	--	--	--
8	9608	--	--	--	--	--	--	--
Test Mode : GFSK TX Mid								
1	4892	V	57.70	-12.98	44.72	74.00	-29.28	Peak
2	4892	V	48.36	-12.98	35.38	54.00	-18.62	Avg
3	7338	--	--	--	--	--	--	--
4	9784	--	--	--	--	--	--	--
5	4892	H	54.83	-12.98	41.85	74.00	-32.15	Peak
6	4892	H	45.07	-12.98	32.09	54.00	-21.91	Avg
7	7338	--	--	--	--	--	--	--
8	9784	--	--	--	--	--	--	--
Test Mode : GFSK TX High								
1	4958	V	56.43	-12.70	43.73	74.00	-30.27	Peak
2	4958	V	49.18	-12.70	36.48	54.00	-17.52	Avg
3	7437	--	--	--	--	--	--	--
4	9916	--	--	--	--	--	--	--
5	4958	H	57.87	-12.70	45.17	74.00	-28.83	Peak
6	4958	H	46.35	-12.70	33.65	54.00	-20.35	Avg
7	7437	--	--	--	--	--	--	--
8	9916	--	--	--	--	--	--	--

Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor.
Margin= Result-Limit.

10.Band Edge Test

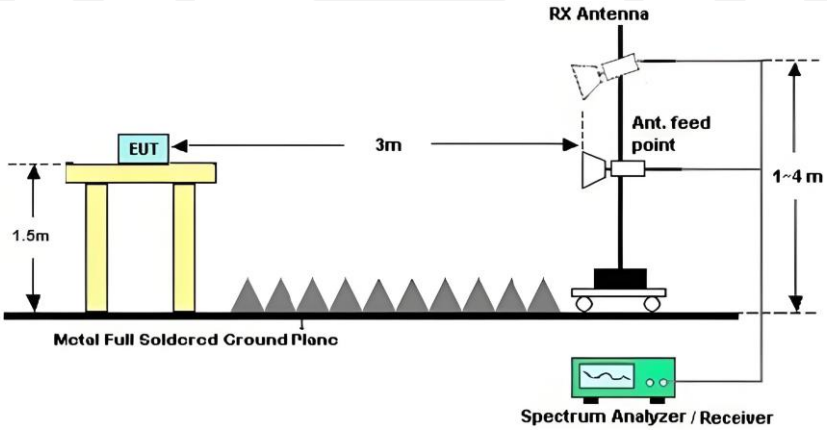
10.1.Test Limit

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)(see § 15.205(c)).`

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241

10.2.Block Diagram of Test Setup



10.3.Test Procedure

ANSI C63.10-2020 section 6.10.5.2

All restriction band and non- restriction band have been tested, only worse case is reported.

Details see the KDB558074 D01 Meas Guidance v05r02

1. Put the EUT on a 1.5m high table, power on the EUT. Emissions were scanned and measured rotating the EUT to 360 degrees, Find the maximum Emission
2. Check the spurious emissions out of band.
3. RBW 1MHz, VBW 3MHz, peak detector for peak value, RBW 1MHz, VBW 10Hz, RMS detector for AV value.

10.4.Test Results

Test Date	:	2025.11.29	Temperature	:	26℃
Test Engineer	:	Jensen Wang	Humidity	:	54%
Test Results	:	**PASS**			

Frequency Range : **2310MHz~2410MHz**								
Test Mode : GFSK TX 2402MHz								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	2390	H	61.67	-20.45	41.22	74.00	-32.78	Peak
2	2390	H	--	-20.45	41.22	54.00	-12.78	Avg
3	2400	H	63.80	-20.41	43.39	74.00	-30.61	Peak
4	2400	H	--	-20.41	43.39	54.00	-10.61	Avg
1	2390	V	60.71	-20.45	40.26	74.00	-33.74	Peak
2	2390	V	--	-20.45	40.26	54.00	-13.74	Avg
3	2400	V	65.98	-20.41	45.57	74.00	-28.43	Peak
4	2400	V	--	-20.41	45.57	54.00	-8.43	Avg
Frequency Range : **2450MHz~2550MHz**								
Test Mode : GFSK TX 2479MHz								
1	2483.5	H	61.77	-20.15	41.62	74.00	-32.38	Peak
2	2483.5	H	--	-20.15	41.62	54.00	-12.38	Avg
1	2483.5	V	66.67	-20.15	46.52	74.00	-27.48	Peak
2	2483.5	V	--	-20.15	46.52	54.00	-7.48	Avg

Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor.
Margin= Result-Limit.
3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

11. Power Line Conducted Emissions

11.1. Test Limits

Frequency (MHz)	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.

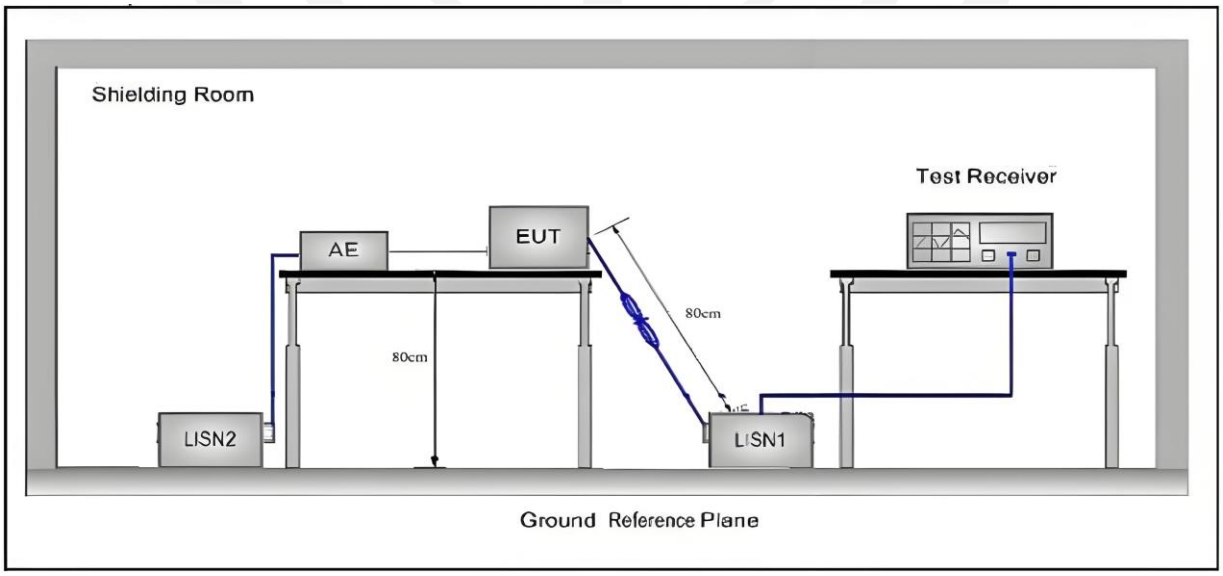
2. The lower limit shall apply at the transition frequencies.

3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

11.2. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10-2020 on Conducted Emission Measurement. The bandwidth of test receiver is set at 9 kHz.

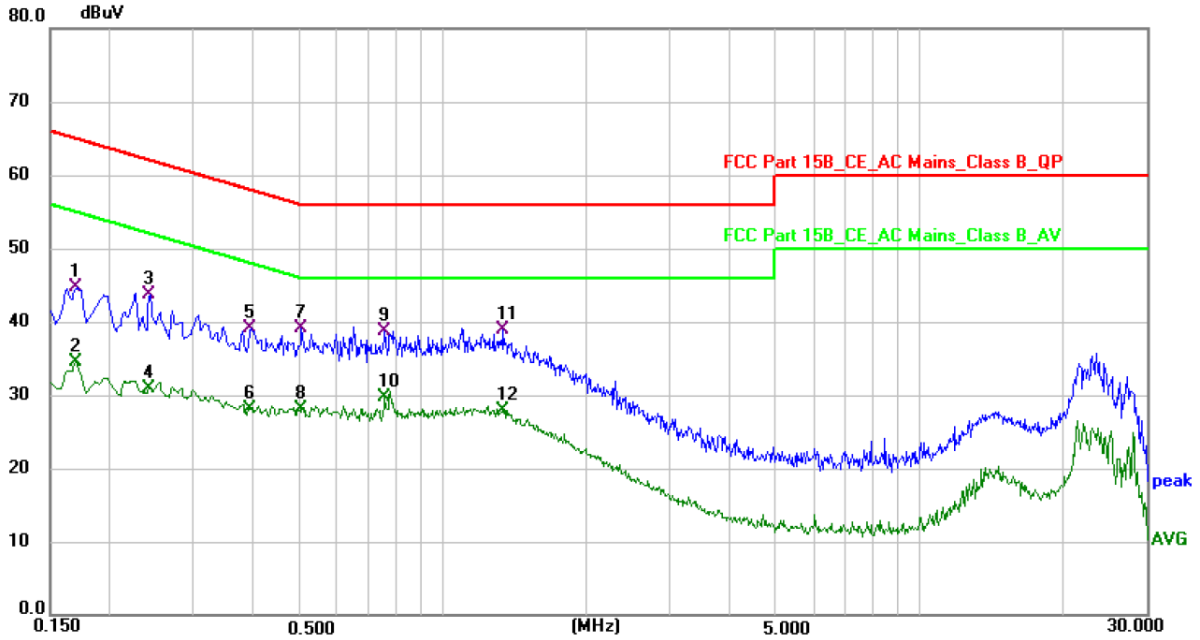
11.3. Test Setup



11.4.Test Results

Test Date	:	2025.11.29	Temperature	:	26℃
Test Engineer	:	Jensen Wang	Humidity	:	54%
Test Mode	:	GFSK mode			
Test Results	:	**PASS**			
Note:	1. The test results are listed in next pages. 2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out. 3. If the limits for the measurement with the average detector are met when using a receiver with a quasi-peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out. 4. All modes have been tested, and only worst data of GFSK mode, Channel 2402MHz (AC 120V/ 60Hz) was listed in this report.				

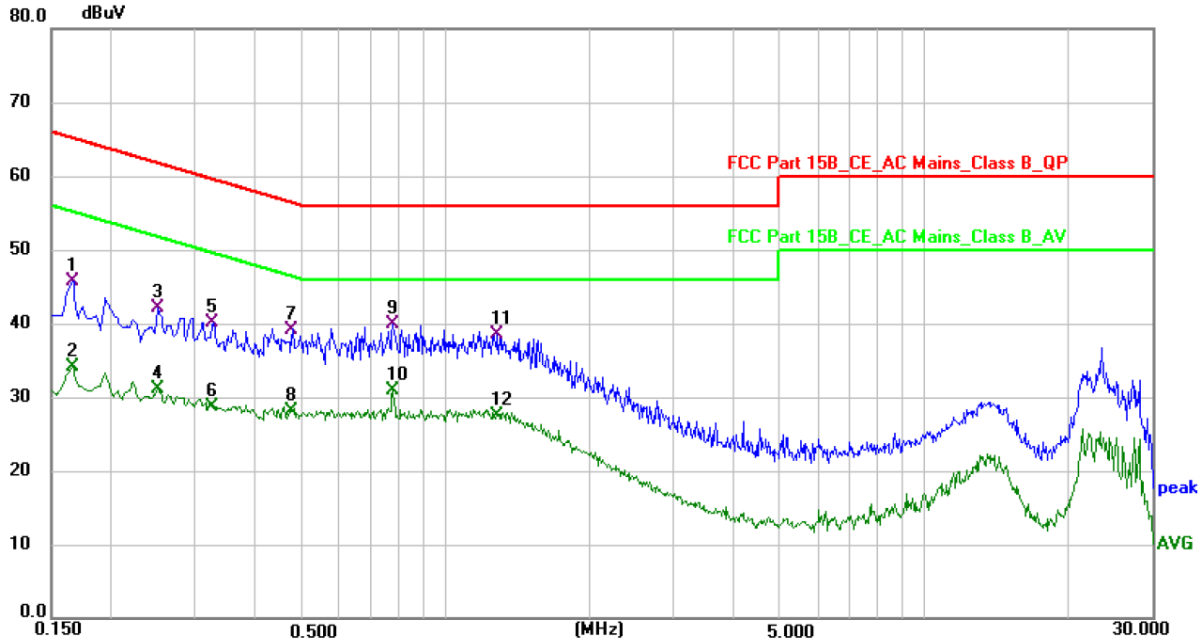
Polarization: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1700	34.83	9.94	44.77	64.96	-20.19	QP
2	0.1700	24.47	9.94	34.41	54.96	-20.55	AVG
3	0.2420	33.82	9.97	43.79	62.03	-18.24	QP
4	0.2420	20.97	9.97	30.94	52.03	-21.09	AVG
5	0.3940	29.37	9.64	39.01	57.98	-18.97	QP
6	0.3940	18.53	9.64	28.17	47.98	-19.81	AVG
7	0.5060	29.29	9.90	39.19	56.00	-16.81	QP
8	0.5060	18.23	9.90	28.13	46.00	-17.87	AVG
9	0.7580	29.28	9.43	38.71	56.00	-17.29	QP
10 *	0.7580	20.34	9.43	29.77	46.00	-16.23	AVG
11	1.3380	29.51	9.40	38.91	56.00	-17.09	QP
12	1.3380	18.54	9.40	27.94	46.00	-18.06	AVG

Note: Level = Reading + Factor Margin = Level - Limit

Polarization: N



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1660	35.80	9.86	45.66	65.16	-19.50	QP
2	0.1660	24.16	9.86	34.02	55.16	-21.14	AVG
3	0.2500	32.20	9.91	42.11	61.76	-19.65	QP
4	0.2500	21.29	9.91	31.20	51.76	-20.56	AVG
5	0.3260	30.37	9.72	40.09	59.55	-19.46	QP
6	0.3260	19.00	9.72	28.72	49.55	-20.83	AVG
7	0.4780	29.47	9.73	39.20	56.37	-17.17	QP
8	0.4780	18.42	9.73	28.15	46.37	-18.22	AVG
9	0.7780	30.14	9.71	39.85	56.00	-16.15	QP
10 *	0.7780	21.20	9.71	30.91	46.00	-15.09	AVG
11	1.2860	28.98	9.44	38.42	56.00	-17.58	QP
12	1.2860	18.03	9.44	27.47	46.00	-18.53	AVG

Note: Level = Reading + Factor Margin = Level - Limit

12. Antenna Requirements

12.1. Test Limit

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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

12.2. Test Result

The EUT antenna is internal antenna. It complies with the standard requirement.

13.Photos of test setup

Reference to the **appendix I Test Setup Photo** for details.

14. Photos of EUT

Reference to the **appendix II external photos** and **appendix III internal photos** for details.

------ END OF REPORT------