TEST REPORT

CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.: CTK-2022-02888

1. Applicant

◦ Name : NEOLAB CONVERGENCE

◦ Address : #1501, Mario Tower, 28, Digital-ro 30-gil, Guro-gu, Seoul, Korea 08389

◦ Date of Receipt : 2022-09-30

2. Manufacturer

◦ Name : NEOLAB CONVERGENCE

◦ Address : #1501, Mario Tower, 28, Digital-ro 30-gil, Guro-gu, Seoul, Korea 08389

3. Use of Report : For FCC Certification

4. Test Sample / Model: NWP-F151 / NWP-F151

5. Date of Test : 2022-10-31 to 2022-11-07

6. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.247
ANSI C63.10-2013

7. Testing Environment: refer to 6 page

8. Test Results : Compliance

9. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing
(Address : 5, Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, 17142 Korea)

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This report cannot be reproduced or copied without the written consent of CTK

Approval	Tested by Gwanyong Kim: (Signature)	Technical Manager Young-taek Lee: (Signature)

Remark. This report is not related to KOLAS accreditation and relevant regulation

2022-11-14

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REPORT REVISION HISTORY

Date	Revision	Page No
2022-11-14	Issued (CTK-2022-02888)	all

CONTENTS

1. General Product Description

1.1 Client Information

Company	NEOLAB CONVERGENCE
Contact Point	#1501, Mario Tower, 28, Digital-ro 30-gil, Guro-gu, Seoul, Korea 08389
Contact Person	Name : Cho Min-Gu E-mail : mgcho@neolab.net Tel : +82–70-4377-0741 Fax : +82-2-3462-2983

1.2 Product Information

FCC ID	2AALG-NWP-F151
Product Description	NWP-F151
Basic model	NWP-F151
Variant Model name	-
Operating Frequency	2 402 MHz - 2 480 MHz
RF Output Power	7.78 dBm (5.998 mW)
Antenna type	Chip Antenna
Antenna gain	2.9 dBi
Number of channels	40
Channel Spacing	2 MHz
Type of Modulation	GFSK (Bluetooth LE 1 Mbps)
Power Source	DC 3.7 V (Battery)
Test Software	Airoha Tool Kit – V2.5.4
RF Power setting in Test SW	Power setting input “GC 55”

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253R6P
AC/DC Adapter	HP	HSTNN-LA40	7628011101

2. Accreditations

2.1 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	8737A
KOREA	NRRA	KR0025

2.2 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

3. Test Specifications

3.1 Standards

Section in FCC	Requirement(s)	Status (Note 1)	Test Condition
15.247(a)	6 dB Bandwidth	C	Conducted
15.247(e)	Transmitter power spectral density	C	
15.247(b)	Maximum peak conducted output power	C	
15.247(d)	Unwanted emission	C	
15.209	Transmitter emission	C	Radiated
15.207(a)	AC Conducted Emission	C	Line Conducted
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable			
Note 2: The data in this test report are traceable to the national or international standards.			
Note 3: The sample was tested according to the following specification: FCC Part 15.247, ANSI C63.10-2013			
Note 4: The tests were performed according to the method of measurements prescribed in KDB No.558074, ANSI C63.10-2013			

3.2 Testing Environment

Test Item		Test Date	Temperature	Relative Humidity
6 dB Bandwidth		2022-11-01	23	43
Transmitter power spectral density				
Maximum peak conducted output power				
Unwanted emission (Conducted)				
Transmitter emission (Radiated)	1) 9 kHz to 30 MHz	2022-11-02	21	43
	2) 30 MHz to 1 GHz			
	3) 1 GHz to 18 GHz	2022-10-31 ~ 2022-11-07	20~23	39~46
	4) 18 GHz to 26.5 GHz			
	5) Restricted Frequency Bands			
AC Conducted Emission		2022-11-02	19	44

3.3 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments.
During at testing, system components were manipulated within the confines of typical usage to maximize each emission. All modulation modes were tests.
The results are only attached worst cases.

Test Frequency

Lowest channel	Middle channel	Highest channel
2 402 MHz	2 440 MHz	2 480 MHz

Test mode

Mode	Duty Cycle	Duty Cycle Factor
Bluetooth LE 1 Mbps	85.24 %	0.70 dB

3.4 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
Coverage factor k = 2, Confidence levels of 95 %

Description	Uncertainty
Conducted RF Output Power	1.5 dB (C.L. : Approx. 95 %, k = 2)
Power Spectral Density	1.5 dB (C.L. : Approx. 95 %, k = 2)
Occupied Bandwidth	0.1 MHz (C.L. : Approx. 95 %, k = 2)
Unwanted Emission(conducted)	3.0 dB (C.L. : Approx. 95 %, k = 2)
Radiated Emissions (f ≤ 30 MHz)	1.5 dB (C.L. : Approx. 95 %, k = 2)
Radiated Emissions (f ≤ 1 GHz)	3.88 dB (C.L. : Approx. 95 %, k = 2)
Radiated Emissions (f > 1 GHz)	4.62 dB (C.L. : Approx. 95 %, k = 2)
AC Conducted Emission	1.94 dB (C.L. : Approx. 95 %, k = 2)
Temperature	1 ℃ (C.L.: Approx. 95 %, k = 2)
Relative Humidity	3 % (C.L.: Approx. 95 %, k = 2)

4. Technical Characteristic Test

4.1 6 dB Bandwidth and 99 % Bandwidth

Test Procedures

KDB 558074 – Section 8.2
ANSI C63.10–2013 – Section 6.9.2

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Procedures

ANSI C63.10-2013 – Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission.
Use the 99 % power bandwidth function of the instrument and report the measured bandwidth.

Test Settings :

Center frequency = the highest, middle and the lowest channels

a) RBW = 100 kHz (6dB Bandwidth)

b) RBW = 1 % to 5 % of the OBW (99 % Bandwidth)

c) VBW ≥ 3 x RBW

d) Detector = peak

e) Trace mode = Max hold

f) Sweep = auto couple

g) Allow trace to fully stabilize

h) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Limit : 6 dB Bandwidth

6 dB Bandwidth > 500 kHz

Limit : 99 % Bandwidth

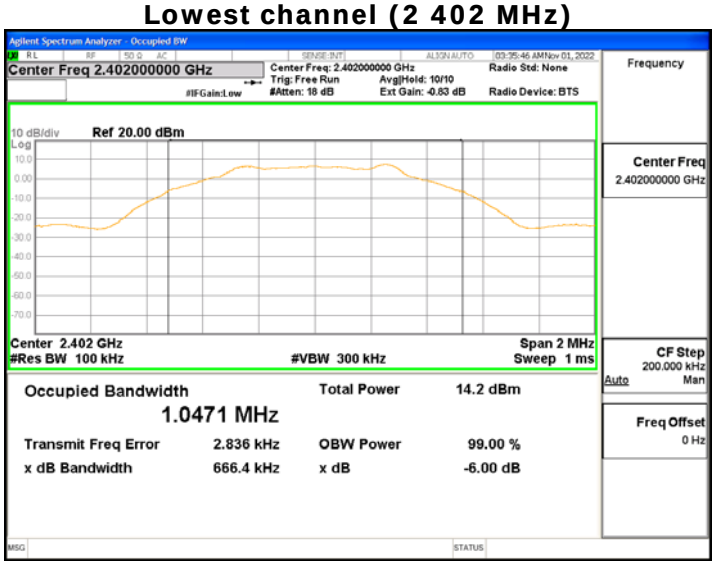
N/A

Test Data :

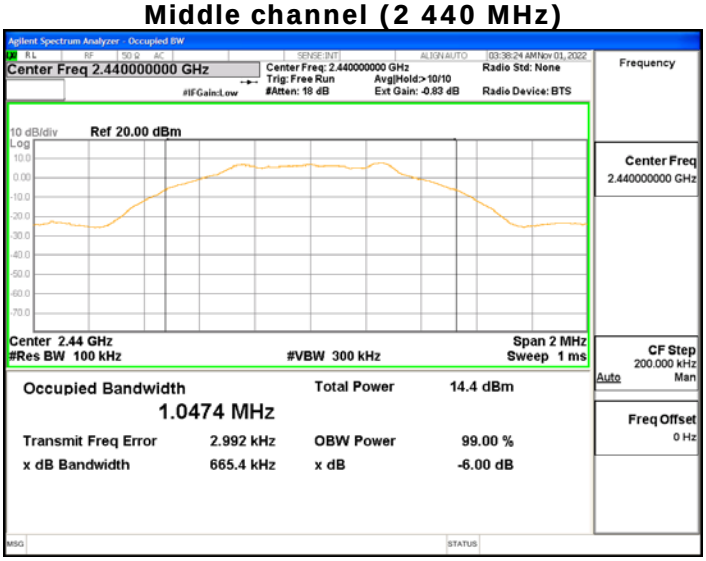
Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	99 % Bandwidth [MHz]	Result
Lowest	2 402	0.666	1.047	Complies
Middle	2 440	0.665	1.047	
Highest	2 480	0.664	1.047	

See next pages for actual measured spectrum plots.

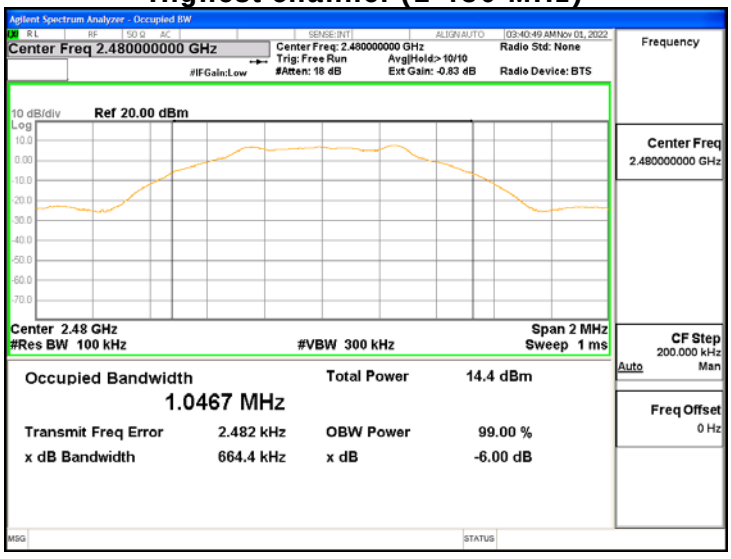
Lowest channel (2 402 MHz)



Middle channel (2 440 MHz)



Highest channel (2 480 MHz)



4.2 Maximum peak Conducted Output Power

Test Procedures

KDB 558074 – Section 8.3.1.1
ANSI C63.10-2013 – Section 11.9.1.1

The following procedure can be used when the maximum available RBW of the instrument is greater than the DTS bandwidth:

Test Settings :

Center frequency = the highest, middle and the lowest channels

a) RBW ≥ DTS Bandwidth
b) VBW ≥ 3 x RBW
c) span ≥ 3 x RBW
d) Sweep time = auto couple
e) Detector = peak
f) Trace mode= max hold
g) Allow trace to fully stabilize
h) Use peak marker function to determine the peak amplitude level.

Limit :

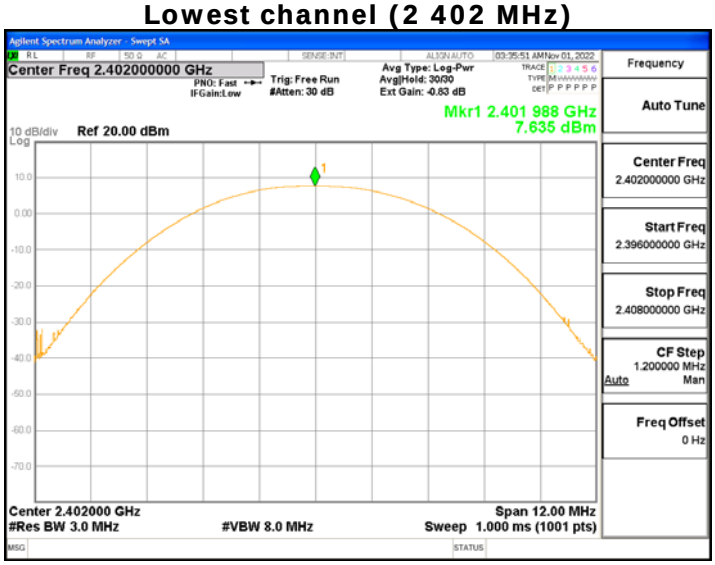
Maximum Output Power	<	1 W (30 dBm)

Test Data :

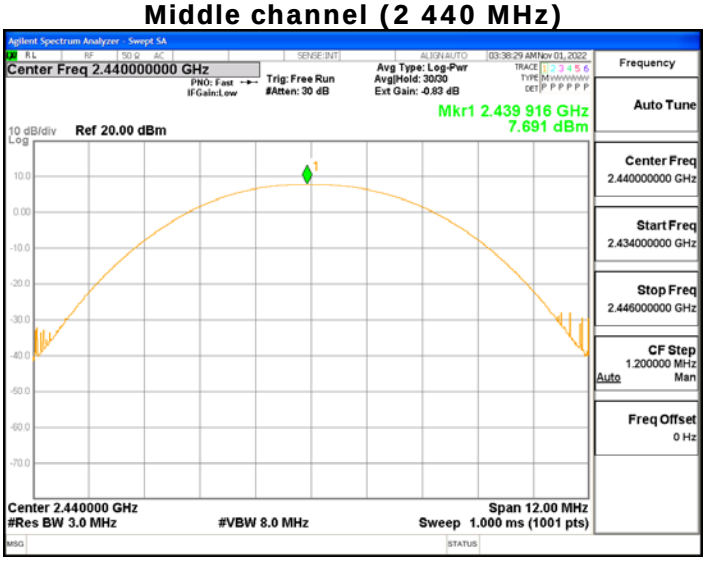
Channel	Frequency [MHz]	Measurement data [dBm]	Limit [dBm]	Result
Lowest	2 402	7.64	30	Complies
Middle	2 440	7.69	30	
Highest	2 480	7.78	30	

See next pages for actual measured spectrum plots.

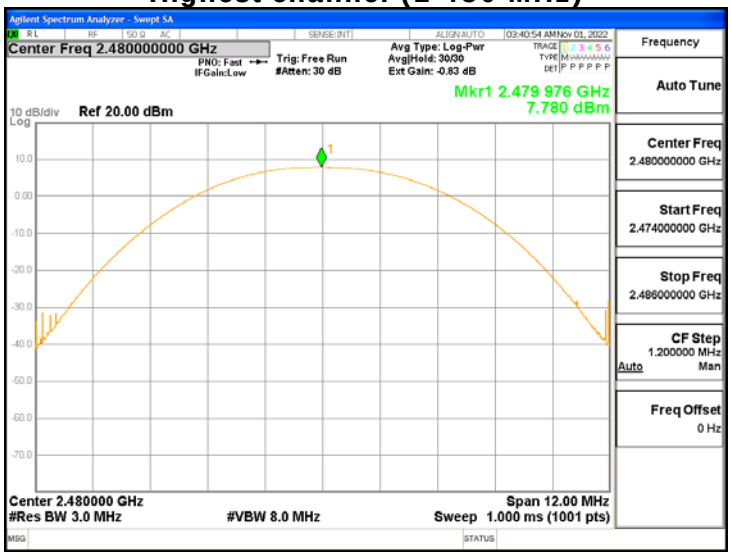
Lowest channel (2 402 MHz)



Middle channel (2 440 MHz)



Highest channel (2 480 MHz)



4.3 Power Spectral Density

Test Procedures

KDB 558074 – Section 8.4
ANSI C63.10–2013 – Section 11.10.2

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

Test Settings :

Center frequency = the highest, middle and the lowest channels

a) RBW : 3 kHz ≤ RBW ≤ 100 kHz
b) VBW ≥ 3 x RBW
c) span ≥ 1.5 x DTS bandwidth
d) Sweep time = auto couple
e) Detector = peak
f) Trace mode= max hold
g) Allow trace to fully stabilize
h) Use the peak marker function to determine the maximum amplitude level within the RBW.

Limit :

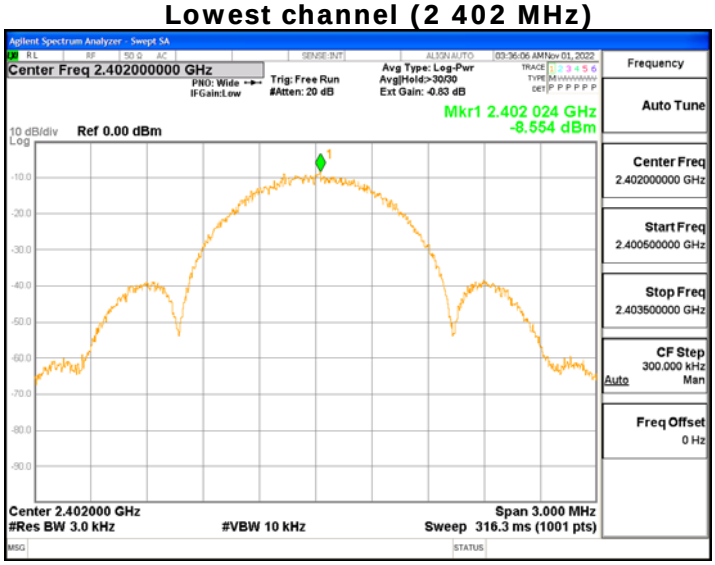
Power Spectral Density < 8 dBm @ 3 kHz BW

Test Data :

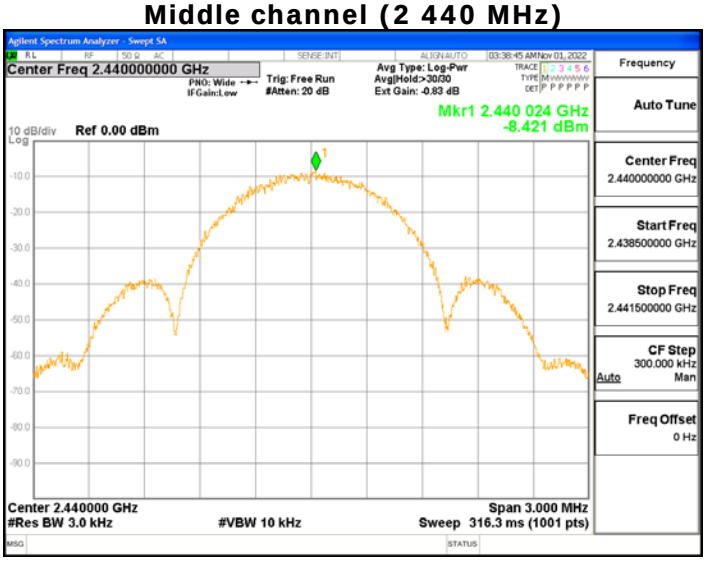
Channel	Frequency [MHz]	Measurement data [dBm]	Limit [dBm]	Result
Lowest	2 402	-8.554	8	Complies
Middle	2 440	-8.421		
Highest	2 480	-8.380		

See next pages for actual measured spectrum plots.

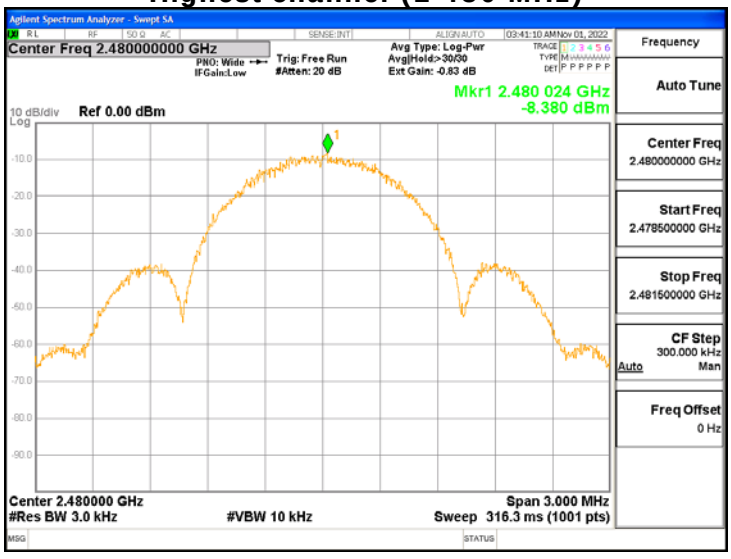
Lowest channel (2 402 MHz)



Middle channel (2 440 MHz)



Highest channel (2 480 MHz)



4.4 Band Edge & Conducted Spurious emission

Test Procedures

KDB 558074 – Section 8.5
ANSI C63.10–2013 – Section 11.11.3

The Unwanted emission from the EUT were measured according to the dictates PKPSD measurement procedure in section 11.11 of ANSI C63.10-2013.

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 root-mean-square averaging over a time interval, as permitted under Section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB.

Test Settings :

Center frequency = the highest, middle and the lowest channels

a) RBW = 100 kHz
b) VBW ≥ 3 x RBW
c) Detector = peak
d) Sweep time = auto couple
e) Trace mode= max hold
f) Allow trace to fully stabilize
g) Use the peak marker function to determine the maximum amplitude level.

Limit :

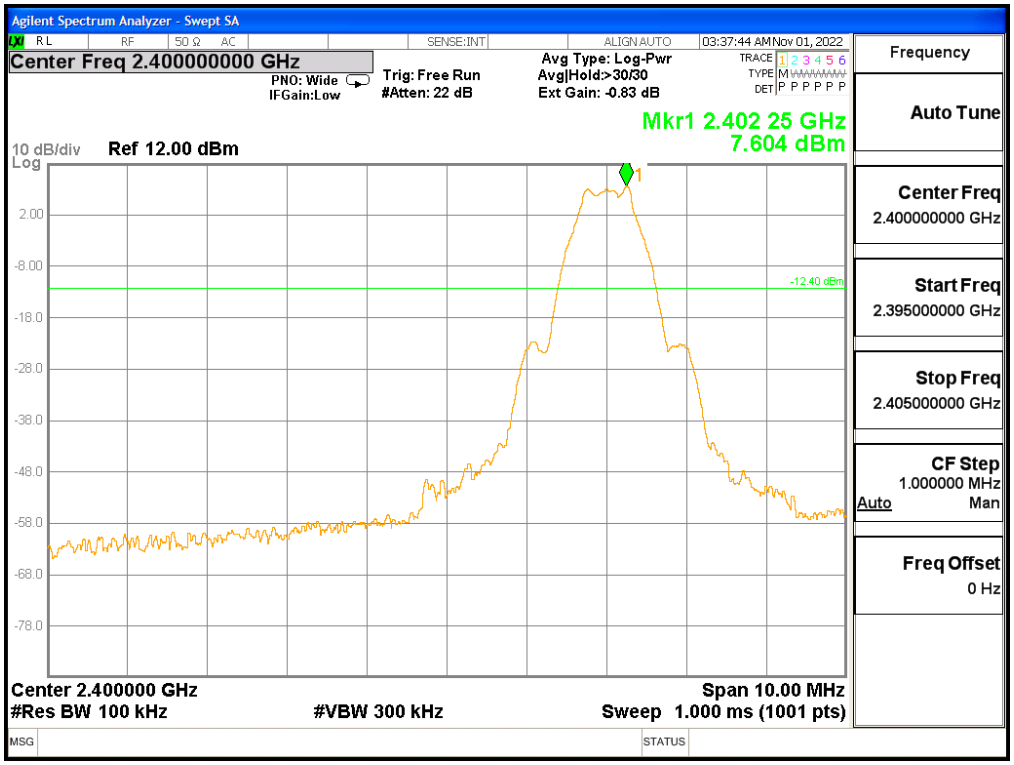
Emission level < 20 dBc

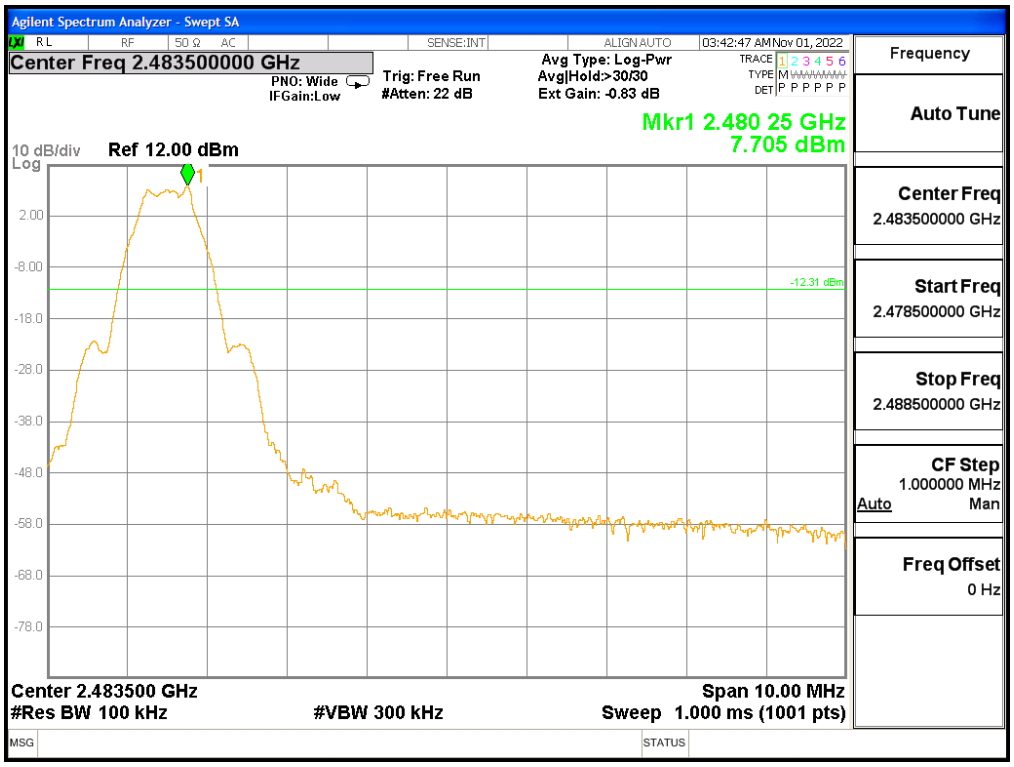
Test results : Complies

- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20 dB lower than the highest in-band spectral density. Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.

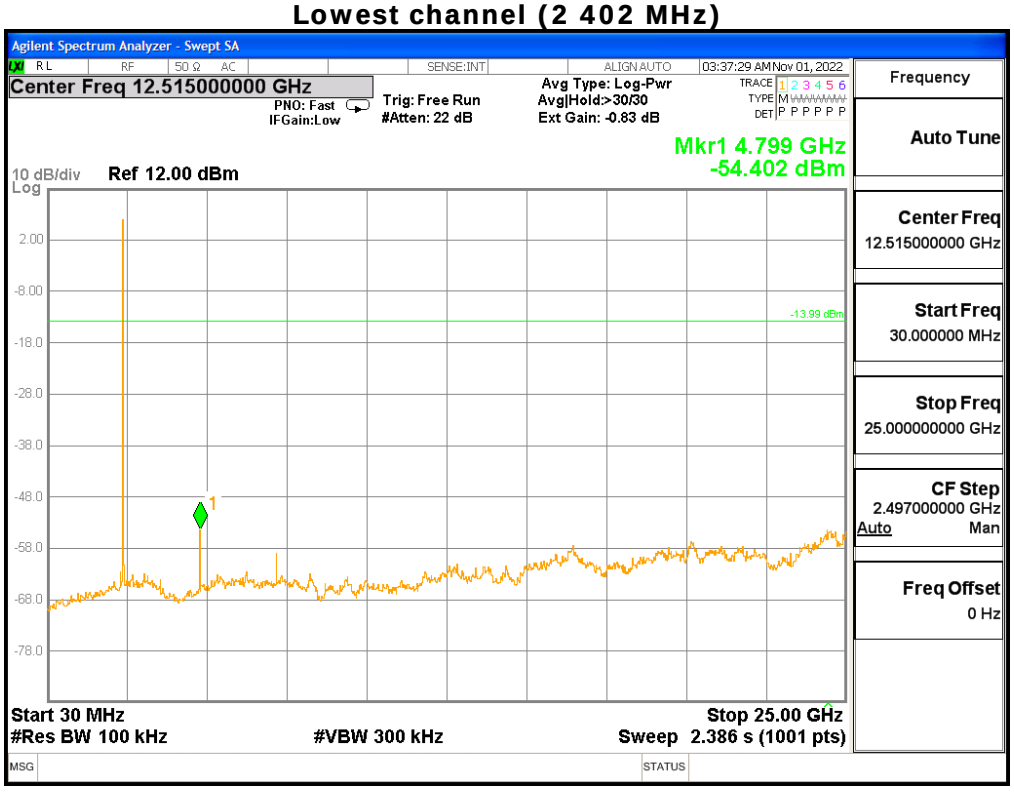
Band-edge


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.400000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 22 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.83 dB
03:37:44 AM Nov 01, 2022
Mkr1 2.402 25 GHz
7.604 dBm
10 dB/div
Log
Ref 12.00 dBm
-12.40 dBm
Center 2.400000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.400000000 GHz
Start Freq
2.395000000 GHz
Stop Freq
2.405000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

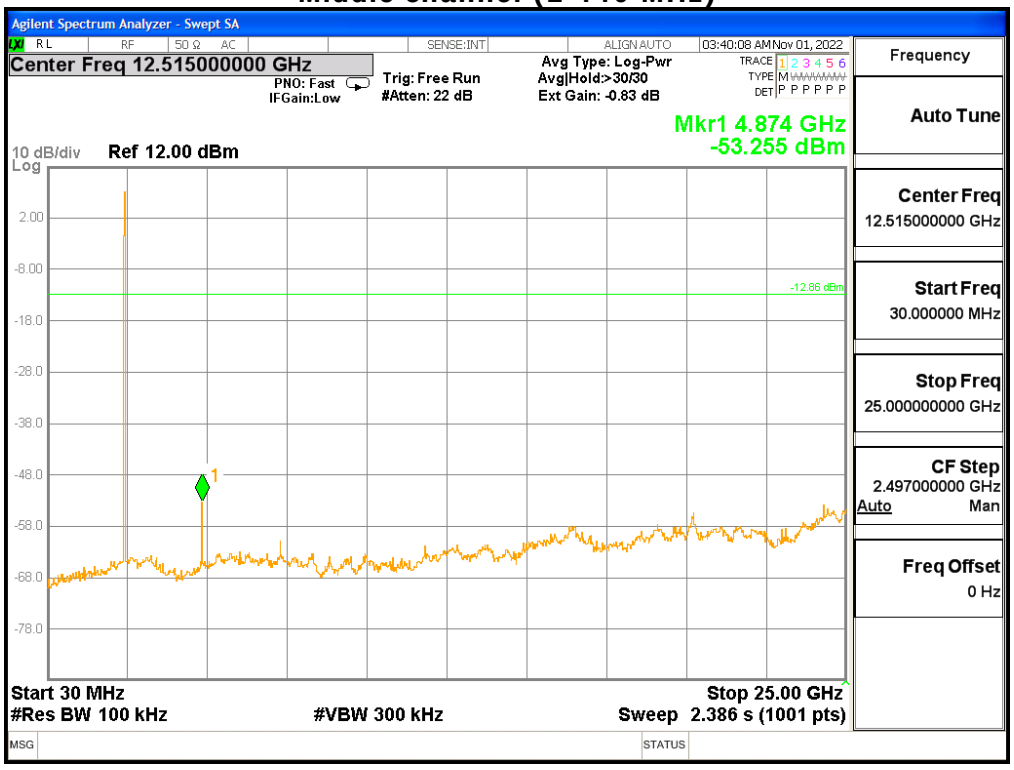

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.483500000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 22 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.83 dB
03:42:47 AM Nov 01, 2022
Mkr1 2.480 25 GHz
7.705 dBm
10 dB/div
Log
Ref 12.00 dBm
-12.31 dBm
Center 2.483500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.483500000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.488500000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

Conducted Spurious emission

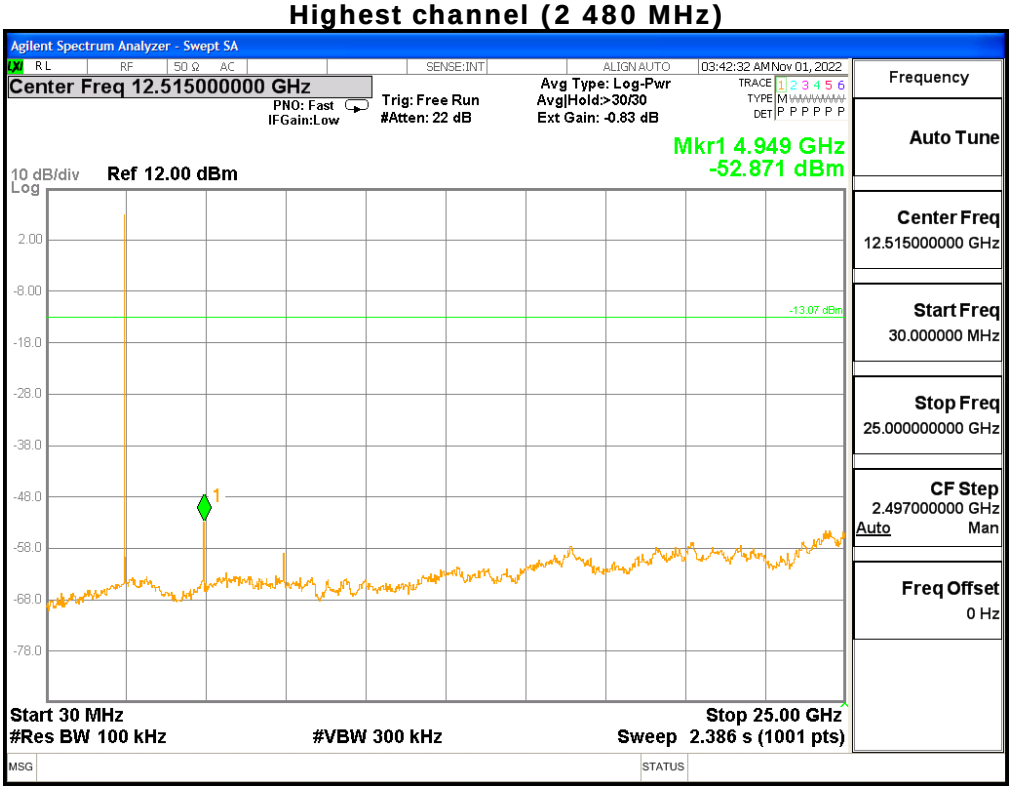
Lowest channel (2 402 MHz)



Middle channel (2 440 MHz)



Highest channel (2 480 MHz)



4.5 Radiated Emission

Test Location

☒ 10 m SAC (test distance : ☐ 10 m, ☒ 3 m)
☒ 3 m SAC (test distance : 3 m)

Test Procedures

KDB 558074 – Section 8.5, 8.6
ANSI C63.10–2013 – Section 11.11, 11.12

1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
2) In the frequency rage above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3 m away from the EUT. Test Antenna height is carried from 1 m to 4 m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

Test Settings :

Frequency Range = 9 kHz ~ 26.5 GHz (2.4 GHz 10^{th} harmonic)

a) RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz, 9 kHz for f < 30 MHz,
200 Hz for f < 150 kHz

b) VBW ≥ RBW

c) Sweep time = auto couple

Limit :

FCC Part 15 § 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

Table 1. Restricted Frequency Bands

MHz	MHz	MHz	MHz	MHz	GHz
0.09-0.11	8.37626-8.38675	73-74.6	399.9-410	2690-2900	10.6-12.7
[1]0.495-0.505	8.41425-8.41475	74.8-75.2	608-614	3260-3267	13.25-13.4
2.1735-2.1905	12.29-12.293	108-121.94	960-1240	3332-3339	14.47-14.5
4.125-4.128	12.51975-12.52025	123-138	1300-1427	3345.8-3358	15.35-16.2
4.17725-4.17775	12.57675-12.57725	149.9-150.05	1435-1626.5	3600-4400	17.7-21.4
4.20725-4.20775	13.36-13.41	156.52475-156.52525	1645.5-1646.5	4500-5150	22.01-23.12
6.215-6.218	16.42-16.423	156.7-156.9	1660-1710	5350-5460	23.6-24
6.26775-6.26825	16.69475-16.69525	162.0125-167.17	1718.8-1722.2	7250-7750	31.2-31.8
6.31175-6.31225	16.80425-16.80475	167.72-173.2	2200-2300	8025-8500	36.43-36.5
8.291-8.294	25.5-25.67	240-285	2310-2390	9000-9200	[2]Above 38.6
8.362-8.366	37.5-38.25	322-335.4	2483.5-2500	9300-9500	

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

FCC Part 15 § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 2 :

Table 2. General Field Strength Limits for Licence-Exempt Transmitters

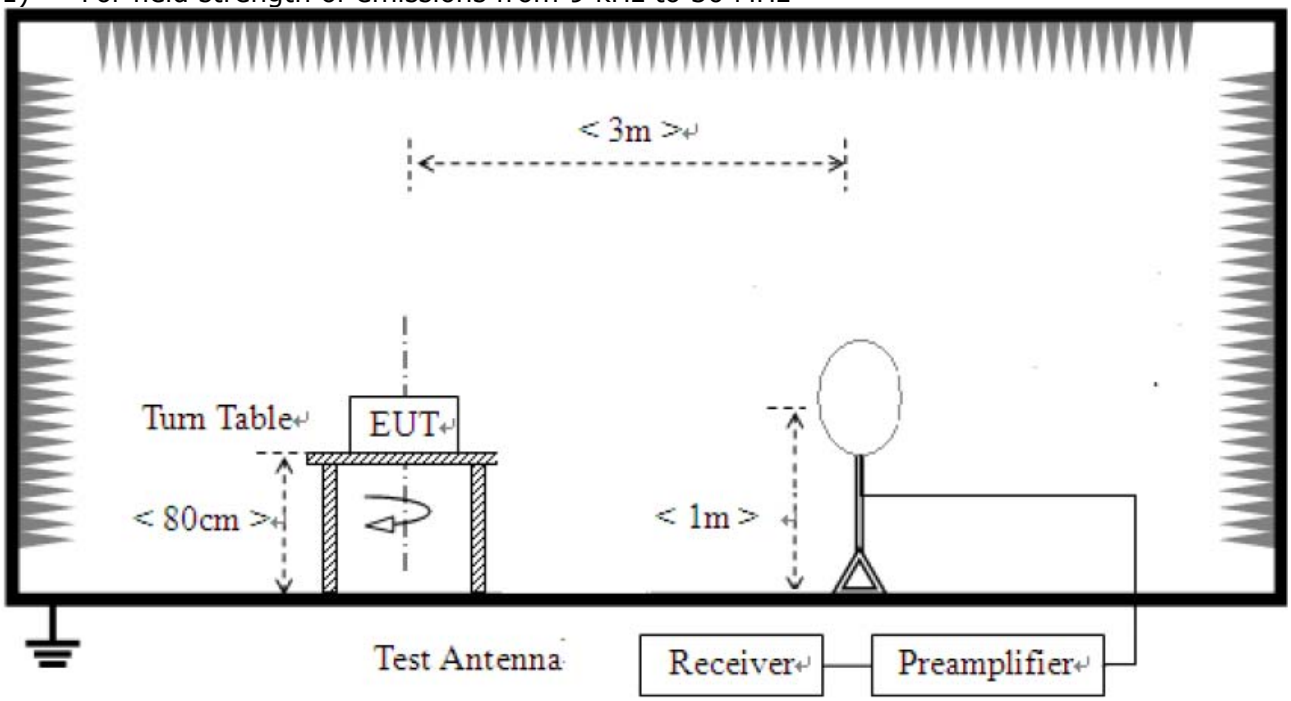
Frequency(MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Deasurement Distance (meters)
0.009-0.490	2400/F(kHz)	48.5 – 13.8	300
0.490-1.705	24000/F(kHz)	33.8 – 23	30
1.705-30	30	29.5	30
30-88	100**	40	3
88-216	150**	43.5	3
216-960	200**	46	3
Above 960	500	54	3

** Except as provided in 15.209(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, 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

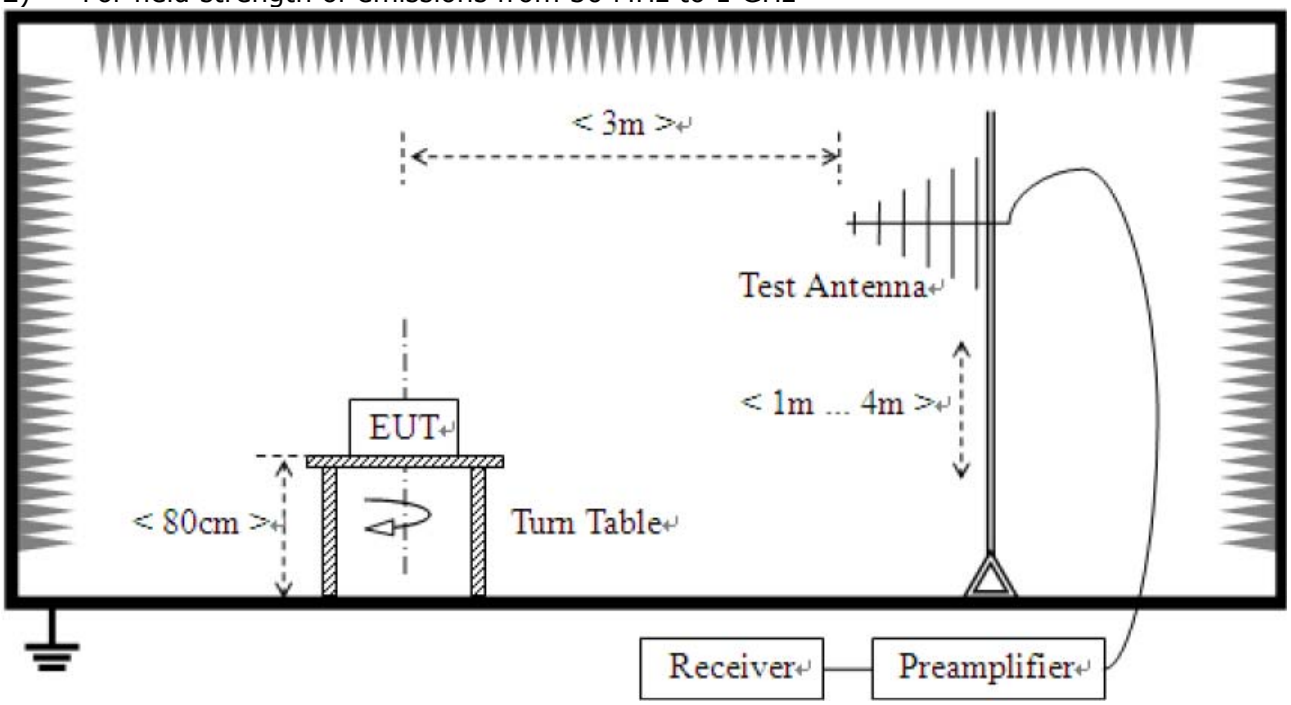
Note :
1) For above 1 GHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
2) For above 1 GHz, limit field strength of harmonics : 54 dBuV/m@3 m (AV) and 74 dBuV/m@3 m (PK)
3) For measurement above 1 GHz, the resolution bandwidth is set to 1 MHz and video bandwidth is set to 3 MHz for peak measurement.

Test Setup:

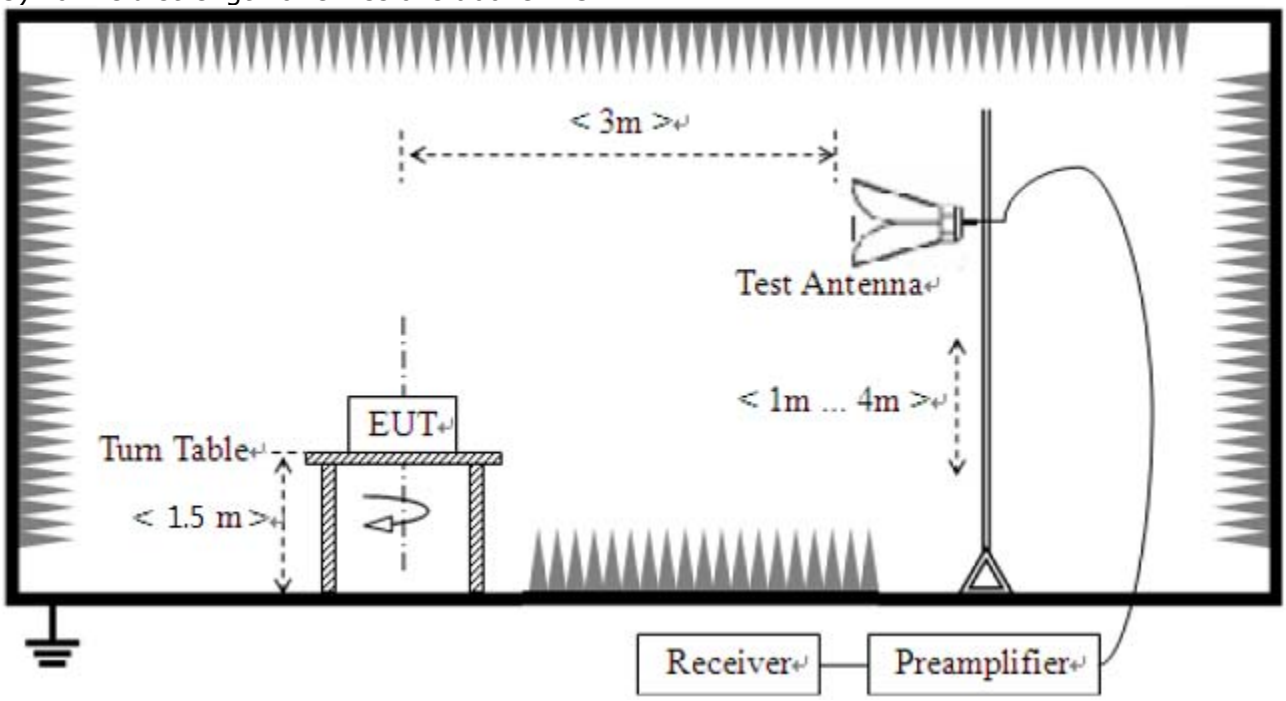
1) For field strength of emissions from 9 kHz to 30 MHz



2) For field strength of emissions from 30 MHz to 1 GHz



3) For field strength of emissions above 1 GHz



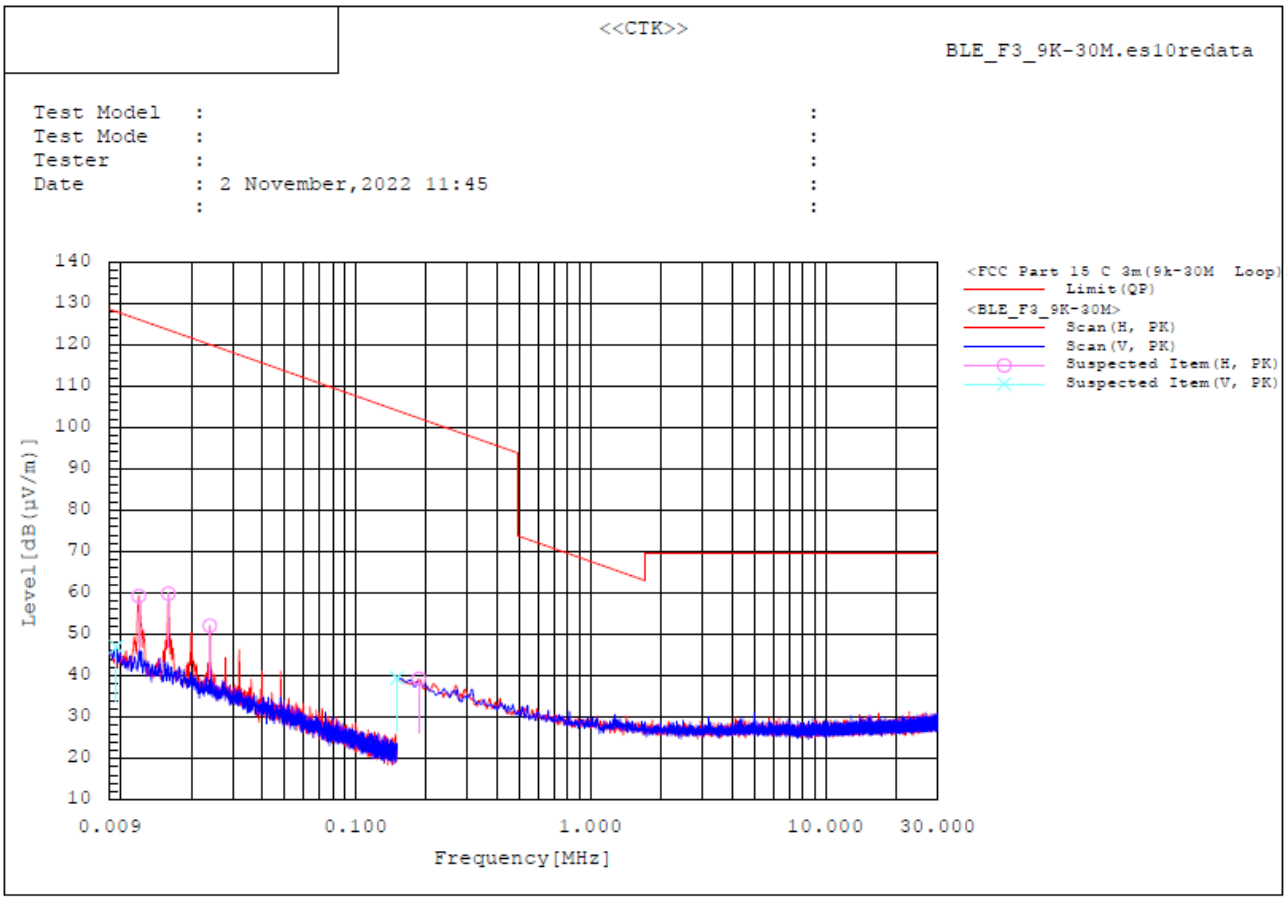
Test results

1) 9 kHz to 30 MHz

Test mode : Transmission status Highest channel(Worst case)

The requirements are:
☒ Complies

Test Data



Result : There are more than 20 dB of margin compared to the reference value.

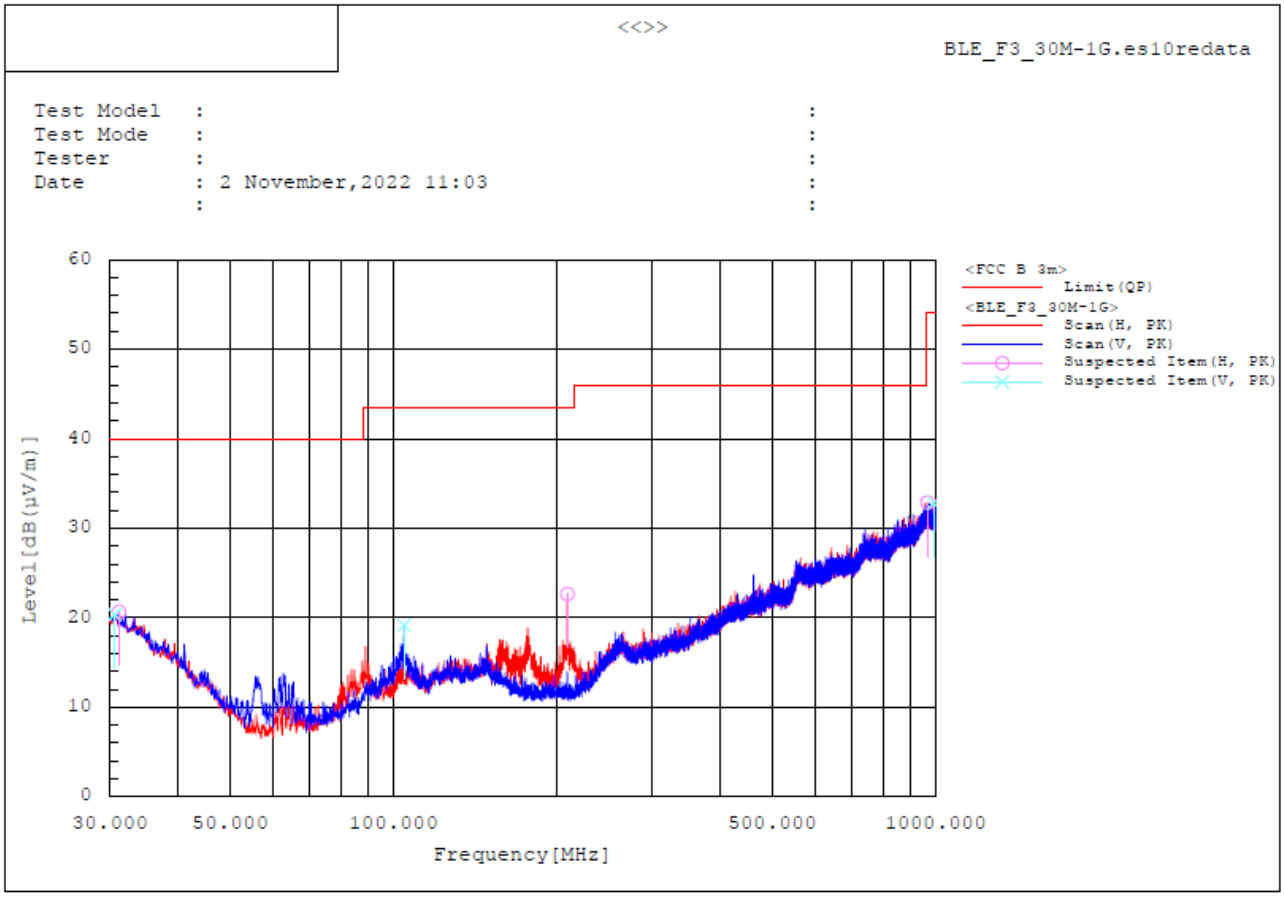
Remark :
1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
4. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
5. This data is the Peak(PK) value.

2) 30 MHz to 1 GHz

Test mode : Transmission status Highest channel(Worst case)

The requirements are:
☒ Complies

Test Data



Spectrum Selection

No.	Frequency	Pol	Reading PK	c.f	Result PK	Limit QP	Margin QP-PK	Height	Angle	Remark
	[MHz]		[dB(µV)]	[dB(1/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB]	[cm]	[deg]	
1	30.582	V	27.0	-6.6	20.4	40.0	19.6	300.0	196.8	
2	31.164	H	27.4	-6.8	20.6	40.0	19.4	199.9	278.0	
3	104.593	V	33.0	-13.8	19.2	43.5	24.3	99.9	359.9	
4	209.159	H	37.2	-14.6	22.6	43.5	20.9	99.9	359.1	
5	965.371	H	25.2	7.7	32.9	54.0	21.1	99.9	0.0	
6	990.397	V	25.4	7.4	32.8	54.0	21.2	400.2	2.9	

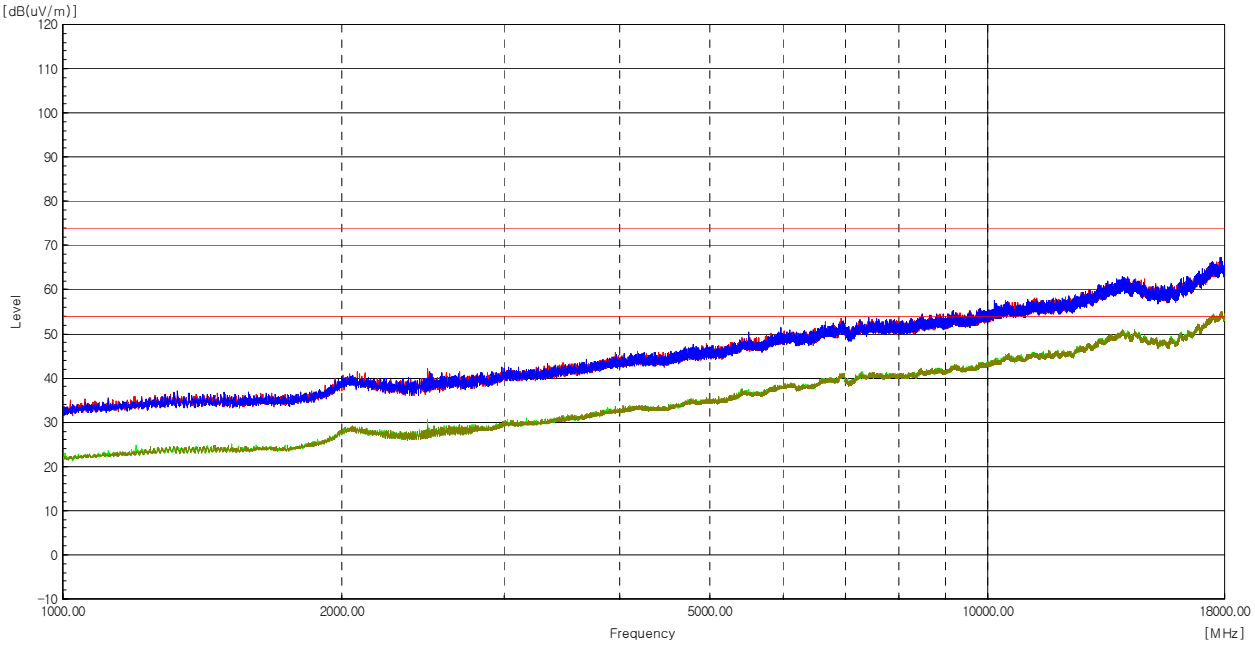
Remark :
1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
4. This data is the Peak(PK) value.

3) 1 GHz to 18 GHz

Test mode : Transmission status Highest channel(Worst case)

The requirements are:
☒ Complies

Test Data



Result : No peak found

Remarks

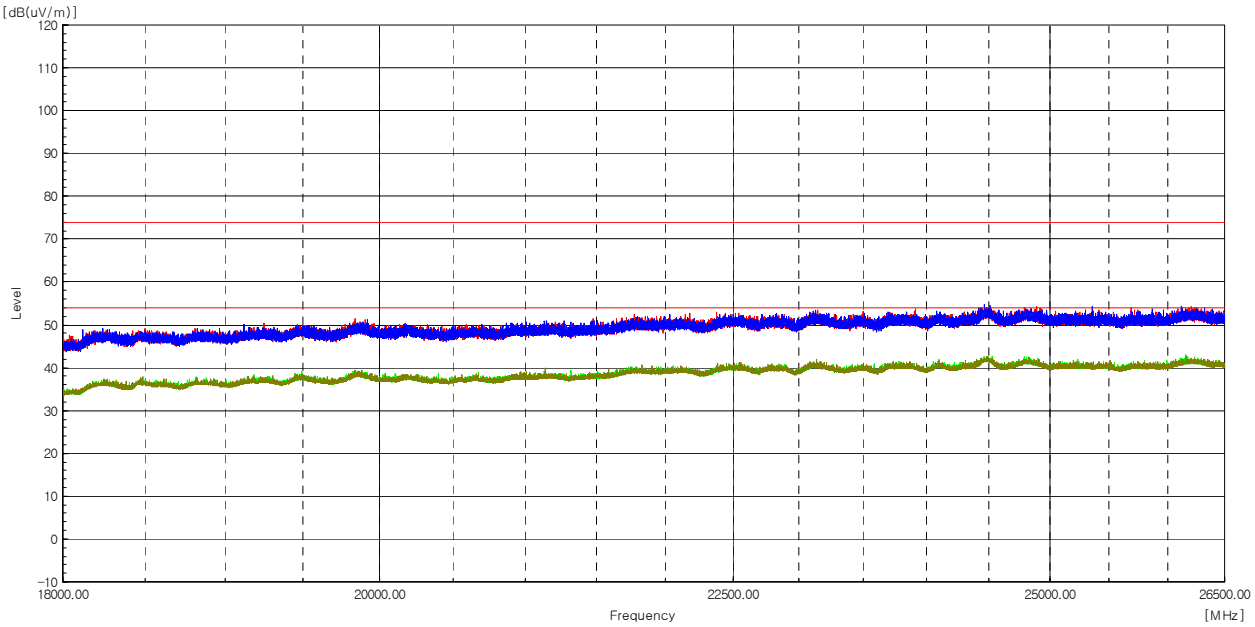
1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain
4. Band reject filter was used from 1 GHz to 18 GHz
5. The 18 GHz end had no signal detected. As can be seen from the conducted spurious emission test, no signal was detected in the section.

4) 18 GHz to 26.5 GHz

Test mode : Transmission status Highest channel(Worst case)

The requirements are:
☒ Complies

Test Data



Result : No peak found

Remarks

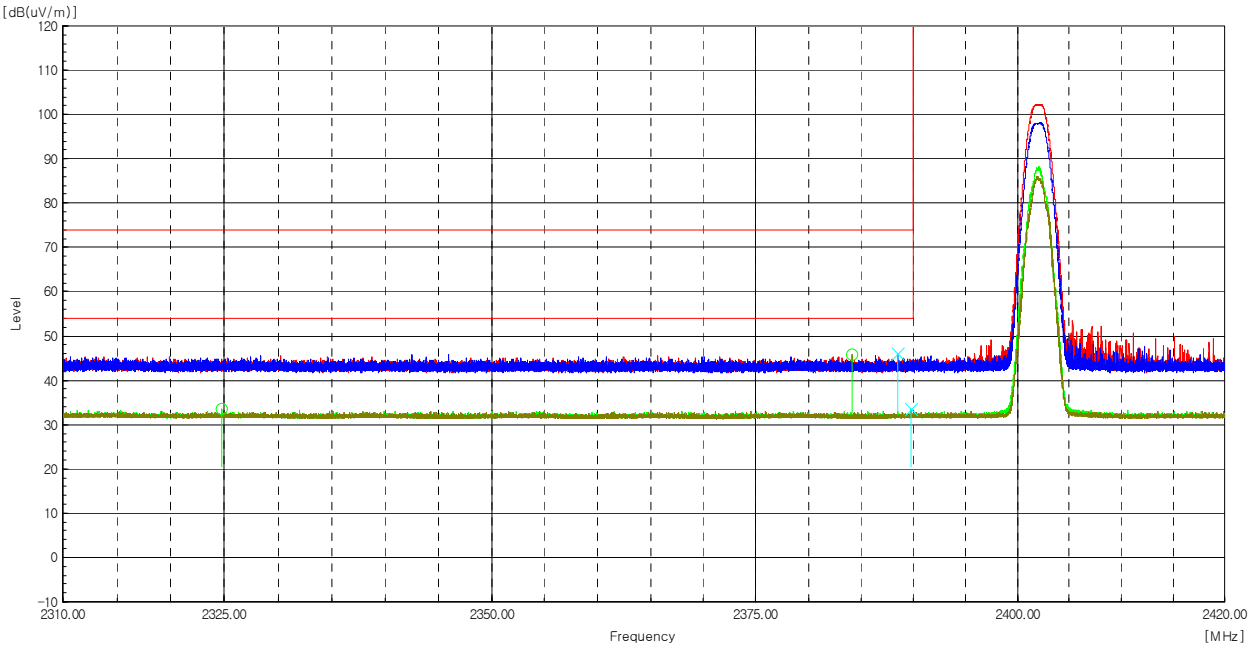
1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

5) Restricted Frequency Bands

Test mode : Transmission status Lowest channel
(Test frequency range : 2 310 MHz – 2 390 MHz)

The requirements are:
☒ Complies

Test Data



Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
2 384.161	H	51.7	-----	-5.9	45.8	-----	74.0	-----	28.2	-----
2 324.763	H	-----	39.6	-6.0	-----	33.6	-----	54.0	-----	20.4
2 388.499	V	52.0	-----	-5.9	46.1	-----	74.0	-----	27.9	-----
2 389.841	V	-----	39.4	-5.9	-----	33.5	-----	54.0	-----	20.5

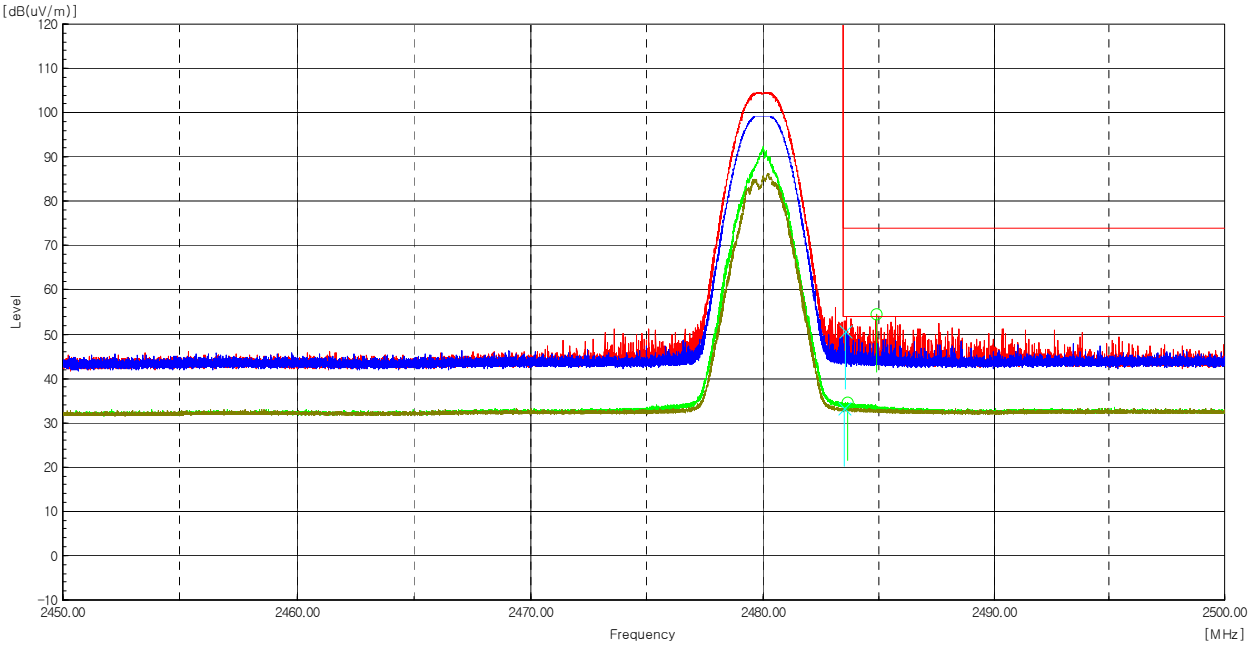
Remarks

1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

Test mode : Transmission status Highest channel
(Test frequency range : 2 483.5 MHz – 2 500 MHz)

The requirements are:
☒ Complies

Test Data



Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
2 484.939	H	59.9	-----	-5.3	54.6	-----	74.0	-----	19.4	-----
2 483.655	H	-----	39.7	-5.3	-----	34.4	-----	54.0	-----	19.6
2 483.581	V	55.9	-----	-5.3	50.6	-----	74.0	-----	23.4	-----
2 483.537	V	-----	38.7	-5.3	-----	33.4	-----	54.0	-----	20.6

Remarks
1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

4.6 AC Power Line Conducted Emissions

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits.

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

ANSI C63.10-2013 - Section 6.2.2

The EUT was placed on a non-metallic table 0.8 m above the metallic, grounded floor and 0.4 m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8 m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average**
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* The level decreases linearly with the logarithm of the frequency.
** A linear average detector is required.

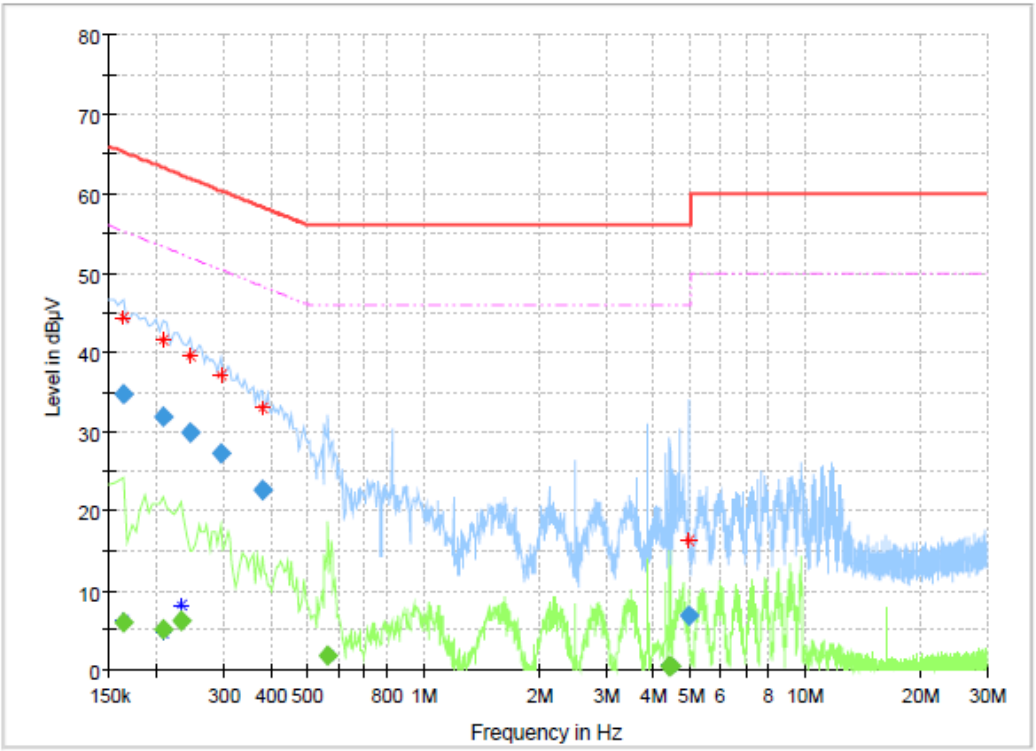
Test Results

The requirements are:
☒ Complies

Test Data

Test mode : Highest channel(Worst case)

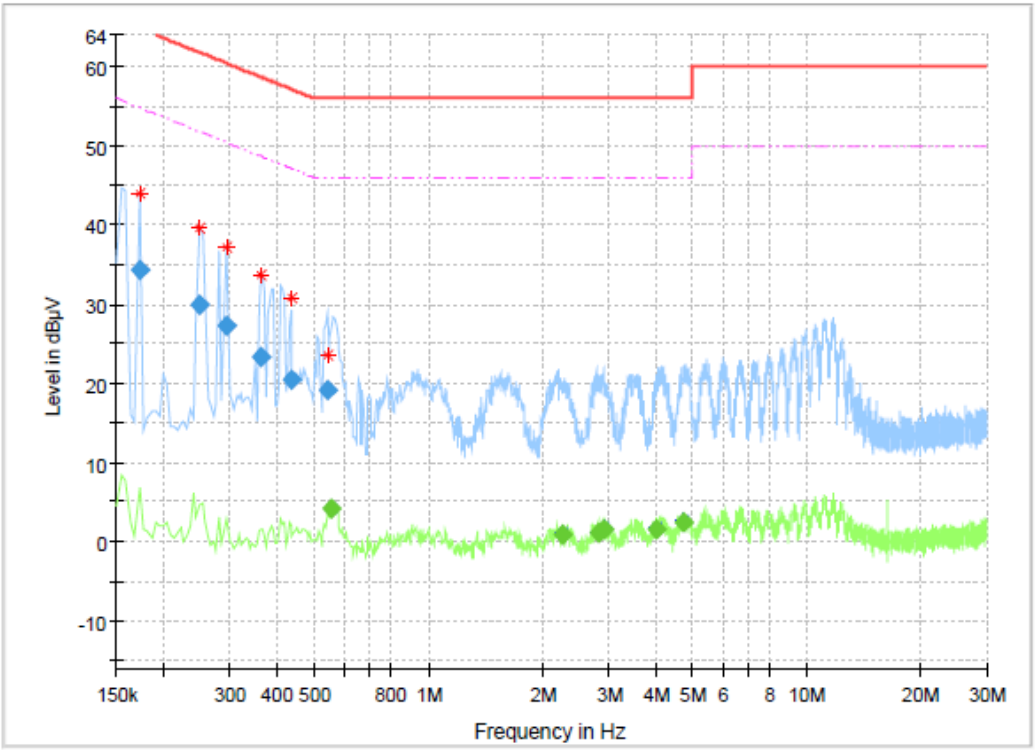
[LINE]



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.163500	---	5.99	55.28	49.29	15000.0	9.000	L1	ON	10.0
0.163500	34.79	---	65.28	30.49	15000.0	9.000	L1	ON	10.0
0.208500	---	5.09	53.27	48.18	15000.0	9.000	L1	ON	9.9
0.208500	31.88	---	63.27	31.39	15000.0	9.000	L1	ON	9.9
0.231000	---	6.15	52.41	46.26	15000.0	9.000	L1	ON	9.8
0.244500	29.83	---	61.94	32.11	15000.0	9.000	L1	ON	9.8
0.294000	27.27	---	60.41	33.14	15000.0	9.000	L1	ON	9.8
0.379500	22.68	---	58.29	35.61	15000.0	9.000	L1	ON	10.0
0.564000	---	1.70	46.00	44.30	15000.0	9.000	L1	ON	10.0
4.425000	---	0.34	46.00	45.66	15000.0	9.000	L1	ON	9.9
4.456500	---	0.45	46.00	45.55	15000.0	9.000	L1	ON	9.9
4.974000	6.78	---	56.00	49.22	15000.0	9.000	L1	ON	10.0

[NEUTRAL]



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.172500	34.37	---	64.84	30.47	15000.0	9.000	N	ON	10.3
0.249000	29.95	---	61.79	31.84	15000.0	9.000	N	ON	9.9
0.294000	27.28	---	60.41	33.13	15000.0	9.000	N	ON	10.0
0.361500	23.37	---	58.69	35.32	15000.0	9.000	N	ON	10.2
0.433500	20.57	---	57.19	36.61	15000.0	9.000	N	ON	10.2
0.541500	19.19	---	56.00	36.81	15000.0	9.000	N	ON	10.2
0.555000	---	4.28	46.00	41.72	15000.0	9.000	N	ON	10.2
2.269500	---	0.90	46.00	45.10	15000.0	9.000	N	ON	9.9
2.809500	---	1.25	46.00	44.75	15000.0	9.000	N	ON	10.0
2.917500	---	1.53	46.00	44.47	15000.0	9.000	N	ON	10.0
4.002000	---	1.68	46.00	44.32	15000.0	9.000	N	ON	10.0
4.758000	---	2.48	46.00	43.52	15000.0	9.000	N	ON	10.0

5. APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Signal Analyzer	Agilent	N9020A	MY50510240	2022-07-13	2023-07-13
2	Signal Generator	Rohde & Schwarz	SMB100A	175528	2022-03-25	2023-03-25
3	EMI TEST RECEIVER	Rohde & Schwarz	ESW44	102039	2022-05-04	2023-05-04
4	Bilog Antenna	TESEQ	CBL6111D	60654	2021-09-03	2023-09-03
5	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-125	2022-04-15	2024-04-15
6	Attenuator	PASTERNACK	PE7AP006-06	L20210504000 023	2022-08-10	2023-08-10
7	AMPLIFIER	SONOMA	310N	411011	2022-08-10	2023-08-10
8	Spectrum Analyzer	Rohde & Schwarz	FSV40	101574	2022-01-12	2023-01-12
9	Preamplifier	Agilent	8449B	3008A00620	2022-05-10	2023-05-10
10	Double Ridged Guide Antenna	ETS-Lindgren	3115	00078895	2022-04-14	2023-04-14
11	Horn Antenna	SCHWARZBECK	BBHA9170	788	2022-10-19	2023-10-19
12	Band Reject Filter	Micro Tronics	BRM50702	G444	2022-10-13	2023-10-13
13	Low Noise Amplifier	TESTEK	TK-PA1840H	210124-L	2021-11-15	2022-11-15
14	Dual-Tracking DC Power Supply	Topward Electric Instruments Co.,Ltd.	6303D	711196	2022-04-18	2023-04-18
15	DC POWER SUPPLY	HP	E3632A	KR75305831	2022-07-14	2023-07-14
16	LISN	Rohde & Schwarz	ENV216	102698	2022-05-13	2023-05-13
17	EMI Test Receiver	Rohde & Schwarz	ESR3	102826	2022-05-04	2023-05-04

	Cable	Manufacturer	Model No.	Serial No.	Check Date
1	RF Cable (Conducted)	Junkosha Inc.	MWX221	2008S240	2022-11-01
2	RF Cable (9kHz-1GHz Radiated)	Canare Corporation	L-5D2W	N/A	2022-09-21
3	RF Cable (9kHz-1GHz Radiated)	HUBER+SUHNER	SUCOFLEX 104	MY27558/4	2022-09-21
4	RF Cable (1GHz-18GHz Radiated)	Junkosha Inc.	MWX221	2008S246	2022-04-14
5	RF Cable (1GHz-18GHz Radiated)	Rosenberger	NONE	1520.9927.00	2022-04-14
6	RF Cable (1GHz-18GHz Radiated)	Sensorview Co., LTD	9S18	TPC2204060007	2022-04-14
7	RF Cable (18GHz-26.5GHz Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY2372/2	2022-04-14
8	RF Cable (18GHz-26.5GHz Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY073/2	2022-04-14
9	RF Cable (18GHz-26.5GHz Radiated)	Sensorview Co., LTD	9S40	TP210713-001	2022-04-14
10	RF Cable (AC Power Line Emissions)	Canare Corporation	L-5D2W	N/A	2022-04-12

-END-