TEST REPORT

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Report No.:
CTK-2021-04055

1. Client

◦ Name : Samsung Electronics Co Ltd

◦ Address : 19 Chapin Rd, Building D. Pine Brook, New Jersey, United States

◦ Date of Receipt : 2021-10-26

2. Manufacturer

◦ Name : Samsung Electronics Co., Ltd.

◦ Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

3. Use of Report : For FCC Conformance / ISED Conformance

4. Test Sample / Model: Wi-Fi/BT Transceiver / WCB940M

5. Date of Test : 2021-11-01 to 2021-11-09

6. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.247
RSS-247 & RSS-Gen

7. Testing Environment: Temp.: (24 ± 1) ℃, Humidity: (50 ± 3) % R.H.

8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by Ji-Hye, Kim: (Signature)	Technical Manager Won-Jae, Hwang: (Signature)

2021-11-10

Republic of KOREA **CTK Co., Ltd.**

REPORT REVISION HISTORY

Date	Revision	Page No
2021-11-10	Issued (CTK-2021-04055)	all

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1. General Product Description

1.1 Client Information

Company	Samsung Electronics Co., Ltd.
Contact Point	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Contact Person	Name : Youngjoong Noh E-mail : monk.noh@samsung.com Tel : +82-277-0598 Fax : -

1.2 Product Information

FCC ID	A3LWCB940M
ISED	649E-WCB940M
Product Description	Wi-Fi/BT Transceiver
Model name	WCB940M
Variant Model name	-
Operating Frequency	2 412 MHz – 2 472 MHz
RF Output Power	802.11b : 21.50 dBm (141.25 mW)
Antenna Specification	Antenna type : Chip Antenna Peak Gain : -2.31 dBi (ANT1), -0.52 dBi (ANT2)
Number of channels	13 (802.11b)
Type of Modulation	802.11b : DSSS
Data Rate	802.11b : 11 / 5.5 / 2 / 1 Mbps
Power Source	DC 5 V
Hardware Rev	V1.0
Software Rev	FC2

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253QPR
AC/DC Adapter	HP	HSTNN-LA40	-

1.4 Model Differences

Not applicable

2. Facility and Accreditations

2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea.

2.2 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	8737A-2
KOREA	NRRA	KR0025

2.3 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

FCC Part Section(s)	Requirement(s)	Status (Note 1)	Test Condition
15.247(a)	6 dB Bandwidth	C	Conducted
15.247(b)	Maximum Output Power	C	
15.247(d)	Conducted Spurious emission	C	
15.247(d)	Unwanted Emission(Conducted)	C	
15.247(e)	Transmitter Power Spectral Density	C	
15.209	Radiated Emissions	C	Radiated
15.207	AC Conducted Emissions	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			
Note 4: The tests were performed according to the method of measurements prescribed in KDB No.558074, ANSI C63.10-2013			

ISED Part Section(s)	Requirement(s)	Status (Note 1)	Test Condition
RSS-247 5.2(a)	6 dB Bandwidth	C	Conducted
RSS-247 5.4(d)	Maximum Output Power	C	
RSS-247 5.5	Conducted Spurious emission	C	
RSS-247 5.5	Unwanted Emission(Conducted)	C	
RSS-247 5.2(b)	Transmitter Power Spectral Density	C	
RSS-Gen 6.13	Radiated Emissions	C	Radiated
RSS-Gen 8.8	AC Conducted Emissions	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: RSS-247, RSS-GEN			
Note 4: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013			

3.2 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

802.11b

Low	Mid	High_1	High_2	High_3
2 412 MHz	2 442 MHz	2 462 MHz	2 467 MHz	2 472 MHz

Test mode and Duty Cycle

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11b	DSSS	1 Mbps	99.7 %	-

3.3 Device Modifications

The following modifications were necessary for compliance: Not applicable

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 (9 kHz to 30 MHz)	1.16 dB (C.L.: Approx. 95 %, k = 2)
Radiated Emissions (f ≤ 1 GHz)	4.54 dB (C.L.: Approx. 95 %, k = 2)
Radiated Emissions (f > 1 GHz)	4.98 dB (C.L.: Approx. 95 %, k = 2)

3.5 Test Software

Conducted Test	Ics Pro Ver. 6.0.3
Radiated Test	TOYO EMI software EP5RE Ver. 6.0.1.0
Line Conducted Test	ESCI7, ESCI3 : EMC32 Ver. 8.50.0 ESR7 : EMC32 Ver. 8.53.0

4. Technical Characteristic Test

4.1 6dB Bandwidth

Test Procedures

KDB 558074 - Section 8.2
ANSI C63.10-2013 - Section 11.8.2
RSS-Gen – Section 6.7

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
RSS-Gen – Section 6.7

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
b) VBW ≥ 3 x RBW
c) Detector = peak
d) Trace mode = Max hold
e) Sweep = auto couple
f) Allow trace to fully stabilize
g) 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.

Minimum Standard :

6 dB Bandwidth	>	500kHz

Test Data :

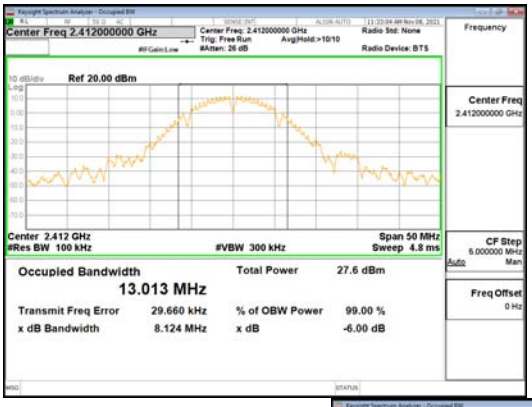
ANT1

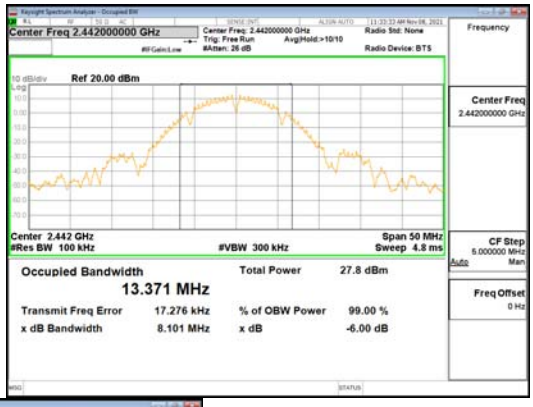
Mode	6 dB Bandwidth and 99 % Bandwidth (MHz)	
	802.11b	
Frequency	6 dB	99 %
2 412 MHz	8.12	13.01
2 442 MHz	8.10	13.37
2 462 MHz	8.11	13.02
2 467 MHz	8.13	13.02
2 472 MHz	8.11	12.72

ANT2

Mode	6 dB Bandwidth and 99 % Bandwidth (MHz)	
	802.11b	
Frequency	6 dB	99 %
2 412 MHz	8.10	12.79
2 442 MHz	9.02	13.82
2 462 MHz	9.12	14.75
2 467 MHz	8.10	12.50
2 472 MHz	8.09	12.47

See next pages for actual measured spectrum plots.


Center Freq 2.412000000 GHz
Ref 20.00 dBm
Center 2.412 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50 MHz
Sweep 4.8 ms
Occupied Bandwidth
13.013 MHz
Total Power 27.6 dBm
Transmit Freq Error 29.660 kHz
% of OBW Power 99.00 %
x dB Bandwidth 8.124 MHz
x dB -6.00 dB


Center Freq 2.442000000 GHz
Ref 20.00 dBm
Center 2.442 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50 MHz
Sweep 4.8 ms
Occupied Bandwidth
13.371 MHz
Total Power 27.8 dBm
Transmit Freq Error 17.276 kHz
% of OBW Power 99.00 %
x dB Bandwidth 8.101 MHz
x dB -6.00 dB

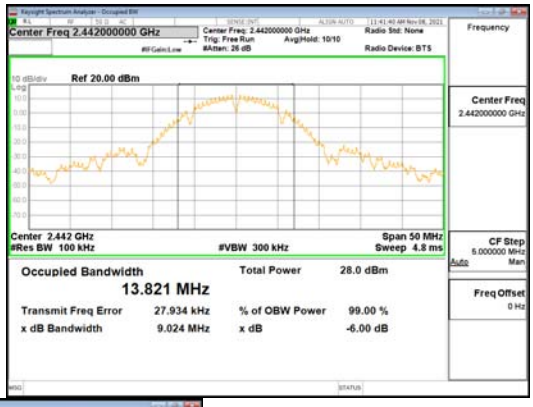
Center Freq 2.462000000 GHz
Ref 20.00 dBm
Center 2.462 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50 MHz
Sweep 4.8 ms
Occupied Bandwidth
13.024 MHz
Total Power 27.4 dBm
Transmit Freq Error -4.386 kHz
% of OBW Power 99.00 %
x dB Bandwidth 8.105 MHz
x dB -6.00 dB

Center Freq 2.467000000 GHz
Ref 20.00 dBm
Center 2.467 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50 MHz
Sweep 4.8 ms
Occupied Bandwidth
13.022 MHz
Total Power 27.4 dBm
Transmit Freq Error 7.097 kHz
% of OBW Power 99.00 %
x dB Bandwidth 8.125 MHz
x dB -6.00 dB

Center Freq 2.472000000 GHz
Ref 20.00 dBm
Center 2.472 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50 MHz
Sweep 4.8 ms
Occupied Bandwidth
12.716 MHz
Total Power 25.4 dBm
Transmit Freq Error 2.185 kHz
% of OBW Power 99.00 %
x dB Bandwidth 8.111 MHz
x dB -6.00 dB

ANT1, 802.11b

Center Freq 2.412000000 GHz
Ref 20.00 dBm
Center 2.412 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50 MHz
Sweep 4.8 ms
Occupied Bandwidth
12.790 MHz
Total Power 27.2 dBm
Transmit Freq Error 59.510 kHz
% of OBW Power 99.00 %
x dB Bandwidth 8.099 MHz
x dB -6.00 dB


Center Freq 2.442000000 GHz
Ref 20.00 dBm
Center 2.442 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50 MHz
Sweep 4.8 ms
Occupied Bandwidth
13.821 MHz
Total Power 28.0 dBm
Transmit Freq Error 27.934 kHz
% of OBW Power 99.00 %
x dB Bandwidth 9.024 MHz
x dB -6.00 dB

Center Freq 2.462000000 GHz
Ref 20.00 dBm
Center 2.462 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50 MHz
Sweep 4.8 ms
Occupied Bandwidth
14.747 MHz
Total Power 28.4 dBm
Transmit Freq Error 12.140 kHz
% of OBW Power 99.00 %
x dB Bandwidth 9.115 MHz
x dB -6.00 dB

Center Freq 2.467000000 GHz
Ref 20.00 dBm
Center 2.467 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50 MHz
Sweep 4.8 ms
Occupied Bandwidth
12.504 MHz
Total Power 25.4 dBm
Transmit Freq Error -1.844 kHz
% of OBW Power 99.00 %
x dB Bandwidth 8.102 MHz
x dB -6.00 dB

Center Freq 2.472000000 GHz
Ref 20.00 dBm
Center 2.472 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50 MHz
Sweep 4.8 ms
Occupied Bandwidth
12.472 MHz
Total Power 24.1 dBm
Transmit Freq Error 10.683 kHz
% of OBW Power 99.00 %
x dB Bandwidth 8.094 MHz
x dB -6.00 dB

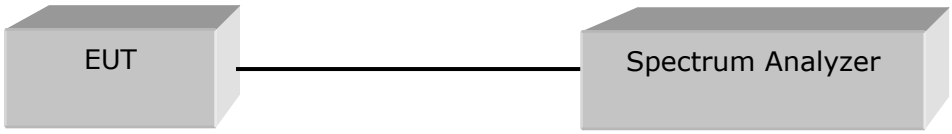
ANT2, 802.11b

4.2 OUTPUT POWER

Test Procedures

KDB 558074 - Section 8.3.2.2 (Average Power)
ANSI C63.10-2013 - Section 11.9.2.2
KDB 662911 D01, D02 (Multiple Transmitter Output)

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



Test Settings:

Center frequency = the highest, middle and the lowest channels

a) span ≥ 1.5 x OBW
b) RBW = 1 MHz
c) VBW ≥ 3 x RBW
d) Sweep time = auto
e) Detector = RMS
f) average at least 100
g) Duty cycle factor = 10log(1/x)

Test mode	Duty Cycle Factor (dB)
802.11b	0.00

Limit

Operating Mode	Mode	ANT Configuration	ANT Gain (dBi)	Limit (dBm)
SISO	802.11b	ANT1	-2.31	30.00
SISO	802.11b	ANT2	-0.52	30.00

Test Data :

ANT1

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11b	2 412	20.77	0.00	20.77	30.00	9.23
	2 442	21.01	0.00	21.01	30.00	8.99
	2 462	20.60	0.00	20.60	30.00	9.40
	2 467	20.57	0.00	20.57	30.00	9.43
	2 472	18.60	0.00	18.60	30.00	11.40

ANT2

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11b	2 412	20.41	0.00	20.41	30.00	9.59
	2 442	21.50	0.00	21.50	30.00	8.50
	2 462	21.11	0.00	21.11	30.00	8.89
	2 467	18.57	0.00	18.57	30.00	11.43
	2 472	17.19	0.00	17.19	30.00	12.81

See next pages for actual measured spectrum plots.

Center Freq 2.412000000 GHz
Ref 30.00 dBm
Center 2.412 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 50 MHz
Sweep 1 ms
Channel Power
20.77 dBm / 13.08 MHz
Power Spectral Density
-50.39 dBm /Hz

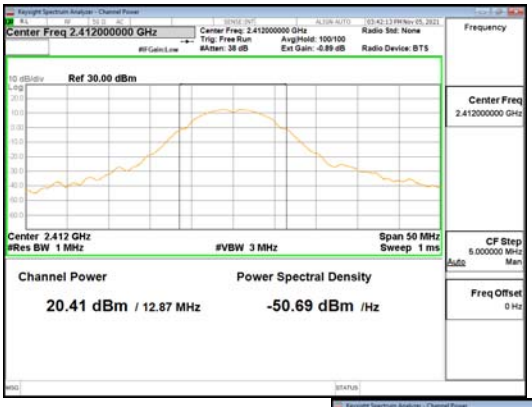
Center Freq 2.442000000 GHz
Ref 30.00 dBm
Center 2.442 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 50 MHz
Sweep 1 ms
Channel Power
21.01 dBm / 13.47 MHz
Power Spectral Density
-50.29 dBm /Hz

Center Freq 2.462000000 GHz
Ref 30.00 dBm
Center 2.462 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 50 MHz
Sweep 1 ms
Channel Power
20.60 dBm / 13.04 MHz
Power Spectral Density
-50.55 dBm /Hz

Center Freq 2.467000000 GHz
Ref 30.00 dBm
Center 2.467 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 50 MHz
Sweep 1 ms
Channel Power
20.57 dBm / 13.06 MHz
Power Spectral Density
-50.59 dBm /Hz

Center Freq 2.472000000 GHz
Ref 30.00 dBm
Center 2.472 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 50 MHz
Sweep 1 ms
Channel Power
18.60 dBm / 12.74 MHz
Power Spectral Density
-52.45 dBm /Hz

ANT1, 802.11b


Center Freq 2.412000000 GHz
Ref 30.00 dBm
Center 2.412 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 50 MHz
Sweep 1 ms
Channel Power
20.41 dBm / 12.87 MHz
Power Spectral Density
-50.69 dBm /Hz

Center Freq 2.442000000 GHz
Ref 30.00 dBm
Center 2.442 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 50 MHz
Sweep 1 ms
Channel Power
21.50 dBm / 14.8 MHz
Power Spectral Density
-50.20 dBm /Hz

Center Freq 2.462000000 GHz
Ref 30.00 dBm
Center 2.462 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 50 MHz
Sweep 1 ms
Channel Power
21.11 dBm / 13.43 MHz
Power Spectral Density
-50.17 dBm /Hz

Center Freq 2.467000000 GHz
Ref 30.00 dBm
Center 2.467 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 50 MHz
Sweep 1 ms
Channel Power
18.57 dBm / 12.51 MHz
Power Spectral Density
-52.40 dBm /Hz

Center Freq 2.472000000 GHz
Ref 30.00 dBm
Center 2.472 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 50 MHz
Sweep 1 ms
Channel Power
17.19 dBm / 12.62 MHz
Power Spectral Density
-53.82 dBm /Hz

ANT2, 802.11b

4.3 Transmitter Power Spectral Density

Test Procedures

KDB 558074 - Section 8.4
ANSI C63.10-2013 - Section 11.10.2
KDB 662911 D01, D02 (Multiple Transmitter Output)

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

Operating Mode	Mode	ANT Configuration	ANT Gain (dBi)	Limit (dBm)
SISO	802.11b	ANT1	-2.31	8.00
SISO	802.11b	ANT2	-0.52	8.00

Test Data

ANT1

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Limit (dBm)	Margin(dB)
802.11b	2 412	-1.86	8.00	9.86
	2 442	-0.51	8.00	8.51
	2 462	-0.61	8.00	8.61
	2 467	-1.61	8.00	9.61
	2 472	-3.85	8.00	11.85

ANT2

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Limit (dBm)	Margin(dB)
802.11b	2 412	-1.32	8.00	9.32
	2 442	-0.21	8.00	8.21
	2 462	-1.69	8.00	9.69
	2 467	-2.70	8.00	10.70
	2 472	-5.20	8.00	13.20

See next pages for actual measured spectrum plots.

Center Freq 2.412000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg/Hold: 10/10
Ext Gain: -0.89 dB
Mkr1 2.412 54 GHz
-1.864 dBm
Ref 16.89 dBm
Center 2.41200 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 30.00 MHz
Sweep 3.163 s (1001 pts)

Center Freq 2.442000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg/Hold: 10/10
Ext Gain: -0.89 dB
Mkr1 2.442 81 GHz
-0.506 dBm
Ref 16.89 dBm
Center 2.44200 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 30.00 MHz
Sweep 3.163 s (1001 pts)

Center Freq 2.462000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg/Hold: 10/10
Ext Gain: -0.89 dB
Mkr1 2.462 87 GHz
-0.608 dBm
Ref 16.89 dBm
Center 2.46200 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 30.00 MHz
Sweep 3.163 s (1001 pts)

Center Freq 2.467000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg/Hold: 10/10
Ext Gain: -0.89 dB
Mkr1 2.467 66 GHz
-1.608 dBm
Ref 16.89 dBm
Center 2.46700 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 30.00 MHz
Sweep 3.163 s (1001 pts)

Center Freq 2.472000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg/Hold: 10/10
Ext Gain: -0.89 dB
Mkr1 2.471 34 GHz
-3.849 dBm
Ref 16.89 dBm
Center 2.47200 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 30.00 MHz
Sweep 3.163 s (1001 pts)

ANT1, 802.11b

Center Freq 2.412000000 GHz
Mkr1 2.411 16 GHz
-1.320 dBm
Ref 16.89 dBm
Center 2.41200 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 30.00 MHz
Sweep 3.163 s (1001 pts)

Center Freq 2.442000000 GHz
Mkr1 2.442 66 GHz
-0.212 dBm
Ref 16.89 dBm
Center 2.44200 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 30.00 MHz
Sweep 3.163 s (1001 pts)

Center Freq 2.462000000 GHz
Mkr1 2.461 37 GHz
-1.685 dBm
Ref 16.89 dBm
Center 2.46200 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 30.00 MHz
Sweep 3.163 s (1001 pts)

Center Freq 2.467000000 GHz
Mkr1 2.466 34 GHz
-2.704 dBm
Ref 16.89 dBm
Center 2.46700 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 30.00 MHz
Sweep 3.163 s (1001 pts)

Center Freq 2.472000000 GHz
Mkr1 2.473 71 GHz
-5.200 dBm
Ref 16.89 dBm
Center 2.47200 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 30.00 MHz
Sweep 3.163 s (1001 pts)

ANT2, 802.11b

4.4 Conducted Spurious emission

Test Procedures

KDB 558074 - Section 8.5
ANSI C63.10-2013 - Section 11.11.3
RSS-Gen - Section 6.13

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.
After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

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	<	30 dBc

Test Data: Complies

- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 30dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.

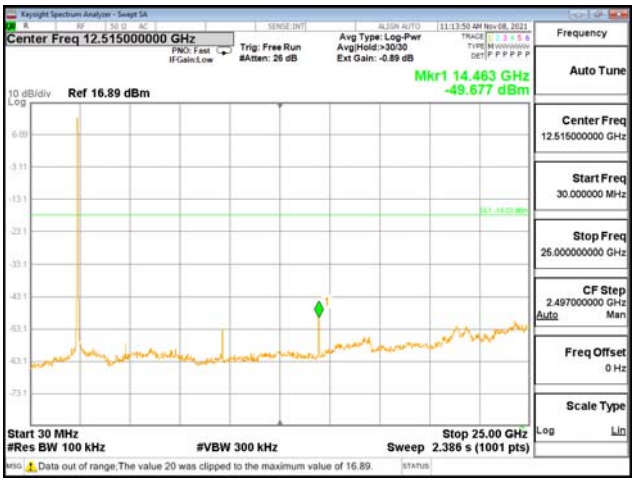
See next pages for actual measured spectrum plots.

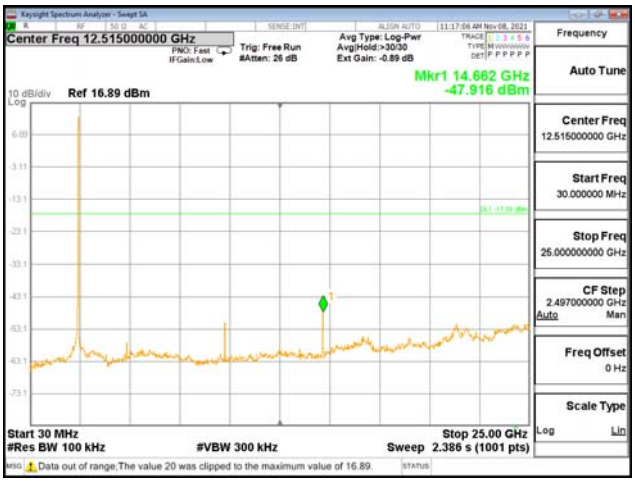
Center Freq 2.400000000 GHz
Mkr1 2.412 50 GHz
12.973 dBm
Ref 16.89 dBm
Center 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)

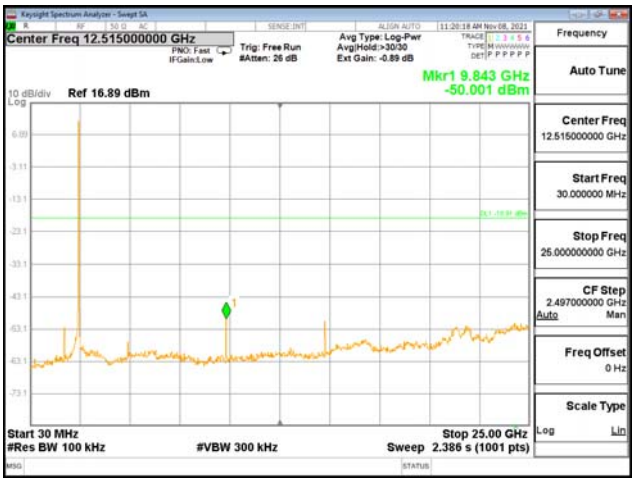
Center Freq 2.483500000 GHz
Mkr1 2.461 00 GHz
12.430 dBm
Ref 16.89 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)

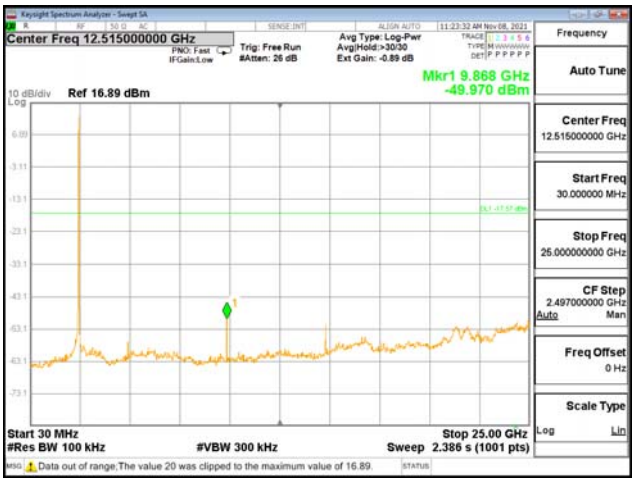
Center Freq 2.483500000 GHz
Mkr1 2.468 00 GHz
12.541 dBm
Ref 16.89 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)

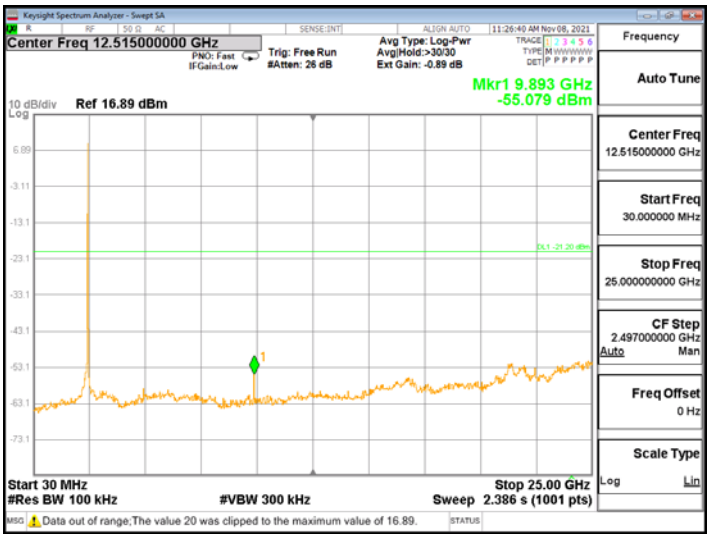
Center Freq 2.483500000 GHz
Mkr1 2.472 50 GHz
10.696 dBm
Ref 16.89 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)


Center Freq 12.515000000 GHz
Mkr1 14.463 GHz
-49.677 dBm
Ref 16.89 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)


Center Freq 12.515000000 GHz
Mkr1 14.662 GHz
-47.916 dBm
Ref 16.89 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)


Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.89 dB
Mkr1 9.843 GHz
-50.001 dBm
10 dB/div
Ref 16.89 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin


Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.89 dB
Mkr1 9.868 GHz
-49.970 dBm
10 dB/div
Ref 16.89 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
Data out of range;The value 20 was clipped to the maximum value of 16.89.
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin


Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.89 dB
Mkr1 9.893 GHz
-55.079 dBm
10 dB/div
Ref 16.89 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
Data out of range;The value 20 was clipped to the maximum value of 16.89.
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

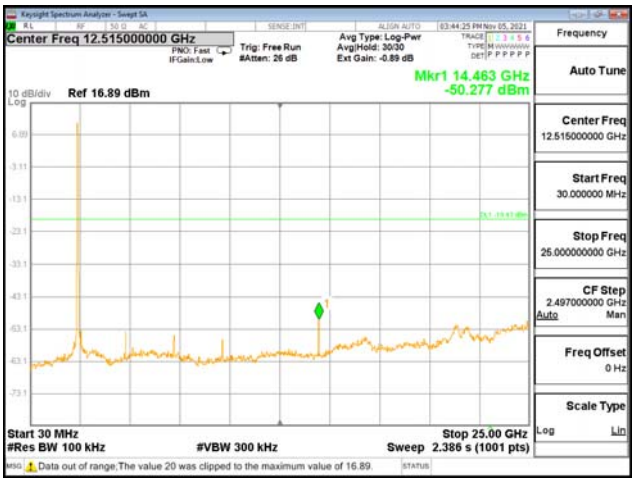
ANT1, 802.11b

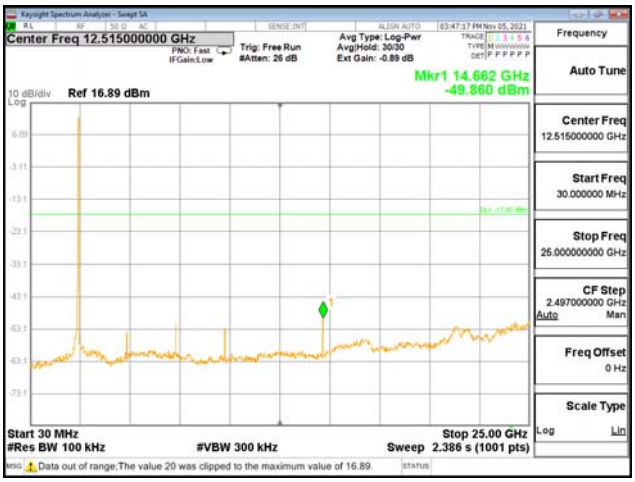
Center Freq 2.400000000 GHz
Mkr1 2.412 50 GHz
12.840 dBm
Ref 16.89 dBm
Center 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)

Center Freq 2.483500000 GHz
Mkr1 2.462 50 GHz
13.152 dBm
Ref 16.89 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)

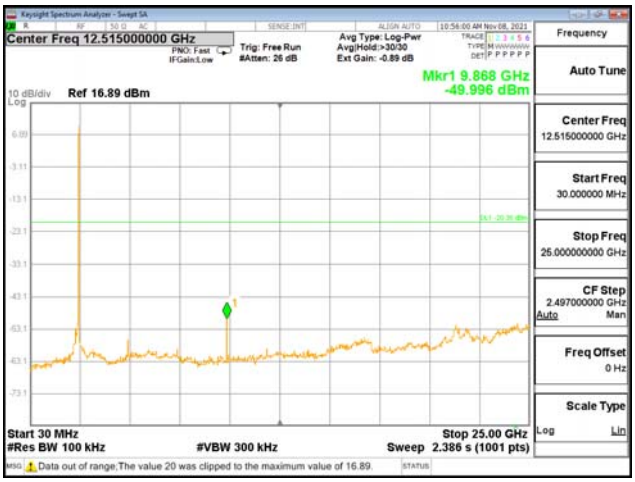
Center Freq 2.483500000 GHz
Mkr1 2.467 50 GHz
10.786 dBm
Ref 16.89 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)

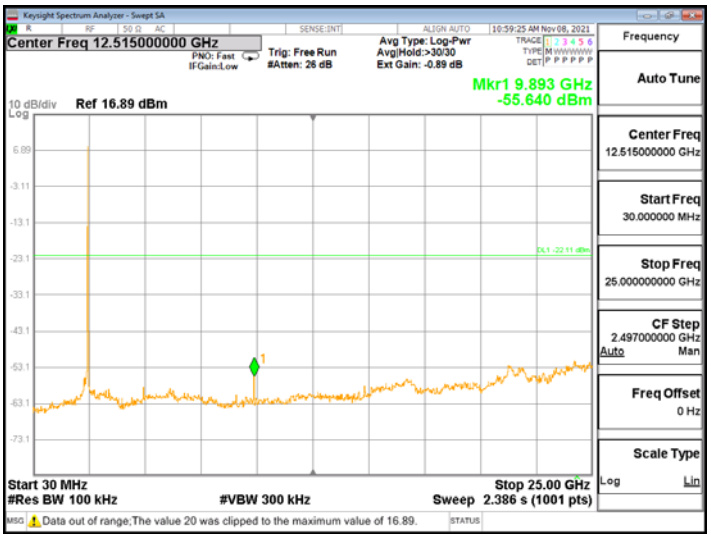
Center Freq 2.483500000 GHz
Mkr1 2.471 50 GHz
9.416 dBm
Ref 16.89 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)


Center Freq 12.515000000 GHz
Mkr1 14.463 GHz
-50.277 dBm
Ref 16.89 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)


Center Freq 12.515000000 GHz
Mkr1 14.662 GHz
-49.860 dBm
Ref 16.89 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)

Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold: 30/30
Ext Gain: -0.89 dB
Mkr1 14.762 GHz
-48.222 dBm
10 dB/div
Ref 16.89 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin


Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.89 dB
Mkr1 9.868 GHz
-49.996 dBm
10 dB/div
Ref 16.89 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
Data out of range;The value 20 was clipped to the maximum value of 16.89.
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin


Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.89 dB
Mkr1 9.893 GHz
-55.640 dBm
10 dB/div
Ref 16.89 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
Data out of range;The value 20 was clipped to the maximum value of 16.89.
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

ANT2, 802.11b

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
RSS-Gen - Section 6.13

1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. 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 3m away from the EUT. Test Antenna height is carried from 1m to 4m 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 ~ 1 GHz

a) RBW = 100 kHz for f < 1 GHz, 9 kHz for f < 30 MHz

b) VBW ≥ RBW

c) Detector = CISPR Quasi-peak

d) Sweep time = auto couple

- Peak

Frequency Range = 1 GHz ~ 25 GHz (2.4 GHz 10th harmonic)

a) RBW = 1 MHz

b) VBW ≥ 3 x RBW

c) Detector = Peak

d) Sweep time = auto

e) Trace mode = max hold

- Average (duty cycle ≥ 98%)

Frequency Range = 1 GHz ~ 25 GHz (2.4 GHz 10th harmonic)

a) RBW = 1 MHz

b) VBW ≥ 3 x RBW

c) Detector = RMS

d) Sweep time = auto

e) Averaging type = power (i.e., RMS)

f) Trace mode = average (at least 100 traces)

- Average (duty cycle < 98%, duty cycle variations are less than ±2%)

Frequency Range = 1 GHz ~ 25 GHz (2.4 GHz 10th harmonic)

a) RBW = 1 MHz

b) VBW ≥ 3 x RBW

c) Detector = RMS

d) Sweep time = auto

e) Averaging type = power (i.e., RMS)

f) Trace mode = average (at least 100 traces)

A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 % duty cycle.
If power averaging (RMS) mode, then the applicable correction factor is 10 log(1/x), where x is the duty cycle.

Test mode	Duty Cycle Factor (dB)
802.11b	0.00

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:

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 :

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m	Deasurement 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**	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 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. 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@3m (AV) and 74 dBuV/m@3m (PK)

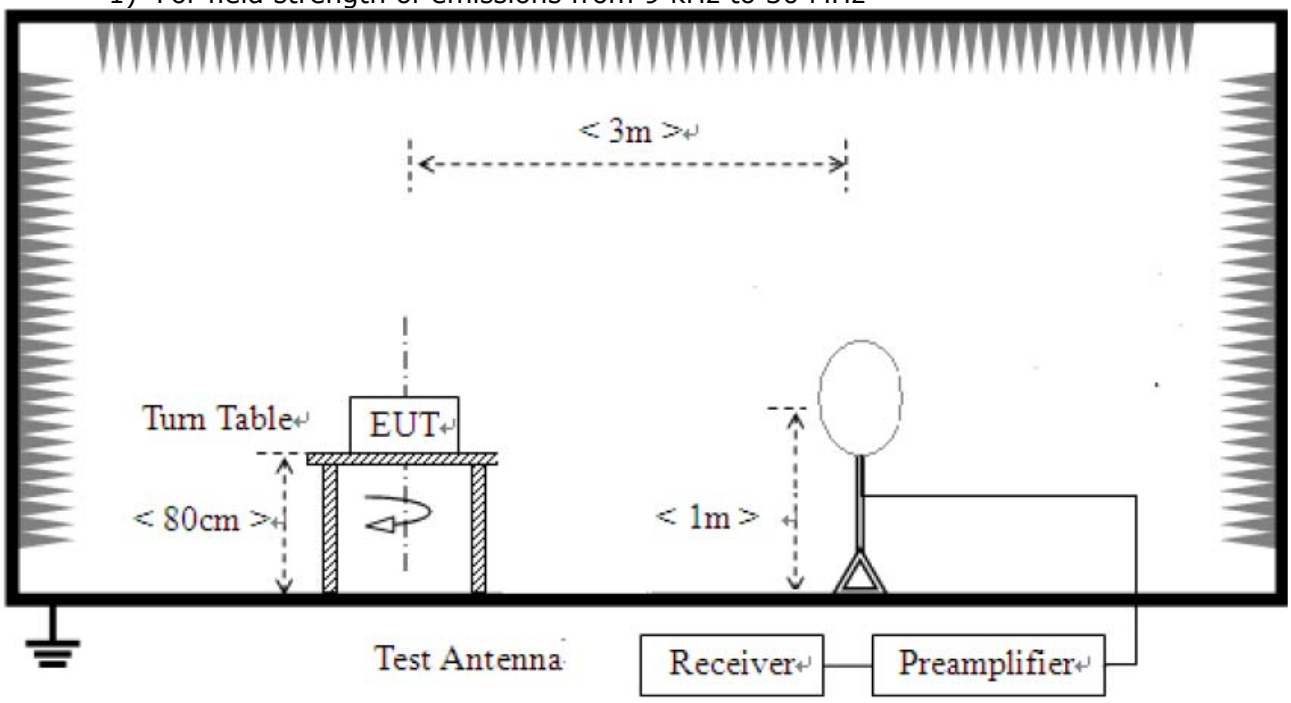
We have done all test mode.
The worst-case antenna configuration and Test mode are determined to be as follows.

802.11b mode : ANT1, ANT2

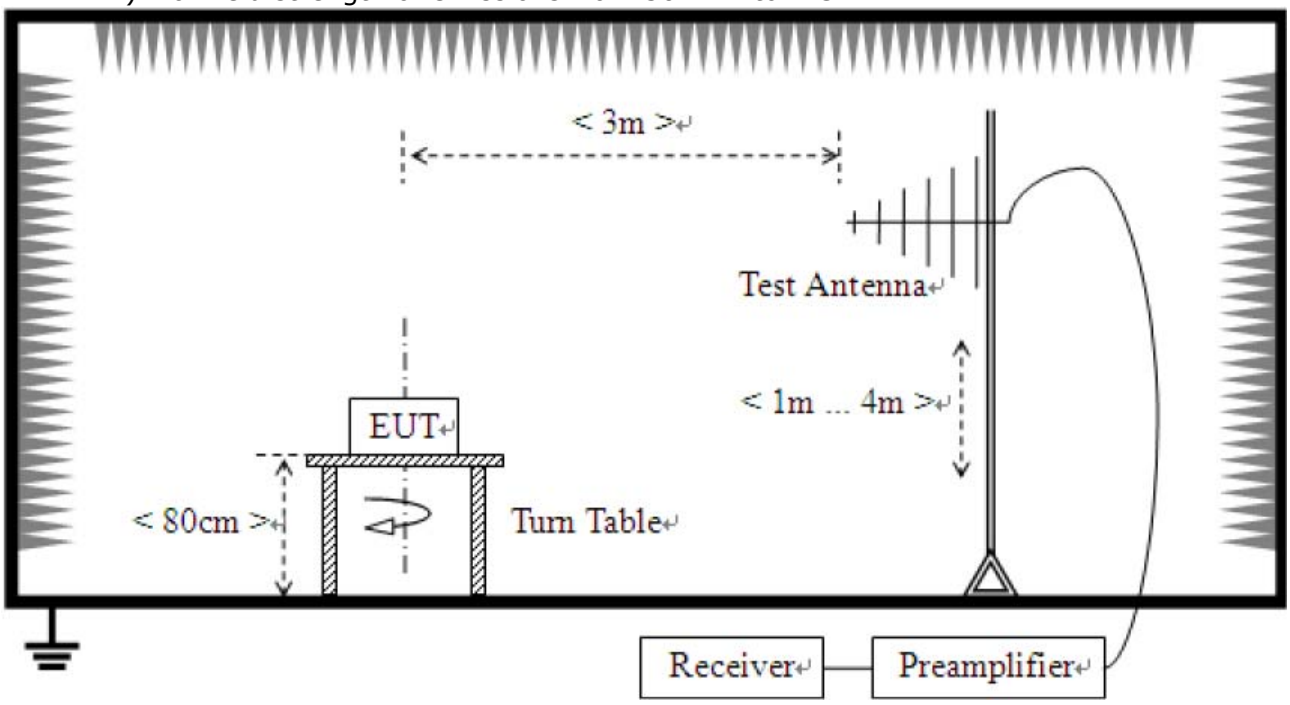
So the results are only attached worst cases.

Test Setup:

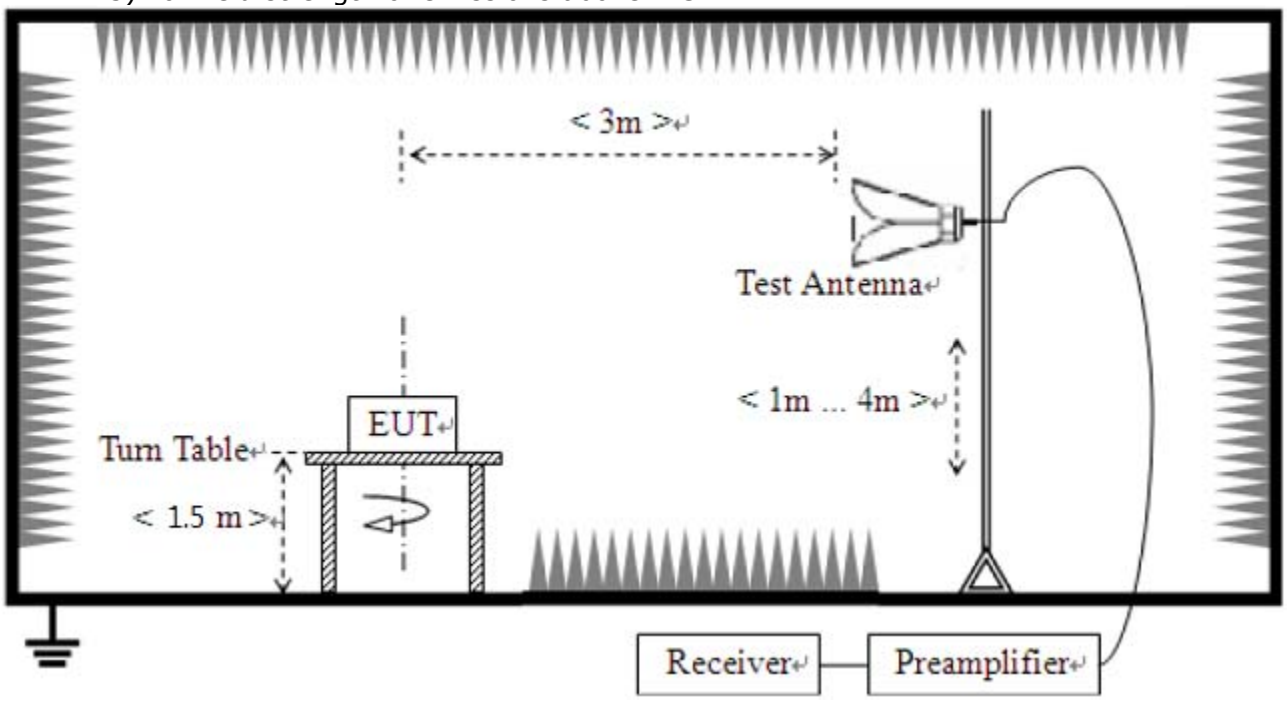
1) For field strength of emissions from 9 kHz to 30 MHz



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



3) For field strength of emissions above 1 GHz



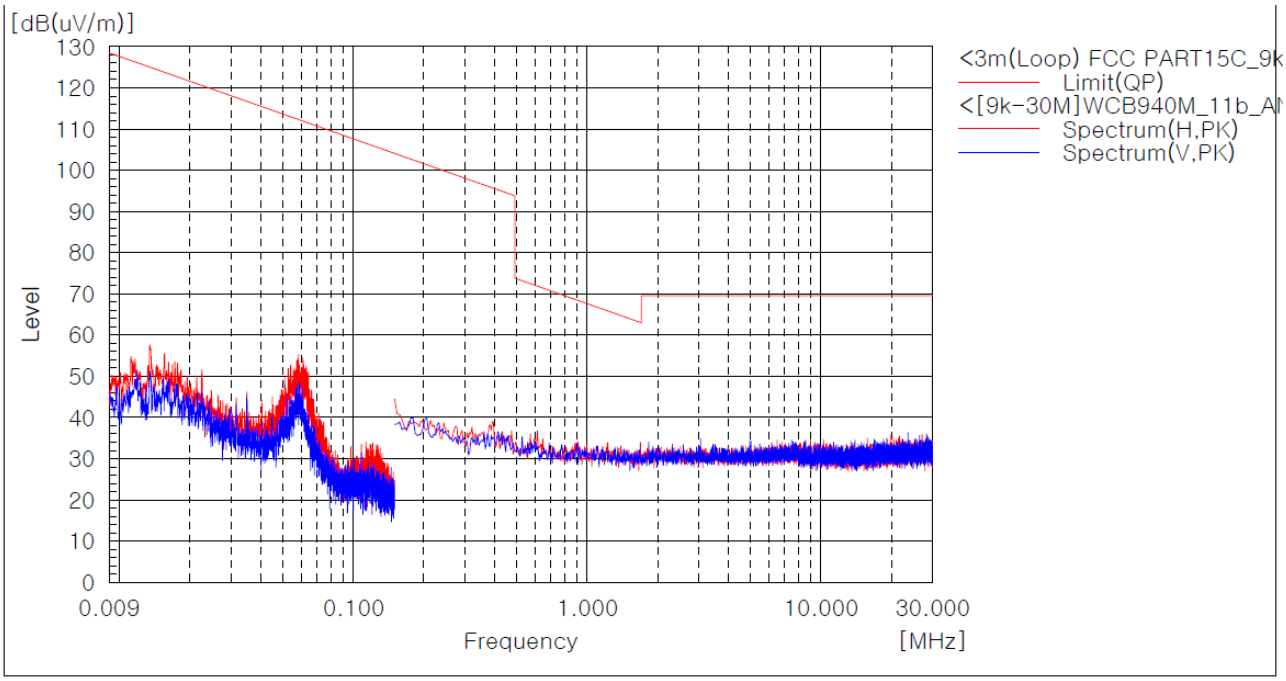
Test results

1) 9 kHz to 30 MHz

Test mode : Transmitter (Worst Case)

The requirements are:
☒ Complies

Test Data



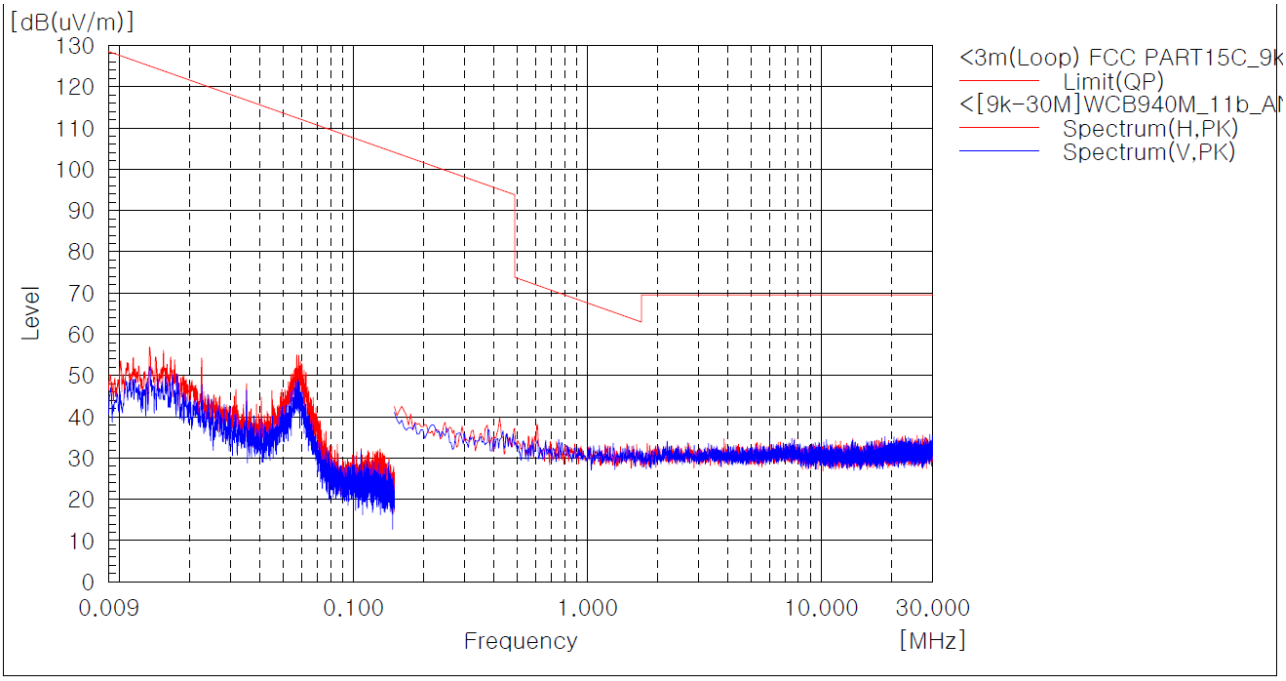
Frequency [MHz]	(P)	Reading [dBuV]	c.f [dB(1/m)]	Level [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]
The emissions 9 kHz to 30 MHz were 20 dB lower than the limit.						

Remark :
1. The unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down positon(X,Y axis). The worst emission was found in lie-down position(X 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.

Test mode : Transmitter (simultaneous transmissions BDR + DTS)

The requirements are:
☒ Complies

Test Data



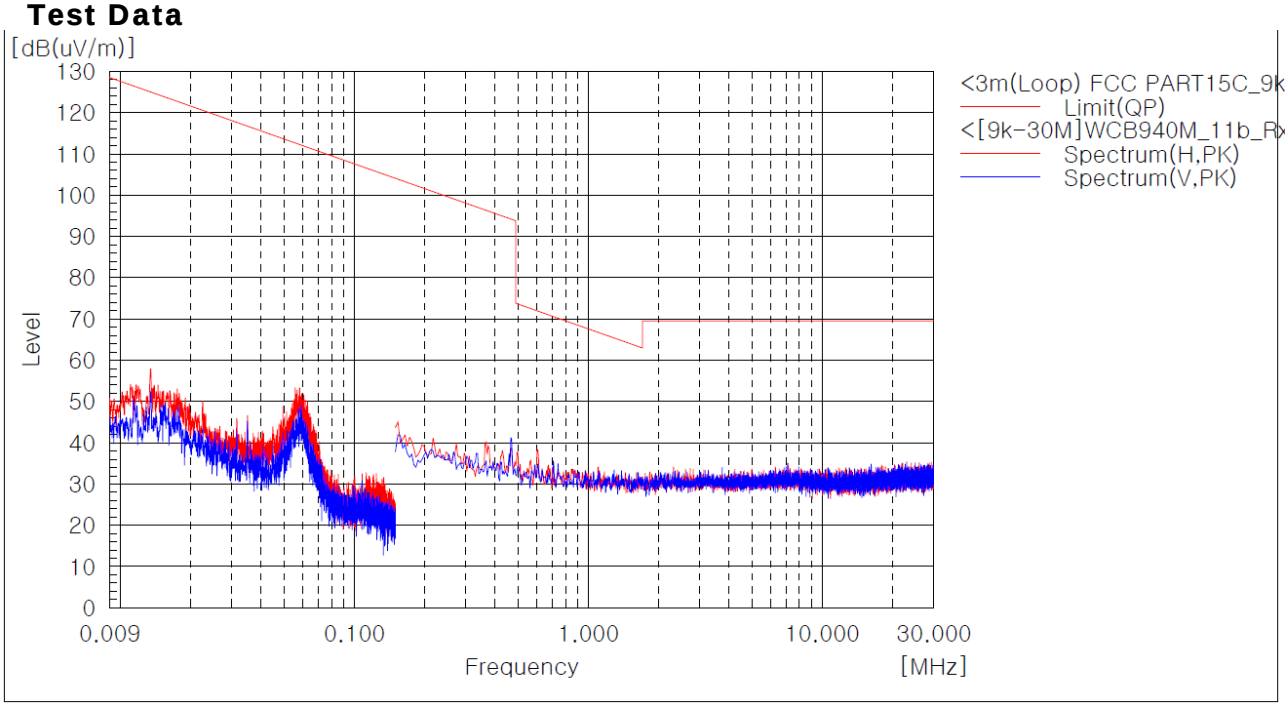
Frequency [MHz]	(P)	Reading [dBuV]	c.f [dB(1/m)]	Level [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]
The emissions 9 kHz to 30 MHz were 20 dB lower than the limit.						

Remark :
1. 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(X 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.

Test mode : Receiver (Worst Case)

The requirements are:
☒ Complies

Test Data



Frequency [MHz]	(P)	Reading [dBuV]	c.f [dB(1/m)]	Level [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]
The emissions 9 kHz to 30 MHz were 20 dB lower than the limit.						

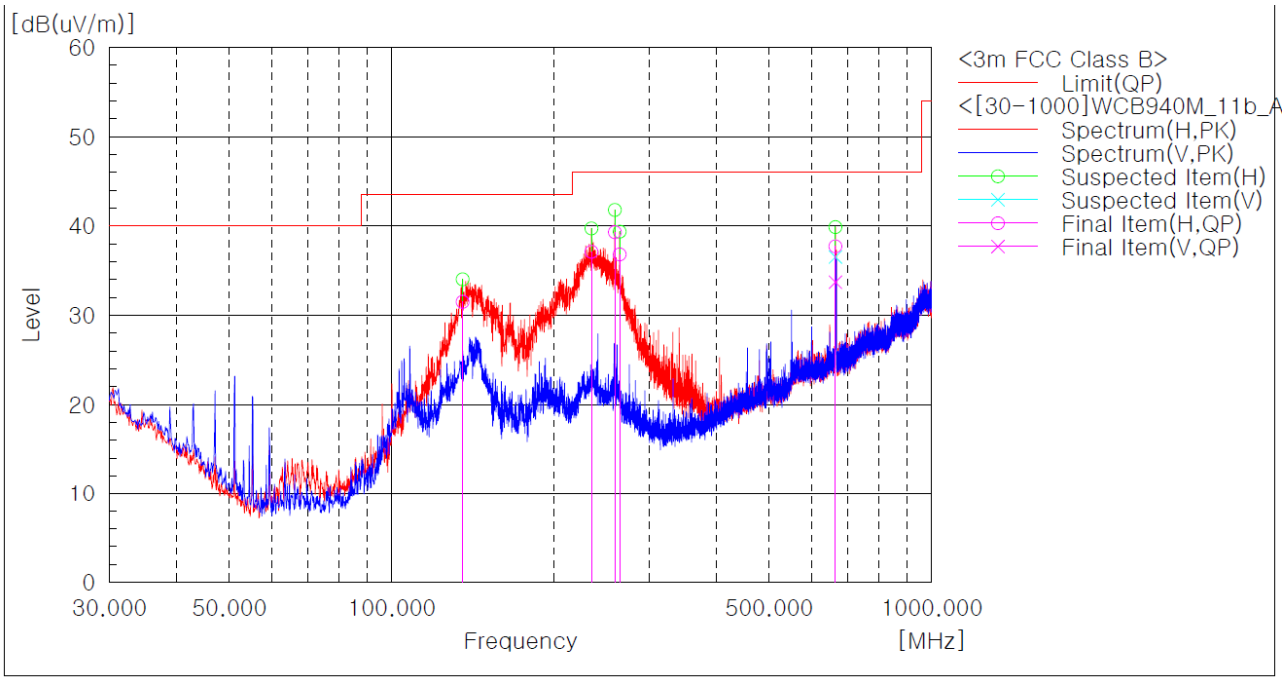
Remark :
1. The unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down positon(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor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

2) 30 MHz to 1 GHz

Test mode : Transmitter (Worst Case)

The requirements are:
☒ Complies

Test Data



Final Result

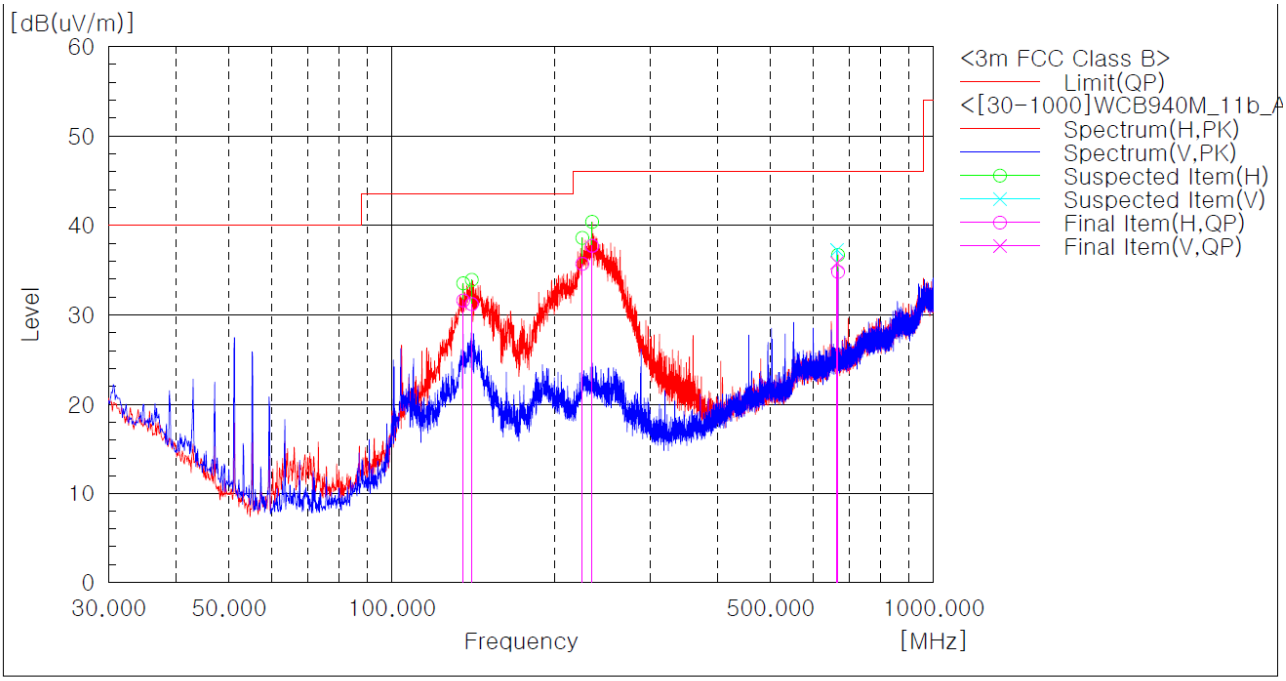
No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	135.366	H	43.2	-11.7	31.5	43.5	12.0	209.0	216.0
2	234.428	H	49.1	-12.0	37.1	46.0	8.9	100.0	358.0
3	259.041	H	47.6	-8.3	39.3	46.0	6.7	100.0	345.0
4	264.498	H	45.0	-8.2	36.8	46.0	9.2	100.0	353.0
5	663.653	V	32.6	1.1	33.7	46.0	12.3	101.0	57.0
6	663.774	H	36.6	1.1	37.7	46.0	8.3	100.0	287.0

Remark :
1. The unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down positon(X,Y axis). The worst emission was found in lie-down position(X 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

Test mode : Transmitter (simultaneous transmissions BDR + DTS)

The requirements are:
☒ Complies

Test Data



Final Result

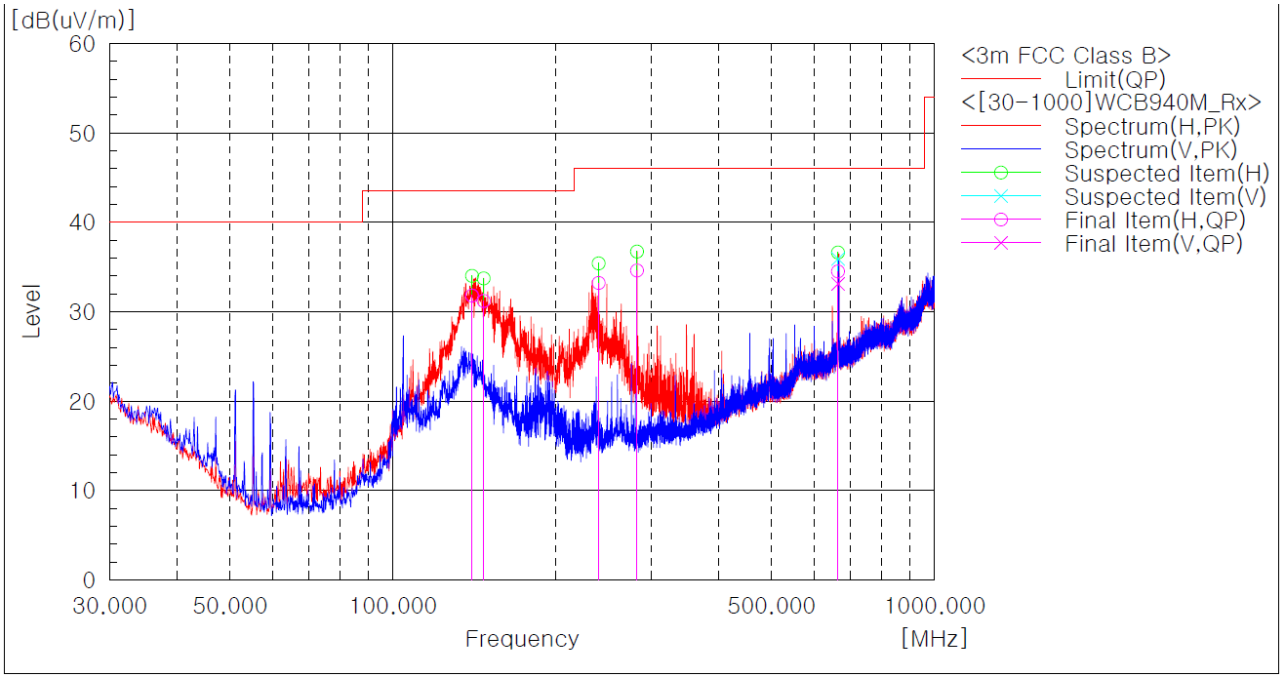
No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	135.488	H	43.3	-11.7	31.6	43.5	11.9	206.0	24.0
2	140.459	H	42.9	-11.7	31.2	43.5	12.3	206.0	210.0
3	224.728	H	48.6	-12.9	35.7	46.0	10.3	101.0	358.0
4	234.306	H	49.7	-12.0	37.7	46.0	8.3	101.0	1.0
5	663.774	V	34.7	1.1	35.8	46.0	10.2	101.0	107.0
6	666.441	H	33.8	1.0	34.8	46.0	11.2	101.0	295.0

Remark :
1. 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(X 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

Test mode : Receiver (Worst Case)

The requirements are:
☒ Complies

Test Data



Final Result

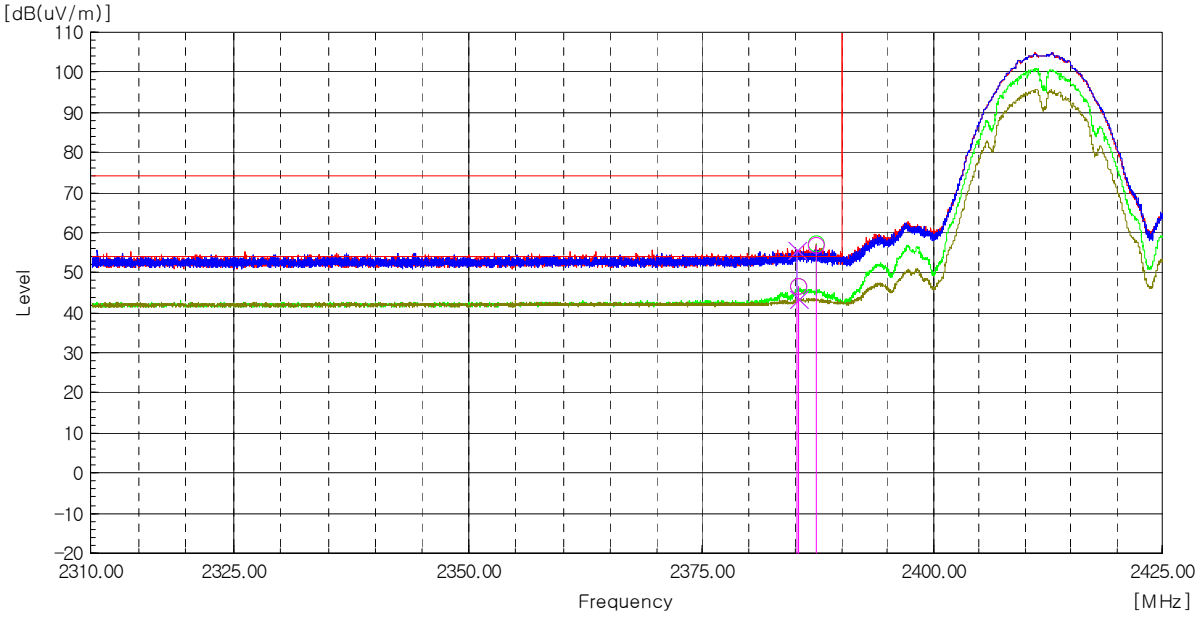
No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	139.974	H	43.5	-11.7	31.8	43.5	11.7	205.0	20.0
2	147.128	H	43.0	-11.8	31.2	43.5	12.3	205.0	22.0
3	239.884	H	44.3	-11.1	33.2	46.0	12.8	307.0	1.0
4	282.321	H	43.9	-9.3	34.6	46.0	11.4	101.0	1.0
5	663.653	H	33.4	1.1	34.5	46.0	11.5	101.0	283.0
6	663.774	V	32.0	1.1	33.1	46.0	12.9	101.0	91.0

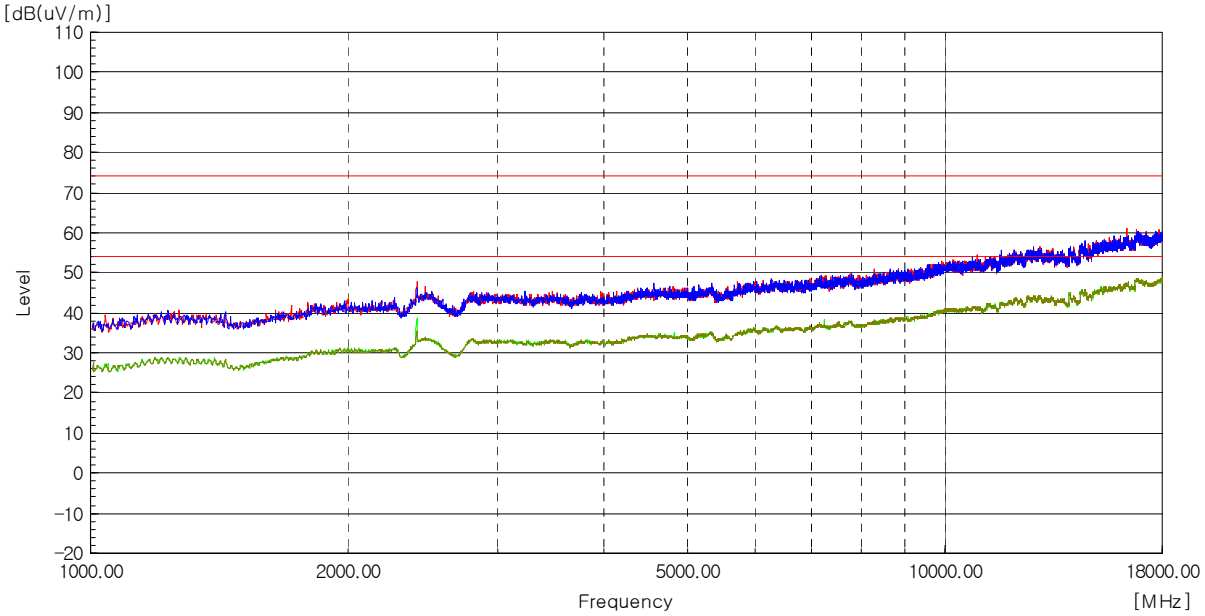
Remark :
1. The unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down positon(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor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

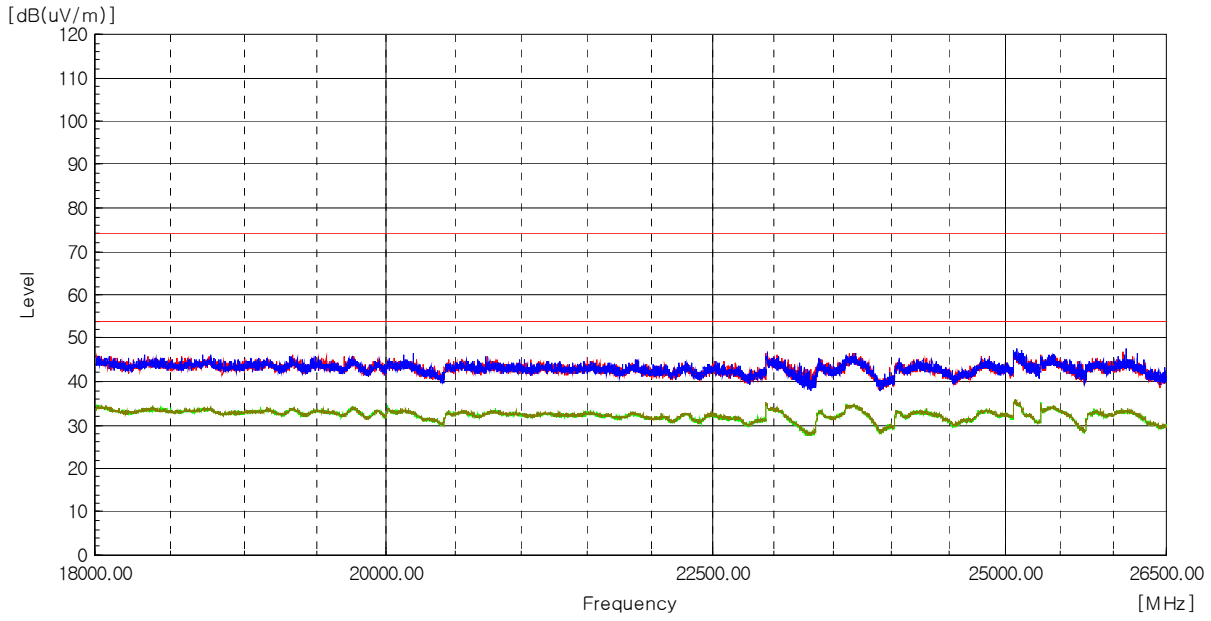
3) above 1 GHz

The requirements are:
☒ Complies

Test Data






[dB(uV/m)]
120
110
100
90
80
70
60
50
40
30
20
10
0
Level
18000.00
20000.00
22500.00
25000.00
26500.00
Frequency
[MHz]

Test mode : Transmitter (802.11b, ANT1)

Low (2 412 MHz)

Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
2 387.18	H	59.5	-----	-2.5	57.0	-----	-----	74.0	-----	17.0	-----
2 385.38	H	-----	49.0	-2.5	-----	46.5	0.0	-----	54.0	-----	7.5
2 385.14	V	58.1	-----	-2.5	55.6	-----	-----	74.0	-----	18.4	-----
2 385.38	V	-----	46.1	-2.5	-----	43.6	0.0	-----	54.0	-----	10.4
7 234.98	H	46.9	-----	4.3	51.2	-----	-----	74.0	-----	22.8	-----
7 235.14	H	-----	35.5	4.3	-----	39.8	0.0	-----	54.0	-----	14.2
7 239.54	V	45.9	-----	4.3	50.2	-----	-----	74.0	-----	23.8	-----
7 236.60	V	-----	33.9	4.3	-----	38.2	0.0	-----	54.0	-----	15.8

Mid (2 442 MHz)

Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
7 326.85	H	47.5	-----	4.1	51.6	-----	-----	74.0	-----	22.4	-----
7 324.71	H	-----	36.1	4.1	-----	40.2	0.0	-----	54.0	-----	13.8
7 435.62	V	46.2	-----	4.5	50.7	-----	-----	74.0	-----	23.3	-----
7 324.74	V	-----	34.5	4.1	-----	38.6	0.0	-----	54.0	-----	15.4

High_1 (2 462 MHz)

Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
2 488.68	H	64.3	-----	-2.1	62.2	-----	-----	74.0	-----	11.8	-----
2 488.54	H	-----	46.7	-2.1	-----	44.6	0.0	-----	54.0	-----	9.4
2 492.94	V	58.5	-----	-2.1	56.4	-----	-----	74.0	-----	17.6	-----
2 496.58	V	-----	45.7	-2.1	-----	43.6	0.0	-----	54.0	-----	10.4

High_2 (2 467 MHz)

Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
2 484.85	H	61.1	-----	-2.1	59.0	-----	-----	74.0	-----	15.0	-----
2 485.07	H	-----	51.9	-2.1	-----	49.8	0.0	-----	54.0	-----	4.2
2 483.64	V	72.4	-----	-2.1	70.3	-----	-----	74.0	-----	3.7	-----
2 484.88	V	-----	46.4	-2.1	-----	44.3	0.0	-----	54.0	-----	9.7

High_3 (2 472 MHz)

Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
2 484.91	H	64.0	-----	-2.1	61.9	-----	-----	74.0	-----	12.1	-----
2 484.76	H	-----	55.4	-2.1	-----	53.3	0.0	-----	54.0	-----	0.7
2 492.51	V	58.5	-----	-2.1	56.4	-----	-----	74.0	-----	17.6	-----
2 484.91	V	-----	46.2	-2.1	-----	44.1	0.0	-----	54.0	-----	9.9

Remarks

1. 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(X axis) and the worst case was recorded.
2. Peak Result = Reading + c.f(Correction factor)
   Average Result = Reading + c.f(Correction factor) + Duty Cycle Factor
3. Correction factor = Antenna factor + Cable loss - Amp Gain

Test mode : Transmitter (802.11b, ANT2)

Low (2 412 MHz)

Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
2 384.16	H	60.1	-----	-2.6	57.5	-----	-----	74.0	-----	16.5	-----
2 385.31	H	-----	50.1	-2.5	-----	47.6	0.0	-----	54.0	-----	6.4
2 383.53	V	60.0	-----	-2.6	57.4	-----	-----	74.0	-----	16.6	-----
2 385.17	V	-----	46.7	-2.5	-----	44.2	0.0	-----	54.0	-----	9.8
7 236.93	H	46.3	-----	4.3	50.6	-----	-----	74.0	-----	23.4	-----
7 237.78	H	-----	36.8	4.3	-----	41.1	0.0	-----	54.0	-----	12.9
7 234.34	V	45.5	-----	4.3	49.8	-----	-----	74.0	-----	24.2	-----
7 237.18	V	-----	34.5	4.3	-----	38.8	0.0	-----	54.0	-----	15.2

Mid (2 442 MHz)

Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
7 324.76	H	46.5	-----	4.1	50.6	-----	-----	74.0	-----	23.4	-----
7 327.46	H	-----	35.9	4.1	-----	40.0	0.0	-----	54.0	-----	14.0
7 361.97	V	46.1	-----	4.2	50.3	-----	-----	74.0	-----	23.7	-----
7 326.94	V	-----	34.3	4.1	-----	38.4	0.0	-----	54.0	-----	15.6

High_1 (2 462 MHz)

Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
2 484.72	H	58.3	-----	-2.1	56.2	-----	-----	74.0	-----	17.8	-----
2 489.96	H	-----	46.3	-2.1	-----	44.2	0.0	-----	54.0	-----	9.8
2 493.78	V	58.1	-----	-2.1	56.0	-----	-----	74.0	-----	18.0	-----
2 488.33	V	-----	45.7	-2.1	-----	43.6	0.0	-----	54.0	-----	10.4

High_2 (2 467 MHz)

Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
2 485.39	H	58.1	-----	-2.1	56.0	-----	-----	74.0	-----	18.0	-----
2 485.82	H	-----	46.8	-2.1	-----	44.7	0.0	-----	54.0	-----	9.3
2 497.11	V	58.3	-----	-2.1	56.2	-----	-----	74.0	-----	17.8	-----
2 497.06	V	-----	45.7	-2.1	-----	43.6	0.0	-----	54.0	-----	10.4

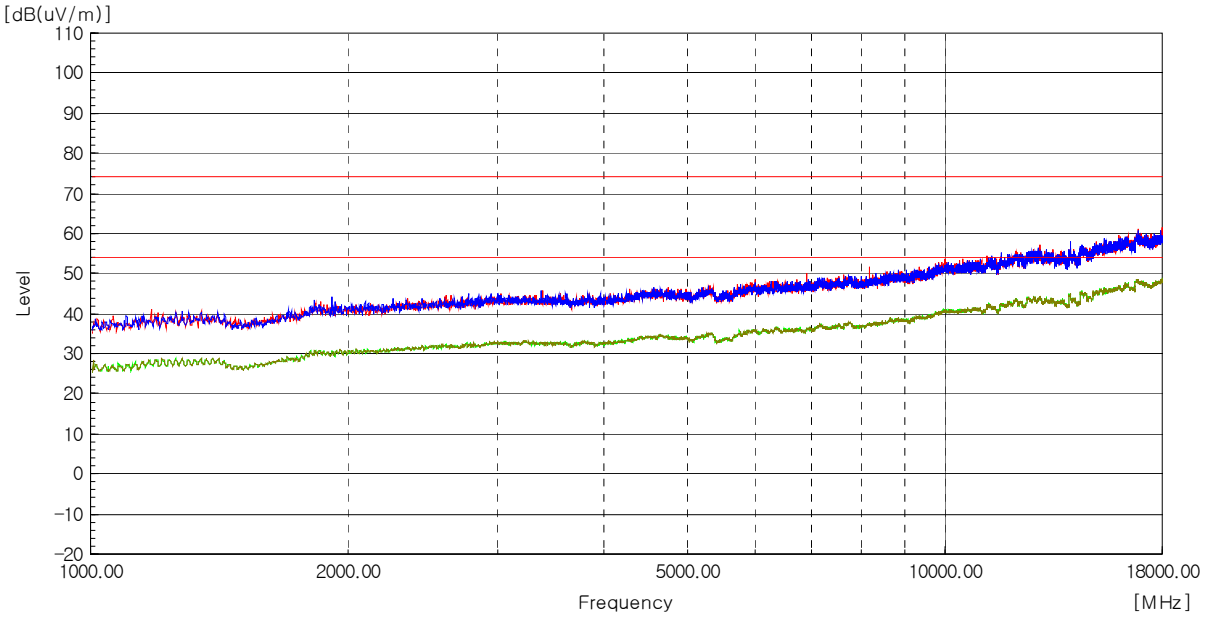
High_3 (2 472 MHz)

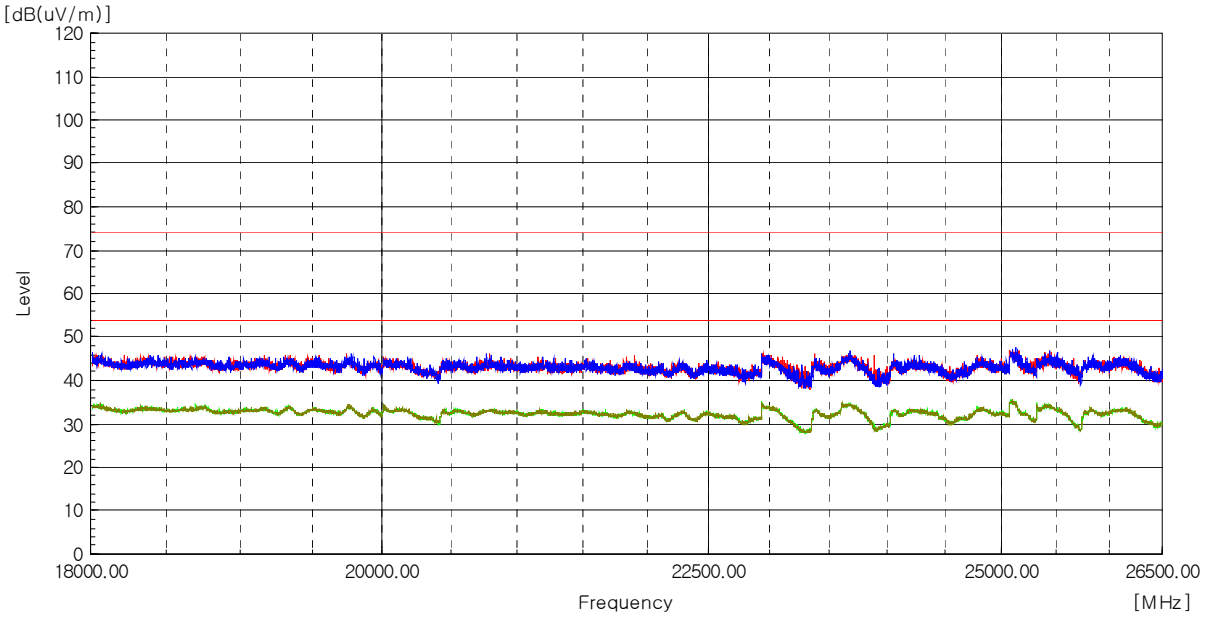
Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
2 485.61	H	61.4	-----	-2.1	59.3	-----	-----	74.0	-----	14.7	-----
2 485.59	H	-----	53.2	-2.1	-----	51.1	0.0	-----	54.0	-----	2.9
2 485.65	V	60.3	-----	-2.1	58.2	-----	-----	74.0	-----	15.8	-----
2 485.71	V	-----	48.9	-2.1	-----	46.8	0.0	-----	54.0	-----	7.2

Remarks

1. 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(X axis) and the worst case was recorded.
2. Peak Result = Reading + c.f(Correction factor)
   Average Result = Reading + c.f(Correction factor) + Duty Cycle Factor
3. Correction factor = Antenna factor + Cable loss - Amp Gain

Test mode : Receiver (Worst Case)





Test mode : Receiver (Worst Case)

Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Duty Cycle Factor [dB]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]
The emissions above 1 GHz were 20 dB lower than the limit.											

Remarks

1. The unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down positon(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Correction factor = Antenna factor + Cable loss - Amp Gain

4.6 AC Conducted Emissions

Frequency Range of Measurement
150 kHz to 30 MHz

Instrument Settings
IF Band Width: 9 kHz

Test Procedures

RSS-Gen - Section 8.8

Module has been tested by mounting the End product(Printer).
The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit
- **15.207(a)**

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

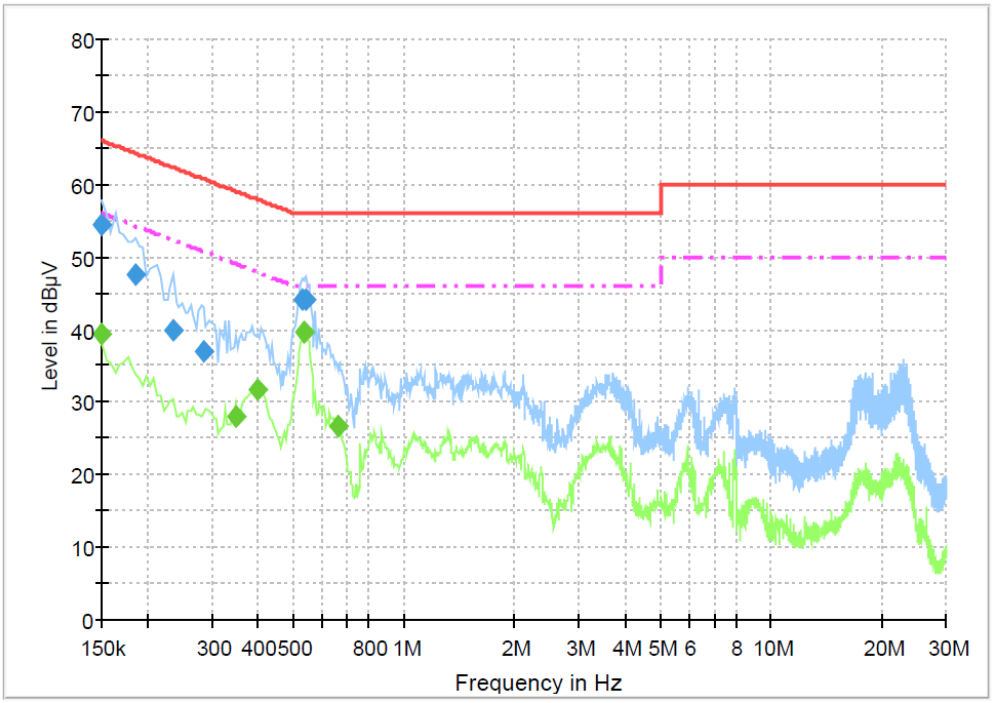
* The level decreases linearly with the logarithm of the frequency.
** A linear average detector is required.

Test Results

The requirements are:
☒ Complies

Test Data

[LINE]
3CE_Class B_L1



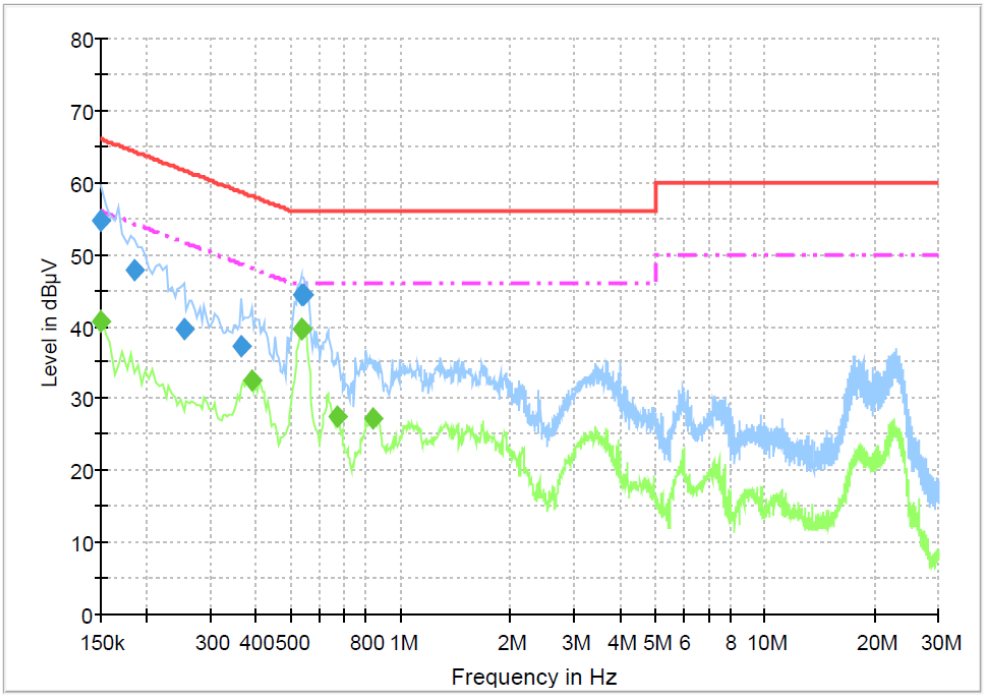
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	54.3	1000.0	9.000	On	L1	9.7	11.7	66.0
0.186000	47.6	1000.0	9.000	On	L1	9.9	16.6	64.2
0.235500	39.9	1000.0	9.000	On	L1	9.7	22.4	62.3
0.285000	36.9	1000.0	9.000	On	L1	9.7	23.8	60.7
0.528000	44.1	1000.0	9.000	On	L1	9.9	11.9	56.0
0.541500	44.1	1000.0	9.000	On	L1	9.9	11.9	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	39.4	1000.0	9.000	On	L1	9.7	16.6	56.0
0.348000	27.9	1000.0	9.000	On	L1	9.9	21.1	49.0
0.397500	31.6	1000.0	9.000	On	L1	9.9	16.3	47.9
0.532500	39.6	1000.0	9.000	On	L1	9.9	6.4	46.0
0.537000	39.7	1000.0	9.000	On	L1	9.9	6.3	46.0
0.663000	26.7	1000.0	9.000	On	L1	9.9	19.3	46.0

[NEUTRAL]
3CE_Class B_N



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	54.7	1000.0	9.000	On	N	9.8	11.3	66.0
0.186000	47.9	1000.0	9.000	On	N	9.9	16.3	64.2
0.253500	39.6	1000.0	9.000	On	N	9.6	22.1	61.6
0.366000	37.2	1000.0	9.000	On	N	9.9	21.4	58.6
0.532500	44.3	1000.0	9.000	On	N	9.9	11.7	56.0
0.541500	44.3	1000.0	9.000	On	N	9.9	11.7	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	40.6	1000.0	9.000	On	N	9.8	15.4	56.0
0.388500	32.4	1000.0	9.000	On	N	9.9	15.7	48.1
0.532500	39.6	1000.0	9.000	On	N	9.9	6.4	46.0
0.537000	39.7	1000.0	9.000	On	N	9.9	6.3	46.0
0.667500	27.4	1000.0	9.000	On	N	9.9	18.6	46.0
0.838500	27.2	1000.0	9.000	On	N	9.8	18.8	46.0

APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date
1	Signal Analyzer	Agilent	N9020A	MY50200096	2021-01-24	2022-01-24
2	Signal Generator	Rohde & Schwarz	SMB100A	175528	2021-04-12	2022-04-12
3	EMI Test Receiver	Rohde & Schwarz	ESCI7	100814	2021-10-20	2022-10-20
4	Bilog Antenna	Schaffner	CBL6111C	2551	2020-05-26	2022-05-26
5	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-126	2020-05-20	2022-05-20
6	6dB Attenuator	R&S	DNF	272.4110.50-2	2021-10-22	2022-10-22
7	6dB Attenuator	BIRD	5W 6dB	1744	2020-12-16	2021-12-16
8	AMPLIFIER	SONOMA	310	291721	2021-01-22	2022-01-22
9	EMI Test Receiver	Rohde & Schwarz	ESU40	100336	2021-01-12	2022-01-12
10	Preamplifier	Agilent	8449B	3008A01504	2020-12-17	2021-12-17
11	Horn Antenna	ETS-Lindgren	3117	00154525	2021-10-21	2022-10-21
12	Horn Antenna	SCHWARZBECK	BBHA9170	00967	2021-05-25	2022-05-25
13	Band Reject Filter	Micro Tronics	BRM50702	G233	2021-01-14	2022-01-14
14	Low Noise Amplifier	TESTEK	TK-PA1840H	200115-L	2021-05-21	2022-05-21
15	LISN	Rohde & Schwarz	ENV216	101235	2021-01-12	2022-01-12

	Cable	Manufacturer	Model No.	Serial No.	Check Date
1	RF Cable	Canare Corporation	L-5D2W	N/A	2021-01-21
2	RF Cable	Junkosha Inc.	MWX221	1512S127	2021-11-03
3	RF Cable	HUBER+SUHNER	SUCOFLEX 102	MY073/2	2021-06-01
4	RF Cable	HUBER+SUHNER	SUCOFLEX 104	MY27558/4	2021-06-01
5	RF Cable	HUBER+SUHNER	SUCOFLEX 104	N/A	2021-06-01
6	RF Cable	HUBER+SUHNER	SUCOFLEX 104	MY27573/4	2021-06-01
7	RF Cable	HUBER+SUHNER	SUCOFLEX 106	N/A	2021-06-01
8	RF Cable	HUBER+SUHNER	SUCOFLEX 102	803010/2	2020-10-16
9	RF Cable	HUBER+SUHNER	SUCOFLEX 102	803742/2	2020-10-16
10	RF Cable	HUBER+SUHNER	SUCOFLEX 102	MY2374/2	2021-06-01
11	RF Cable	HUBER+SUHNER	SUCOFLEX 102	MY4728/2	2021-06-01