# TEST REPORT

**CTK Co., Ltd.**
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
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Tel: +82-31-339-9970
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Report No.:
CTK-2020-04546


**1. Client**

◦ Name : Samsung Electronics Co Ltd

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

◦ Date of Receipt : 2020-10-26

**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 / WCA942M

**5. Date of Test :** 2020-11-05 to 2020-11-20

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

**7. Testing Environment:** Temp.: (23 ± 1) ℃, Humidity: (49 ± 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<br>Ji-Hye, Kim: (Signature) | Technical Manager<br>Won-Jae, Hwang: (Signature) |

2020-11-20

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

# REPORT REVISION HISTORY

| Date | Revision | Page No |
|---|---|---|
| 2020-11-20 | Issued (CTK-2020-04546) | 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<br>E-mail : monk.noh@samsung.com<br>Tel : +82-277-0598<br>Fax : - |

## 1.2 Product Information

| | |
|---|---|
| **FCC ID** | A3LWCA942M |
| **ISED** | 649E-WCA942M |
| **Product Description** | Wi-Fi/BT Transceiver |
| **Model name** | WCA942M |
| **Variant Model name** | - |
| **Operating Frequency** | 2 412 MHz – 2 472 MHz |
| **RF Output Power** | 802.11b : 18.88 dBm (77.27 mW)<br>802.11g : 17.58 dBm (57.28 mW)<br>802.11n_HT20 : 16.88 dBm (48.75 mW)<br>802.11ax_HE20 : 17.47 dBm (55.85 mW) |
| **Antenna Specification** | Antenna type : Chip Antenna<br>Peak Gain : -2.31 dBi (ANT1), -0.52 dBi (ANT2) |
| **Number of channels** | 13 (802.11b/g/n_HT20/ax_HE20) |
| **Type of Modulation** | 802.11b : DSSS<br>802.11g/n : OFDM<br>802.11ax : OFDMA |
| **Data Rate** | 802.11b : 11 / 5.5 / 2 / 1 Mbps<br>802.11g : 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps<br>802.11n: up to 144 Mbps<br>802.11ax: up to 286 Mbps |
| **Power Source** | DC 5 V |
| **Hardware Rev** | V2.0 |
| **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.

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# 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/g/n_HT20/ax_HE20

| Low | Mid | High |
|---|---|---|
| 2 412 MHz | 2 442 MHz | 2 472 MHz |

**Test mode**

| Test mode | Modulation | Data rate | Duty Cycle | Duty Cycle Factor |
|---|---|---|---|---|
| 802.11b | DSSS | 1 Mbps | 99.7 % | - |
| 802.11g | OFDM | 6 Mbps | 97.2 % | 0.12 dB |
| 802.11n_HT20 | OFDM | MCS 0 | 97.0 % | 0.13 dB |
| 802.11ax_HE20 | OFDMA | MCS 0 | 93.2 % | 0.31 dB |

## 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 |
| Power Spectral Density | ± 1.5 dB |
| Occupied Bandwidth | ± 0.1 MHz |
| Unwanted Emission(conducted) | ± 3.0 dB |
| Radiated Emissions (f ≤ 1 GHz) | ± 4.0 dB |
| Radiated Emissions (f > 1 GHz) | ± 5.0 dB |

## 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<br>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**

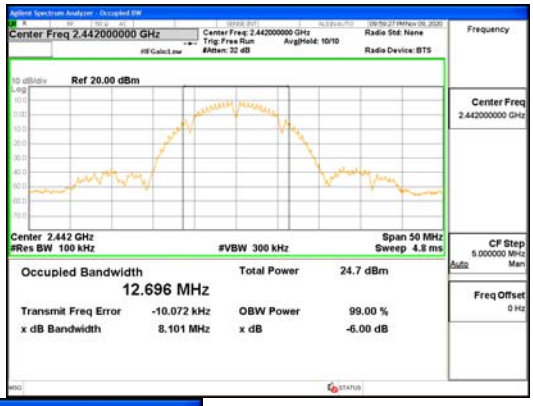
| Mode | 6 dB Bandwidth and 99 % Bandwidth (MHz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 802.11b | | 802.11g | | 802.11n_HT20 | | 802.11ax_HE20 | |
| Frequency | 6 dB | 99 % | 6 dB | 99 % | 6 dB | 99 % | 6 dB | 99 % |
| 2 412 MHz | 8.10 | 12.80 | 15.16 | 16.33 | 15.73 | 17.52 | 17.80 | 18.76 |
| 2 442 MHz | 8.10 | 12.64 | 16.29 | 16.51 | 17.18 | 17.77 | 17.72 | 18.94 |
| 2 472 MHz | 8.09 | 12.61 | 15.16 | 16.32 | 15.72 | 17.52 | 17.77 | 18.77 |

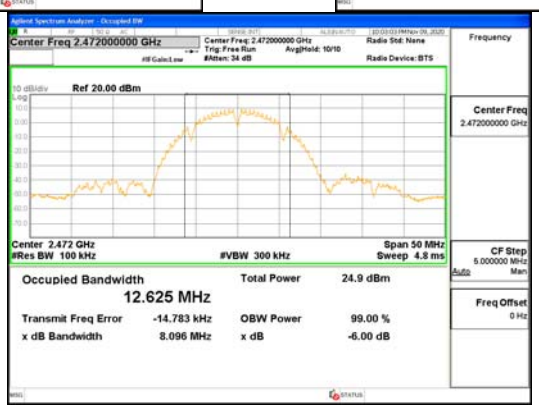
**ANT2**

| Mode | 6 dB Bandwidth and 99 % Bandwidth (MHz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 802.11b | | 802.11g | | 802.11n_HT20 | | 802.11ax_HE20 | |
| Frequency | 6 dB | 99 % | 6 dB | 99 % | 6 dB | 99 % | 6 dB | 99 % |
| 2 412 MHz | 8.09 | 12.85 | 15.17 | 16.33 | 15.16 | 17.50 | 18.03 | 18.76 |
| 2 442 MHz | 8.10 | 12.70 | 15.63 | 16.57 | 15.21 | 17.77 | 18.17 | 18.95 |
| 2 472 MHz | 8.10 | 12.63 | 15.18 | 16.34 | 15.18 | 17.51 | 18.17 | 18.75 |

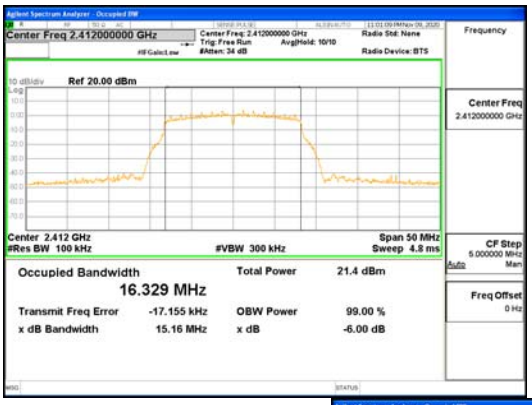
See next pages for actual measured spectrum plots.

**ANT1, 802.11b**

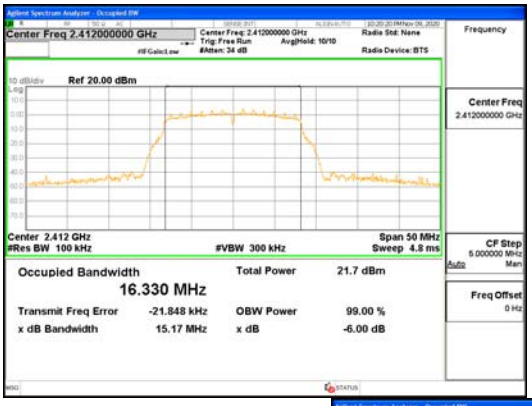


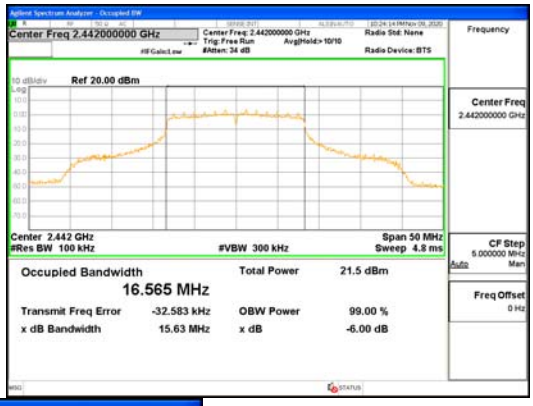



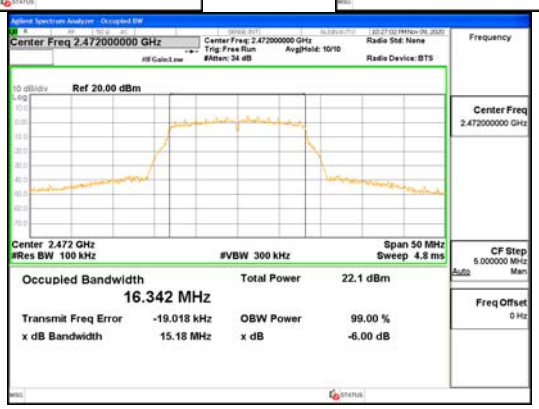

**ANT2, 802.11b**



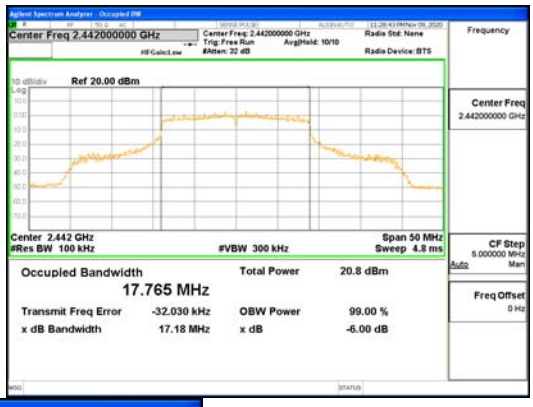
**ANT1, 802.11g**



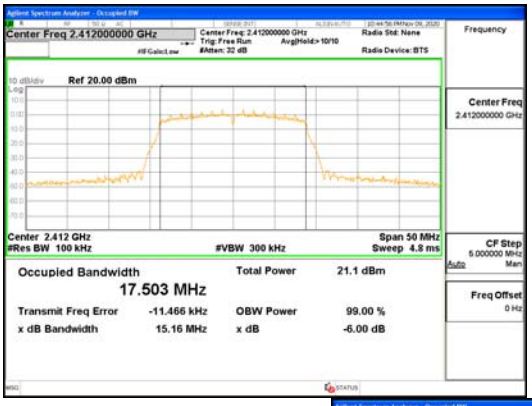



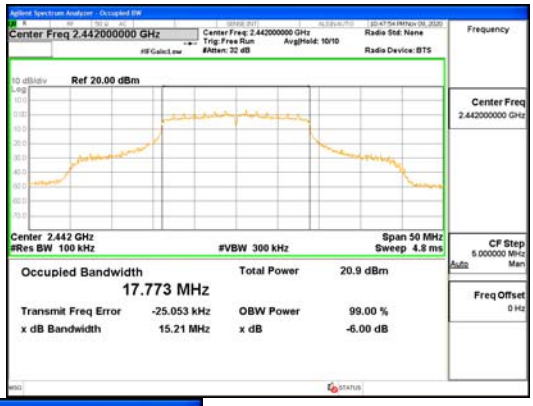




**ANT2, 802.11g**

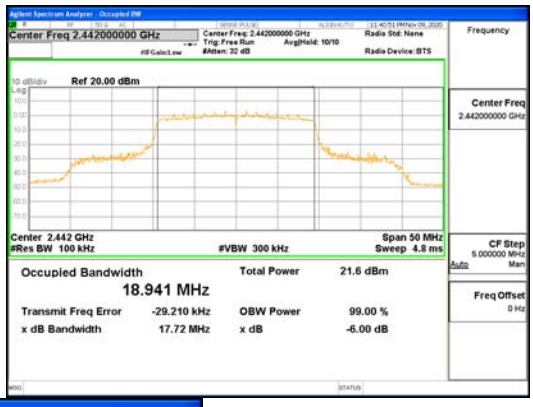


**ANT1, 802.11n_HT20**

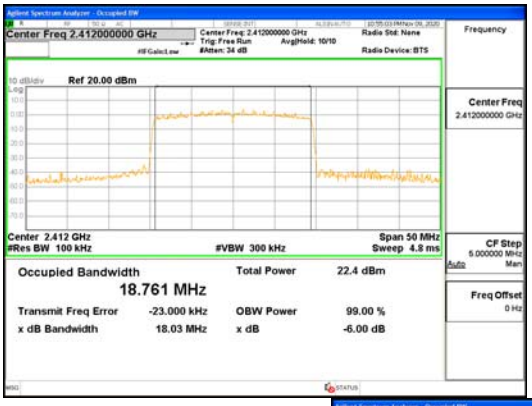


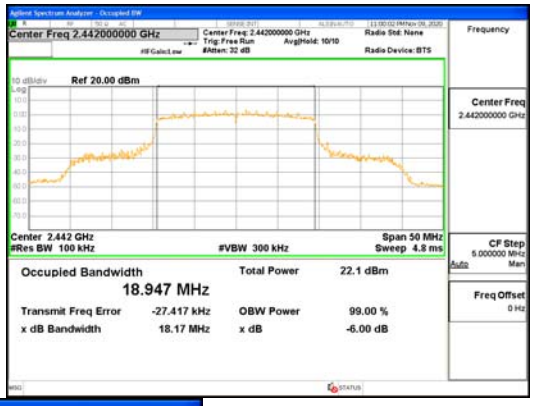



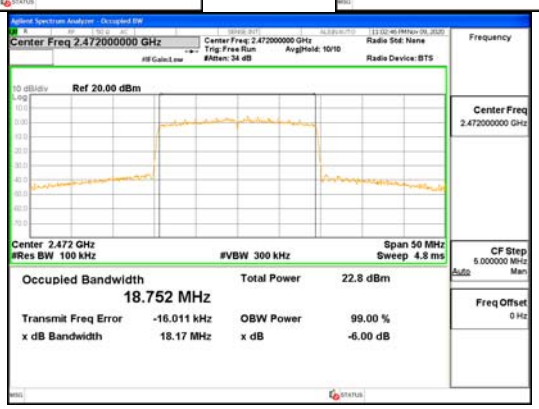
**ANT2, 802.11n_HT20**



**ANT1, 802.11ax_HE20**



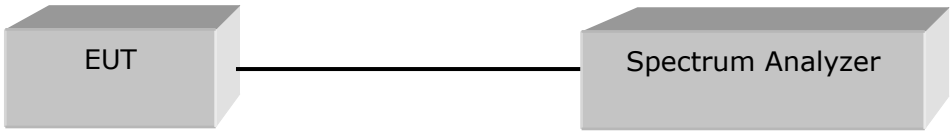

**ANT2, 802.11ax_HE20**

## 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 |
| 802.11g | 0.12 |
| 802.11n_HT20 | 0.13 |
| 802.11ax_HE20 | 0.31 |

**Limit**

| Operating Mode | Mode | ANT Configuration | ANT Gain (dBi) | Limit (dBm) |
|---|---|---|---|---|
| SISO | 802.11b/g/n/ax | ANT1 | -2.31 | 30.00 |
| SISO | 802.11b/g/n/ax | ANT2 | -0.52 | 30.00 |
| MIMO (2Tx) | 802.11g/n/ax | ANT1 + ANT2 | 1.69 | 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 | 18.85 | 0.00 | 18.85 | 30.00 | 11.15 |
| | 2 442 | 18.88 | 0.00 | 18.88 | 30.00 | 11.12 |
| | 2 472 | 18.64 | 0.00 | 18.64 | 30.00 | 11.36 |
| 802.11g | 2 412 | 14.04 | 0.12 | 14.16 | 30.00 | 15.84 |
| | 2 442 | 13.69 | 0.12 | 13.81 | 30.00 | 16.19 |
| | 2 472 | 14.06 | 0.12 | 14.18 | 30.00 | 15.82 |
| 802.11n _HT20 | 2 412 | 13.33 | 0.13 | 13.46 | 30.00 | 16.54 |
| | 2 442 | 13.07 | 0.13 | 13.20 | 30.00 | 16.80 |
| | 2 472 | 13.32 | 0.13 | 13.45 | 30.00 | 16.55 |
| 802.11ax _HE20 | 2 412 | 13.77 | 0.31 | 14.08 | 30.00 | 15.92 |
| | 2 442 | 13.64 | 0.31 | 13.95 | 30.00 | 16.05 |
| | 2 472 | 13.63 | 0.31 | 13.94 | 30.00 | 16.06 |

**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 | 17.19 | 0.00 | 17.19 | 30.00 | 12.81 |
| | 2 442 | 17.34 | 0.00 | 17.34 | 30.00 | 12.66 |
| | 2 472 | 17.51 | 0.00 | 17.51 | 30.00 | 12.49 |
| 802.11g | 2 412 | 14.35 | 0.12 | 14.47 | 30.00 | 15.53 |
| | 2 442 | 14.23 | 0.12 | 14.35 | 30.00 | 15.65 |
| | 2 472 | 14.81 | 0.12 | 14.93 | 30.00 | 15.07 |
| 802.11n _HT20 | 2 412 | 13.68 | 0.13 | 13.81 | 30.00 | 16.19 |
| | 2 442 | 13.51 | 0.13 | 13.64 | 30.00 | 16.36 |
| | 2 472 | 14.12 | 0.13 | 14.25 | 30.00 | 15.75 |
| 802.11ax _HE20 | 2 412 | 13.91 | 0.31 | 14.22 | 30.00 | 15.78 |
| | 2 442 | 13.99 | 0.31 | 14.3 | 30.00 | 15.70 |
| | 2 472 | 14.62 | 0.31 | 14.93 | 30.00 | 15.07 |

**ANT1 + ANT2 (MIMO)**

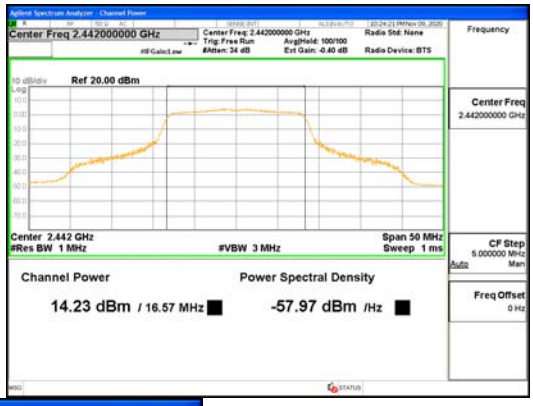
| Test Mode | Frequency (MHz) | Measured Output Power (dBm) | Duty cycle Factor (dB) | Result Output Power (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| 802.11g | 2 412 | 17.21 | 0.12 | 17.33 | 30.00 | 12.67 |
| | 2 442 | 16.98 | 0.12 | 17.10 | 30.00 | 12.90 |
| | 2 472 | 17.46 | 0.12 | 17.58 | 30.00 | 12.42 |
| 802.11n _HT20 | 2 412 | 16.52 | 0.13 | 16.65 | 30.00 | 13.35 |
| | 2 442 | 16.31 | 0.13 | 16.44 | 30.00 | 13.56 |
| | 2 472 | 16.75 | 0.13 | 16.88 | 30.00 | 13.12 |
| 802.11ax _HE20 | 2 412 | 16.85 | 0.31 | 17.16 | 30.00 | 12.84 |
| | 2 442 | 16.83 | 0.31 | 17.14 | 30.00 | 12.86 |
| | 2 472 | 17.16 | 0.31 | 17.47 | 30.00 | 12.53 |

See next pages for actual measured spectrum plots.

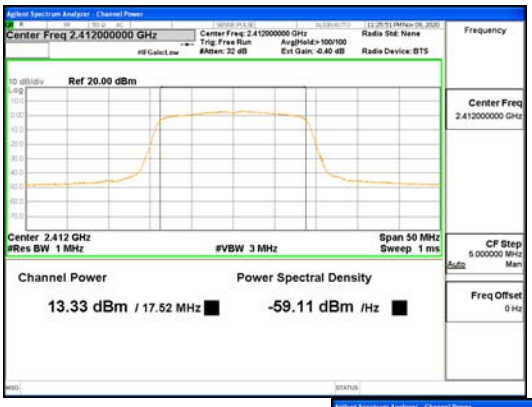
**ANT1, 802.11b**

**ANT2, 802.11b**

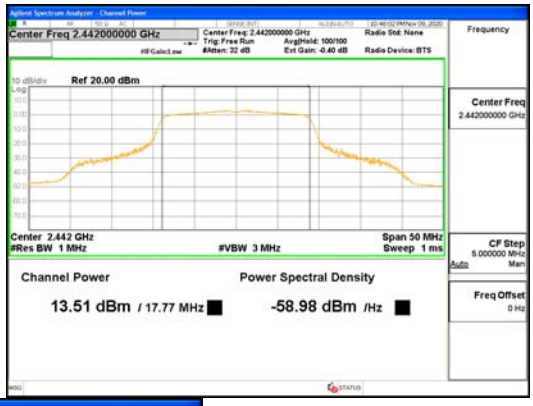
**ANT1, 802.11g**



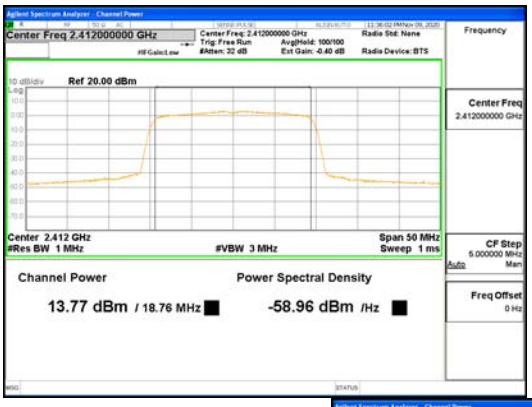
**ANT2, 802.11g**



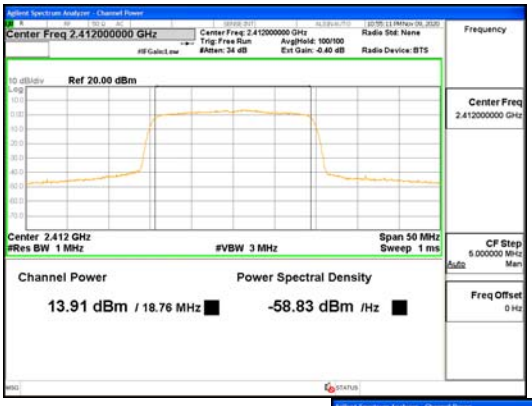
**ANT1, 802.11n_HT20**

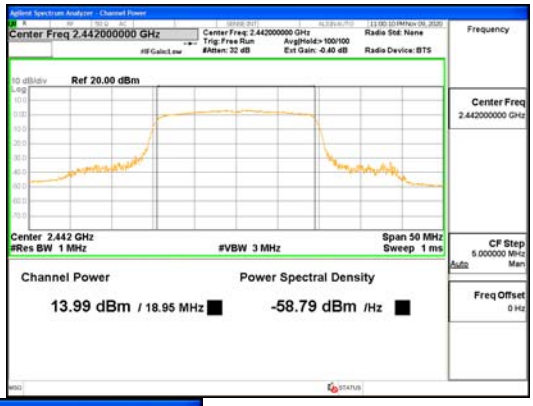


**ANT2, 802.11n_HT20**



**ANT1, 802.11ax_HE20**



**ANT2, 802.11ax_HE20**

## 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/g/n/ax | ANT1 | -2.31 | 8.00 |
| SISO | 802.11b/g/n/ax | ANT2 | -0.52 | 8.00 |
| MIMO (2Tx) | 802.11g/n/ax | ANT1 + ANT2 | 1.69 | 8.00 |

## Test Data

### ANT1

| Test Mode | Frequency (MHz) | Measured Power Density (dBm) | Limit (dBm) | Margin(dB) |
|---|---|---|---|---|
| 802.11b | 2 412 | -3.85 | 8.00 | 11.85 |
| | 2 442 | -4.18 | 8.00 | 12.18 |
| | 2 472 | -3.56 | 8.00 | 11.56 |
| 802.11g | 2 412 | -9.68 | 8.00 | 17.68 |
| | 2 442 | -9.85 | 8.00 | 17.85 |
| | 2 472 | -10.28 | 8.00 | 18.28 |
| 802.11n_HT20 | 2 412 | -11.62 | 8.00 | 19.62 |
| | 2 442 | -11.10 | 8.00 | 19.10 |
| | 2 472 | -10.58 | 8.00 | 18.58 |
| 802.11ax_HE20 | 2 412 | -11.94 | 8.00 | 19.94 |
| | 2 442 | -11.61 | 8.00 | 19.61 |
| | 2 472 | -11.79 | 8.00 | 19.79 |

### ANT2

| Test Mode | Frequency (MHz) | Measured Power Density (dBm) | Limit (dBm) | Margin(dB) |
|---|---|---|---|---|
| 802.11b | 2 412 | -5.28 | 8.00 | 13.28 |
| | 2 442 | -4.47 | 8.00 | 12.47 |
| | 2 472 | -4.87 | 8.00 | 12.87 |
| 802.11g | 2 412 | -9.44 | 8.00 | 17.44 |
| | 2 442 | -10.20 | 8.00 | 18.20 |
| | 2 472 | -10.00 | 8.00 | 18.00 |
| 802.11n_HT20 | 2 412 | -11.50 | 8.00 | 19.50 |
| | 2 442 | -11.64 | 8.00 | 19.64 |
| | 2 472 | -10.33 | 8.00 | 18.33 |
| 802.11ax_HE20 | 2 412 | -11.38 | 8.00 | 19.38 |
| | 2 442 | -11.73 | 8.00 | 19.73 |
| | 2 472 | -11.77 | 8.00 | 19.77 |

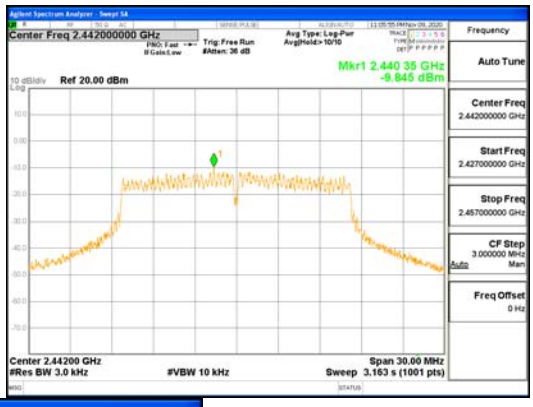
**ANT1 + ANT2 (MIMO)**

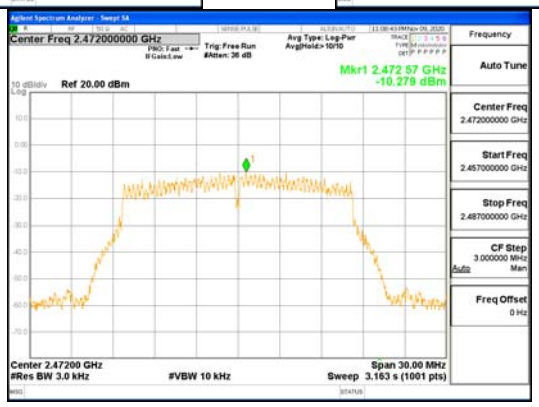
| Test Mode | Frequency (MHz) | Measured Power Density (dBm) | Limit (dBm) | Margin(dB) |
|---|---|---|---|---|
| 802.11g | 2 412 | -6.55 | 8.00 | 14.55 |
| | 2 442 | -7.01 | 8.00 | 15.01 |
| | 2 472 | -7.13 | 8.00 | 15.13 |
| 802.11n_HT20 | 2 412 | -8.55 | 8.00 | 16.55 |
| | 2 442 | -8.35 | 8.00 | 16.35 |
| | 2 472 | -7.44 | 8.00 | 15.44 |
| 802.11ax_HE20 | 2 412 | -8.64 | 8.00 | 16.64 |
| | 2 442 | -8.66 | 8.00 | 16.66 |
| | 2 472 | -8.77 | 8.00 | 16.77 |

See next pages for actual measured spectrum plots.

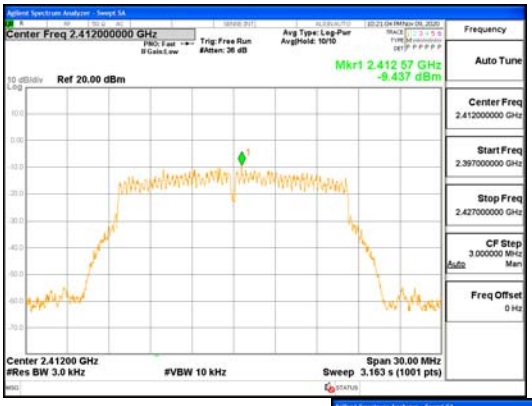
**ANT1, 802.11b**

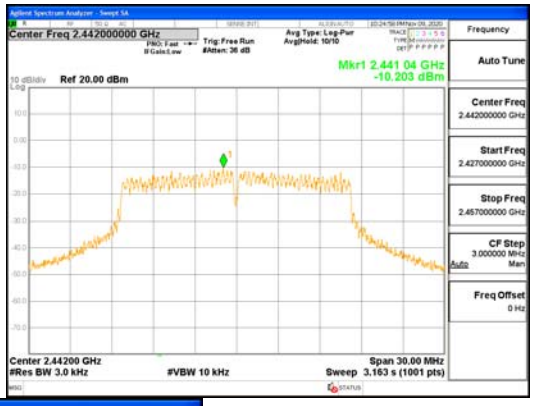
**ANT2, 802.11b**

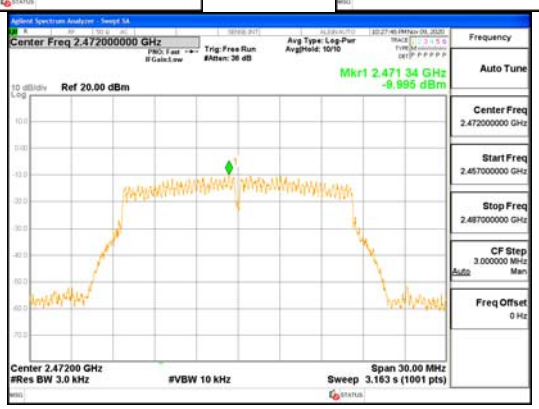


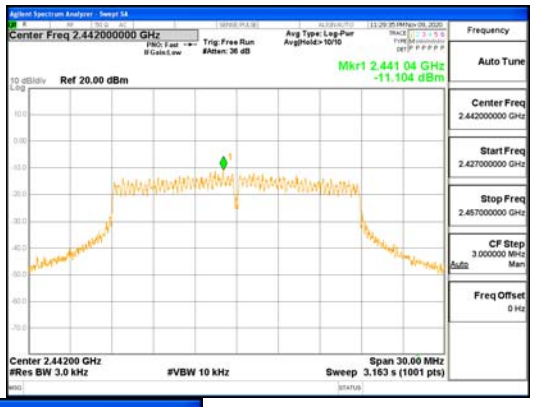

**ANT1, 802.11g**

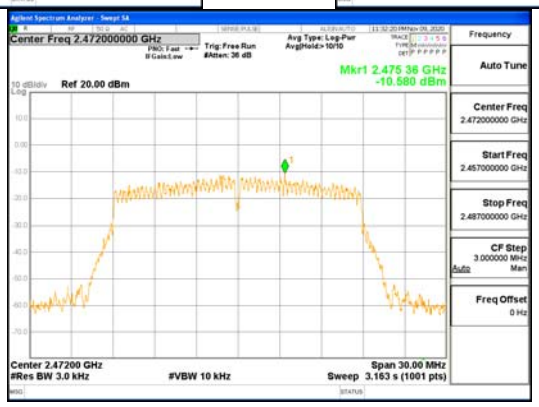


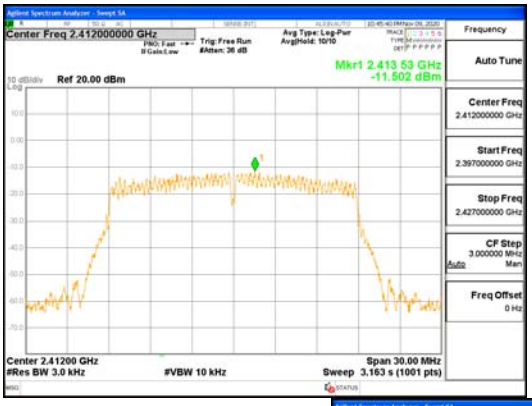



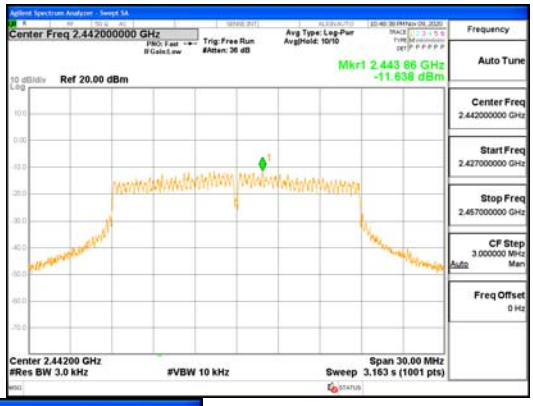

**ANT2, 802.11g**



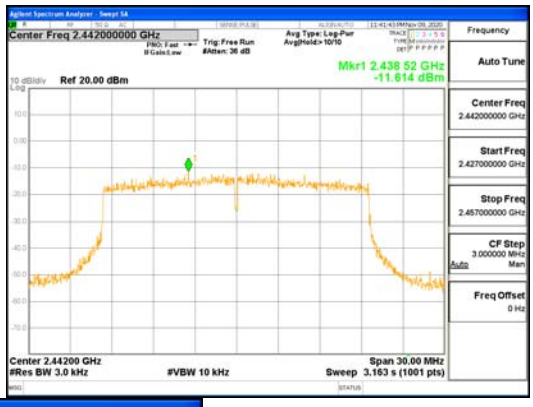



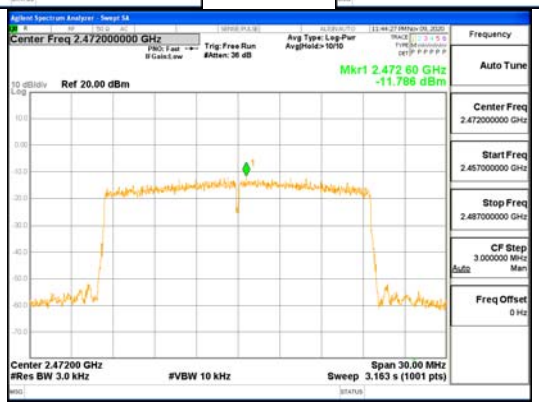

**ANT1, 802.11n_HT20**



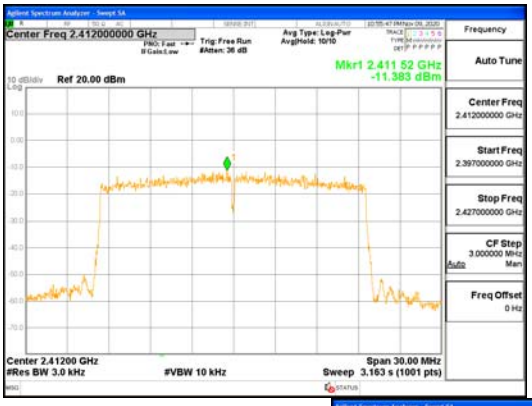



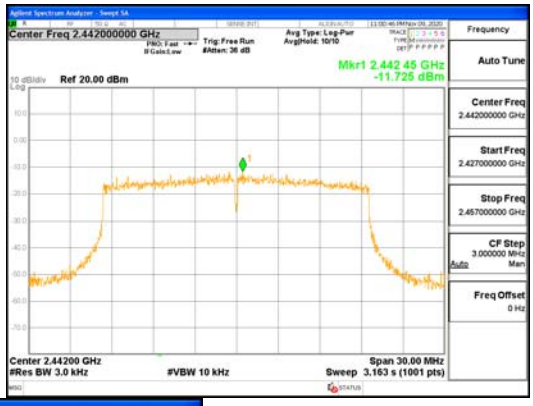
**ANT2, 802.11n_HT20**




**ANT1, 802.11ax_HE20**



**ANT2, 802.11ax_HE20**

## 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.

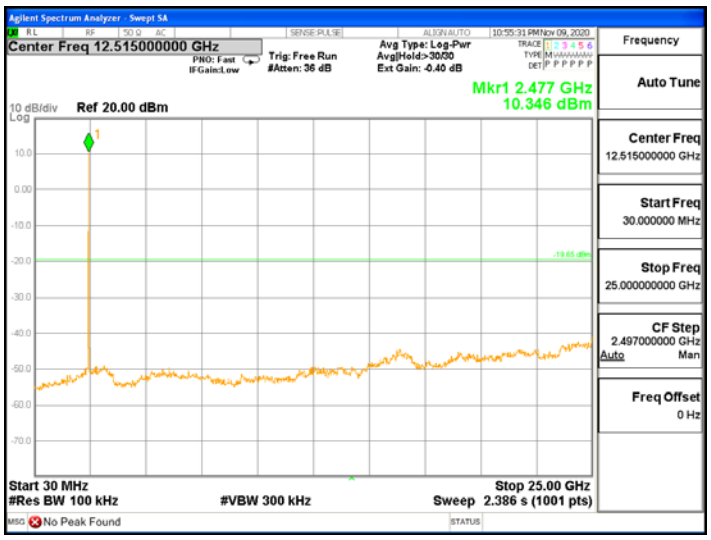
See next pages for actual measured spectrum plots.

Center Freq 2.400000000 GHz
Mkr1 2.413 00 GHz
10.523 dBm
Ref 20.00 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 2.471 45 GHz
10.238 dBm
Ref 20.00 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 2.402 GHz
10.061 dBm
Ref 20.00 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 2.452 GHz
9.377 dBm
Ref 20.00 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)

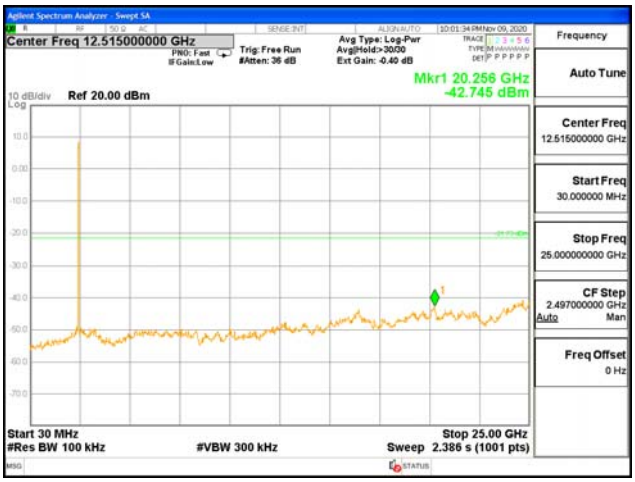

Center Freq 12.515000000 GHz
Mkr1 2.477 GHz
10.346 dBm
Ref 20.00 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)

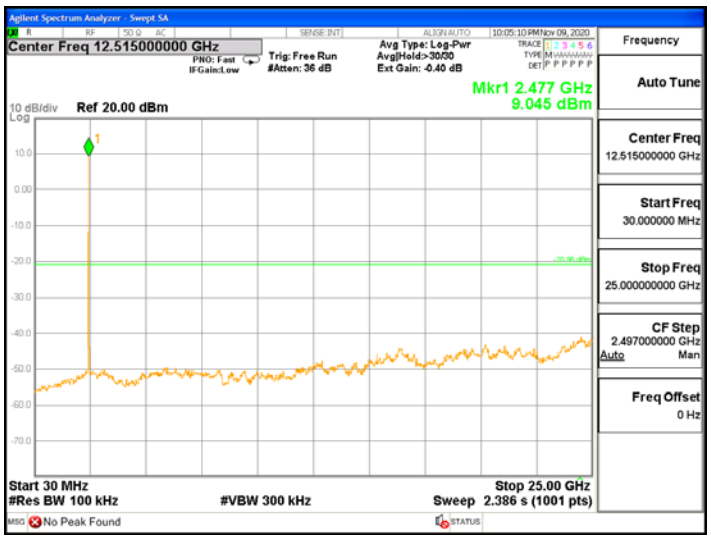
**ANT1, 802.11b**

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.400000000 GHz
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Mkr1 2.412 50 GHz
9.076 dBm
10 dB/div
Ref 20.00 dBm
Center 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.400000000 GHz
Start Freq
2.375000000 GHz
Stop Freq
2.425000000 GHz
CF Step
5.000000 MHz
Auto
Man
Freq Offset
0 Hz

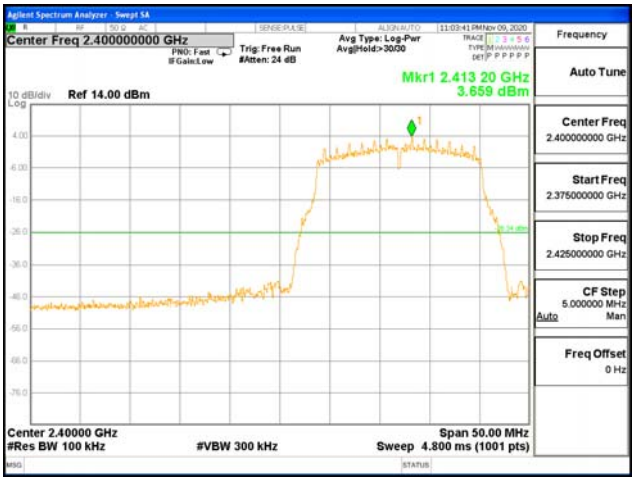
Agilent Spectrum Analyzer - Swept SA
Center Freq 2.483500000 GHz
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Mkr1 2.472 50 GHz
9.360 dBm
10 dB/div
Ref 20.00 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.483500000 GHz
Start Freq
2.458500000 GHz
Stop Freq
2.508500000 GHz
CF Step
5.000000 MHz
Auto
Man
Freq Offset
0 Hz

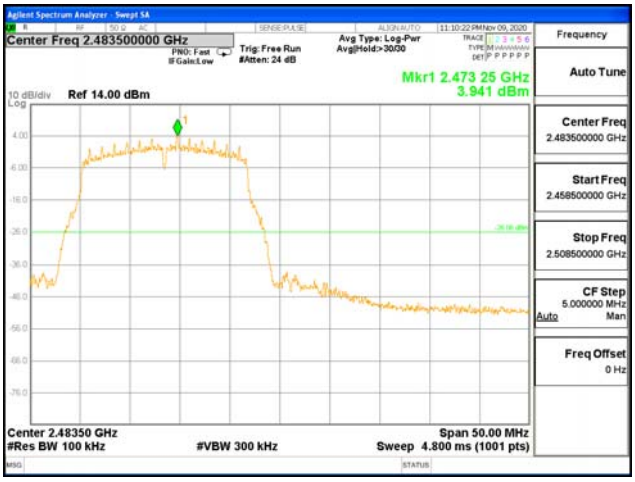
Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold: 30/30
Ext Gain: -0.40 dB
Mkr1 20.256 GHz
-42.201 dBm
10 dB/div
Ref 20.00 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
Frequency
Auto Tune
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


Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.40 dB
Mkr1 20.256 GHz
-42.745 dBm
10 dB/div
Ref 20.00 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


Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 36 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.40 dB
Mkr1 2.477 GHz
9.045 dBm
10 dB/div
Ref 20.00 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
No Peak Found
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

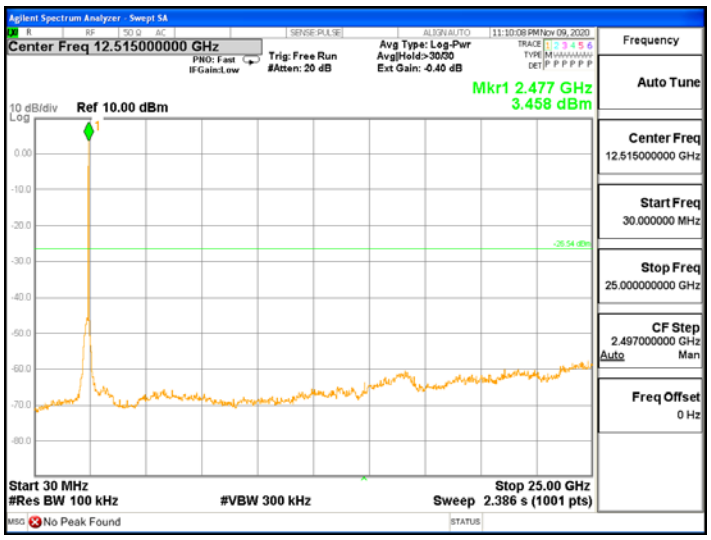
**ANT2, 802.11b**


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.400000000 GHz
Trig: Free Run
#Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Mkr1 2.413 20 GHz
3.659 dBm
10 dB/div Ref 14.00 dBm
Center 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)
Frequency
Auto Tune
Center Freq 2.400000000 GHz
Start Freq 2.375000000 GHz
Stop Freq 2.425000000 GHz
CF Step 5.000000 MHz
Freq Offset 0 Hz

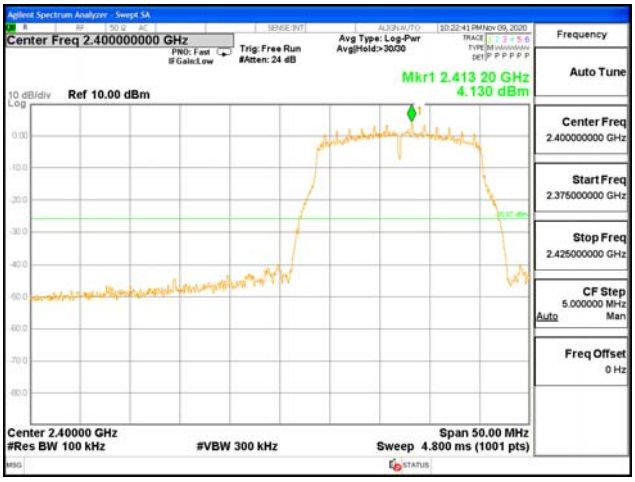

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.483500000 GHz
Trig: Free Run
#Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Mkr1 2.473 25 GHz
3.941 dBm
10 dB/div Ref 14.00 dBm
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)
Frequency
Auto Tune
Center Freq 2.483500000 GHz
Start Freq 2.458500000 GHz
Stop Freq 2.508500000 GHz
CF Step 5.000000 MHz
Freq Offset 0 Hz

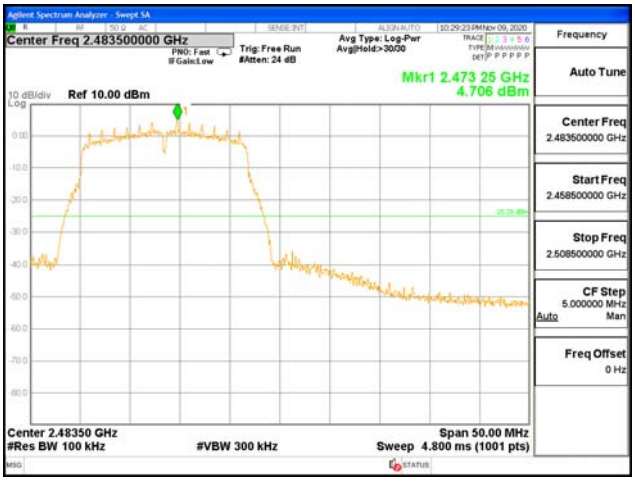
Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.40 dB
Mkr1 2.402 GHz
2.880 dBm
10 dB/div Ref 10.00 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
No Peak Found
Frequency
Auto Tune
Center Freq 12.515000000 GHz
Start Freq 30.000000 MHz
Stop Freq 25.000000000 GHz
CF Step 2.497000000 GHz
Freq Offset 0 Hz

Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.40 dB
Mkr1 2.452 GHz
3.628 dBm
10 dB/div Ref 10.00 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
No Peak Found
Frequency
Auto Tune
Center Freq 12.515000000 GHz
Start Freq 30.000000 MHz
Stop Freq 25.000000000 GHz
CF Step 2.497000000 GHz
Freq Offset 0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.40 dB
Mkr1 2.477 GHz
3.458 dBm
10 dB/div Ref 10.00 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
No Peak Found
Frequency
Auto Tune
Center Freq 12.515000000 GHz
Start Freq 30.000000 MHz
Stop Freq 25.000000000 GHz
CF Step 2.497000000 GHz
Freq Offset 0 Hz

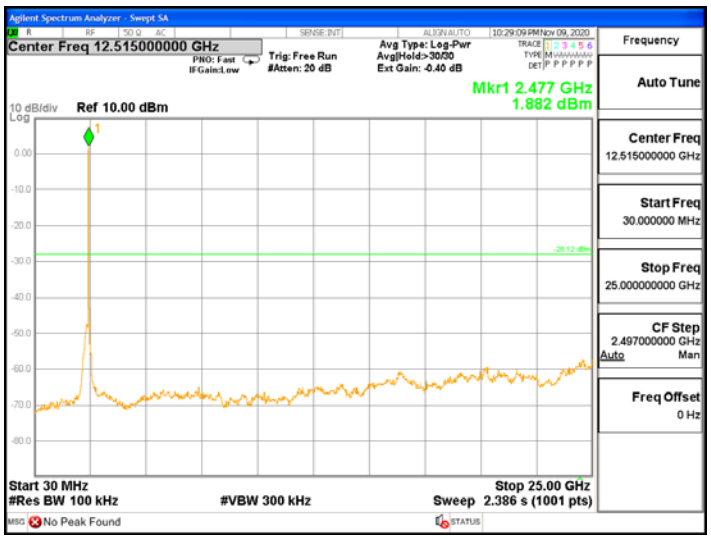
**ANT1, 802.11g**


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.400000000 GHz
Trig: Free Run
#Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Mkr1 2.413 20 GHz
4.130 dBm
10 dB/div Ref 10.00 dBm
Frequency
Auto Tune
Center Freq 2.400000000 GHz
Start Freq 2.375000000 GHz
Stop Freq 2.425000000 GHz
CF Step 5.000000 MHz
Auto Man
Freq Offset 0 Hz
Center 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)

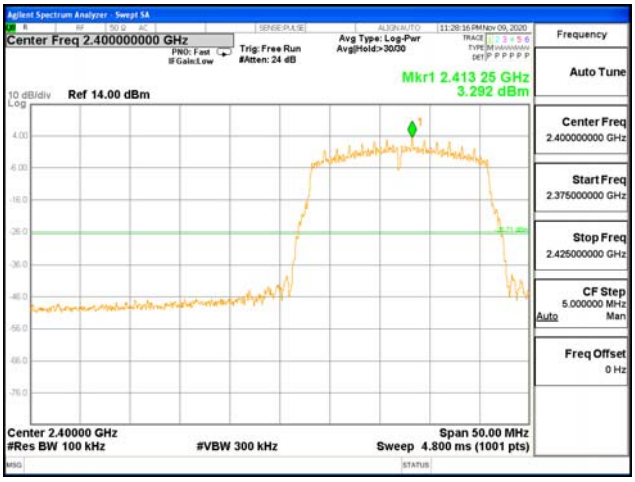

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.483500000 GHz
Trig: Free Run
#Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Mkr1 2.473 25 GHz
4.706 dBm
10 dB/div Ref 10.00 dBm
Frequency
Auto Tune
Center Freq 2.483500000 GHz
Start Freq 2.458500000 GHz
Stop Freq 2.508500000 GHz
CF Step 5.000000 MHz
Auto Man
Freq Offset 0 Hz
Center 2.48350 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 50.00 MHz
Sweep 4.800 ms (1001 pts)

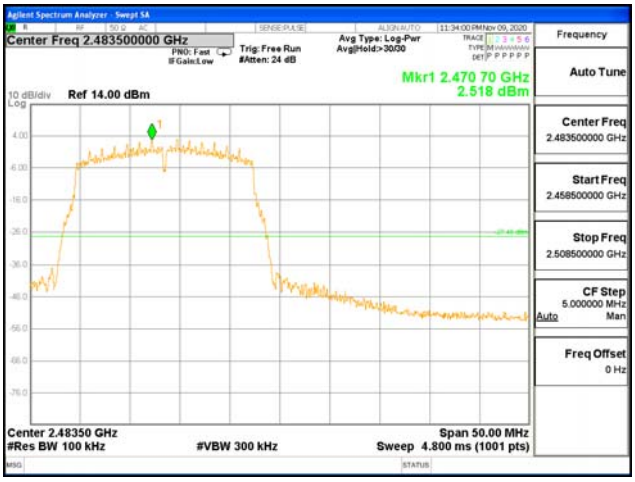
Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.40 dB
Mkr1 20.181 GHz
-59.098 dBm
10 dB/div Ref 10.00 dBm
Frequency
Auto Tune
Center Freq 12.515000000 GHz
Start Freq 30.000000 MHz
Stop Freq 25.000000000 GHz
CF Step 2.497000000 GHz
Auto Man
Freq Offset 0 Hz
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)

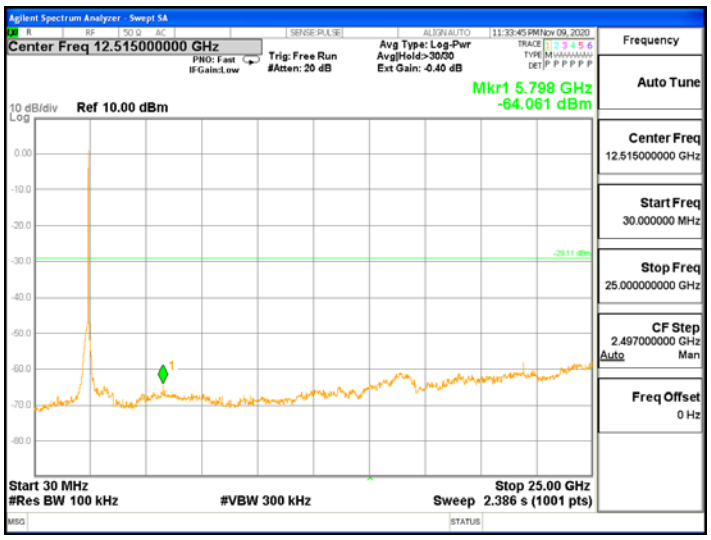
Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.40 dB
Mkr1 16.410 GHz
-59.604 dBm
10 dB/div Ref 10.00 dBm
Frequency
Auto Tune
Center Freq 12.515000000 GHz
Start Freq 30.000000 MHz
Stop Freq 25.000000000 GHz
CF Step 2.497000000 GHz
Auto Man
Freq Offset 0 Hz
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)


Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.40 dB
Mkr1 2.477 GHz
1.882 dBm
10 dB/div Ref 10.00 dBm
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
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.386 s (1001 pts)
No Peak Found

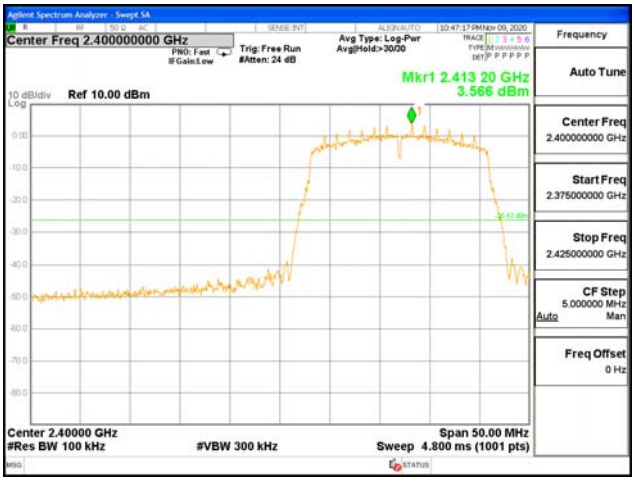
**ANT2, 802.11g**

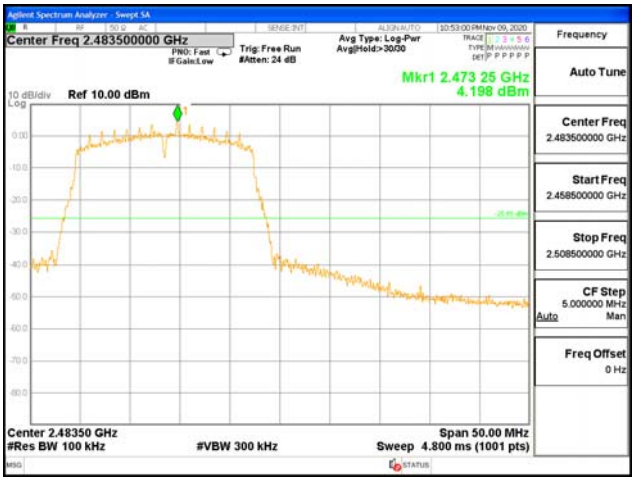


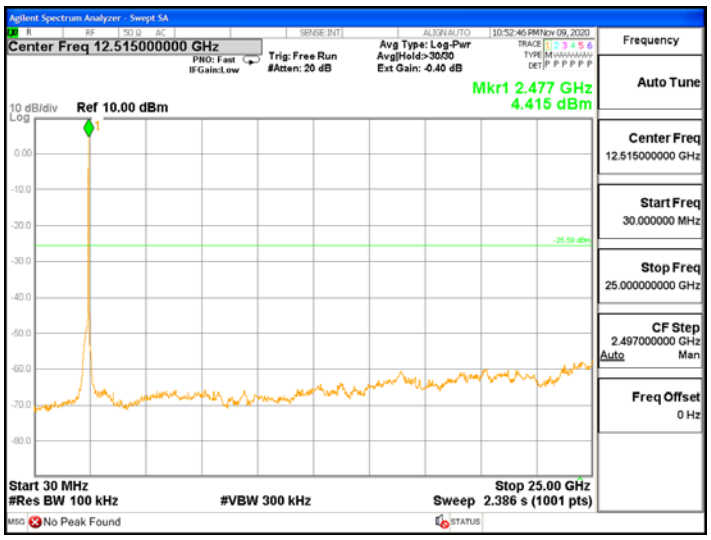





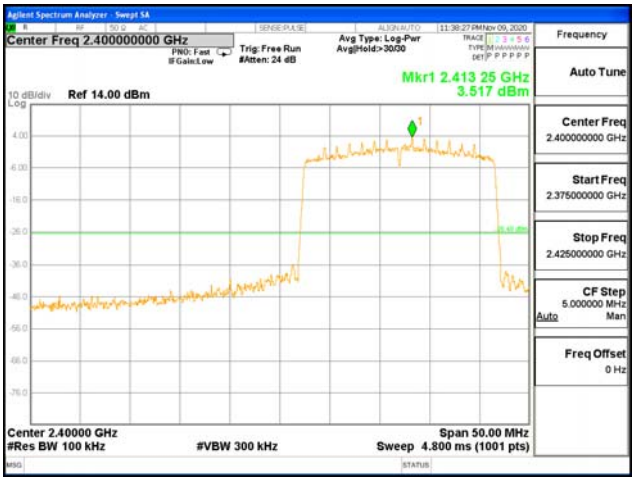

**ANT1, 802.11n_HT20**

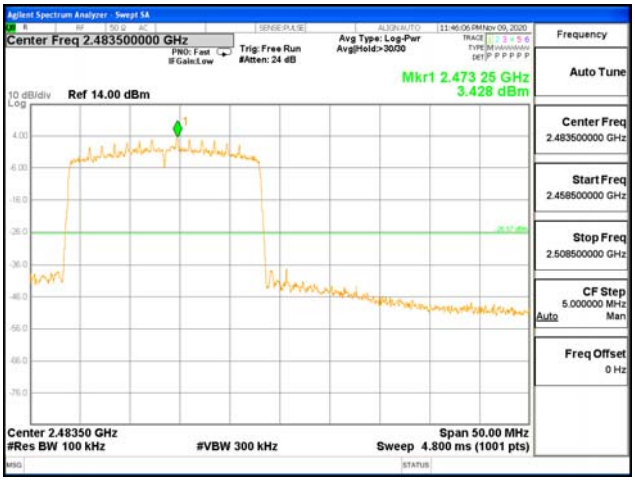


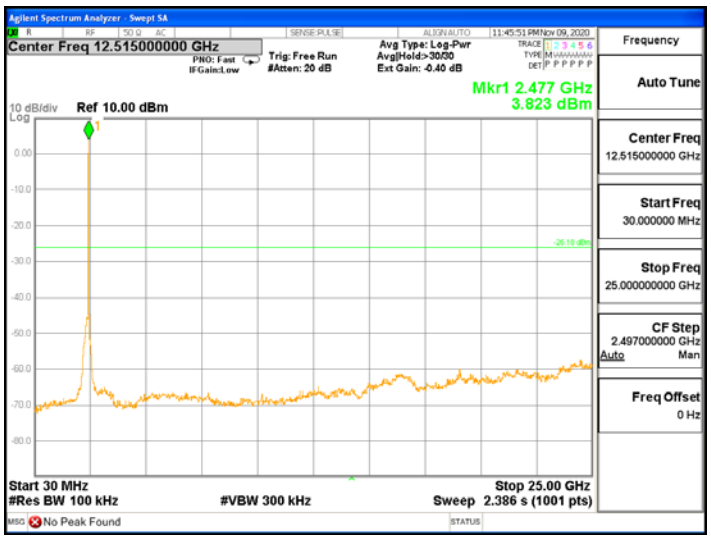





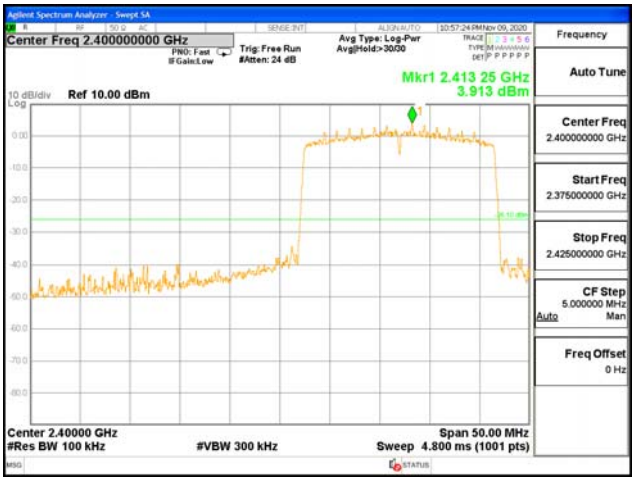

**ANT2, 802.11n_HT20**

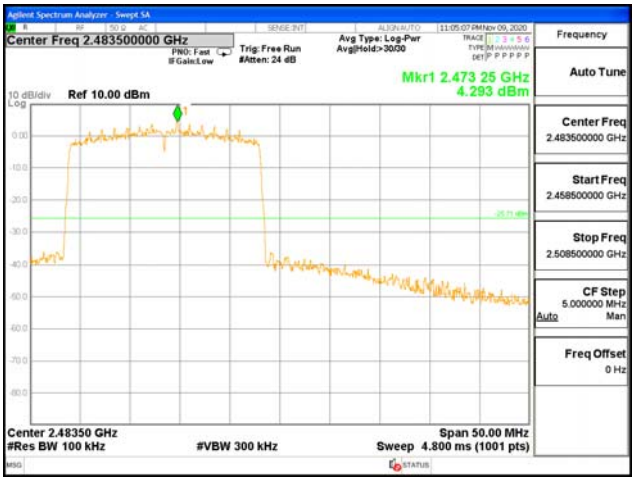


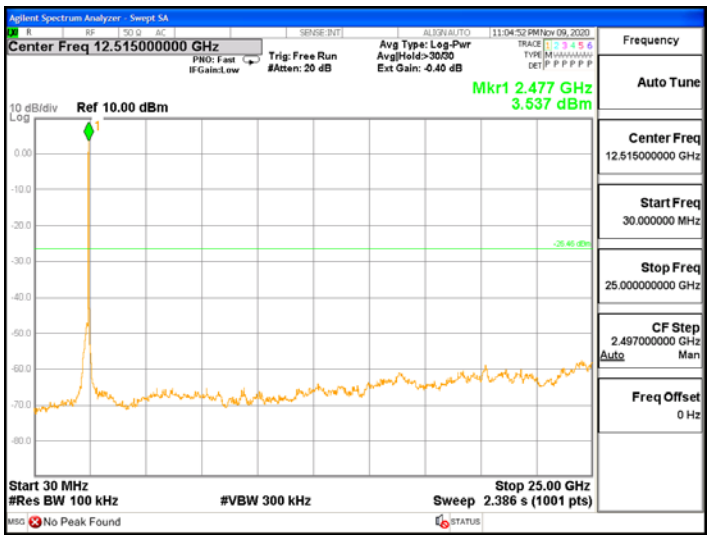






**ANT1, 802.11ax_HE20**






**ANT2, 802.11ax_HE20**

## 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 10$^{th}$ 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 10$^{th}$ 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 |
| 802.11g | 0.12 |
| 802.11n_HT20 | 0.13 |
| 802.11ax_HE20 | 0.31 |

**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)

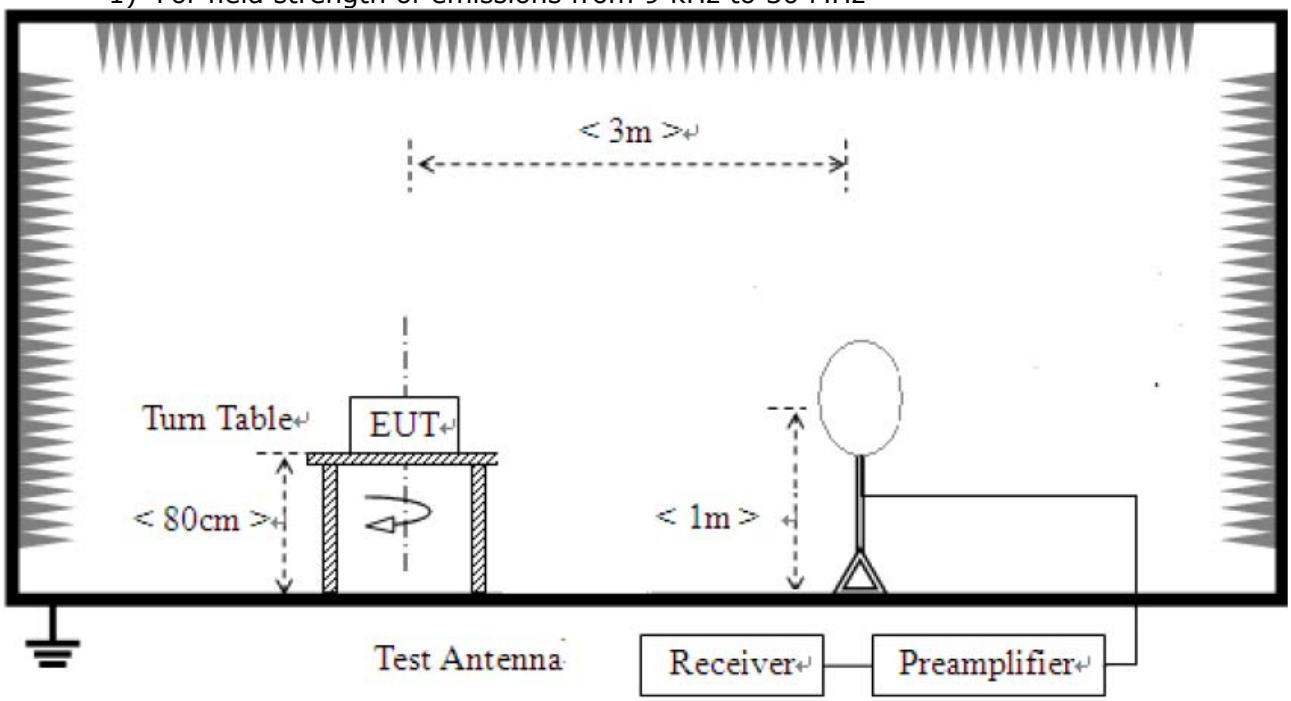
We have done all test mode.
The worst-case antenna configuration and Test mode are determined to be as follows.

802.11b mode : ANT1, ANT2
802.11g mode : ANT1 + ANT2 (MIMO)
802.11n mode : ANT1 + ANT2 (MIMO)
802.11ax mode : ANT1 + ANT2 (MIMO)

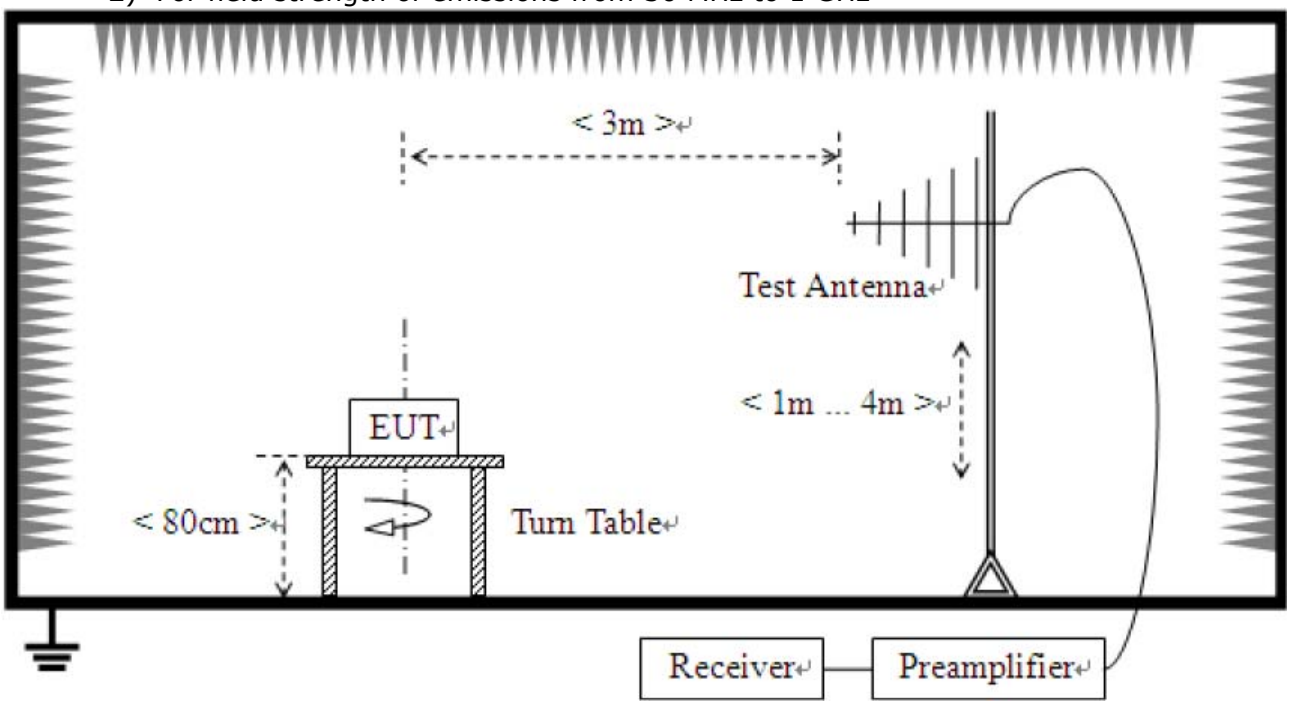
So the results are only attached worst cases.

**Test Setup:**

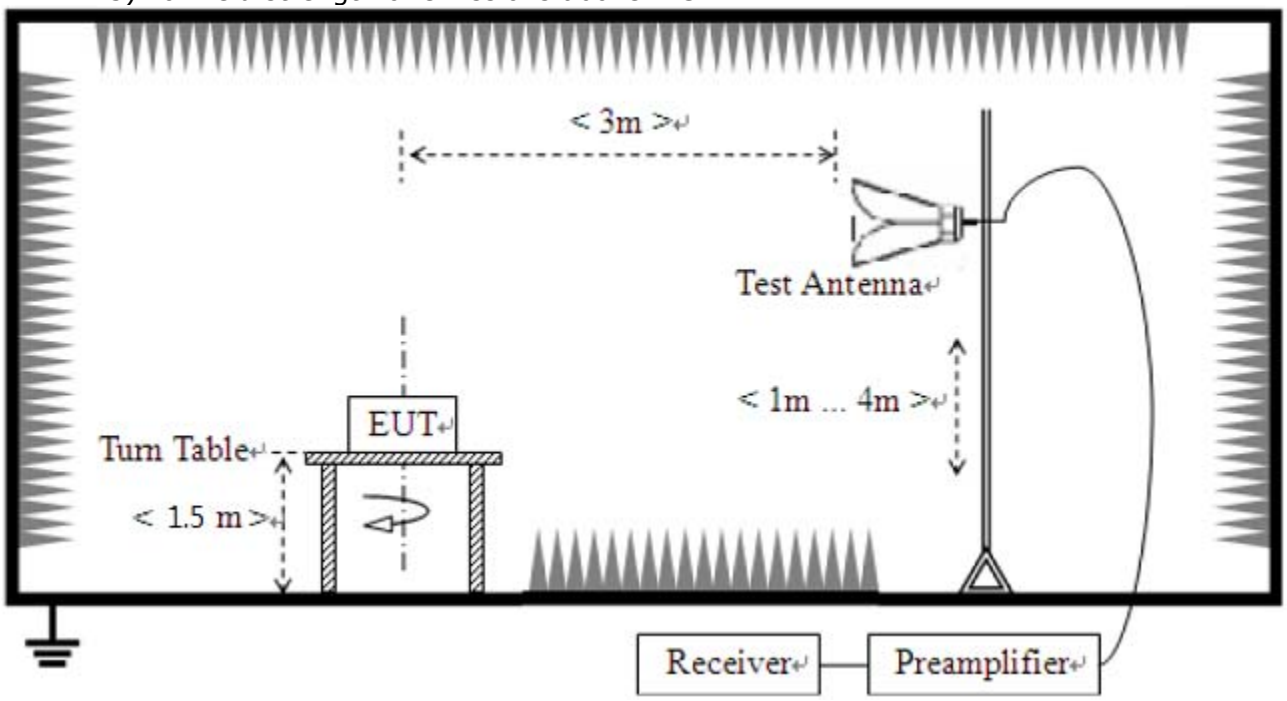
1) For field strength of emissions from 9 kHz to 30 MHz




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



3) For field strength of emissions above 1 GHz



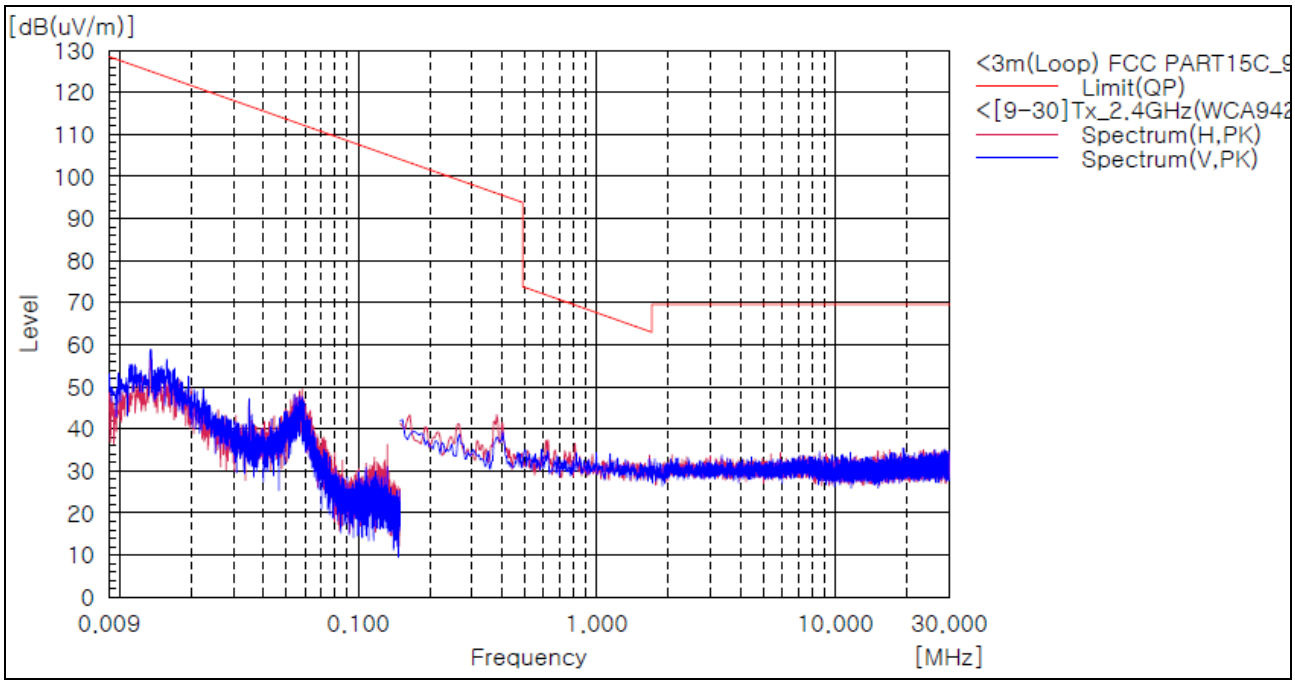
## Test results

### 1) 9 kHz to 30 MHz

**Test mode : Transmitter (Worst Case)**

The requirements are:
☒ Complies

**Test Data**



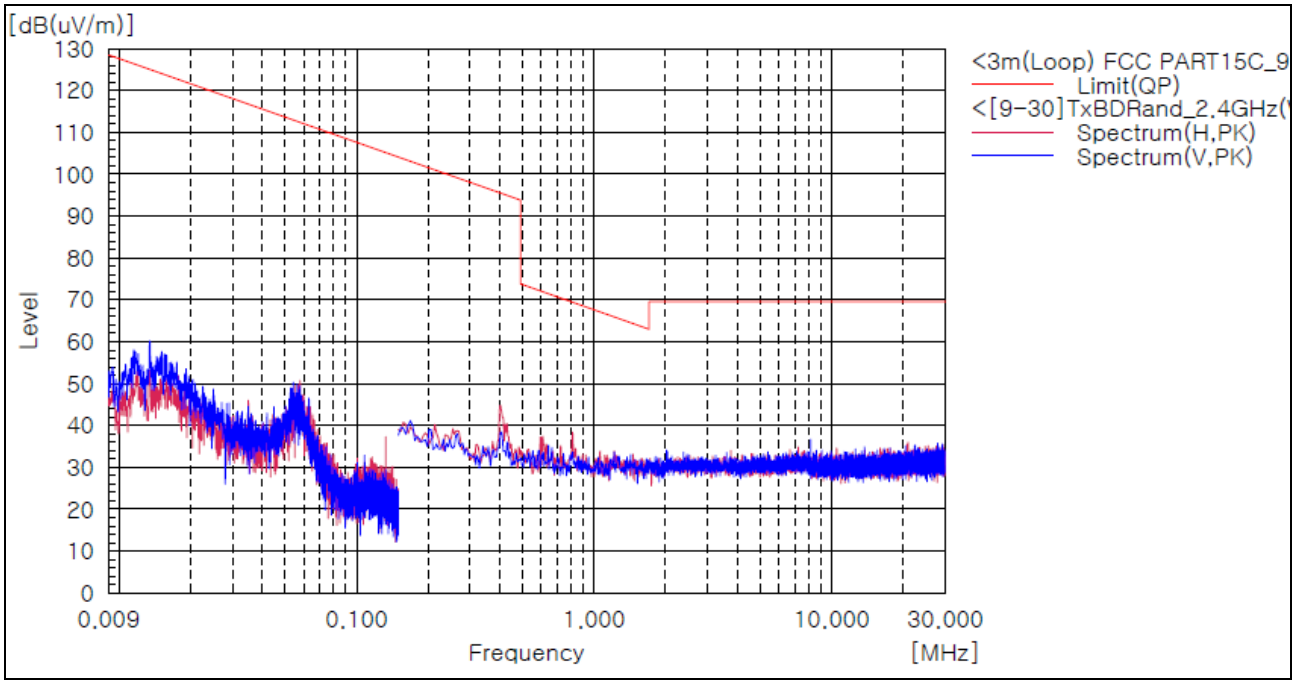

| Frequency [MHz] | (P) | Reading [dBuV] | c.f [dB(1/m)] | Level [dB(uV/m)] | Limit [dB(uV/m)] | Margin [dB] |
|---|---|---|---|---|---|---|
| The emissions 9 kHz to 30 MHz were 20 dB lower than the limit. | | | | | | |

**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**



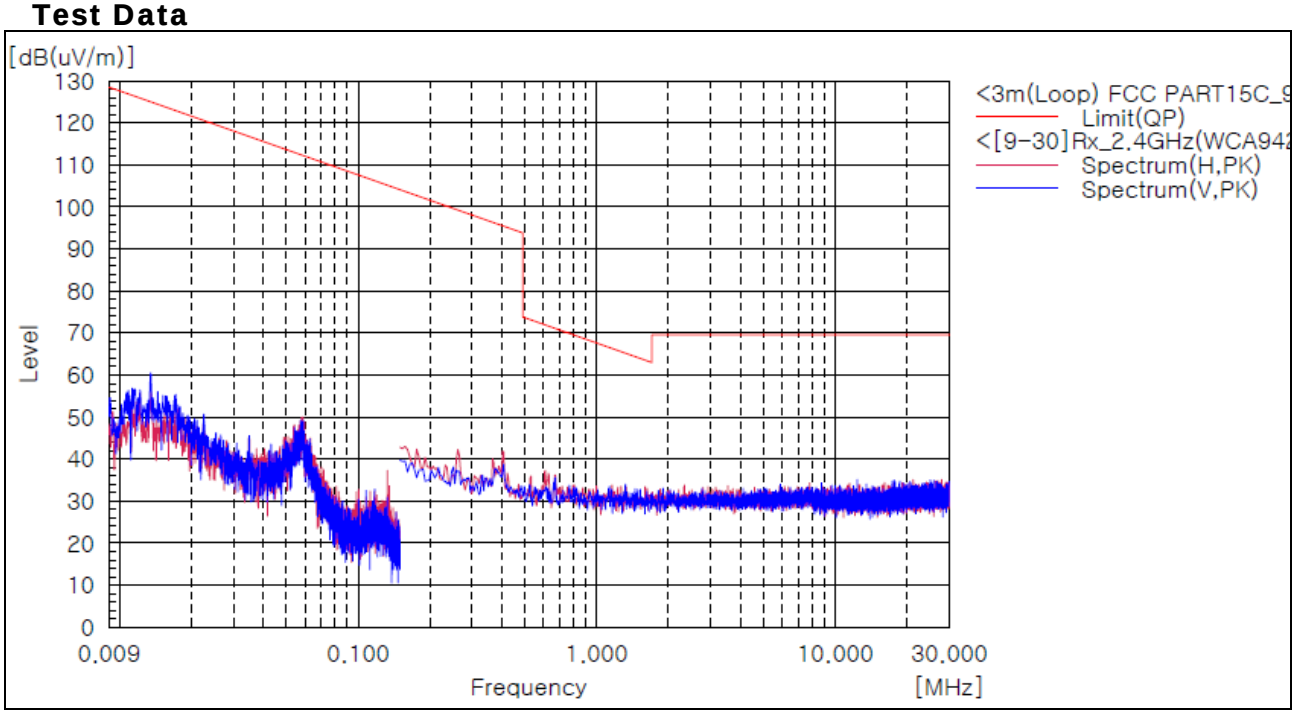

| Frequency [MHz] | (P) | Reading [dBuV] | c.f [dB(1/m)] | Level [dB(uV/m)] | Limit [dB(uV/m)] | Margin [dB] |
|---|---|---|---|---|---|---|
| The emissions 9 kHz to 30 MHz were 20 dB lower than the limit. | | | | | | |

**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. | | | | | | |

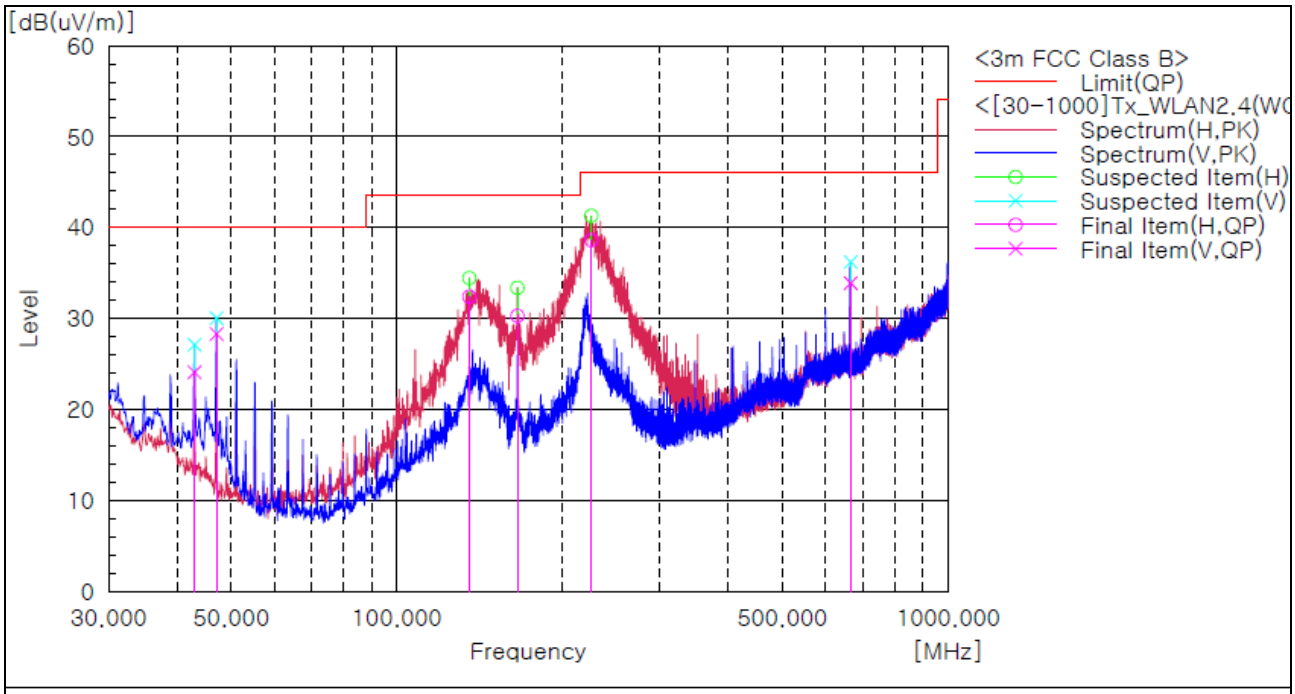
**Remark** :
1. The unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down positon(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna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

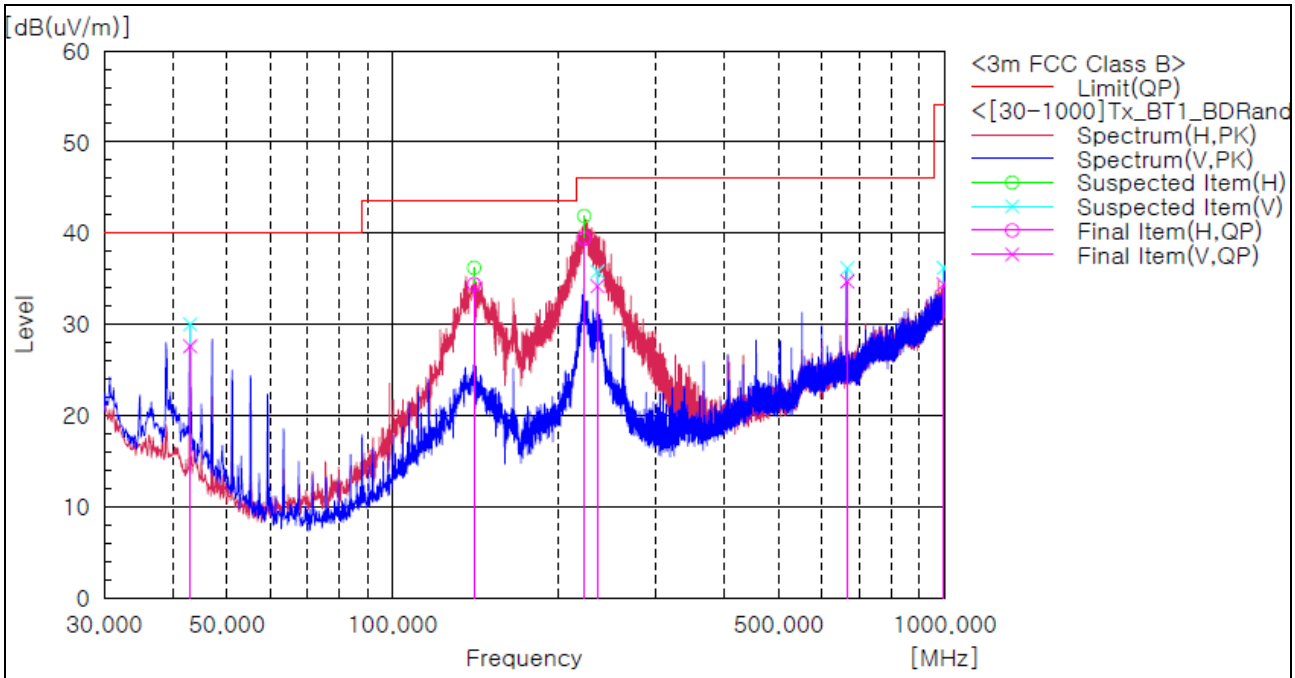
| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 42.974 | V | 36.9 | -12.8 | 24.1 | 40.0 | 15.9 | 101.0 | 80.0 |
| 2 | 47.096 | V | 43.4 | -15.1 | 28.3 | 40.0 | 11.7 | 101.0 | 275.0 |
| 3 | 135.488 | H | 44.1 | -11.7 | 32.4 | 43.5 | 11.1 | 209.0 | 213.0 |
| 4 | 165.558 | H | 43.6 | -13.3 | 30.3 | 43.5 | 13.2 | 209.0 | 357.0 |
| 5 | 225.455 | H | 51.4 | -12.8 | 38.6 | 46.0 | 7.4 | 101.0 | 11.0 |
| 6 | 666.320 | V | 32.9 | 1.0 | 33.9 | 46.0 | 12.1 | 191.0 | 200.0 |

**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

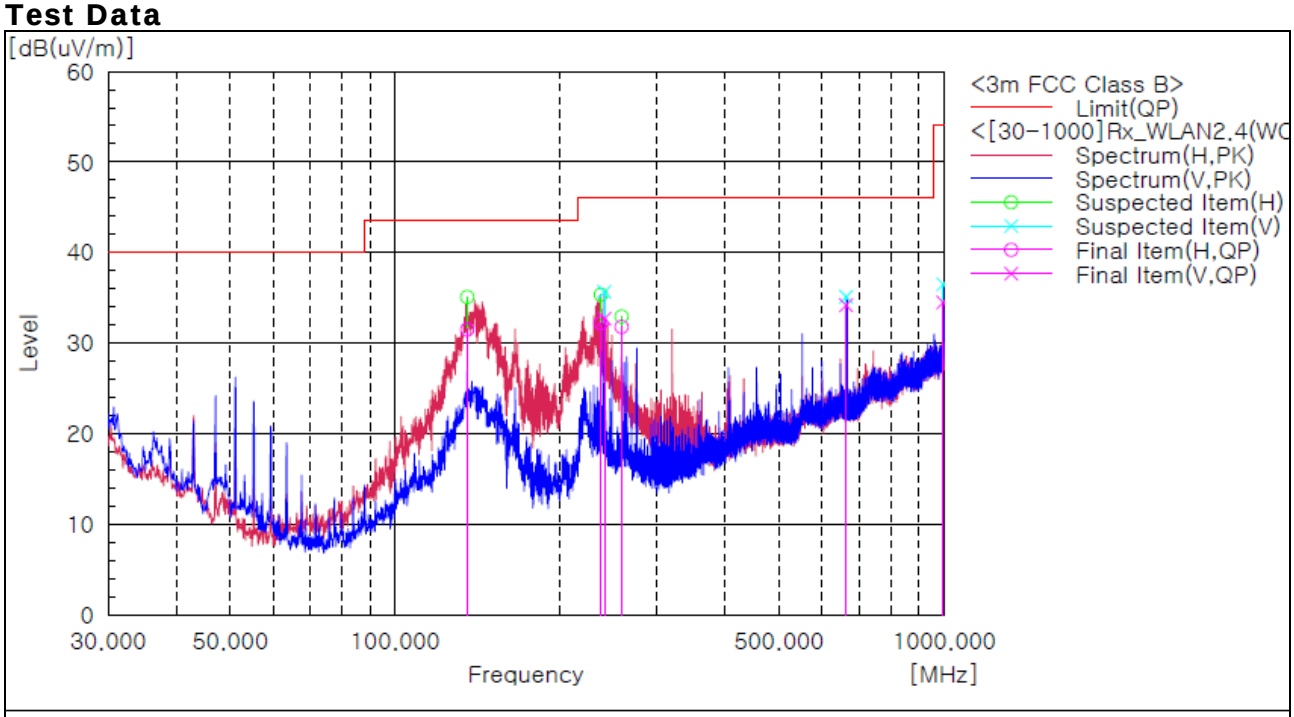
| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 42.974 | V | 40.4 | -12.8 | 27.6 | 40.0 | 12.4 | 100.0 | 181.0 |
| 2 | 140.459 | H | 46.3 | -11.9 | 34.4 | 43.5 | 9.1 | 209.0 | 205.0 |
| 3 | 222.303 | H | 52.4 | -13.0 | 39.4 | 46.0 | 6.6 | 209.0 | 37.0 |
| 4 | 235.034 | V | 45.9 | -11.7 | 34.2 | 46.0 | 11.8 | 100.0 | 284.0 |
| 5 | 666.563 | V | 33.7 | 1.0 | 34.7 | 46.0 | 11.3 | 191.0 | 203.0 |
| 6 | 996.484 | V | 25.9 | 8.5 | 34.4 | 54.0 | 19.6 | 100.0 | 271.0 |

**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

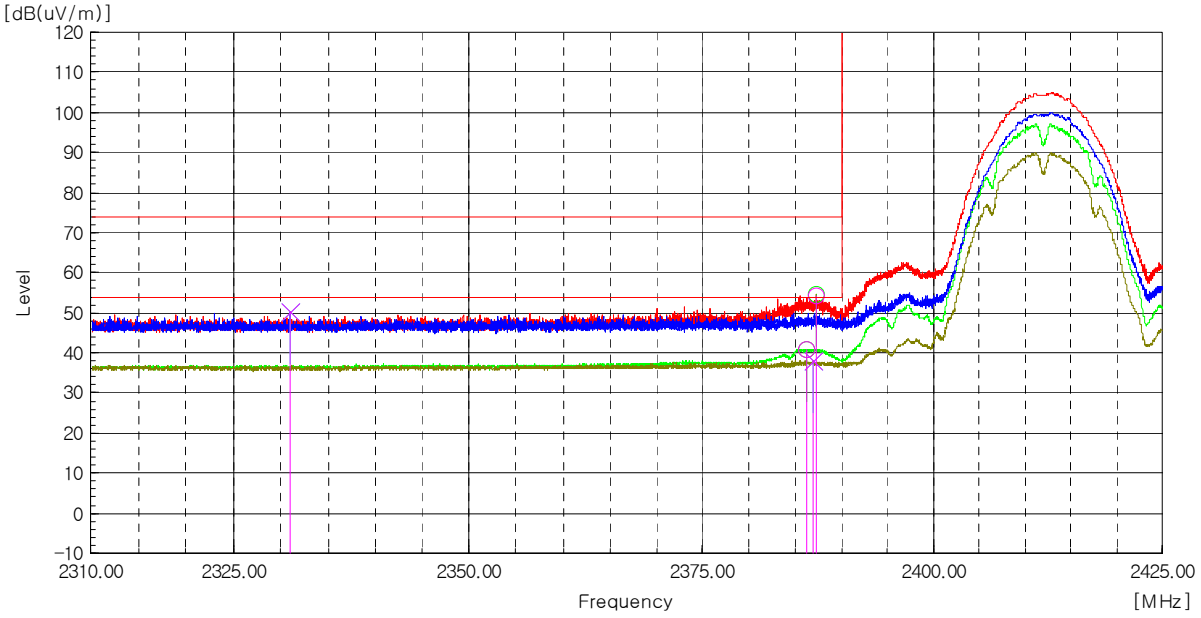
| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 135.366 | H | 43.2 | -11.7 | 31.5 | 43.5 | 12.0 | 208.0 | 212.0 |
| 2 | 237.095 | H | 43.5 | -11.3 | 32.2 | 46.0 | 13.8 | 100.0 | 345.0 |
| 3 | 240.733 | V | 43.4 | -10.7 | 32.7 | 46.0 | 13.3 | 101.0 | 246.0 |
| 4 | 258.799 | H | 40.0 | -8.2 | 31.8 | 46.0 | 14.2 | 100.0 | 206.0 |
| 5 | 663.774 | V | 33.2 | 1.0 | 34.2 | 46.0 | 11.8 | 195.0 | 224.0 |
| 6 | 997.090 | V | 25.9 | 8.6 | 34.5 | 54.0 | 19.5 | 101.0 | 270.0 |

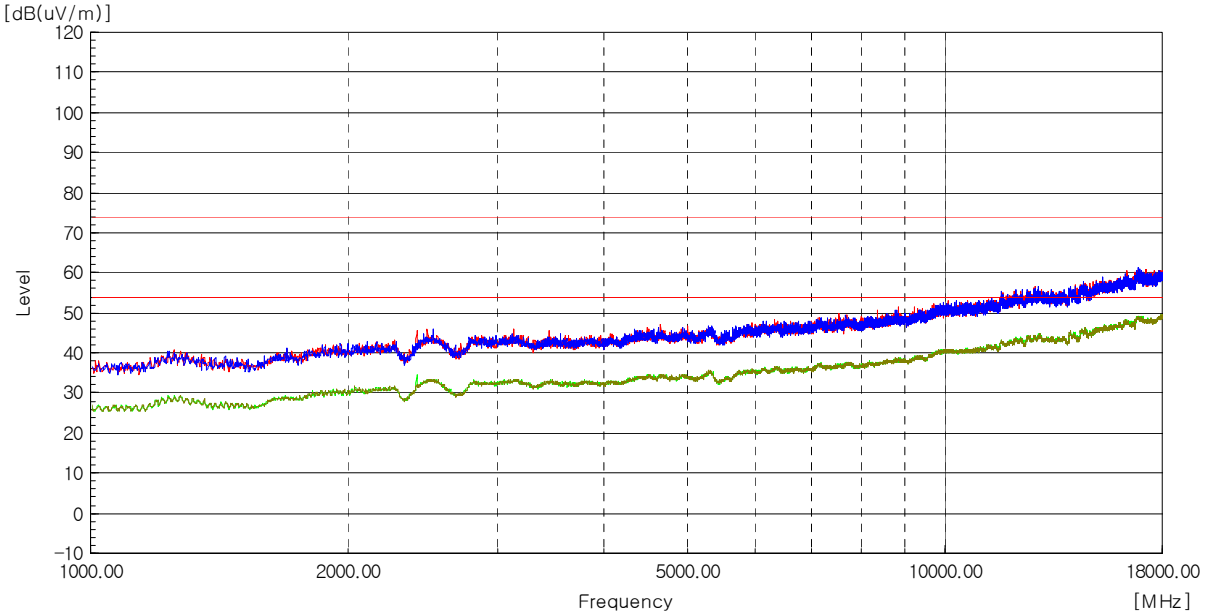
**Remark** :
1. The unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down positon(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna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

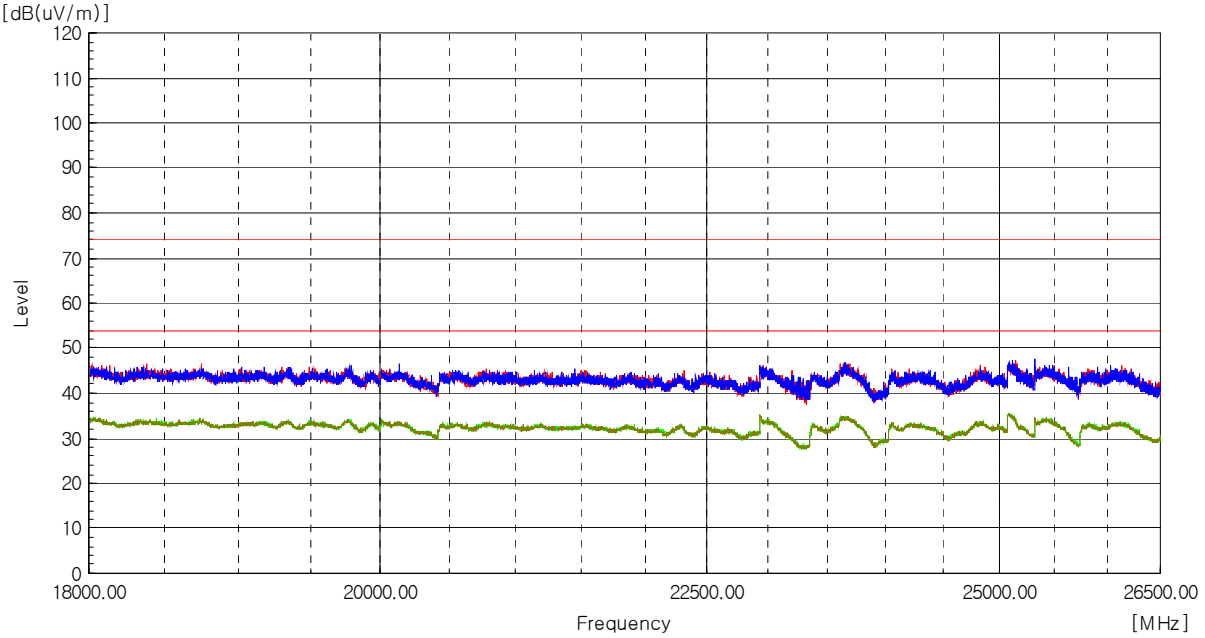
### 3) above 1 GHz

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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 387.21 | H | 57.5 | ----- | -3.1 | 54.4 | ----- | ----- | 74.0 | ----- | 19.6 | ----- |
| 2 386.23 | H | ----- | 44.1 | -3.1 | ----- | 41.0 | 0 | ----- | 54.0 | ----- | 13.0 |
| 2 331.00 | V | 53.3 | ----- | -3.2 | 50.1 | ----- | ----- | 74.0 | ----- | 23.9 | ----- |
| 2 386.86 | V | ----- | 41.2 | -3.1 | ----- | 38.1 | 0 | ----- | 54.0 | ----- | 15.9 |

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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| The emissions above 1 GHz were 20 dB lower than the limit. | | | | | | | | | | | |

High (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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 484.88 | H | 63.2 | ----- | -2.5 | 60.7 | ----- | ----- | 74.0 | ----- | 13.3 | ----- |
| 2 485.26 | H | ----- | 54.3 | -2.5 | ----- | 51.8 | 0 | ----- | 54.0 | ----- | 2.2 |
| 2 484.99 | V | 60.7 | ----- | -2.5 | 58.2 | ----- | ----- | 74.0 | ----- | 15.8 | ----- |
| 2 485.14 | V | ----- | 49.8 | -2.5 | ----- | 47.3 | 0 | ----- | 54.0 | ----- | 6.7 |

**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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 386.32 | H | 54.8 | ----- | -3.1 | 51.7 | ----- | ----- | 74.0 | ----- | 22.3 | ----- |
| 2 383.30 | H | ----- | 41.5 | -3.1 | ----- | 38.4 | 0 | ----- | 54.0 | ----- | 15.6 |
| 2 372.09 | V | 52.8 | ----- | -3.1 | 49.7 | ----- | ----- | 74.0 | ----- | 24.3 | ----- |
| 2 362.92 | V | ----- | 40.3 | -3.1 | ----- | 37.2 | 0 | ----- | 54.0 | ----- | 16.8 |

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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| The emissions above 1 GHz were 20 dB lower than the limit. | | | | | | | | | | | |

High (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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 486.94 | H | 61.3 | ----- | -2.5 | 58.8 | ----- | ----- | 74.0 | ----- | 15.2 | ----- |
| 2 486.76 | H | ----- | 52.5 | -2.5 | ----- | 50.0 | 0 | ----- | 54.0 | ----- | 4.0 |
| 2 485.07 | V | 55.7 | ----- | -2.5 | 53.2 | ----- | ----- | 74.0 | ----- | 20.8 | ----- |
| 2 486.64 | V | ----- | 43.9 | -2.5 | ----- | 41.4 | 0 | ----- | 54.0 | ----- | 12.6 |

**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 (802.11g)

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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 389.91 | H | 70.9 | ----- | -3.1 | 67.8 | ----- | ----- | 74.0 | ----- | 6.2 | ----- |
| 2 389.54 | H | ----- | 46.6 | -3.1 | ----- | 43.5 | 0.1 | ----- | 54.0 | ----- | 10.4 |
| 2 385.50 | V | 62.2 | ----- | -3.1 | 59.1 | ----- | ----- | 74.0 | ----- | 14.9 | ----- |
| 2 389.94 | V | ----- | 43.3 | -3.1 | ----- | 40.2 | 0.1 | ----- | 54.0 | ----- | 13.7 |

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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| The emissions above 1 GHz were 20 dB lower than the limit. | | | | | | | | | | | |

High (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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 484.88 | H | 72.9 | ----- | -2.5 | 70.4 | ----- | ----- | 74.0 | ----- | 3.6 | ----- |
| 2 484.24 | H | ----- | 53.0 | -2.5 | ----- | 50.5 | 0.1 | ----- | 54.0 | ----- | 3.4 |
| 2 484.67 | V | 66.7 | ----- | -2.5 | 64.2 | ----- | ----- | 74.0 | ----- | 9.8 | ----- |
| 2 485.00 | V | ----- | 46.0 | -2.5 | ----- | 43.5 | 0.1 | ----- | 54.0 | ----- | 10.4 |

**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 (802.11n_HT20)

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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 389.78 | H | 66.5 | ----- | -3.1 | 63.4 | ----- | ----- | 74.0 | ----- | 10.6 | ----- |
| 2 389.84 | H | ----- | 46.2 | -3.1 | ----- | 43.1 | 0.1 | ----- | 54.0 | ----- | 10.8 |
| 2 389.85 | V | 61.6 | ----- | -3.1 | 58.5 | ----- | ----- | 74.0 | ----- | 15.5 | ----- |
| 2 389.42 | V | ----- | 42.8 | -3.1 | ----- | 39.7 | 0.1 | ----- | 54.0 | ----- | 14.2 |

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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| The emissions above 1 GHz were 20 dB lower than the limit. | | | | | | | | | | | |

High (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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 484.13 | H | 70.5 | ----- | -2.5 | 68.0 | ----- | ----- | 74.0 | ----- | 6.0 | ----- |
| 2 483.58 | H | ----- | 53.1 | -2.5 | ----- | 50.6 | 0.1 | ----- | 54.0 | ----- | 3.3 |
| 2 486.23 | V | 65.8 | ----- | -2.5 | 63.3 | ----- | ----- | 74.0 | ----- | 10.7 | ----- |
| 2 483.51 | V | ----- | 47.5 | -2.5 | ----- | 45.0 | 0.1 | ----- | 54.0 | ----- | 8.9 |

**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 (802.11ax_HE20)

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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 389.71 | H | 70.9 | ----- | -3.1 | 67.8 | ----- | ----- | 74.0 | ----- | 6.2 | ----- |
| 2 389.97 | H | ----- | 45.1 | -3.1 | ----- | 42.0 | 0.3 | ----- | 54.0 | ----- | 11.7 |
| 2 388.40 | V | 66.6 | ----- | -3.1 | 63.5 | ----- | ----- | 74.0 | ----- | 10.5 | ----- |
| 2 389.95 | V | ----- | 44.8 | -3.1 | ----- | 41.7 | 0.3 | ----- | 54.0 | ----- | 12.0 |

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] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| The emissions above 1 GHz were 20 dB lower than the limit. | | | | | | | | | | | |

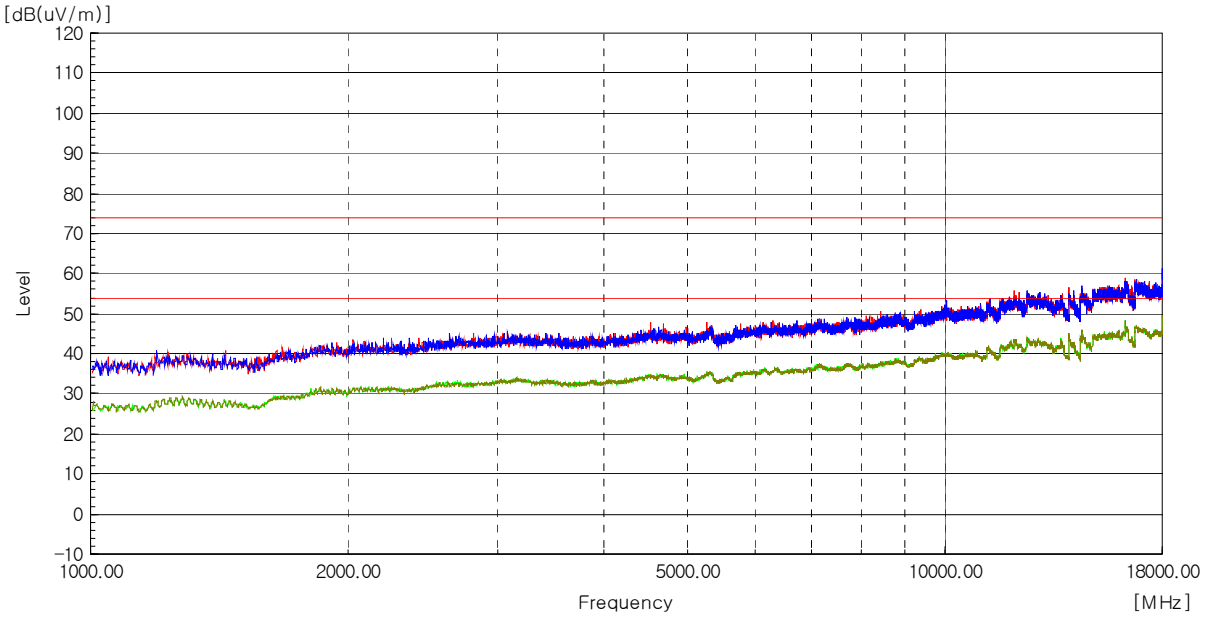
High (2 472 MHz)

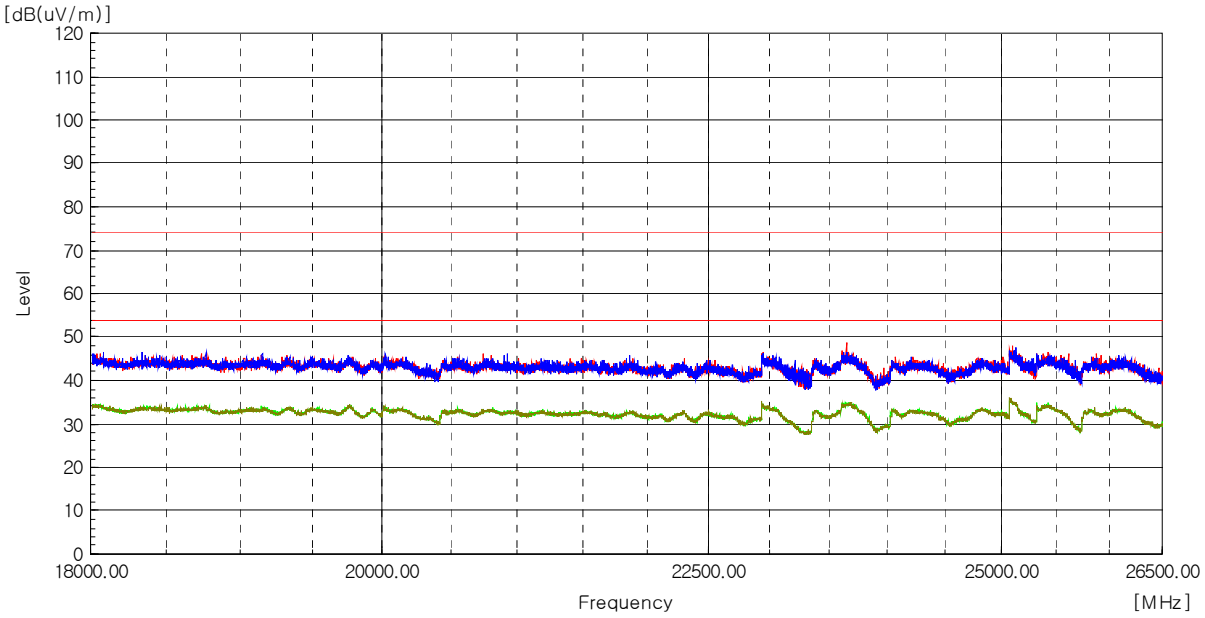
| Frequency [MHz] | (P) | Reading PK [dBuV] | Reading AV [dBuV] | c.f [dB(1/m)] | Level PK [dB(uV/m)] | Level AV [dB(uV/m)] | Duty Cycle Factor [dB] | Limit PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Margin PK [dB] | Margin AV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 483.75 | H | 72.7 | ----- | -2.5 | 70.2 | ----- | ----- | 74.0 | ----- | 3.8 | ----- |
| 2 483.97 | H | ----- | 52.8 | -2.5 | ----- | 50.3 | 0.3 | ----- | 54.0 | ----- | 3.4 |
| 2 483.56 | V | 65.9 | ----- | -2.5 | 63.4 | ----- | ----- | 74.0 | ----- | 10.6 | ----- |
| 2 484.05 | V | ----- | 45.8 | -2.5 | ----- | 43.3 | 0.3 | ----- | 54.0 | ----- | 10.4 |

**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.

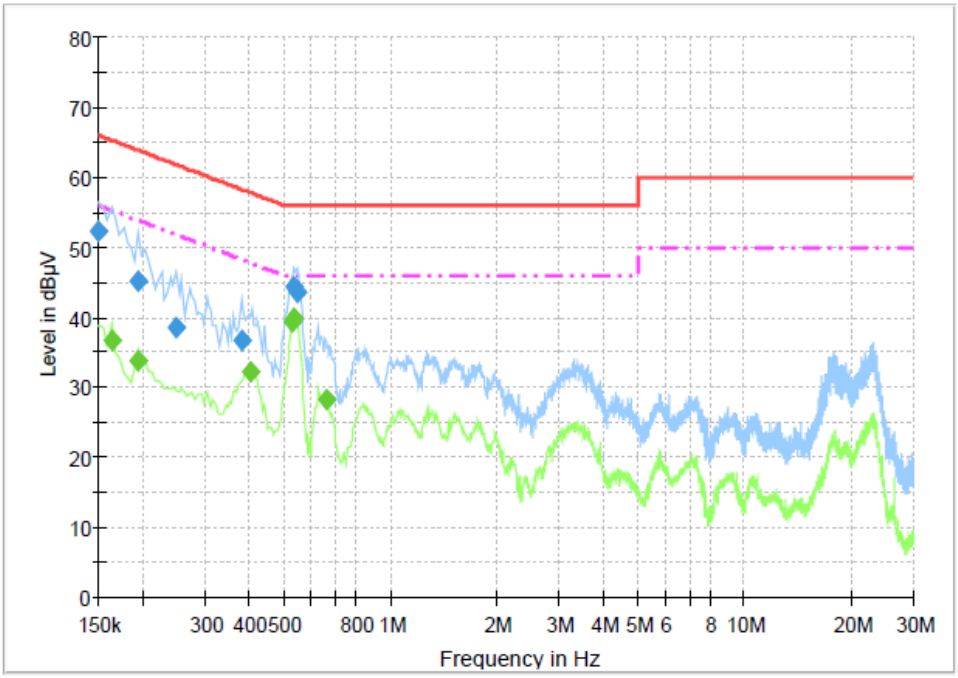
### Test Results

The requirements are:
☒ Complies

## Test Data

**[LINE]**

3CE_Class B_L1




## Final Result 1

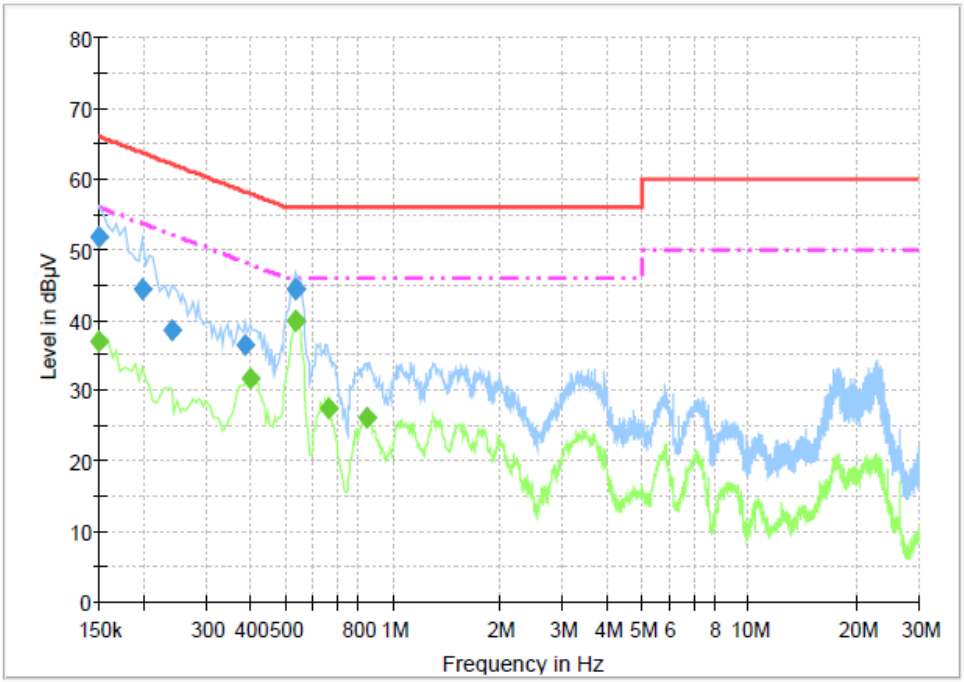
| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.150000 | 52.2 | 1000.0 | 9.000 | On | L1 | 9.8 | 13.8 | 66.0 |
| 0.195000 | 45.2 | 1000.0 | 9.000 | On | L1 | 9.8 | 18.6 | 63.8 |
| 0.249000 | 38.5 | 1000.0 | 9.000 | On | L1 | 9.7 | 23.2 | 61.8 |
| 0.379500 | 36.7 | 1000.0 | 9.000 | On | L1 | 10.0 | 21.6 | 58.3 |
| 0.532500 | 44.2 | 1000.0 | 9.000 | On | L1 | 10.0 | 11.8 | 56.0 |
| 0.546000 | 43.7 | 1000.0 | 9.000 | On | L1 | 10.0 | 12.3 | 56.0 |

## Final Result 2

| Frequency (MHz) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.163500 | 36.8 | 1000.0 | 9.000 | On | L1 | 9.8 | 18.5 | 55.3 |
| 0.195000 | 33.9 | 1000.0 | 9.000 | On | L1 | 9.8 | 19.9 | 53.8 |
| 0.402000 | 32.3 | 1000.0 | 9.000 | On | L1 | 10.0 | 15.5 | 47.8 |
| 0.528000 | 39.3 | 1000.0 | 9.000 | On | L1 | 10.0 | 6.7 | 46.0 |
| 0.537000 | 39.9 | 1000.0 | 9.000 | On | L1 | 10.0 | 6.1 | 46.0 |
| 0.663000 | 28.4 | 1000.0 | 9.000 | On | L1 | 9.9 | 17.6 | 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 | 51.7 | 1000.0 | 9.000 | On | N | 9.8 | 14.3 | 66.0 |
| 0.199500 | 44.5 | 1000.0 | 9.000 | On | N | 9.8 | 19.1 | 63.6 |
| 0.240000 | 38.6 | 1000.0 | 9.000 | On | N | 9.7 | 23.5 | 62.1 |
| 0.384000 | 36.4 | 1000.0 | 9.000 | On | N | 9.9 | 21.8 | 58.2 |
| 0.532500 | 44.3 | 1000.0 | 9.000 | On | N | 10.0 | 11.7 | 56.0 |
| 0.537000 | 44.4 | 1000.0 | 9.000 | On | N | 10.0 | 11.6 | 56.0 |

## Final Result 2

| Frequency (MHz) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.150000 | 37.0 | 1000.0 | 9.000 | On | N | 9.8 | 19.0 | 56.0 |
| 0.397500 | 31.7 | 1000.0 | 9.000 | On | N | 9.9 | 16.2 | 47.9 |
| 0.532500 | 39.8 | 1000.0 | 9.000 | On | N | 10.0 | 6.2 | 46.0 |
| 0.537000 | 39.9 | 1000.0 | 9.000 | On | N | 10.0 | 6.1 | 46.0 |
| 0.663000 | 27.5 | 1000.0 | 9.000 | On | N | 9.9 | 18.5 | 46.0 |
| 0.847500 | 26.2 | 1000.0 | 9.000 | On | N | 9.8 | 19.8 | 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 | MY50200512 | 2020-05-25 | 2021-05-25 |
| 2 | Signal Generator | Rohde & Schwarz | SMB100A | 175528 | 2020-04-28 | 2021-04-28 |
| 3 | EMI Test Receiver | Rohde & Schwarz | ESCI7 | 100814 | 2020-10-20 | 2021-10-20 |
| 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 | 2020-10-23 | 2021-10-23 |
| 7 | 6dB Attenuator | BIRD | 5W 6dB | 1744 | 2020-01-13 | 2021-01-03 |
| 8 | AMPLIFIER | SONOMA | 310 | 291721 | 2020-01-22 | 2021-01-22 |
| 9 | EMI Test Receiver | Rohde & Schwarz | ESU40 | 100336 | 2020-01-17 | 2021-01-17 |
| 10 | Preamplifier | Agilent | 8449B | 3008A01504 | 2019-12-17 | 2020-12-17 |
| 11 | Horn Antenna | ETS-Lindgren | 3117 | 00154525 | 2020-10-14 | 2021-10-14 |
| 12 | Horn Antenna | SCHWARZBECK | BBHA9170 | 00967 | 2020-06-02 | 2021-06-02 |
| 13 | Band Reject Filter | Micro Tronics | BRM50702 | G233 | 2020-01-21 | 2021-01-21 |
| 14 | Low Noise Amplifier | TESTEK | TK-PA1840H | 200115-L | 2020-05-29 | 2021-05-29 |
| 15 | LISN | Rohde & Schwarz | ENV216 | 101235 | 2020-01-17 | 2021-01-17 |

| | Cable | Manufacturer | Model No. | Serial No. | Check Date |
|---|---|---|---|---|---|
| 1 | RF Cable | Canare Corporation | L-5D2W | N/A | 2020-01-19 |
| 2 | RF Cable | Junkosha Inc. | MWX221 | 1512S127 | 2020-11-05 |
| 3 | RF Cable | HUBER+SUHNER | SUCOFLEX 102 | MY073/2 | 2020-05-19 |
| 4 | RF Cable | HUBER+SUHNER | SUCOFLEX 104 | MY27558/4 | 2020-05-29 |
| 5 | RF Cable | HUBER+SUHNER | SUCOFLEX 104 | N/A | 2020-05-29 |
| 6 | RF Cable | HUBER+SUHNER | SUCOFLEX 104 | MY27573/4 | 2020-05-29 |
| 7 | RF Cable | HUBER+SUHNER | SUCOFLEX 106 | N/A | 2020-05-29 |
| 8 | RF Cable | HUBER+SUHNER | SUCOFLEX 102 | 803010/2 | 2020-10-27 |
| 9 | RF Cable | HUBER+SUHNER | SUCOFLEX 102 | 803742/2 | 2020-10-27 |
| 10 | RF Cable | HUBER+SUHNER | SUCOFLEX 102 | MY2374/2 | 2020-05-07 |
| 11 | RF Cable | HUBER+SUHNER | SUCOFLEX 102 | MY4728/2 | 2020-05-07 |