




TEST REPORT

| | | |
|---|--|---|
| <p>KCTL KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr</p> | <p>Report No.: KR20-SRF0145-B Page (1) of (83)</p> |  |
|---|--|---|

1. Client

- Name : SystemBase Co., Ltd.
- Address : Daerung Post Tower-1 16F, 288, Digital-ro, Guro-gu, Seoul, South Korea
- Date of Receipt : 2020-05-11

2. Use of Report : Certification

3. Name of Product / Model : Serial to WiFi Converter / sWiFi/all V1.0

4. Manufacturer / Country of Origin : SystemBase Co., Ltd. / Korea



5. FCC ID : PRO-SWIFIALLV10

6. Date of Test : 2020-06-16 to 2020-06-26

7. Location of Test : Permanent Testing Lab On Site Testing (Address: Address of testing location)

8. Test method used : FCC Part 15 Subpart E, 15.407

9. Test Result : Refer to the test result in the test report

| | | |
|-------------|--|--|
| Affirmation | Tested by  | Technical Manager  |
| | Name : Minsoo Yoon (Signature) | Name : Heesu Ahn (Signature) |

2020-07-01

KCTL Inc.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.

REPORT REVISION HISTORY

| Date | Revision | Page No |
|------------|-------------------|-------------------------|
| 2020-06-19 | Originally issued | - |
| 2020-06-26 | Updated | 4,10,16, 21 ~ 25, 55 |
| 2020-07-01 | Updated | 10 |
| | | |
| | | |

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Note. The report No. KR20-SRF0145-A is superseded by the report No. KR20-SRF0145-B.

General remarks for test reports

Nothing significant to report.



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1. General information

Client : SystemBase Co., Ltd.
Address : Daerung Post Tower-1 16F, 288, Digital-ro, Guro-gu, Seoul, South Korea
Manufacturer : SystemBase Co., Ltd.
Address : Daerung Post Tower-1 16F, 288, Digital-ro, Guro-gu, Seoul, South Korea
Laboratory : KCTL Inc.
Address : 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations : FCC Site Designation No: KR0040, FCC Site Registration No: 687132
VCCI Registration No. : R-20080, G-20078, C-20059, T-20056
Industry Canada Registration No. : 8035A
KOLAS No.: KT231

2. Device information

Equipment under test : Serial to WiFi Converter
Model : sWiFi/all V1.0
Modulation technique : WIFI(802.11a/b/g/n_HT20)_DSSS, OFDM
Number of channels : 802.11b/g/n_HT20 : 11 ch
UNII-1: 4 ch (20 MHz)
UNII-2A: 4 ch (20 MHz)
UNII-2C: 12 ch (20 MHz)
UNII-3: 5 ch (20 MHz)
Power source : AC 120 V / 60 Hz
Antenna specification : Dipole Antenna
Antenna gain : WIFI(802.11b/g/n_HT20): ANT_6.13 dBi
UNII-1 ANT_6.20 dBi
UNII-2A ANT_6.67 dBi
UNII-2C ANT_6.40 dBi
UNII-3 ANT_6.40 dBi
Frequency range : 2 412 MHz ~ 2 462 MHz (802.11b/g/n_HT20)
UNII-1: 5 150 MHz ~ 5 250 MHz (802.11a/n_HT20)
UNII-2A: 5 250 MHz ~ 5 350 MHz (802.11a/n_HT20)
UNII-2C: 5 470 MHz ~ 5 725 MHz (802.11a/n_HT20)
UNII-3: 5 725 MHz ~ 5 850 MHz (802.11a/n_HT20)
Software version : V 1.0.0
Hardware version : V 1.0.4
Test device serial No. : N/A
Operation temperature : -40 ~ 85 °C

2.1. Accessory information

| Equipment | Manufacturer | Model | Serial No. | Power source |
|------------------|---|---------------------------|------------|--|
| AC to DC Adapter | Dee Van Electronics(Longchuan) Co.,LTD. | DSA-6PFE-05 FKA 050100 | - | INPUT : 100 ~ 240 V / 50/60 Hz / 0.2 A OUTPUT : 5 V, 1.0 A |

2.2. Frequency/channel operations

This device contains the following capabilities:

WLAN 2.4 GHz_802.11b/g/n_HT20, WLAN 5 GHz_802.11a/n_HT20

UNII-1

| Ch. | Frequency (MHz) |
|-----|-----------------|
| 36 | 5 180 |
| 40 | 5 200 |
| 48 | 5 240 |

UNII-2A

| Ch. | Frequency (MHz) |
|-----|-----------------|
| 52 | 5 260 |
| 56 | 5 280 |
| 64 | 5 320 |

UNII-2C

| Ch. | Frequency (MHz) |
|-----|-----------------|
| 100 | 5 500 |
| 116 | 5 580 |
| 144 | 5 720 |

UNII-3

| Ch. | Frequency (MHz) |
|-----|-----------------|
| 149 | 5 745 |
| 157 | 5 785 |
| 165 | 5 825 |

Table 2.2.1. 802.11a/n_HT20 mode



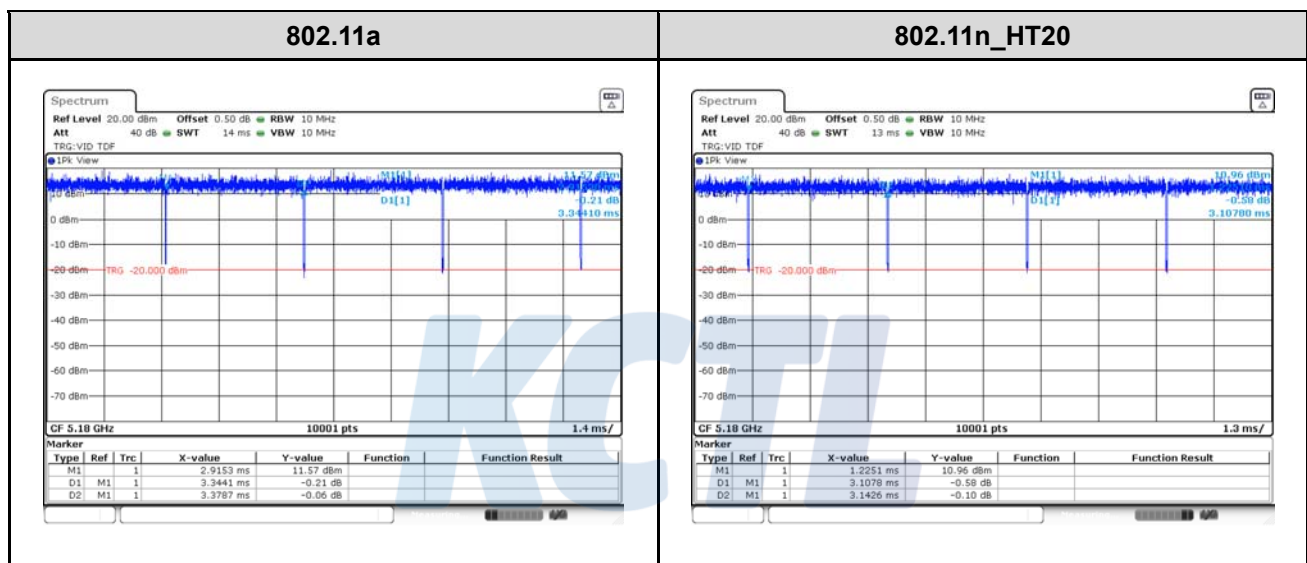
2.4. Duty Cycle Factor

- UNII-1

| Test mode | T _{on} time (ms) | Period (ms) | Duty cycle | | Duty cycle factor (dB) |
|--------------|---------------------------|-------------|------------|-------|------------------------|
| | | | (Linear) | (%) | |
| 802.11a | 3.344 1 | 3.378 7 | 0.989 8 | 98.98 | 0.04 |
| 802.11n_HT20 | 3.107 8 | 3.142 6 | 0.988 9 | 98.89 | 0.05 |

Notes.

1. Duty cycle (Linear) = T_{on} time / Period
2. DCF(Duty cycle factor) = 10log(1/duty cycle)

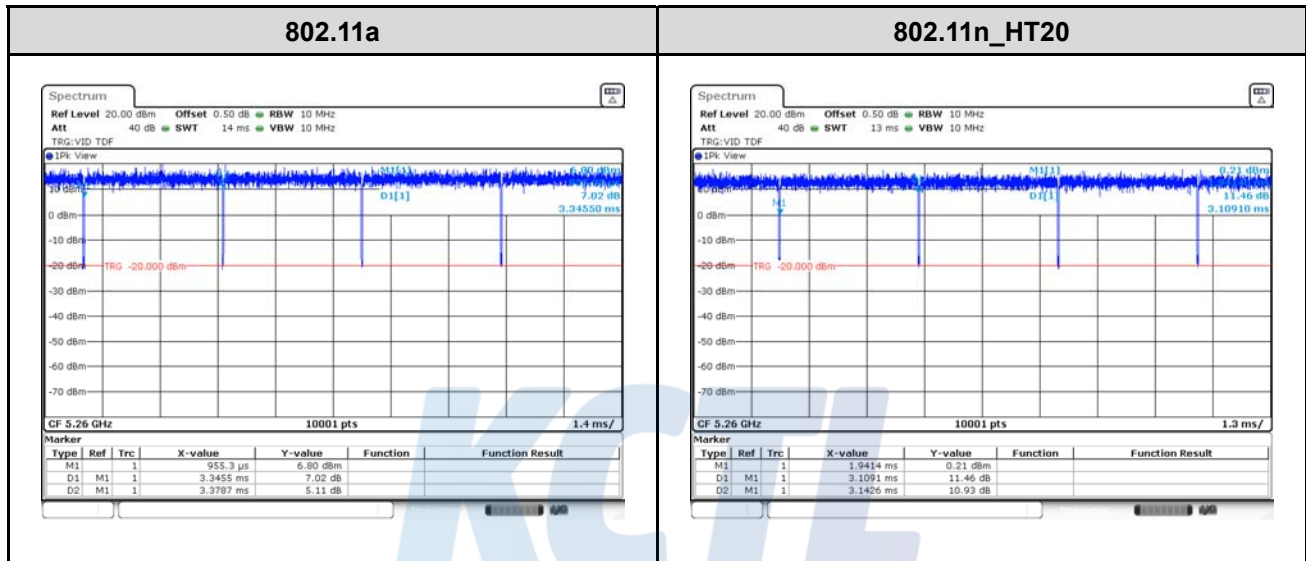


- UNII-2A

| Test mode | T _{on} time (ms) | Period (ms) | Duty cycle | | Duty cycle factor (dB) |
|--------------|---------------------------|-------------|------------|-------|------------------------|
| | | | (Linear) | (%) | |
| 802.11a | 3.345 5 | 3.378 7 | 0.990 2 | 99.02 | 0.04 |
| 802.11n_HT20 | 3.109 1 | 3.142 6 | 0.989 3 | 98.93 | 0.05 |

Notes.

1. Duty cycle (Linear) = T_{on} time / Period
2. DCF(Duty cycle factor) = 10log(1/duty cycle)

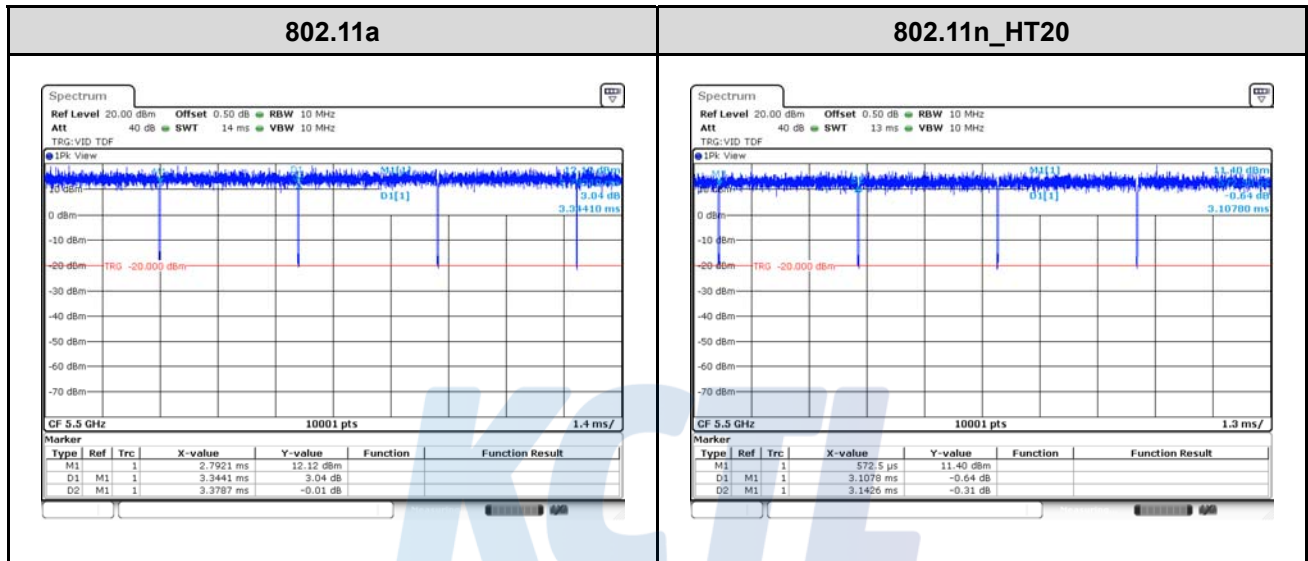


- UNII-2C

| Test mode | T _{on} time (ms) | Period (ms) | Duty cycle | | Duty cycle factor (dB) |
|--------------|---------------------------|-------------|------------|-------|------------------------|
| | | | (Linear) | (%) | |
| 802.11a | 3.344 1 | 3.378 7 | 0.989 8 | 98.98 | 0.04 |
| 802.11n_HT20 | 3.107 8 | 3.142 6 | 0.988 9 | 98.89 | 0.05 |

Notes.

1. Duty cycle (Linear) = T_{on} time / Period
2. DCF(Duty cycle factor) = 10log(1/duty cycle)

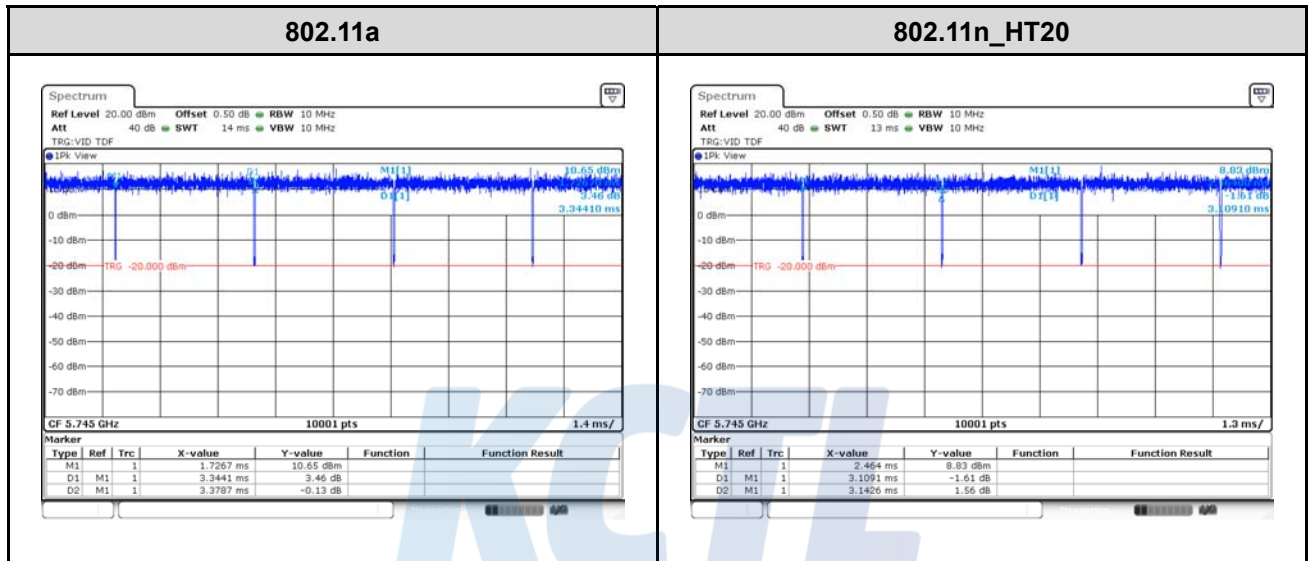


- UNII-3

| Test mode | T _{on} time (ms) | Period (ms) | Duty cycle | | Duty cycle factor (dB) |
|--------------|---------------------------|-------------|------------|-------|------------------------|
| | | | (Linear) | (%) | |
| 802.11a | 3.344 1 | 3.378 7 | 0.989 8 | 98.98 | 0.04 |
| 802.11n_HT20 | 3.109 1 | 3.142 6 | 0.989 3 | 98.93 | 0.05 |

Notes.

1. Duty cycle (Linear) = T_{on} time / Period
2. DCF(Duty cycle factor) = 10log(1/duty cycle)



3. Antenna requirement

Requirement of FCC part section 15.203, 15.407:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

- The transmitter has a dipole antenna with unique antenna connector(RP-SMA).

4. Summary of tests

| FCC Part section(s) | Parameter | Test results |
|---------------------------------------|---|------------------------|
| 15.407(a) | Maximum conducted output power | Pass |
| 15.407(a) | Maximum power spectral density | N/T ^(Note1) |
| 15.407(a) | 26 dB Channel Bandwidth | N/T ^(Note1) |
| 15.407(e) | 6 dB Channel Bandwidth | N/T ^(Note1) |
| 15.407(g) | Frequency stability | Pass |
| 15.407(b), 15.205(a), 15.209(a) | Spurious emission | Pass |
| | Band-edge, restricted band | Pass |
| 15.207(a) | Conducted Emissions | Pass |
| 15.407(h) | DFS -Channel closing transmission time -Channel move time -Non occupied period | N/T ^(Note2) |

Notes: (N/T: Not Tested, N/A: Not Applicable)

- These test item was performed. (FCC ID: 2ADXS-WFM50-SFP2501, Test Report No. F690501/RF-RTL009890-2 issued on 29, June, 2016 by SGS Korea Co., Ltd. (Gunpo Laboratory))
- These test item was performed. (FCC ID: 2ADXS-WFM50-SFP2501, Test Report No. F690501/RF-RTL009891-1 issued on 29, June, 2016 by SGS Korea Co., Ltd. (Gunpo Laboratory))
- All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
- The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation
- The test procedure(s) in this report were performed in accordance as following.
 - ANSI C63.10-2013
 - KDB 662911 D01 v02r01
 - KDB 789033 D02 v02r01
- Based on the baseline scan, the worst-case data rates were:
 - SISO Antenna: 802.11b mode : 1Mbps
 - 802.11g mode : 6Mbps
 - 802.11n_HT20 mode : MCS0

5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

| Parameter | Expanded uncertainty (\pm) | |
|------------------------------|--------------------------------|--------|
| Conducted RF power | 1.3 dB | |
| Conducted spurious emissions | 1.3 dB | |
| Radiated spurious emissions | 9 kHz ~ 30 MHz: | 2.3 dB |
| | 30 MHz ~ 300 MHz | 5.4 dB |
| | 300 MHz ~ 1 000 MHz | 5.5 dB |
| | Above 1 GHz | 6.7 dB |
| Conducted emissions | 9 kHz ~ 150 kHz | 3.7 dB |
| | 150 kHz ~ 30 MHz | 3.3 dB |

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6. Measurement results explanation example

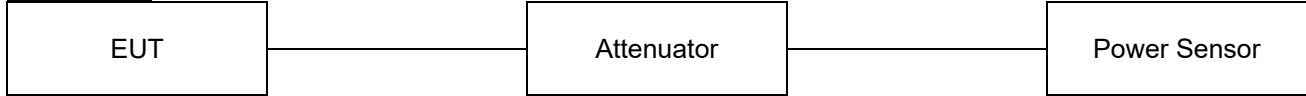
The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.

With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

| Frequency (MHz) | Factor(dB) | Frequency (MHz) | Factor(dB) |
|-----------------|------------|-----------------|------------|
| 30 | 10.02 | 9 000 | 12.38 |
| 50 | 10.09 | 10 000 | 12.54 |
| 100 | 10.15 | 11 000 | 12.56 |
| 200 | 10.24 | 12 000 | 12.59 |
| 300 | 10.34 | 13 000 | 12.79 |
| 400 | 10.40 | 14 000 | 12.69 |
| 500 | 10.48 | 15 000 | 12.82 |
| 600 | 10.53 | 16 000 | 13.41 |
| 700 | 10.55 | 17 000 | 13.59 |
| 800 | 10.60 | 18 000 | 13.48 |
| 900 | 10.62 | 19 000 | 13.46 |
| 1 000 | 10.68 | 20 000 | 13.73 |
| 2 000 | 11.05 | 21 000 | 13.71 |
| 3 000 | 11.33 | 22 000 | 13.84 |
| 4 000 | 11.50 | 23 000 | 14.05 |
| 5 000 | 11.61 | 24 000 | 14.38 |
| 6 000 | 11.93 | 25 000 | 14.08 |
| 7 000 | 12.32 | 26 000 | 14.19 |
| 8 000 | 12.33 | 26 500 | 14.00 |

Notes:

Offset(dB) = RF cable loss(dB) + Attenuator(dB)

7. Test results**7.1. Maximum conducted output power****Test setup****Limit**

According to §15.407(a),

| Band | EUT category | | Conducted output power limit |
|---------|--------------|-----------------------------------|---|
| UNII-1 | | Outdoor access point | 1 W (30 dBm) |
| | | Indoor access point | |
| | | Fixed point-to-point access point | |
| | √ | Client device | 250 mW (23.98 dBm) |
| UNII-2A | | √ | 250 mW or 11 dBm + 10logB ¹⁾ |
| UNII-2C | | √ | 250 mW or 11 dBm + 10logB ¹⁾ |
| UNII-3 | | √ | 1 W (30 dBm) |

Note:

1) Conducted output power limit B is the 26 dB emission bandwidth.

Test procedureANSI C63.10-2013-Section 12.3.3.2 and 14.2
KDB 789033 D02 v02r01 - Section E.2.d) or e)
KDB 662911 D01 v02r01 – Section E).1)

Test settings**Used test method is Section E.2.d)****◆ KDB 789033 D02 v02r01****Section E.2.d)****Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction):**

- (i) Measure the duty cycle, x , of the transmitter output signal as described in II.B..
- (ii) Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (iii) Set RBW = 1 MHz
- (iv) Set RBW \geq 3 MHz
- (v) Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW} / 2$, so that narrowband signals are not lost between frequency bins.)
- (vi) Sweep time = auto.
- (vii) Detector = power averaging (rms), if available. Otherwise use sample detector mode.
- (viii) Do not use sweep triggering. Allow the sweep to "free run."
- (ix) Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.
- (x) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (xi) Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add $10 \log(1/0,25) = 6 \text{ dB}$ if the duty cycle is 25%.

Section E.2.e)**Method SA-2 Alternative (power averaging(rms) detection with slow sweep with each spectrum bin averaging across on and off times of the EUT transmissions, followed by duty cycle correction):**

- (i) Measure the duty cycle, x , of the transmitter output signal as described in II.B..
- (ii) Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (iii) Set RBW = 1 MHz
- (iv) Set RBW \geq 3 MHz
- (v) Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW} / 2$, so that narrowband signals are not lost between frequency bins.)
- (vi) Manually set sweep time $\geq 10 \times (\text{number of points in sweep}) \times (\text{total on/off period of the transmitted signal})$.
- (vii) Set detector = power averaging (rms)
- (viii) Perform a single sweep.
- (ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement

function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

- (x) Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add $10 \log(1/0.25) = 6$ dB if the duty cycle is 25%.

Section E.3.a)

Method PM (Measurement using an RF average power meter):

- (xi) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.
- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
 - At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
 - The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five
- (xii) If the transmitter does not transmit continuously, measure the duty cycle, x , of the transmitter output signal as described in II
- (xiii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- (xiv) Adjust the measurement in dBm by adding $10 \log(1/x)$ where x is the duty cycle (e.g., $10 \log(1/0.25)$ if the duty cycle is 25%).

Section E.3.b)

Method PM-G (Measurement using a gated RF average power meter):

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Test results

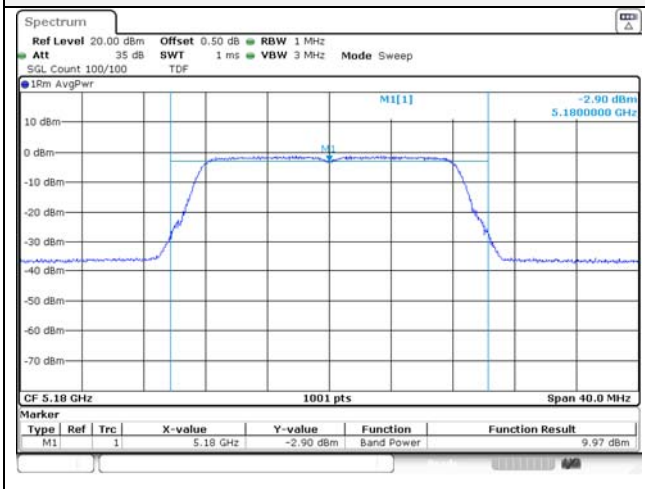
| Test mode | Band | Freq (MHz) | Measured output power (dBm) | Conducted Power Limit (dBm) |
|---------------|---------|------------|-----------------------------|-----------------------------|
| 802.11a | UNII-1 | 5 180 | 9.97 | 23.78 |
| | | 5 200 | 10.25 | |
| | | 5 240 | 10.38 | |
| | UNII-2A | 5 260 | 10.35 | 23.31 |
| | | 5 280 | 11.21 | |
| | | 5 320 | 11.49 | |
| | UNII-2C | 5 500 | 10.52 | 23.58 |
| | | 5 600 | 9.80 | |
| | | 5 700 | 9.16 | |
| | UNII-3 | 5 745 | 8.60 | 29.60 |
| | | 5 785 | 8.22 | |
| | | 5 825 | 7.92 | |
| 802.11n_ HT20 | UNII-1 | 5 180 | 9.44 | 23.78 |
| | | 5 200 | 9.77 | |
| | | 5 240 | 10.02 | |
| | UNII-2A | 5 260 | 9.34 | 23.31 |
| | | 5 280 | 10.25 | |
| | | 5 320 | 10.12 | |
| | UNII-2C | 5 500 | 9.51 | 23.58 |
| | | 5 600 | 9.31 | |
| | | 5 700 | 8.70 | |
| | UNII-3 | 5 745 | 8.61 | 29.60 |
| | | 5 785 | 7.85 | |
| | | 5 825 | 7.88 | |

Note:

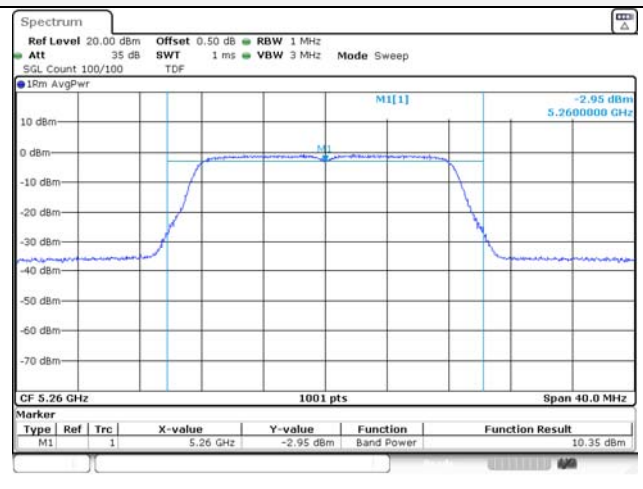
1. Conducted Output power Calculation:

$$\text{Conducted Output power} = \text{Measured power(dB m)} + \text{DCF (dB)}$$

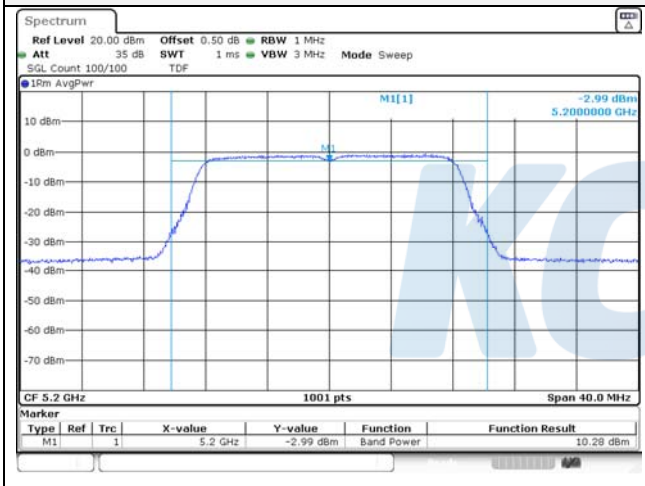
UNII-1 / 802.11a / Low ch.



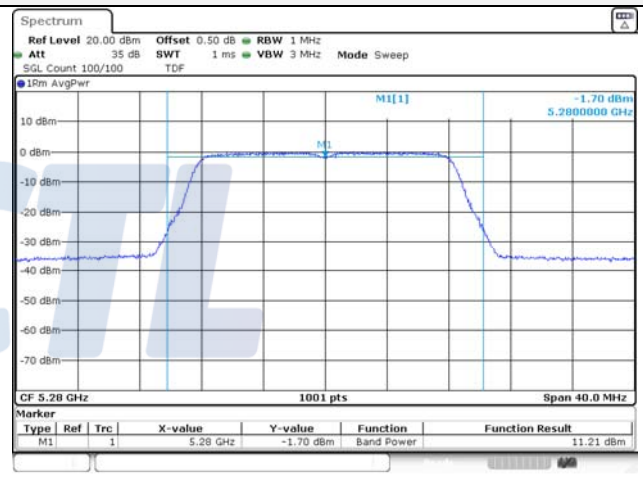
UNII-2A / 802.11a / Low ch.



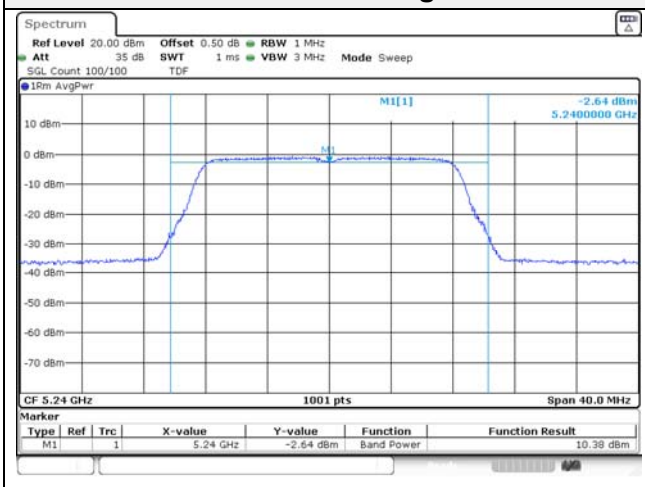
UNII-1 / 802.11a / Mid ch.



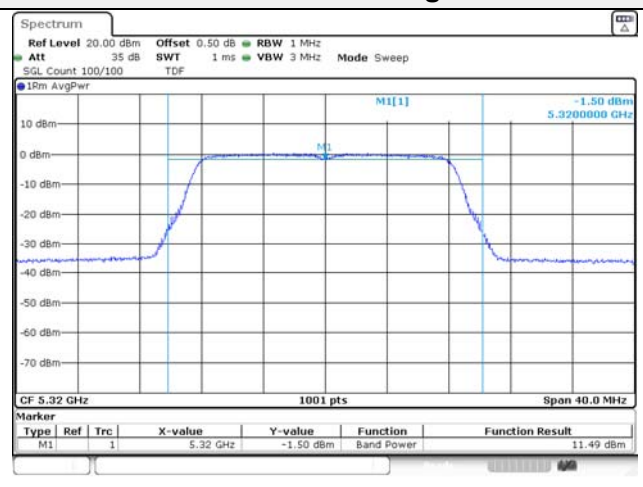
UNII-2A / 802.11a / Mid ch.



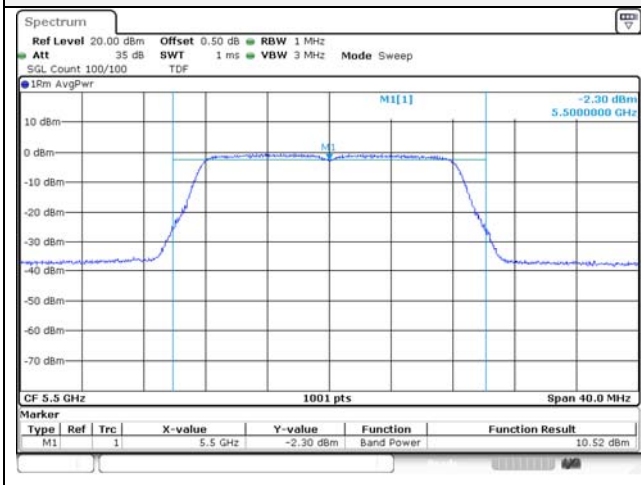
UNII-1 / 802.11a / High ch.



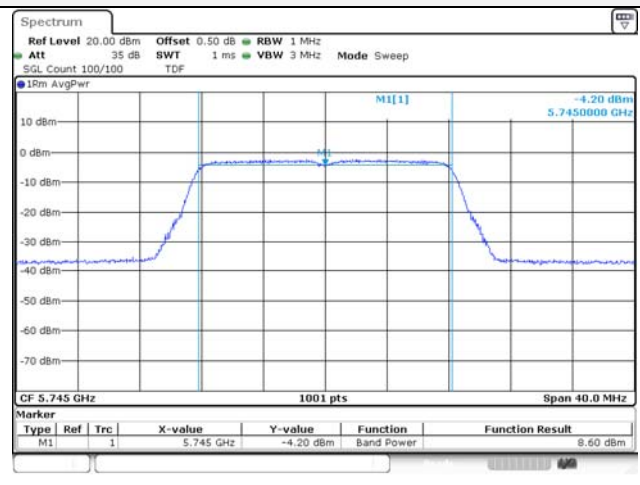
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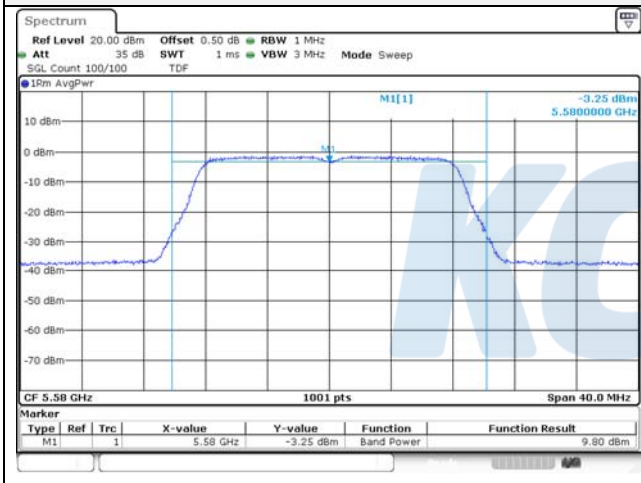
UNII-2C / 802.11a / Low ch.



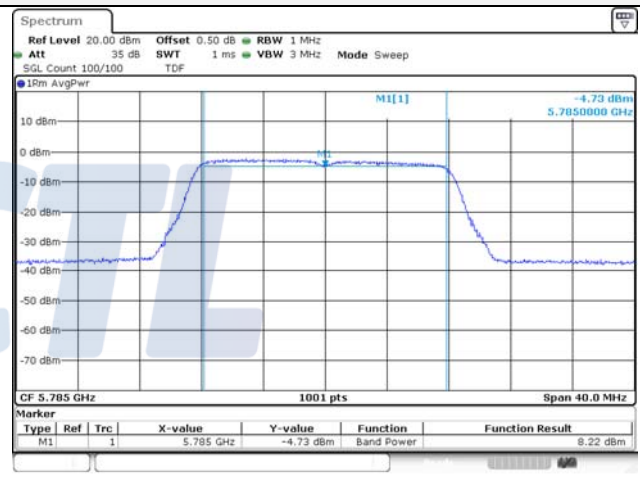
UNII-3 / 802.11a / Low ch.



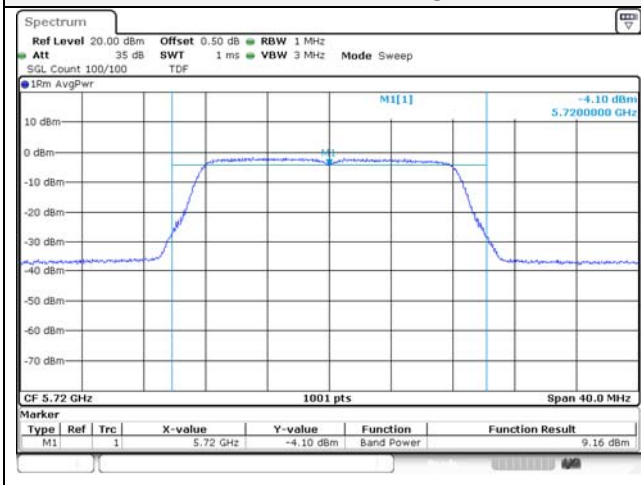
UNII-2C / 802.11a / Mid ch.



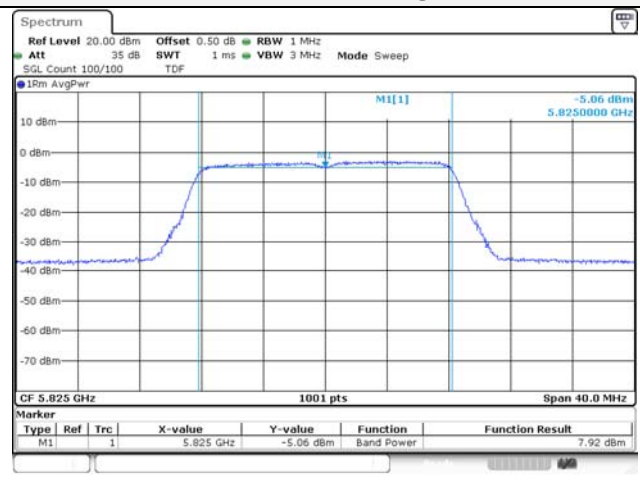
UNII-3 / 802.11a / Mid ch.



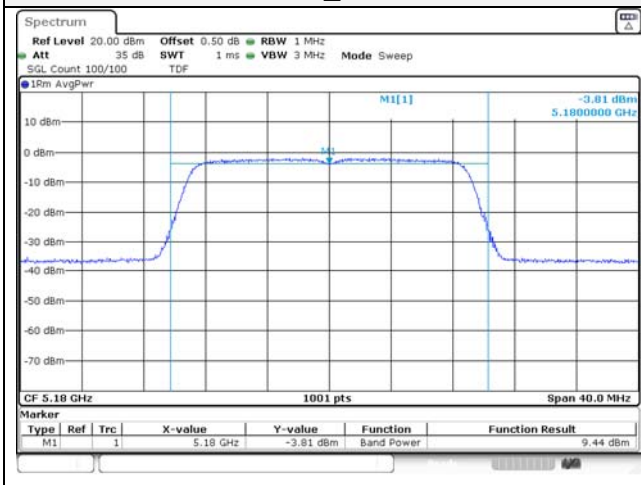
UNII-2C / 802.11a / High ch.



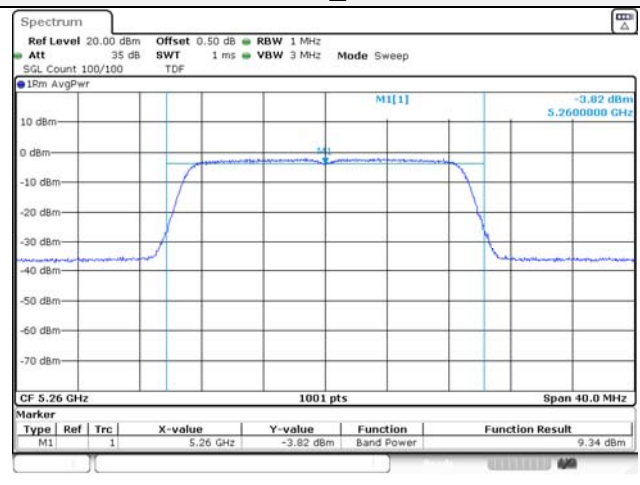
UNII-3 / 802.11a / High ch.



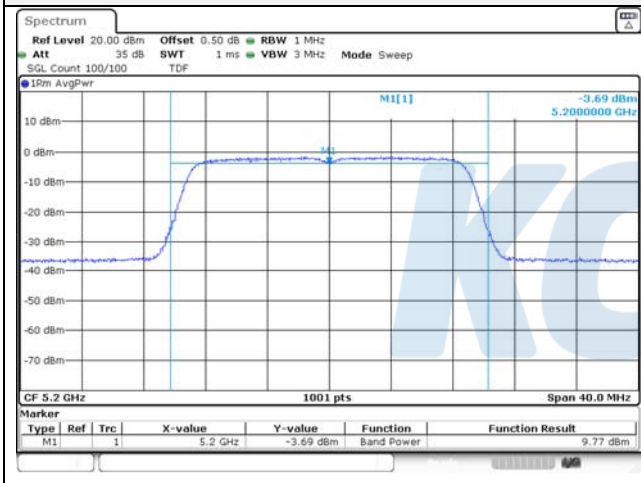
UNII-1 / 802.11n_HT20 / Low ch.



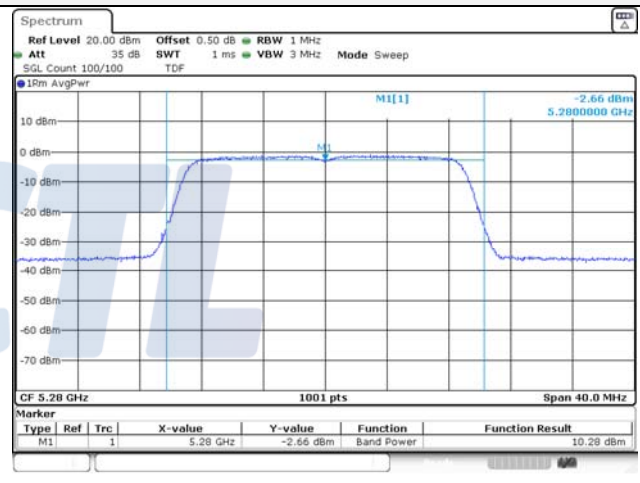
UNII-2A / 802.11n_HT20 / Low ch.



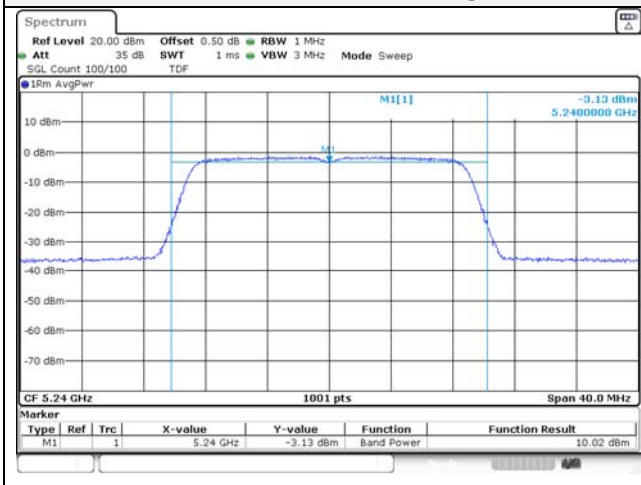
UNII-1 / 802.11n_HT20 / Mid ch.



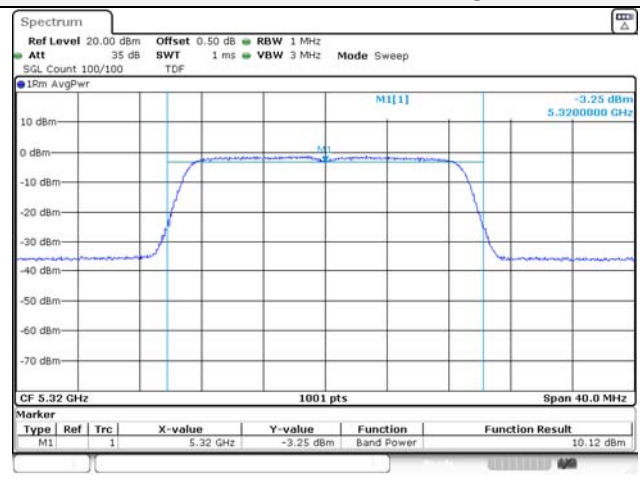
UNII-2A / 802.11n_HT20 / Mid ch.



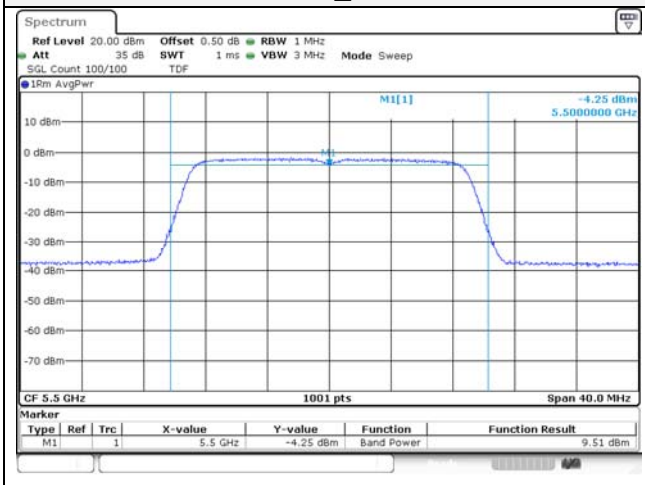
UNII-1 / 802.11n_HT20 / High ch.



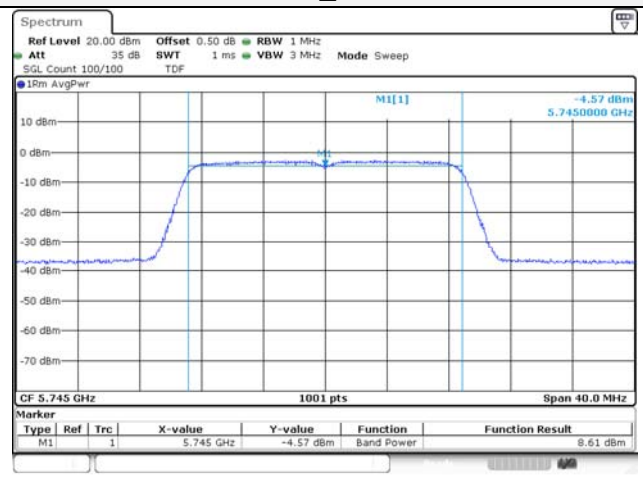
UNII-2A / 802.11n_HT20 / High ch.



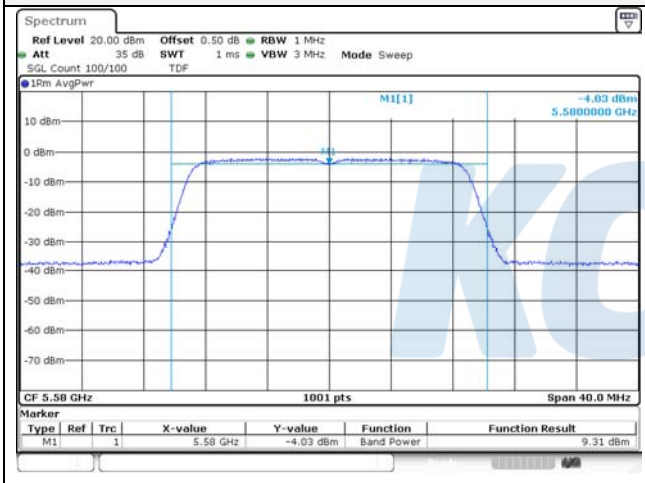
UNII-2C / 802.11n_HT20 / Low ch.



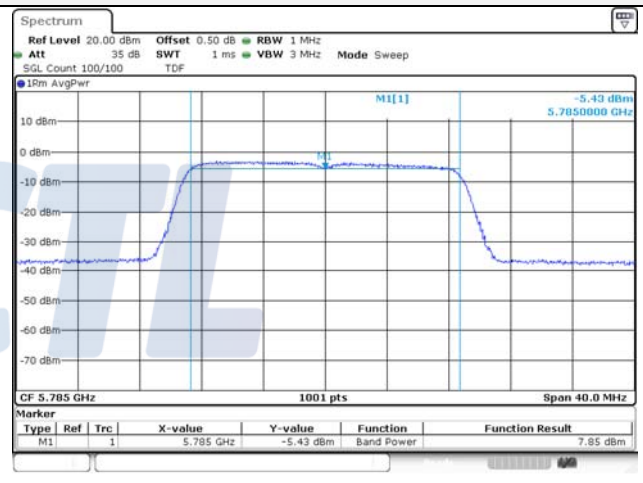
UNII-3 / 802.11n_HT20 / Low ch.



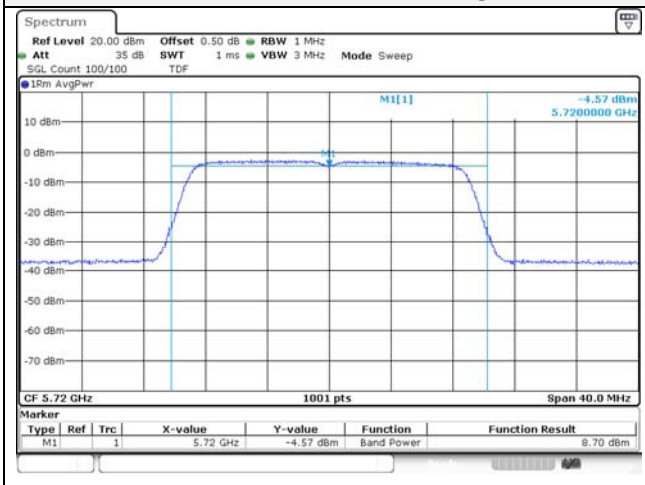
UNII-2C / 802.11n_HT20 / Mid ch.



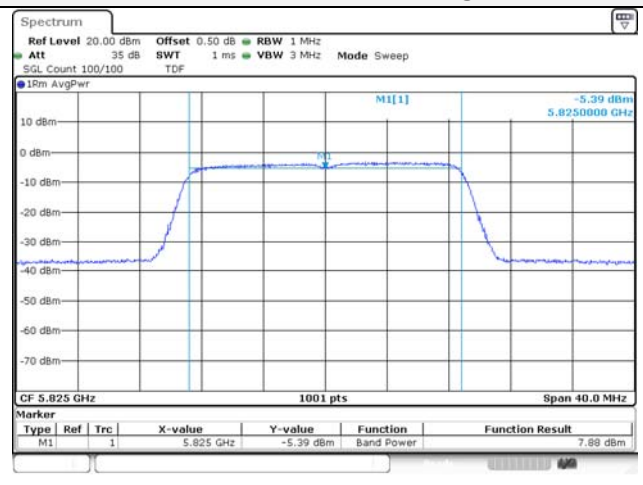
UNII-3 / 802.11n_HT20 / Mid ch.



UNII-2C / 802.11n_HT20 / High ch.

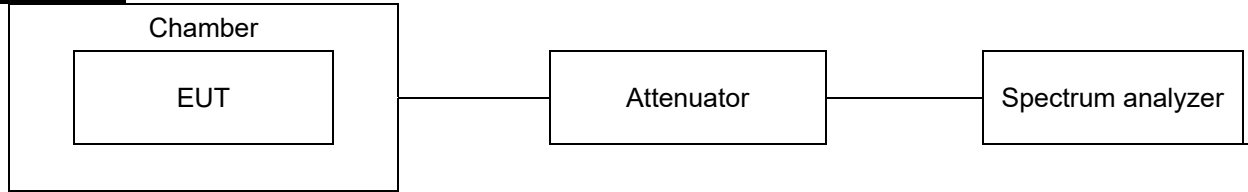


UNII-3 / 802.11n_HT20 / High ch.



7.2. Frequency Stability

Test setup



Limit

N/A

Test procedure

ANSI C63.10-2013, clause 6.8.1

Test settings

The frequency stability of the carrier frequency of the intentional radiator shall be maintained all conditions of normal operation as specified in the user manual. The frequency stability shall be maintained over a temperature variation of specified in the user manual at normal supply voltage, and over a variation in the primary supply voltage of specified in the user manual of the rated supply voltage at a temperature of 20 °C. For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

1. The EUT was placed inside the environmental test chamber.
2. The temperature was incremented by 10 °C intervals from lowest temperature.
3. Each increase step of temperature measured the frequency.
4. The test temperature was set 20°C and the supply voltage was then adjusted on the EUT from 85 % to 115% and the frequency record.
5. While maintaining a constant temperature inside the environmental chamber, turn the EUT on and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

Test resultsTest mode : UNII-1Frequency(Hz) : 5 180 000 000

| Voltage [%] | Voltage [V] | TEMP [°C] | Maintaining time | Measure frequency [Hz] | Frequency deviation [Hz] | Deviation [%] | | |
|----------------|----------------|--------------|---------------------|------------------------------|--------------------------------|------------------|---------|-----------|
| 100 | 5 | +22(Ref) | Startup | 5 179 916 588 | -83 412 | -0.001 61 | | |
| | | | 2 minutes | 5 179 917 042 | -82 958 | -0.001 60 | | |
| | | | 5 minutes | 5 179 918 768 | -81 232 | -0.001 57 | | |
| | | | 10 minutes | 5 179 919 463 | -80 537 | -0.001 55 | | |
| | | -30 | Startup | 5 180 005 320 | 5 320 | 0.000 10 | | |
| | | | 2 minutes | 5 180 006 102 | 6 102 | 0.000 12 | | |
| | | | 5 minutes | 5 180 006 937 | 6 937 | 0.000 13 | | |
| | | | 10 minutes | 5 180 007 642 | 7 642 | 0.000 15 | | |
| | | -20 | Startup | 5 180 009 872 | 9 872 | 0.000 19 | | |
| | | | 2 minutes | 5 180 010 235 | 10 235 | 0.000 20 | | |
| | | | 5 minutes | 5 180 010 768 | 10 768 | 0.000 21 | | |
| | | | 10 minutes | 5 180 011 341 | 11 341 | 0.000 22 | | |
| | | -10 | Startup | 5 179 968 062 | -31 938 | -0.000 62 | | |
| | | | 2 minutes | 5 179 967 731 | -32 269 | -0.000 62 | | |
| | | | 5 minutes | 5 179 967 625 | -32 375 | -0.000 63 | | |
| | | | 10 minutes | 5 179 967 422 | -32 578 | -0.000 63 | | |
| | | 0 | Startup | 5 179 966 542 | -33 458 | -0.000 65 | | |
| | | | 2 minutes | 5 179 966 231 | -33 769 | -0.000 65 | | |
| | | | 5 minutes | 5 179 965 867 | -34 133 | -0.000 66 | | |
| | | | 10 minutes | 5 179 965 477 | -34 523 | -0.000 67 | | |
| | | 10 | Startup | 5 179 942 616 | -57 384 | -0.001 11 | | |
| | | | 2 minutes | 5 179 942 237 | -57 763 | -0.001 12 | | |
| | | | 5 minutes | 5 179 941 864 | -58 136 | -0.001 12 | | |
| | | | 10 minutes | 5 179 941 345 | -58 655 | -0.001 13 | | |
| | | 20 | Startup | 5 179 923 844 | -76 156 | -0.001 47 | | |
| | | | 2 minutes | 5 179 923 462 | -76 538 | -0.001 48 | | |
| | | | 5 minutes | 5 179 923 052 | -76 948 | -0.001 49 | | |
| | | | 10 minutes | 5 179 922 731 | -77 269 | -0.001 49 | | |
| | | 30 | Startup | 5 179 918 690 | -81 310 | -0.001 57 | | |
| | | | 2 minutes | 5 179 918 237 | -81 763 | -0.001 58 | | |
| | | | 5 minutes | 5 179 917 849 | -82 151 | -0.001 59 | | |
| | | | 10 minutes | 5 179 917 428 | -82 572 | -0.001 59 | | |
| | | 40 | Startup | 5 179 924 643 | -75 357 | -0.001 45 | | |
| | | | 2 minutes | 5 179 924 877 | -75 123 | -0.001 45 | | |
| | | | 5 minutes | 5 179 925 031 | -74 969 | -0.001 45 | | |
| | | | 10 minutes | 5 179 925 386 | -74 614 | -0.001 44 | | |
| | | 50 | Startup | 5 179 934 778 | -65 222 | -0.001 26 | | |
| | | | 2 minutes | 5 179 934 912 | -65 088 | -0.001 26 | | |
| | | | 5 minutes | 5 179 935 106 | -64 894 | -0.001 25 | | |
| | | | 10 minutes | 5 179 935 328 | -64 672 | -0.001 25 | | |
| | | 85 | 4.25 | +22(Ref) | Startup | 5 179 915 612 | -84 388 | -0.001 63 |
| | | | | | 2 minutes | 5 179 915 831 | -84 169 | -0.001 62 |
| | | | | | 5 minutes | 5 179 916 045 | -83 955 | -0.001 62 |
| | | | | | 10 minutes | 5 179 916 287 | -83 713 | -0.001 62 |
| | | 115 | 5.75 | +22(Ref) | Startup | 5 179 917 413 | -82 587 | -0.001 59 |
| | | | | | 2 minutes | 5 179 917 628 | -82 372 | -0.001 59 |
| | | | | | 5 minutes | 5 179 917 844 | -82 156 | -0.001 59 |
| | | | | | 10 minutes | 5 179 918 025 | -81 975 | -0.001 58 |

Test mode : UNII-2AFrequency(Hz) : 5 260 000 000

| Voltage | Voltage | TEMP | Maintaining time | Measure frequency | Frequency deviation | Deviation | | |
|---------|---------|----------|------------------|-------------------|---------------------|---------------|---------|-----------|
| [%] | [V] | [°C] | | [Hz] | [Hz] | [%] | | |
| 100 | 5 | +22(Ref) | Startup | 5 259 916 451 | -83 549 | -0.001 59 | | |
| | | | 2 minutes | 5 259 916 905 | -83 095 | -0.001 58 | | |
| | | | 5 minutes | 5 259 918 631 | -81 369 | -0.001 55 | | |
| | | | 10 minutes | 5 259 919 326 | -80 674 | -0.001 53 | | |
| | | -30 | Startup | 5 260 005 183 | 5 183 | 0.000 10 | | |
| | | | 2 minutes | 5 260 005 965 | 5 965 | 0.000 11 | | |
| | | | 5 minutes | 5 260 006 800 | 6 800 | 0.000 13 | | |
| | | | 10 minutes | 5 260 007 505 | 7 505 | 0.000 14 | | |
| | | -20 | Startup | 5 260 009 735 | 9 735 | 0.000 19 | | |
| | | | 2 minutes | 5 260 010 098 | 10 098 | 0.000 19 | | |
| | | | 5 minutes | 5 260 010 631 | 10 631 | 0.000 20 | | |
| | | | 10 minutes | 5 260 011 204 | 11 204 | 0.000 21 | | |
| | | -10 | Startup | 5 259 967 925 | -32 075 | -0.000 61 | | |
| | | | 2 minutes | 5 259 967 594 | -32 406 | -0.000 62 | | |
| | | | 5 minutes | 5 259 967 488 | -32 512 | -0.000 62 | | |
| | | | 10 minutes | 5 259 967 285 | -32 715 | -0.000 62 | | |
| | | 0 | Startup | 5 259 966 405 | -33 595 | -0.000 64 | | |
| | | | 2 minutes | 5 259 966 094 | -33 906 | -0.000 64 | | |
| | | | 5 minutes | 5 259 965 730 | -34 270 | -0.000 65 | | |
| | | | 10 minutes | 5 259 965 340 | -34 660 | -0.000 66 | | |
| | | 10 | Startup | 5 259 942 479 | -57 521 | -0.001 09 | | |
| | | | 2 minutes | 5 259 942 100 | -57 900 | -0.001 10 | | |
| | | | 5 minutes | 5 259 941 727 | -58 273 | -0.001 11 | | |
| | | | 10 minutes | 5 259 941 208 | -58 792 | -0.001 12 | | |
| | | 20 | Startup | 5 259 923 707 | -76 293 | -0.001 45 | | |
| | | | 2 minutes | 5 259 923 325 | -76 675 | -0.001 46 | | |
| | | | 5 minutes | 5 259 922 915 | -77 085 | -0.001 47 | | |
| | | | 10 minutes | 5 259 922 594 | -77 406 | -0.001 47 | | |
| | | 30 | Startup | 5 259 918 553 | -81 447 | -0.001 55 | | |
| | | | 2 minutes | 5 259 918 100 | -81 900 | -0.001 56 | | |
| | | | 5 minutes | 5 259 917 712 | -82 288 | -0.001 56 | | |
| | | | 10 minutes | 5 259 917 291 | -82 709 | -0.001 57 | | |
| | | 40 | Startup | 5 259 924 506 | -75 494 | -0.001 44 | | |
| | | | 2 minutes | 5 259 924 740 | -75 260 | -0.001 43 | | |
| | | | 5 minutes | 5 259 924 894 | -75 106 | -0.001 43 | | |
| | | | 10 minutes | 5 259 925 249 | -74 751 | -0.001 42 | | |
| | | 50 | Startup | 5 259 934 641 | -65 359 | -0.001 24 | | |
| | | | 2 minutes | 5 259 934 775 | -65 225 | -0.001 24 | | |
| | | | 5 minutes | 5 259 934 969 | -65 031 | -0.001 24 | | |
| | | | 10 minutes | 5 259 935 191 | -64 809 | -0.001 23 | | |
| | | 85 | 4.25 | +22(Ref) | Startup | 5 259 915 475 | -84 525 | -0.001 61 |
| | | | | | 2 minutes | 5 259 915 694 | -84 306 | -0.001 60 |
| | | | | | 5 minutes | 5 259 915 908 | -84 092 | -0.001 60 |
| | | | | | 10 minutes | 5 259 916 150 | -83 850 | -0.001 59 |
| | | 115 | 5.75 | +22(Ref) | Startup | 5 259 917 276 | -82 724 | -0.001 57 |
| | | | | | 2 minutes | 5 259 917 491 | -82 509 | -0.001 57 |
| | | | | | 5 minutes | 5 259 917 707 | -82 293 | -0.001 56 |
| | | | | | 10 minutes | 5 259 917 888 | -82 112 | -0.001 56 |

Test mode : UNII-2C

Frequency(Hz) : 5 500 000 000

| Voltage | Voltage | TEMP | Maintaining time | Measure frequency | Frequency deviation | Deviation | | |
|---------|---------|----------|------------------|-------------------|---------------------|---------------|---------|-----------|
| [%] | [V] | [°C] | | [Hz] | [Hz] | [%] | | |
| 100 | 5 | +22(Ref) | Startup | 5 499 916 799 | -83 201 | -0.001 51 | | |
| | | | 2 minutes | 5 499 917 253 | -82 747 | -0.001 50 | | |
| | | | 5 minutes | 5 499 918 979 | -81 021 | -0.001 47 | | |
| | | | 10 minutes | 5 499 919 674 | -80 326 | -0.001 46 | | |
| | | -30 | Startup | 5 500 005 531 | 5 531 | 0.000 10 | | |
| | | | 2 minutes | 5 500 006 313 | 6 313 | 0.000 11 | | |
| | | | 5 minutes | 5 500 007 148 | 7 148 | 0.000 13 | | |
| | | | 10 minutes | 5 500 007 853 | 7 853 | 0.000 14 | | |
| | | -20 | Startup | 5 500 010 083 | 10 083 | 0.000 18 | | |
| | | | 2 minutes | 5 500 010 446 | 10 446 | 0.000 19 | | |
| | | | 5 minutes | 5 500 010 979 | 10 979 | 0.000 20 | | |
| | | | 10 minutes | 5 500 011 552 | 11 552 | 0.000 21 | | |
| | | -10 | Startup | 5 499 968 273 | -31 727 | -0.000 58 | | |
| | | | 2 minutes | 5 499 967 942 | -32 058 | -0.000 58 | | |
| | | | 5 minutes | 5 499 967 836 | -32 164 | -0.000 58 | | |
| | | | 10 minutes | 5 499 967 633 | -32 367 | -0.000 59 | | |
| | | 0 | Startup | 5 499 966 753 | -33 247 | -0.000 60 | | |
| | | | 2 minutes | 5 499 966 442 | -33 558 | -0.000 61 | | |
| | | | 5 minutes | 5 499 966 078 | -33 922 | -0.000 62 | | |
| | | | 10 minutes | 5 499 965 688 | -34 312 | -0.000 62 | | |
| | | 10 | Startup | 5 499 942 827 | -57 173 | -0.001 04 | | |
| | | | 2 minutes | 5 499 942 448 | -57 552 | -0.001 05 | | |
| | | | 5 minutes | 5 499 942 075 | -57 925 | -0.001 05 | | |
| | | | 10 minutes | 5 499 941 556 | -58 444 | -0.001 06 | | |
| | | 20 | Startup | 5 499 924 055 | -75 945 | -0.001 38 | | |
| | | | 2 minutes | 5 499 923 673 | -76 327 | -0.001 39 | | |
| | | | 5 minutes | 5 499 923 263 | -76 737 | -0.001 40 | | |
| | | | 10 minutes | 5 499 922 942 | -77 058 | -0.001 40 | | |
| | | 30 | Startup | 5 499 918 901 | -81 099 | -0.001 47 | | |
| | | | 2 minutes | 5 499 918 448 | -81 552 | -0.001 48 | | |
| | | | 5 minutes | 5 499 918 060 | -81 940 | -0.001 49 | | |
| | | | 10 minutes | 5 499 917 639 | -82 361 | -0.001 50 | | |
| | | 40 | Startup | 5 499 924 854 | -75 146 | -0.001 37 | | |
| | | | 2 minutes | 5 499 925 088 | -74 912 | -0.001 36 | | |
| | | | 5 minutes | 5 499 925 242 | -74 758 | -0.001 36 | | |
| | | | 10 minutes | 5 499 925 597 | -74 403 | -0.001 35 | | |
| | | 50 | Startup | 5 499 934 989 | -65 011 | -0.001 18 | | |
| | | | 2 minutes | 5 499 935 123 | -64 877 | -0.001 18 | | |
| | | | 5 minutes | 5 499 935 317 | -64 683 | -0.001 18 | | |
| | | | 10 minutes | 5 499 935 539 | -64 461 | -0.001 17 | | |
| | | 85 | 4.25 | +22(Ref) | Startup | 5 499 915 823 | -84 177 | -0.001 53 |
| | | | | | 2 minutes | 5 499 916 042 | -83 958 | -0.001 53 |
| | | | | | 5 minutes | 5 499 916 256 | -83 744 | -0.001 52 |
| | | | | | 10 minutes | 5 499 916 498 | -83 502 | -0.001 52 |
| | | 115 | 5.75 | +22(Ref) | Startup | 5 499 917 624 | -82 376 | -0.001 50 |
| | | | | | 2 minutes | 5 499 917 839 | -82 161 | -0.001 49 |
| | | | | | 5 minutes | 5 499 918 055 | -81 945 | -0.001 49 |
| | | | | | 10 minutes | 5 499 918 236 | -81 764 | -0.001 49 |

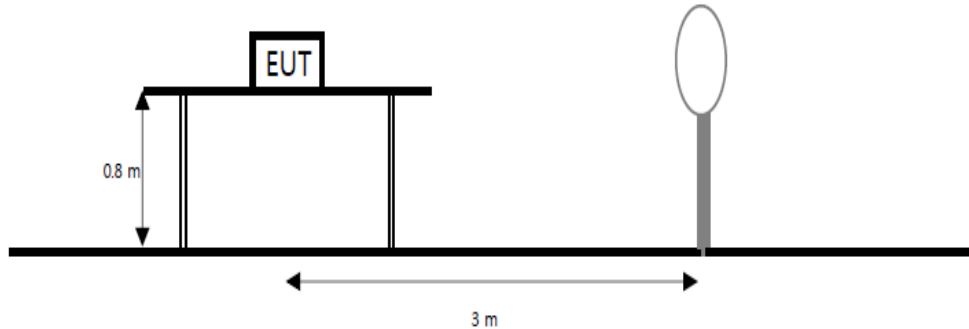
Test mode : UNII-3Frequency(Hz) : 5 745 000 000

| Voltage | Voltage | TEMP | Maintaining time | Measure frequency | Frequency deviation | Deviation | | |
|---------|---------|----------|------------------|-------------------|---------------------|---------------|---------|-----------|
| [%] | [V] | [°C] | | [Hz] | [Hz] | [%] | | |
| 100 | 5 | +22(Ref) | Startup | 5 744 916 641 | -83 359 | -0.001 45 | | |
| | | | 2 minutes | 5 744 917 095 | -82 905 | -0.001 44 | | |
| | | | 5 minutes | 5 744 918 821 | -81 179 | -0.001 41 | | |
| | | | 10 minutes | 5 744 919 516 | -80 484 | -0.001 40 | | |
| | | -30 | Startup | 5 745 005 373 | 5 373 | 0.000 09 | | |
| | | | 2 minutes | 5 745 006 155 | 6 155 | 0.000 11 | | |
| | | | 5 minutes | 5 745 006 990 | 6 990 | 0.000 12 | | |
| | | | 10 minutes | 5 745 007 695 | 7 695 | 0.000 13 | | |
| | | -20 | Startup | 5 745 009 925 | 9 925 | 0.000 17 | | |
| | | | 2 minutes | 5 745 010 288 | 10 288 | 0.000 18 | | |
| | | | 5 minutes | 5 745 010 821 | 10 821 | 0.000 19 | | |
| | | | 10 minutes | 5 745 011 394 | 11 394 | 0.000 20 | | |
| | | -10 | Startup | 5 744 968 115 | -31 885 | -0.000 56 | | |
| | | | 2 minutes | 5 744 967 784 | -32 216 | -0.000 56 | | |
| | | | 5 minutes | 5 744 967 678 | -32 322 | -0.000 56 | | |
| | | | 10 minutes | 5 744 967 475 | -32 525 | -0.000 57 | | |
| | | 0 | Startup | 5 744 966 595 | -33 405 | -0.000 58 | | |
| | | | 2 minutes | 5 744 966 284 | -33 716 | -0.000 59 | | |
| | | | 5 minutes | 5 744 965 920 | -34 080 | -0.000 59 | | |
| | | | 10 minutes | 5 744 965 530 | -34 470 | -0.000 60 | | |
| | | 10 | Startup | 5 744 942 669 | -57 331 | -0.001 00 | | |
| | | | 2 minutes | 5 744 942 290 | -57 710 | -0.001 00 | | |
| | | | 5 minutes | 5 744 941 917 | -58 083 | -0.001 01 | | |
| | | | 10 minutes | 5 744 941 398 | -58 602 | -0.001 02 | | |
| | | 20 | Startup | 5 744 923 897 | -76 103 | -0.001 32 | | |
| | | | 2 minutes | 5 744 923 515 | -76 485 | -0.001 33 | | |
| | | | 5 minutes | 5 744 923 105 | -76 895 | -0.001 34 | | |
| | | | 10 minutes | 5 744 922 784 | -77 216 | -0.001 34 | | |
| | | 30 | Startup | 5 744 918 743 | -81 257 | -0.001 41 | | |
| | | | 2 minutes | 5 744 918 290 | -81 710 | -0.001 42 | | |
| | | | 5 minutes | 5 744 917 902 | -82 098 | -0.001 43 | | |
| | | | 10 minutes | 5 744 917 481 | -82 519 | -0.001 44 | | |
| | | 40 | Startup | 5 744 924 696 | -75 304 | -0.001 31 | | |
| | | | 2 minutes | 5 744 924 930 | -75 070 | -0.001 31 | | |
| | | | 5 minutes | 5 744 925 084 | -74 916 | -0.001 30 | | |
| | | | 10 minutes | 5 744 925 439 | -74 561 | -0.001 30 | | |
| | | 50 | Startup | 5 744 934 831 | -65 169 | -0.001 13 | | |
| | | | 2 minutes | 5 744 934 965 | -65 035 | -0.001 13 | | |
| | | | 5 minutes | 5 744 935 159 | -64 841 | -0.001 13 | | |
| | | | 10 minutes | 5 744 935 381 | -64 619 | -0.001 12 | | |
| | | 85 | 4.25 | +22(Ref) | Startup | 5 744 915 665 | -84 335 | -0.001 47 |
| | | | | | 2 minutes | 5 744 915 884 | -84 116 | -0.001 46 |
| | | | | | 5 minutes | 5 744 916 098 | -83 902 | -0.001 46 |
| | | | | | 10 minutes | 5 744 916 340 | -83 660 | -0.001 46 |
| | | 115 | 5.75 | +22(Ref) | Startup | 5 744 917 466 | -82 534 | -0.001 44 |
| | | | | | 2 minutes | 5 744 917 681 | -82 319 | -0.001 43 |
| | | | | | 5 minutes | 5 744 917 897 | -82 103 | -0.001 43 |
| | | | | | 10 minutes | 5 744 918 078 | -81 922 | -0.001 43 |

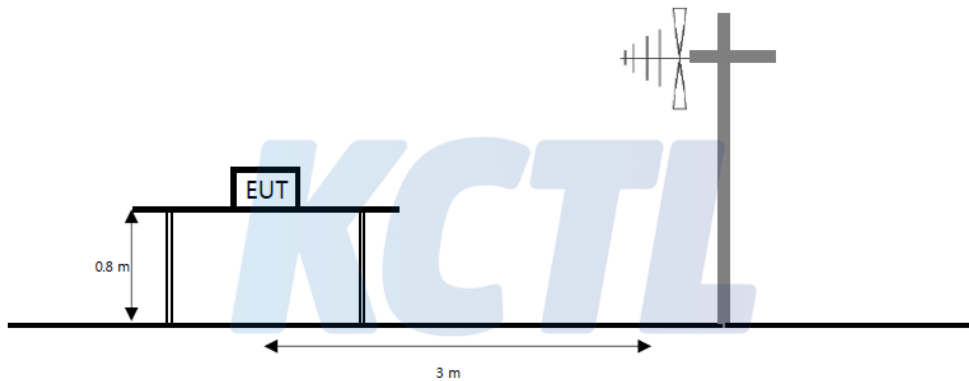
7.3. Spurious Emission, Band Edge and Restricted bands

Test setup

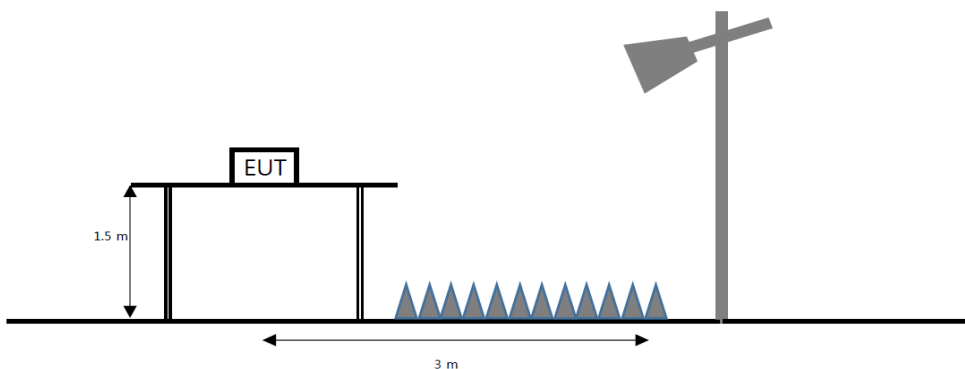
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz emissions, whichever is lower.



Limit

According to section 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 ($\mu\text{V}/\text{m}$) | Measurement distance (m) |
|-----------------|---|--------------------------|
| 0.009 - 0.490 | 2 400/F(kHz) | 300 |
| 0.490 - 1.705 | 24 000/F(kHz) | 30 |
| 1.705 - 30 | 30 | 30 |
| 30 - 88 | 100** | 3 |
| 88 - 216 | 150** | 3 |
| 216 - 960 | 200** | 3 |
| Above 960 | 500 | 3 |

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

According to section 15.205(a) and (b) only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|-----------------------|-----------------------|-------------------|---------------|
| 0.009 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| 0.495 - 0.505 | 16.694 75 - 16.695 25 | 608 - 614 | 5.35 - 5.46 |
| 2.173 5 - 2.190 5 | 16.804 25 - 16.804 75 | 960 - 1 240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1 300 - 1 427 | 8.025 - 8.5 |
| 4.177 25 - 4.177 75 | 37.5 - 38.25 | 1 435 - 1 626.5 | 9.0 - 9.2 |
| 4.207 25 - 4.207 75 | 73 - 74.6 | 1 645.5 - 1 646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1 660 - 1 710 | 10.6 - 12.7 |
| 6.267 75 - 6.268 25 | 108 - 121.94 | 1 718.8 - 1 722.2 | 13.25 - 13.4 |
| 6.311 75 - 6.312 25 | 123 - 138 | 2 200 - 2 300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2 310 - 2 390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.524 75 - 156.525 | 2 483.5 - 2 500 | 17.7 - 21.4 |
| 8.376 25 - 8.386 75 | 25 | 2 690 - 2 900 | 22.01 - 23.12 |
| 8.414 25 - 8.414 75 | 156.7 - 156.9 | 3 260 - 3 267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 162.012 5 - 167.17 | 3 332 - 3 339 | 31.2 - 31.8 |
| 12.519 75 - 12.520 25 | 167.72 - 173.2 | 3 345.8 - 3 358 | 36.43 - 36.5 |
| 12.576 75 - 12.577 25 | 240 - 285 | 3 600 - 4 400 | Above 38.6 |
| 13.36 - 13.41 | 322 - 335.4 | | |

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in section 15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 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.

According to section 15.407(b), undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz

For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

KCTL

Test procedureANSI C63.10-2013 Section 12.7.7.2, 12.7.5, 12.7.6
KDB 789033 D02 v02r01 – Section G**Test settings****Peak field strength measurements**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW \geq (3 \times RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

| Frequency | RBW |
|---------------------|--------------------|
| 9 kHz to 150 kHz | 200 Hz to 300 Hz |
| 0.15 MHz to 30 MHz | 9 kHz to 10 kHz |
| 30 MHz to 1 000 MHz | 100 kHz to 120 kHz |
| > 1 000 MHz | 1 MHz |

Average field strength measurements**Trace averaging with continuous EUT transmission at full power**

If the EUT can be configured or modified to transmit continuously (D \geq 98%), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

1. RBW = 1 MHz (unless otherwise specified).
2. VBW \geq (3 \times RBW).
3. Detector = RMS (power averaging), if [span / (# of points in sweep)] \leq (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
4. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT (D \geq 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than $\pm 2\%$), then the following procedure shall be used:

1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 MHz (unless otherwise specified).
4. VBW \geq [3 \times RBW].
5. Detector = RMS (power averaging), if [span / (# of points in sweep)] \leq (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this

condition cannot be satisfied, then the detector mode shall be set to peak.

6. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
7. Sweep time = auto.
8. Perform a trace average of at least 100 traces.
9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (rms) mode was used in step f), then the applicable correction factor is $[10 \log (1 / D)]$, where D is the duty cycle.
 - 2) If linear voltage averaging mode was used in step f), then the applicable correction factor is $[20 \log (1 / D)]$, where D is the duty cycle.
 - 3) If a specific emission is demonstrated to be continuous ($D \geq 98\%$) rather than turning ON and OFF with with the transmit cycle, then no duty cycle correction is required for that emission.

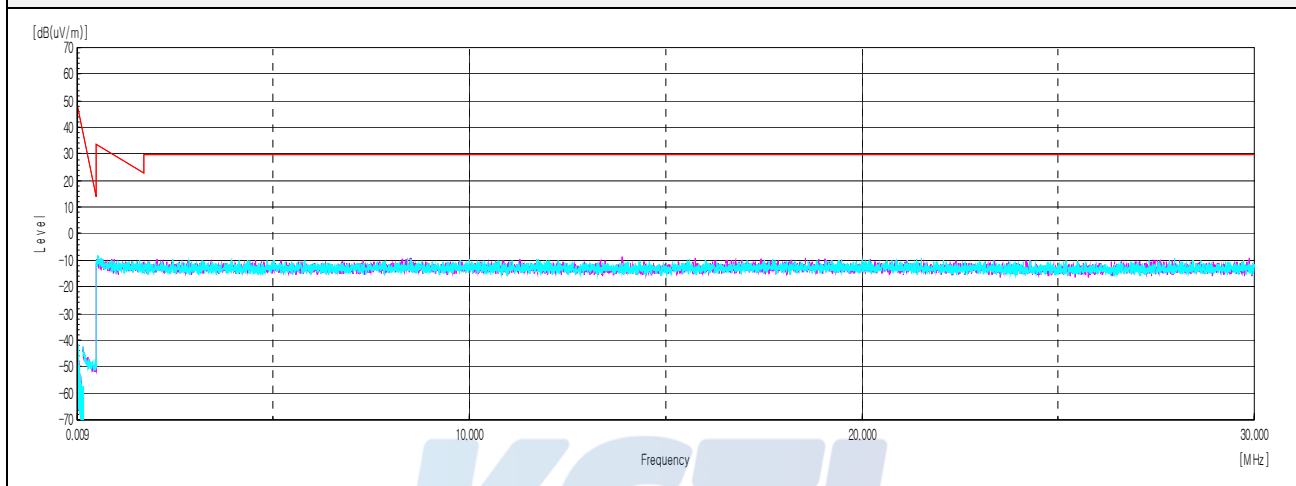
Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz ($\geq 1/T$) for Average detection (AV) at frequency above 1 GHz. (where T = pulse width)
2. $f < 30$ MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40 \log(D_m/D_s)$
 $f \geq 30$ MHz, extrapolation factor of 20 dB/decade of distance. $F_d = 20 \log(D_m/D_s)$
Where:
 F_d = Distance factor in dB
 D_m = Measurement distance in meters
 D_s = Specification distance in meters
3. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d (dB)
4. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
5. Average test would be performed if the peak result were greater than the average limit.
6. ¹⁾ means restricted band.
7. According to part 15.31(f)(2), an extrapolation factor of 40 dB/decade is applied because measured distance of radiated emission is 3 m.
8. Below 30 MHz frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 dB of the limit, then the following statement shall be made: "No spurious emissions were detected within 20 dB of the limit."

Test results (Below 30 MHz) – Worst case: 802.11a / UNII-2A High frequency

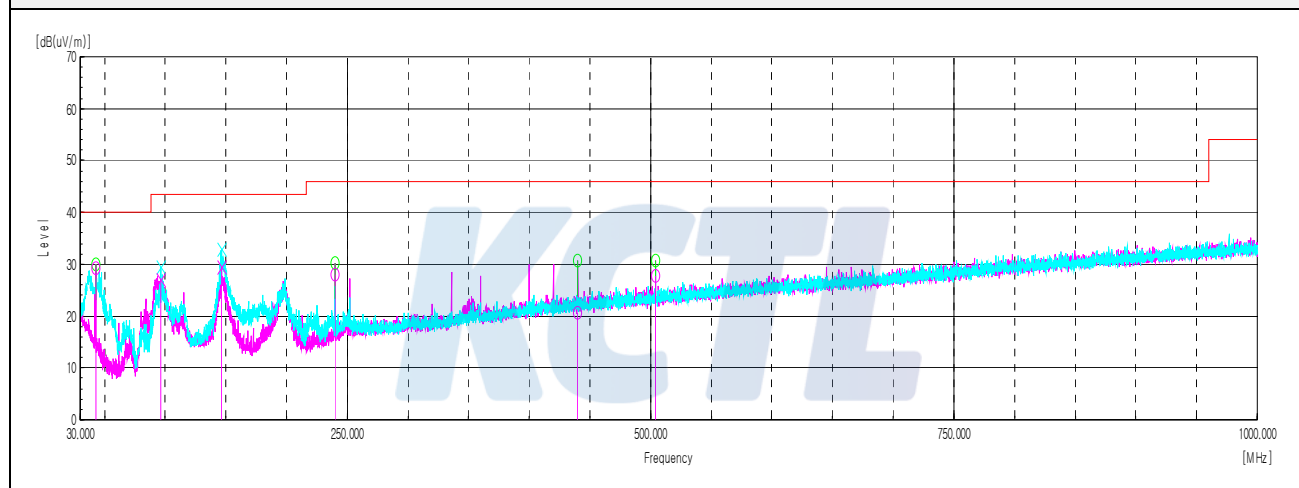
| Frequency | Pol. | Reading | Ant. Factor | Amp.+Cable | DCF | Result | Limit | Margin |
|-----------|-------|----------------|-------------|------------|------|------------------|------------------|--------|
| (MHz) | (V/H) | (dB(μ V)) | (dB) | (dB) | (dB) | (dB(μ V/m)) | (dB(μ V/m)) | (dB) |

No spurious emissions were detected within 20 dB of the limit.

Horizontal/Vertical**KCTL**

Test results (Below 1 000 MHz) – Worst case: 802.11a / UNII-2A High frequency

| Frequency | Pol. | Reading | Ant. Factor | Amp.+Cable | DCF | Result | Limit | Margin |
|------------------------|-------|----------------|-------------|------------|------|------------------|------------------|--------|
| (MHz) | (V/H) | (dB(μ V)) | (dB) | (dB) | (dB) | (dB(μ V/m)) | (dB(μ V/m)) | (dB) |
| Quasi peak data | | | | | | | | |
| 42.731 | H | 41.3 | 18.17 | -30.29 | - | 29.18 | 40.00 | 10.82 |
| 96.203 | V | 39.8 | 16.32 | -29.24 | - | 26.88 | 43.50 | 16.62 |
| 146.400 | V | 40.6 | 17.19 | -28.47 | - | 29.32 | 43.50 | 14.18 |
| 240.005 ¹⁾ | H | 37.4 | 17.60 | -27.39 | - | 27.61 | 46.00 | 18.39 |
| 440.068 | H | 23.2 | 23.00 | -25.52 | - | 20.68 | 46.00 | 25.32 |
| 503.966 | H | 29 | 23.82 | -25.00 | - | 27.82 | 46.00 | 18.18 |

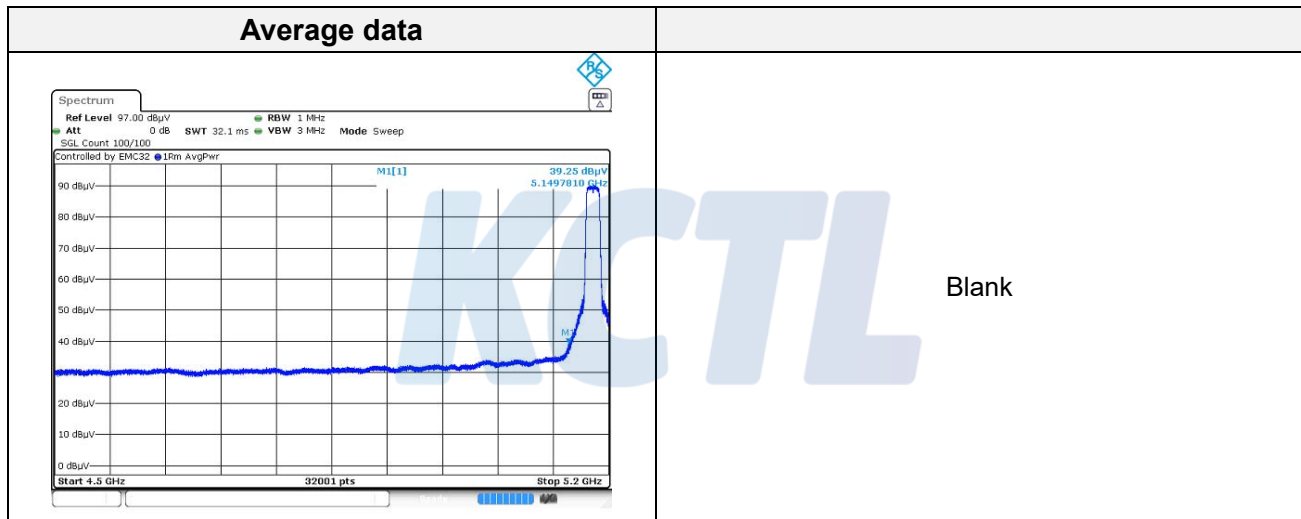
Horizontal/Vertical

Test results (Above 1 000 MHz)

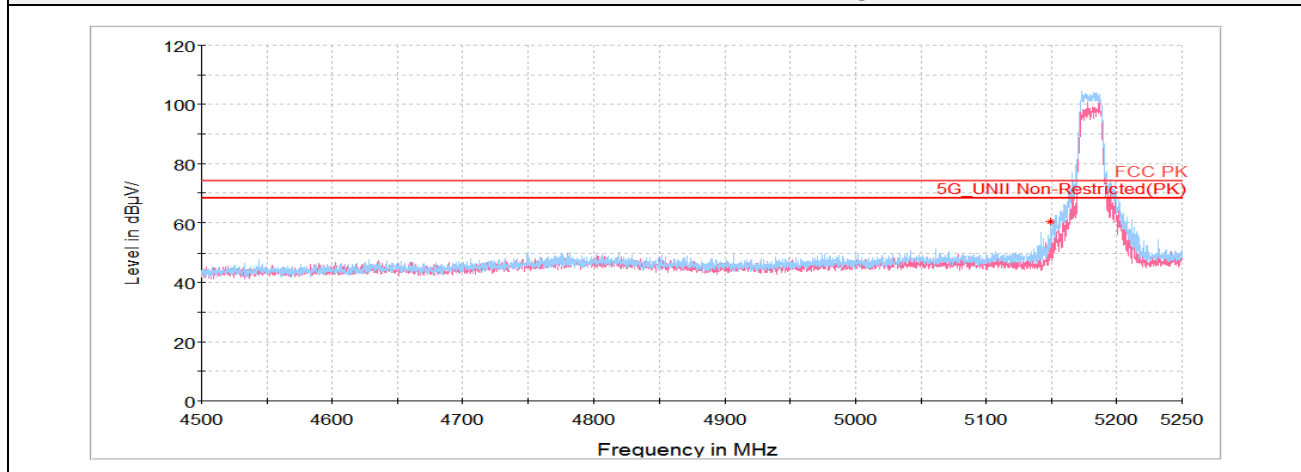
802.11a UNII-1

Lowest Channel (5 180 MHz)

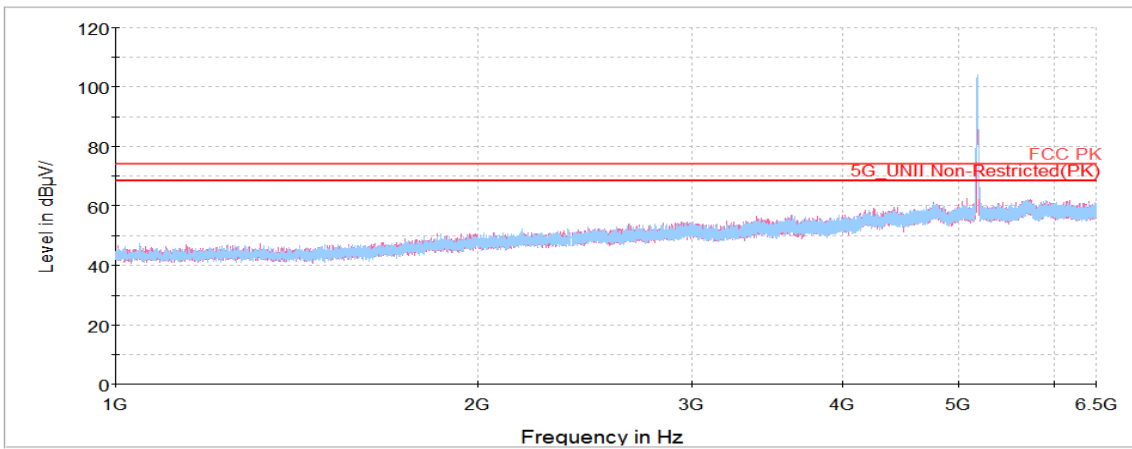
| Frequency | Pol. | Reading | Ant. Factor | Amp.+Cable | DCF | Result | Limit | Margin |
|------------------------|-------|----------|-------------|------------|------|------------|------------|--------|
| (MHz) | (V/H) | (dB(μV)) | (dB) | (dB) | (dB) | (dB(μV/m)) | (dB(μV/m)) | (dB) |
| Peak data | | | | | | | | |
| 5 149.78 ¹⁾ | H | 53.14 | 34.24 | -27.12 | - | 60.26 | 74.00 | 13.74 |
| 10 347.11 | H | 58.74 | 37.25 | -52.01 | - | 43.98 | 68.20 | 24.22 |
| 16 573.28 | V | 57.00 | 41.57 | -45.41 | - | 53.16 | 68.20 | 15.04 |
| Average Data | | | | | | | | |
| 5 149.78 ¹⁾ | H | 39.25 | 34.24 | -27.12 | - | 46.37 | 54.00 | 7.63 |



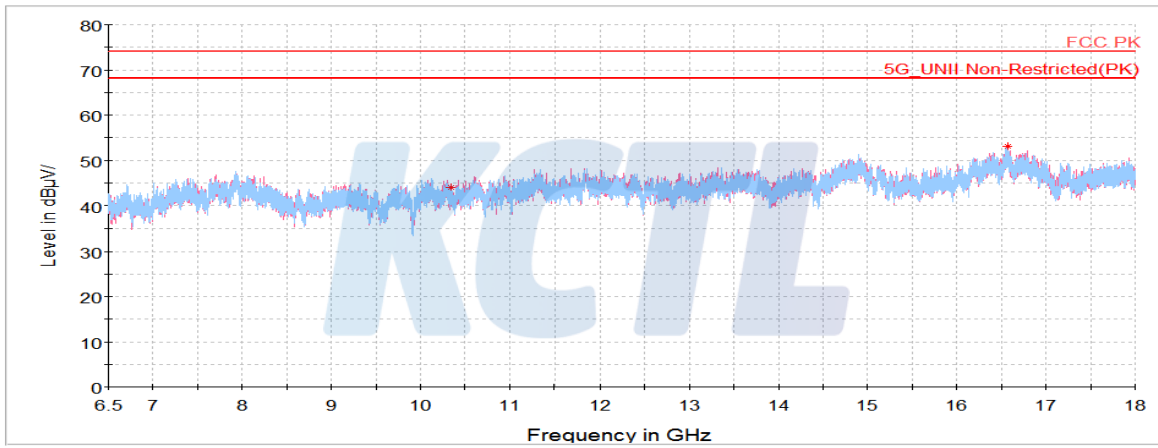
Horizontal/Vertical for Band-edge



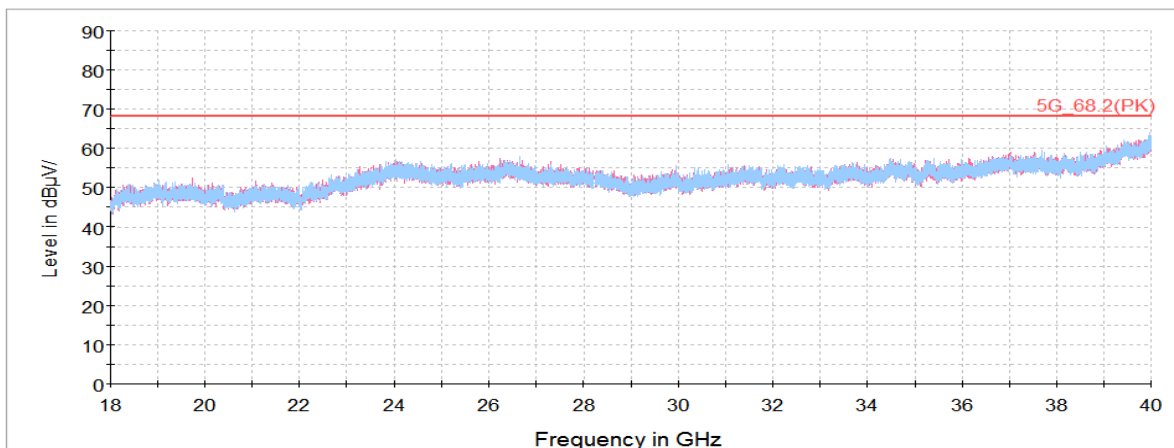
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

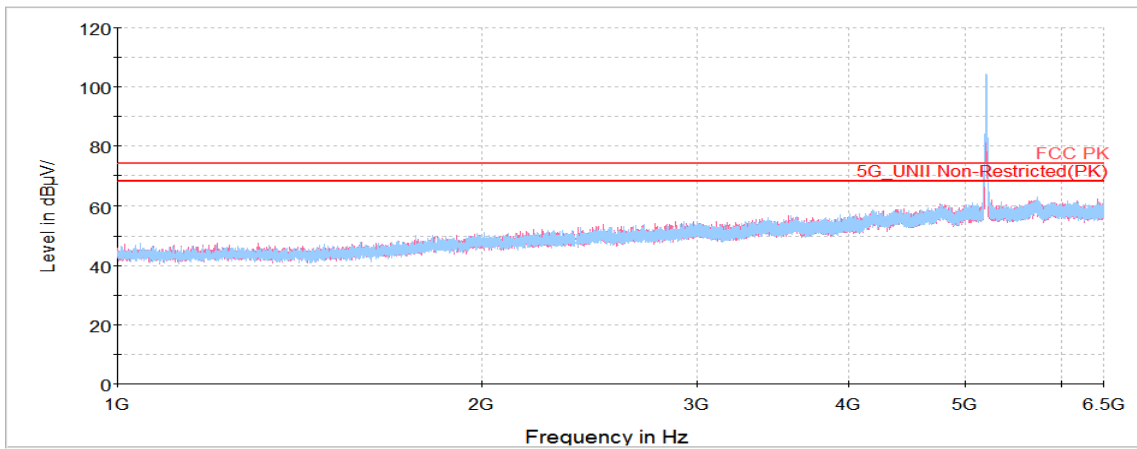


Middle Channel (5 200 MHz)

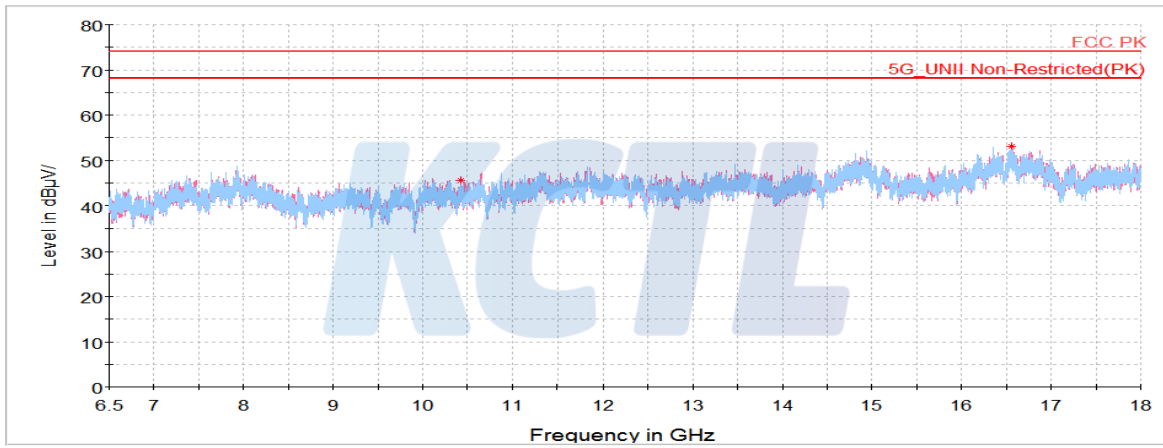
| Frequency | Pol. | Reading | Ant. Factor | Amp.+Cable | DCF | Result | Limit | Margin |
|---|-------|----------------|-------------|------------|------|------------------|------------------|--------|
| (MHz) | (V/H) | (dB(μ V)) | (dB) | (dB) | (dB) | (dB(μ V/m)) | (dB(μ V/m)) | (dB) |
| Peak data | | | | | | | | |
| 10 419.70 | V | 60.07 | 37.32 | -51.85 | - | 45.54 | 68.20 | 22.66 |
| 16 553.52 | V | 56.86 | 41.55 | -45.33 | - | 53.08 | 68.20 | 15.12 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit | | | | | | | | |

KCTL

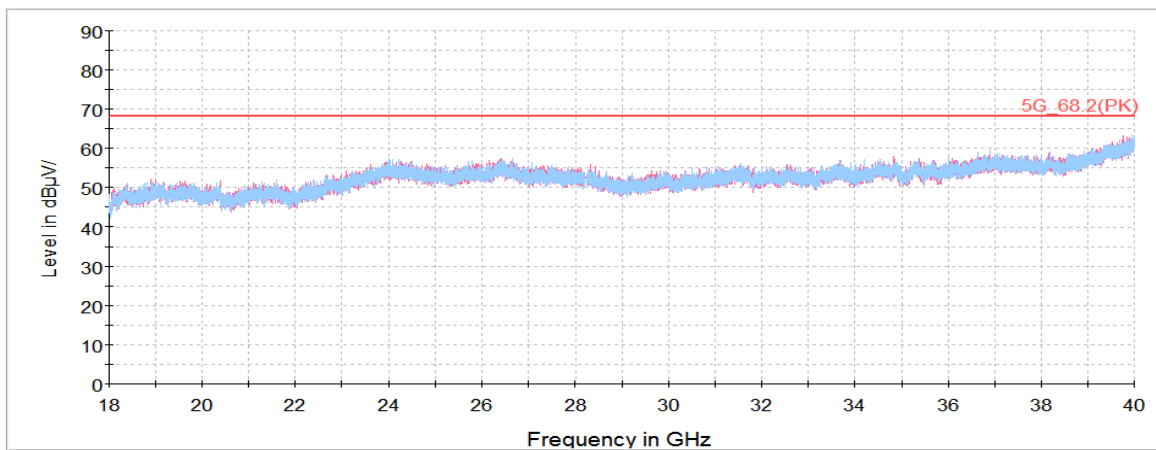
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

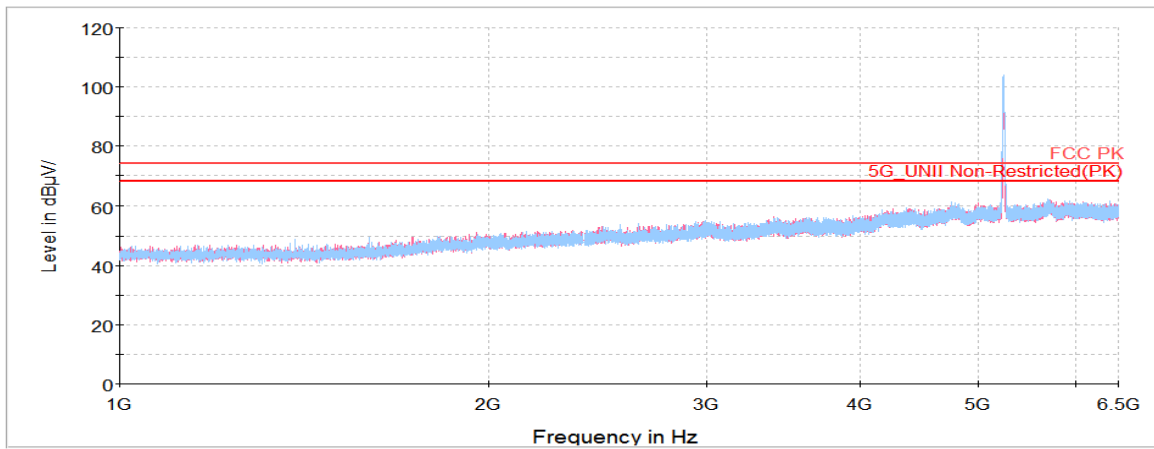


Highest Channel (5 240 MHz)

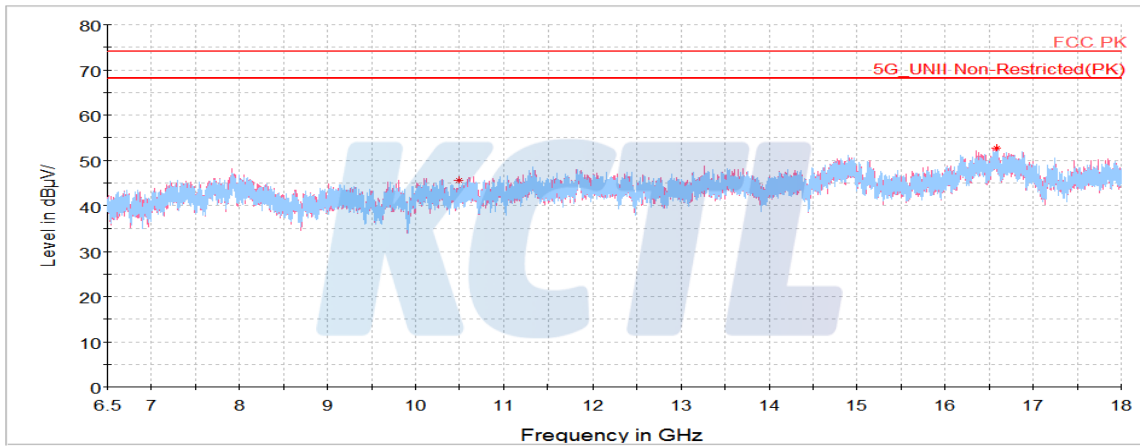
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 10 499.84 | H | 59.84 | 37.40 | -51.67 | - | 45.57 | 68.20 | 22.63 |
| 16 587.30 | H | 56.63 | 41.59 | -45.46 | - | 52.76 | 68.20 | 15.44 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

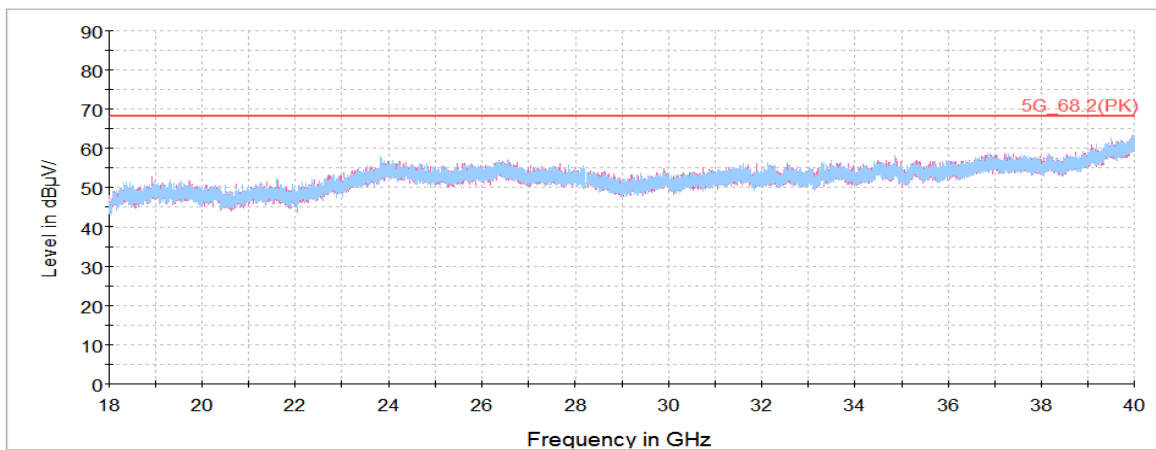
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



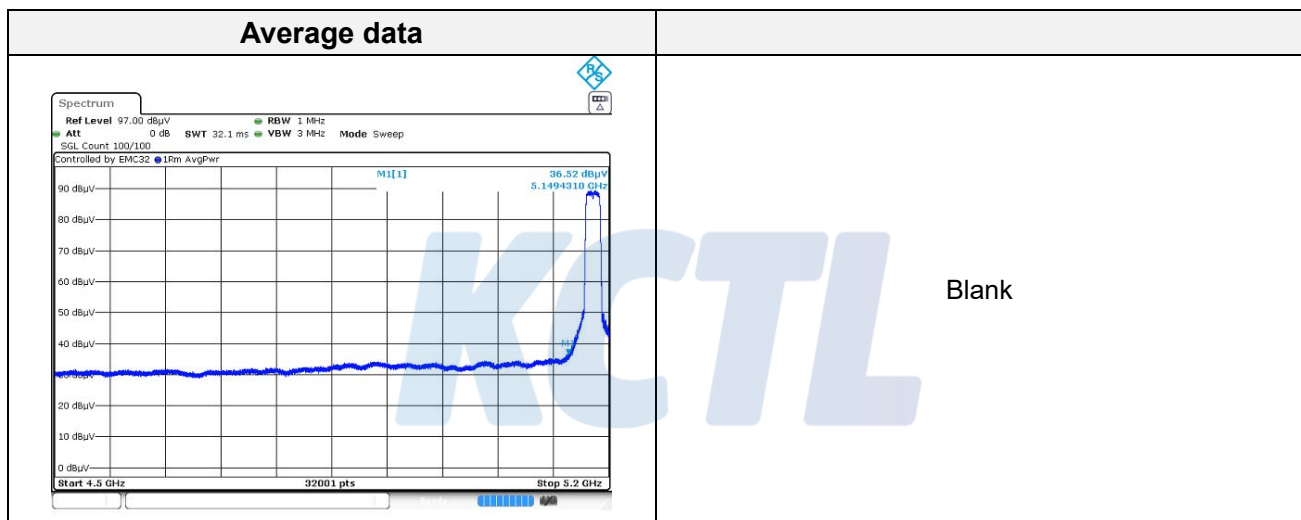
Horizontal/Vertical for 18 GHz ~ 40 GHz



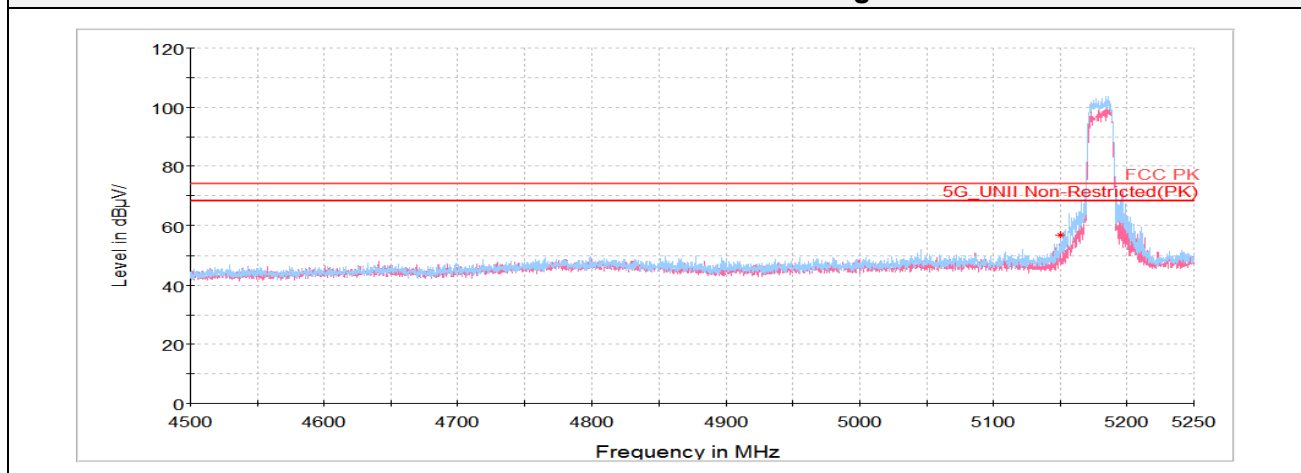
802.11n HT20 UNII-1

Lowest Channel (5 180 MHz)

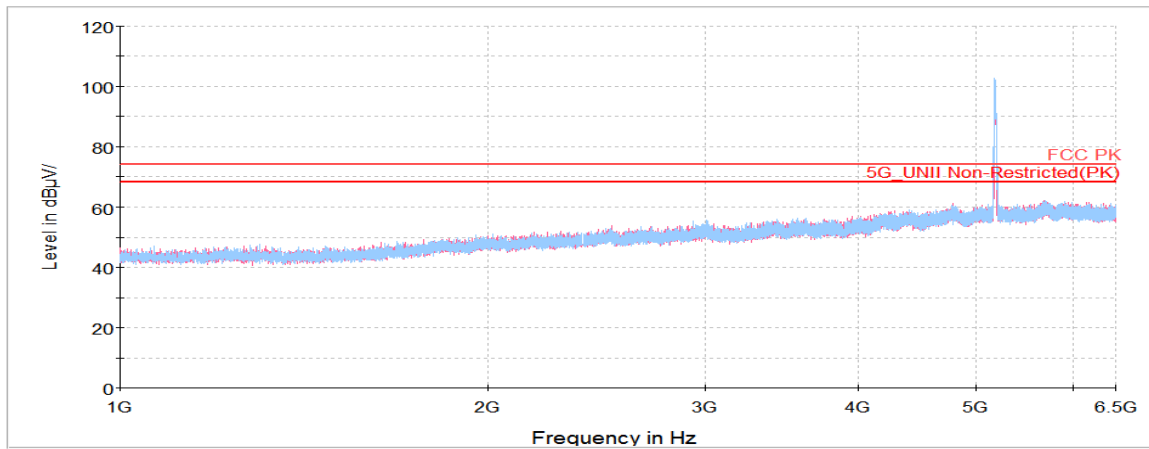
| Frequency | Pol. | Reading | Ant. Factor | Amp.+Cable | DCF | Result | Limit | Margin |
|------------------------|-------|----------|-------------|------------|------|------------|------------|--------|
| (MHz) | (V/H) | (dB(μV)) | (dB) | (dB) | (dB) | (dB(μV/m)) | (dB(μV/m)) | (dB) |
| Peak data | | | | | | | | |
| 5 149.43 ¹⁾ | H | 49.60 | 34.24 | -27.12 | - | 56.72 | 74.00 | 17.28 |
| 10 412.88 | V | 60.54 | 37.31 | -51.86 | - | 45.99 | 68.20 | 22.21 |
| 16 584.06 | V | 57.86 | 41.58 | -45.45 | - | 53.99 | 68.20 | 14.21 |
| Average Data | | | | | | | | |
| 5 149.43 ¹⁾ | H | 36.52 | 34.24 | -27.12 | - | 43.64 | 54.00 | 10.36 |



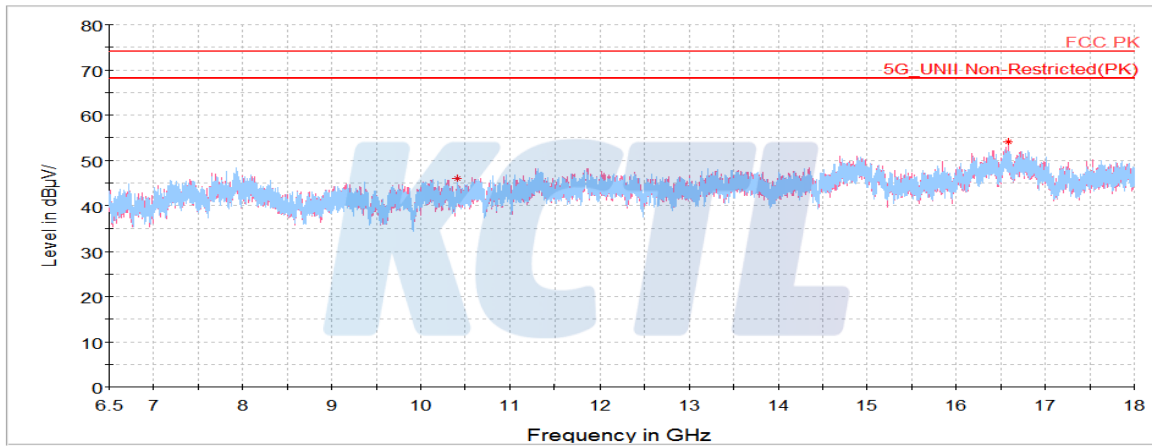
Horizontal/Vertical for Band-edge



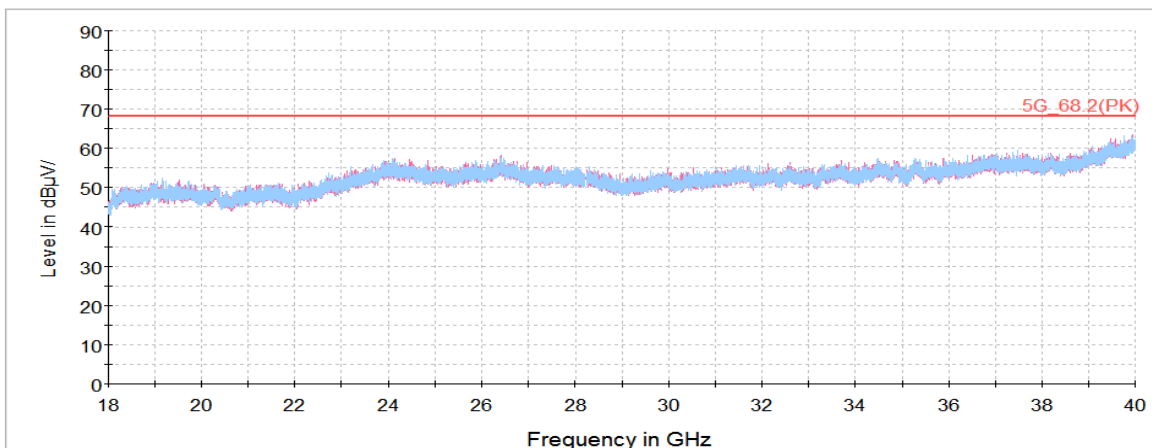
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

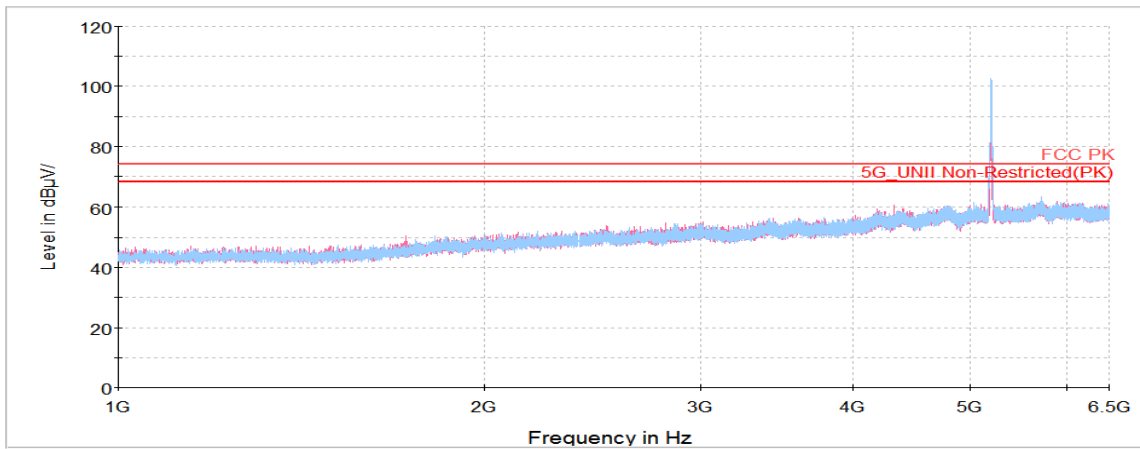


Middle Channel (5 200 MHz)

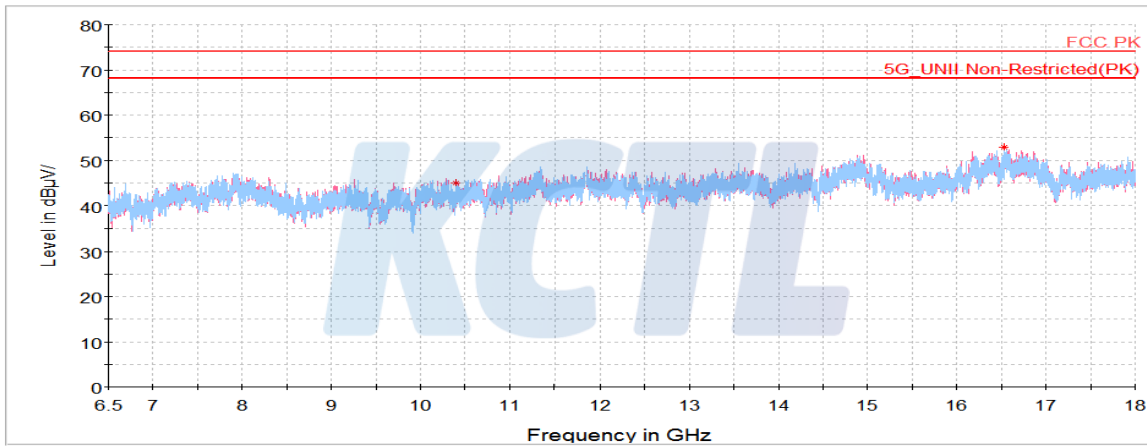
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|---|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 10 401.38 | H | 59.47 | 37.30 | -51.89 | - | 44.88 | 68.20 | 23.32 |
| 16 528.36 | V | 56.67 | 41.53 | -45.24 | - | 52.96 | 68.20 | 15.24 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit | | | | | | | | |

KCTL

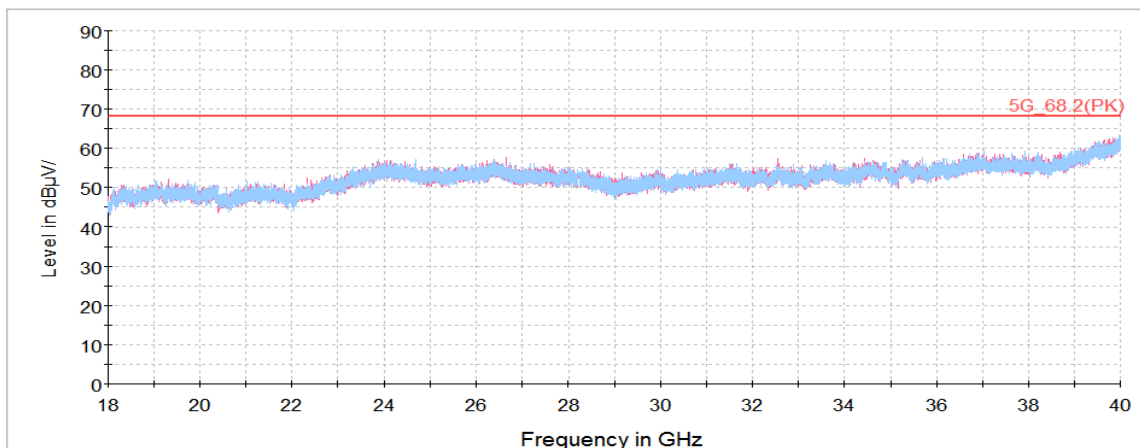
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

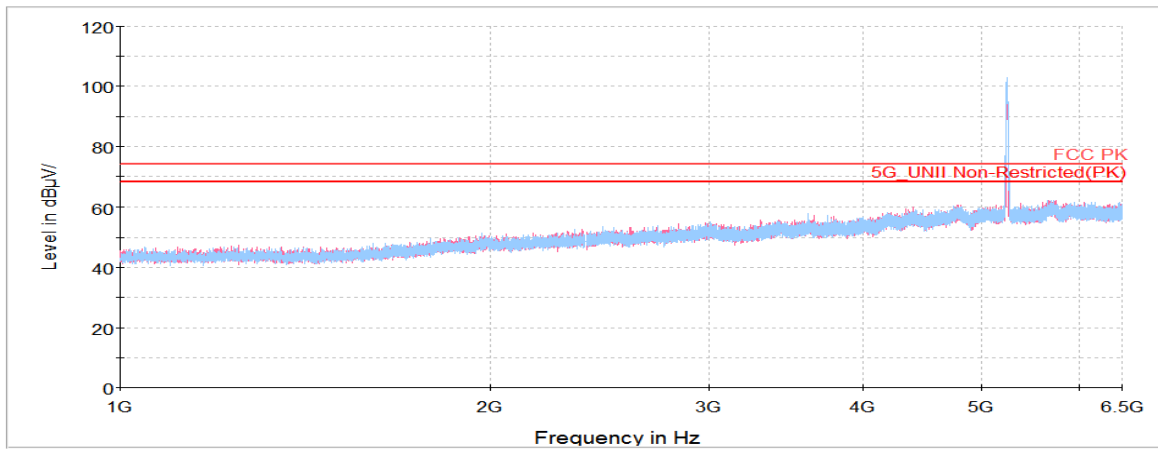


Highest Channel (5 240 MHz)

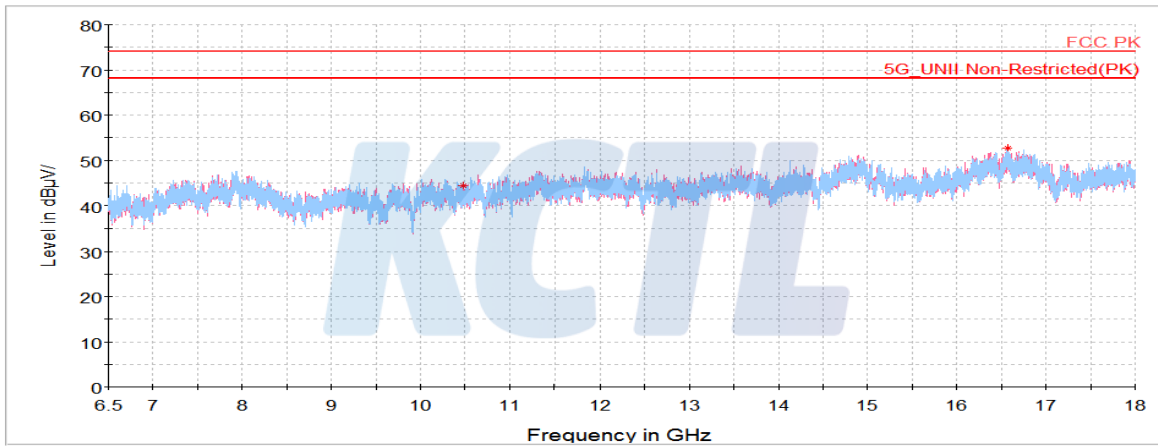
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 10 478.28 | V | 58.65 | 37.38 | -51.71 | - | 44.32 | 68.20 | 23.88 |
| 16 567.17 | H | 56.58 | 41.57 | -45.38 | - | 52.77 | 68.20 | 15.43 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

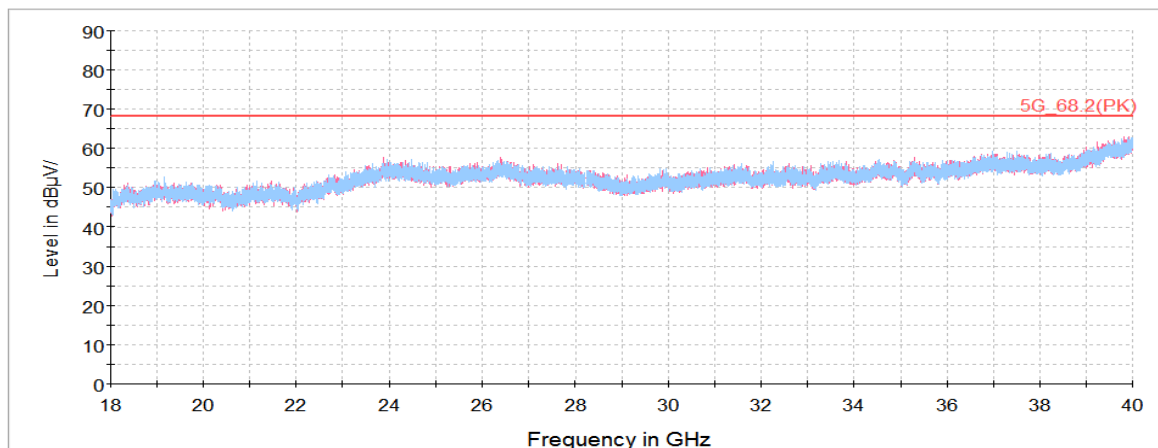
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

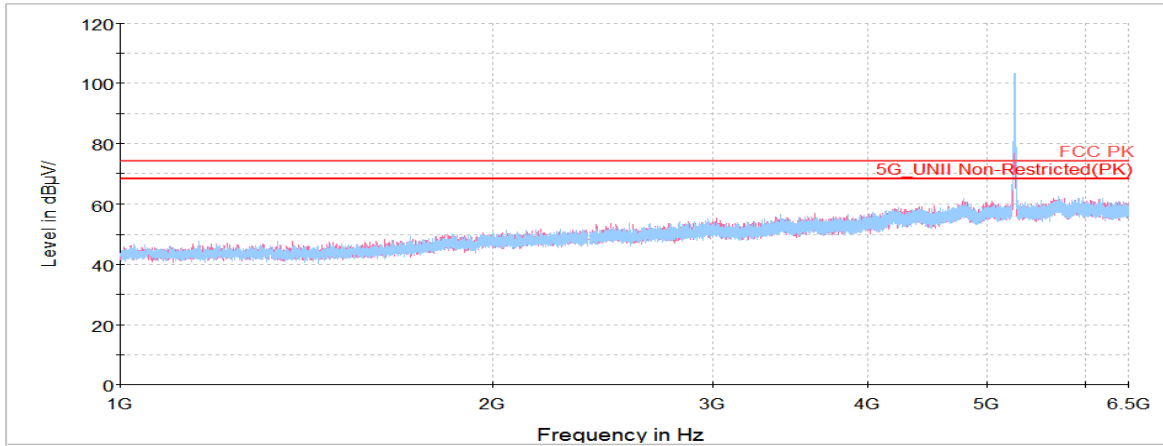


802.11a UNII-2A**Lowest Channel (5 260 MHz)**

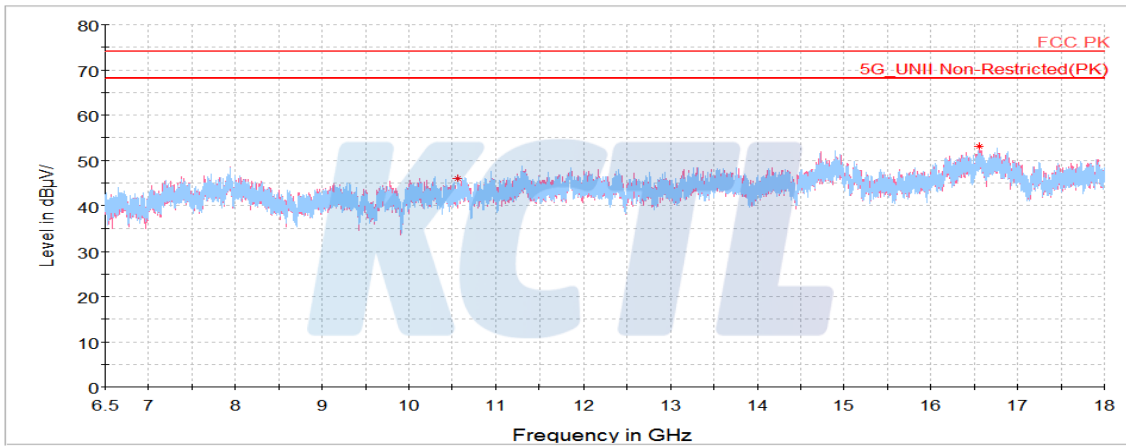
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 10 567.77 | H | 60.19 | 37.44 | -51.70 | - | 45.93 | 68.20 | 22.27 |
| 16 564.30 | V | 56.97 | 41.56 | -45.37 | - | 53.16 | 68.20 | 15.04 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

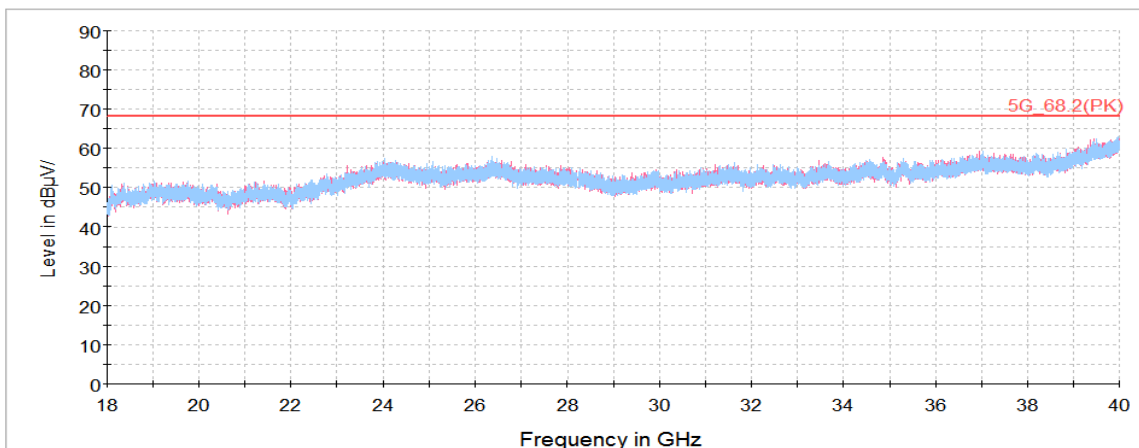
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

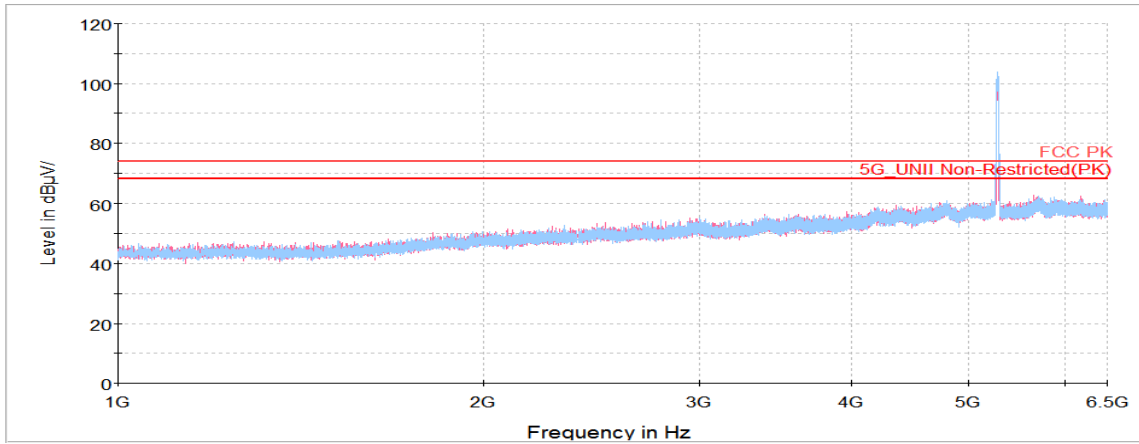


Middle Channel (5 280 MHz)

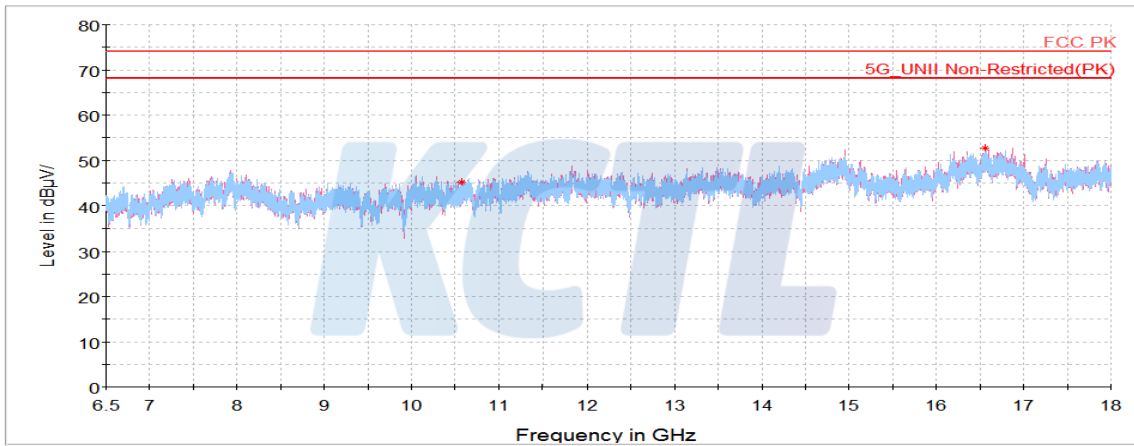
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 10 577.11 | H | 59.50 | 37.45 | -51.70 | - | 45.25 | 68.20 | 22.95 |
| 16 565.73 | H | 56.51 | 41.57 | -45.38 | - | 52.70 | 68.20 | 15.50 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

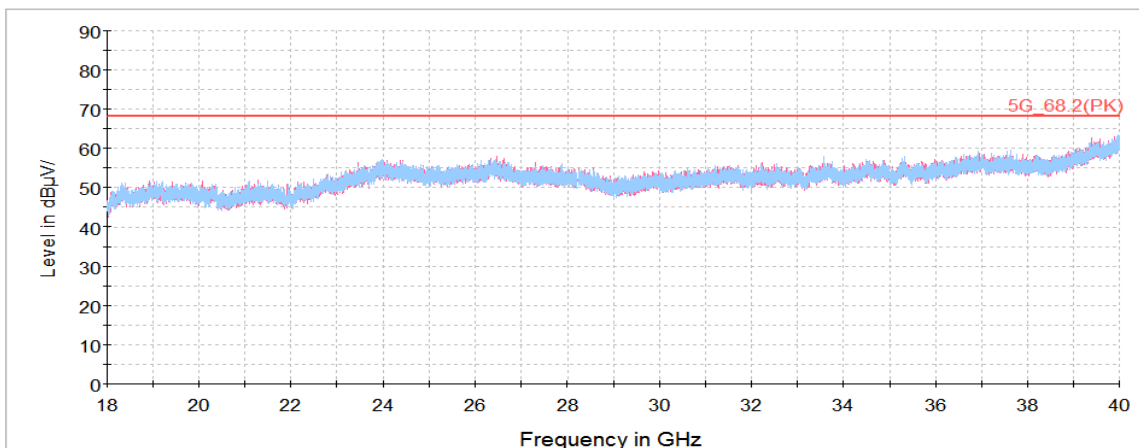
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



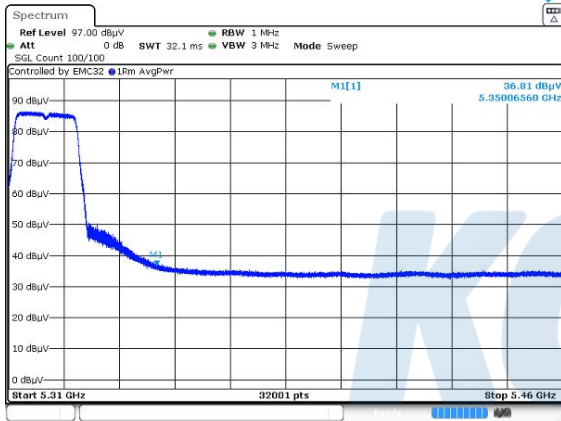
Horizontal/Vertical for 18 GHz ~ 40 GHz



Highest Channel (5 320 MHz)

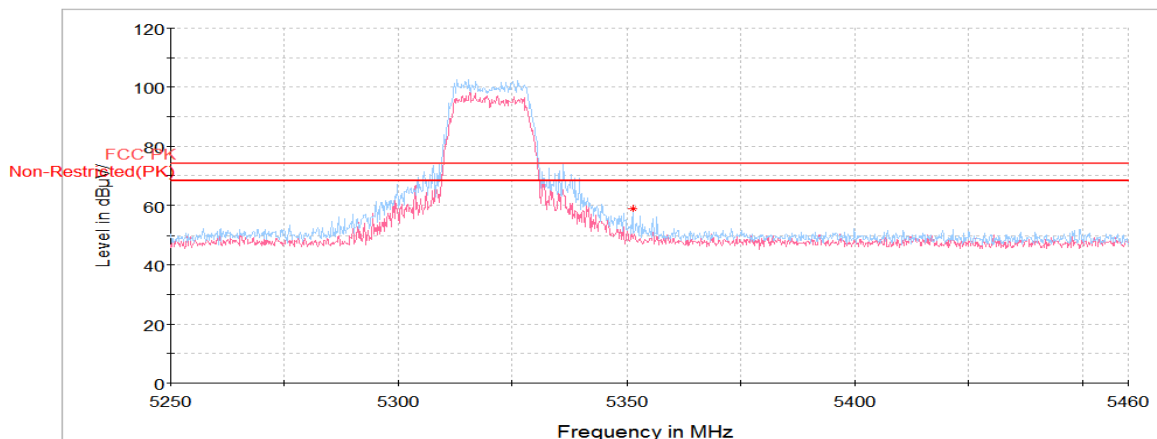
| Frequency | Pol. | Reading | Ant. Factor | Amp.+Cable | DCF | Result | Limit | Margin |
|-------------------------|-------|----------|-------------|------------|------|------------|------------|--------|
| (MHz) | (V/H) | (dB(μV)) | (dB) | (dB) | (dB) | (dB(μV/m)) | (dB(μV/m)) | (dB) |
| Peak data | | | | | | | | |
| 5 350.07 ¹⁾ | H | 50.99 | 34.56 | -26.84 | - | 58.71 | 74.00 | 15.29 |
| 10 654.02 ¹⁾ | H | 60.77 | 37.49 | -51.74 | - | 46.52 | 74.00 | 27.48 |
| 16 767.70 | H | 57.58 | 41.77 | -46.12 | - | 53.23 | 68.20 | 14.97 |
| Average Data | | | | | | | | |
| 5 350.07 ¹⁾ | H | 36.81 | 34.56 | -26.84 | - | 44.53 | 54.00 | 9.47 |

Average data

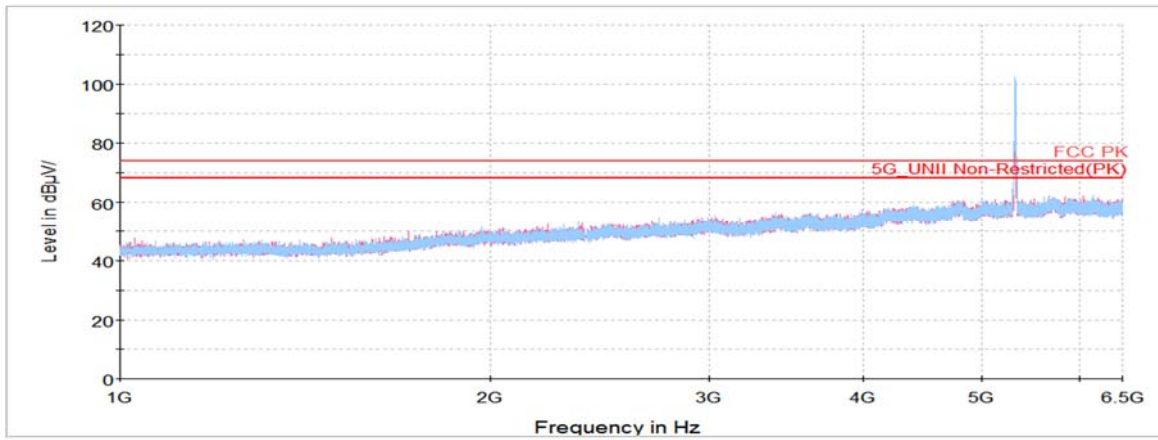


Blank

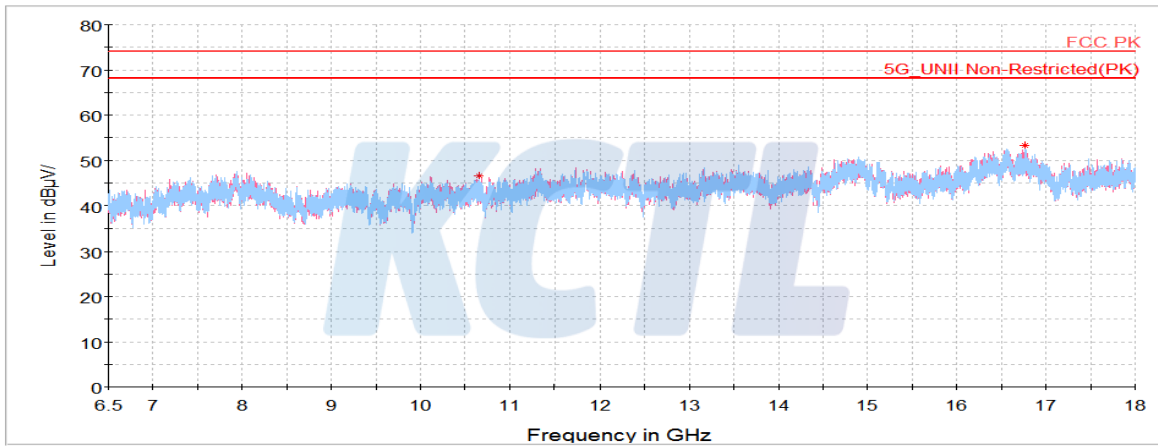
Horizontal/Vertical for Band-edge



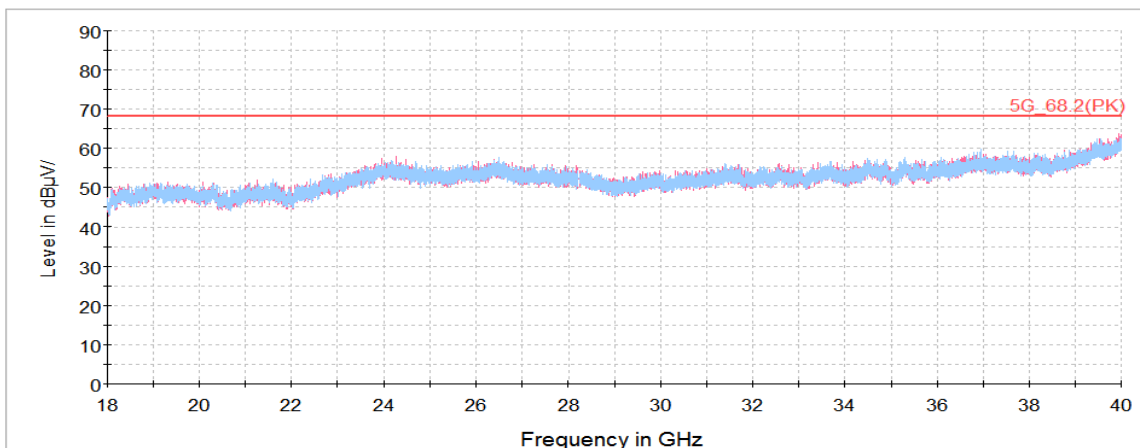
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

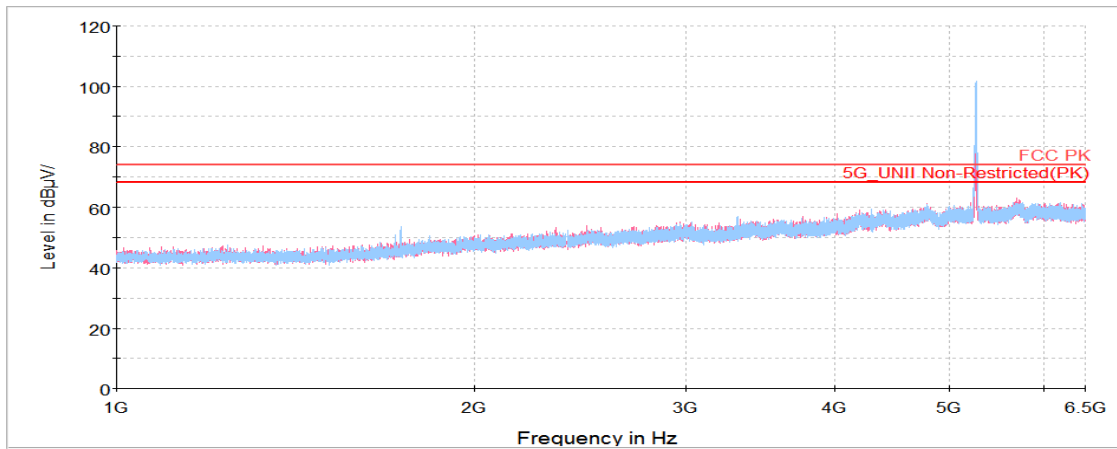


802.11n HT20 UNII-2A**Lowest Channel (5 260 MHz)**

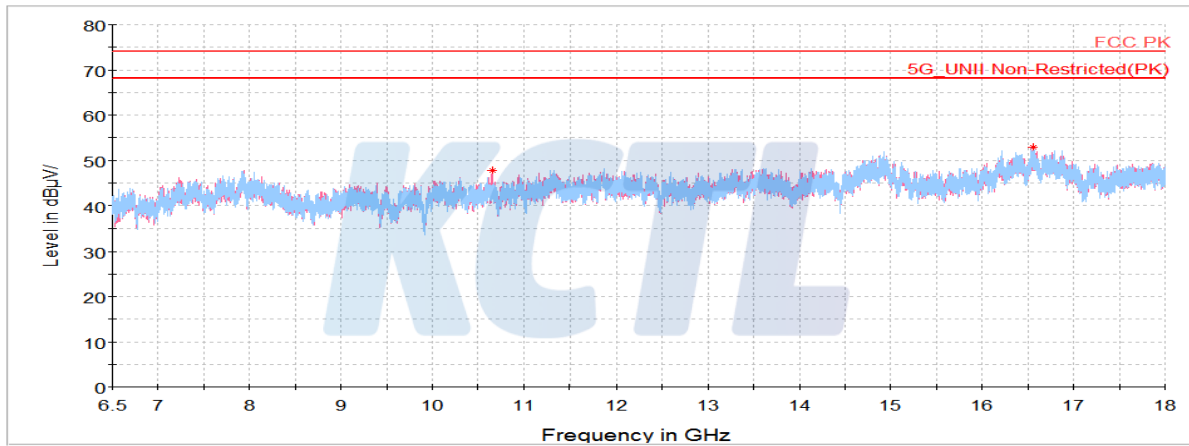
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 10 651.50 ¹⁾ | V | 61.90 | 37.49 | -51.74 | - | 47.65 | 74.00 | 26.35 |
| 16 552.80 | V | 56.65 | 41.55 | -45.33 | - | 52.87 | 68.20 | 15.33 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

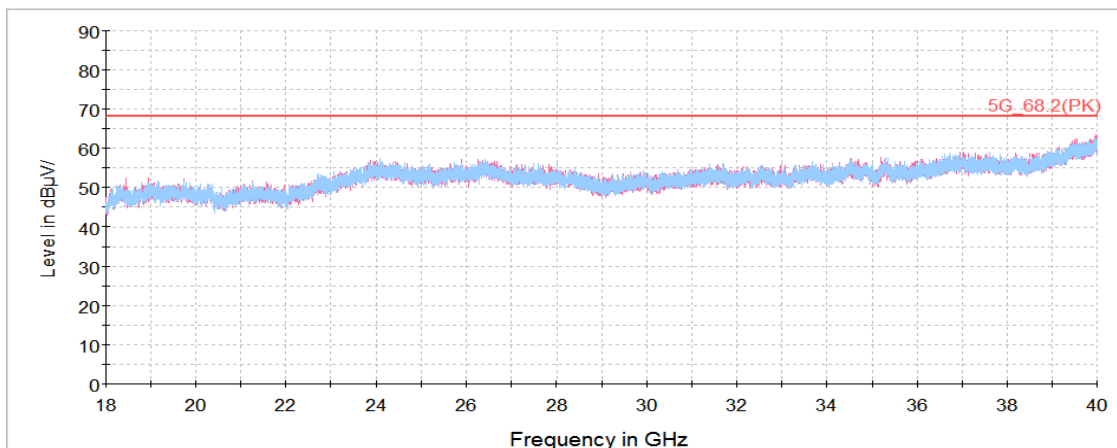
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

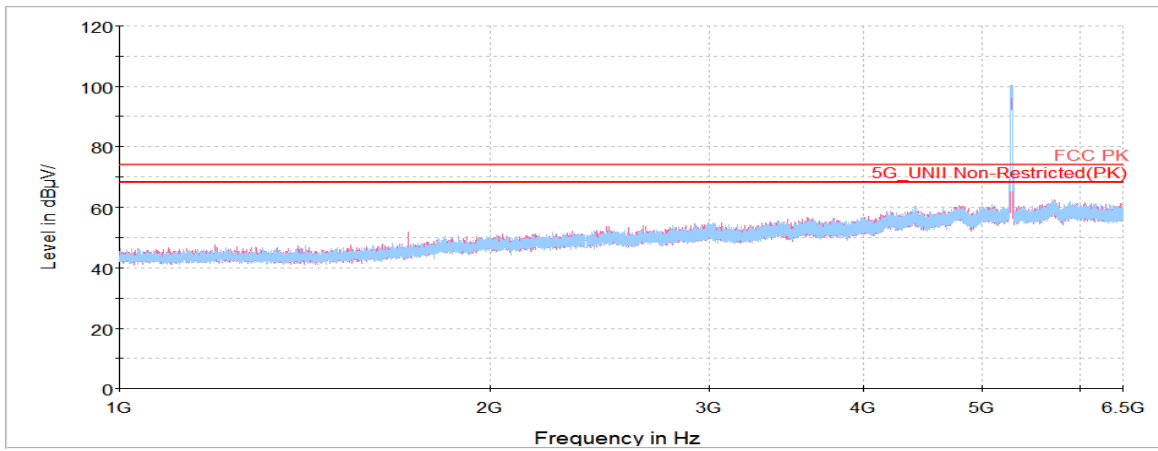


Middle Channel (5 280 MHz)

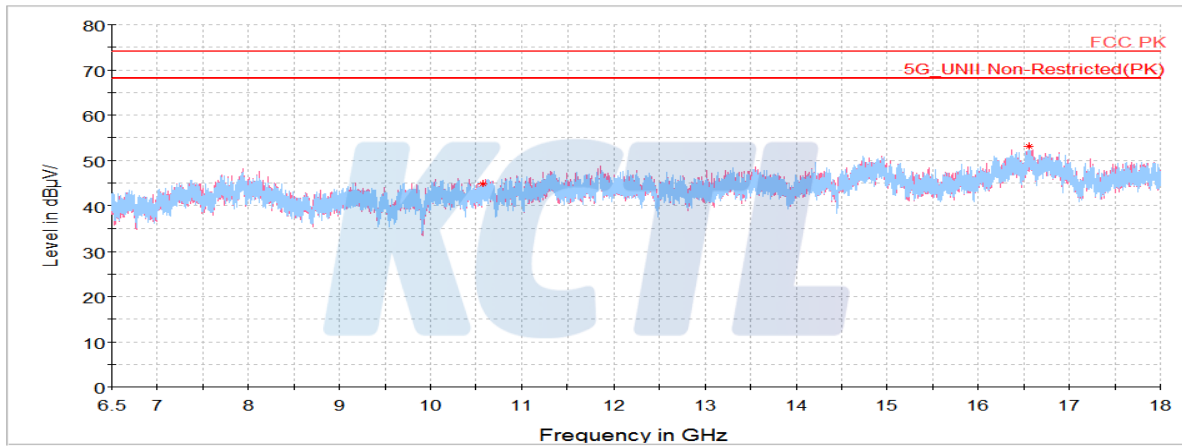
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 10 571.72 | H | 59.11 | 37.44 | -51.70 | - | 44.85 | 68.20 | 23.35 |
| 16 558.19 | H | 56.77 | 41.56 | -45.35 | - | 52.98 | 68.20 | 15.22 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

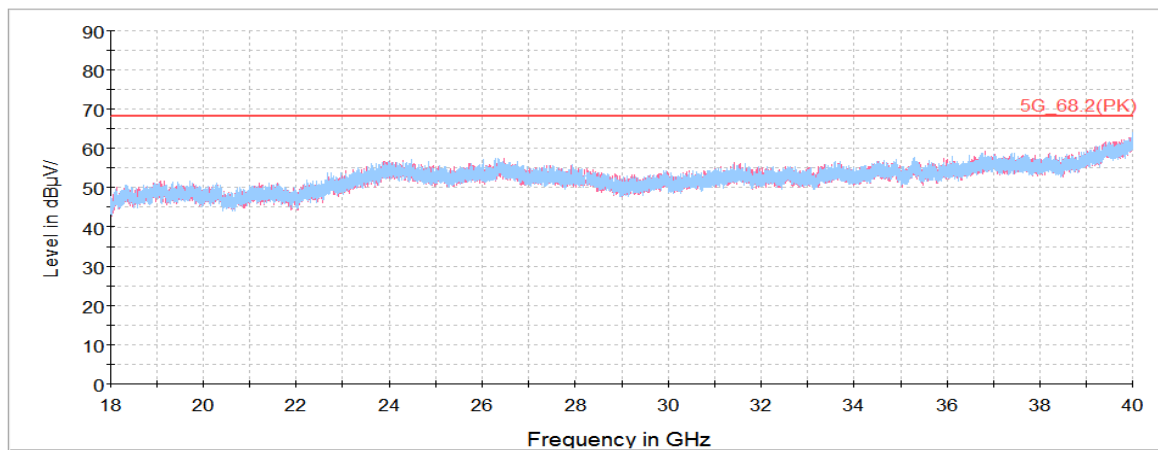
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



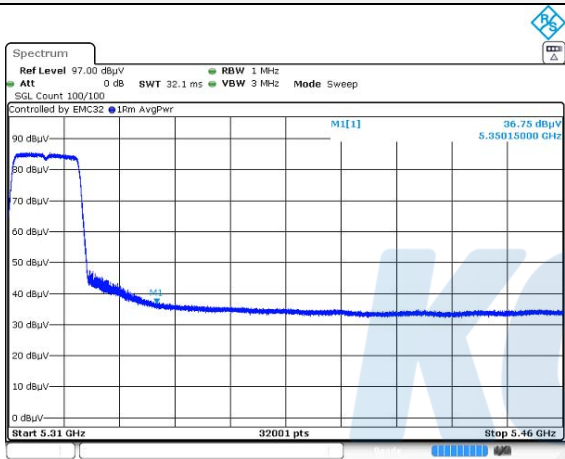
Horizontal/Vertical for 18 GHz ~ 40 GHz



Highest Channel (5 320 MHz)

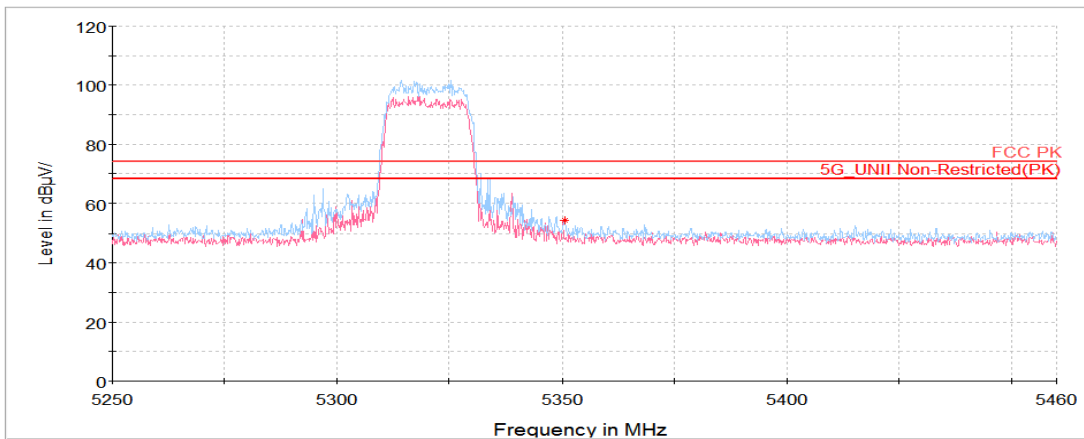
| Frequency | Pol. | Reading | Ant. Factor | Amp.+Cable | DCF | Result | Limit | Margin |
|-------------------------|-------|----------|-------------|------------|------|------------|------------|--------|
| (MHz) | (V/H) | (dB(μV)) | (dB) | (dB) | (dB) | (dB(μV/m)) | (dB(μV/m)) | (dB) |
| Peak data | | | | | | | | |
| 5 350.15 ¹⁾ | H | 46.39 | 34.56 | -26.84 | - | 60.08 | 74.00 | 13.92 |
| 10 657.61 ¹⁾ | V | 60.38 | 37.49 | -51.74 | - | 46.13 | 74.00 | 27.87 |
| 16 540.22 | V | 56.31 | 41.54 | -45.28 | - | 52.57 | 68.20 | 15.63 |
| Average Data | | | | | | | | |
| 5 350.21 ¹⁾ | H | 36.75 | 34.56 | -26.84 | - | 44.47 | 54.00 | 9.53 |

Average data

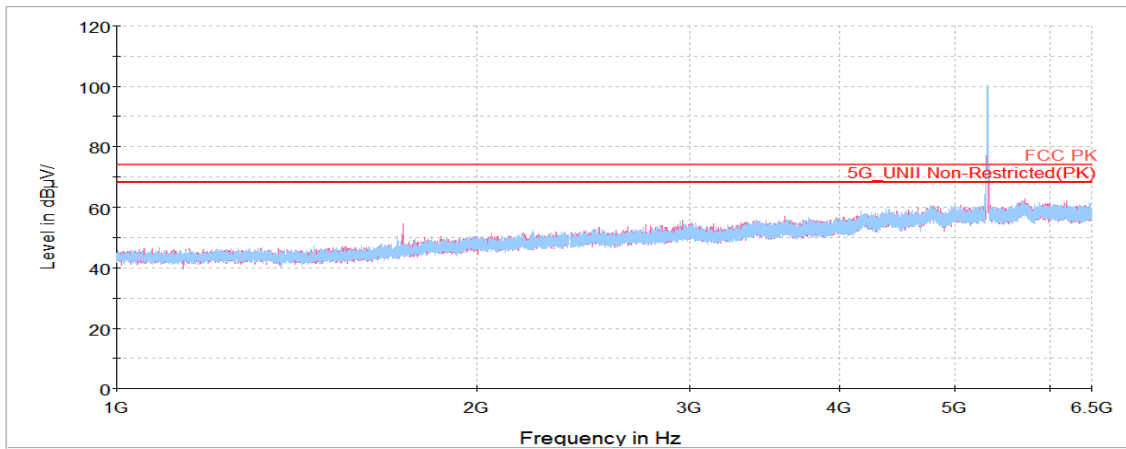


Blank

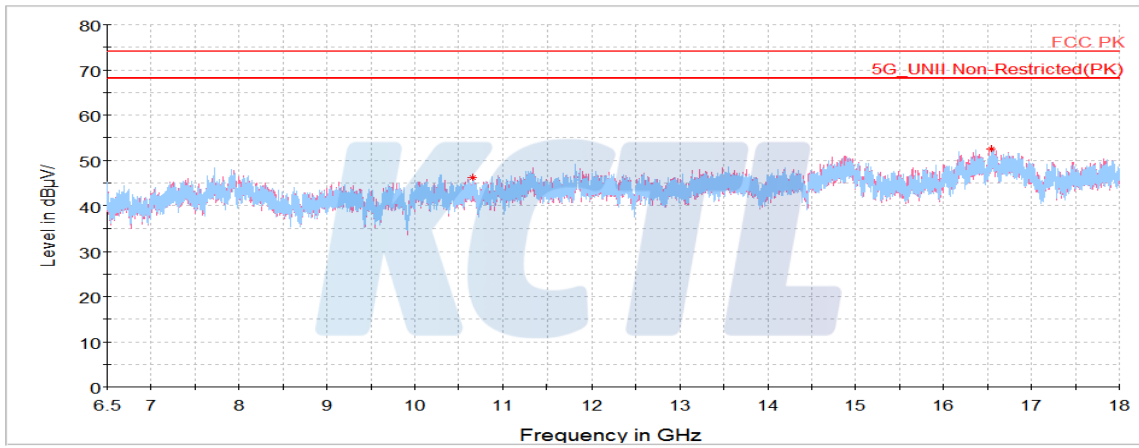
Horizontal/Vertical for Band-edge



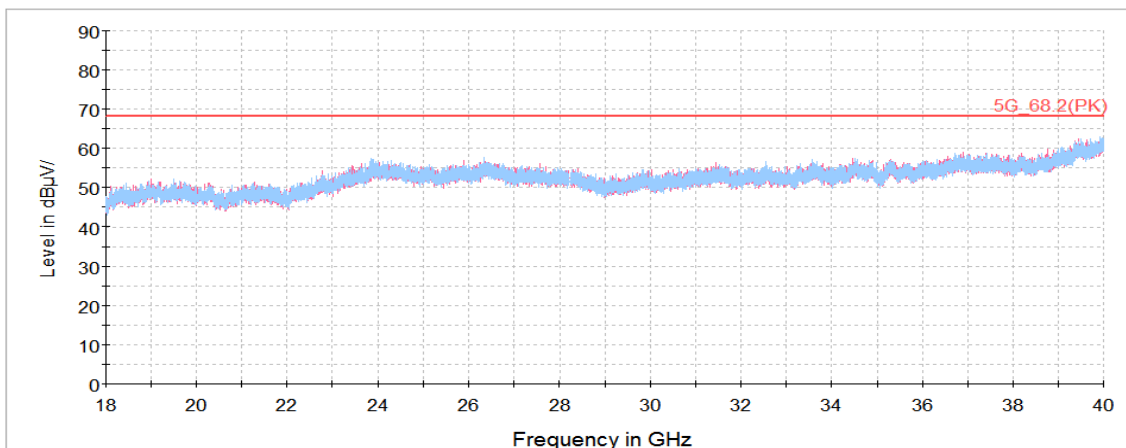
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



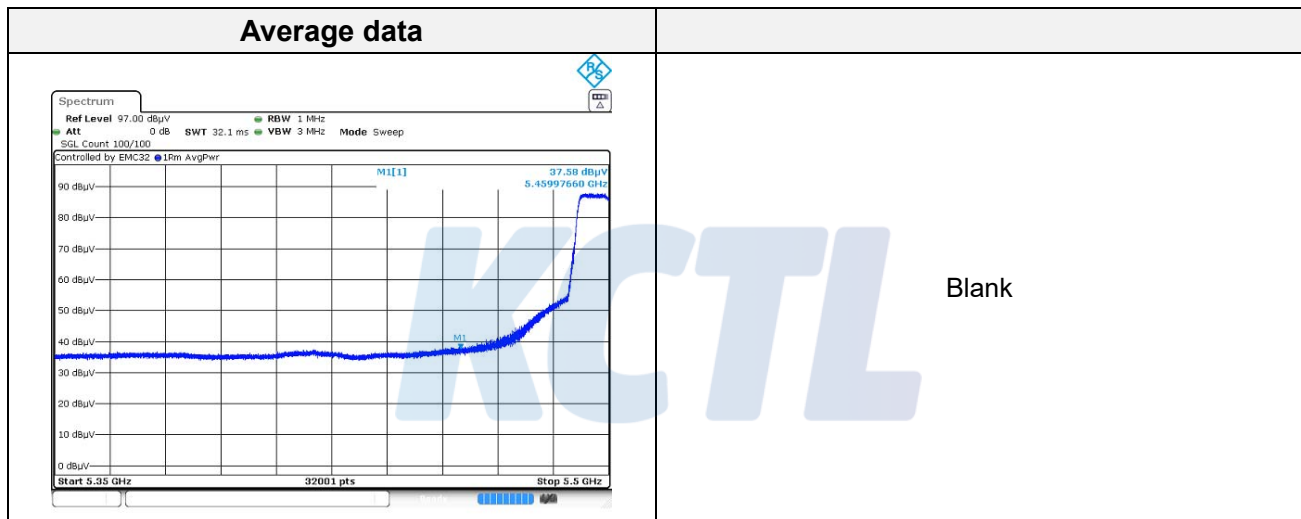
Horizontal/Vertical for 18 GHz ~ 40 GHz



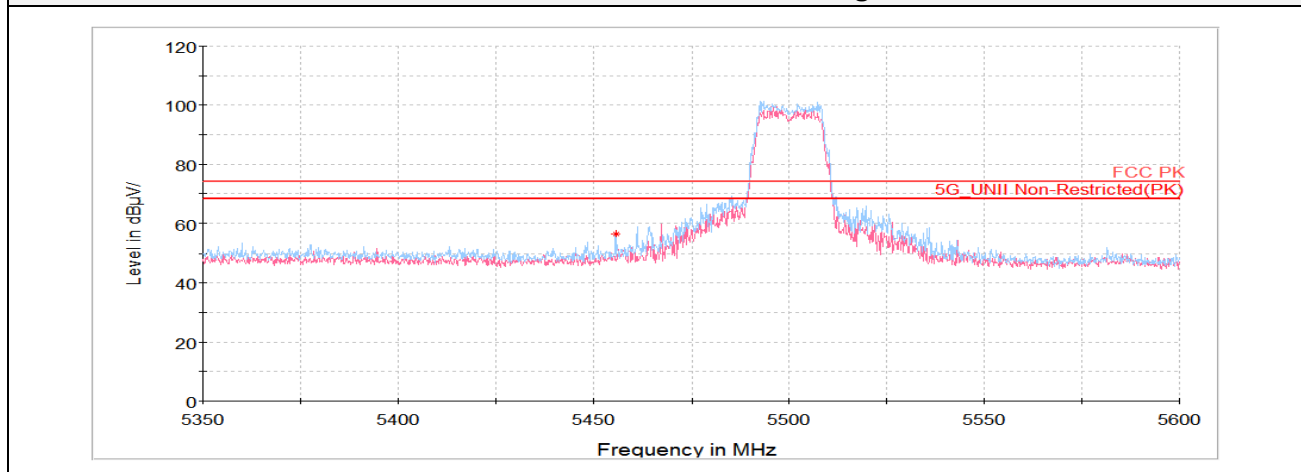
802.11a UNII-2C

Lowest Channel (5 500 MHz)

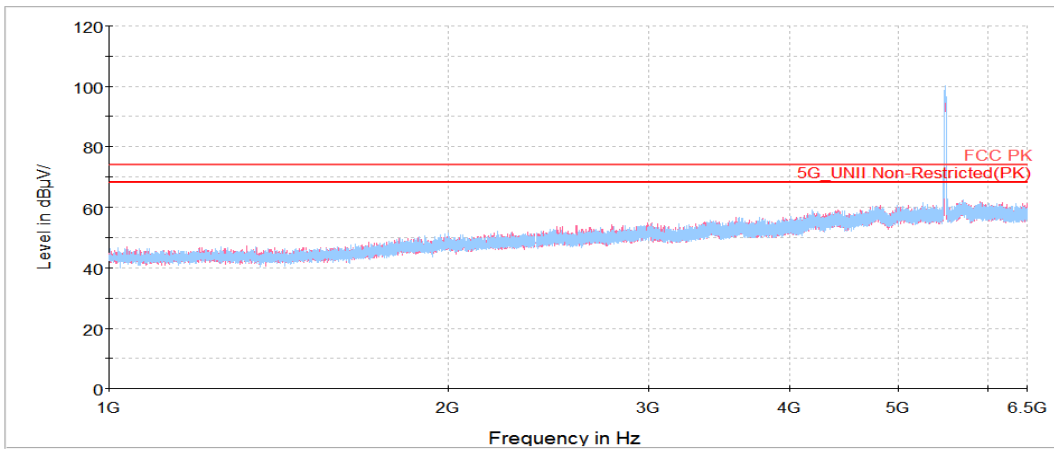
| Frequency | Pol. | Reading | Ant. Factor | Amp.+Cable | DCF | Result | Limit | Margin |
|-------------------------|-------|----------|-------------|------------|------|------------|------------|--------|
| (MHz) | (V/H) | (dB(μV)) | (dB) | (dB) | (dB) | (dB(μV/m)) | (dB(μV/m)) | (dB) |
| Peak data | | | | | | | | |
| 5 459.98 ¹⁾ | H | 48.91 | 34.74 | -27.35 | - | 56.30 | 74.00 | 17.70 |
| 11 000.45 ¹⁾ | V | 60.77 | 37.70 | -51.90 | - | 46.57 | 74.00 | 27.43 |
| 16 549.92 | V | 57.51 | 41.55 | -45.32 | - | 53.74 | 68.20 | 14.46 |
| Average Data | | | | | | | | |
| 5 459.98 ¹⁾ | H | 37.58 | 34.74 | -27.35 | - | 44.97 | 54.00 | 9.03 |



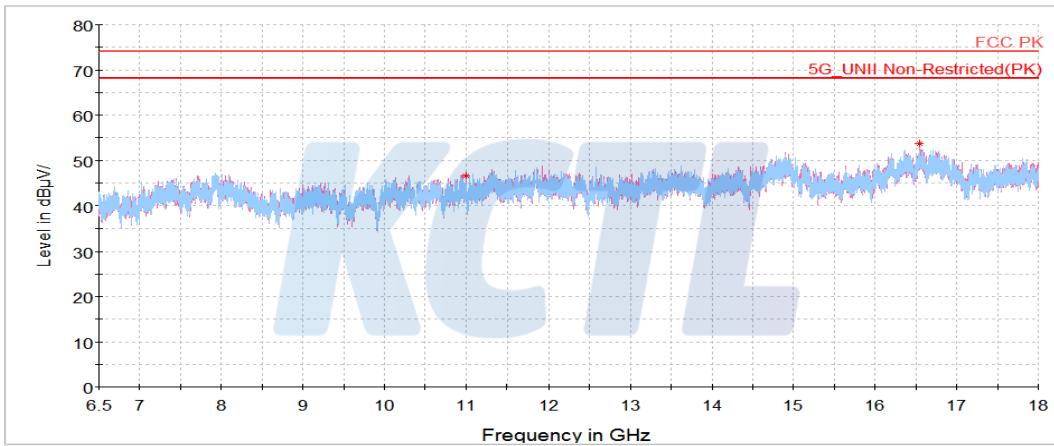
Horizontal/Vertical for Band-edge



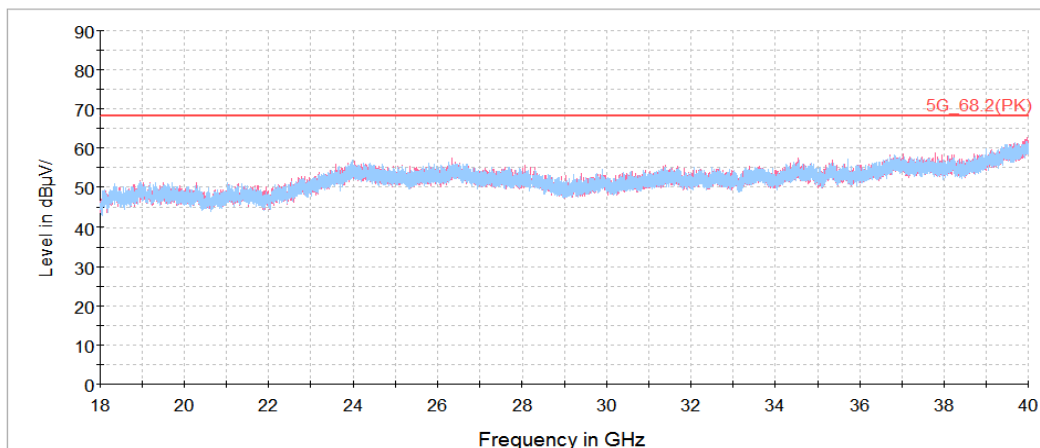
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

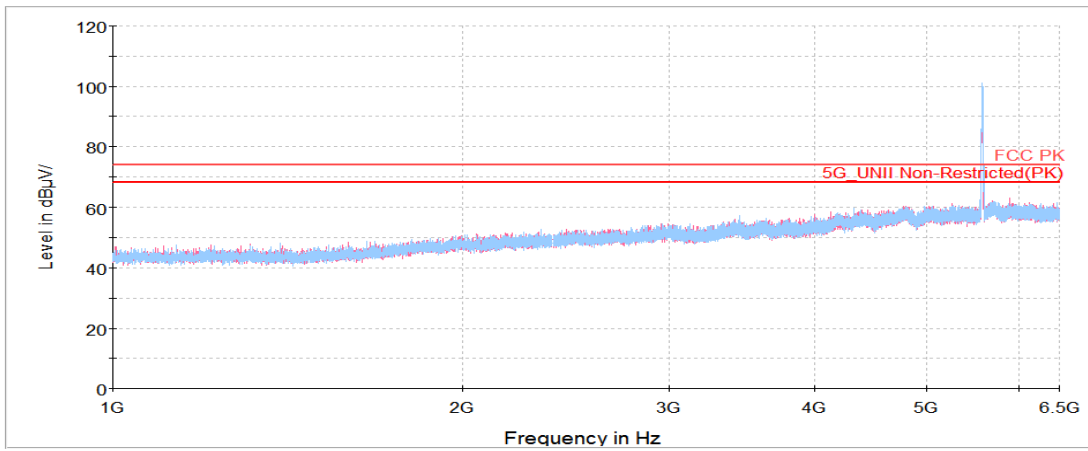


Middle Channel (5 580 MHz)

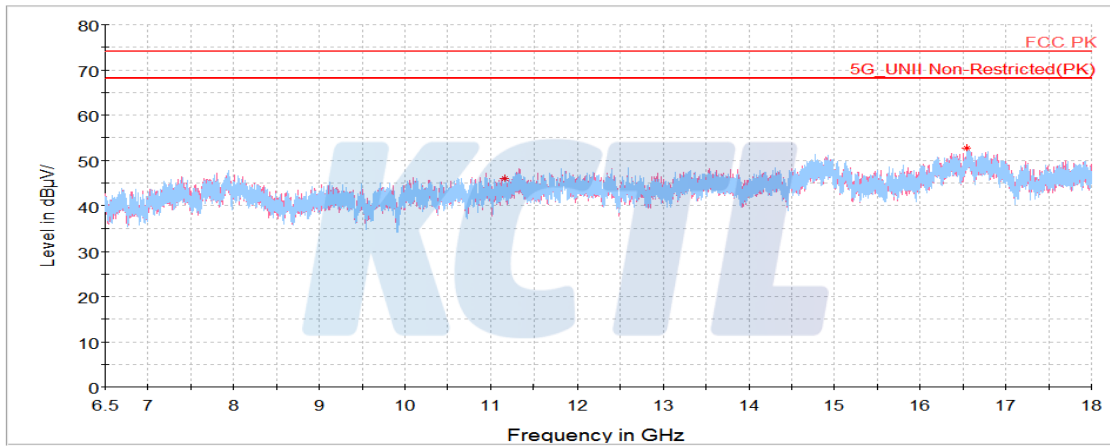
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 11 160.02 ¹⁾ | H | 59.32 | 37.80 | -51.18 | - | 45.94 | 74.00 | 28.06 |
| 16 545.61 | V | 56.34 | 41.55 | -45.30 | | 52.59 | 68.20 | 15.61 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

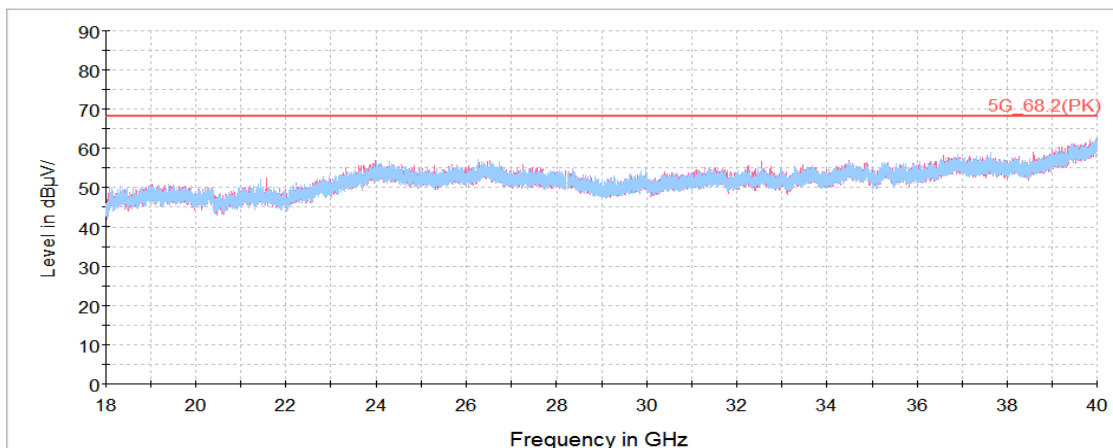
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

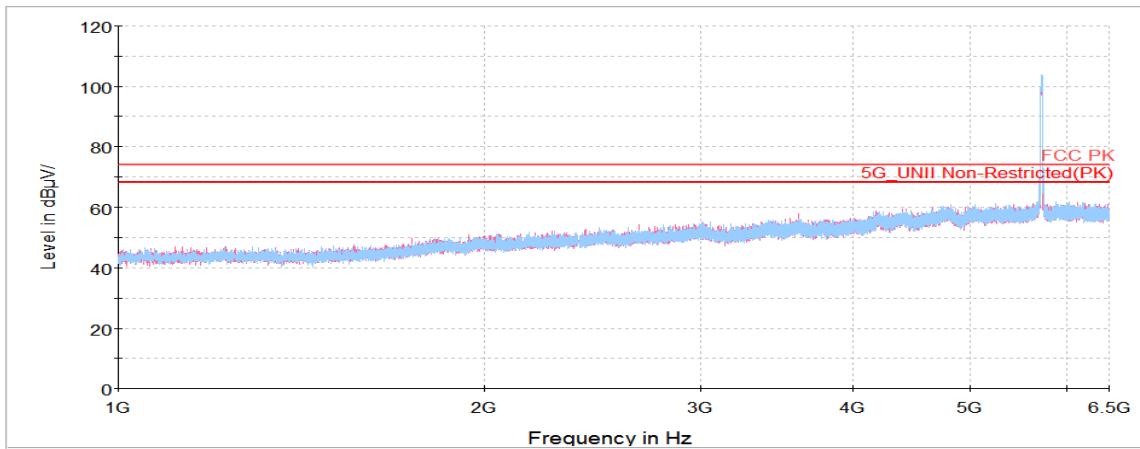


Highest Channel (5 720 MHz)

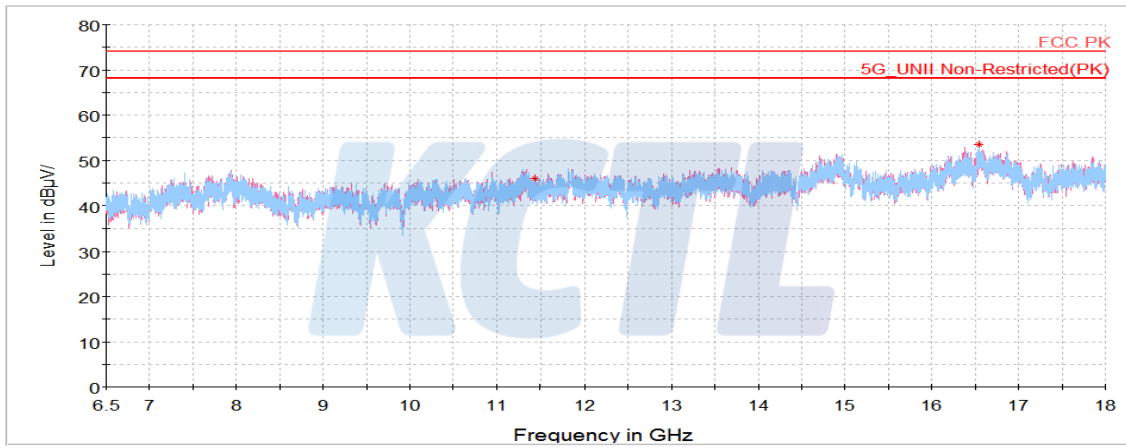
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 11 443.20 ¹⁾ | V | 57.80 | 37.97 | -49.91 | - | 45.86 | 74.00 | 28.14 |
| 16 548.84 | H | 57.29 | 41.55 | -45.32 | - | 53.52 | 68.20 | 14.68 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

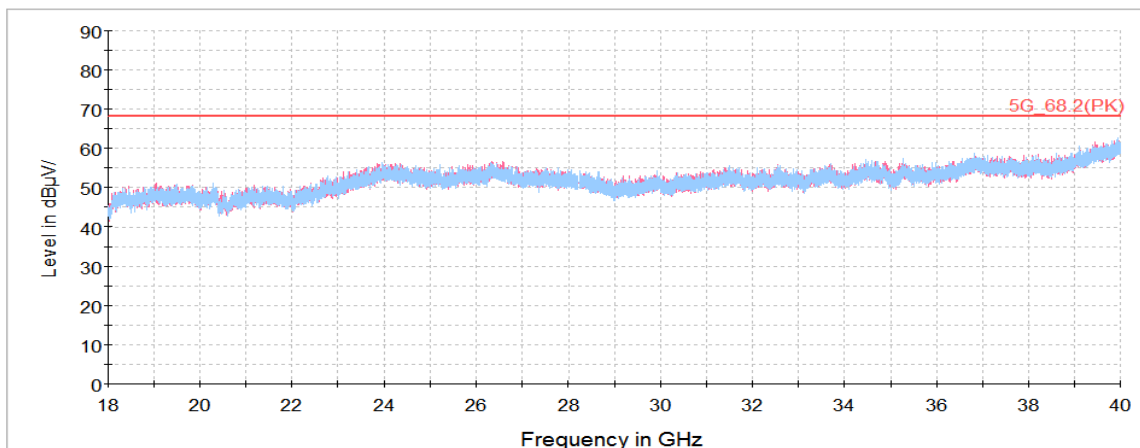
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

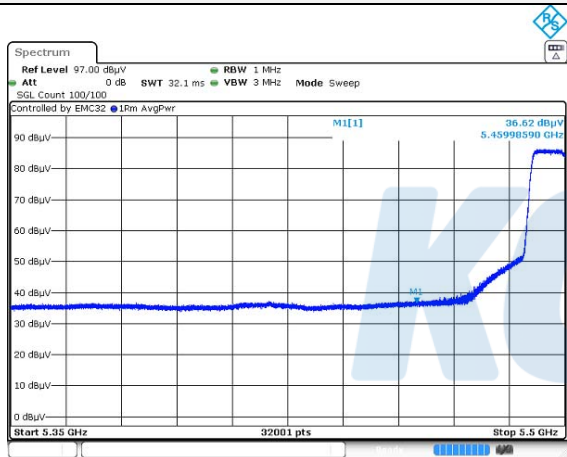


802.11n HT20 UNII-2C

Lowest Channel (5 500 MHz)

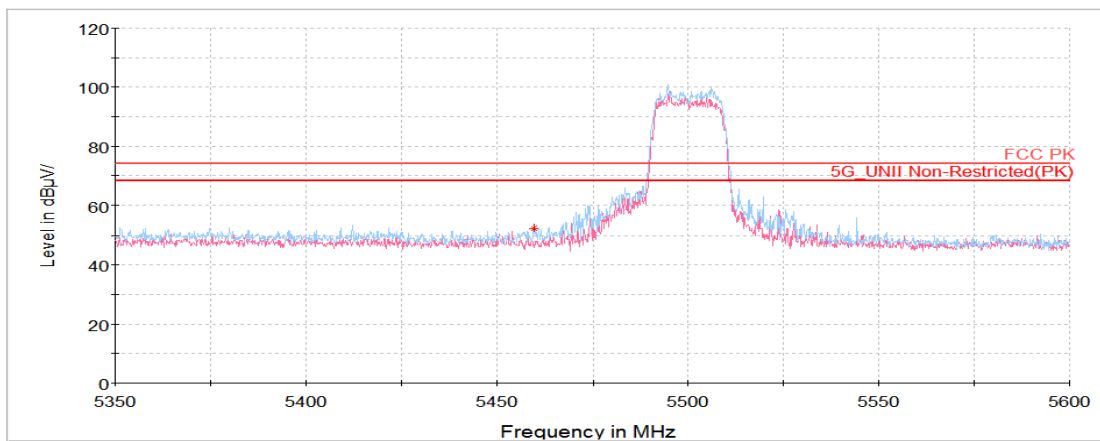
| Frequency | Pol. | Reading | Ant. Factor | Amp.+Cable | DCF | Result | Limit | Margin |
|-------------------------|-------|----------|-------------|------------|------|------------|------------|--------|
| (MHz) | (V/H) | (dB(μV)) | (dB) | (dB) | (dB) | (dB(μV/m)) | (dB(μV/m)) | (dB) |
| Peak data | | | | | | | | |
| 5 459.99 ¹⁾ | H | 45.00 | 34.74 | -27.35 | - | 52.39 | 74.00 | 21.61 |
| 10 990.75 ¹⁾ | V | 60.45 | 37.69 | -51.89 | - | 46.25 | 74.00 | 27.75 |
| 16 549.20 | V | 57.17 | 41.55 | -45.32 | - | 53.40 | 68.20 | 14.80 |
| Average Data | | | | | | | | |
| 5 459.99 ¹⁾ | H | 36.62 | 34.74 | -27.35 | - | 44.01 | 54.00 | 9.99 |

Average data

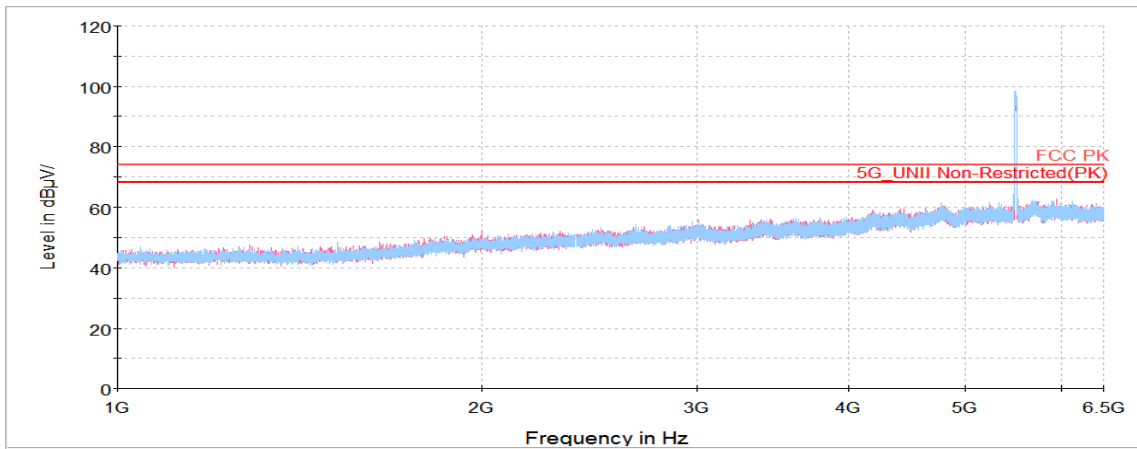


Blank

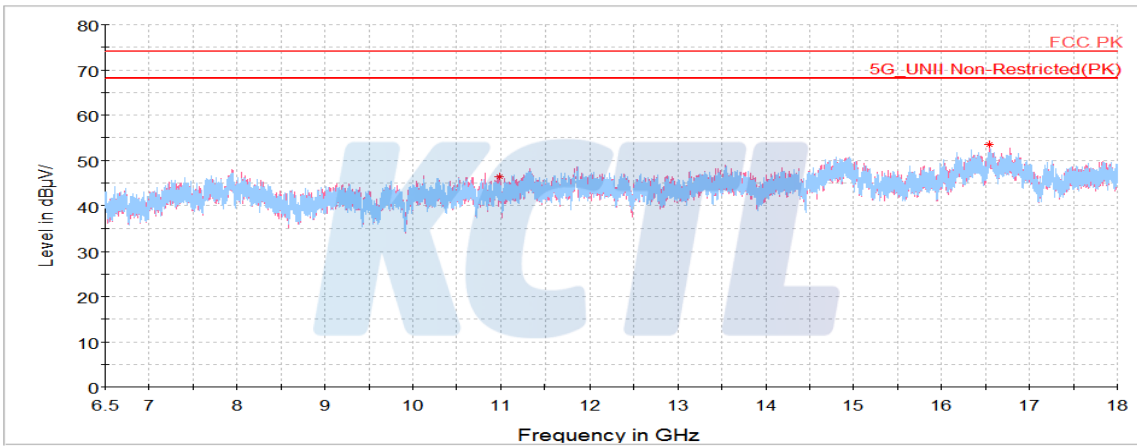
Horizontal/Vertical for Band-edge



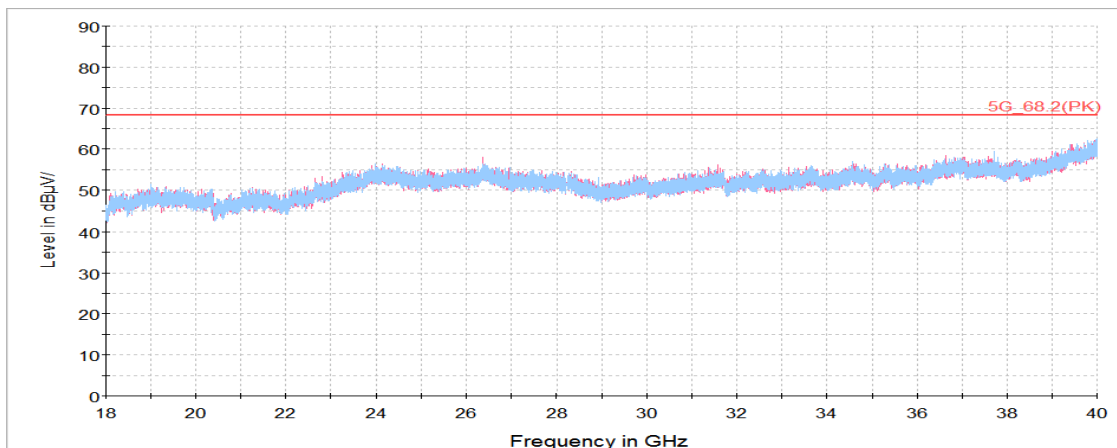
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

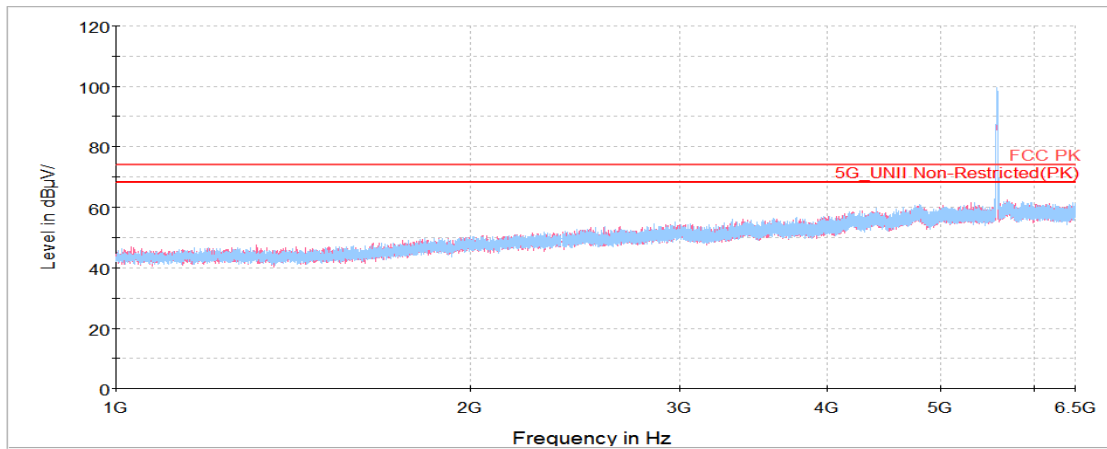


Middle Channel (5 580 MHz)

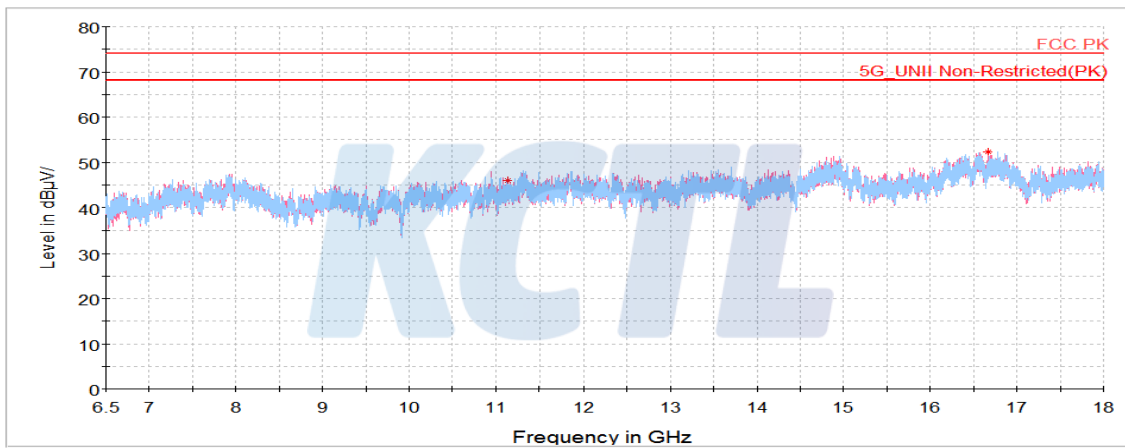
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 11 134.86 ¹⁾ | H | 59.41 | 37.78 | -51.29 | - | 45.90 | 74.00 | 28.10 |
| 16 673.55 | V | 56.42 | 41.67 | -45.77 | - | 52.32 | 68.20 | 15.88 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

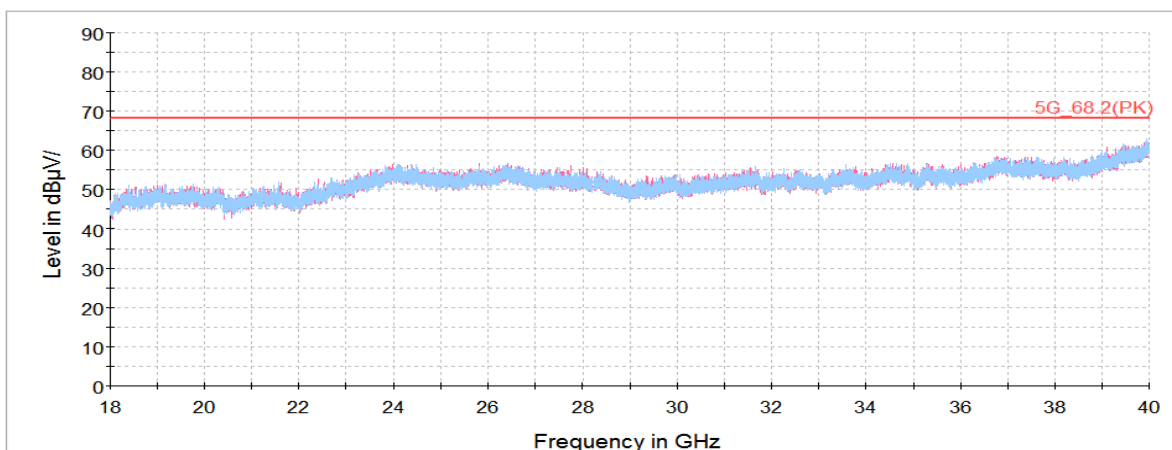
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

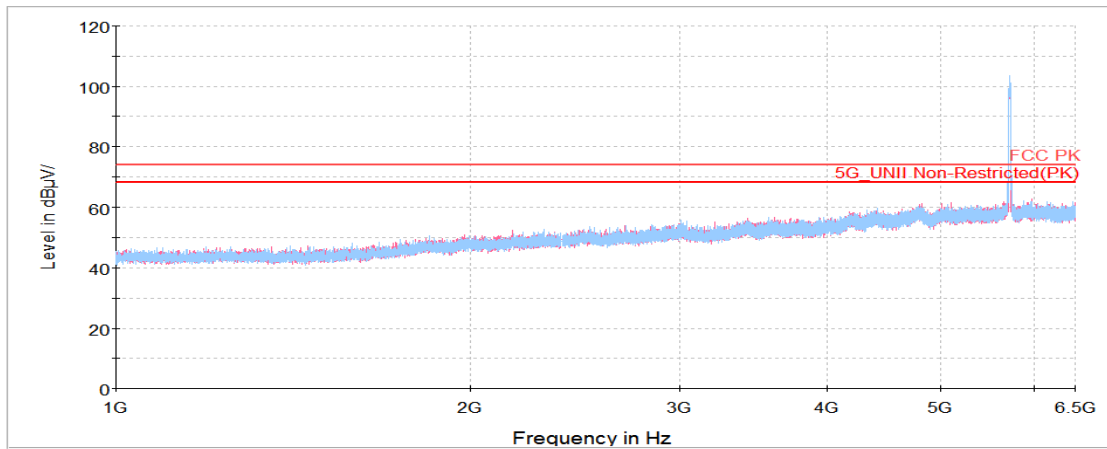


Highest Channel (5 720 MHz)

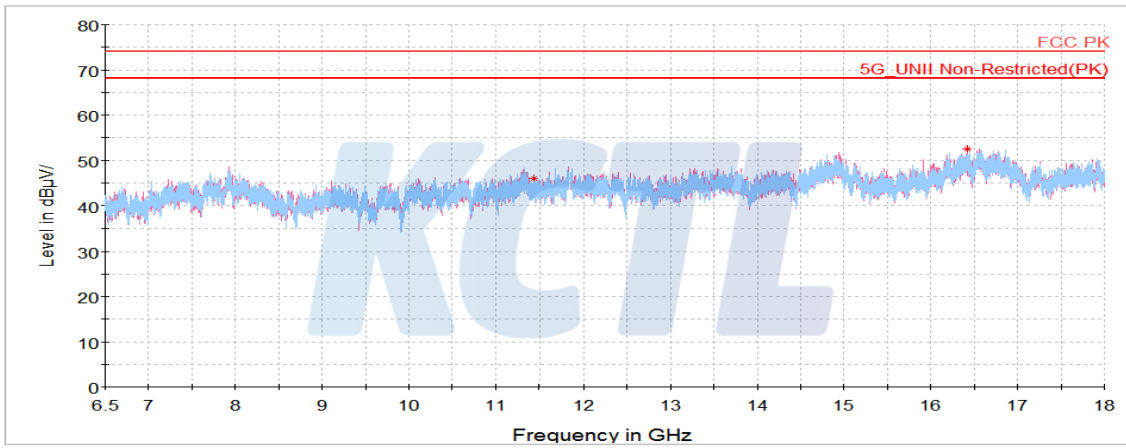
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 11 439.97 ¹⁾ | V | 58.01 | 37.96 | -49.93 | - | 46.04 | 74.00 | 27.96 |
| 16 418.75 | V | 56.32 | 41.84 | -45.64 | - | 52.52 | 68.20 | 15.68 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

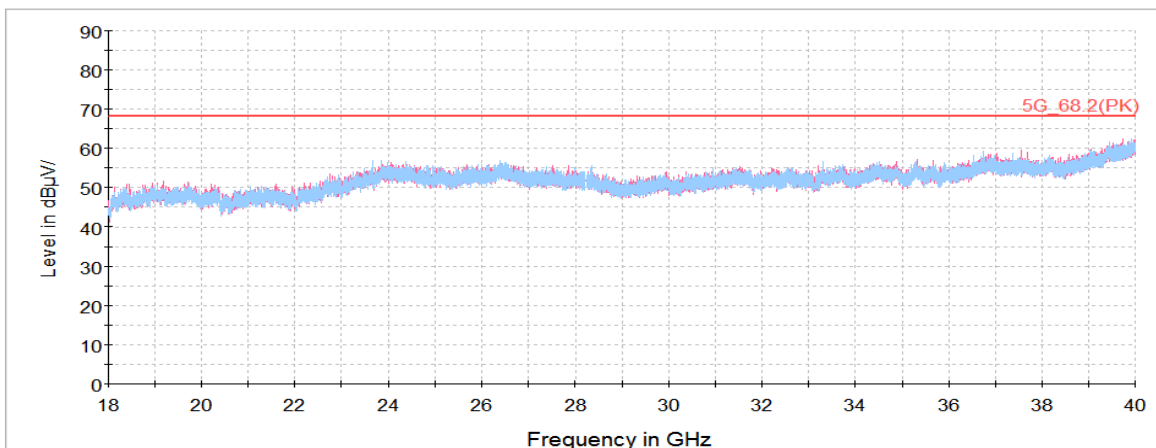
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz

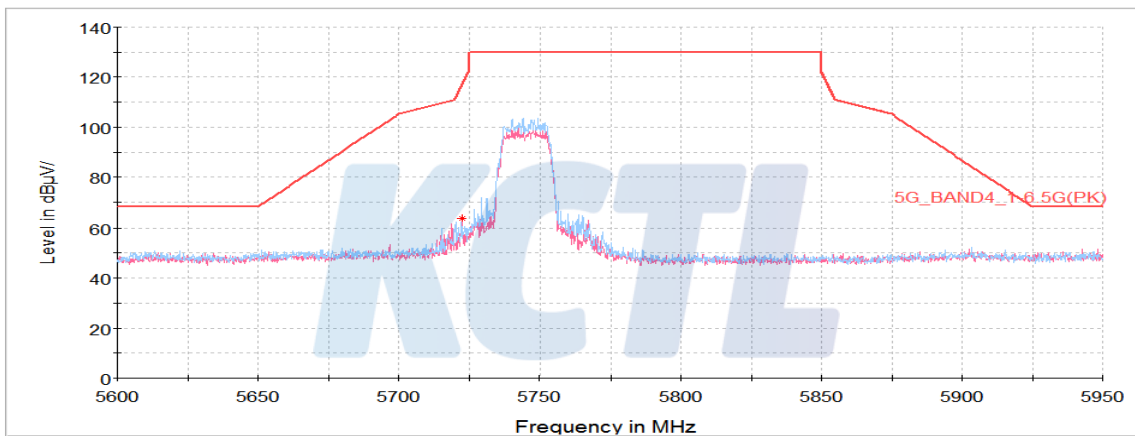


Horizontal/Vertical for 18 GHz ~ 40 GHz

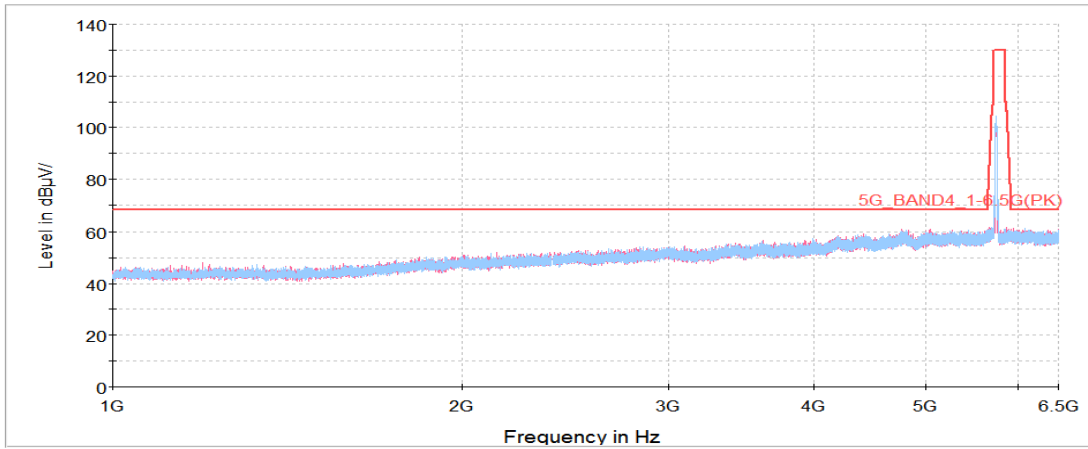


802.11a UNII-3**Lowest Channel (5 745 MHz)**

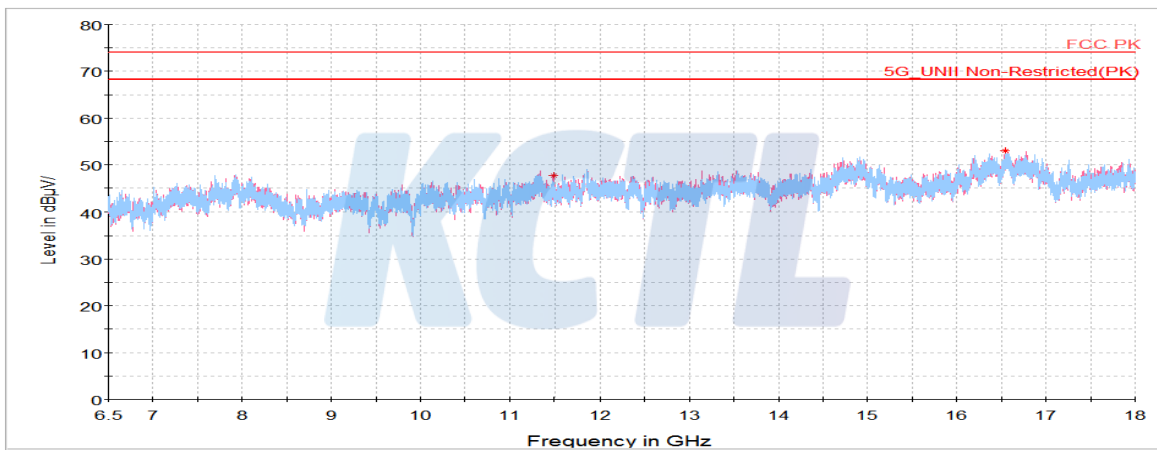
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 5 722.61 | V | 54.25 | 35.07 | -25.88 | - | 63.44 | 116.75 | 53.31 |
| 11 488.48 ¹⁾ | V | 59.40 | 37.99 | -49.71 | - | 47.68 | 74.00 | 26.32 |
| 16 544.89 | H | 56.75 | 41.54 | -45.30 | - | 52.99 | 68.20 | 15.21 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

Horizontal/Vertical for Band-edge

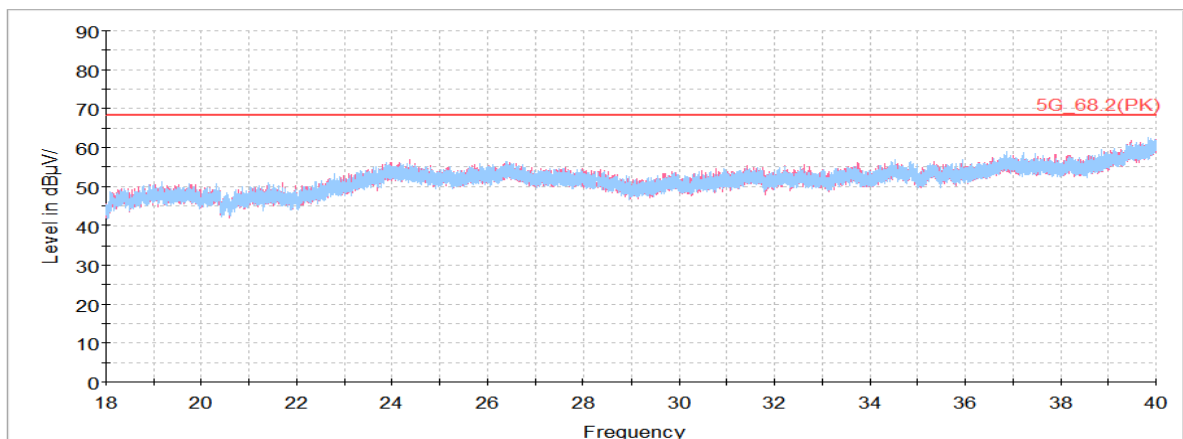
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

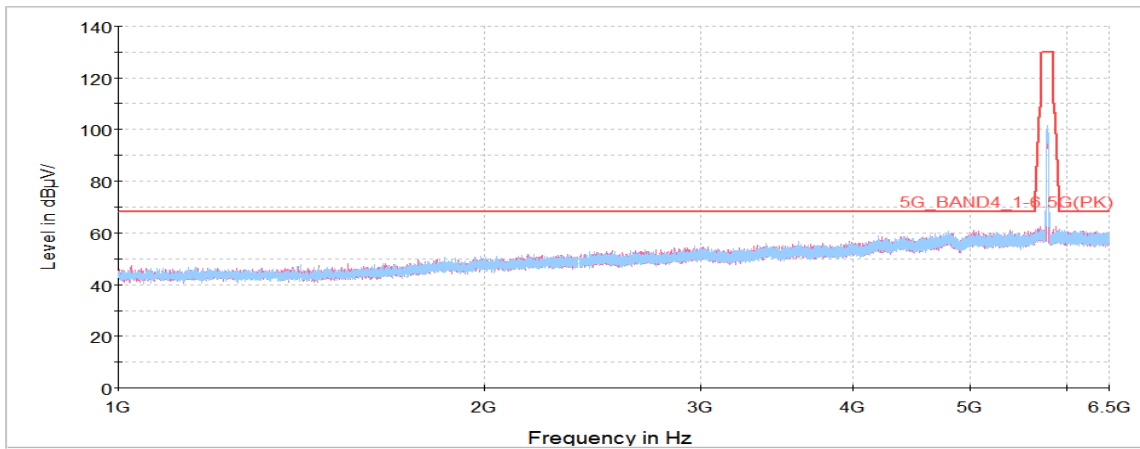


Middle Channel (5 785 MHz)

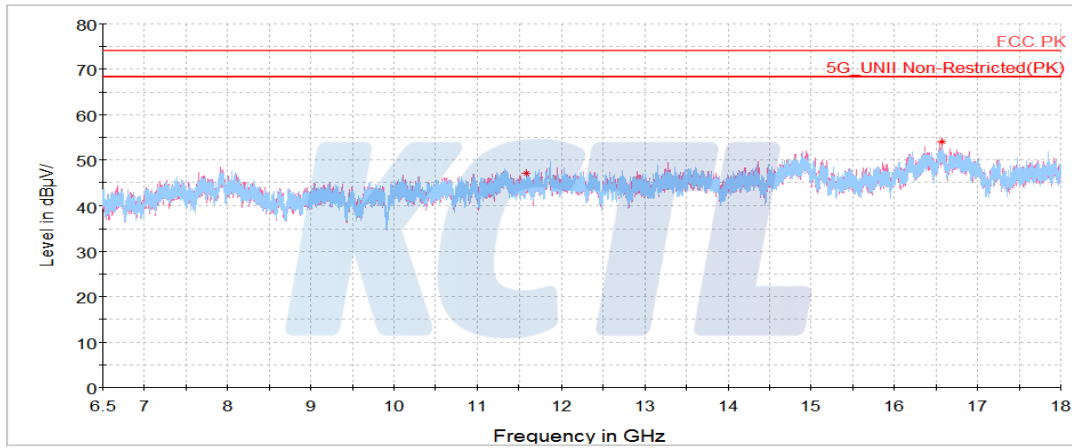
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 11 593.78 ¹⁾ | V | 58.82 | 38.11 | -49.82 | - | 47.11 | 74.00 | 26.89 |
| 16 566.45 | V | 57.78 | 41.57 | -45.38 | - | 53.97 | 68.20 | 14.23 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

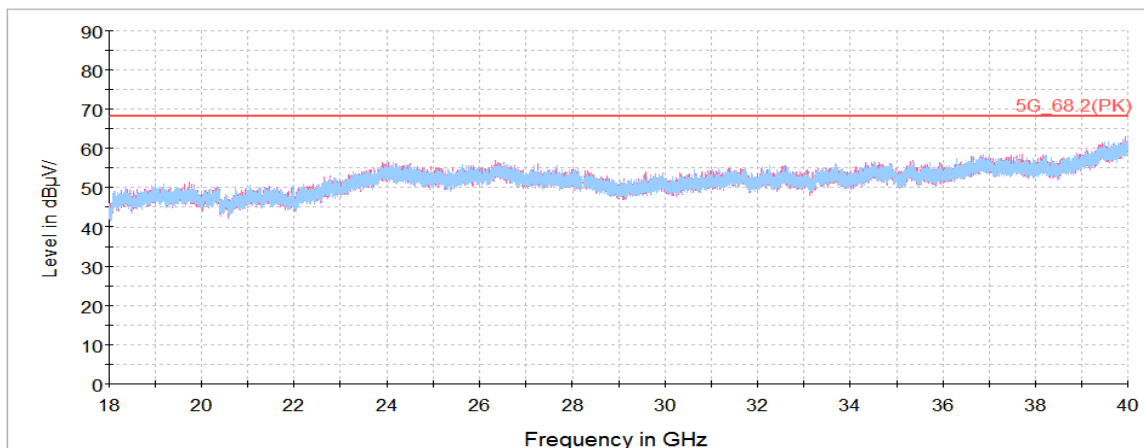
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



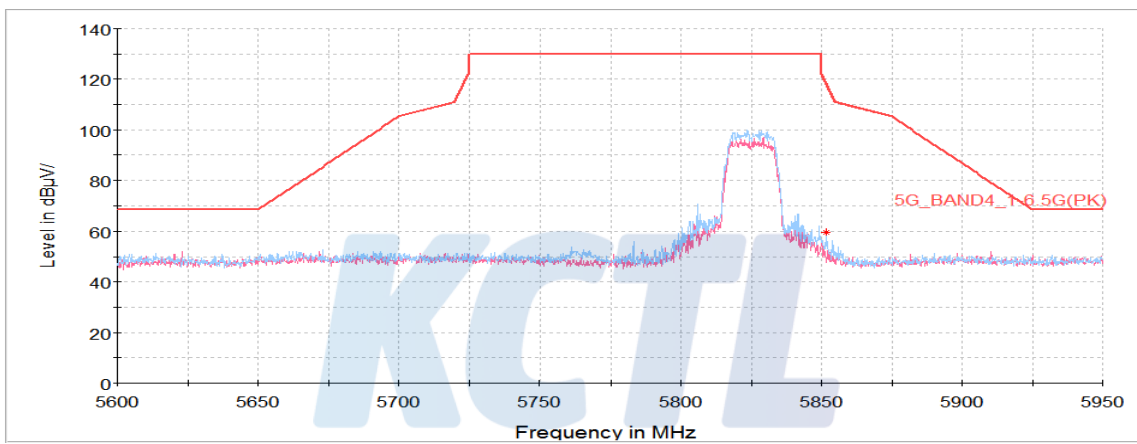
Horizontal/Vertical for 18 GHz ~ 40 GHz



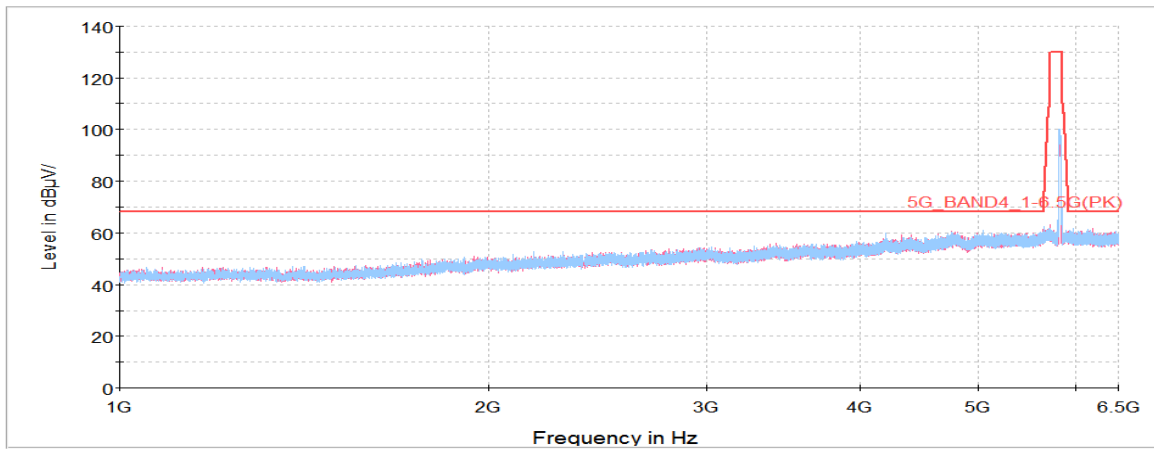
Highest Channel (5 825 MHz)

| Frequency | Pol. | Reading | Ant. Factor | Amp.+Cable | DCF | Result | Limit | Margin |
|--|-------|----------|-------------|------------|------|------------|------------|--------|
| (MHz) | (V/H) | (dB(μV)) | (dB) | (dB) | (dB) | (dB(μV/m)) | (dB(μV/m)) | (dB) |
| Peak data | | | | | | | | |
| 5 851.69 | H | 51.16 | 35.22 | -26.67 | - | 59.71 | 118.35 | 58.64 |
| 11 638.34 ¹⁾ | H | 59.58 | 38.17 | -49.90 | - | 47.85 | 74.00 | 26.15 |
| 16 584.78 | V | 57.12 | 41.58 | -45.45 | - | 53.25 | 68.20 | 14.95 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

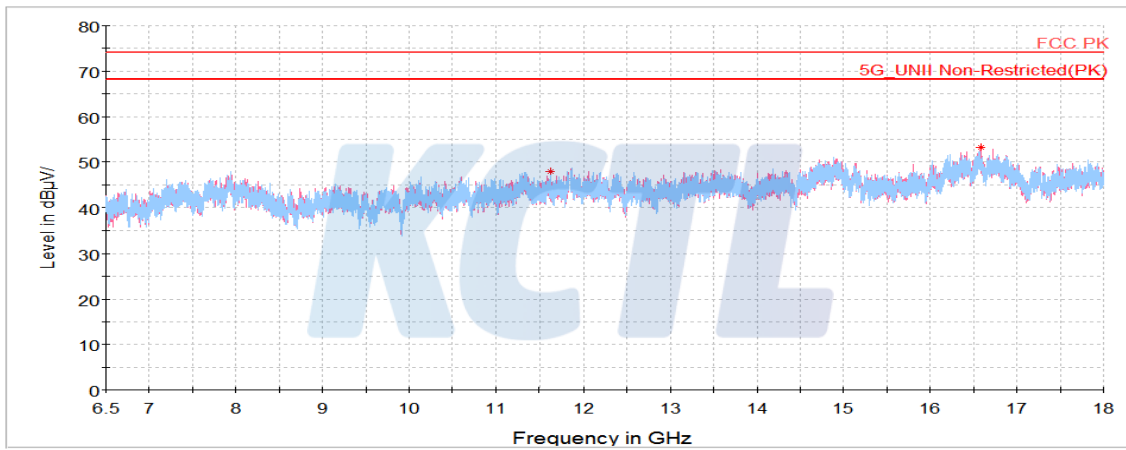
Horizontal/Vertical for Band-edge



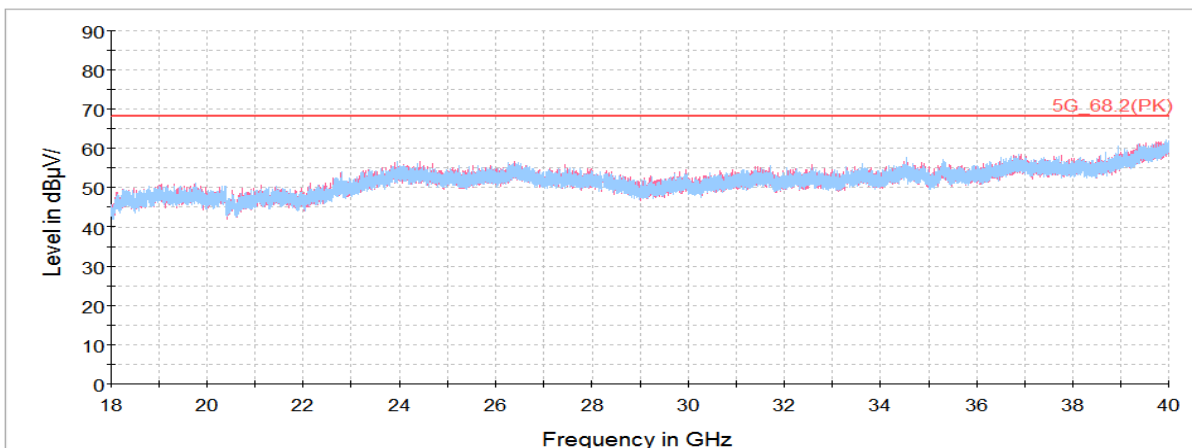
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz

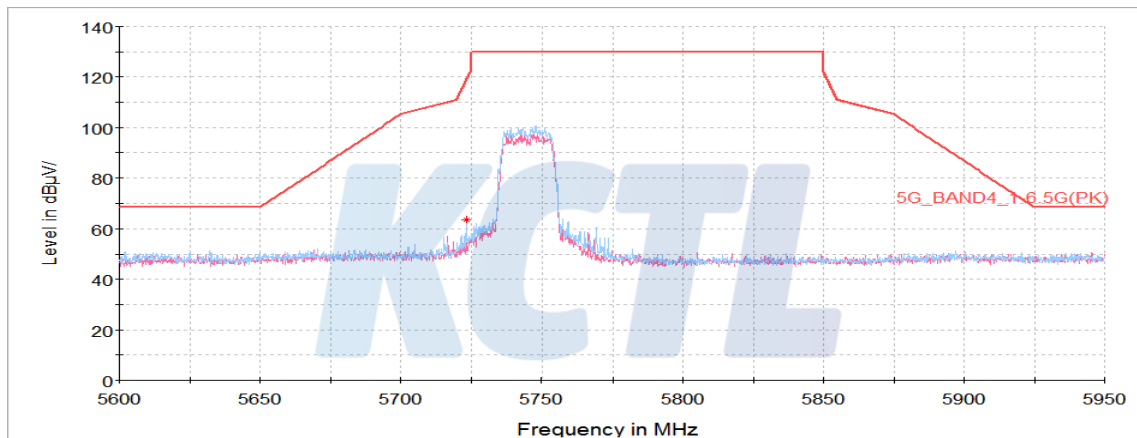


Horizontal/Vertical for 18 GHz ~ 40 GHz

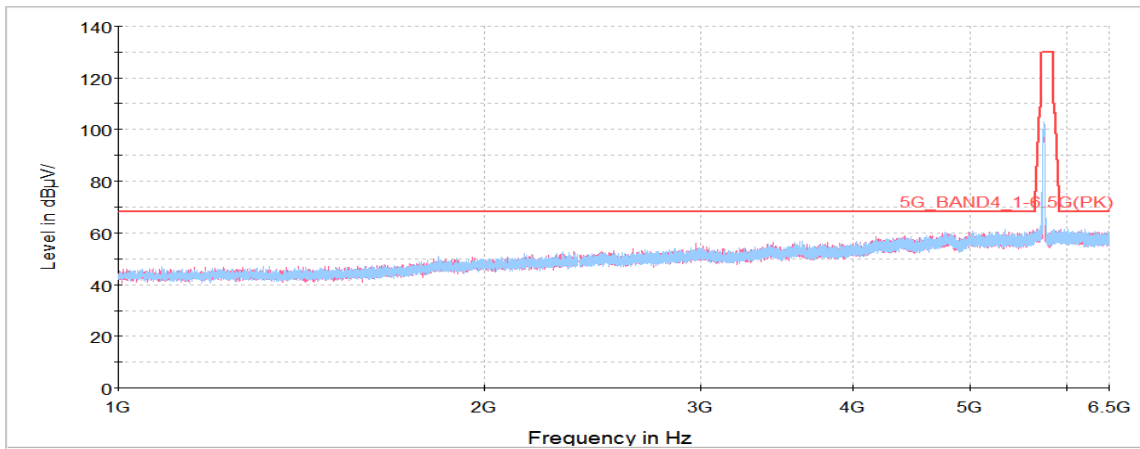


802.11n HT20 UNII-3**Lowest Channel (5 745 MHz)**

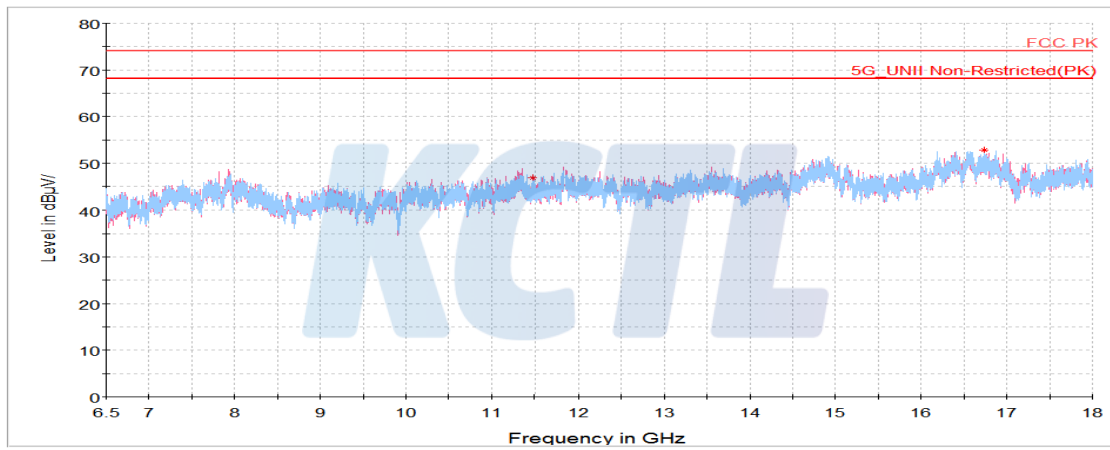
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 5 723.30 | H | 54.30 | 35.07 | -25.89 | - | 63.48 | 118.32 | 54.84 |
| 11 478.78 ¹⁾ | H | 58.54 | 37.99 | -49.75 | - | 46.78 | 74.00 | 27.22 |
| 16 736.80 | H | 57.10 | 41.74 | -46.01 | - | 52.83 | 68.20 | 15.37 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

Horizontal/Vertical for Band-edge

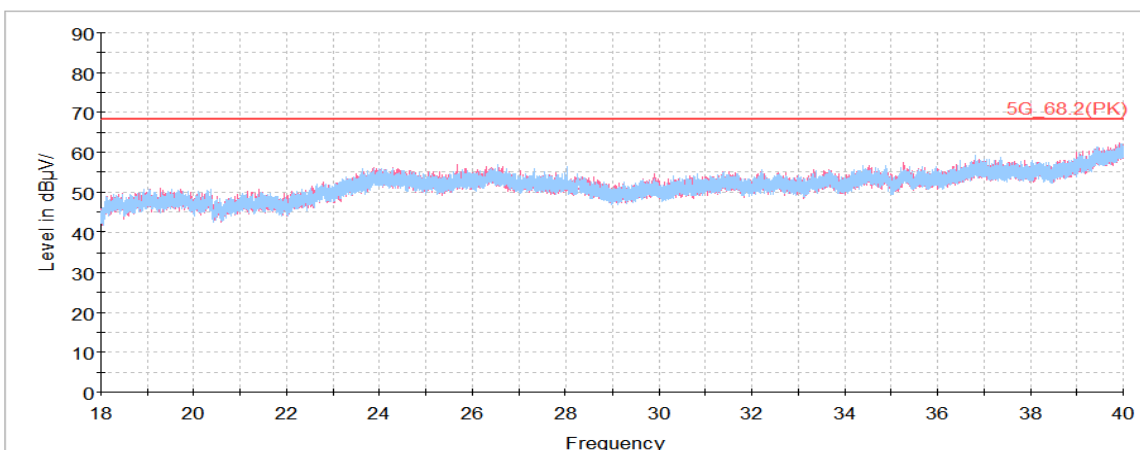
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

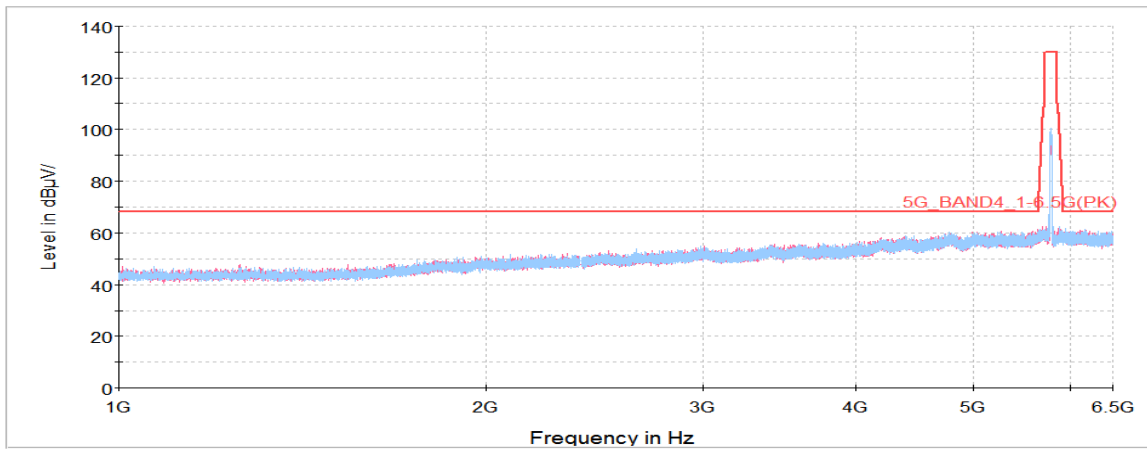


Middle Channel (5 785 MHz)

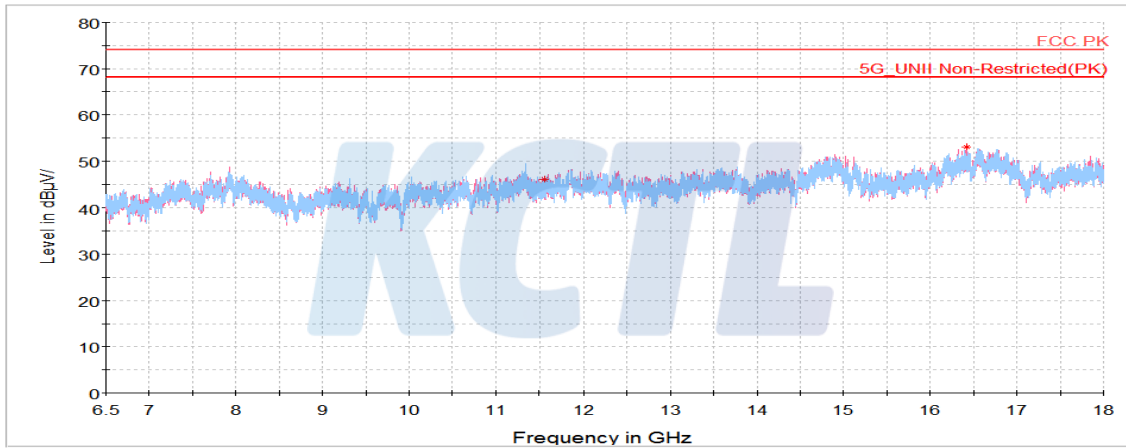
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 11 570.06 ¹⁾ | H | 57.79 | 38.08 | -49.78 | | 46.09 | 74.00 | 27.91 |
| 16 421.63 | V | 56.84 | 41.84 | -45.63 | | 53.05 | 68.20 | 15.15 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

KCTL

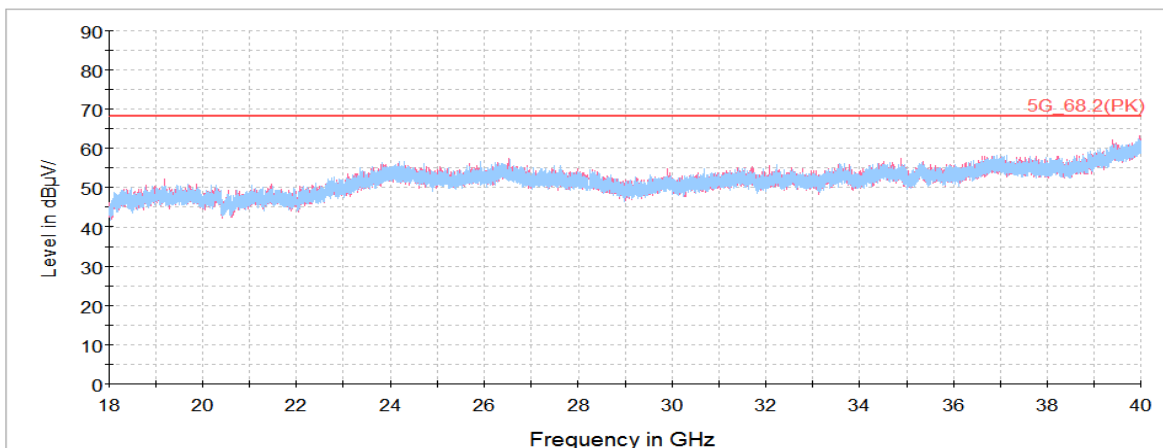
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz

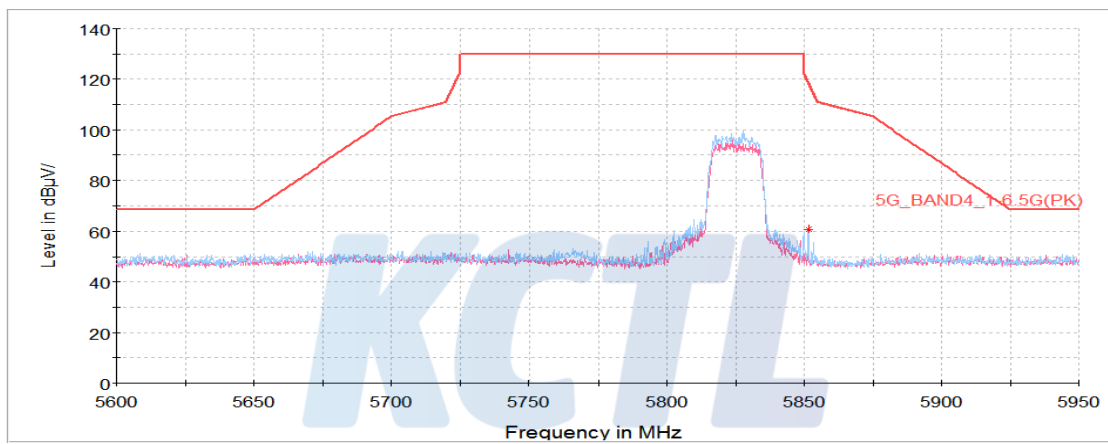


Horizontal/Vertical for 18 GHz ~ 40 GHz

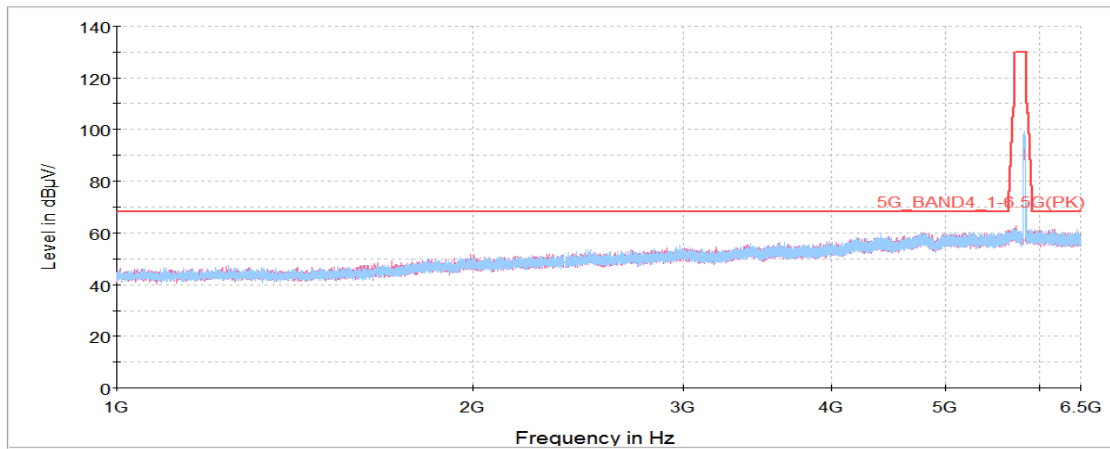


Highest Channel (5 825 MHz)

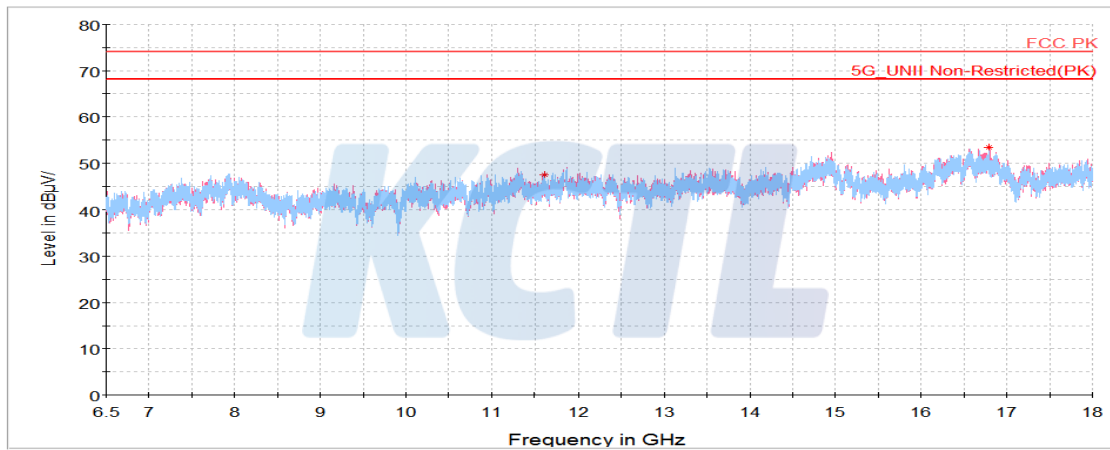
| Frequency (MHz) | Pol. (V/H) | Reading (dB(μ V)) | Ant. Factor (dB) | Amp.+Cable (dB) | DCF (dB) | Result (dB(μ V/m)) | Limit (dB(μ V/m)) | Margin (dB) |
|--|---------------|---------------------------|---------------------|--------------------|-------------|----------------------------|---------------------------|----------------|
| Peak data | | | | | | | | |
| 5 851.52 | H | 52.33 | 35.22 | -26.67 | | 60.88 | 118.74 | 57.86 |
| 11 621.81 ¹⁾ | V | 59.15 | 38.15 | -49.87 | | 47.43 | 74.00 | 26.57 |
| 16 793.22 | H | 57.77 | 41.79 | -46.21 | | 53.35 | 68.20 | 14.85 |
| Average Data | | | | | | | | |
| No spurious emissions were detected within 20 dB of the limit. | | | | | | | | |

Horizontal/Vertical for Band-edge

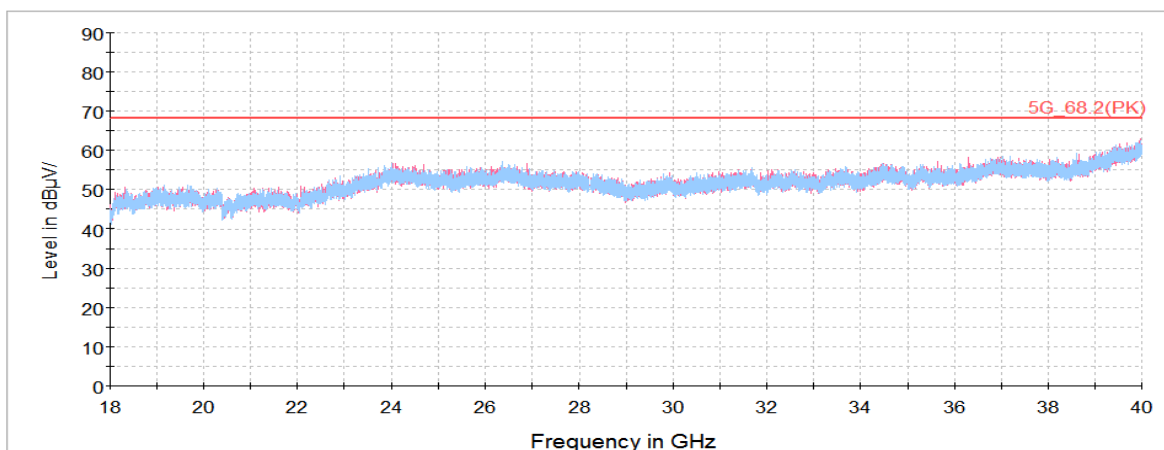
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz

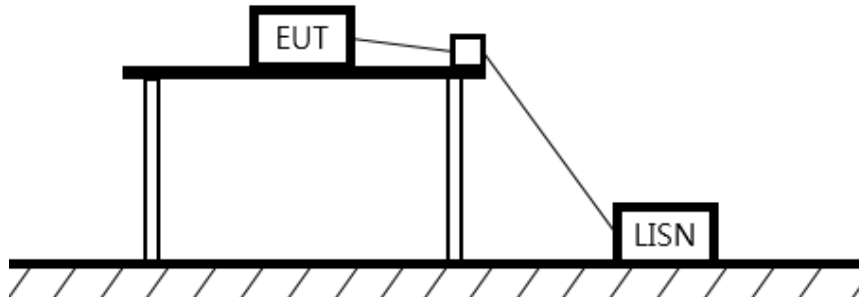


Horizontal/Vertical for 18 GHz ~ 40 GHz



7.3. AC Conducted emission

Test setup



Limit

§15.407

According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

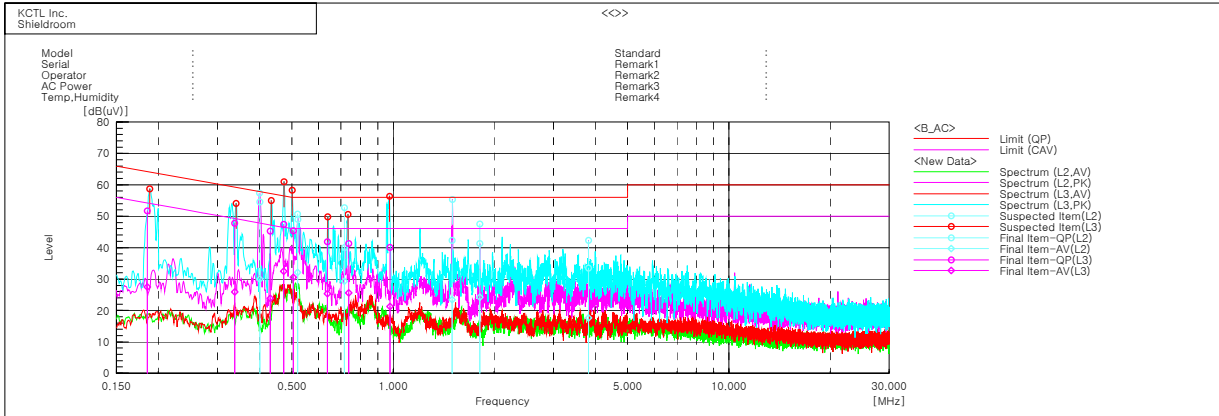
| Frequency of Emission (MHz) | Conducted limit (dB μ V/m) | |
|-----------------------------|--------------------------------|----------|
| | Quasi-peak | Average |
| 0.15 – 0.50 | 66 - 56* | 56 - 46* |
| 0.50 – 5.00 | 56 | 46 |
| 5.00 – 30.0 | 60 | 50 |

Measurement procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50 Ω /50 μ H LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 kHz or to quasi-peak and average within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

Test results

Worst case: 802.11a / UNII-2A High frequency



Final Result

--- L2 Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|-----|-----------------|---------------------|----------------------|----------|--------------------|---------------------|-------------------|-------------------|----------------|-----------------|
| 1 | 0.40104 | 44.3 | 19.8 | 10.2 | 54.5 | 30.0 | 57.8 | 47.8 | 3.3 | 17.8 |
| 2 | 0.52006 | 40.5 | 22.0 | 10.2 | 50.7 | 32.2 | 56.0 | 46.0 | 5.3 | 13.8 |
| 3 | 0.71595 | 42.5 | 19.1 | 10.2 | 52.7 | 29.3 | 56.0 | 46.0 | 3.3 | 16.7 |
| 4 | 1.49997 | 32.1 | 13.1 | 10.3 | 42.4 | 23.4 | 56.0 | 46.0 | 13.6 | 22.6 |
| 5 | 1.81079 | 37.2 | 13.9 | 10.3 | 47.5 | 24.2 | 56.0 | 46.0 | 8.5 | 21.8 |
| 6 | 3.81621 | 23.1 | 7.3 | 10.4 | 33.5 | 17.7 | 56.0 | 46.0 | 22.5 | 28.3 |

--- L3 Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|-----|-----------------|---------------------|----------------------|----------|--------------------|---------------------|-------------------|-------------------|----------------|-----------------|
| 1 | 0.18525 | 41.4 | 17.2 | 10.3 | 51.7 | 27.5 | 64.2 | 54.2 | 12.5 | 26.7 |
| 2 | 0.33774 | 37.6 | 15.8 | 10.1 | 47.7 | 25.9 | 59.3 | 49.3 | 11.6 | 23.4 |
| 3 | 0.4306 | 35.1 | 13.7 | 10.2 | 45.3 | 23.9 | 57.2 | 47.2 | 11.9 | 23.3 |
| 4 | 0.47259 | 37.2 | 22.3 | 10.2 | 47.4 | 32.5 | 56.5 | 46.5 | 9.1 | 14.0 |
| 5 | 0.5046 | 35.1 | 20.4 | 10.2 | 45.3 | 30.6 | 56.0 | 46.0 | 10.7 | 15.4 |
| 6 | 0.6374 | 31.6 | 15.2 | 10.2 | 41.8 | 25.4 | 56.0 | 46.0 | 14.2 | 20.6 |
| 7 | 0.73851 | 31.1 | 15.4 | 10.2 | 41.3 | 25.6 | 56.0 | 46.0 | 14.7 | 20.4 |
| 8 | 0.97963 | 29.9 | 11.1 | 10.2 | 40.1 | 21.3 | 56.0 | 46.0 | 15.9 | 24.7 |

8. Measurement equipment

| Equipment Name | Manufacturer | Model No. | Serial No. | Next Cal. Date |
|----------------------------|----------------------|----------------------------|-------------|----------------|
| Spectrum Analyzer | R&S | FSV40 | 100989 | 21.01.03 |
| EMI TEST RECEIVER | R&S | ESCI7 | 100732 | 20.08.22 |
| Bi-Log Antenna | TESEQ | CBL 6112D | 37876 | 20.07.20 |
| Amplifier | SONOMA INSTRUMENT | 310N | 284608 | 20.08.22 |
| ATTENUATOR | Agilent | 8491B | MY39270292 | 20.07.20 |
| Horn antenna | ETS.lindgren | 3117 | 155787 | 20.10.24 |
| Horn antenna | ETS.lindgren | 3116 | 00086632 | 21.02.17 |
| Attenuator | API Inmet | 40AH2W-10 | 12 | 21.05.12 |
| Broadband PreAmplifier | SCHWARZBECK | BBV9718 | 216 | 20.07.30 |
| AMPLIFIER | L-3 Narda-MITEQ | AMF-7D-01001800 -22-10P | 2031196 | 21.02.12 |
| AMPLIFIER | L-3 Narda-MITEQ | JS44-18004000-33-8P | 2000996 | 21.01.22 |
| LOOP Antenna | R&S | HFH2-Z2 | 100355 | 20.08.24 |
| Antenna Mast | Innco Systems | MA4640-XP-ET | - | - |
| Turn Table | Innco Systems | DT2000 | 79 | - |
| Antenna Mast | Innco Systems | MA4000-EP | 303 | - |
| Turn Table | Innco Systems | DT2000 | 79 | - |
| Highpass Filter | WT | WT-A1699-HS | WT160411002 | 21.05.11 |
| TWO-LINE V - NETWORK | R&S | ENV216 | 101358 | 20.10.02 |
| EMI TEST RECEIVER | R&S | ESCI | 100001 | 20.08.22 |
| Vector Signal Generator | R&S | SMBV100A | 257566 | 20.07.16 |
| Signal Generator | R&S | SMR40 | 100007 | 21.04.08 |
| Cable Assembly | RadiAll | 2301761768000PJ | 1724.659 | - |
| Cable Assembly | gigalane | RG-400 | - | - |
| Cable Assembly | HUER+SUHNER | SUCOFLEX 104 | MY4342/4 | - |

End of test report