TESTING (OR CALIBRATION)
NVLAP LAB CODE 600141-0

Registration
No.788871

# TEST REPORT FOR WLAN TESTING

Report No.: LTE/WCDMA/GSM（GPRS） Multi-Mode Digital Mobile Phone

Product Model: ZTE Blade A7 2019

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: FCC Part 15, Subpart C (2019)

FCC ID: SRQ-ZTEA72019

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30 Shixing Street, Shijingshan District,

Beijing, P.R.China

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# 1. GENERAL INFORMATION

## 1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).
The test results relate only to individual items of the samples which have been tested.
The certification and accreditation identifiers used in this report shall not be applicable to the tested or calibrated samples thereof. The manufacturer shall not mark the tested samples or items (or a separate part of the item) with the identifiers of certification and accreditation to mislead relevant parties about the tested samples or items.

## 1.2 Information about the testing laboratory

| | |
|---|---|
| Company: | The State Radio_monitoring_center Testing Center (SRTC) |
| Address: | 15th Building, No.30 Shixing Street, Shijingshan District, P.R.China |
| City: | Beijing |
| Country or Region: | P.R.China |
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## 1.3 Applicant's details

| | |
|---|---|
| Company: | ZTE Corporation |
| Address: | ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District,Guangdong |
| City: | Shenzhen |
| Country or Region: | China |
| Contacted person: | Yang Zhao |
| Tel: | 029-83600770 |
| Fax: | --- |
| Email: | zhao.yangxa@zte.com.cn |

## 1.4 Manufacturer's details

| | |
|---|---|
| Company: | ZTE Corporation |
| Address: | ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District,Guangdong |
| City: | Shenzhen |
| Country or Region: | China |
| Contacted person: | Yang Zhao |
| Tel: | 029-83600770 |
| Fax: | --- |
| Email: | zhao.yangxa@zte.com.cn |

## 1.5 Test Environment

| | |
|---|---|
| Date of Receipt of test sample at SRTC: | 2019-03-12 |
| Testing Start Date: | 2019-03-18 |
| Testing End Date: | 2019-04-11 |

| Environmental Data: | Temperature (°C) | Humidity (%) |
|---|---|---|
| Ambient | 25 | 30 |

| | |
|---|---|
| Normal Supply Voltage (V d.c.): | 3.85 |

# 2 DESCRIPTION OF THE DEVICE UNDER TEST

## 2.1Final Equipment Build Status

| | |
|---|---|
| Frequency Band | 2.412GHz~2.462GHz |
| Number of Channel For 20MHz | 11 |
| Modulation Type | DBPSK/DQPSK/CCK/BPSK/QPSK/16QAM/64QAM |
| Duplex Mode | TDD |
| Channel Spacing | 5MHz |
| Data Rate | 802.11b:1Mbps-11Mbps<br>802.11g:6Mbps-54Mbps<br>802.11n HT20:MCS0-MCS7 |
| Power Supply | Battery/Charger |
| HW Version | ukhB |
| SW Version | TEL_MX_ZTE_Blade_A7_2019V1.0 |
| IMEI | 864432040006454 |
| Antenna type | Refer to Note |
| Antenna connector | Refer to Note |

**Note：The antenna provide to the EUT, please refer to the following table:**

| Brand | Model | Antenna gain | Frequency range(GHz) | Antenna type | Connecter Type |
|---|---|---|---|---|---|
| N/A | N/A | 1.39dBi | 2.412GHz~2.462GHz | IFA Antenna | N/A |
| Manufacturers ensure that their designs will not be modified by the user or third parties arbitrary antenna parameters and performance. | | | | | |

## 2.2 Description of Test Modes

**11 channels are provided to this EUT:**

| CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (MHz) |
|---|---|---|---|
| 1 | 2412 | 7 | 2442 |
| 2 | 2417 | 8 | 2447 |
| 3 | 2422 | 9 | 2452 |
| 4 | 2427 | 10 | 2457 |
| 5 | 2432 | 11 | 2462 |
| 6 | 2437 | --- | --- |

### 2.2.1 Test Mode Applicability and Tested Channel Detail

| EUT CONFIGURE MODE | APPLICABLE TO | | | | DESCRIPTION |
|---|---|---|---|---|---|
| | RE ≥ 1G | RE<1G | PLC | APCM | - |
| - | √ | √ | √ | √ | - |

Where **RE 1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz

**PLC:** Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

**Radiated Emission Test (Above 1GHz):**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|
| 1 to 11 | 6 | DBPSK/ BPSK | 1,6,6.5 |

**Radiated Emission Test (Below 1GHz):**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|
| 1 to 11 | 6 | DBPSK/ BPSK | 1,6,6.5 |

**Power Line Conducted Emission Test:**

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|
| 1 to 11 | 6 | DBPSK | 1 |

**Antenna Port Conducted Measurement:**

This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|
| 1 to 11 | 1,3, 6,9, 11 | DBPSK/ BPSK | 1,6,6.5 |

## 2.3 Duty Cycle of Test Signal

| Modulation Type | Data Rate | Duty Cycle | Correction factor |
|---|---|---|---|
| 11b | 1Mbps | 97.2% | 0.12dB |
| 11g | 6Mbps | 93.5% | 0.29dB |
| 11n(HT20) | 6.5Mbps | 92.7% | 0.33dB |
| Duty cycle of test signal is > 98 %, duty factor shall not be considered.<br>Correction factor = 10* log (1/duty cycle) | | | |

## 2.4 EUT Operating conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

## 2.5 Support Equipment

The following support equipment was used to exercise the DUT during testing:

| | |
|---|---|
| Equipment | Battery |
| Manufacturer | Ningbo Veken Battery Co., Ltd. |
| Model Number | Li3931T44P8h806139 |
| Serial Number | --- |

| | |
|---|---|
| Equipment | Battery |
| Manufacturer | Zhongshan Tianmao Battery Co., Ltd. |
| Model Number | Li3931T44P8h806139 |
| Serial Number | --- |

| | |
|---|---|
| Equipment | Charger |
| Manufacturer | RUIJING |
| Model Number | STC-A515A-Z |
| Serial Number | --- |

| | |
|---|---|
| Equipment | Charger |
| Manufacturer | CHENYANG |
| Model Number | STC-A515A-Z |
| Serial Number | --- |

| | |
|---|---|
| Equipment | Charger |
| Manufacturer | DOKOCOM |
| Model Number | STC-A515A-A |
| Serial Number | --- |

| | |
|---|---|
| Equipment | Charger |
| Manufacturer | RUIJING |
| Model Number | STC-A515A-A |
| Serial Number | --- |

| | |
|---|---|
| Equipment | Charger |
| Manufacturer | CHENYANG |
| Model Number | STC-A515A-A |
| Serial Number | --- |

| | |
|---|---|
| Equipment | Headset |
| Manufacturer | JUWEI ELECTRONICS CO.,LTD |
| Model Number | JWEP1036-Z01R |
| Serial Number | --- |

| | |
|---|---|
| Equipment | Headset |
| Manufacturer | ShenZhen FDC Electronic Co.,Ltd |
| Model Number | DEM-66 |
| Serial Number | --- |

| | |
|---|---|
| Equipment | USB Cable |
| Manufacturer | Dongguan Guojun Plastic Electronic Co.,Ltd |
| Model Number | USB-MU5-W-70-M-L |
| Serial Number | --- |

| | |
|---|---|
| Equipment | USB Cable |
| Manufacturer | Shen Zhen Shi Yi HUA XING Electron Co.,Ltd |
| Model Number | USB-MU5-W-70-M-L |
| Serial Number | --- |

# 3 REFERENCE SPECIFICATION

| Specification | Version | Title |
|---|---|---|
| 15.35 | 2019 | Measurement detector functions and bandwidths. |
| 15.209 | 2019 | Radiated emission limits; general requirements. |
| 15.247 | 2019 | Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz. |
| 15.203 | 2019 | Antenna requirement |
| ANSI C63.10 | 2013 | Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |
| KDB 558074D01 V05r02 | April 2, 2019 | GUIDANCE FOR PERFORMING COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEMS (DTS) OPERATING UNDER SECTION 15.247 |

# 4 KEY TO NOTES AND RESULT CODES

The following are the definition of the test result.

| Code | Meaning |
|---|---|
| PASS | Test result shows that the requirements of the relevant specification have been met. |
| FAIL | Test result shows that the requirements of the relevant specification have not been met. |
| N/T | Test case is not tested. |
| NTC | Nominal voltage, Normal Temperature |
| HV | High voltage, Normal Temperature |
| LV | Low voltage, Normal Temperature |
| HTHV | high voltage, High Temperature |
| LTHV | High voltage, Low Temperature |
| HTLV | Low voltage, High Temperature |
| LTLV | Low voltage, Low Temperature |

# 5 RESULT SUMMARY

| No. | Test case | Reference | Verdict |
|---|---|---|---|
| 1 | Peak Power Output | 15.247(a)(2) | Pass |
| 2 | Occupied Bandwidth | 15.247(b)(3) ) | Pass |
| 3 | Transmitter Power Spectral Density | 15.247(e) ) | Pass |
| 4 | Conducted Out of band emission measurement | 15.247(d) | Pass |
| 5 | Band Edge | 15.247(d) | Pass |
| 6 | Spurious Radiated Emissions | 15.247(d)/15.35(b)/15.209 | Pass |
| 7 | AC Power line Conducted Emission | 15.207 | Pass |
| 8 | Antenna requirement | 15.203 | Pass（refer to section 2.1） |

| | |
|---|---|
| This Test Report Is Issued by:<br>Mr. Peng Zhen | Checked by:<br>Mr. Li Bin |
| Tested by:<br>Tong Daocheng | Issued date:<br>20190411 |

# 6 TEST RESULT

## 6.1 Peak Power Output

### 6.1.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 22°C | 40% | 101.5kPa |

### 6.1.2 Test Description

A transmitter antenna terminal of EUT is connected to the power meter. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle (>98%), at maximum power, and at the appropriate frequencies.

### 6.1.3 Test limit

FCC Part15.247(b)(3)
The maximum permissible conducted output power is 1 Watt.
Used conversion factor: Limit (dBm) = 10 log (Limit (W)/1mW)
==> Maximum Output Power: 30.0 dBm

### 6.1.4 Test Procedure Used

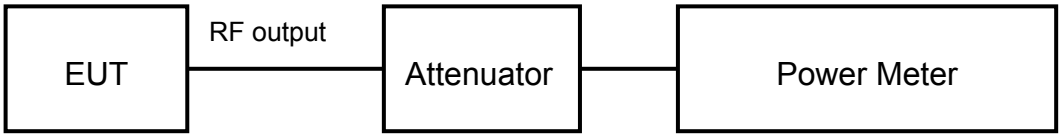
KDB 558074 D01 DTS Meas Guidance v05r02 – Section 9.1.3

### 6.1.5 Test Settings

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

### 6.1.6 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.




### 6.1.7 Test result

The test results are shown in Appendix A .

## 6.2 Occupied Bandwidth

### 6.2.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 22°C | 40% | 101.5kPa |

### 6.2.2 Test Description

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer and Bluetooth test set via a power splitter with a known loss. Which connected to the transmitter antenna terminal of the EUT while the EUT is operating at maximum power and at the appropriate frequencies. All modes of operation were investigated and the worst case configuration results are reported in this section.

### 6.2.3 Test limit

FCC Part15.247(a)(2)
The minimum permissible 6dB bandwidth is 500 kHz

### 6.2.4 Test Procedure Used

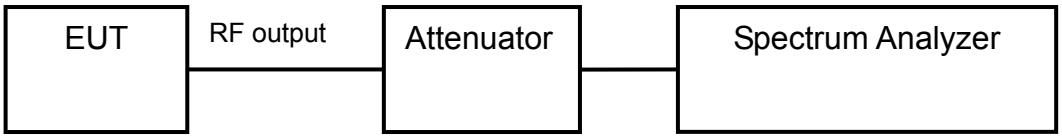
KDB 558074 D01 DTS Meas Guidance v05r02 – Section 8.1 Option 1

### 6.2.5 Test Settings

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 x RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 6.2.6 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.




### 6.2.7 Test result

The test results are shown in Appendix A.

## 6.3 Transmitter Power Spectral Density

### 6.3.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 22°C | 40% | 101.5kPa |

### 6.3.2 Test Description

The peak power density is measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle (>98%), at maximum power, and at the appropriate frequencies. All data rates were investigated and the worst case configuration results are reported in this section.

### 6.3.3 Test limit

FCC Part15.247(e)
The maximum permissible power spectral density is 8.0 dBm in any 3 kHz band.

### 6.3.4 Test Procedure Used

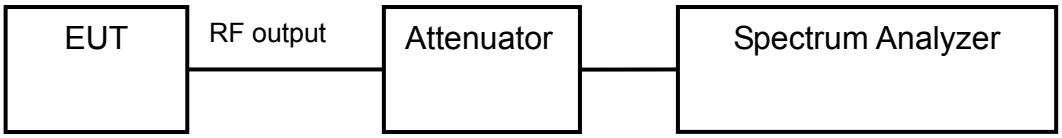
KDB 558074 D01 DTS Meas Guidance v05r02 Section 10.2.

### 6.3.5 Test Settings

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 6.3.6 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.




### 6.3.7 Test result

The test results are shown in Appendix A.

## 6.4 Conducted Out of band emission measurement

### 6.4.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 22°C | 40% | 101.5kPa |

### 6.4.2 Test Description

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle (>98%), at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration.

### 6.4.3 Test limit

FCC Part 15.247(d)
The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth.

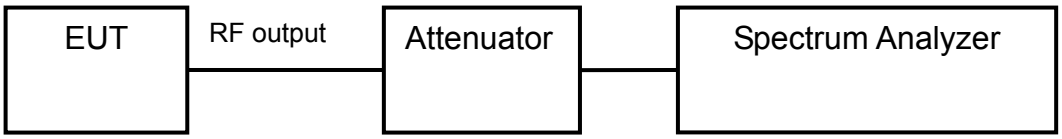
### 6.4.4 Test Procedure Used

KDB 558074 D01 DTS Meas Guidance v05r02 Section 11.3

### 6.4.5 Test Settings

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100kHz.
c) Set the VBW ≥ 300kHz.
d) Detector = peak.
e) Set span to encompass the spectrum to be examined
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level.

### 6.4.6 Test Setup




### 6.4.7 Test result

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

The test results are shown in Appendix A.

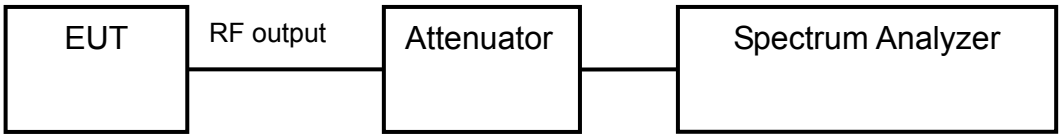
## 6.5 Band-edge measurement

### 6.5.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 22°C | 40% | 101.5kPa |

### 6.5.2 Test Description

For the following out of band conducted spurious emissions plots, the EUT was set to transmit at maximum power with the largest packet size available. The worst case spurious emissions were found in this configuration.




### 6.5.3 Test limit

Part 15.247(d)

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth.

### 6.5.4 Test Procedure Used

KDB 558074 D01 DTS Meas Guidance v05r02 Section 12.1

### 6.5.5 Test Settings

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100kHz.
c) Set the VBW ≥ 300kHz.
d) Detector = peak.
e) Set span to encompass the spectrum to be examined
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level.

### 6.5.6 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

### 6.5.7 Test result

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.
The test results are shown in Appendix A .

## 6.6 Spurious Radiated Emissions

### 6.6.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 22°C | 40% | 101.5kPa |

### 6.6.2 Test Description

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at maximum power and at the appropriate frequencies. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

### 6.6.3 Test limit

Part15.205, 15.209, 15.247(d)

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in below Table per Section 15.209.

| Frequency [MHz] | Field strength [ μV/m ] | Measured Distance [meters] |
|---|---|---|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30～88 | 100 | 3 |
| 88～216 | 150 | 3 |
| 216～960 | 200 | 3 |
| Above 960 | 500 | 3 |

**Radiated Limits**

Part15.35(b):

There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit

**Used conversion factor: Limit (dBμV/m) = 20 log (Limit (μV/m)/1μV/m)**

| Frequency [MHz] | Detector | Unit (dBμV/m) |
|---|---|---|
| 30～88 | Quasi-peak | 40.0 |
| 88～216 | Quasi-peak | 43.5 |
| 216～960 | Quasi-peak | 46.0 |
| 960～1000 | Quasi-peak | 54.0 |
| 1000～5th harmonic of the highest frequency or 40GHz, whichever is lower | Average | 54.0 |
| | Peak | 74.0 |

**Conversion Radiated limits**

### 6.6.4 Test Procedure Used

KDB 558074 D01 DTS Meas Guidance v05r02 – Section 12.2.7

**For Radiated emission below 30MHz**

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. Both X and Y axes of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

**For Radiated emission above 30MHz**
a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

**For the radiated emission test above 1GHz:**
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The

final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

NOTE:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Average detection (AV) at frequency above 1GHz. If duty cycle of test signal is < 98%, the duty factor need added to measured value.
4. All modes of operation were investigated and the worst-case emissions are reported.

### 6.6.5 Test Settings

**Average Field Strength Measurements per Section 12.2.7 of KDB 558074 (Part 15.35)**
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz > 1/T
4. Averaging type was set to RMS to ensure that video filtering was applied in the power domain
5. Detector = average
6. Sweep time = auto
7. Trace mode = max hold
8. Trace was allowed to run for at least 50 times (1/duty cycle) traces

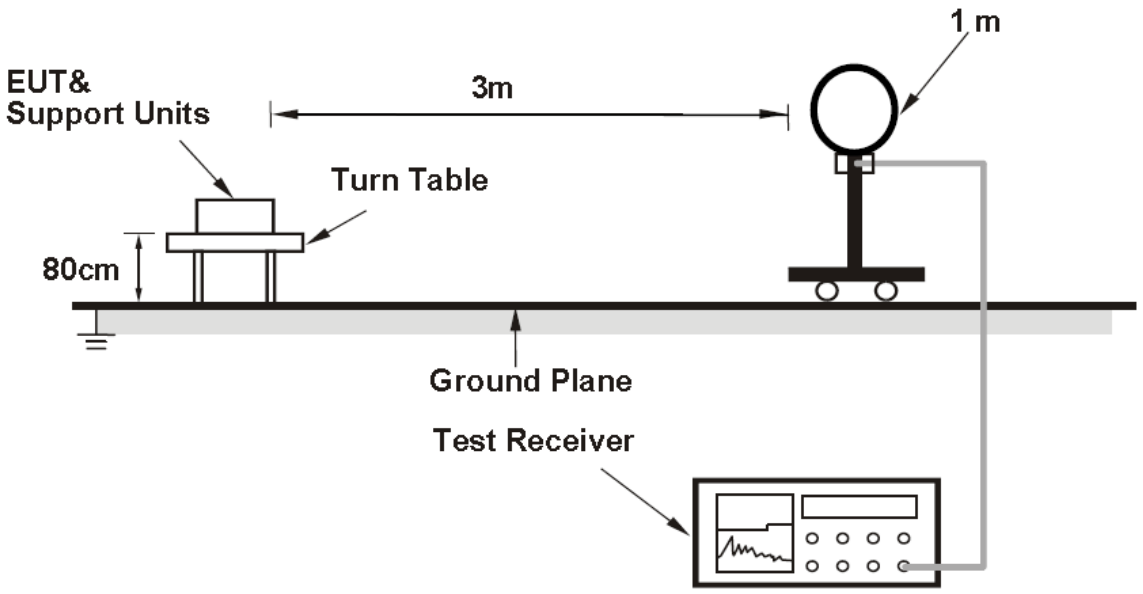
**Peak Field Strength Measurements per Section 12.2.7of KDB 558074 (Part 15.35)**
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW is set depending on measurement frequency, as specified in following table

| Frequency | RBW |
|---|---|
| 9-150kHz | 200-300Hz |
| 0.15-30MHz | 9-10kHz |
| 30-1000MHz | 100-120kHz |
| >1000MHz | 1MHz |

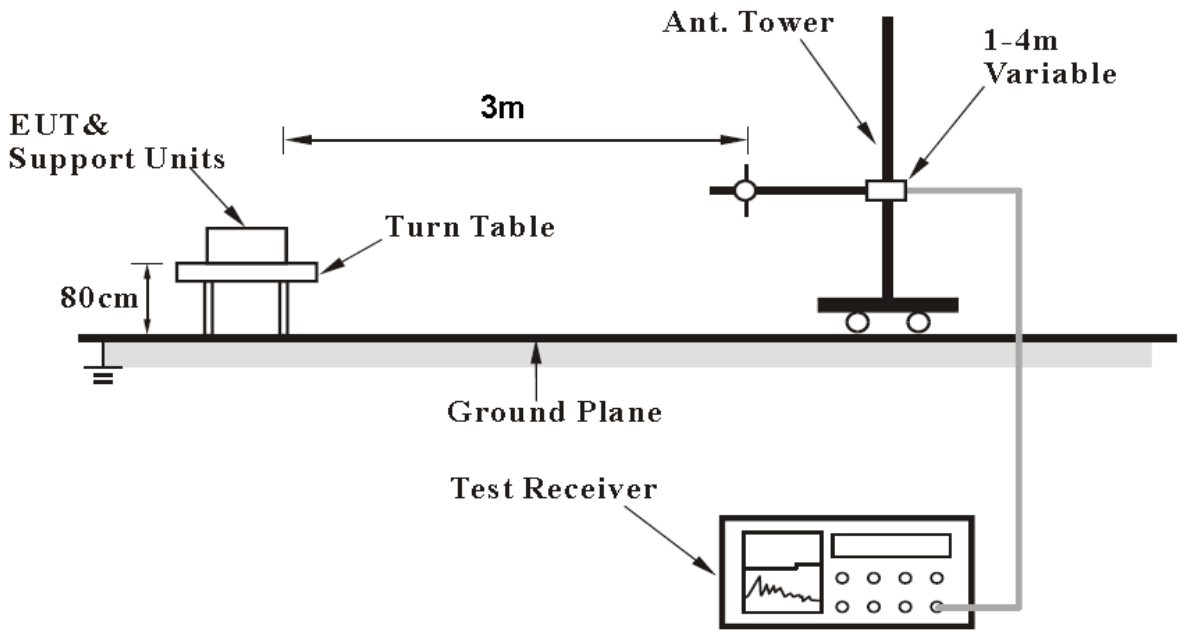
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

### 6.6.6 Test Setup

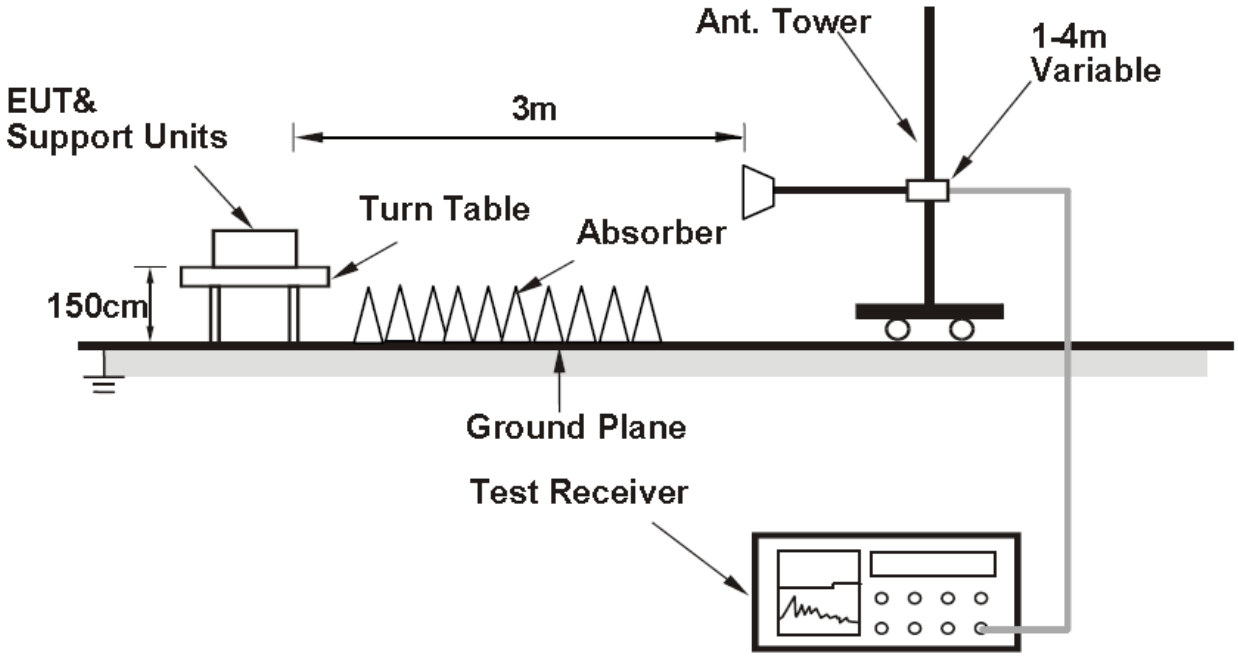
**For Radiated emission below 30MHz**




**For Radiated emission 30MHz to 1GHz**



**For Radiated emission above 1GHz**




### 6.6.7 Test result

The test results are shown in Appendix B.

## 6.7 AC Power line Conducted Emission

### 6.7.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 22°C | 40% | 101.5kPa |

### 6.7.2 Test limit

FCC Part15.207, RSS-247

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

* Decreases with the logarithm of the frequency.

The measurement is made according to ANSI C63.10-2013

### 6.7.3 Test Procedures

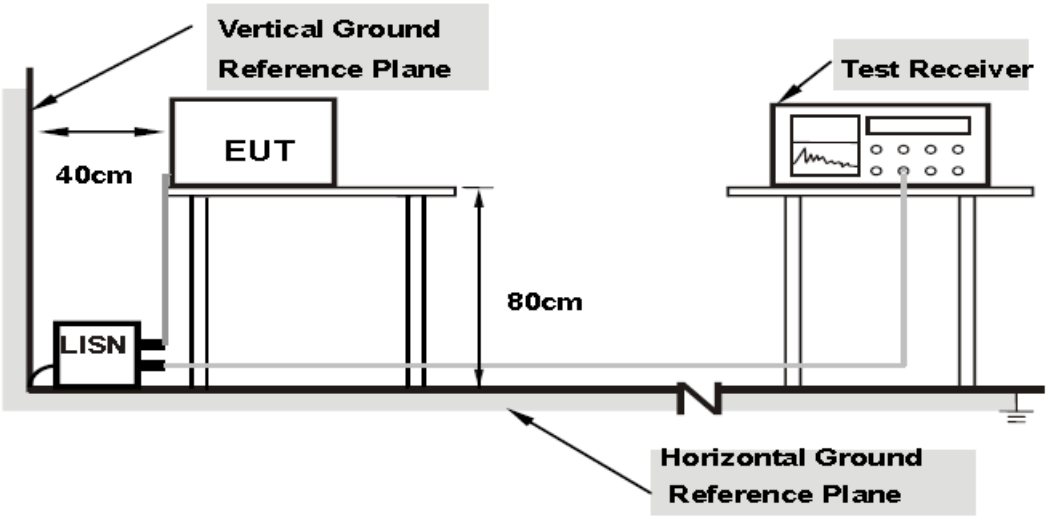
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.
The EUT shall test under the power AC120V/60Hz.

### 6.7.4 Test Setup




For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 6.7.5 Test result

The test results are shown in AppendixB .

# 7 MEASUREMENT UNCERTAINTIES

| Items | Uncertainty | |
|---|---|---|
| Occupied Bandwidth | 3kHz | |
| Peak power output | 0.67dB | |
| Band edge compliance | 1.20dB | |
| Spurious emissions | 30MHz～1GHz | 2.83dB |
| | 1GHz～12.75GHz | 2.50dB |
| | 12.75GHz～25GHz | 2.75dB |

# 8 TEST EQUIPMENTS

| No. | Name/ Model | Manufacturer | S/N | Cal date | Cal Due date |
|---|---|---|---|---|---|
| 1. | Spectrum Analyzer FSV | ROHDE&SCHWARZ | 101065 | 2018.08.20 | 2019.08.19 |
| 2. | Power Meter E4416A | Agilent | MY52370013 | 2019.03.01 | 2020.02.28 |
| 3. | Power Sensor E9327A | Agilent | MY52420006 | 2019.03.01 | 2020.02.28 |
| 4. | Attenuator 6810.17.B | HUBER+SUHNER | 768710 | 2018.08.20 | 2019.08.19 |
| 5. | 23.18m×16.88m×9.60m Semi-Anechoic Chamber | FRANKONIA | --- | ----- | ----- |
| 6. | Turn table Diameter:5m | FRANKONIA | ----- | ----- | ----- |
| 7. | Antenna master SAC(MA4.0) | MATURO | ----- | ----- | ----- |
| 8. | 9.080m×5.255m×3.525m Shielding room | FRANKONIA | ----- | ----- | ----- |
| 9. | HF 907 Double-Ridged Waveguide Horn Antenna | R&S | 100512 | 2018.08.20 | 2019.08.19 |
| 10. | 3160-09 Receive antenna | SCHWARZ-BECK | 002058-002 | 2018.08.20 | 2019.08.19 |
| 11. | ESI 40 EMI test receiver | R&S | 100015 | 2018.08.20 | 2019.08.19 |
| 12. | ESCS30 EMI test receiver | R&S | 100029 | 2018.08.20 | 2019.08.19 |
| 13. | HL562 Receive antenna | R&S | 100167 | 2018.08.20 | 2019.08.19 |
| 14. | ENV216 AMN | R&S | 3560.6550.12 | 2018.08.20 | 2019.08.19 |
| 15. | HFH2-Z2 Loop antenna | R&S | 100340 | 2018.08.20 | 2019.08.19 |

# APPENDIX A – TEST DATA OF CONDUCTED EMISSION

Please refer to the attachment.

# APPENDIX B – TEST DATA OF RADIATED EMISSION

Please refer to the attachment.

# APPENDIX A – TEST DATA OF CONDUCTED EMISSION

In order to find the worst case condition, Pre-tests are needed at the presence of different data rate. Data rate below means worst-case rate of each test item.

Worst-case data rates are shown as following table.

| Test Mode | Data Rate |
|---|---|
| 802.11b | 1Mbps |
| 802.11g | 6Mbps |
| 802.11n HT20 | MCS0(6.5 Mbps) |

**Conducted power**

| Modulation type | Peak power output (dBm) | | |
|---|---|---|---|
| | 2412MHz | 2437MHz | 2462MHz |
| 11b | 18.96 | 19.29 | 20.59 |
| 11g | 20.89 | 21.26 | 21.66 |
| 11n HT20 | 20.66 | 21.58 | 21.53 |

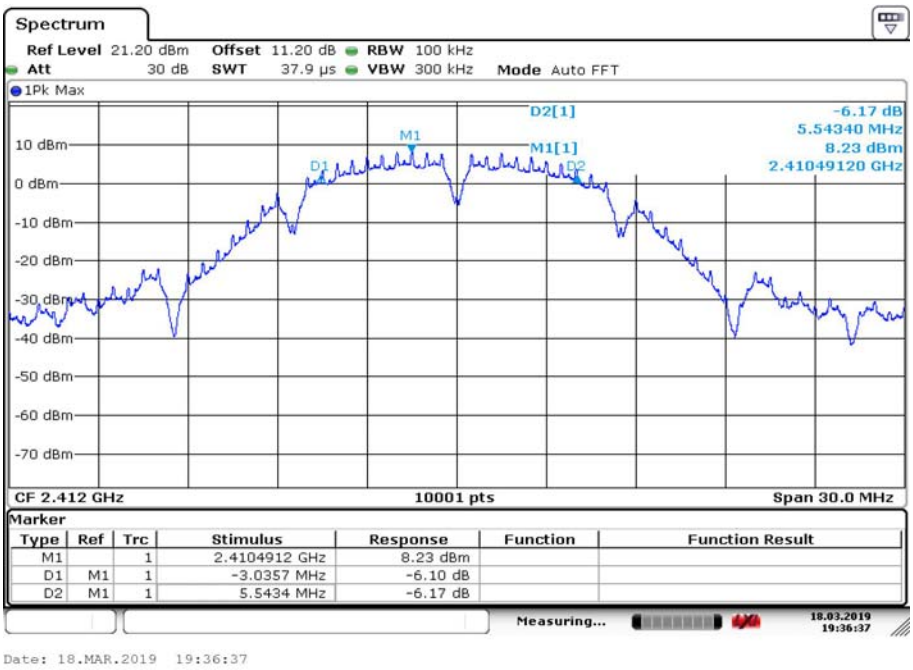
| Modulation type | Average power output (dBm) | | |
|---|---|---|---|
| | 2412MHz | 2437MHz | 2462MHz |
| 11b | 16.55 | 16.72 | 17.13 |
| 11g | 14.97 | 15.31 | 16.57 |
| 11n HT20 | 14.63 | 15.34 | 15.36 |

## 6dB Bandwidth

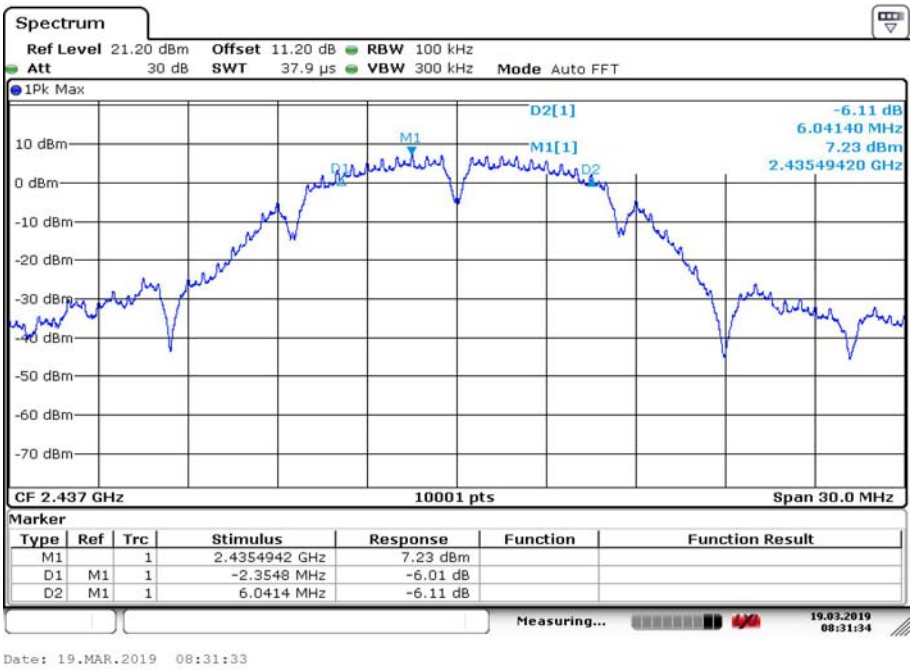
Offset 11.2dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.0dB

Test Mode: 802.11b

| Carrier frequency (MHz) | Channel No. | 6 dB bandwidth(kHz) |
|---|---|---|
| 2412 | 1 | 8579.1 |
| 2437 | 6 | 8396.2 |
| 2462 | 11 | 9123.1 |

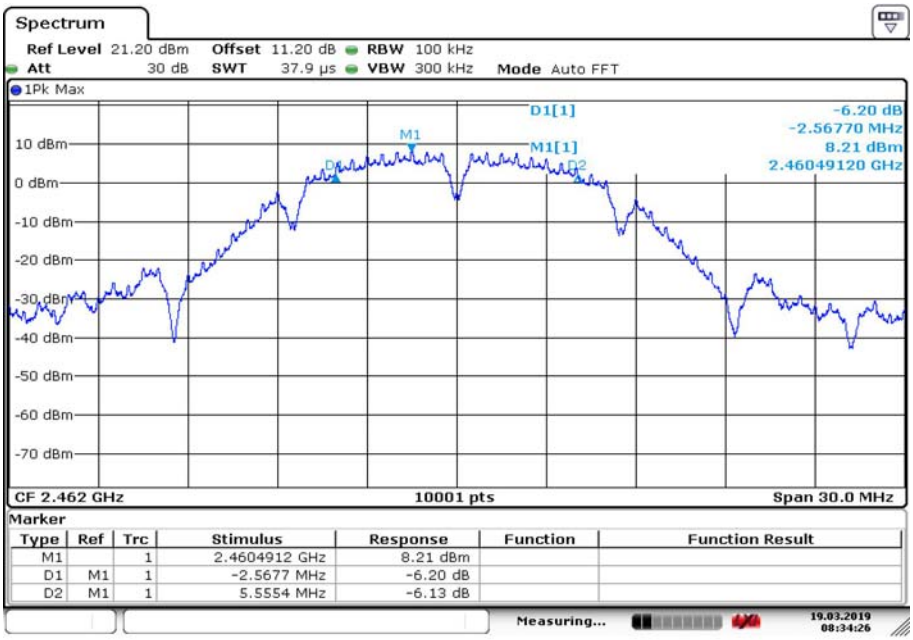



Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b




Date: 19.MAR.2019 08:31:33

Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11b

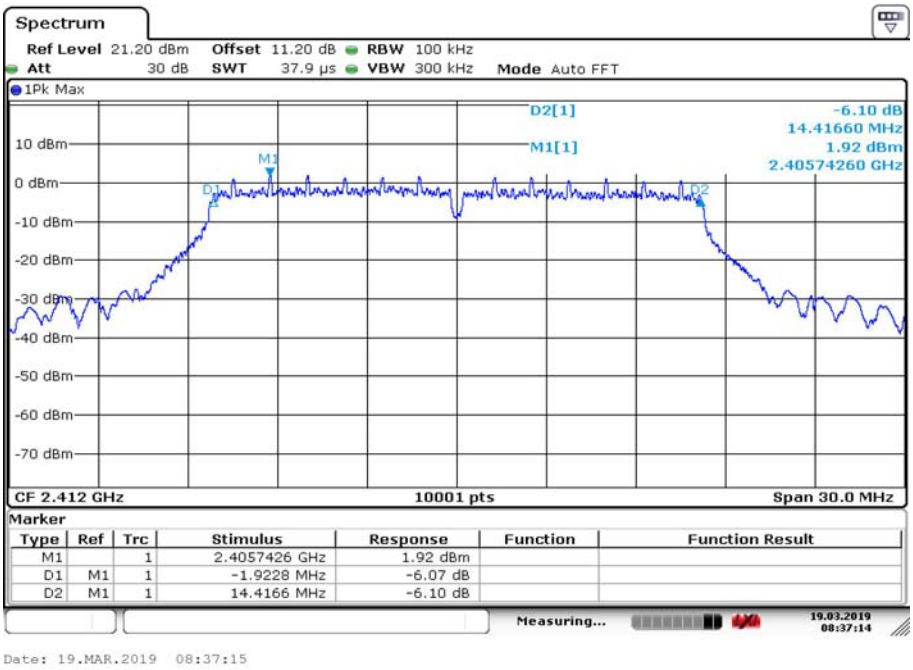



Date: 19.MAR.2019 08:34:26

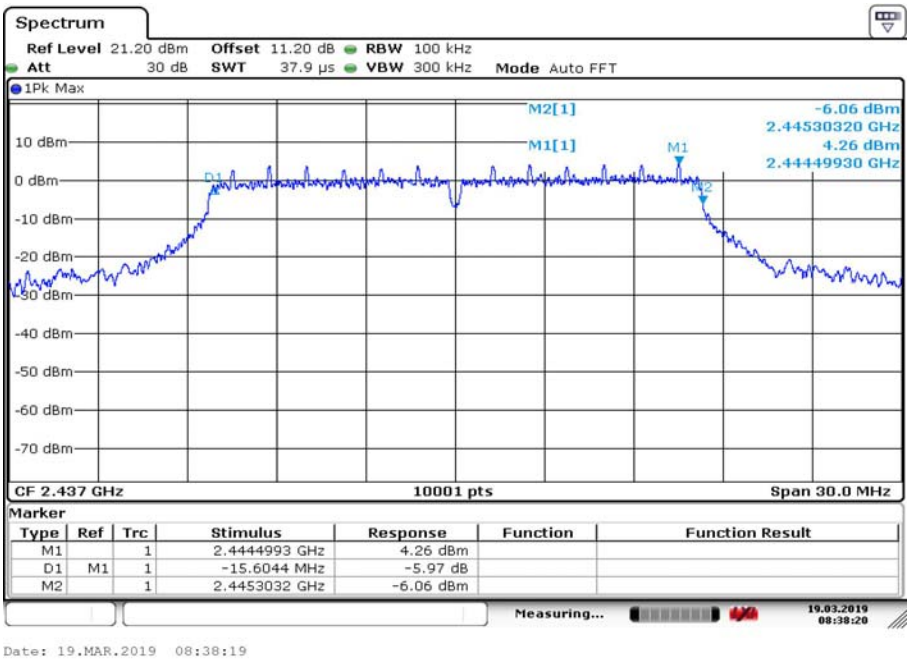
Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b

Test Mode: 802.11g

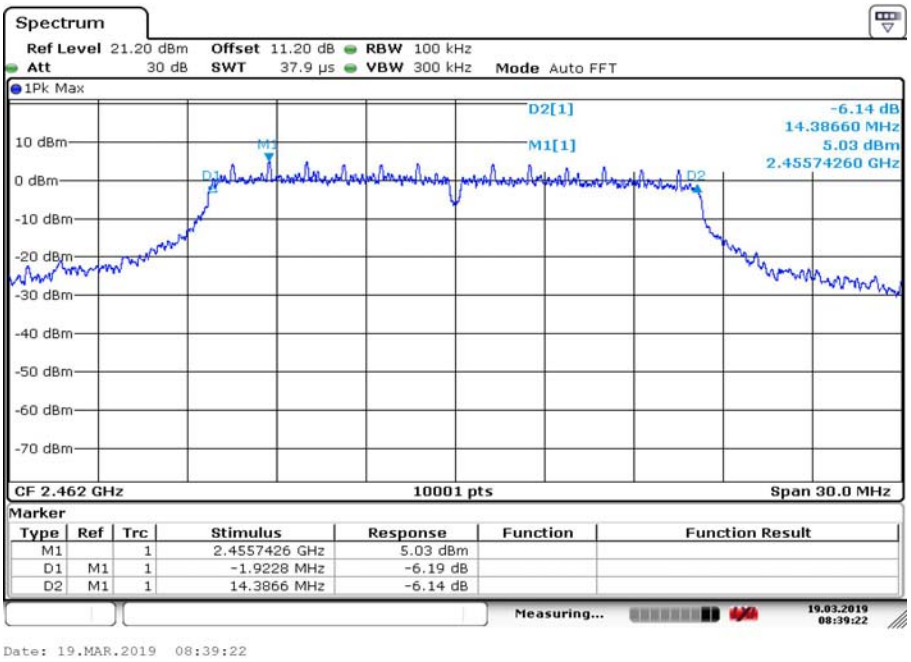
| Carrier frequency (MHz) | Channel No. | 6 dB bandwidth(kHz) |
|---|---|---|
| 2412 | 1 | 16339.4 |
| 2437 | 6 | 18049.7 |
| 2462 | 11 | 16309.4 |




Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g



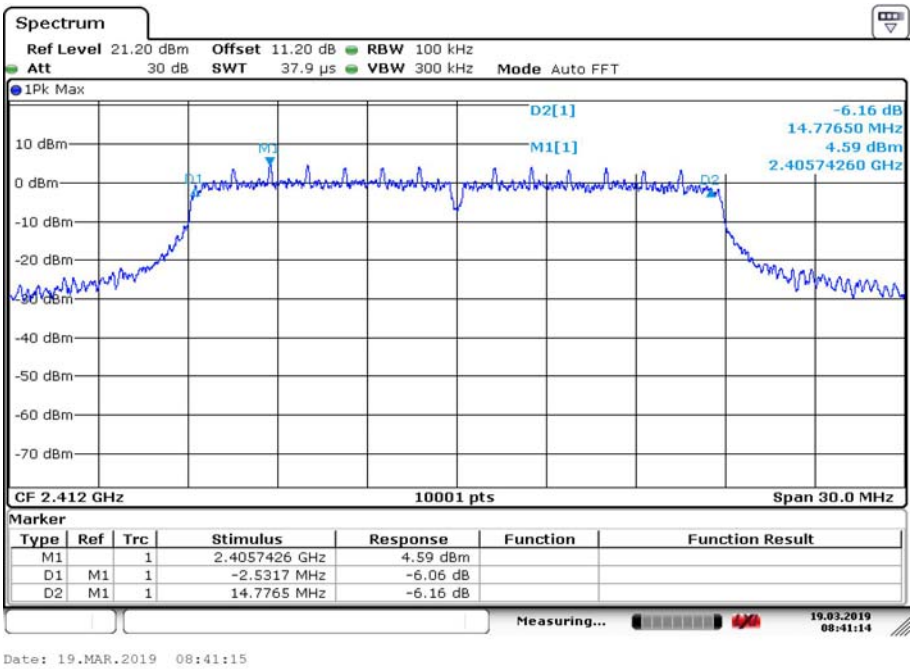

Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11g



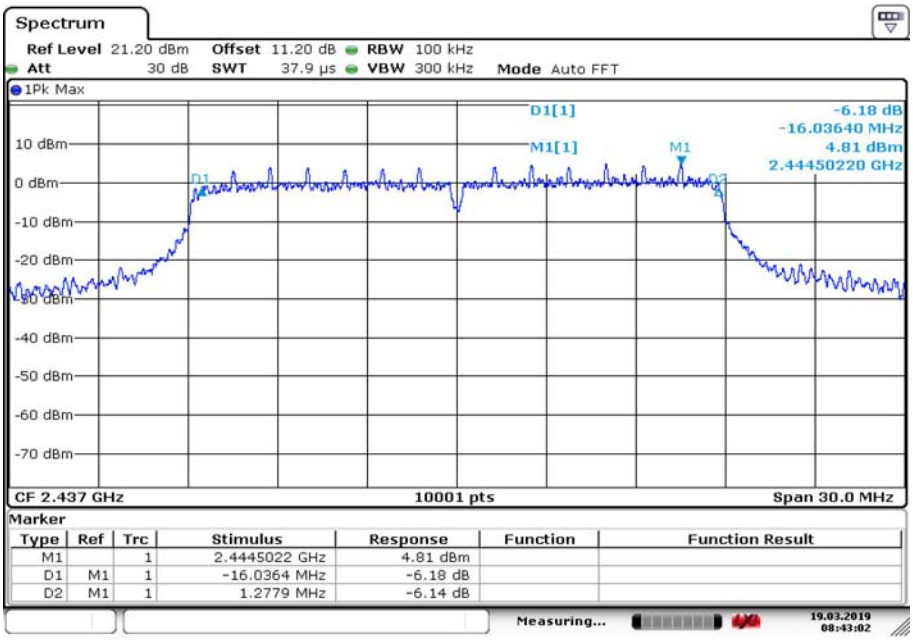

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g

Test Mode: 802.11n (HT20)

| Carrier frequency (MHz) | Channel No. | 6 dB bandwidth(kHz) |
|---|---|---|
| 2412 | 1 | 17308.2 |
| 2437 | 6 | 17314.3 |
| 2462 | 11 | 16666.3 |

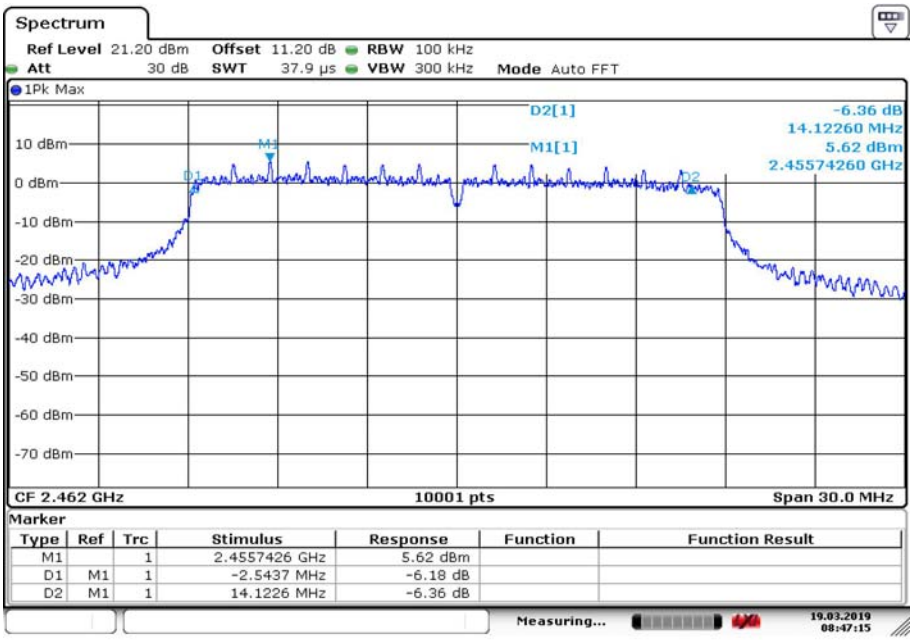



Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n (HT20)




Date: 19.MAR.2019 08:43:03

Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11n (HT20)




Date: 19.MAR.2019 08:47:16

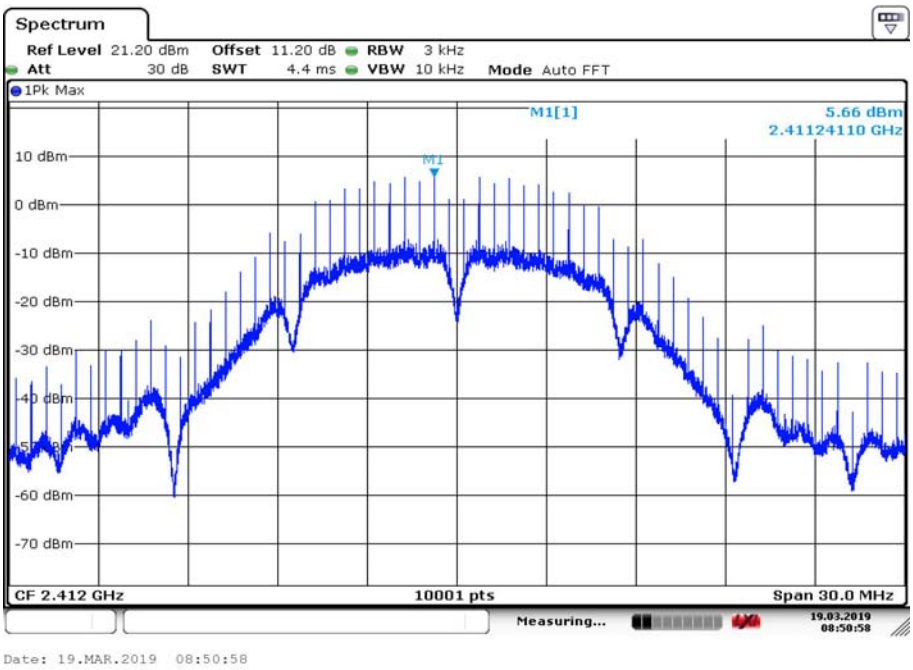
Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n (HT20)

## Transmitter Power Spectral Density

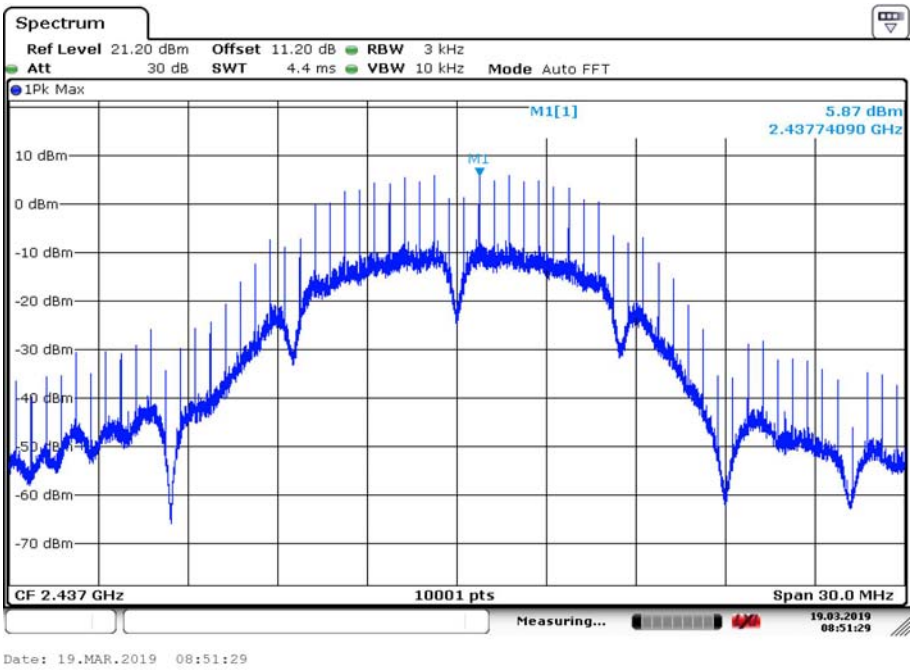
Offset 11.2dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.0dB

Test Mode: 802.11b

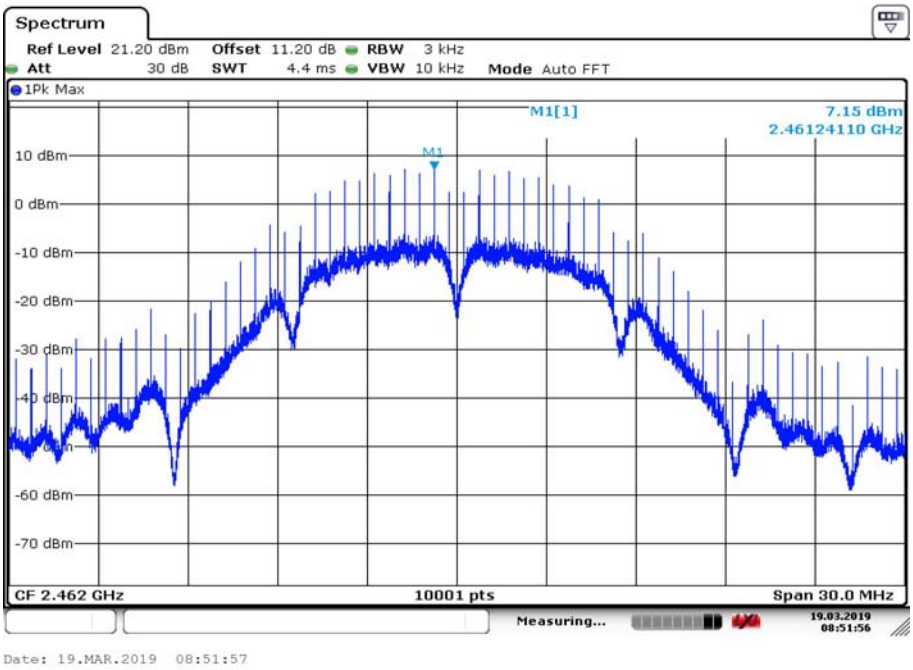
| Carrier frequency (MHz) | Channel No | Power Density (dBm) |
|---|---|---|
| 2412 | 1 | 5.66 |
| 2437 | 6 | 5.87 |
| 2462 | 11 | 7.15 |




Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11b



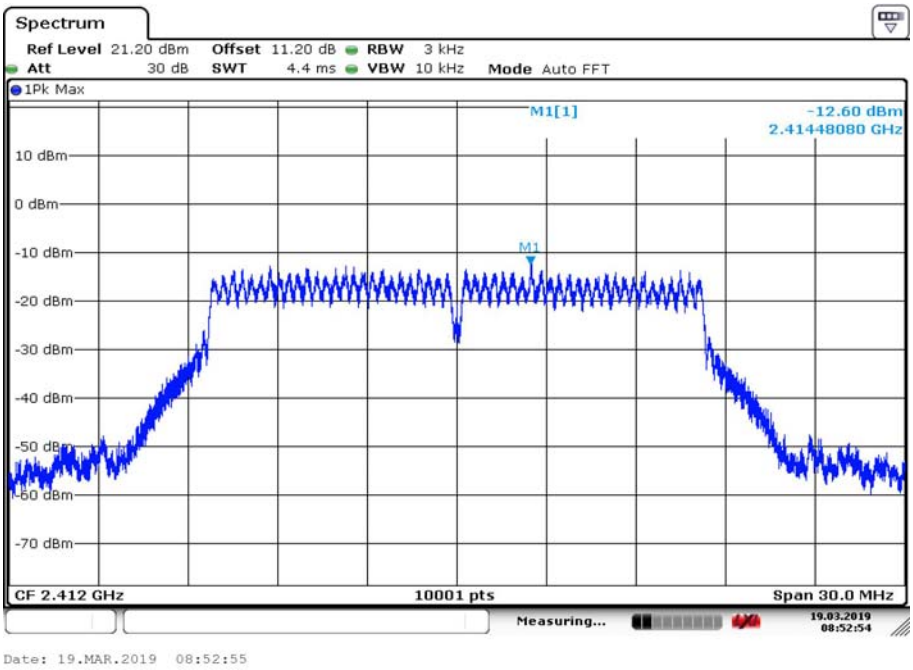

Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11b



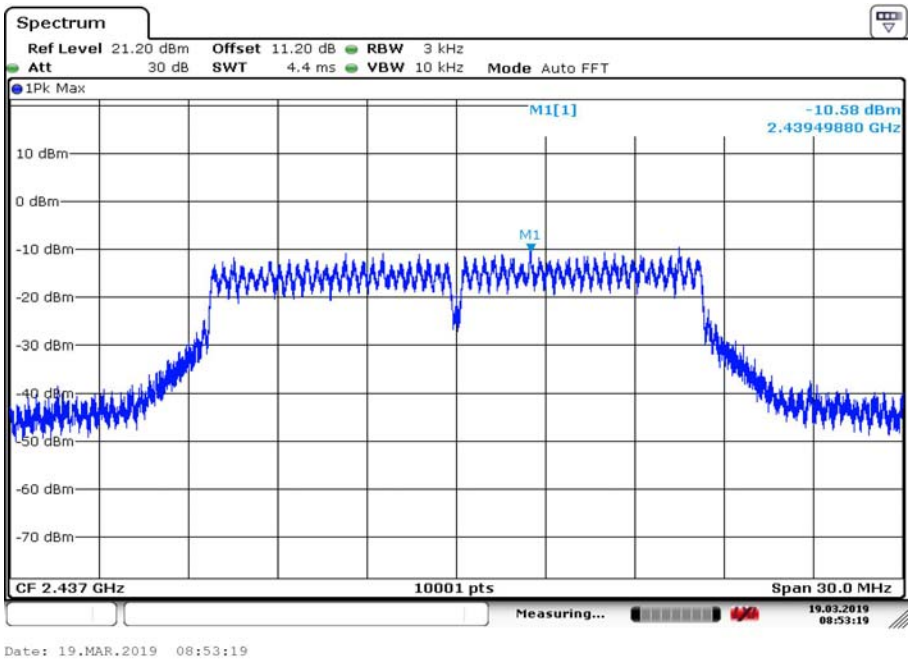

Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11b

Test Mode: 802.11g

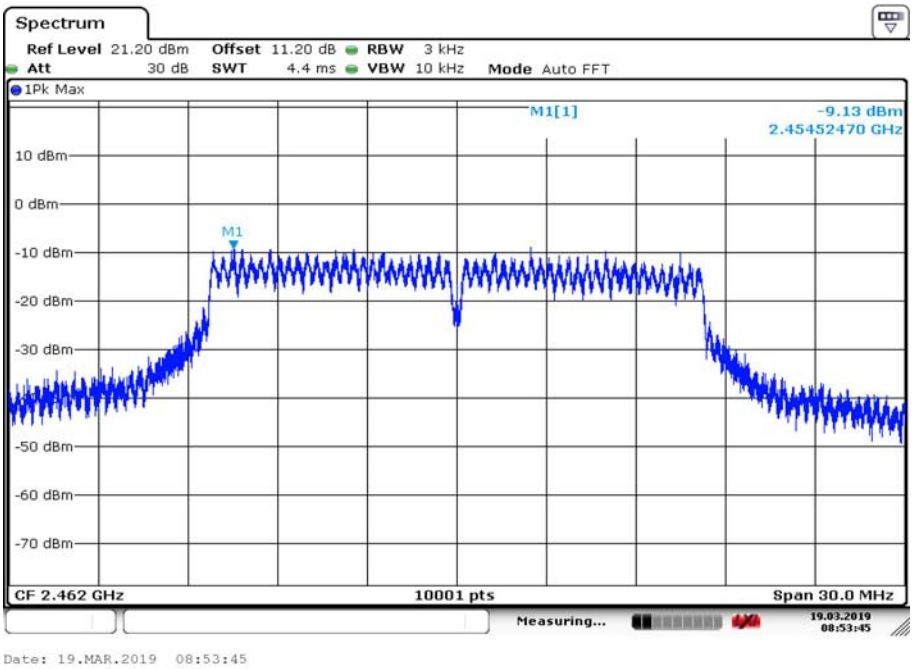
| Carrier frequency (MHz) | Channel No | Power Density (dBm) |
|---|---|---|
| 2412 | 1 | -12.60 |
| 2442 | 6 | -10.58 |
| 2472 | 11 | -9.13 |




Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11g



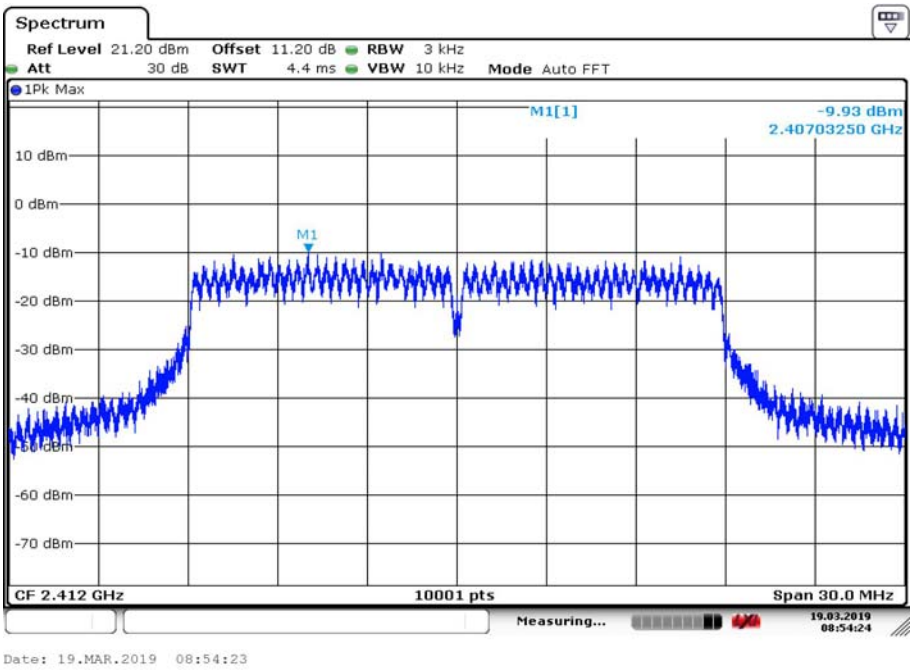

Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11g



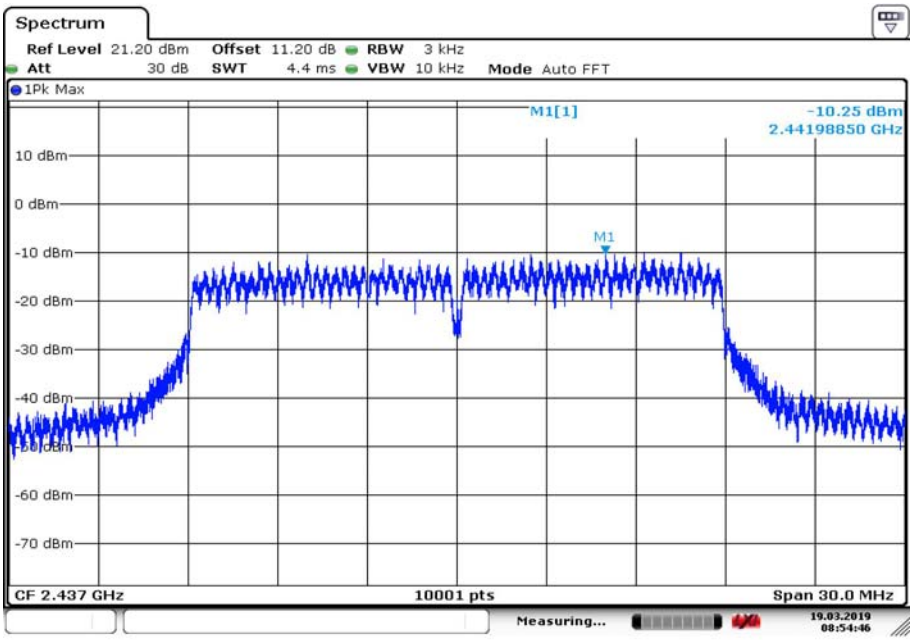

Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11g

Test Mode: 802.11n (HT20)

| Carrier frequency (MHz) | Channel No | Power Density (dBm) |
|---|---|---|
| 2412 | 1 | -9.93 |
| 2437 | 6 | -10.25 |
| 2462 | 11 | -9.37 |

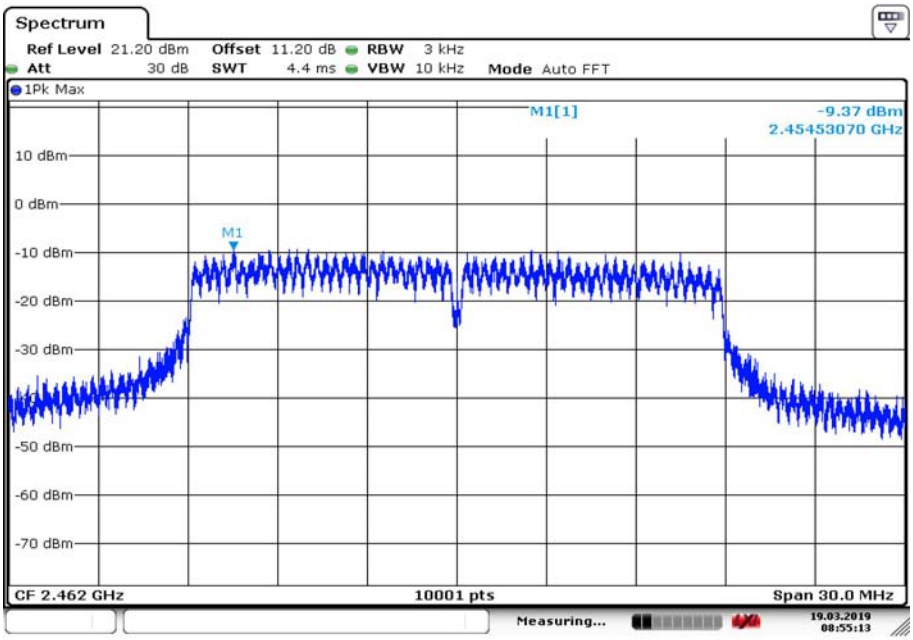



Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11n (HT20)




Date: 19.MAR.2019 08:54:47

Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11n (HT20)




Date: 19.MAR.2019 08:55:13

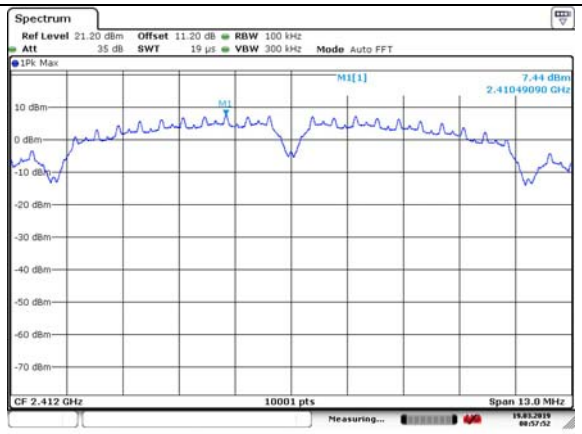
Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11n (HT20)

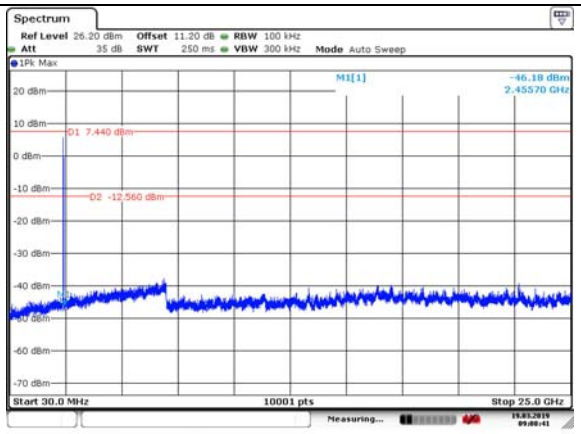
## Conducted Out of band emission measurement

Offset 11.2dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.0dB

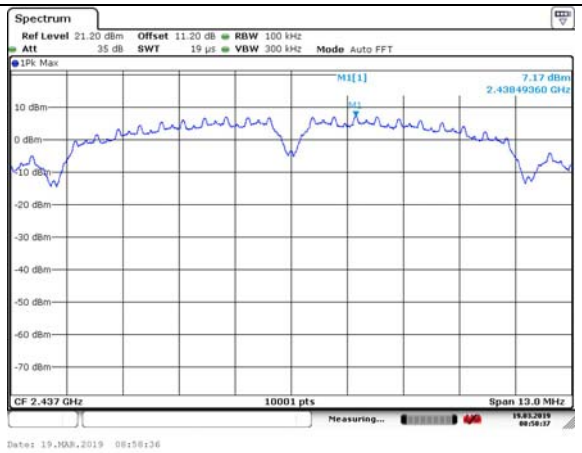
802.11b

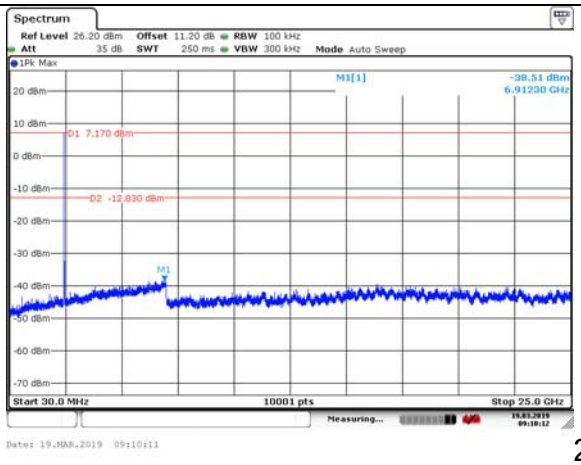
CH1



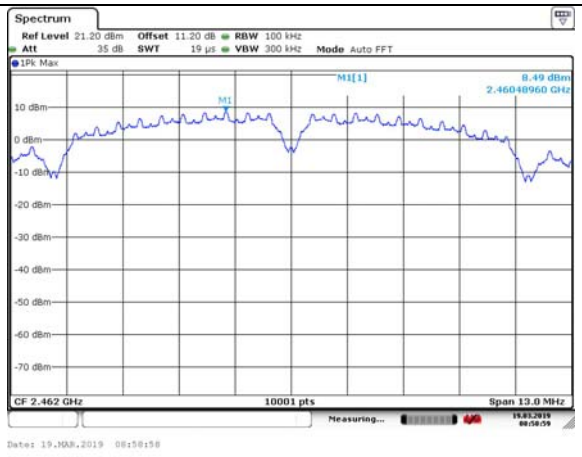

CH6

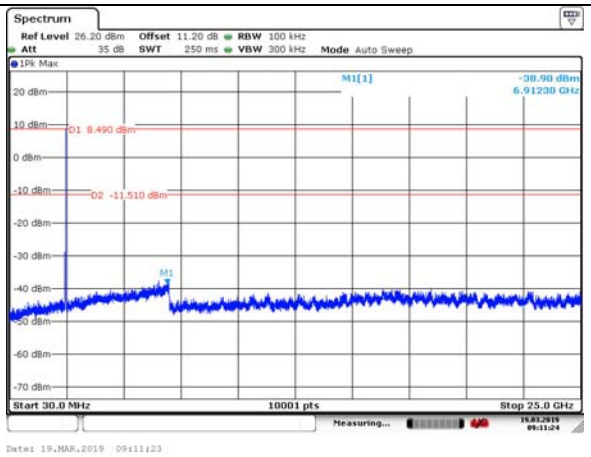



29

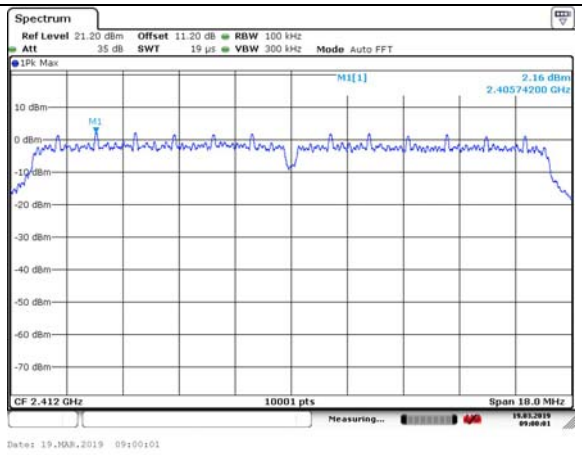
CH11

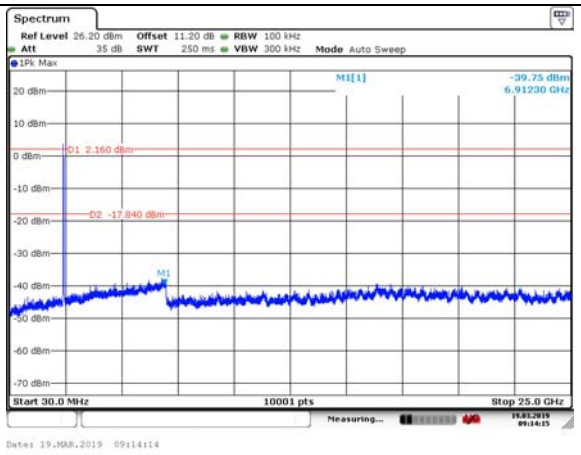


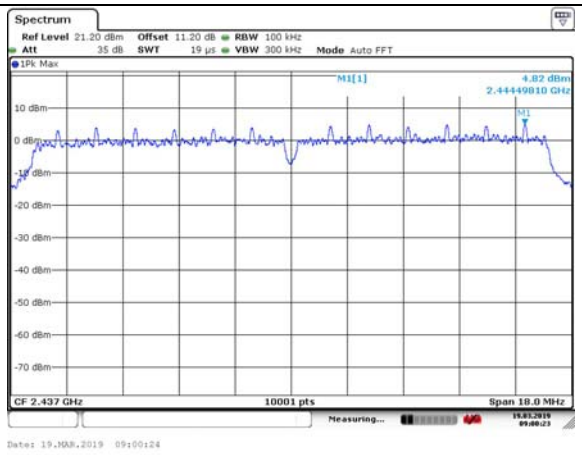
802.11g

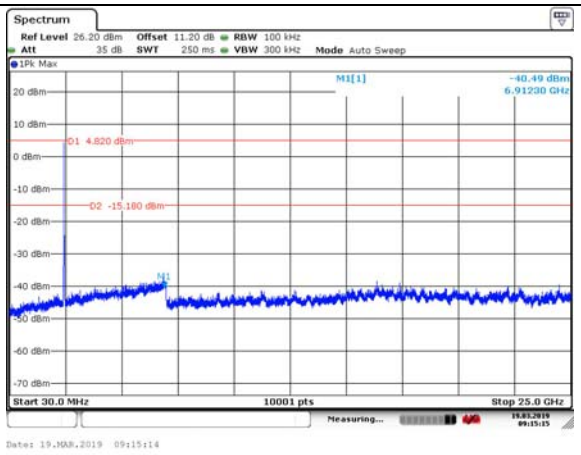
CH1



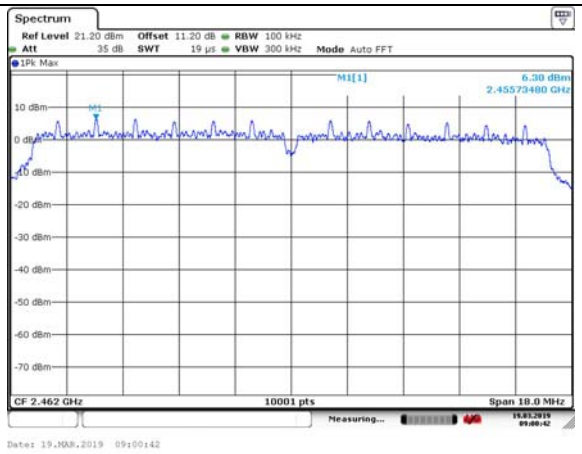



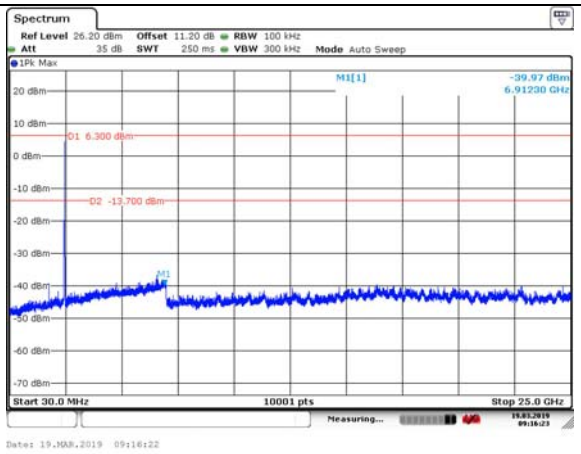

CH6



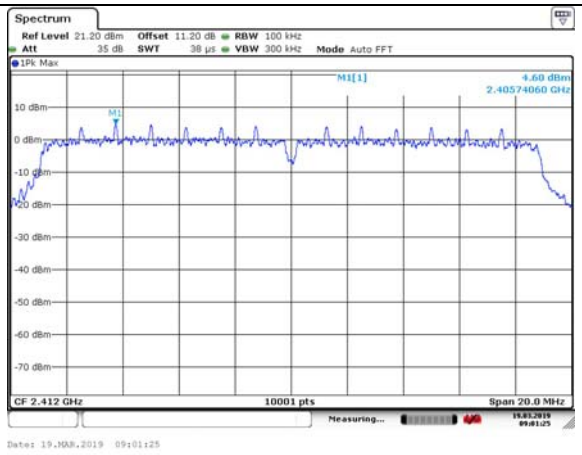

CH11

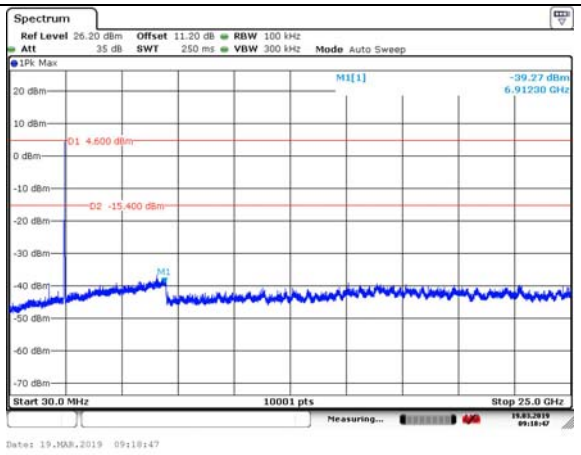


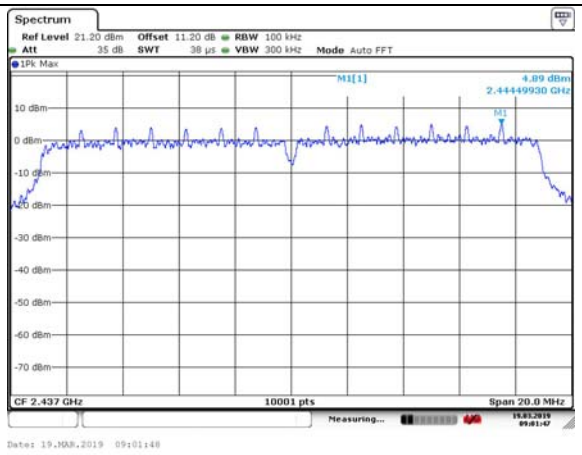
802.11n (HT20)

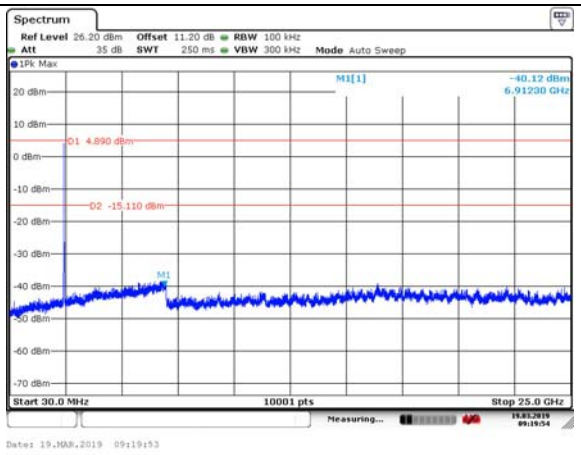
CH1



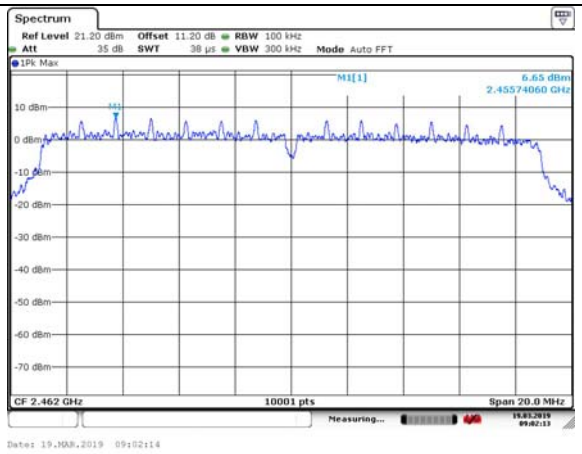



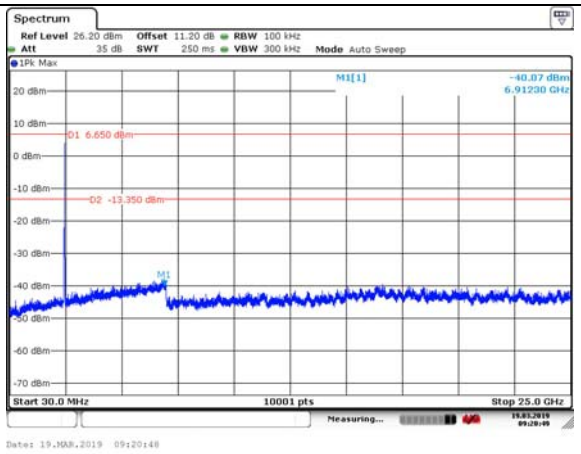

CH6




CH11

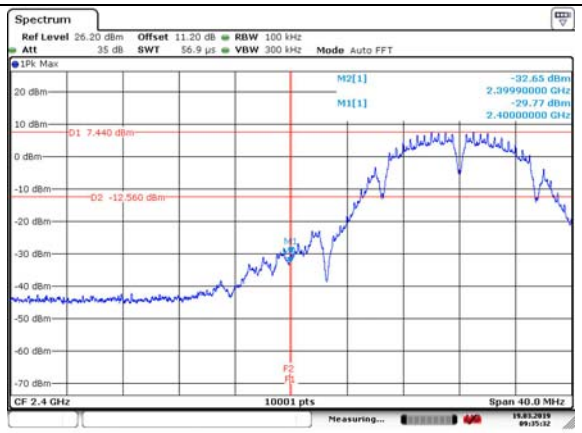
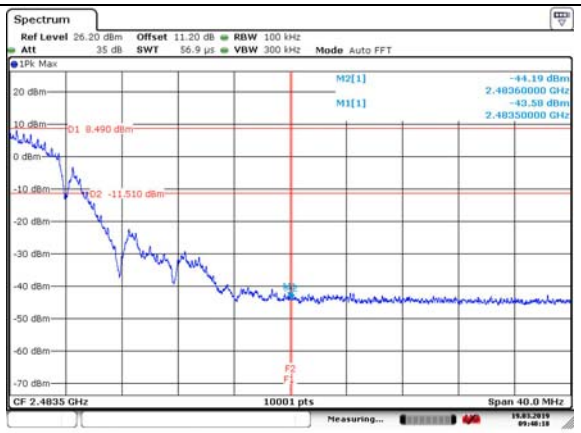


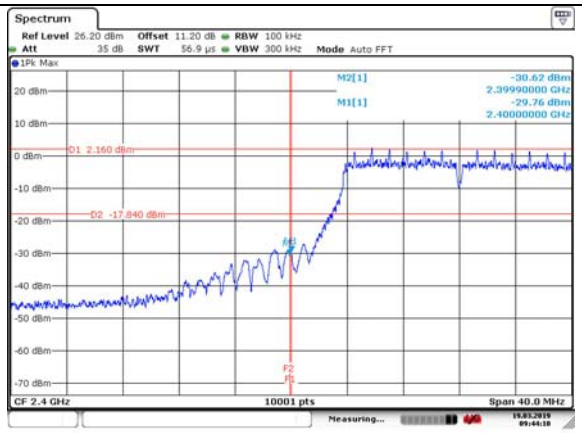
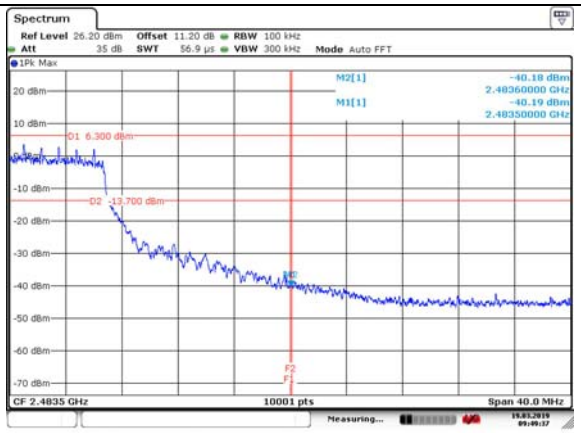
**Band edge measurement (RF Conducted measurement)**

Offset 11.2dB = Attenuator 10dB+ Temporary antenna connector loss 0.2dB+ Cable loss 1.0dB

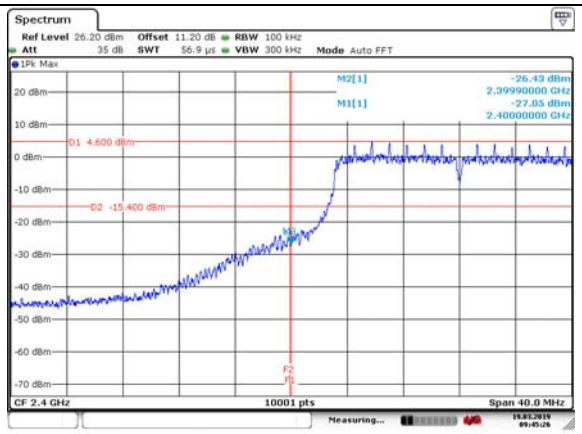
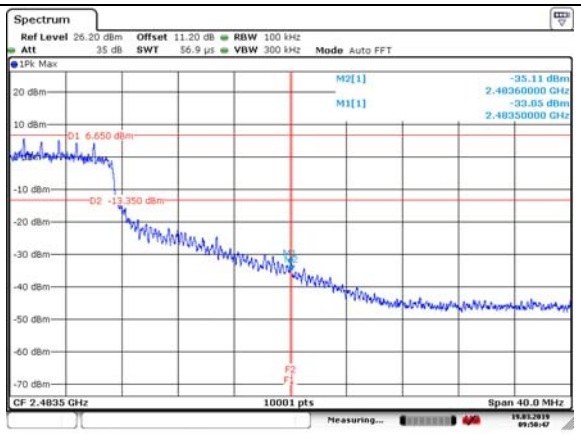
802.11b

| CH1 | CH11 |
|---|---|
|  |  |

802.11g

| CH1 | CH11 |
|---|---|
|  |  |

802.11n (HT20)

| CH1 | CH11 |
|---|---|
|  |  |

# APPENDIX B – TEST DATA OF RADIATED EMISSION

**Radiated Emission Band Edge**

The worst case attitude: The mobile lay down.
The measurement results are obtained as described below:
Measure Level = Reading Level + cable loss + antenna factor
Sample calculation: (101.03 dBuV/m) = (67.03 dBμV) + (8.90 dB) + (25.10 dB), the corresponding frequency is 2412MHz.

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 101.03 | 67.03 | N/A | N/A | 8.90 | 25.10 |

Peak detector：RBW=1MHz,VBW=3MHz,sweep time=200ms；
Average detector：RBW=1MHz,VBW=3MHz,sweep time=auto；

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b
Polarity:Horizontal
Detector: Peak

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 98.08 | 64.08 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 56.11 | 22.11 | -17.89 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b
Polarity:Vertical
Detector: Average

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 90.65 | 56.65 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 38.20 | 4.20 | -15.80 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b
Polarity:Horizontal
Detector: Average

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 87.71 | 53.71 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 40.45 | 6.45 | -13.55 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b
Polarity:Vertical
Detector: Peak

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 101.39 | 67.39 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 58.56 | 24.56 | -15.44 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b
Polarity:Horizontal
Detector: Peak

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 97.65 | 63.65 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 55.85 | 21.85 | -18.15 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b
Polarity:Vertical
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 88.96 | 54.96 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 37.62 | 3.62 | -16.38 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b
Polarity:Horizontal
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 85.77 | 51.77 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 40.03 | 6.03 | -13.97 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g
Polarity: Vertical
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 100.15 | 66.15 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 58.57 | 24.57 | -15.43 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g
Polarity:Horizontal
Detector: Peak

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 98.89 | 64.89 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 55.41 | 21.41 | -18.59 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g
Polarity: Vertical
Detector: Average

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 91.33 | 57.33 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 38.07 | 4.07 | -15.93 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g
Polarity:Horizontal
Detector: Average

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 86.35 | 52.35 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 41.97 | 7.97 | -12.03 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g
Polarity: Vertical
Detector: Peak

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 102.13 | 68.13 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 55.47 | 21.47 | -18.53 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g
Polarity:Horizontal
Detector: Peak

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 97.24 | 63.24 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 55.45 | 21.45 | -18.55 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g
Polarity: Vertical
Detector: Average

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 88.59 | 54.59 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 40.47 | 6.47 | -13.53 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g
Polarity:Horizontal
Detector: Average

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 85.07 | 51.07 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 41.64 | 7.64 | -12.36 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n(HT20)
Polarity: Vertical
Detector: Peak

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 101.32 | 67.32 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 56.15 | 22.15 | -17.85 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n(HT20)
Polarity:Horizontal
Detector: Peak

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 97.49 | 63.49 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 55.46 | 21.46 | -18.54 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n(HT20)
Polarity: Vertical
Detector: Average

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 91.84 | 57.84 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 38.00 | 4.00 | -16.00 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n(HT20)
Polarity:Horizontal
Detector: Average

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 85.15 | 51.15 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2390 | 41.99 | 7.99 | -12.01 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT20)
Polarity: Vertical
Detector: Peak

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 102.72 | 68.72 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 58.49 | 24.49 | -15.51 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT20)
Polarity:Horizontal
Detector: Peak

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 98.39 | 64.39 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 57.38 | 23.38 | -16.62 | 74.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT20)
Polarity: Vertical
Detector: Average

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 90.98 | 56.98 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 37.80 | 3.80 | -16.20 | 54.00 | 8.90 | 25.10 |

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT20)
Polarity:Horizontal
Detector: Average

| No | Frequency （MHz） | Measure Level （dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuv/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2462 | 86.87 | 52.87 | N/A | N/A | 8.90 | 25.10 |
| 2 | 2483.5 | 40.67 | 6.67 | -13.33 | 54.00 | 8.90 | 25.10 |

***Sample Calculations***

Determining Spurious Emissions Levels

A "reference path loss" is established and the $A_{Rpl}$ is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss.
The measurement results are obtained as described below:
Result= $P_{mea}$ + $A_{Rpl}$
Sample calculation: (34.21 dBμV/m) = (46.01 dBuV) + (-11.8 dB/m), the corresponding frequency is 38.164167MHz.

| Frequency (MHz) | Result (dBuV/m) | ARpl (dB/m) | Pmea (dBuV) | Polarity | Limit (dBuV/m) |
|---|---|---|---|---|---|
| 38.164167 | 34.21 | -11.8 | 46.01 | Vertical | 40.00 |

For 802.11b Channel No.:1

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | Pmea (dBuV/m) | Polarity |
|---|---|---|---|---|
| 31.27125 | 30.72 | -14 | 44.72 | Vertical |
| 40.12375 | 18.49 | -18 | 36.49 | Vertical |
| 46.75125 | 23.08 | -22.1 | 45.18 | Vertical |
| 50.797083 | 19.13 | -24.4 | 43.53 | Vertical |
| 831.725833 | 14.41 | -5.8 | 20.21 | Vertical |
| 939.518333 | 16.17 | -4.2 | 20.37 | Vertical |

For 802.11g Channel No.:1

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | Pmea (dBuV/m) | Polarity |
|---|---|---|---|---|
| 31.315833 | 31.84 | -14 | 45.84 | Vertical |
| 40.6875 | 18.68 | -18.4 | 37.08 | Vertical |
| 46.954583 | 22.88 | -22.2 | 45.08 | Vertical |
| 50.514167 | 19.43 | -24.3 | 43.73 | Vertical |
| 84.823333 | 11.86 | -23.3 | 35.16 | Vertical |
| 907.422917 | 15.64 | -4.7 | 20.34 | Horizontal |

For 802.11n(HT20) Channel No.:1

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | Pmea (dBuV/m) | Polarity |
|---|---|---|---|---|
| 31.354583 | 31.07 | -14 | 45.07 | Vertical |
| 40.812917 | 18.69 | -18.5 | 37.19 | Vertical |
| 46.753333 | 23.09 | -22.1 | 45.19 | Vertical |
| 50.797083 | 18.58 | -24.4 | 42.98 | Vertical |
| 85.024167 | 11.12 | -23.3 | 34.42 | Vertical |
| 944.285 | 16.11 | -4.2 | 20.31 | Vertical |

For 802.11b Channel No.:6

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | Pmea (dBuV/m) | Polarity |
|---|---|---|---|---|
| 31.35125 | 30.4 | -14 | 44.4 | Vertical |
| 38.469583 | 18.98 | -17.3 | 36.28 | Vertical |
| 46.386667 | 22.82 | -21.9 | 44.72 | Vertical |
| 50.634167 | 18.49 | -24.3 | 42.79 | Vertical |
| 831.4 | 14.36 | -5.8 | 20.16 | Vertical |
| 848.093333 | 14.61 | -5.6 | 20.21 | Vertical |

For 802.11g Channel No.:6

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | Pmea (dBuV/m) | Polarity |
|---|---|---|---|---|
| 31.437917 | 30.24 | -14.1 | 44.34 | Vertical |
| 37.8175 | 17.19 | -17 | 34.19 | Vertical |
| 49.4225 | 20.8 | -23.8 | 44.6 | Vertical |
| 50.957083 | 18.12 | -24.4 | 42.52 | Vertical |
| 825.499583 | 14.45 | -5.9 | 20.35 | Vertical |
| 863.00875 | 14.82 | -5.4 | 20.22 | Vertical |

For 802.11n(HT20) Channel No.:6

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | Pmea (dBuV/m) | Polarity |
|---|---|---|---|---|
| 31.19125 | 29.76 | -14 | 43.76 | Vertical |
| 40.325417 | 19.46 | -18.2 | 37.66 | Vertical |
| 46.427917 | 22.72 | -21.9 | 44.62 | Vertical |
| 50.635833 | 18.46 | -24.3 | 42.76 | Vertical |
| 836.94125 | 14.4 | -5.8 | 20.2 | Vertical |
| 948.245 | 16.08 | -4.2 | 20.28 | Vertical |

For 802.11b Channel No.:11

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | Pmea (dBuV/m) | Polarity |
|---|---|---|---|---|
| 31.559167 | 29.92 | -14.1 | 44.02 | Vertical |
| 38.305833 | 19.44 | -17.2 | 36.64 | Vertical |
| 46.992083 | 22.82 | -22.2 | 45.02 | Vertical |
| 50.635833 | 18.54 | -24.3 | 42.84 | Vertical |
| 836.453333 | 14.4 | -5.8 | 20.2 | Vertical |
| 951.359583 | 16.12 | -4.1 | 20.22 | Horizontal |

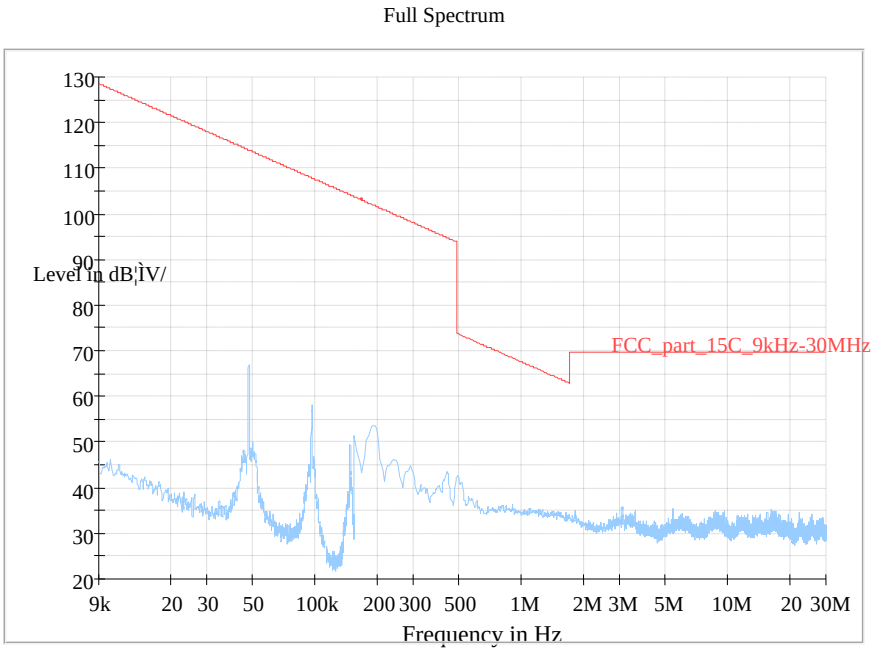
For 802.11g Channel No.:11

| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | Pmea (dBuV/m) | Polarity |
|---|---|---|---|---|
| 31.43375 | 29.54 | -14.1 | 43.64 | Vertical |
| 38.267083 | 19.49 | -17.2 | 36.69 | Vertical |
| 46.509583 | 22.78 | -21.9 | 44.68 | Vertical |
| 50.874583 | 18.02 | -24.4 | 42.42 | Vertical |
| 812.084167 | 14.19 | -6.1 | 20.29 | Vertical |
| 955.320417 | 16.16 | -4 | 20.16 | Vertical |

For 802.11n(HT20) Channel No.:11

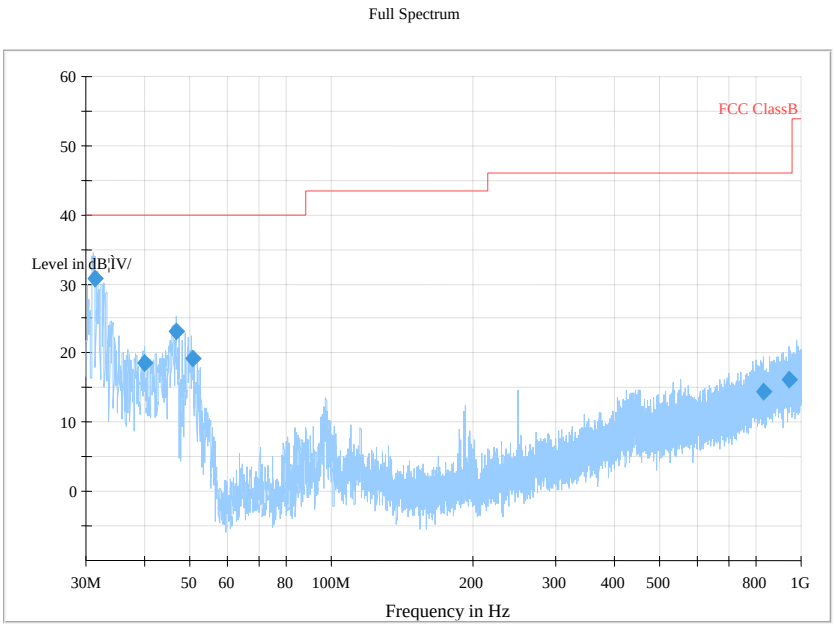
| Frequency(MHz) | Result(dBuV/m) | ARpl (dB) | Pmea (dBuV/m) | Polarity |
|---|---|---|---|---|
| 31.475417 | 33.79 | -14.1 | 47.89 | Vertical |
| 35.880417 | 21.02 | -16.1 | 37.12 | Vertical |
| 46.877083 | 23.29 | -22.2 | 45.49 | Vertical |
| 50.877083 | 18.87 | -24.4 | 43.27 | Vertical |
| 84.985417 | 13.48 | -23.3 | 36.78 | Vertical |
| 939.962917 | 16.22 | -4.2 | 20.42 | Horizontal |

## WLAN Mode

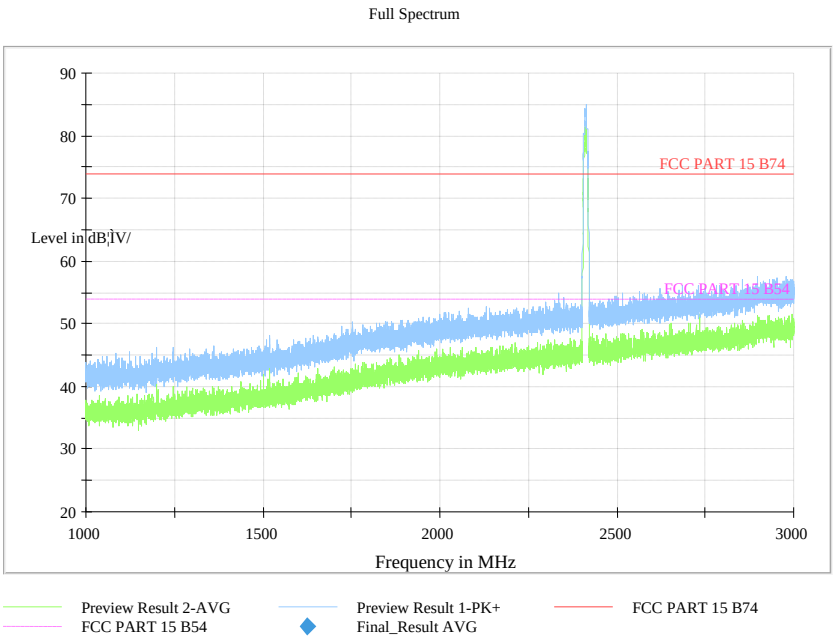



Frequency Range: 9kHz -30MHz

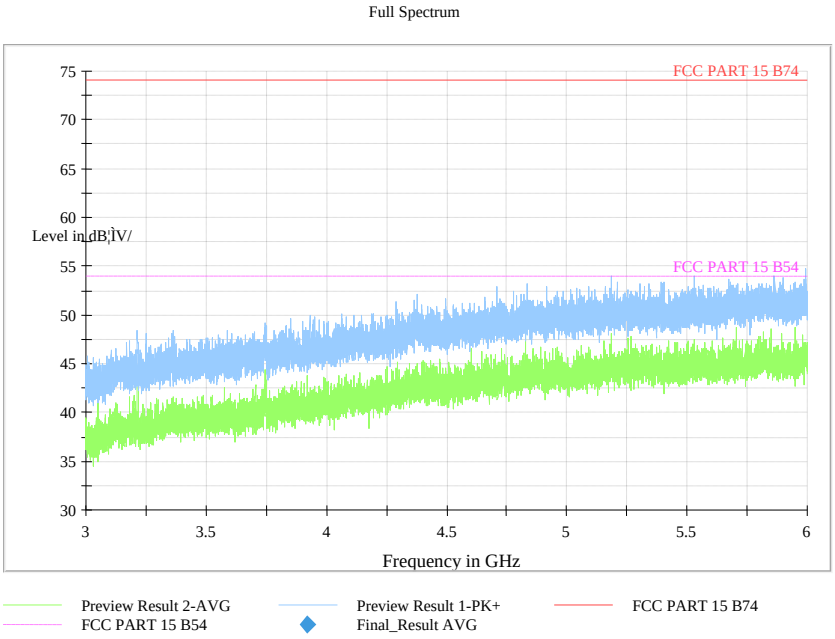
Carrier frequency (MHz): 2412
Channel No.:1



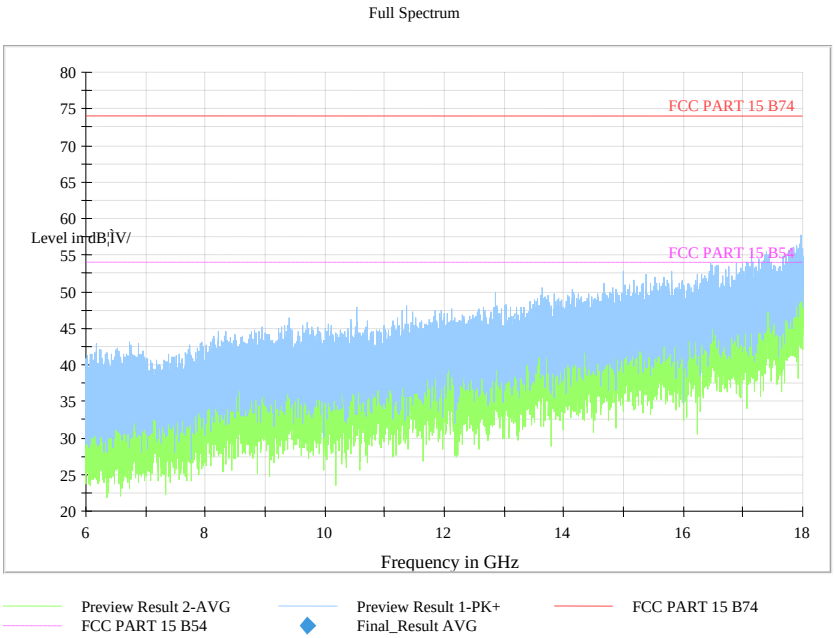

Frequency Range: 30MHz -1GHz
Detector: QP mode
Test Mode: 802.11b



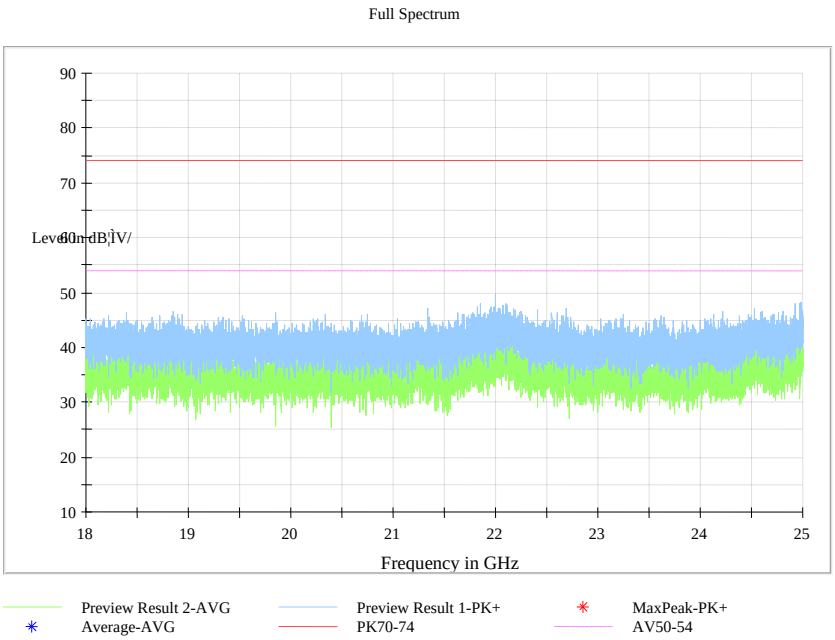

Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



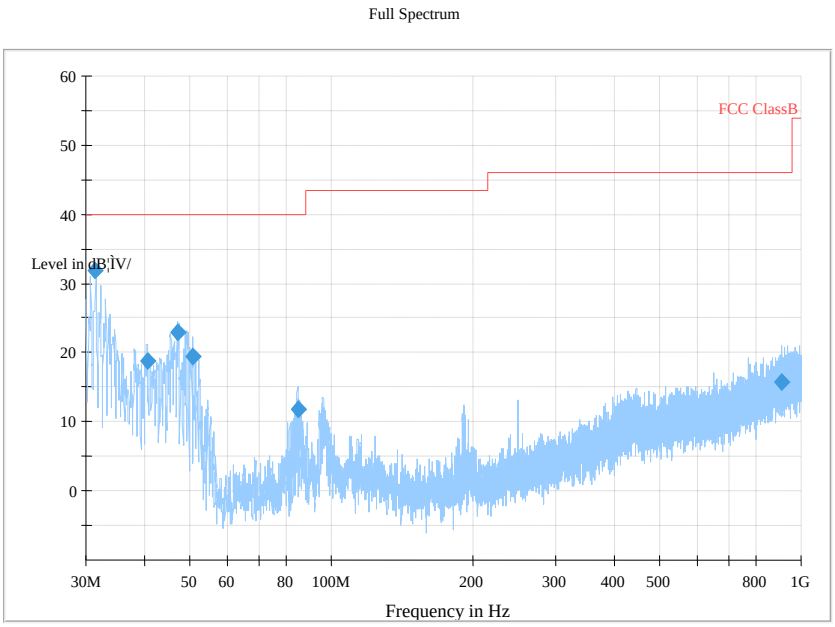

Frequency Range: 3GHz -6GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



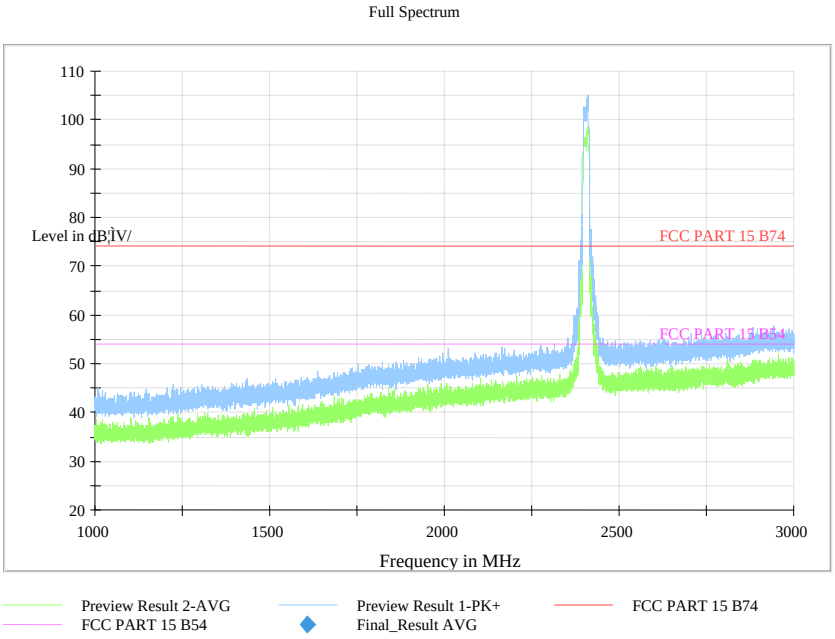

Frequency Range: 6GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



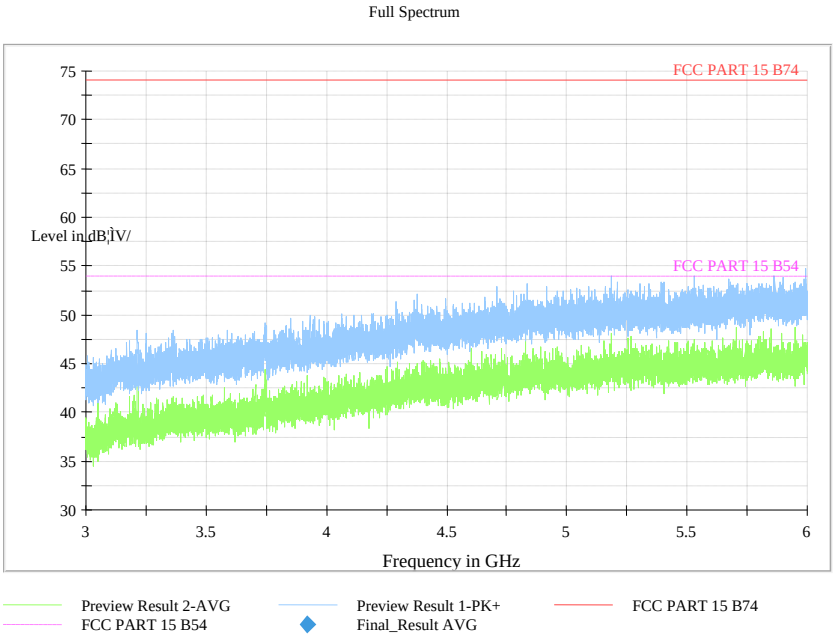

Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



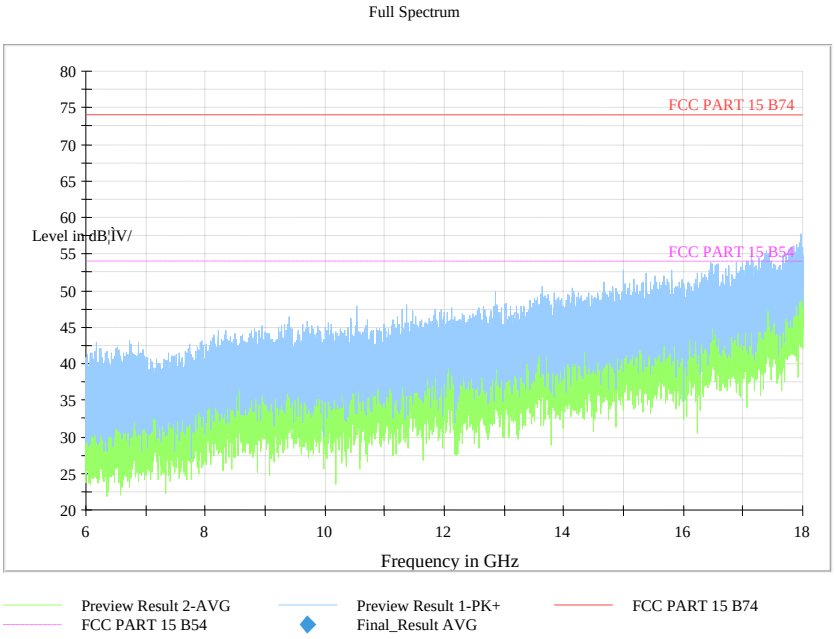

Frequency Range: 30MHz -1GHz
Detector: QP mode
Modulation type: 802.11g



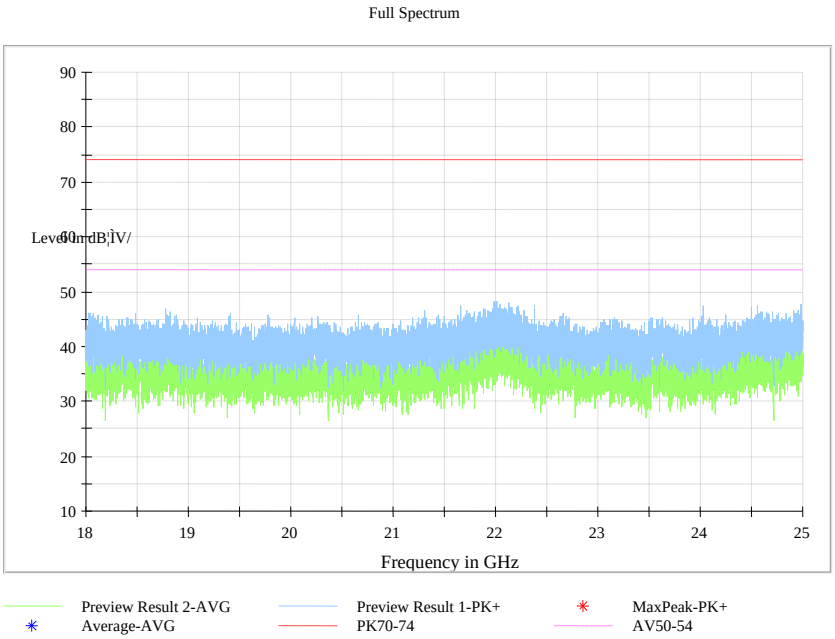

Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



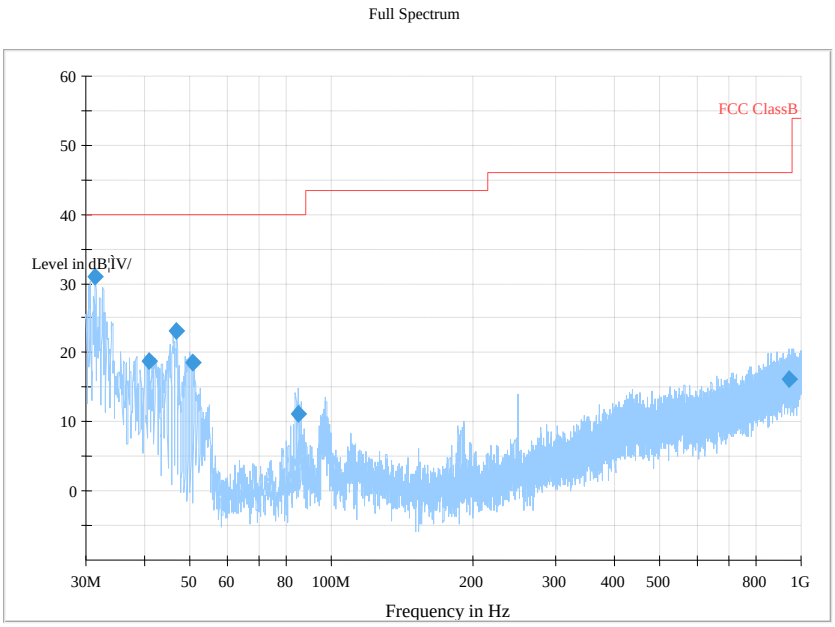

Frequency Range: 3GHz -6GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



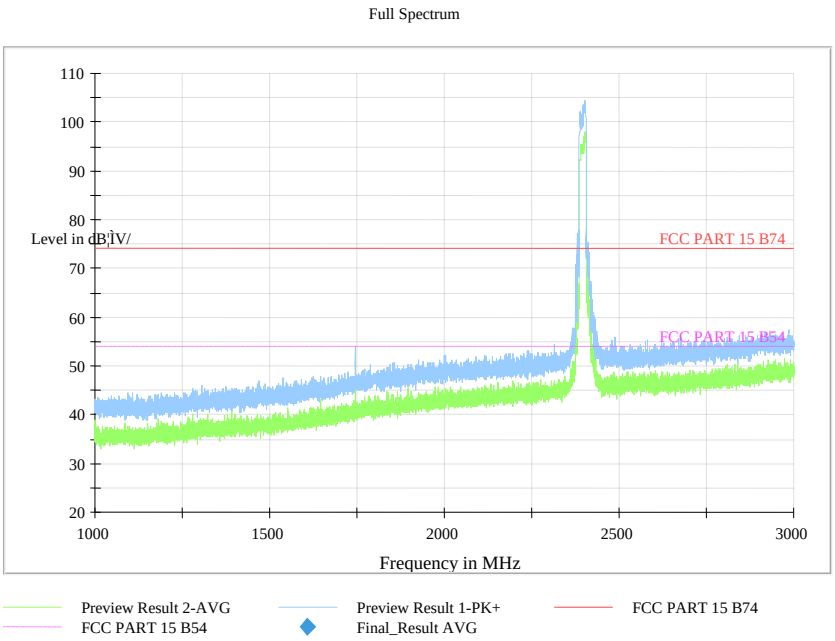

Frequency Range: 6GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



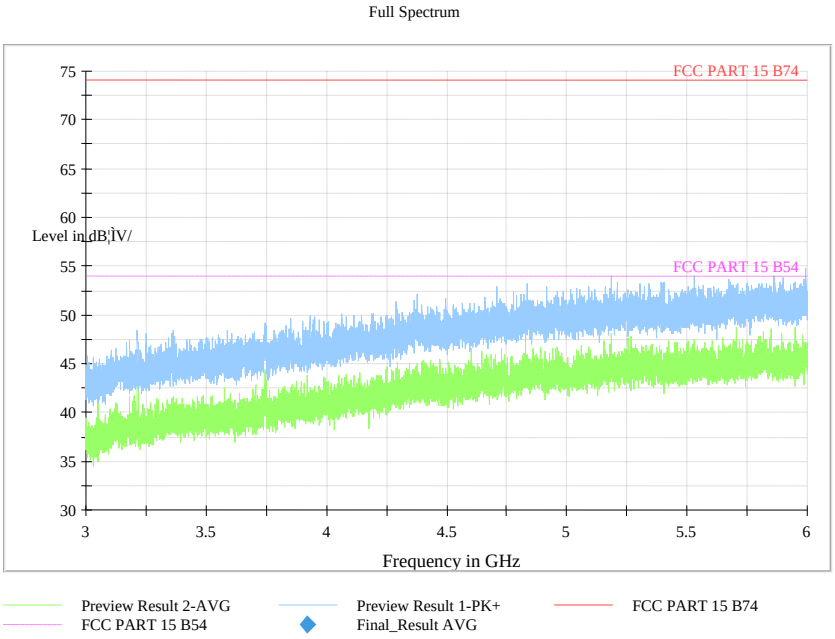

Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



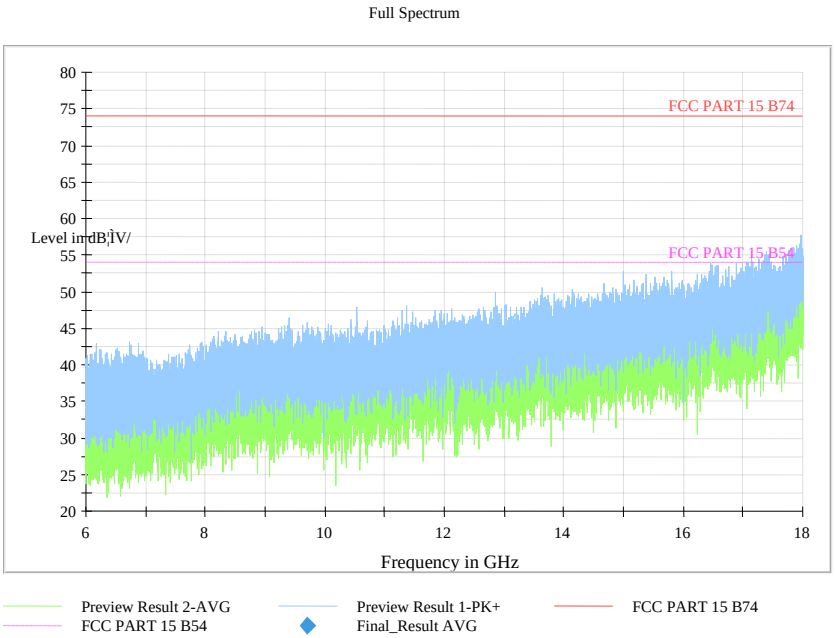

Frequency Range: 30MHz -1GHz
Detector: QP mode
Test Mode: 802.11n(HT20)



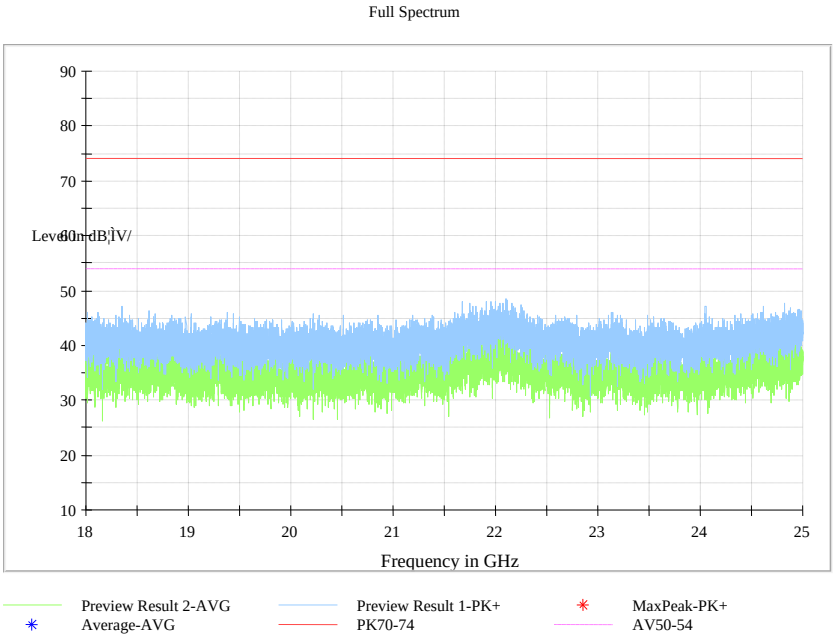

Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)




Frequency Range: 3GHz -6GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)



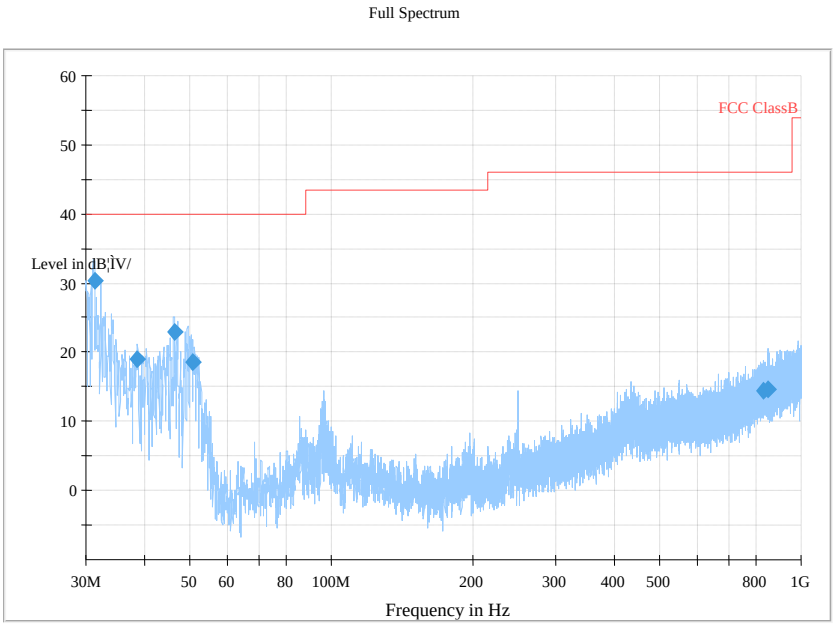

Frequency Range: 6GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)



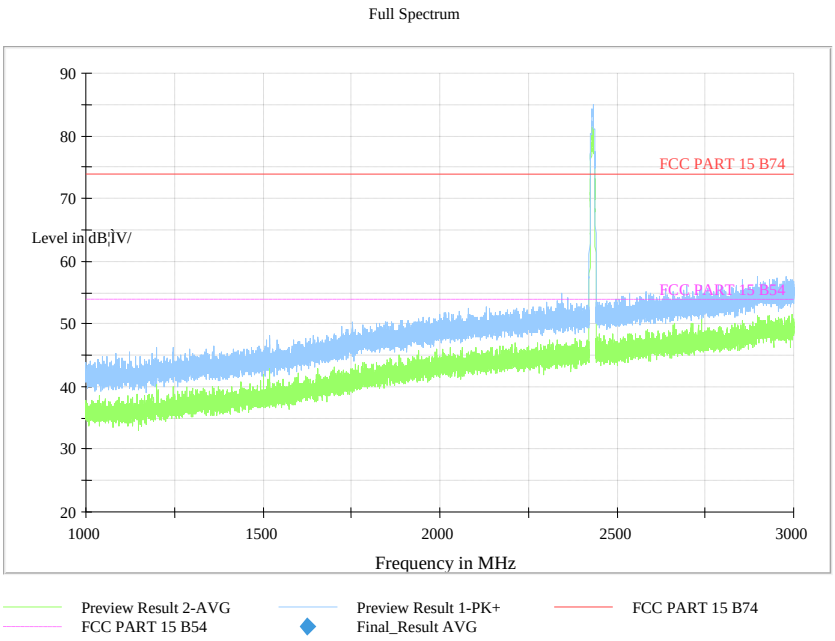

Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode

Modulation type: 802.11n(HT20)

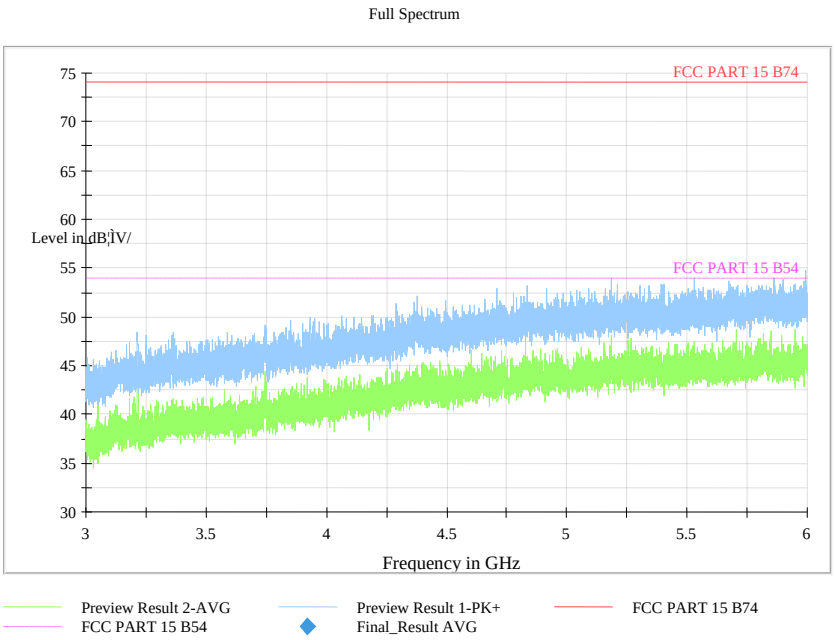
Carrier frequency (MHz): 2437
Channel No.:6



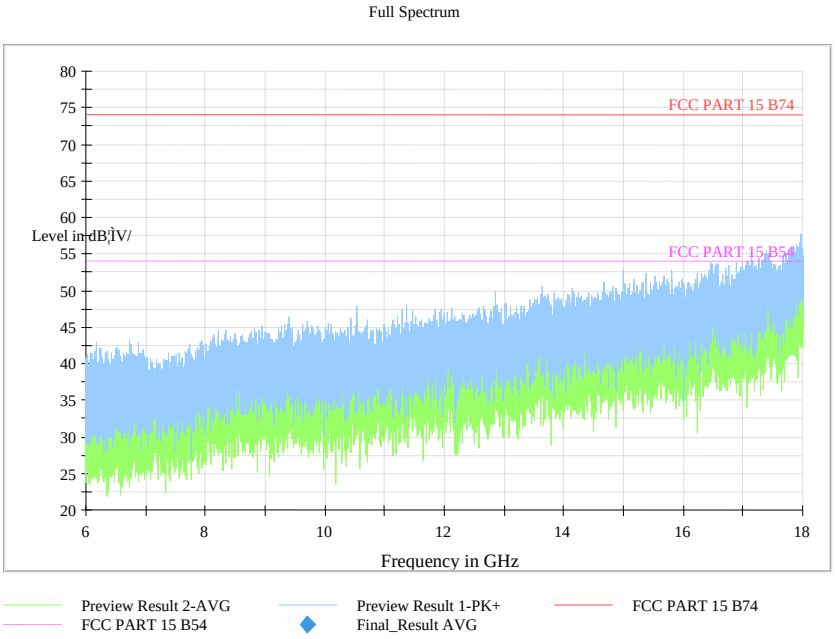

Frequency Range: 30MHz -1GHz
Detector: QP mode
Test Mode: 802.11b



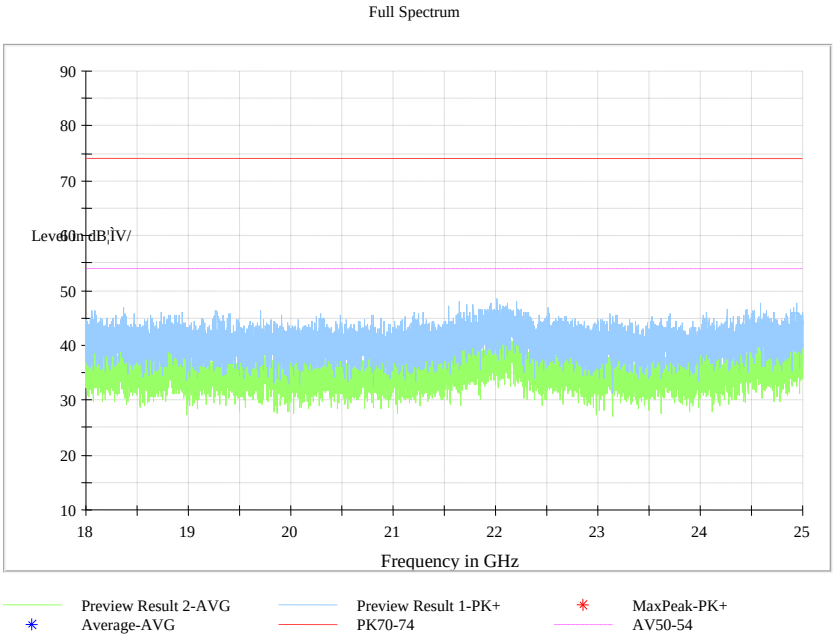

Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



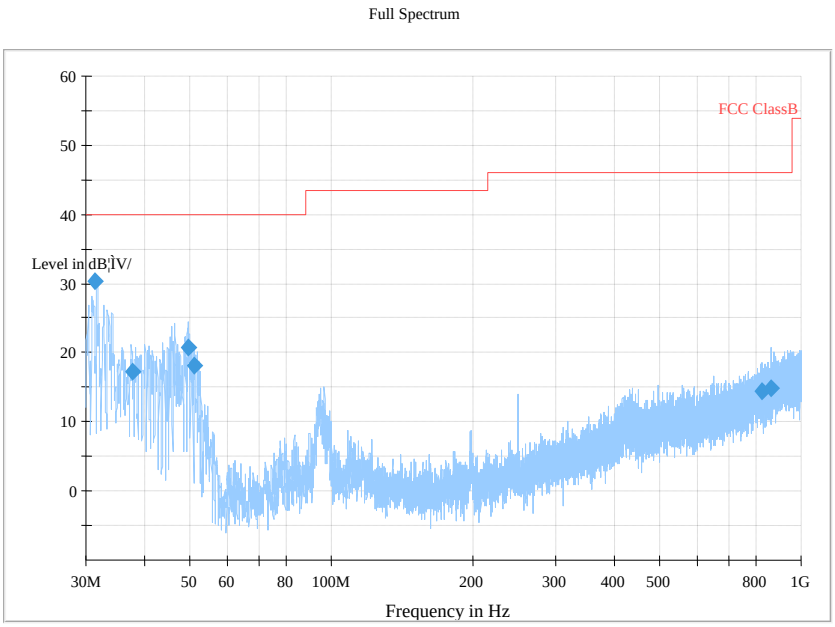

Frequency Range: 3GHz -6GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



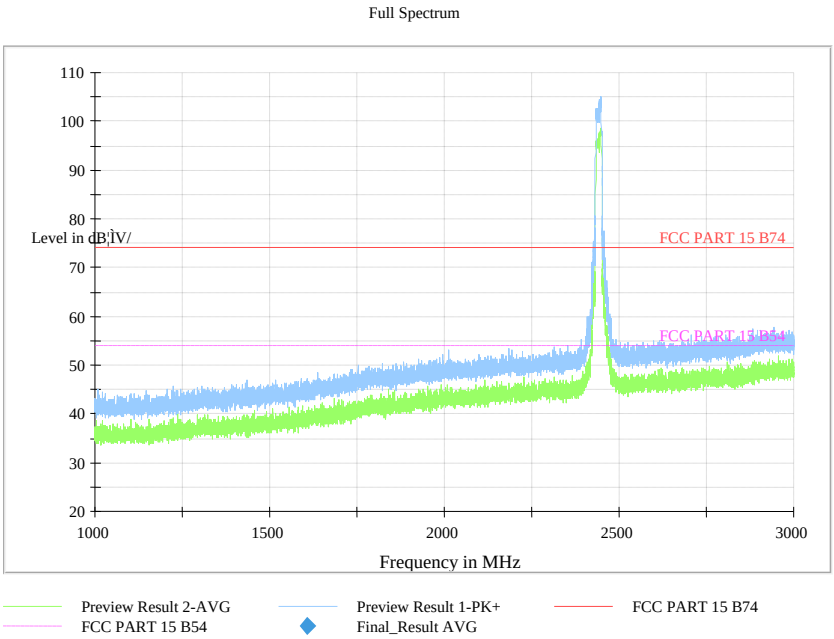

Frequency Range: 6GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



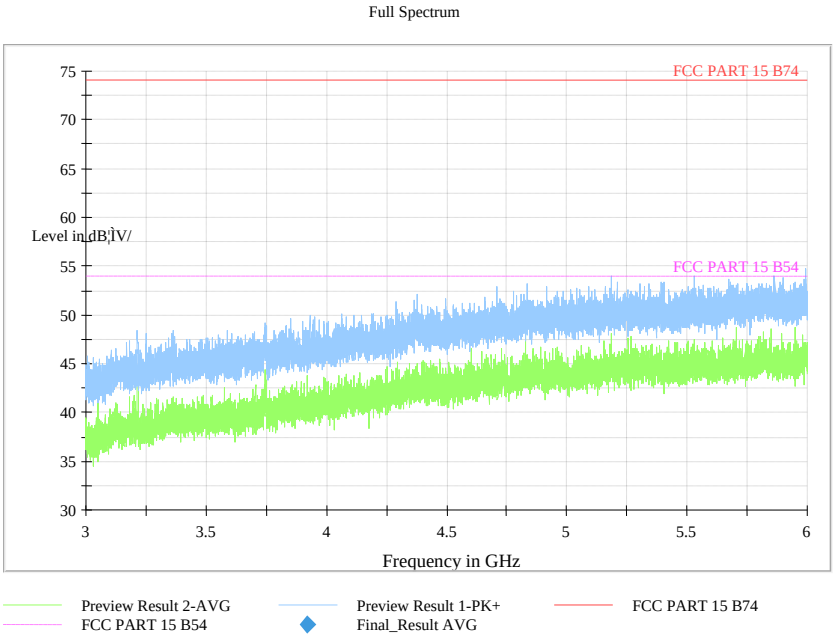

Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



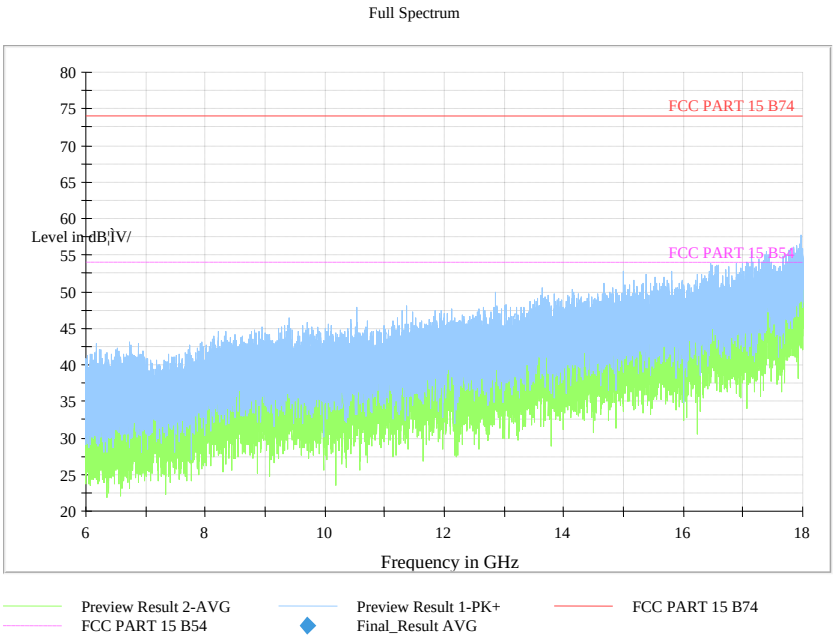

Frequency Range: 30MHz -1GHz
Detector: QP mode
Modulation type: 802.11g



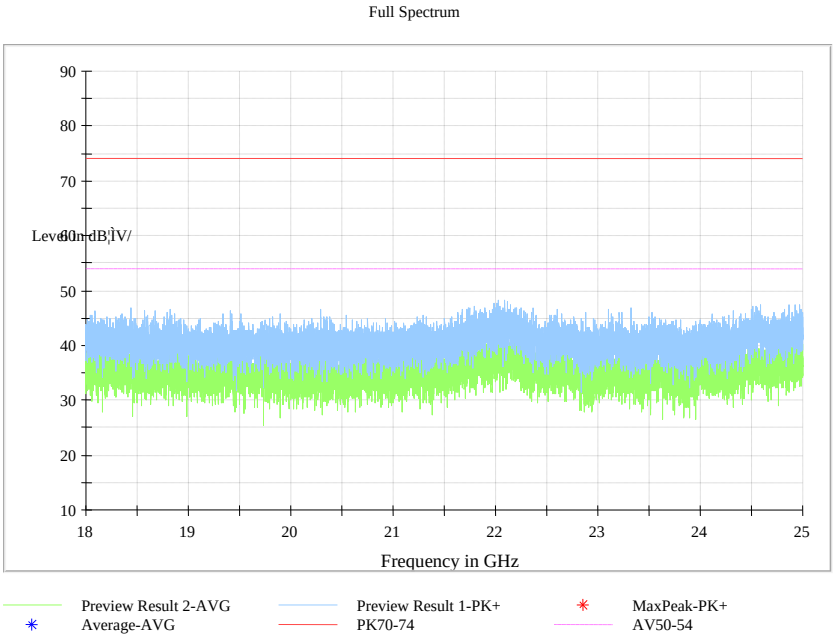

Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



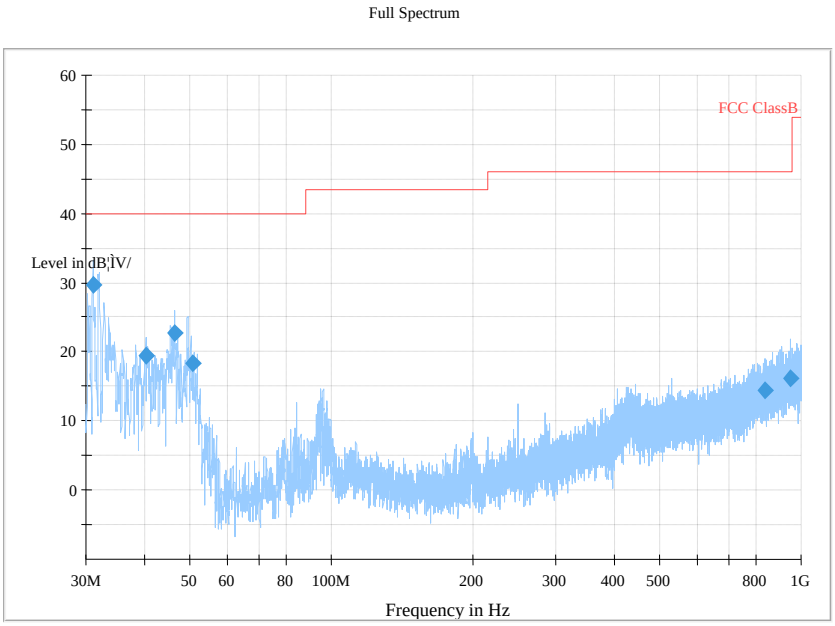

Frequency Range: 3GHz -6GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



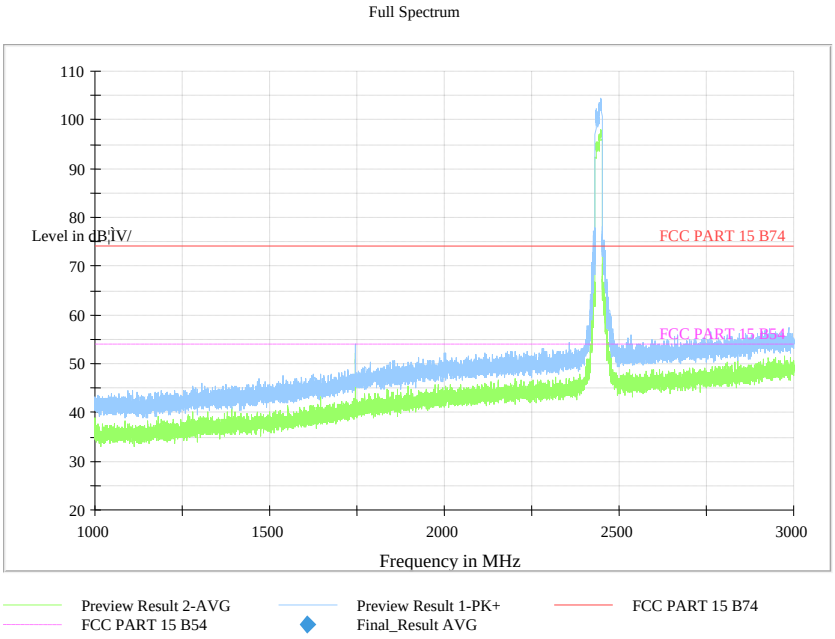

Frequency Range: 6GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



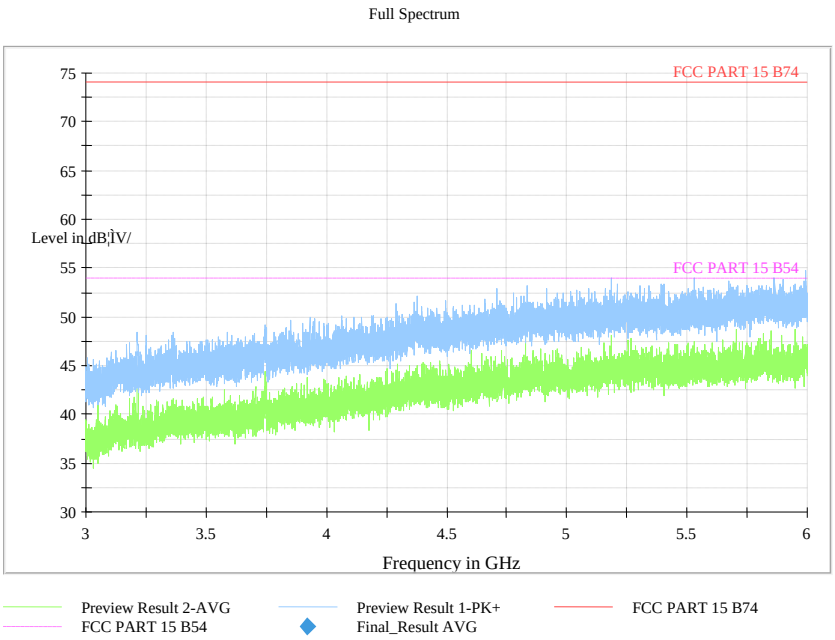

Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



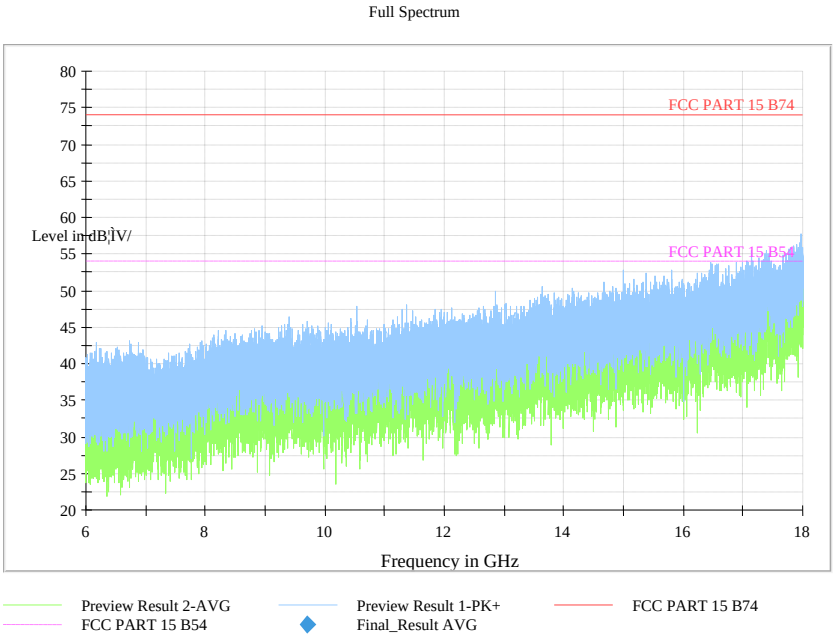

Frequency Range: 30MHz -1GHz
Detector: QP mode
Test Mode: 802.11n(HT20)



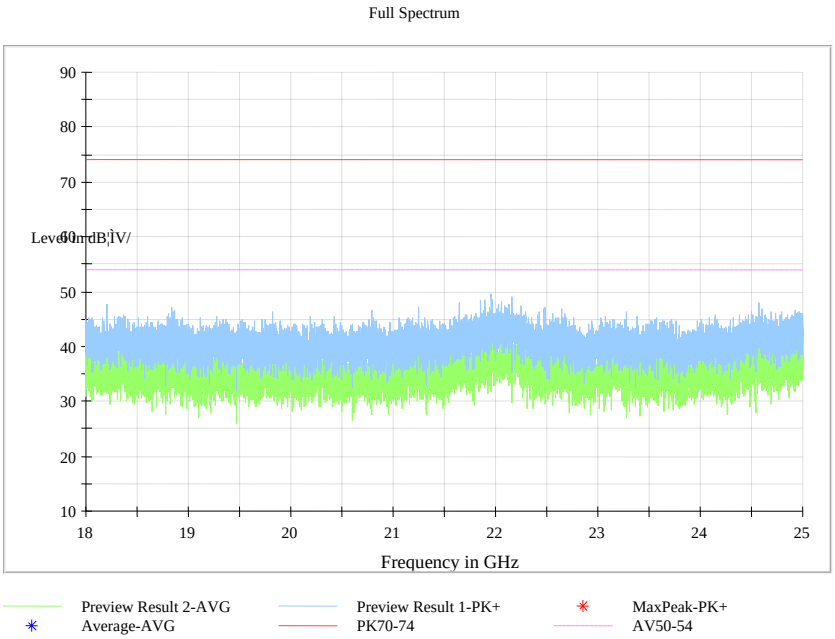

Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)




Frequency Range: 3GHz -6GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)

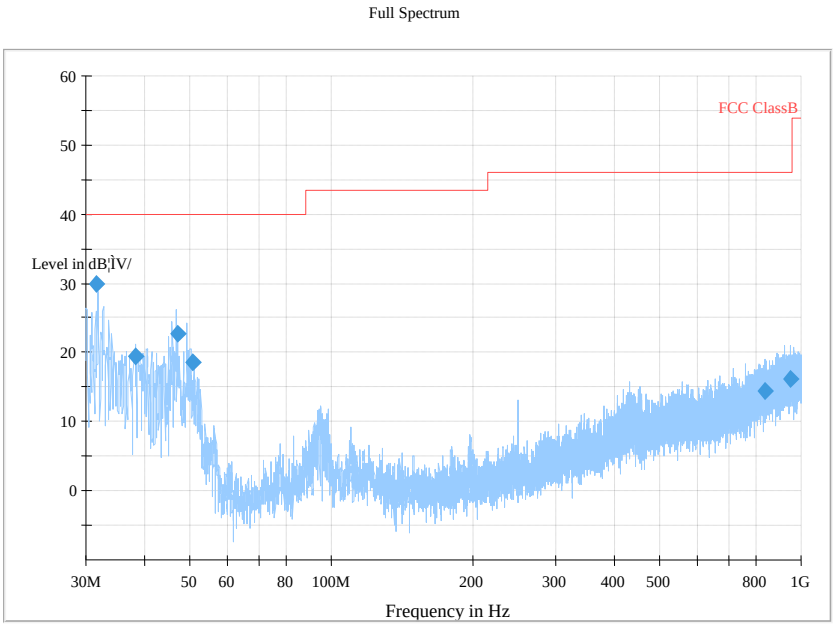



Frequency Range: 6GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)

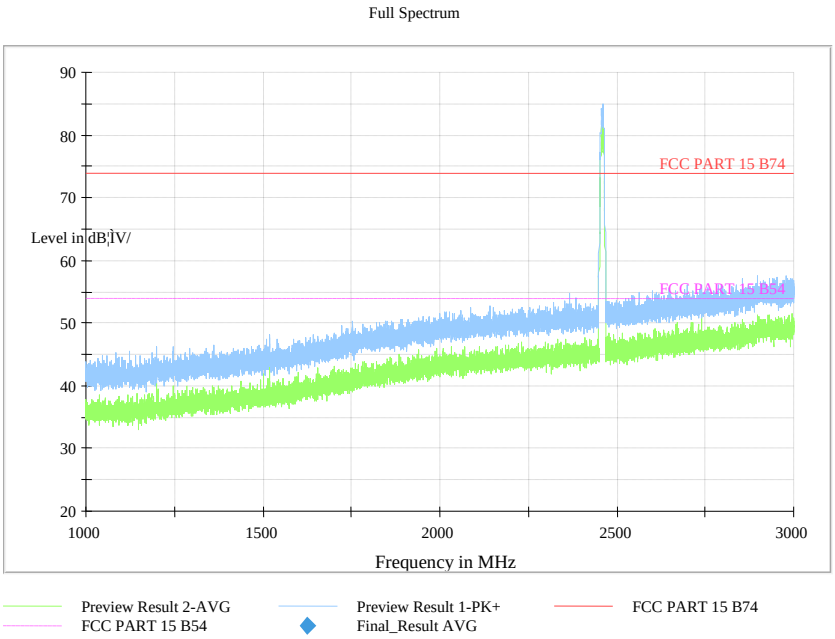



Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)

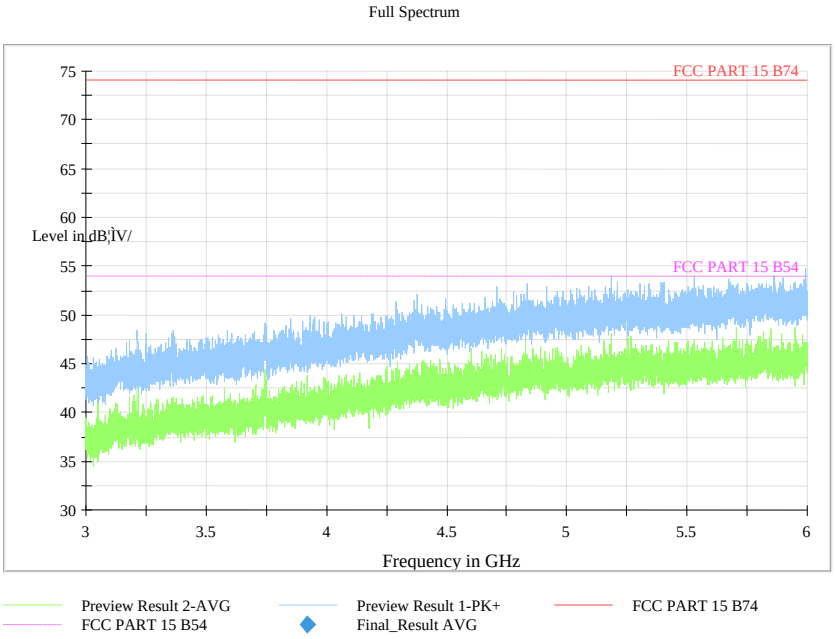
Carrier frequency (MHz): 2462
Channel No.:11



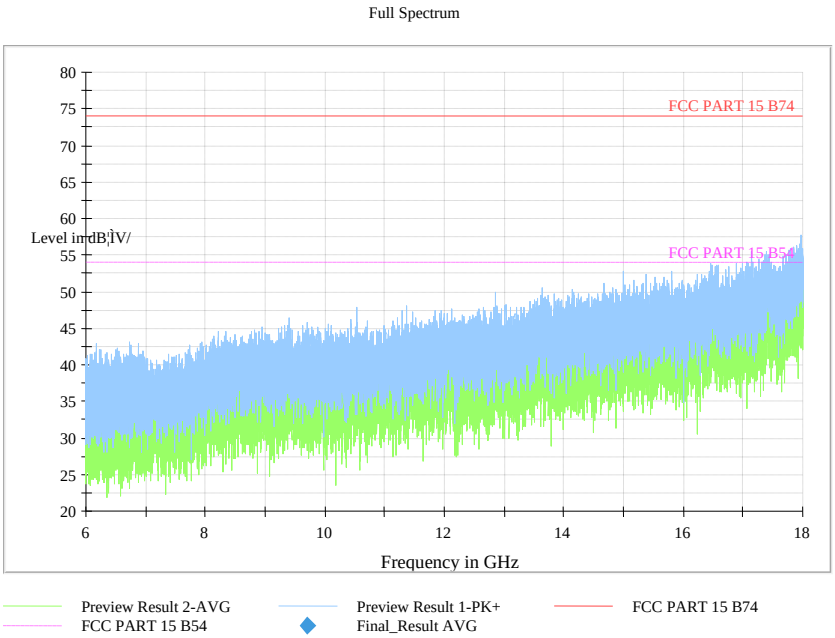

Frequency Range: 30MHz -1GHz
Detector: QP mode
Test Mode: 802.11b



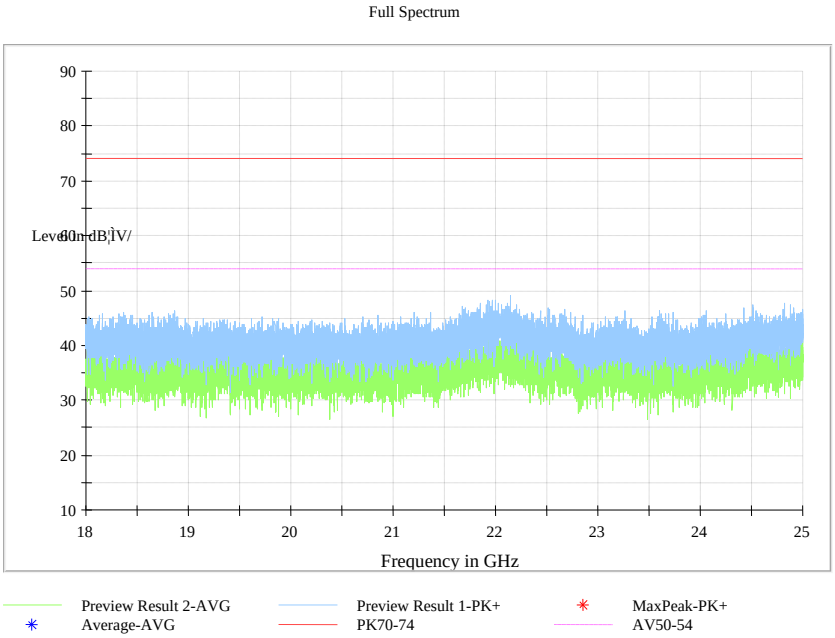

Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



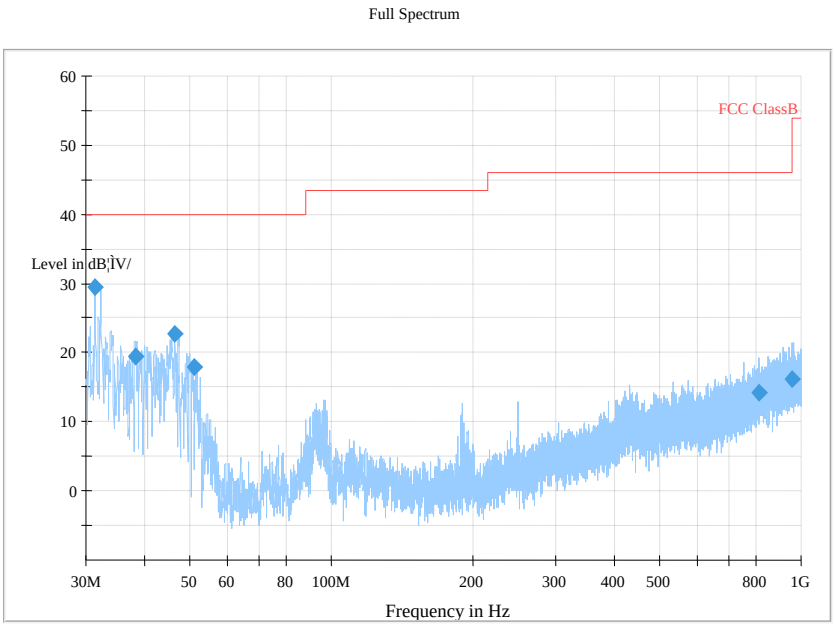

Frequency Range: 3GHz -6GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



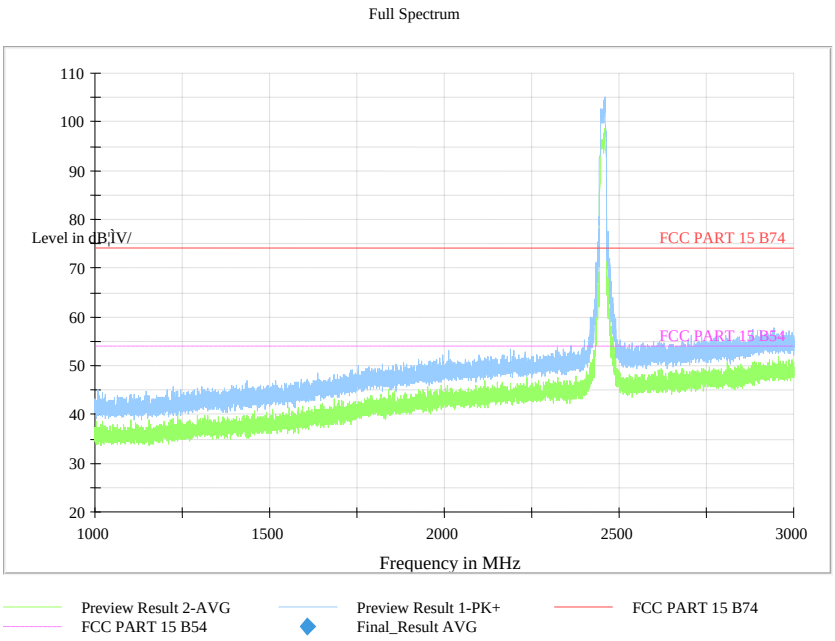

Frequency Range: 6GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



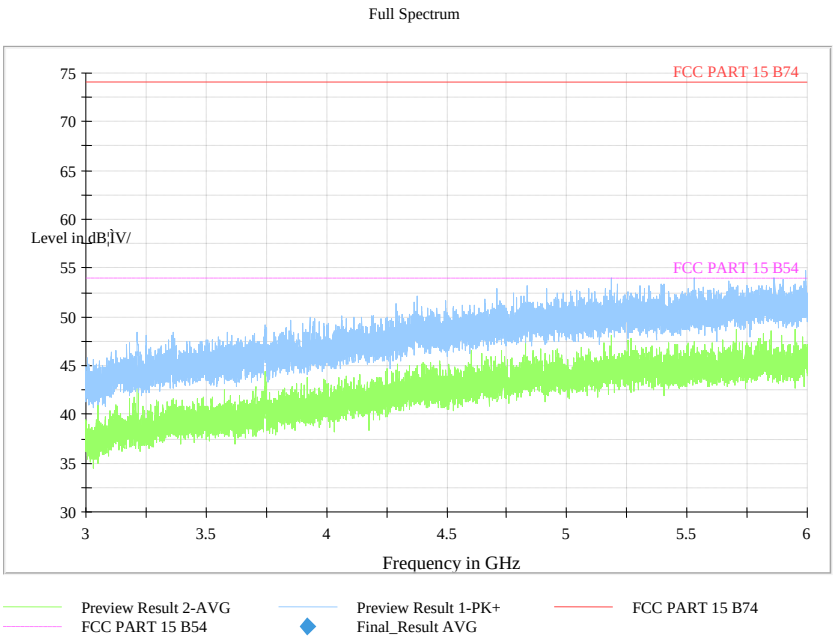

Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



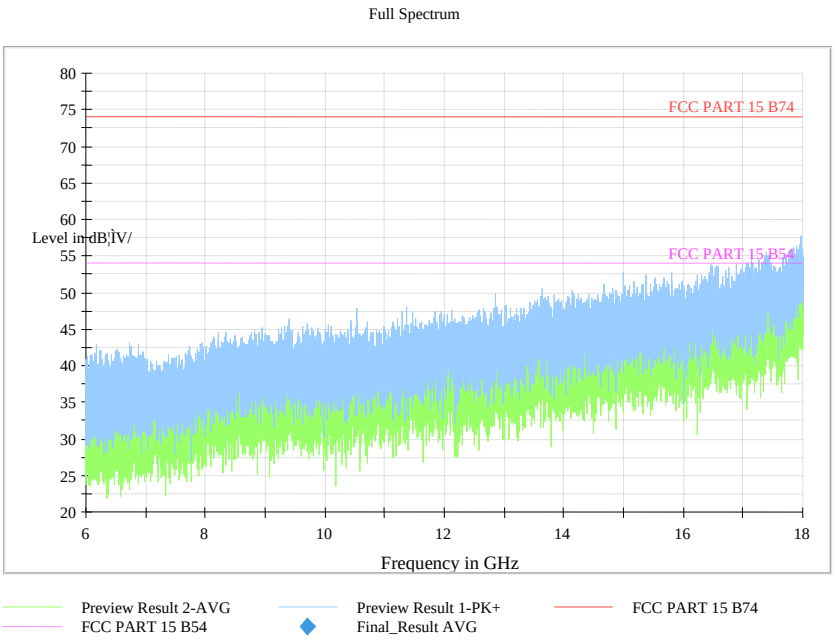

Frequency Range: 30MHz -1GHz
Detector: QP mode
Modulation type: 802.11g



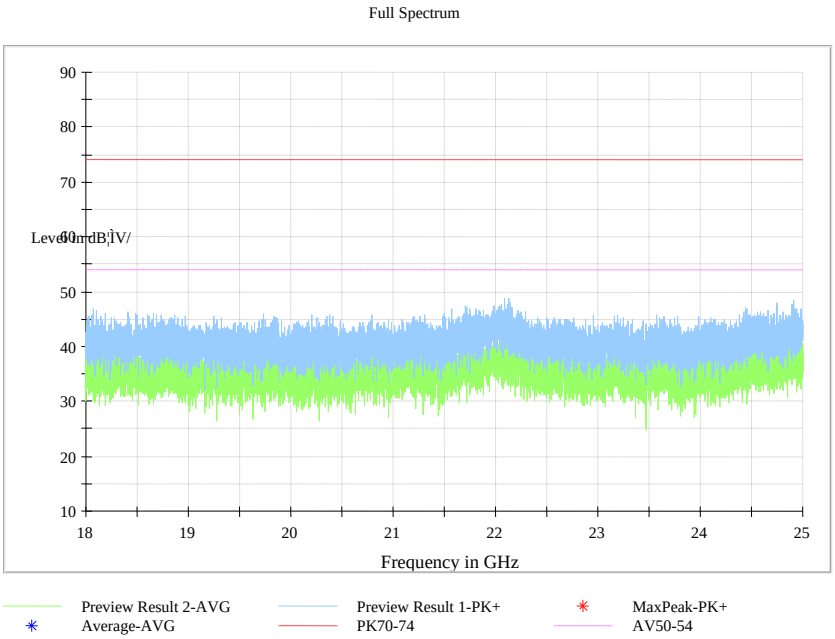

Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



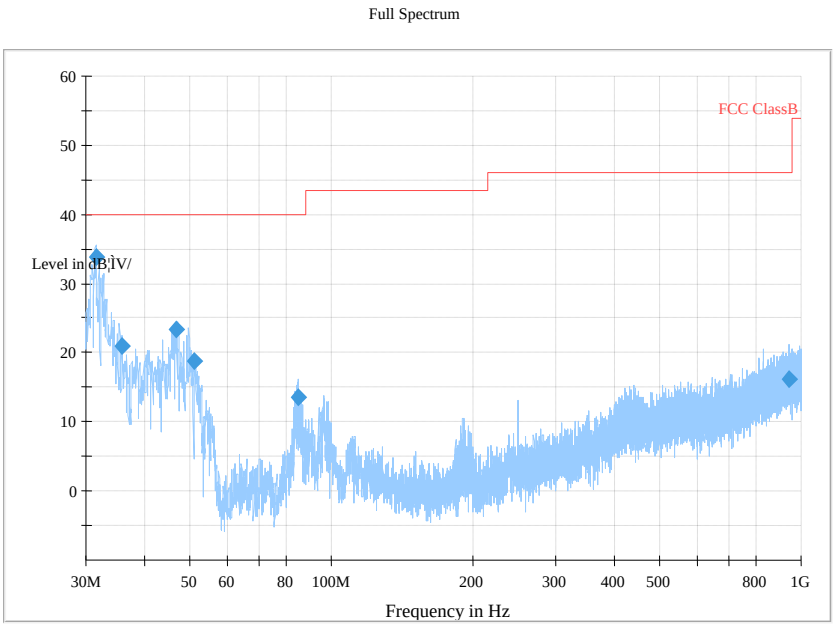

Frequency Range: 3GHz -6GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



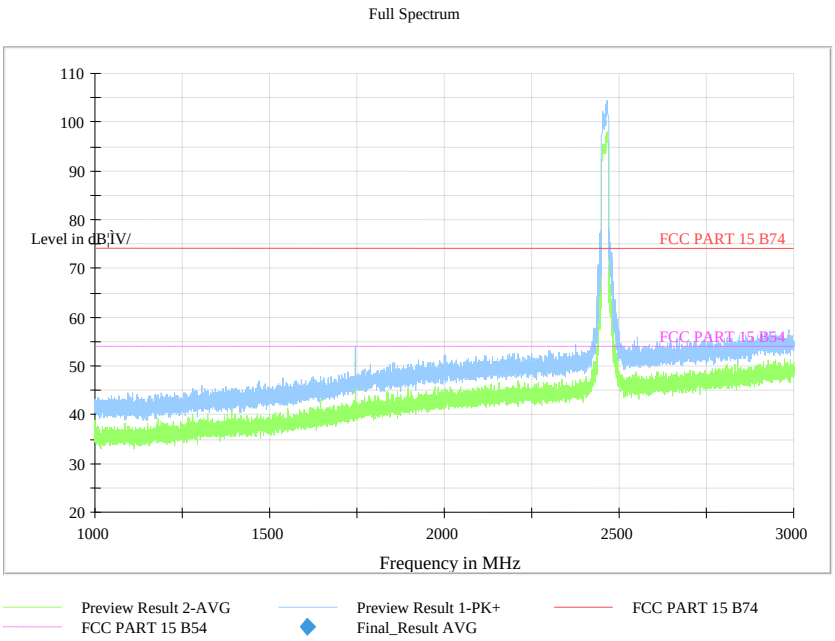

Frequency Range: 6GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



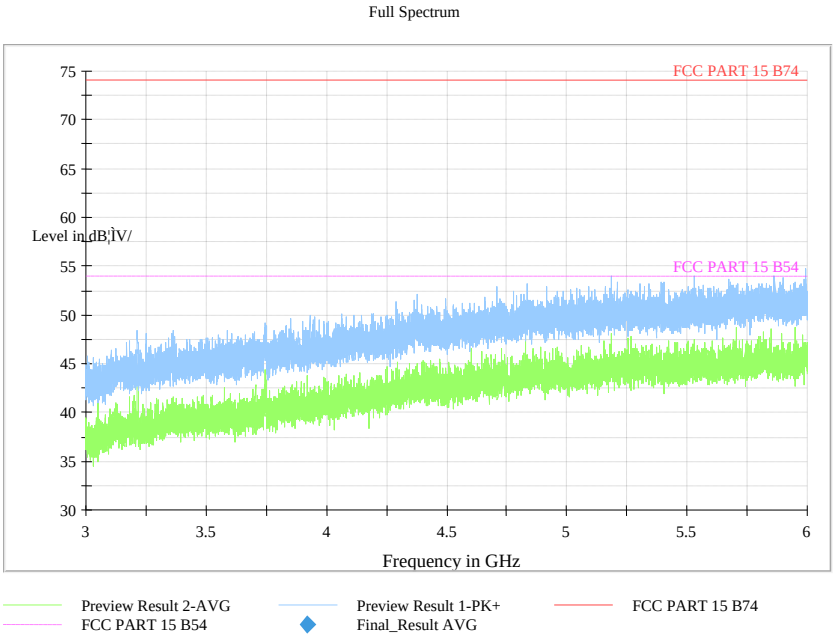

Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



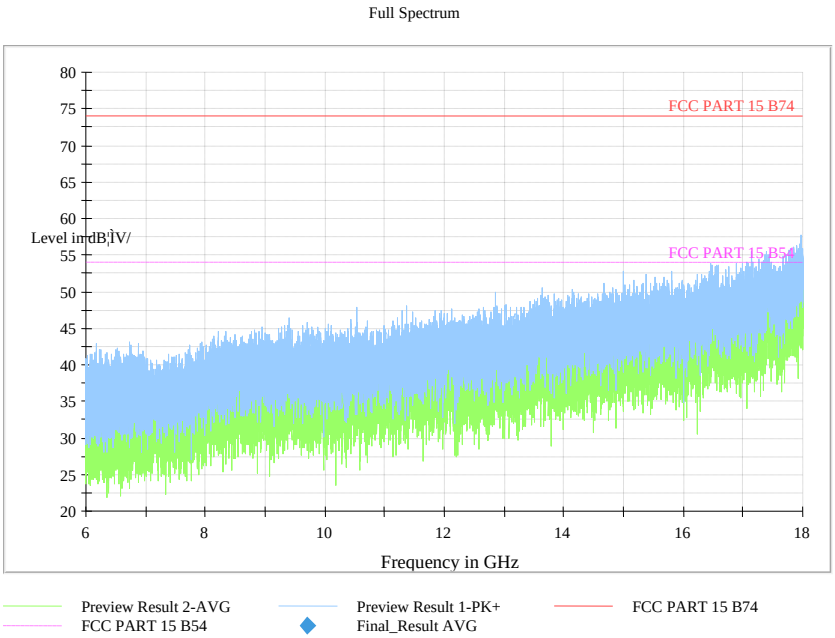

Frequency Range: 30MHz -1GHz
Detector: QP mode
Test Mode: 802.11n(HT20)




Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)

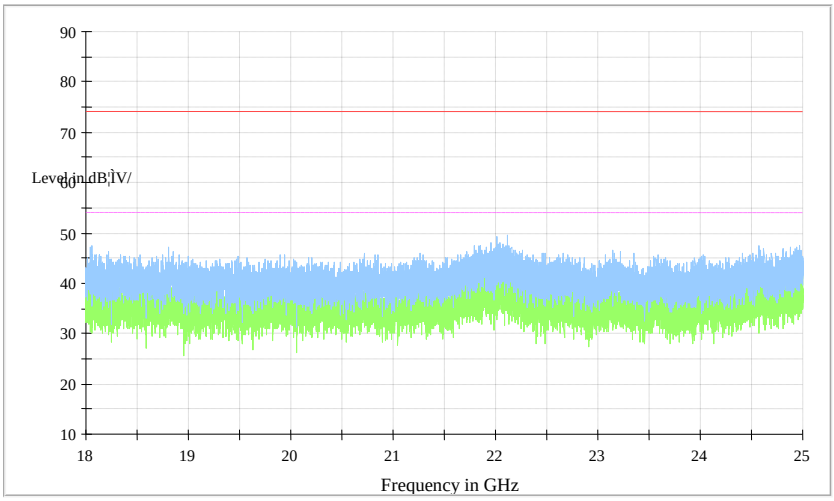



Frequency Range: 3GHz -6GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)




Frequency Range: 6GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)

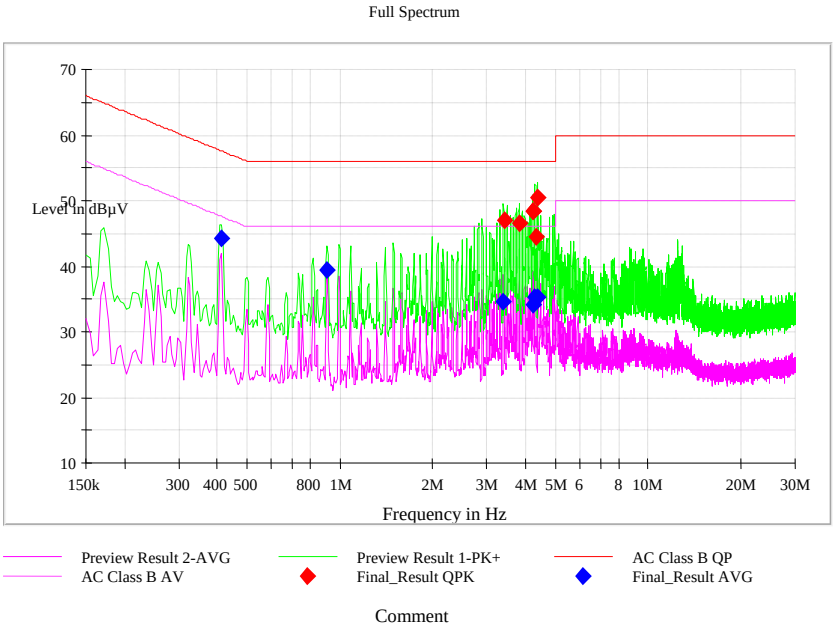
Full Spectrum




Preview Result 2-AVG [Preview Result 2.Result:4]
Preview Result 1-PK+ [Preview Result 1.Result:2]
PK70-74 [..\]
AV50-54 [..\]

Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)

# AC Power line Conducted Emission




L + N Line

***MEASUREMENT RESULT:***

| Frequency (MHz) | MaxPeak (dBuV) | Average (dBuV) | Limit (dBuV) | Margin (dB) | Line | Corr. (dB) |
|---|---|---|---|---|---|---|
| 0.413818 | --- | 44.33 | 47.57 | 3.24 | L1 | 30.1 |
| 0.911318 | --- | 39.52 | 46.00 | 6.48 | L1 | 30.0 |
| 3.398818 | --- | 34.50 | 46.00 | 11.50 | L1 | 29.8 |
| 3.403341 | 46.98 | --- | 56.00 | 9.03 | N | 29.8 |
| 3.814909 | 46.52 | --- | 56.00 | 9.48 | N | 29.8 |
| 4.219000 | 48.28 | --- | 56.00 | 7.72 | L1 | 29.8 |
| 4.221955 | --- | 34.21 | 46.00 | 11.79 | L1 | 29.8 |
| 4.225432 | 48.32 | --- | 56.00 | 7.68 | L1 | 29.8 |
| 4.307886 | --- | 35.22 | 46.00 | 10.78 | L1 | 29.8 |
| 4.319886 | 44.50 | --- | 56.00 | 11.50 | N | 29.8 |
| 4.390341 | --- | 35.27 | 46.00 | 10.73 | L1 | 29.8 |
| 4.394341 | 50.42 | --- | 56.00 | 5.58 | L1 | 29.8 |

---End of Test Report---