

FCC Test Report (WLAN)

Report No.: RF200206E02-1

FCC ID: C3K1885

Test Model: 1885

Received Date: Feb. 06, 2020

Test Date: Mar. 23 to May 19, 2020

Issued Date: June 24, 2020

Applicant: Microsoft Corporation

Address: One Microsoft Way, Redmond, Washington 98052-6399, United States

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

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**FCC Registration /
Designation Number:** 723255 / TW2022



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Release Control Record

| Issue No. | Description | Date Issued |
|---------------|-------------------|---------------|
| RF200206E02-1 | Original release. | June 24, 2020 |

1 Certificate of Conformity

Product: Dual-band wireless accessory radio

Brand: Microsoft

Test Model: 1885


Sample Status: ENGINEERING SAMPLE

Applicant: Microsoft Corporation

Test Date: Mar. 23 to May 19, 2020

Standard: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :  _____, **Date:** June 24, 2020
Claire Kuan / Specialist

Approved by :  _____, **Date:** June 24, 2020
Clark Lin / Technical Manager

2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart E (Section 15.407) | | | |
|--|---|--------|---|
| FCC Clause | Test Item | Result | Remarks |
| 15.407(b)(6) | AC Power Conducted Emissions | Pass | Meet the requirement of limit. Minimum passing margin is -21.08dB at 0.73594MHz. |
| 15.407(b) (1/2/3/4(i/ii)/6) | Radiated Emissions & Band Edge Measurement* | Pass | Meet the requirement of limit. Minimum passing margin is -4.76dB at 945.8MHz. |
| 15.407(a)(1/2/3) | Max Average Transmit Power | Pass | Meet the requirement of limit. |
| --- | Occupied Bandwidth Measurement | - | Reference only. |
| 15.407(a)(1/2/3) | Peak Power Spectral Density | Pass | Meet the requirement of limit. |
| 15.407(e) | 6dB bandwidth | Pass | Meet the requirement of limit. (U-NII-3 Band only) |
| 15.407(g) | Frequency Stability | Pass | Meet the requirement of limit. |
| 15.203 | Antenna Requirement | Pass | No antenna connector is used. |

Note:

Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement | Frequency | Expanded Uncertainty (k=2) (\pm) |
|------------------------------------|----------------|--------------------------------------|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 1.9 dB |
| Conducted Emissions | 9kHz ~ 40GHz | 2.5 dB |
| Radiated Emissions up to 1 GHz | 9kHz ~ 30MHz | 3.1 dB |
| | 30MHz ~ 1GHz | 5.4 dB |
| Radiated Emissions above 1 GHz | 1GHz ~ 18GHz | 5.0 dB |
| | 18GHz ~ 40GHz | 5.3 dB |

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (WLAN)

| | |
|-----------------------|---|
| Product | Dual-band wireless accessory radio |
| Brand | Microsoft |
| Test Model | 1885 |
| Status of EUT | ENGINEERING SAMPLE |
| Power Supply Rating | 3.3Vdc from host equipment |
| Modulation Type | 64QAM, 16QAM, QPSK, BPSK for OFDM |
| Modulation Technology | OFDM |
| Transfer Rate | 802.11n: up to 72.2Mbps |
| Operating Frequency | 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.18~ 5.24GHz, 5.745 ~ 5.825GHz |
| Number of Channel | 2.4GHz: 802.11n (HT20): 11 5GHz: 802.11n (HT20): 9 |
| Output Power | 2.4GHz: 95.06 mW 5.18 ~ 5.24GHz: 10.328 mW 5.745 ~ 5.825GHz: 10.495 mW |
| Antenna Type | Refer to Note |
| Antenna Connector | Refer to Note |
| Accessory Device | NA |
| Cable Supplied | NA |

Note:

1. The antennas provided to the EUT, please refer to the following table:

| Antenna No. | Transmitter Circuit | Antenna Net Gain(dBi) | Frequency range | Antenna Type | Connector Type | Cable Length |
|-------------|---------------------|-----------------------|-----------------------|--------------|----------------|--------------|
| MAIN | 0 | 3.85 | 2.4 ~ 2.4835GHz | PCB | NA | NA |
| | | 5.7 | 5.15~5.25GHz (5G B1) | PCB | NA | NA |
| | | 5.77 | 5.25~5.35GHz (5G B2) | PCB | NA | NA |
| | | 5.52 | 5.47~5.725GHz (5G B3) | PCB | NA | NA |
| | | 5.79 | 5.725~5.85GHz (5G B4) | PCB | NA | NA |
| DIV | 1 | --- | 2.4 ~ 2.4835GHz | PCB | NA | NA |
| | | 4.95 | 5.15~5.25GHz (5G B1) | PCB | NA | NA |
| | | 5.02 | 5.25~5.35GHz (5G B2) | PCB | NA | NA |
| | | 5.24 | 5.47~5.725GHz (5G B3) | PCB | NA | NA |
| | | 5.39 | 5.725~5.85GHz (5G B4) | PCB | NA | NA |

2. The EUT incorporates function as following.

| 2.4GHz Band | | |
|-----------------|-----------------------|-----|
| MODULATION MODE | TX & RX CONFIGURATION | |
| 802.11n (HT20) | 1TX (Fixed Chain 0) | 1RX |
| 5GHz Band | | |
| MODULATION MODE | TX & RX CONFIGURATION | |
| 802.11n (HT20) | 1TX (Fixed Chain 0) | 2RX |

3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

FOR 5180 ~ 5240MHz

4 channels are provided for 802.11n (HT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 36 | 5180 MHz | 44 | 5220 MHz |
| 40 | 5200 MHz | 48 | 5240 MHz |

FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11n (HT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 149 | 5745 MHz | 161 | 5805 MHz |
| 153 | 5765 MHz | 165 | 5825 MHz |
| 157 | 5785 MHz | | |

3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT Configure Mode | Applicable To | | | | Description |
|--------------------|---------------|-------|-----|------|-------------|
| | RE \geq 1G | RE<1G | PLC | APCM | |
| - | √ | √ | √ | √ | - |

Where **RE \geq 1G**: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned **on Y-plane (for below 1GHz) and X-plane (for above 1GHz)**.

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.

| Mode | FREQ. Band (MHz) | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|----------------|------------------|-------------------|----------------|-----------------------|-----------------|------------------|
| 802.11n (HT20) | 5180-5240 | 36 to 48 | 36, 40, 48 | OFDM | BPSK | 6.5 |
| | 5745-5825 | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 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.

| Mode | FREQ. Band (MHz) | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|----------------|-------------------------|-------------------------|----------------|-----------------------|-----------------|------------------|
| 802.11n (HT20) | 5180-5240, 5745-5825 | 36 to 48, 149 to 165 | 36, 165 | OFDM | BPSK | 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.

| Mode | FREQ. Band (MHz) | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|----------------|-------------------------|-------------------------|----------------|-----------------------|-----------------|------------------|
| 802.11n (HT20) | 5180-5240, 5745-5825 | 36 to 48, 149 to 165 | 165 | OFDM | BPSK | 6.5 |

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.

| Mode | FREQ. Band (MHz) | Available Channel | Tested Channel | Modulation Technology | Modulation Type | Data Rate (Mbps) |
|----------------|------------------|-------------------|----------------|-----------------------|-----------------|------------------|
| 802.11n (HT20) | 5180-5240 | 36 to 48 | 36, 40, 48 | OFDM | BPSK | 6.5 |
| | 5745-5825 | 149 to 165 | 149, 157, 165 | OFDM | BPSK | 6.5 |

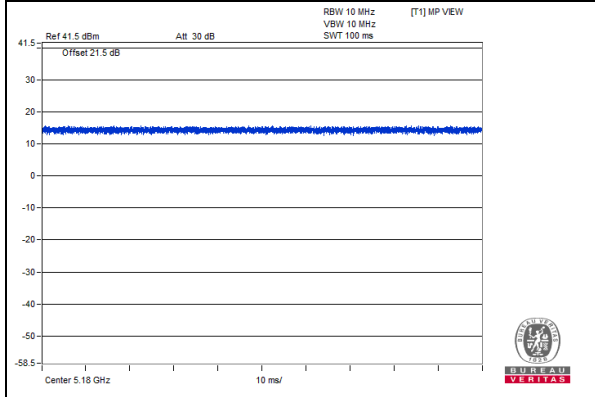
Test Condition:

| Applicable To | Environmental Conditions | Input Power (System) | Tested By |
|---------------|--------------------------|----------------------|--------------|
| RE \geq 1G | 25deg. C, 75%RH | 120Vac, 60Hz | Nelson Teng |
| RE<1G | 25deg. C, 65%RH | 120Vac, 60Hz | Nelson Teng |
| PLC | 25deg. C, 68%RH | 120Vac, 60Hz | Sampson Chen |
| APCM | 26deg. C, 61%RH | 120Vac, 60Hz | Jyunchun Lin |

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.

802.11n (HT20)



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|----|-----------|---------------|--------------|------------|---------|--------------------|
| A. | Adapter | PHIHONG | PSC15A-050 | NA | NA | Supplied by client |
| B. | Test Tool | MediaTek Inc. | NA | NA | NA | Supplied by client |
| C. | Laptop | DELL | E5430 | GM1SKV1 | FCC DoC | Provided by Lab |
| D. | ADAPTER | MediaTek Inc. | M1096761-001 | NA | NA | Supplied by client |

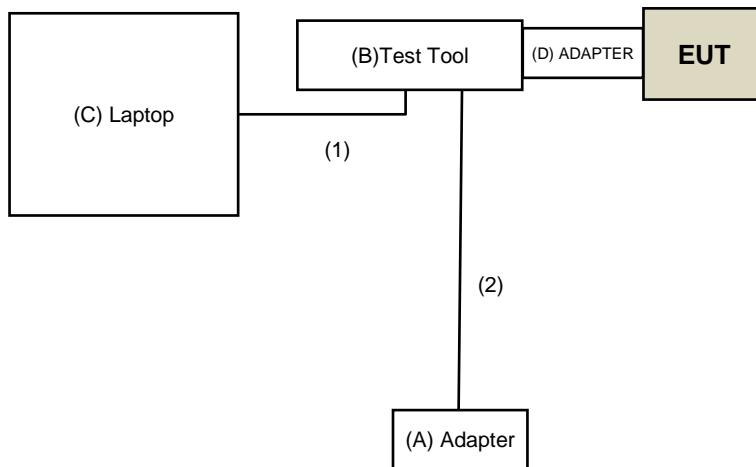
Note:

1. All power cords of the above support units are non-shielded (1.8m).

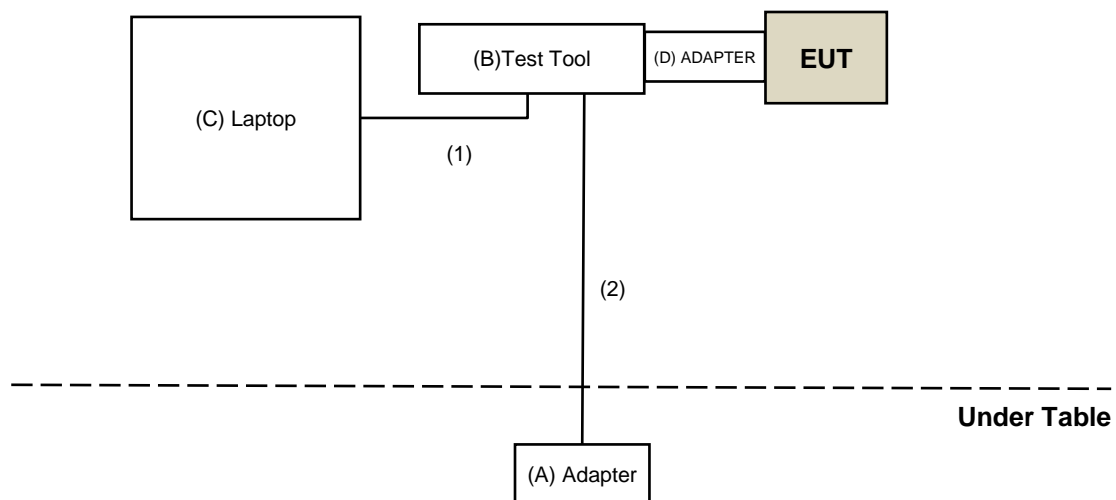
| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|----|------------------|------|------------|--------------------|--------------|--------------------|
| 1. | USB Type B Cable | 1 | 1.8 | Yes | 0 | Provided by Lab |
| 2. | DC Cable | 1 | 1.5 | No | 0 | Supplied by client |

3.4.1 Configuration of System under Test

For AC Power Conducted Emissions Test:



For Radiated Emissions Test:



3.5 General Description of Applied Standard and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test Standard:

FCC Part 15, Subpart E (15.407)

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 789033 D02 General UNII Test Procedure New Rules v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement (Radiated Versus Conducted)

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement 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 |

NOTE:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

| Applicable To | | Limit | |
|---|-----------------|---|---|
| 789033 D02 General UNII Test Procedure New Rules v02r01 | | Field Strength at 3m | |
| | | PK:74 (dBμV/m) | AV:54 (dBμV/m) |
| Frequency Band | Applicable To | EIRP Limit | Equivalent Field Strength at 3m |
| 5150~5250 MHz | 15.407(b)(1) | PK:-27 (dBm/MHz) | PK:68.2(dBμV/m) |
| 5250~5350 MHz | 15.407(b)(2) | | |
| 5470~5725 MHz | 15.407(b)(3) | | |
| 5725~5850 MHz | 15.407(b)(4)(i) | PK:-27 (dBm/MHz) ^{*1} PK:10 (dBm/MHz) ^{*2} PK:15.6 (dBm/MHz) ^{*3} PK:27 (dBm/MHz) ^{*4} | PK: 68.2(dBμV/m) ^{*1} PK:105.2 (dBμV/m) ^{*2} PK: 110.8(dBμV/m) ^{*3} PK:122.2 (dBμV/m) ^{*4} |
| *1 beyond 75 MHz or more above of the band edge. | | *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. | |
| *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. | | *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. | |

Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

4.1.2 Test Instruments

For radiated emission test:

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|--------------------------------------|----------------------|-------------|-----------------|------------------|
| Test Receiver Keysight | N9038A | MY54450088 | July 03, 2019 | July 02, 2020 |
| Pre-Amplifier EMCI | EMC001340 | 980142 | May 30, 2019 | May 29, 2020 |
| Loop Antenna Electro-Metrics | EM-6879 | 264 | Feb. 18, 2020 | Feb. 17, 2021 |
| RF Cable | NA | LOOPCAB-001 | Jan. 08, 2020 | Jan. 07, 2021 |
| RF Cable | NA | LOOPCAB-002 | Jan. 08, 2020 | Jan. 07, 2021 |
| Pre-Amplifier Mini-Circuits | ZFL-1000VH2B | AMP-ZFL-05 | Apr. 30, 2019 | Apr. 29, 2020 |
| Trilog Broadband Antenna SCHWARZBECK | VULB 9168 | 9168-361 | Nov. 11, 2019 | Nov. 10, 2020 |
| RF Cable | 8D | 966-3-1 | Mar. 17, 2020 | Mar. 16, 2021 |
| RF Cable | 8D | 966-3-2 | Mar. 17, 2020 | Mar. 16, 2021 |
| RF Cable | 8D | 966-3-3 | Mar. 17, 2020 | Mar. 16, 2021 |
| Fixed attenuator Mini-Circuits | UNAT-5+ | PAD-3m-3-01 | Sep. 26, 2019 | Sep. 25, 2020 |
| Horn_Antenna SCHWARZBECK | BBHA9120-D | 9120D-406 | Nov. 24, 2019 | Nov. 23, 2020 |
| Pre-Amplifier EMCI | EMC12630SE | 980384 | Jan. 15, 2020 | Jan. 14, 2021 |
| RF Cable | EMC104-SM-SM-1200 | 160922 | Jan. 15, 2020 | Jan. 14, 2021 |
| RF Cable | EMC104-SM-SM-2000 | 180601 | June 10, 2019 | June 09, 2020 |
| RF Cable | EMC104-SM-SM-6000 | 180602 | June 10, 2019 | June 09, 2020 |
| Spectrum Analyzer Keysight | N9030A | MY54490679 | July 17, 2019 | July 16, 2020 |
| Pre-Amplifier EMCI | EMC184045SE | 980387 | Jan. 15, 2020 | Jan. 14, 2021 |
| Horn_Antenna SCHWARZBECK | BBHA 9170 | BBHA9170519 | Nov. 24, 2019 | Nov. 23, 2020 |
| RF Cable | EMC102-KM-KM-1200 | 160924 | Jan. 15, 2020 | Jan. 14, 2021 |
| RF Cable | EMC-KM-KM-4000 | 200214 | Mar. 11, 2020 | Mar. 10, 2021 |
| Software | ADT_Radiated_V8.7.08 | NA | NA | NA |
| Antenna Tower & Turn Table Max-Full | MF-7802 | MF780208406 | NA | NA |
| Boresight Antenna Fixture | FBA-01 | FBA-SIP01 | NA | NA |

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. Tested Date: Mar. 23 to 24, 2020

For other test items:

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|--------------------------------|-------------------------------|---------------|-----------------|------------------|
| Spectrum Analyzer R&S | FSV40 | 100964 | June 04, 2019 | June 03, 2020 |
| Spectrum Analyzer Keysight | N9030A | MY54490679 | July 17, 2019 | July 16, 2020 |
| Power meter Anritsu | ML2495A | 1529002 | July 26, 2019 | July 25, 2020 |
| Power sensor Anritsu | MA2411B | 1339443 | July 26, 2019 | July 25, 2020 |
| Fixed Attenuator Mini-Circuits | MDCS18N-10 | MDCS18N-10-01 | Apr. 14, 2020 | Apr. 13, 2021 |
| Software | ADT_RF Test Software V6.6.5.4 | NA | NA | NA |

Note:

- NOTE:**
1. The test was performed in Oven room 2.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: May 19, 2020

4.1.3 Test Procedure

Following FCC KDB 789033 D02 General UNII Test Procedures:

Radiated versus Conducted Measurements.

The unwanted emission limits in both the restricted and non-restricted bands are based on antenna-port conducted measurements in conjunction with cabinet emissions tests are permitted to demonstrate compliance.

The following steps was performed:

- a. Cabinet emissions measurements. Radiated measurement was performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna was replaced by a termination matching the nominal impedance of the antenna.
- b. Conducted tests was performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT.
- c. EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater.
- d. For all of Radiation emission test

For Radiated emission below 30MHz

- d-1.1. 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.
- d-1.2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d-1.3. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d-1.4. 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.
- d-1.5. 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.
2. KDB 414788 OATS and Chamber Correlation Justification
 - Based on FCC 15.31(f)(2) : measurements may be performed at a distance closer than that specified in the regulations; however, an attempts should be made to avoid making measurements in the near field.
 - OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

For Radiated emission above 30MHz

- d-2.1. 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.
- d-2.2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d-2.3. 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-2.4. 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.
- d-2.5. 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.
- d-2.6. The test-receiver system was set to peak and average detects 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.

Note:

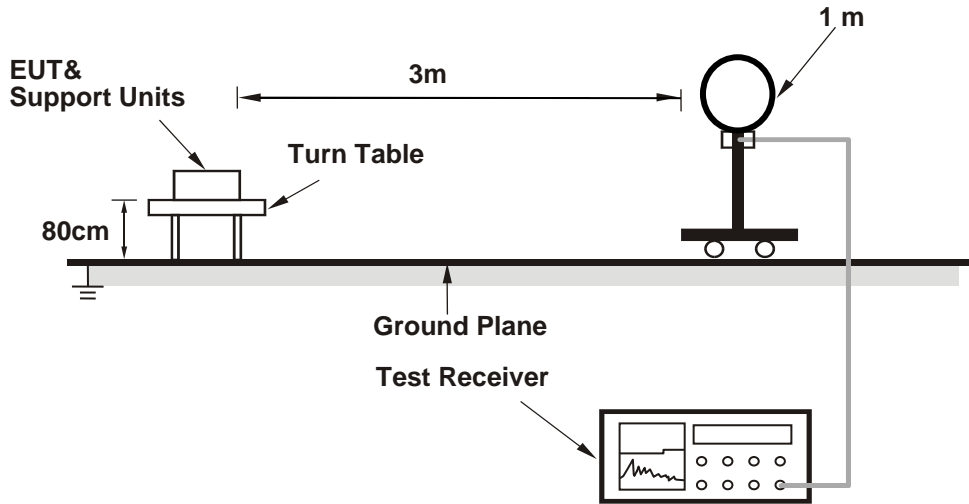
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle \geq 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

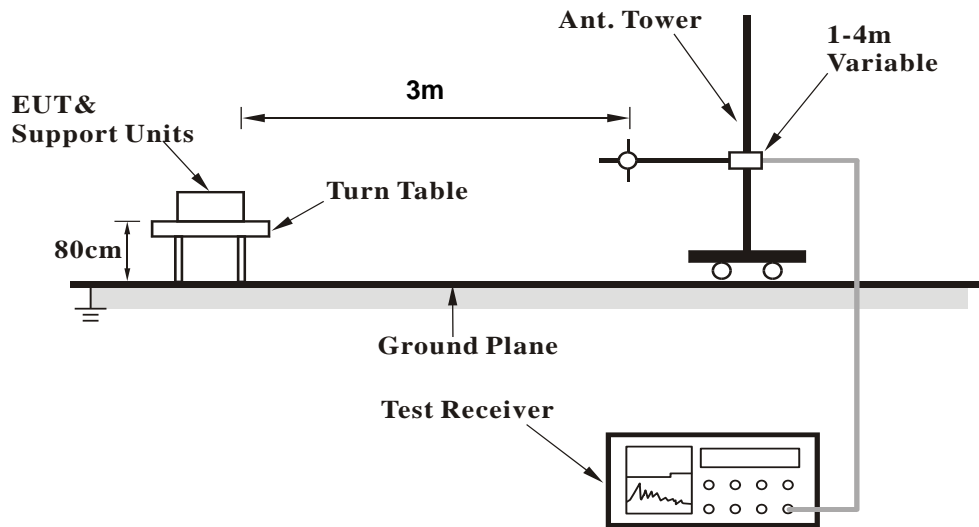
No deviation.

4.1.5 Test Setup

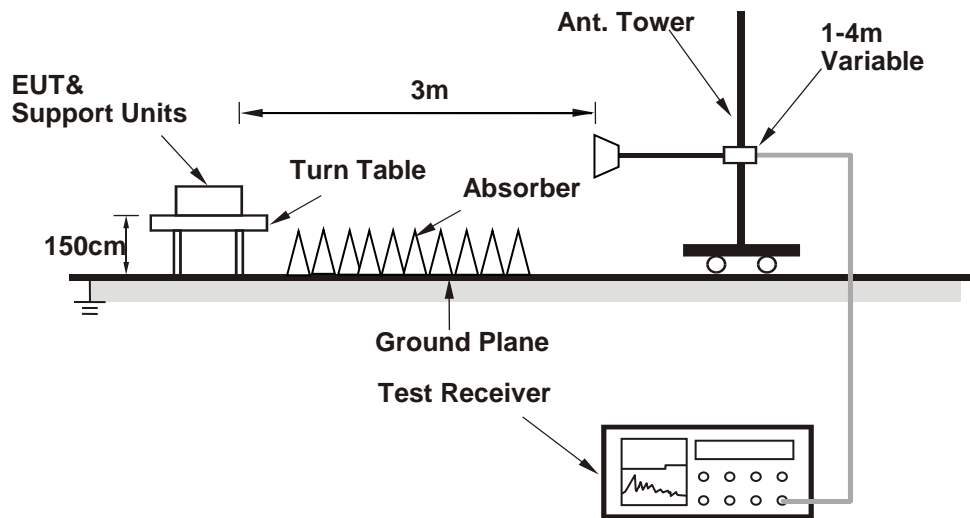
For Radiated emission below 30MHz



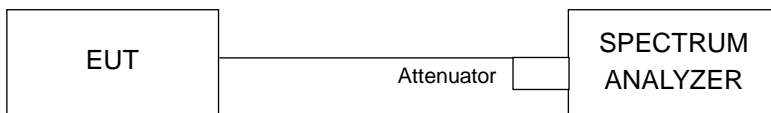
For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For Conducted Configuration:



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

4.1.6 EUT Operating Condition

- a. Connected the EUT with the Laptop which is placed on testing table.
- b. Controlling software (MT7663 QA 0.0.2.6) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results (Radiated Measurement)

| Radiated versus Conducted Measurement | |
|---|--|
| <input type="checkbox"/> Conducted measurement | <input checked="" type="checkbox"/> Radiated measurement |
| <p><u>For Radiated measurement:</u> The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation)</p> <p><u>For Conducted measurement:</u> The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).</p> | |

Radiated test was done with 50ohm terminator on antenna port

Above 1GHz Data:

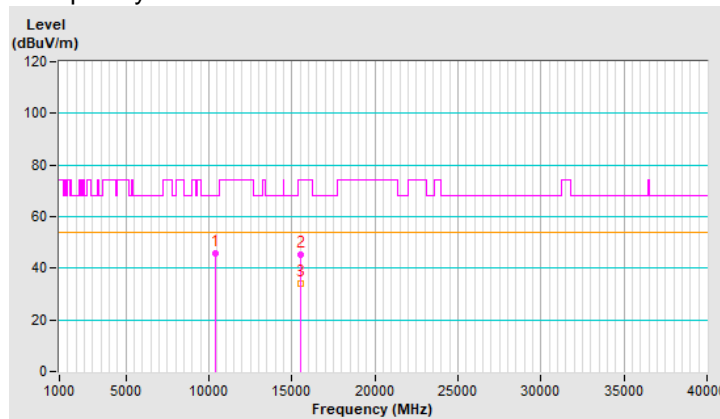
802.11n (HT20)

| | | | |
|------------------------|---------------|--------------------------|--------------|
| CHANNEL | TX Channel 36 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | #10360.00 | 46.0 PK | 68.2 | -22.2 | 1.65 H | 323 | 33.3 | 12.7 |
| 2 | 15540.00 | 45.5 PK | 74.0 | -28.5 | 1.33 H | 229 | 32.3 | 13.2 |
| 3 | 15540.00 | 33.9 AV | 54.0 | -20.1 | 1.33 H | 229 | 20.7 | 13.2 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " # ": The radiated frequency is out of the restricted band.



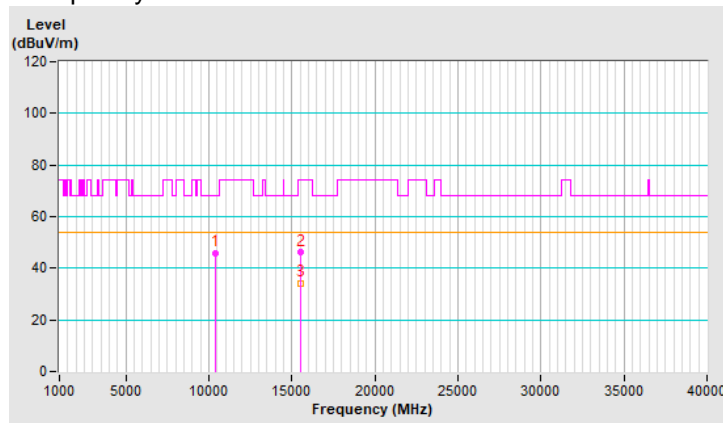
| | | | |
|------------------------|---------------|--------------------------|--------------|
| CHANNEL | TX Channel 36 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | #10360.00 | 46.0 PK | 68.2 | -22.2 | 2.38 V | 168 | 33.3 | 12.7 |
| 2 | 15540.00 | 46.1 PK | 74.0 | -27.9 | 1.54 V | 140 | 32.9 | 13.2 |
| 3 | 15540.00 | 34.2 AV | 54.0 | -19.8 | 1.54 V | 140 | 21.0 | 13.2 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " # ": The radiated frequency is out of the restricted band.



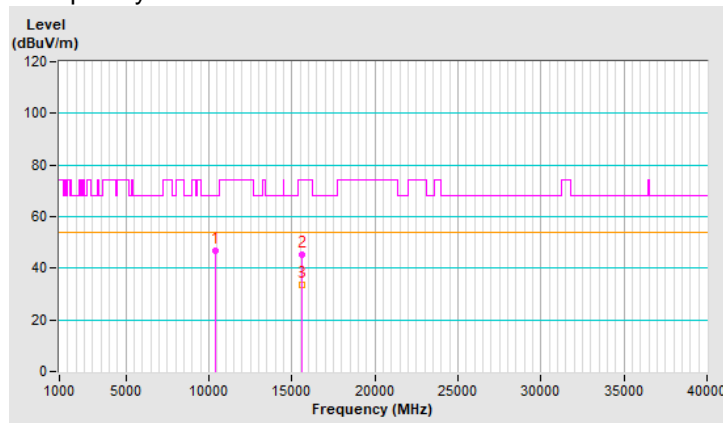
| | | | |
|------------------------|---------------|--------------------------|--------------|
| CHANNEL | TX Channel 40 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | #10400.00 | 46.9 PK | 68.2 | -21.3 | 1.60 H | 319 | 34.1 | 12.8 |
| 2 | 15600.00 | 45.3 PK | 74.0 | -28.7 | 1.32 H | 217 | 31.8 | 13.5 |
| 3 | 15600.00 | 33.8 AV | 54.0 | -20.2 | 1.32 H | 217 | 20.3 | 13.5 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. "#": The radiated frequency is out of the restricted band.



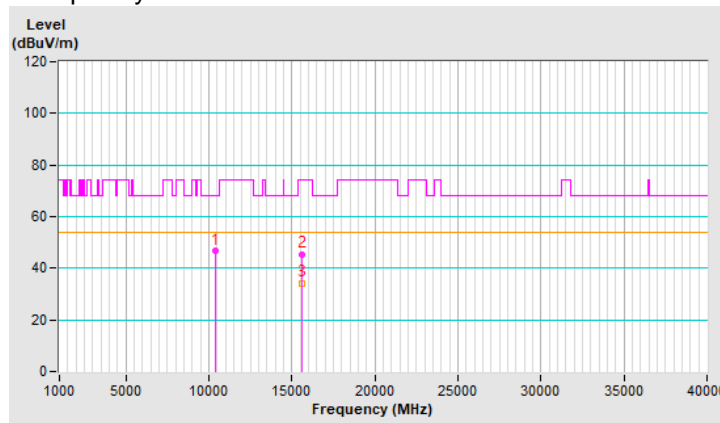
| | | | |
|------------------------|---------------|--------------------------|--------------|
| CHANNEL | TX Channel 40 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | #10400.00 | 46.6 PK | 68.2 | -21.6 | 2.29 V | 149 | 33.8 | 12.8 |
| 2 | 15600.00 | 45.5 PK | 74.0 | -28.5 | 1.45 V | 124 | 32.0 | 13.5 |
| 3 | 15600.00 | 33.9 AV | 54.0 | -20.1 | 1.45 V | 124 | 20.4 | 13.5 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " # ": The radiated frequency is out of the restricted band.



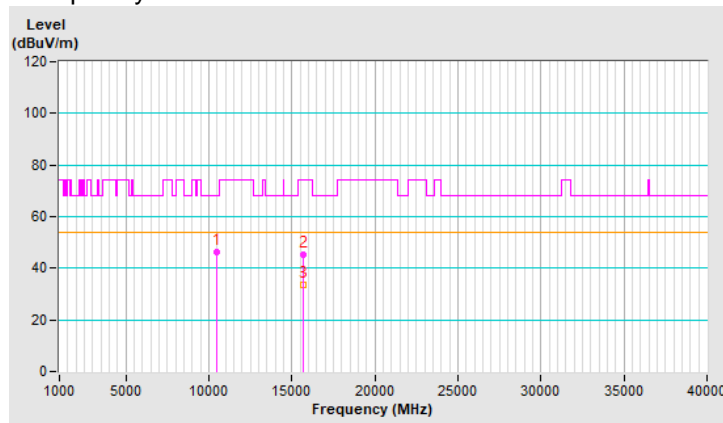
| | | | |
|------------------------|---------------|--------------------------|--------------|
| CHANNEL | TX Channel 48 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | #10480.00 | 46.5 PK | 68.2 | -21.7 | 1.62 H | 318 | 33.4 | 13.1 |
| 2 | 15720.00 | 45.5 PK | 74.0 | -28.5 | 1.34 H | 217 | 31.7 | 13.8 |
| 3 | 15720.00 | 33.7 AV | 54.0 | -20.3 | 1.34 H | 217 | 19.9 | 13.8 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. "#": The radiated frequency is out of the restricted band.



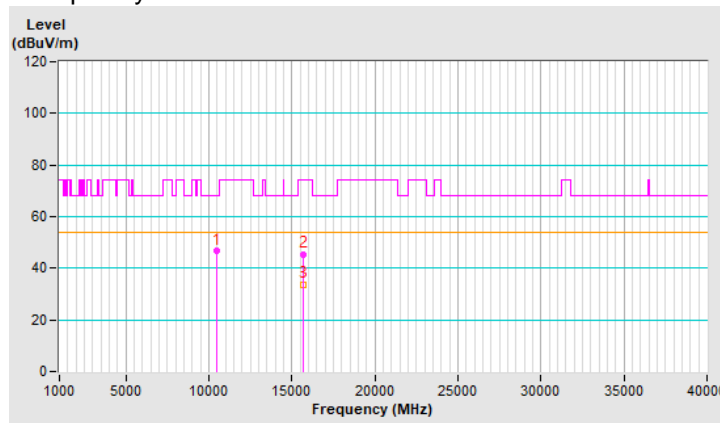
| | | | |
|------------------------|---------------|--------------------------|--------------|
| CHANNEL | TX Channel 48 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | #10480.00 | 46.6 PK | 68.2 | -21.6 | 2.34 V | 165 | 33.5 | 13.1 |
| 2 | 15720.00 | 45.5 PK | 74.0 | -28.5 | 1.50 V | 129 | 31.7 | 13.8 |
| 3 | 15720.00 | 33.8 AV | 54.0 | -20.2 | 1.50 V | 129 | 20.0 | 13.8 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. "#": The radiated frequency is out of the restricted band.



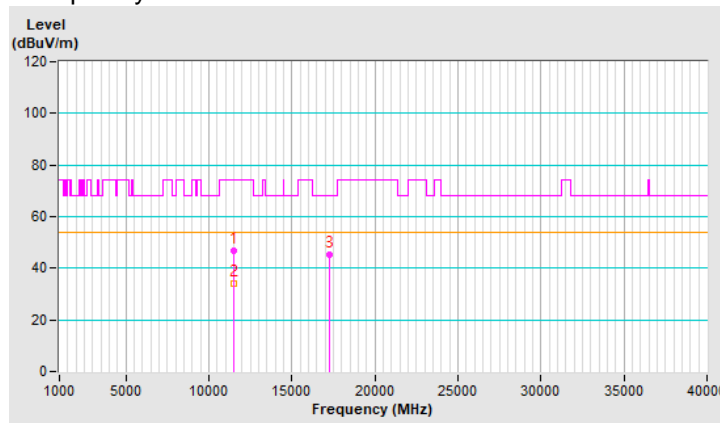
| | | | |
|------------------------|----------------|--------------------------|--------------|
| CHANNEL | TX Channel 149 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | 11490.00 | 46.8 PK | 74.0 | -27.2 | 1.58 H | 326 | 33.5 | 13.3 |
| 2 | 11490.00 | 34.2 AV | 54.0 | -19.8 | 1.58 H | 326 | 20.9 | 13.3 |
| 3 | #17235.00 | 45.3 PK | 68.2 | -22.9 | 1.38 H | 219 | 27.7 | 17.6 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. "#": The radiated frequency is out of the restricted band.



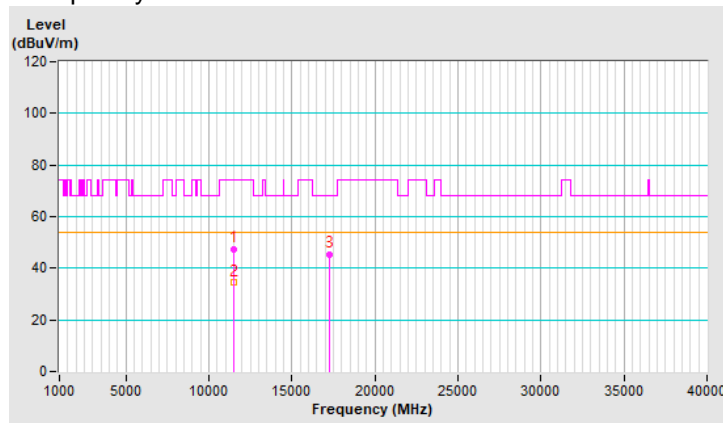
| | | | |
|------------------------|----------------|--------------------------|--------------|
| CHANNEL | TX Channel 149 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | 11490.00 | 47.2 PK | 74.0 | -26.8 | 2.35 V | 172 | 33.9 | 13.3 |
| 2 | 11490.00 | 34.4 AV | 54.0 | -19.6 | 2.35 V | 172 | 21.1 | 13.3 |
| 3 | #17235.00 | 45.5 PK | 68.2 | -22.7 | 1.52 V | 140 | 27.9 | 17.6 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. "#": The radiated frequency is out of the restricted band.



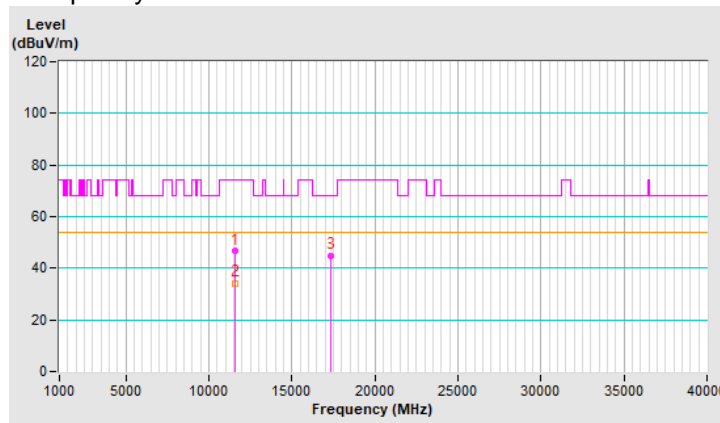
| | | | |
|------------------------|----------------|--------------------------|--------------|
| CHANNEL | TX Channel 157 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | 11570.00 | 46.6 PK | 74.0 | -27.4 | 1.53 H | 316 | 33.4 | 13.2 |
| 2 | 11570.00 | 34.0 AV | 54.0 | -20.0 | 1.53 H | 316 | 20.8 | 13.2 |
| 3 | #17355.00 | 45.0 PK | 68.2 | -23.2 | 1.38 H | 216 | 27.4 | 17.6 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. "#": The radiated frequency is out of the restricted band.



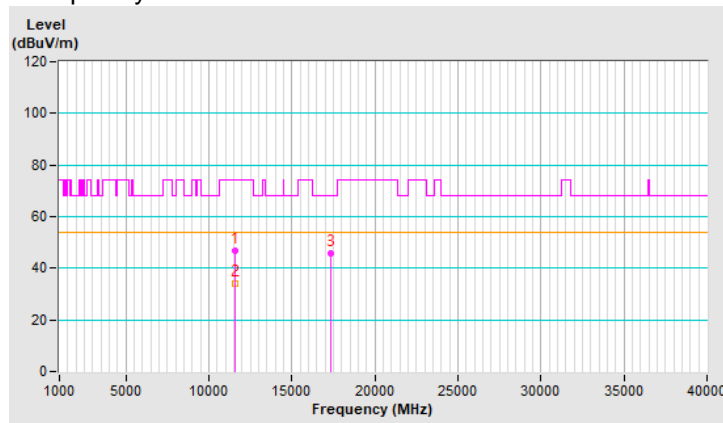
| | | | |
|------------------------|----------------|------------------------------|--------------|
| CHANNEL | TX Channel 157 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1 | 11570.00 | 46.9 PK | 74.0 | -27.1 | 2.31 V | 163 | 33.7 | 13.2 |
| 2 | 11570.00 | 34.1 AV | 54.0 | -19.9 | 2.31 V | 163 | 20.9 | 13.2 |
| 3 | #17355.00 | 45.9 PK | 68.2 | -22.3 | 1.57 V | 151 | 28.3 | 17.6 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. "#": The radiated frequency is out of the restricted band.



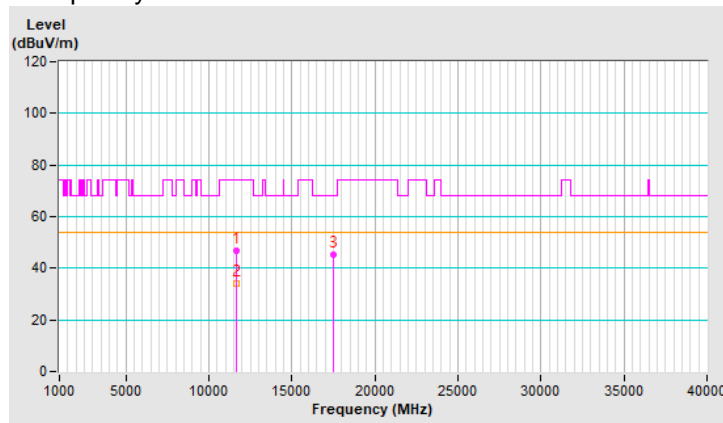
| | | | |
|------------------------|----------------|------------------------------|--------------|
| CHANNEL | TX Channel 165 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1 | 11650.00 | 47.0 PK | 74.0 | -27.0 | 1.58 H | 316 | 33.7 | 13.3 |
| 2 | 11650.00 | 34.1 AV | 54.0 | -19.9 | 1.58 H | 316 | 20.8 | 13.3 |
| 3 | #17475.00 | 45.4 PK | 68.2 | -22.8 | 1.44 H | 223 | 27.5 | 17.9 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. "#": The radiated frequency is out of the restricted band.



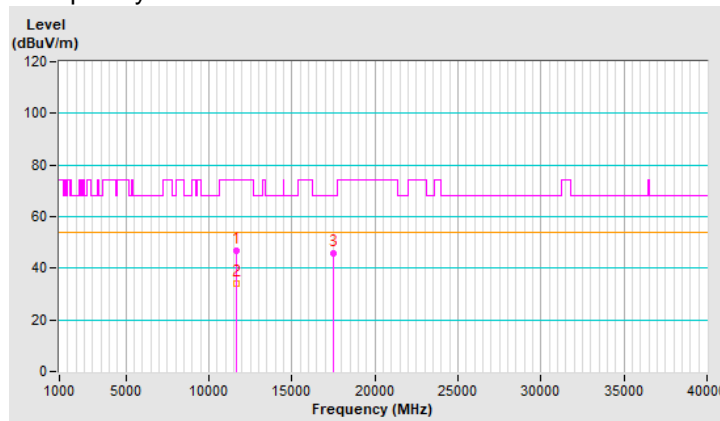
| | | | |
|------------------------|----------------|------------------------------|--------------|
| CHANNEL | TX Channel 165 | DETECTOR FUNCTION | Peak (PK) |
| FREQUENCY RANGE | 1GHz ~ 40GHz | | Average (AV) |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1 | 11650.00 | 46.7 PK | 74.0 | -27.3 | 2.39 V | 186 | 33.4 | 13.3 |
| 2 | 11650.00 | 34.0 AV | 54.0 | -20.0 | 2.39 V | 186 | 20.7 | 13.3 |
| 3 | #17475.00 | 46.0 PK | 68.2 | -22.2 | 1.53 V | 148 | 28.1 | 17.9 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. "#": The radiated frequency is out of the restricted band.



Below 1GHz Data:

802.11n (HT20)

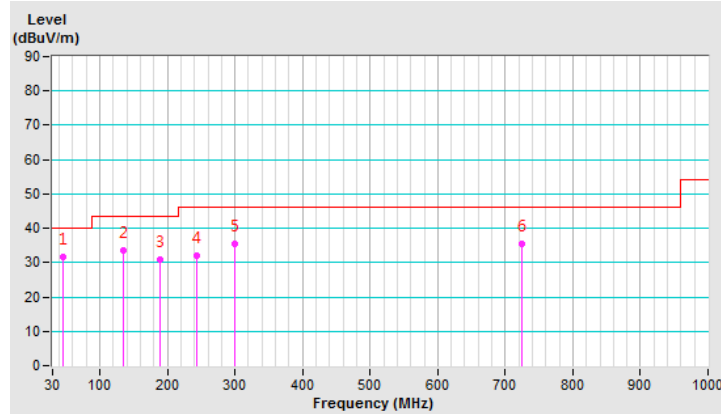
| | | | |
|------------------------|---------------|------------------------------|-----------------|
| CHANNEL | TX Channel 36 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1 | 44.70 | 31.6 QP | 40.0 | -8.4 | 1.00 H | 321 | 39.4 | -7.8 |
| 2 | 134.11 | 33.4 QP | 43.5 | -10.1 | 2.00 H | 303 | 41.4 | -8.0 |
| 3 | 189.42 | 30.8 QP | 43.5 | -12.7 | 1.50 H | 347 | 40.5 | -9.7 |
| 4 | 242.94 | 32.1 QP | 46.0 | -13.9 | 1.00 H | 306 | 40.7 | -8.6 |
| 5 | 298.74 | 35.4 QP | 46.0 | -10.6 | 1.00 H | 213 | 41.8 | -6.4 |
| 6 | 724.03 | 35.4 QP | 46.0 | -10.6 | 1.00 H | 32 | 32.4 | 3.0 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



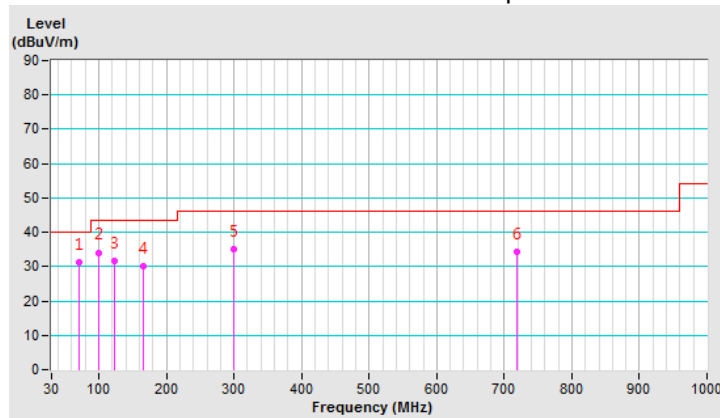
| | | | |
|------------------------|---------------|--------------------------|-----------------|
| CHANNEL | TX Channel 36 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz | | |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | 70.13 | 31.4 QP | 40.0 | -8.6 | 2.00 V | 360 | 41.6 | -10.2 |
| 2 | 99.62 | 34.1 QP | 43.5 | -9.4 | 1.00 V | 301 | 46.0 | -11.9 |
| 3 | 122.93 | 31.7 QP | 43.5 | -11.8 | 1.00 V | 98 | 40.9 | -9.2 |
| 4 | 166.16 | 30.1 QP | 43.5 | -13.4 | 1.00 V | 73 | 37.5 | -7.4 |
| 5 | 299.32 | 35.0 QP | 46.0 | -11.0 | 2.00 V | 101 | 41.4 | -6.4 |
| 6 | 718.17 | 34.4 QP | 46.0 | -11.6 | 1.00 V | 360 | 31.8 | 2.6 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



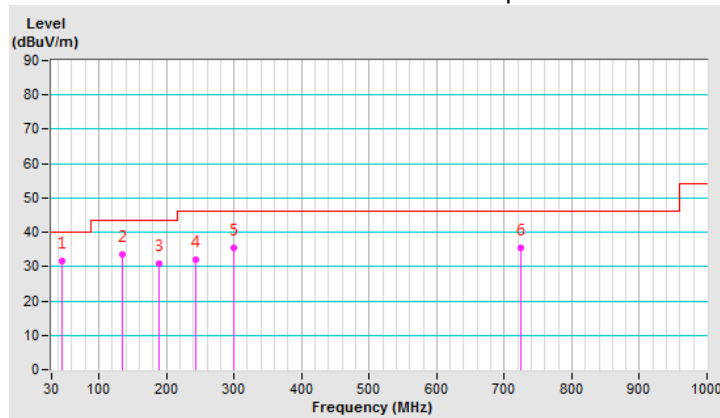
| | | | |
|------------------------|----------------|--------------------------|-----------------|
| CHANNEL | TX Channel 165 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | 44.77 | 31.8 QP | 40.0 | -8.2 | 1.00 H | 333 | 39.6 | -7.8 |
| 2 | 134.19 | 33.5 QP | 43.5 | -10.0 | 2.00 H | 316 | 41.5 | -8.0 |
| 3 | 189.50 | 31.0 QP | 43.5 | -12.5 | 1.50 H | 329 | 40.7 | -9.7 |
| 4 | 243.03 | 31.9 QP | 46.0 | -14.1 | 1.00 H | 289 | 40.5 | -8.6 |
| 5 | 298.84 | 35.5 QP | 46.0 | -10.5 | 1.00 H | 224 | 41.9 | -6.4 |
| 6 | 724.16 | 35.6 QP | 46.0 | -10.4 | 1.00 H | 63 | 32.6 | 3.0 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



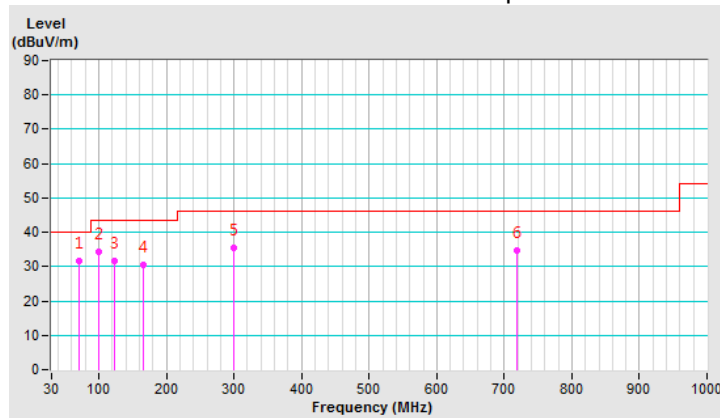
| | | | |
|------------------------|----------------|--------------------------|-----------------|
| CHANNEL | TX Channel 165 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9kHz ~ 1GHz | | |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | 70.31 | 31.6 QP | 40.0 | -8.4 | 2.00 V | 336 | 41.8 | -10.2 |
| 2 | 99.74 | 34.3 QP | 43.5 | -9.2 | 1.00 V | 282 | 46.1 | -11.8 |
| 3 | 123.06 | 31.5 QP | 43.5 | -12.0 | 1.00 V | 115 | 40.6 | -9.1 |
| 4 | 166.33 | 30.4 QP | 43.5 | -13.1 | 1.00 V | 97 | 37.9 | -7.5 |
| 5 | 299.46 | 35.3 QP | 46.0 | -10.7 | 2.00 V | 120 | 41.7 | -6.4 |
| 6 | 718.29 | 34.6 QP | 46.0 | -11.4 | 1.00 V | 346 | 32.0 | 2.6 |

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



4.1.8 Test Results (Conducted Measurement)

| Radiated versus Conducted Measurement | |
|--|---|
| <input checked="" type="checkbox"/> Conducted measurement | <input type="checkbox"/> Radiated measurement |
| <p><u>For Radiated measurement:</u></p> <p>The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation)</p> <p><u>For Conducted measurement:</u></p> <p>The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).</p> <p>Note: In order to obtain results more easily, change max hold to view as following. It has no effect on the result.</p> | |

| Conducted Measurement Factor |
|---|
| <p>a. The composite gain will be used (For U-NII-1: Composite gain = 5.79dBi For U-NII-3: Composite gain = 5.79dBi)</p> <p>b. For the out of band spurious the gain for the specific band may have been used rather than the highest gain across all bands.</p> <p>c. For the band edge the gain for the specific band may have been used.</p> <p>d. In restricted bands below 1000 MHz, add upper bound on ground plane reflection: For $f = 30 - 1000$ MHz, add 4.7 dB.</p> <p>Note: The conducted emission test was considered some factor to compute test result.</p> |

Above 1GHz Data

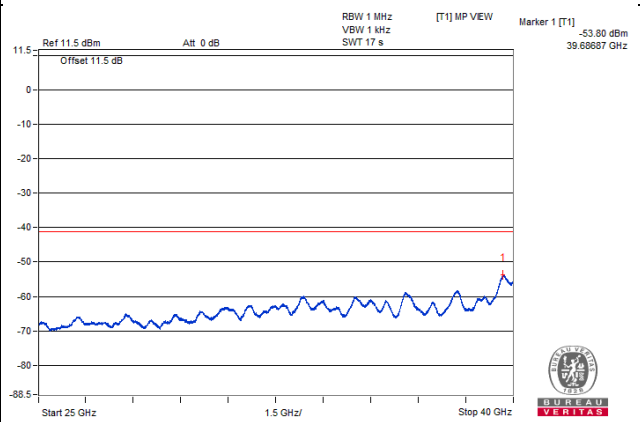
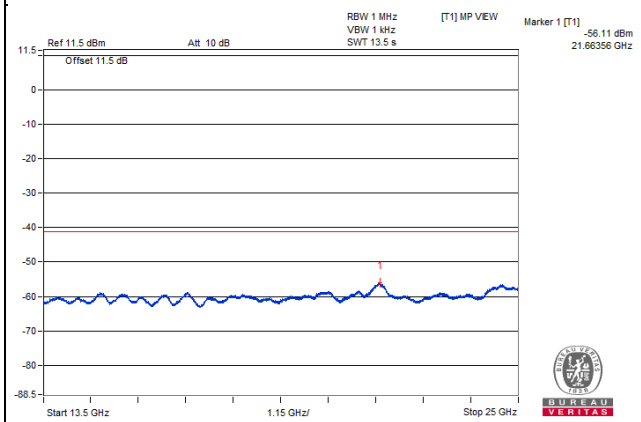
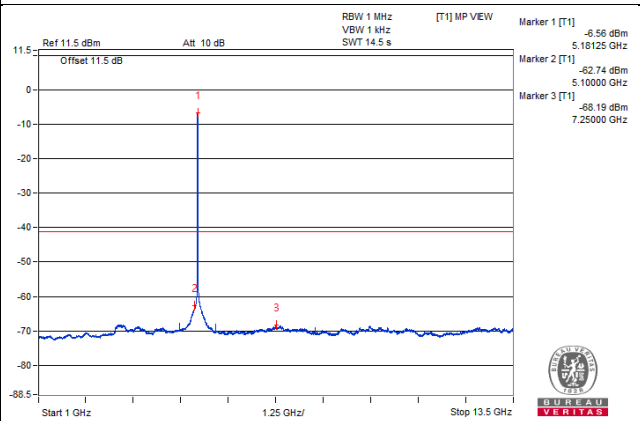
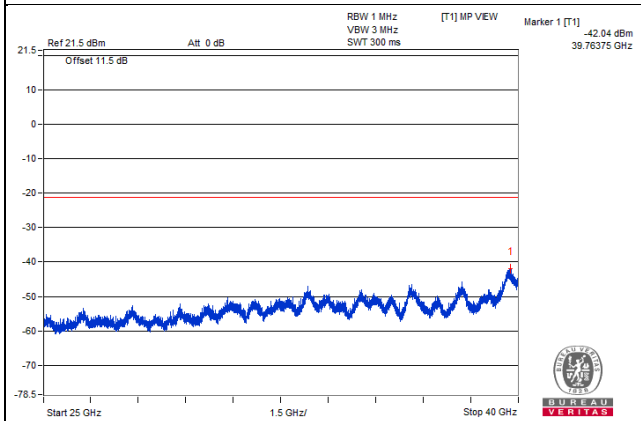
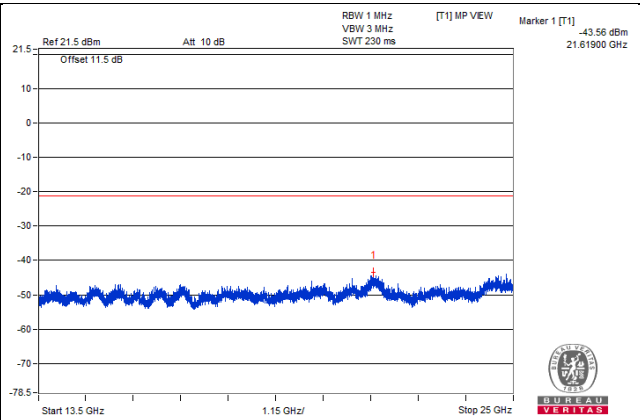
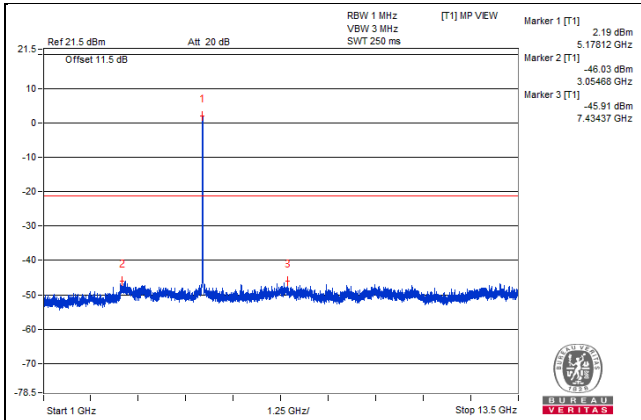
802.11n (HT20) - Channel 36

Conducted spurious emission table

| No. | Frequency (MHz) | Emission Level (dBUV/m) | Limit (dBUV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 5178.12 PK | 103.24 | * | | 2.19 | 5.79 | 7.98 |
| 2 | 3054.68 PK | 55.02 | 68.2 | -13.18 | -46.03 | 5.79 | -40.24 |
| 3 | 7434.37 PK | 55.14 | 74 | -18.86 | -45.91 | 5.79 | -40.12 |
| 4 | 21619 PK | 57.49 | 68.2 | -10.71 | -43.56 | 5.79 | -37.77 |
| 5 | 39763.75 PK | 59.01 | 74 | -14.99 | -42.04 | 5.79 | -36.25 |
| 6 | 5181.25 AV | 94.49 | * | | -6.56 | 5.79 | -0.77 |
| 7 | 5100 AV | 38.31 | 54 | -15.69 | -62.74 | 5.79 | -56.95 |
| 8 | 7250 AV | 32.86 | 54 | -21.14 | -68.19 | 5.79 | -62.4 |
| 9 | 21663.56 AV | 44.94 | # | | -56.11 | 5.79 | -50.32 |
| 10 | 39686.87 AV | 47.25 | 54 | -6.75 | -53.8 | 5.79 | -48.01 |

Note :

1. Emission Level (dBUV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
2. * : Fundamental frequency, the limit was restricted at the output power.
3. # : Non-restricted frequency, no limit for average emission.

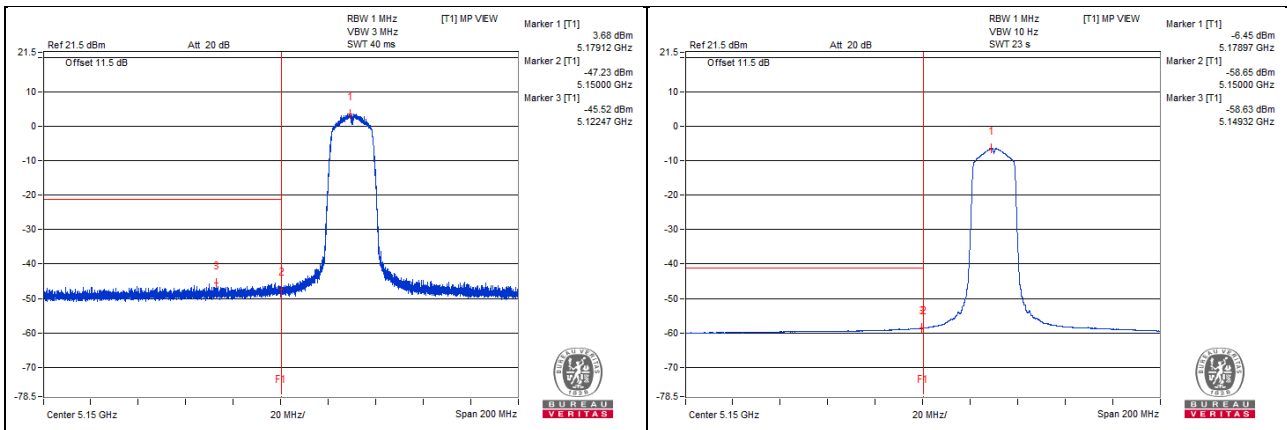


Bandedge table

| No. | Frequency (MHz) | Emission Level (dBUV/m) | Limit (dBUV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 5179.12 PK | 104.64 | * | | 3.68 | 5.7 | 9.38 |
| 2 | 5150 PK | 53.73 | 74 | -20.27 | -47.23 | 5.7 | -41.53 |
| 3 | 5122.47 PK | 55.44 | 74 | -18.56 | -45.52 | 5.7 | -39.82 |
| 4 | 5178.97 AV | 94.51 | * | | -6.45 | 5.7 | -0.75 |
| 5 | 5150 AV | 42.31 | 54 | -11.69 | -58.65 | 5.7 | -52.95 |
| 6 | 5149.32 AV | 42.33 | 54 | -11.67 | -58.63 | 5.7 | -52.93 |

Note :

1. Emission Level (dBUV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
2. * : Fundamental frequency, the limit was restricted at the output power.



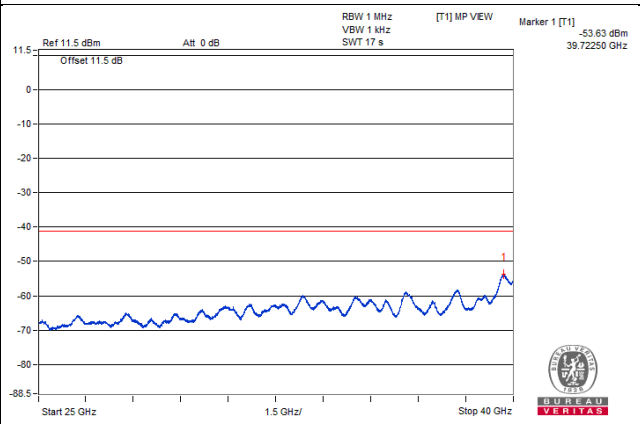
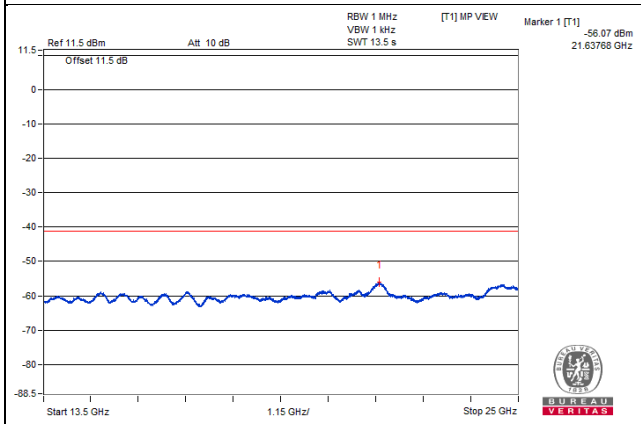
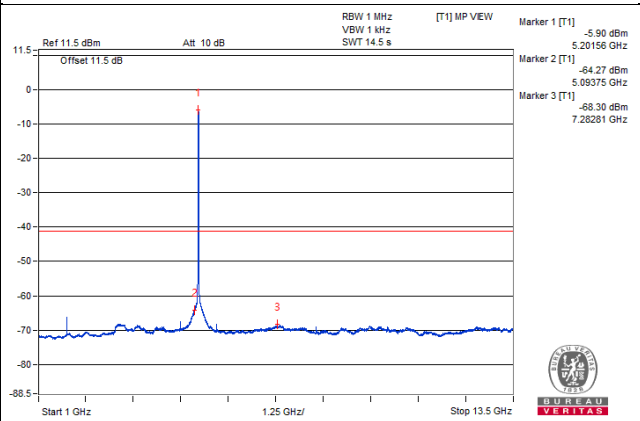
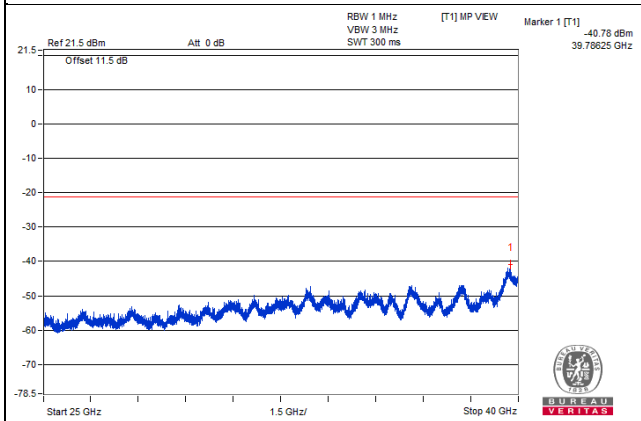
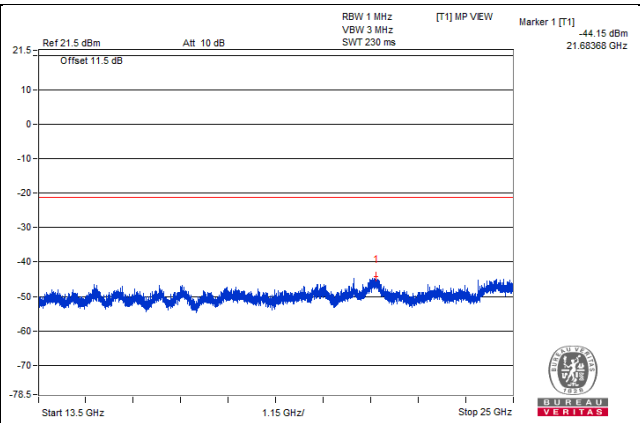
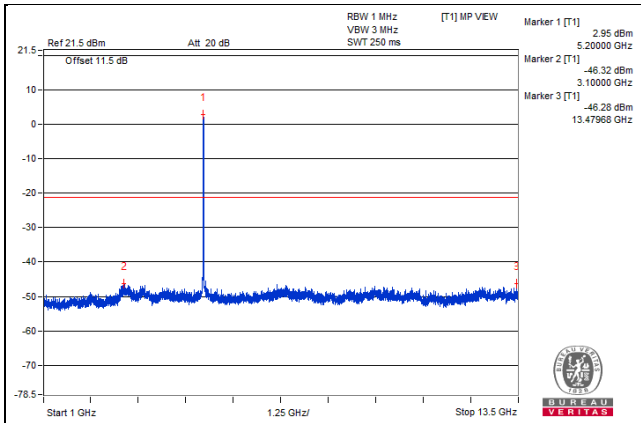
802.11n (HT20) - Channel 40

Conducted spurious emission table

| No. | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 5200 PK | 104 | * | | 2.95 | 5.79 | 8.74 |
| 2 | 3100 PK | 54.73 | 68.2 | -13.47 | -46.32 | 5.79 | -40.53 |
| 3 | 13479.68 PK | 54.77 | 68.2 | -13.43 | -46.28 | 5.79 | -40.49 |
| 4 | 21683.68 PK | 56.9 | 68.2 | -11.3 | -44.15 | 5.79 | -38.36 |
| 5 | 39786.25 PK | 60.27 | 74 | -13.73 | -40.78 | 5.79 | -34.99 |
| 6 | 5201.56 AV | 95.15 | * | | -5.9 | 5.79 | -0.11 |
| 7 | 5093.75 AV | 36.78 | 54 | -17.22 | -64.27 | 5.79 | -58.48 |
| 8 | 7282.81 AV | 32.75 | 54 | -21.25 | -68.3 | 5.79 | -62.51 |
| 9 | 21637.68 AV | 44.98 | # | | -56.07 | 5.79 | -50.28 |
| 10 | 39722.5 AV | 47.42 | 54 | -6.58 | -53.63 | 5.79 | -47.84 |

Note :

1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
2. * : Fundamental frequency, the limit was restricted at the output power.
3. # : Non-restricted frequency, no limit for average emission.

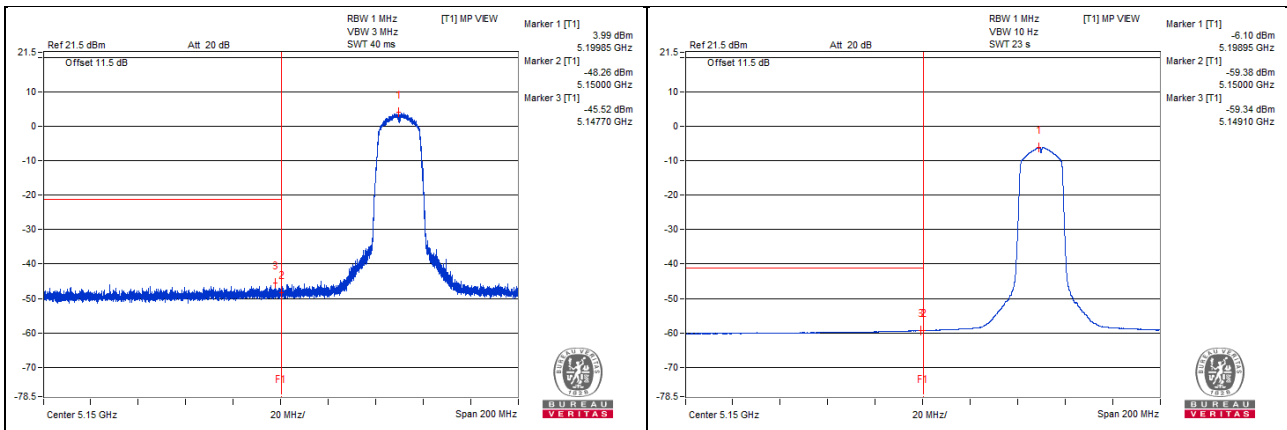


Bandedge table

| No. | Frequency (MHz) | Emission Level (dBUV/m) | Limit (dBUV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 5199.85 PK | 104.95 | * | | 3.99 | 5.7 | 9.69 |
| 2 | 5150 PK | 52.7 | 74 | -21.3 | -48.26 | 5.7 | -42.56 |
| 3 | 5147.7 PK | 55.44 | 74 | -18.56 | -45.52 | 5.7 | -39.82 |
| 4 | 5198.95 AV | 94.86 | * | | -6.1 | 5.7 | -0.4 |
| 5 | 5150 AV | 41.58 | 54 | -12.42 | -59.38 | 5.7 | -53.68 |
| 6 | 5149.1 AV | 41.62 | 54 | -12.38 | -59.34 | 5.7 | -53.64 |

Note :

1. Emission Level (dBUV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
2. * : Fundamental frequency, the limit was restricted at the output power.



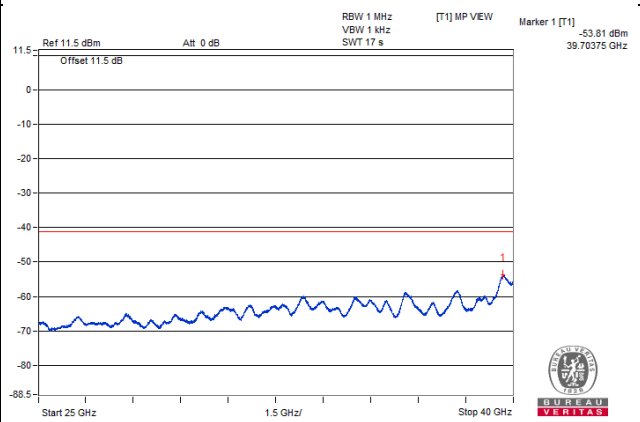
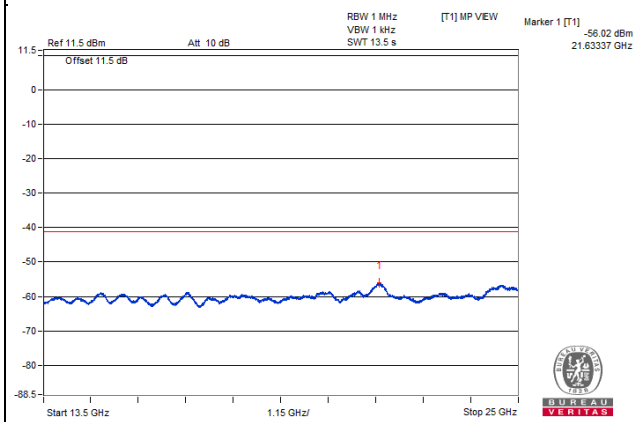
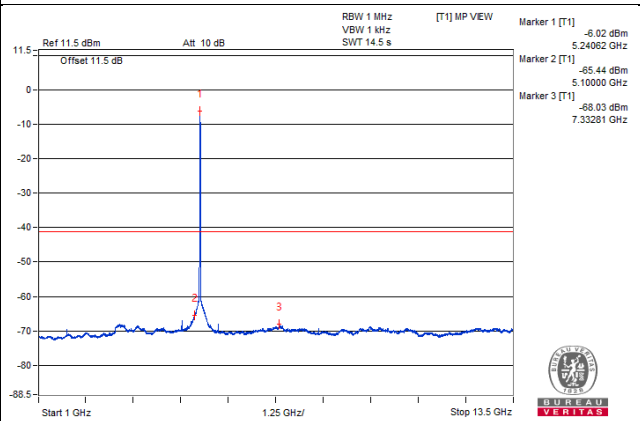
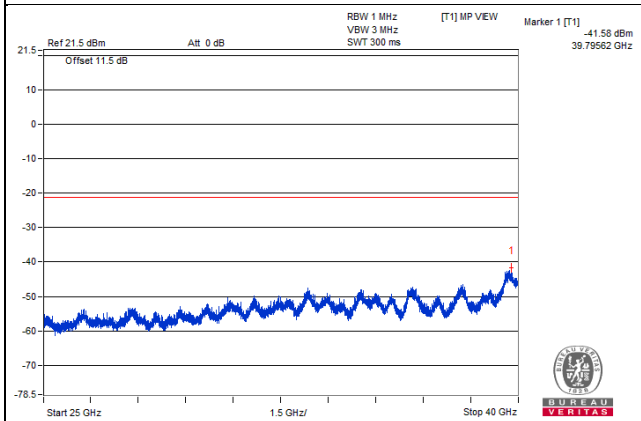
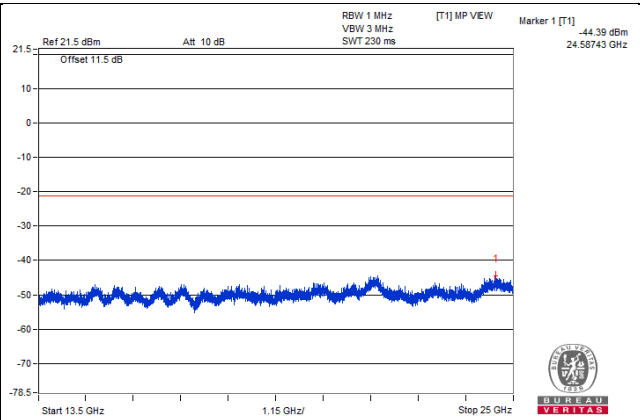
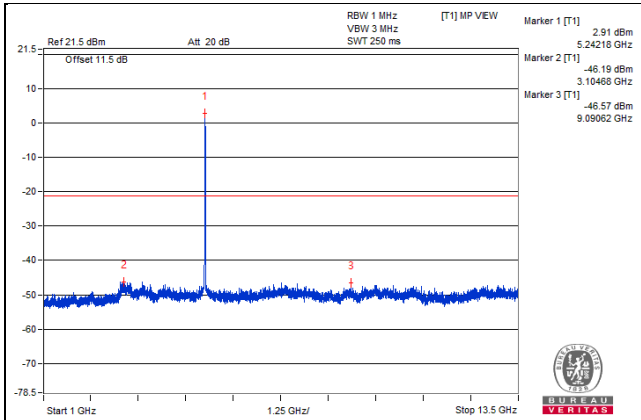
802.11n (HT20) - Channel 48

Conducted spurious emission table

| No. | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 5242.18 PK | 103.96 | * | | 2.91 | 5.79 | 8.7 |
| 2 | 3104.68 PK | 54.86 | 68.2 | -13.34 | -46.19 | 5.79 | -40.4 |
| 3 | 9090.62 PK | 54.48 | 74 | -19.52 | -46.57 | 5.79 | -40.78 |
| 4 | 24587.43 PK | 56.66 | 68.2 | -11.54 | -44.39 | 5.79 | -38.6 |
| 5 | 39795.62 PK | 59.47 | 74 | -14.53 | -41.58 | 5.79 | -35.79 |
| 6 | 5240.62 AV | 95.03 | * | | -6.02 | 5.79 | -0.23 |
| 7 | 5100 AV | 35.61 | 54 | -18.39 | -65.44 | 5.79 | -59.65 |
| 8 | 7332.81 AV | 33.02 | 54 | -20.98 | -68.03 | 5.79 | -62.24 |
| 9 | 21633.37 AV | 45.03 | # | | -56.02 | 5.79 | -50.23 |
| 10 | 39703.75 AV | 47.24 | 54 | -6.76 | -53.81 | 5.79 | -48.02 |

Note :

1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
2. * : Fundamental frequency, the limit was restricted at the output power.
3. # : Non-restricted frequency, no limit for average emission.

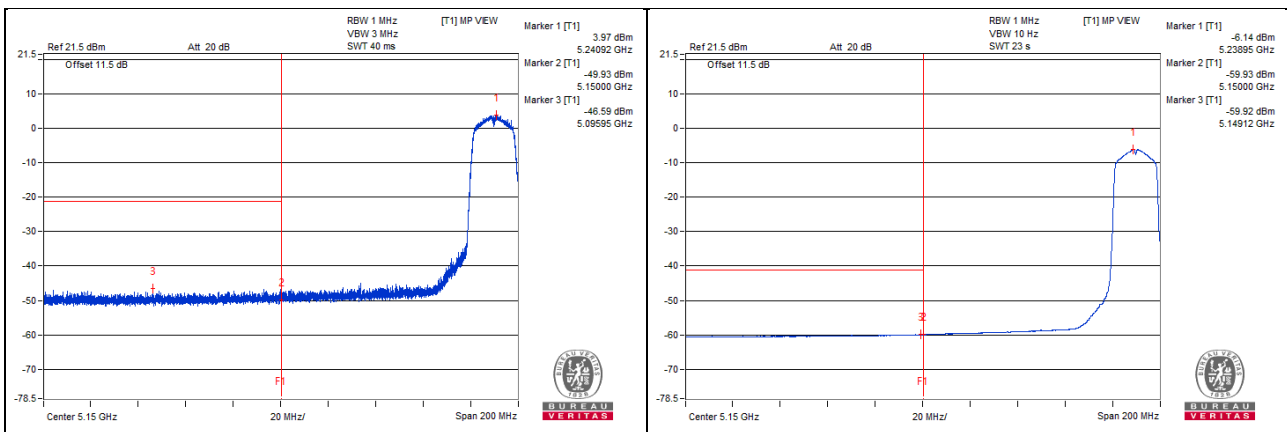


Bandedge table

| No. | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 5240.92 PK | 104.93 | * | | 3.97 | 5.7 | 9.67 |
| 2 | 5150 PK | 51.03 | 74 | -22.97 | -49.93 | 5.7 | -44.23 |
| 3 | 5095.95 PK | 54.37 | 74 | -19.63 | -46.59 | 5.7 | -40.89 |
| 4 | 5238.95 AV | 94.82 | * | | -6.14 | 5.7 | -0.44 |
| 5 | 5150 AV | 41.03 | 54 | -12.97 | -59.93 | 5.7 | -54.23 |
| 6 | 5149.12 AV | 41.04 | 54 | -12.96 | -59.92 | 5.7 | -54.22 |

Note :

- Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
- * : Fundamental frequency, the limit was restricted at the output power.



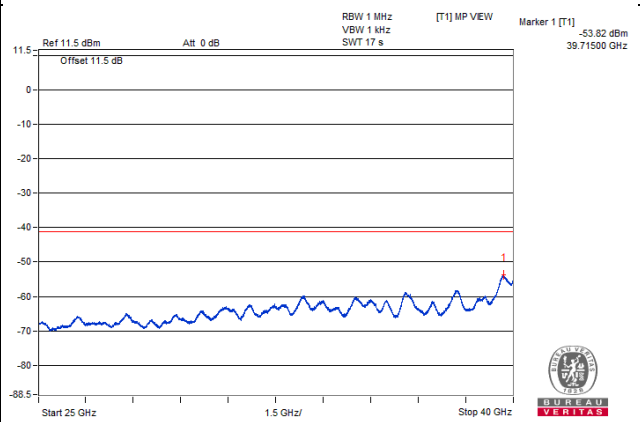
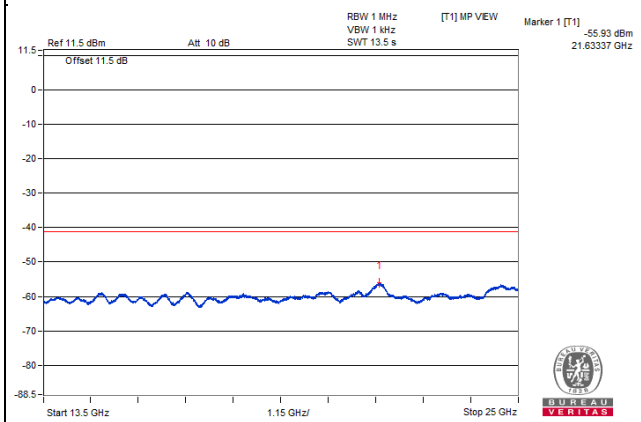
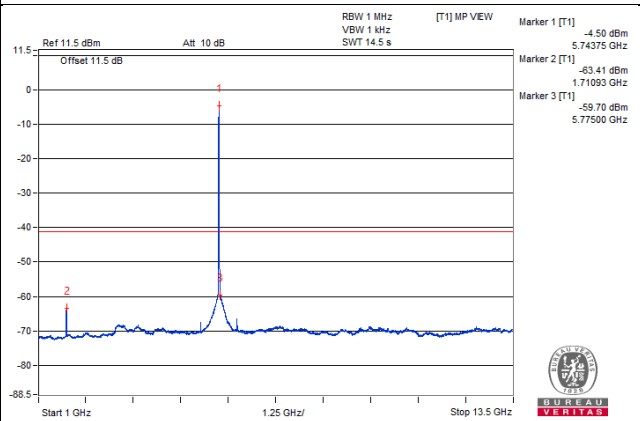
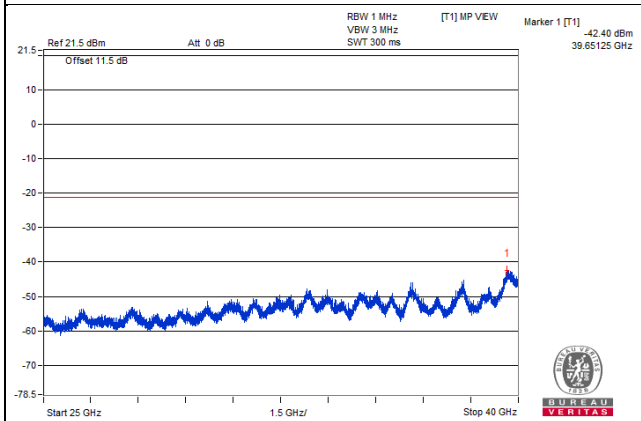
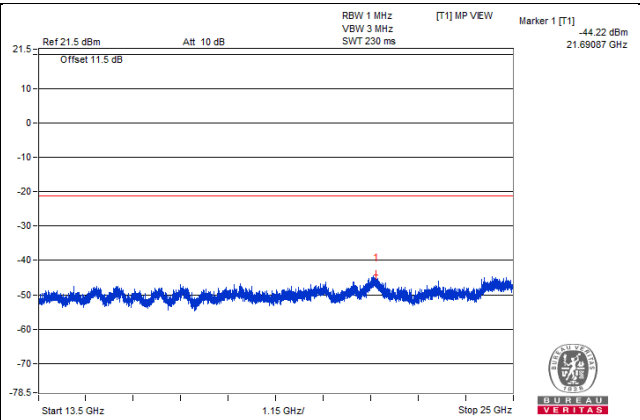
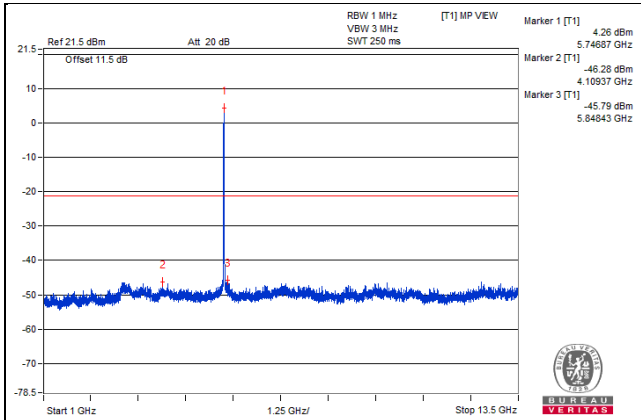
802.11n (HT20) – Channel 149

Conducted spurious emission table

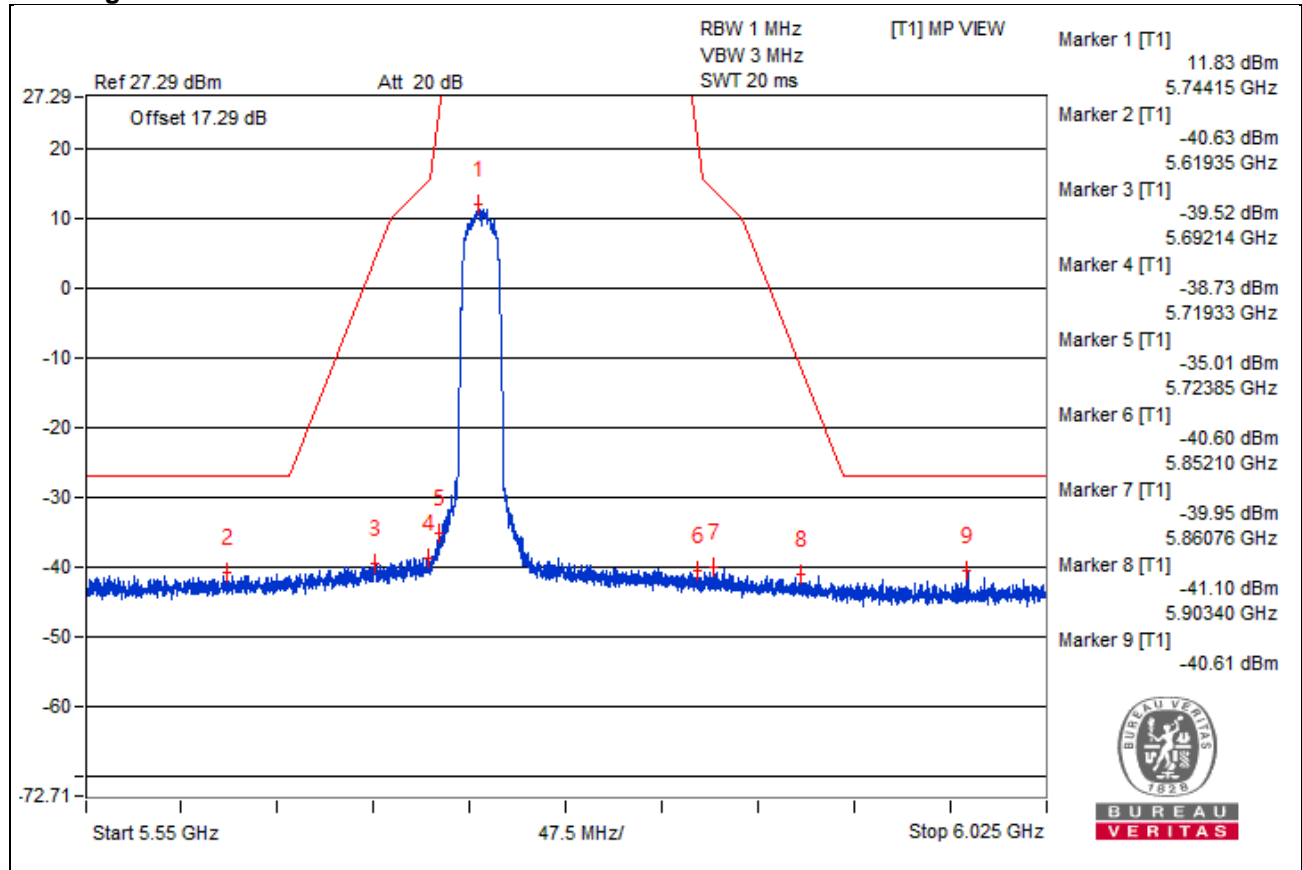
| No. | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 5746.87 PK | 105.31 | * | | 4.26 | 5.79 | 10.05 |
| 2 | 4109.37 PK | 54.77 | 74 | -19.23 | -46.28 | 5.79 | -40.49 |
| 3 | 5848.43 PK | 55.26 | 68.2 | -12.94 | -45.79 | 5.79 | -40 |
| 4 | 21690.87 PK | 56.83 | 68.2 | -11.37 | -44.22 | 5.79 | -38.43 |
| 5 | 39651.25 PK | 58.65 | 74 | -15.35 | -42.4 | 5.79 | -36.61 |
| 6 | 5743.75 AV | 96.55 | * | | -4.5 | 5.79 | 1.29 |
| 7 | 1710.93 AV | 37.64 | 54 | -16.36 | -63.41 | 5.79 | -57.62 |
| 8 | 5775 AV | 41.35 | # | | -59.7 | 5.79 | -53.91 |
| 9 | 21633.37 AV | 45.12 | # | | -55.93 | 5.79 | -50.14 |
| 10 | 39715 AV | 47.23 | 54 | -6.77 | -53.82 | 5.79 | -48.03 |

Note :

1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
2. * : Fundamental frequency, the limit was restricted at the output power.
3. # : Non-restricted frequency, no limit for average emission.



Bandedge table



Note:

1. The offset including attenuator (10dB), cable loss (1.5 dB) and antenna gain (5.79 dBi).
2. The test results were EIRP.

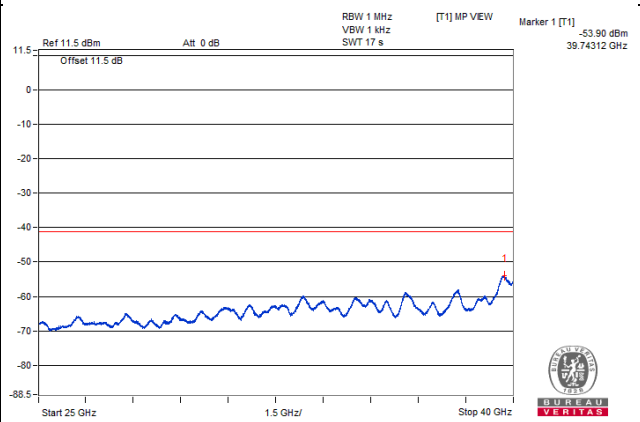
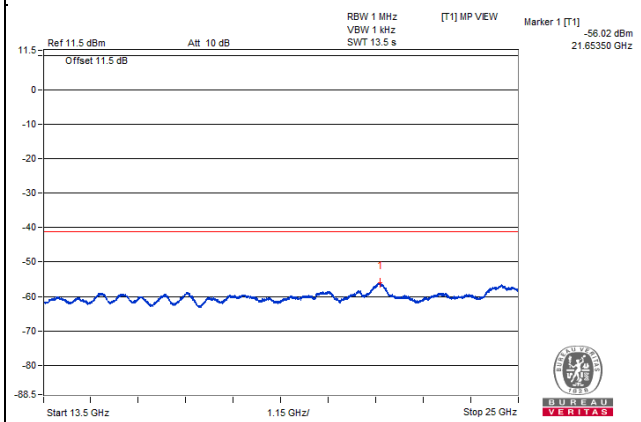
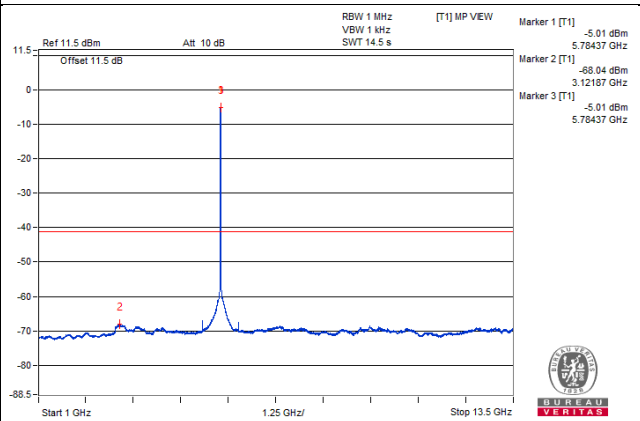
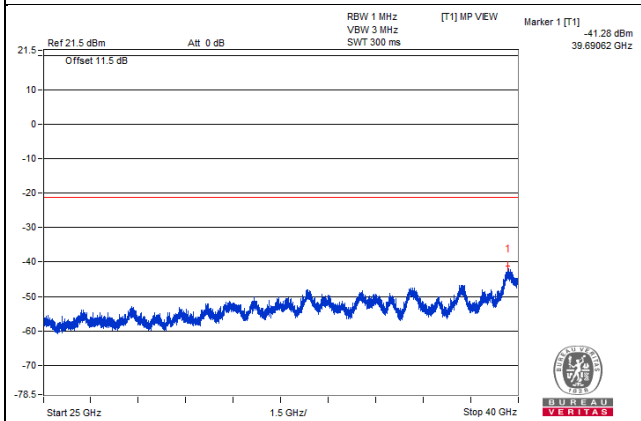
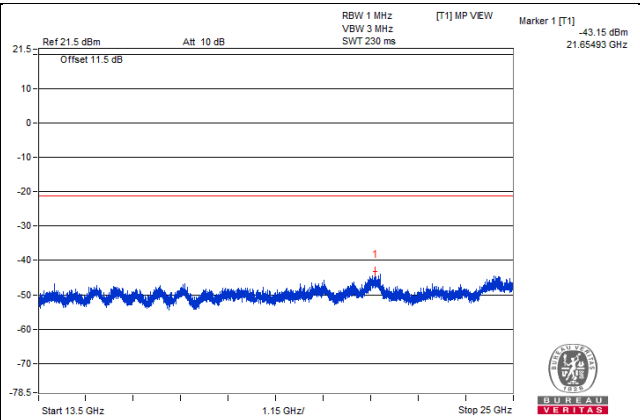
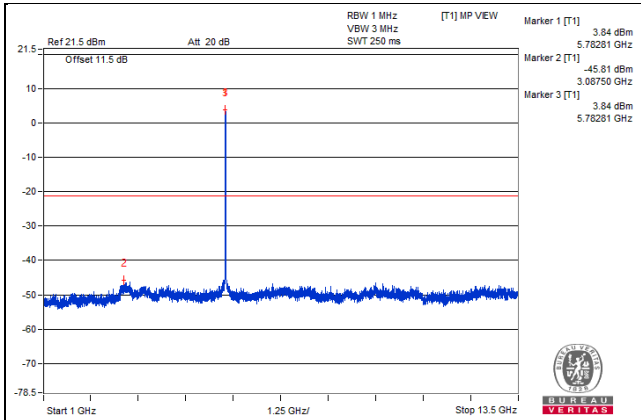
802.11n (HT20) – Channel 157

Conducted spurious emission table

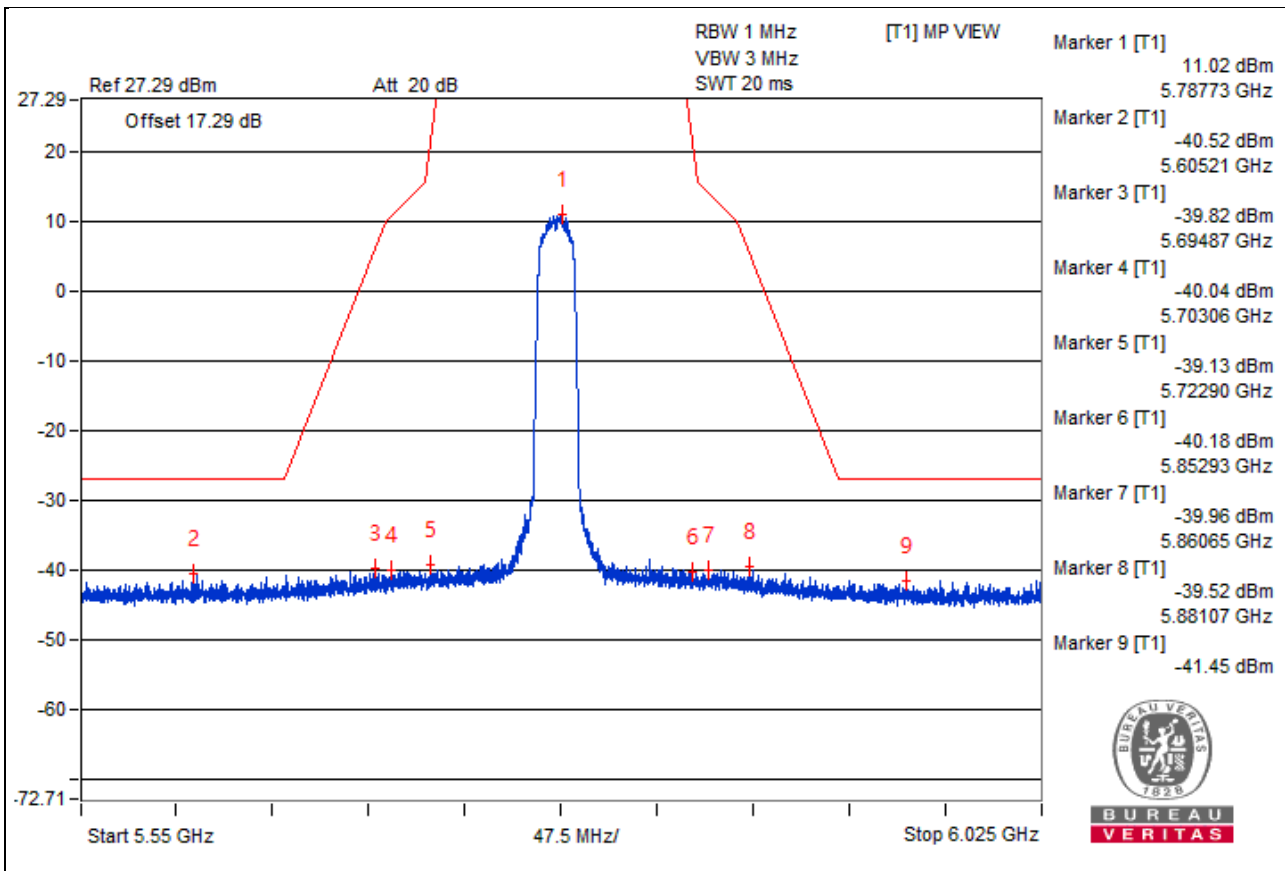
| No. | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 5782.81 PK | 104.89 | * | | 3.84 | 5.79 | 9.63 |
| 2 | 3087.5 PK | 55.24 | 68.2 | -12.96 | -45.81 | 5.79 | -40.02 |
| 3 | 5782.81 PK | 104.89 | * | | 3.84 | 5.79 | 9.63 |
| 4 | 21654.93 PK | 57.9 | 68.2 | -10.3 | -43.15 | 5.79 | -37.36 |
| 5 | 39690.62 PK | 59.77 | 74 | -14.23 | -41.28 | 5.79 | -35.49 |
| 6 | 5784.37 AV | 96.04 | * | | -5.01 | 5.79 | 0.78 |
| 7 | 3121.87 AV | 33.01 | # | | -68.04 | 5.79 | -62.25 |
| 8 | 5784.37 AV | 96.04 | * | | -5.01 | 5.79 | 0.78 |
| 9 | 21653.5 AV | 45.03 | # | | -56.02 | 5.79 | -50.23 |
| 10 | 39743.12 AV | 47.15 | 54 | -6.85 | -53.9 | 5.79 | -48.11 |

Note :

1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
2. * : Fundamental frequency, the limit was restricted at the output power.
3. # : Non-restricted frequency, no limit for average emission.



Bandedge table



Note:

1. The offset including attenuator (10dB), cable loss (1.5 dB) and antenna gain (5.79 dBi).
2. The test results were EIRP.

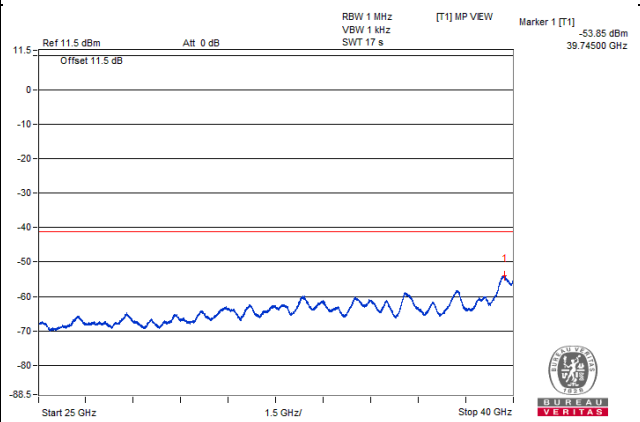
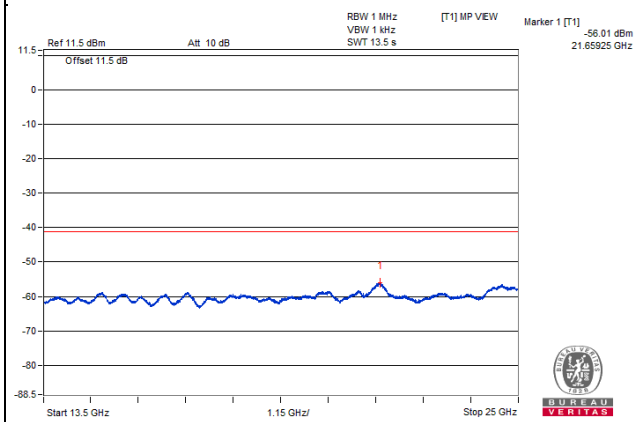
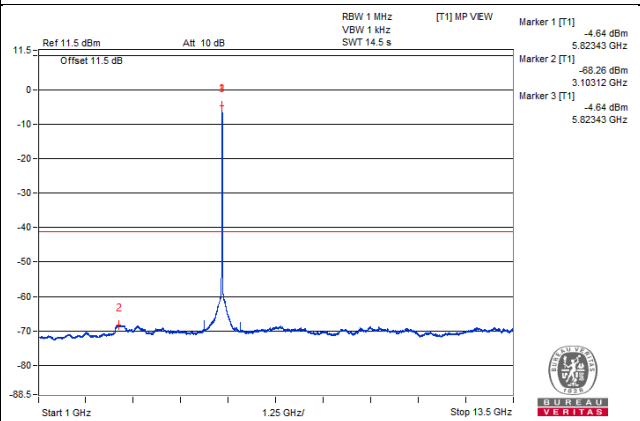
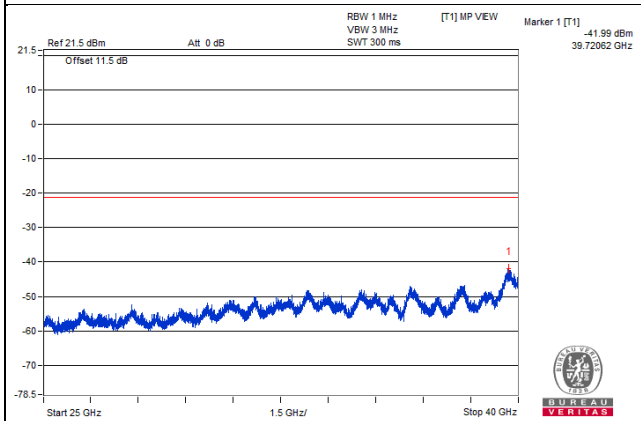
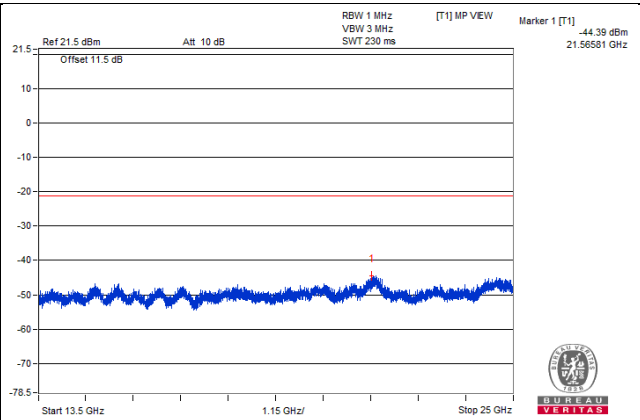
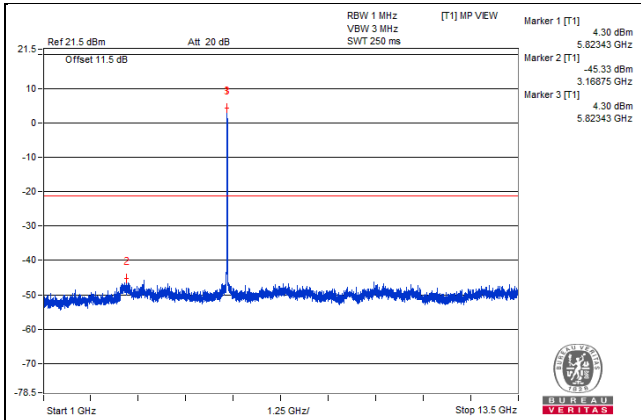
802.11n (HT20) – Channel 165

Conducted spurious emission table

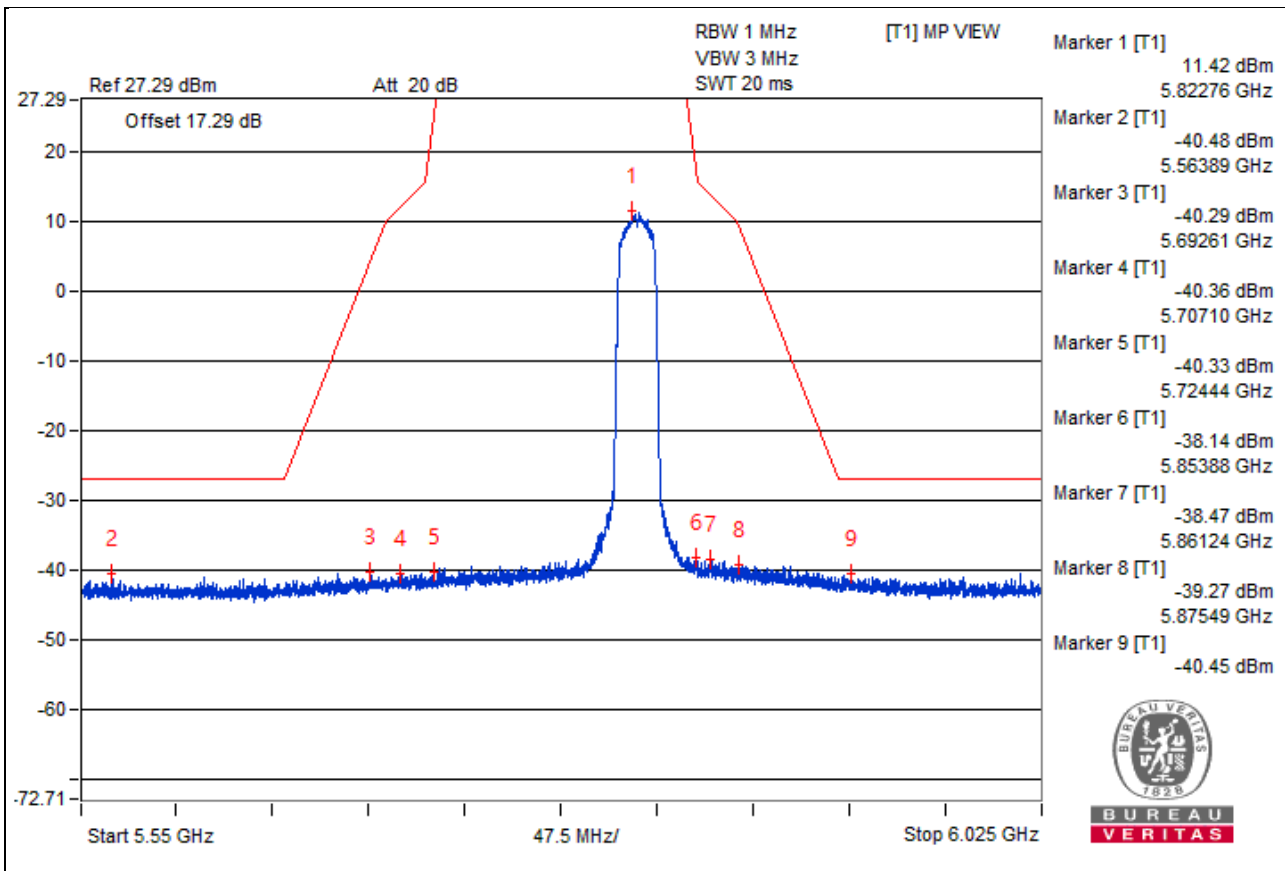
| No. | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 5823.43 PK | 105.35 | * | | 4.3 | 5.79 | 10.09 |
| 2 | 3168.75 PK | 55.72 | 68.2 | -12.48 | -45.33 | 5.79 | -39.54 |
| 3 | 5823.43 PK | 105.35 | * | | 4.3 | 5.79 | 10.09 |
| 4 | 21565.81 PK | 56.66 | 68.2 | -11.54 | -44.39 | 5.79 | -38.6 |
| 5 | 39720.62 PK | 59.06 | 74 | -14.94 | -41.99 | 5.79 | -36.2 |
| 6 | 5823.43 AV | 96.41 | * | | -4.64 | 5.79 | 1.15 |
| 7 | 3103.12 AV | 32.79 | # | | -68.26 | 5.79 | -62.47 |
| 8 | 5823.43 AV | 96.41 | * | | -4.64 | 5.79 | 1.15 |
| 9 | 21659.25 AV | 45.04 | # | | -56.01 | 5.79 | -50.22 |
| 10 | 39745 AV | 47.2 | 54 | -6.8 | -53.85 | 5.79 | -48.06 |

Note :

1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
2. * : Fundamental frequency, the limit was restricted at the output power.
3. # : Non-restricted frequency, no limit for average emission.



Bandedge table



Note:

1. The offset including attenuator (10dB), cable loss (1.5 dB) and antenna gain (5.79 dBi).
2. The test results were EIRP.

Below 1GHz Data

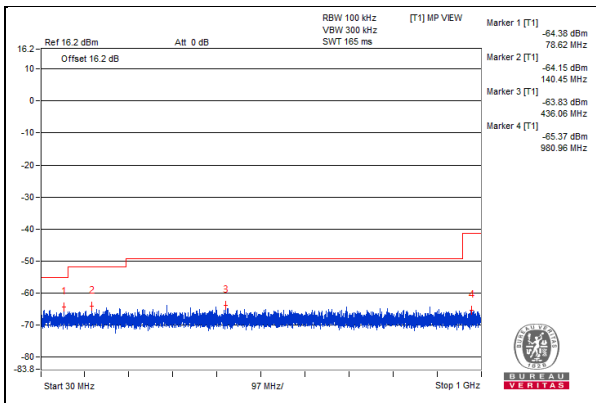
802.11n (HT20) - Channel 36

Conducted spurious emission table

| No. | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 78.62 | 36.67 | # | | -64.38 | 5.79 | -58.59 |
| 2 | 140.45 | 36.9 | # | | -64.15 | 5.79 | -58.36 |
| 3 | 436.06 | 37.22 | # | | -63.83 | 5.79 | -58.04 |
| 4 | 980.96 | 35.68 | 54 | -18.32 | -65.37 | 5.79 | -59.58 |

Note :

1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
2. # : Non-restricted frequency, no limit for average emission.



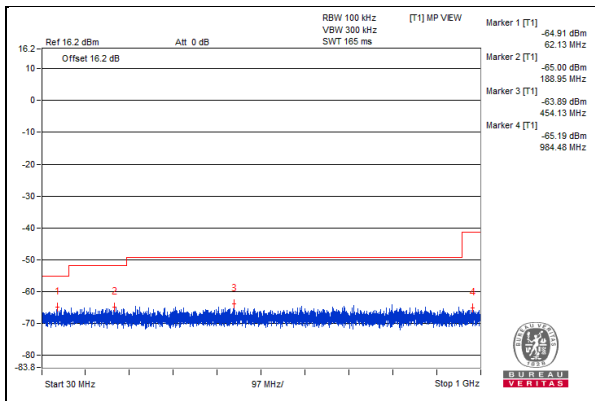
802.11n (HT20) - Channel 165

Conducted spurious emission table

| No. | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|-----|-----------------|-------------------------|----------------|-------------|-----------------|------------------------|------------------|
| 1 | 62.13 | 36.14 | # | | -64.91 | 5.79 | -59.12 |
| 2 | 188.95 | 36.05 | # | | -65 | 5.79 | -59.21 |
| 3 | 454.13 | 37.16 | # | | -63.89 | 5.79 | -58.1 |
| 4 | 984.48 | 35.86 | 54 | -18.14 | -65.19 | 5.79 | -59.4 |

Note :

- Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
- # : Non-restricted frequency, no limit for average emission.



Note: Choose worse case from above and set RBW/VBW=120kHz/1MHz to verification.

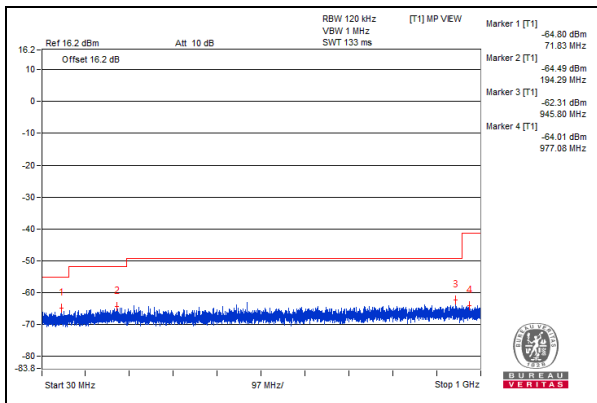
802.11n (HT20) - Channel 165

Conducted spurious emission table

| No. | Frequency (MHz) | Emission Level (dBUV/m) | Limit (dBUV/m) | Margin (dB) | Raw Value (dBm) | Correction Factor (dB) | EIRP Level (dBm) |
|----------|-----------------|-------------------------|----------------|--------------|-----------------|------------------------|------------------|
| 1 | 71.83 | 36.25 | # | | -64.8 | 5.79 | -59.01 |
| 2 | 194.29 | 36.56 | # | | -64.49 | 5.79 | -58.7 |
| 3 | 945.8 | 38.74 | 43.5 | -4.76 | -62.31 | 5.79 | -56.52 |
| 4 | 977.08 | 37.04 | 54 | -16.96 | -64.01 | 5.79 | -58.22 |

Note :

1. Emission Level (dBUV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.
2. # : Non-restricted frequency, no limit for average emission.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

| Frequency (MHz) | Conducted Limit (dBuV) | |
|-----------------|------------------------|---------|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30.0 | 60 | 50 |

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---------------------|------------|-----------------|------------------|
| Test Receiver R&S | ESCS 30 | 847124/029 | Oct. 23, 2019 | Oct. 22, 2020 |
| Line-Impedance Stabilization Network (for EUT) R&S | ESH3-Z5 | 848773/004 | Oct. 23, 2019 | Oct. 22, 2020 |
| Line-Impedance Stabilization Network (for Peripheral) R&S | ESH3-Z5 | 835239/001 | Mar. 19, 2020 | Mar. 18, 2021 |
| 50 ohms Terminator | 50 | 3 | Oct. 23, 2019 | Oct. 22, 2020 |
| RF Cable | 5D-FB | COCCAB-001 | Sep. 27, 2019 | Sep. 26, 2020 |
| Fixed attenuator EMCI | STI02-2200-10 | 005 | Aug. 30, 2019 | Aug. 29, 2020 |
| Software BVADT | BVADT_Cond_V7.3.7.4 | NA | NA | NA |

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3. Tested Date: Apr. 16, 2020

4.2.3 Test Procedure

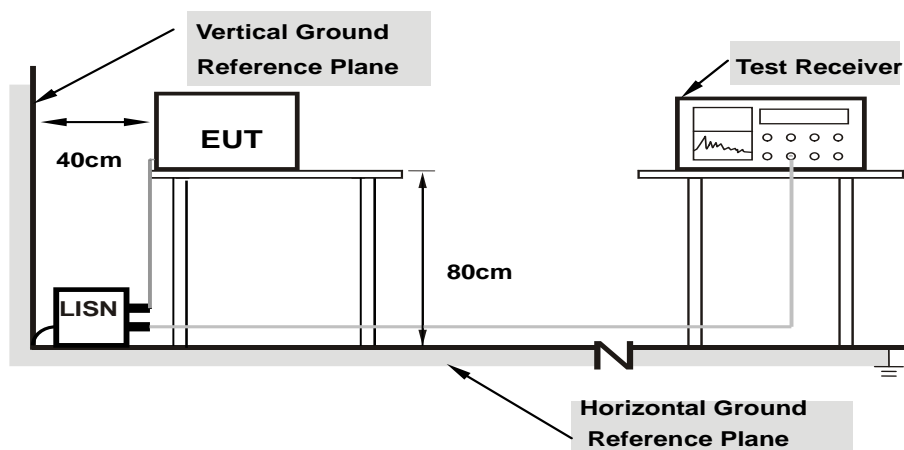
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Condition

Same as 4.1.6.

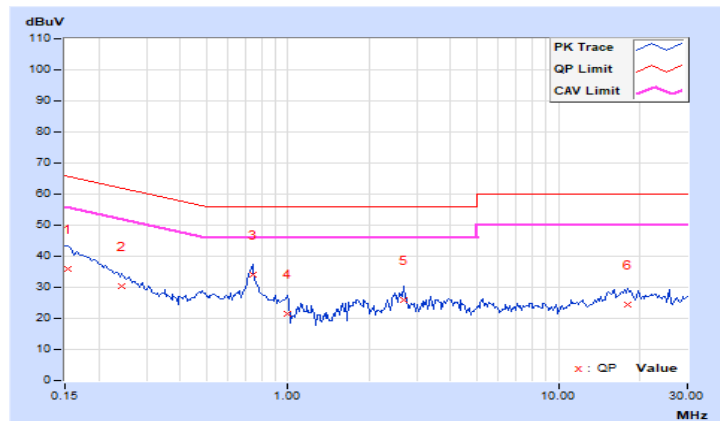
4.2.7 Test Results

| Phase | Line (L) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|----------|-------------------|--------------------------------|
|-------|----------|-------------------|--------------------------------|

| No | Freq. [MHz] | Corr. | Reading Value | | Emission Level | | Limit | | Margin | |
|----|----------------|----------------|---------------|-------|----------------|-------|-----------|-------|--------|--------|
| | | Factor (dB) | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. |
| 1 | 0.15391 | 9.99 | 25.85 | 10.98 | 35.84 | 20.97 | 65.79 | 55.79 | -29.95 | -34.82 |
| 2 | 0.24375 | 9.99 | 20.36 | 6.85 | 30.35 | 16.84 | 61.97 | 51.97 | -31.62 | -35.13 |
| 3 | 0.73984 | 10.03 | 24.00 | 11.54 | 34.03 | 21.57 | 56.00 | 46.00 | -21.97 | -24.43 |
| 4 | 0.99375 | 10.05 | 11.53 | 1.28 | 21.58 | 11.33 | 56.00 | 46.00 | -34.42 | -34.67 |
| 5 | 2.67578 | 10.17 | 15.68 | 7.14 | 25.85 | 17.31 | 56.00 | 46.00 | -30.15 | -28.69 |
| 6 | 17.98047 | 11.23 | 13.16 | 7.23 | 24.39 | 18.46 | 60.00 | 50.00 | -35.61 | -31.54 |

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

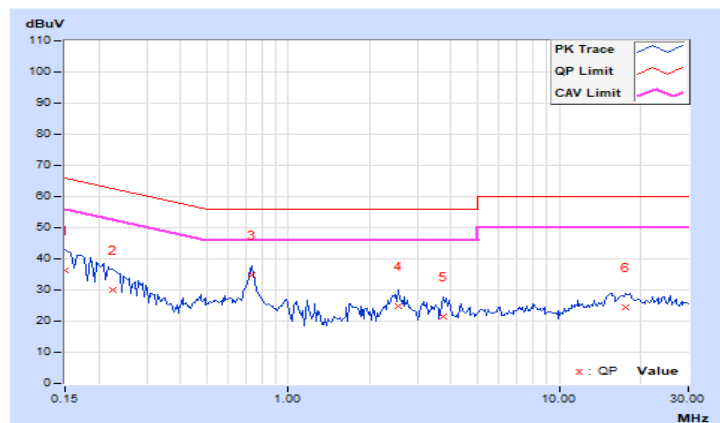


| | | | |
|-------|-------------|-------------------|--------------------------------|
| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|-------|-------------|-------------------|--------------------------------|

| No | Freq. [MHz] | Corr. | Reading Value | | Emission Level | | Limit | | Margin | |
|----------|----------------|--------------|---------------|--------------|----------------|--------------|--------------|--------------|---------------|---------------|
| | | Factor | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | |
| 1 | 0.15000 | 9.99 | 26.36 | 11.81 | 36.35 | 21.80 | 66.00 | 56.00 | -29.65 | -34.20 |
| 2 | 0.22422 | 9.99 | 19.97 | 6.51 | 29.96 | 16.50 | 62.66 | 52.66 | -32.70 | -36.16 |
| 3 | 0.73594 | 10.03 | 24.89 | 12.30 | 34.92 | 22.33 | 56.00 | 46.00 | -21.08 | -23.67 |
| 4 | 2.53906 | 10.15 | 14.84 | 8.03 | 24.99 | 18.18 | 56.00 | 46.00 | -31.01 | -27.82 |
| 5 | 3.74219 | 10.21 | 11.32 | 0.70 | 21.53 | 10.91 | 56.00 | 46.00 | -34.47 | -35.09 |
| 6 | 17.64063 | 10.99 | 13.33 | 7.88 | 24.32 | 18.87 | 60.00 | 50.00 | -35.68 | -31.13 |

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



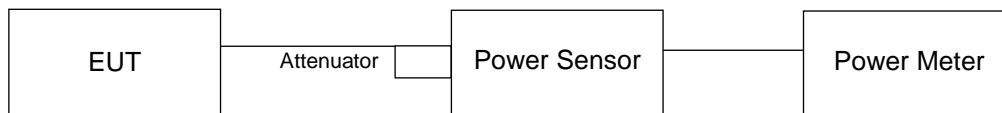
4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

| Operation Band | EUT Category | | Limit |
|----------------|--------------|-----------------------------------|---|
| U-NII-1 | | Outdoor Access Point | 1 Watt (30 dBm) (Max. e.i.r.p \leq 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon) |
| | | Fixed point-to-point Access Point | 1 Watt (30 dBm) |
| | √ | Indoor Access Point | 1 Watt (30 dBm) |
| | | Client device | 250mW (24 dBm) |
| U-NII-2A | | | 250mW (24 dBm) or 11 dBm+10 log B* |
| U-NII-2C | | | 250mW (24 dBm) or 11 dBm+10 log B* |
| U-NII-3 | √ | | 1 Watt (30 dBm) |

*B is the 26 dB emission bandwidth in megahertz

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

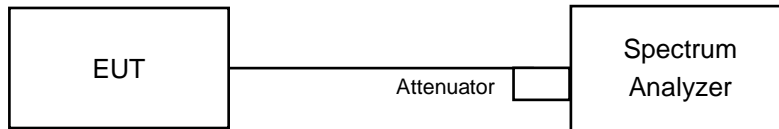
4.3.7 Test Results

802.11n (HT20)

| Channel | Channel Frequency (MHz) | Maximum Conducted Power (mW) | Maximum Conducted Power (dBm) | Power Limit (dBm) | Pass/Fail |
|---------|-------------------------|------------------------------|-------------------------------|-------------------|-----------|
| 36 | 5180 | 10.328 | 10.14 | 30 | Pass |
| 40 | 5200 | 10.162 | 10.07 | 30 | Pass |
| 48 | 5240 | 10.023 | 10.01 | 30 | Pass |
| 149 | 5745 | 10.28 | 10.12 | 30 | Pass |
| 157 | 5785 | 10.399 | 10.17 | 30 | Pass |
| 165 | 5825 | 10.495 | 10.21 | 30 | Pass |

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

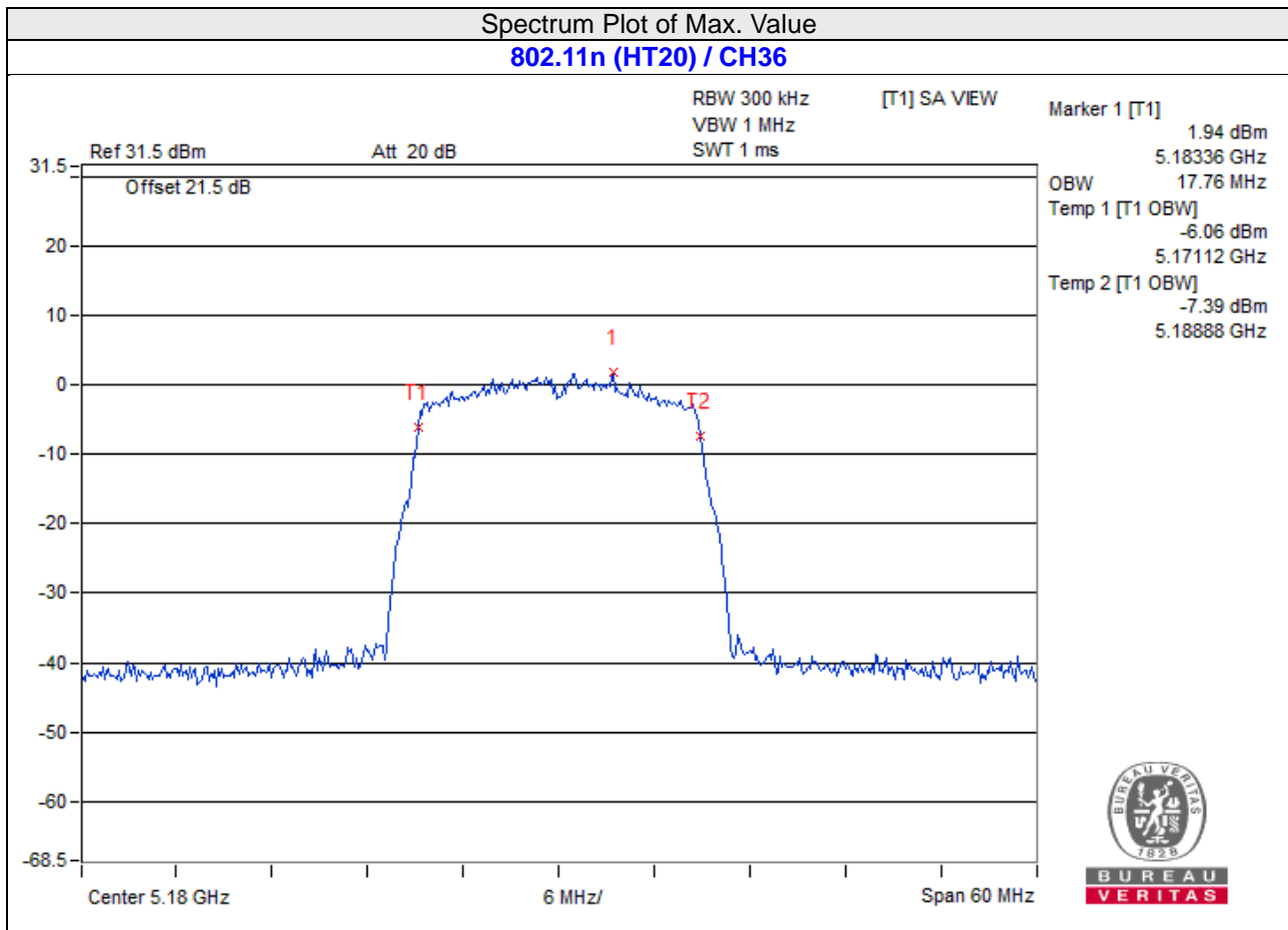
4.4.3 Test Procedure

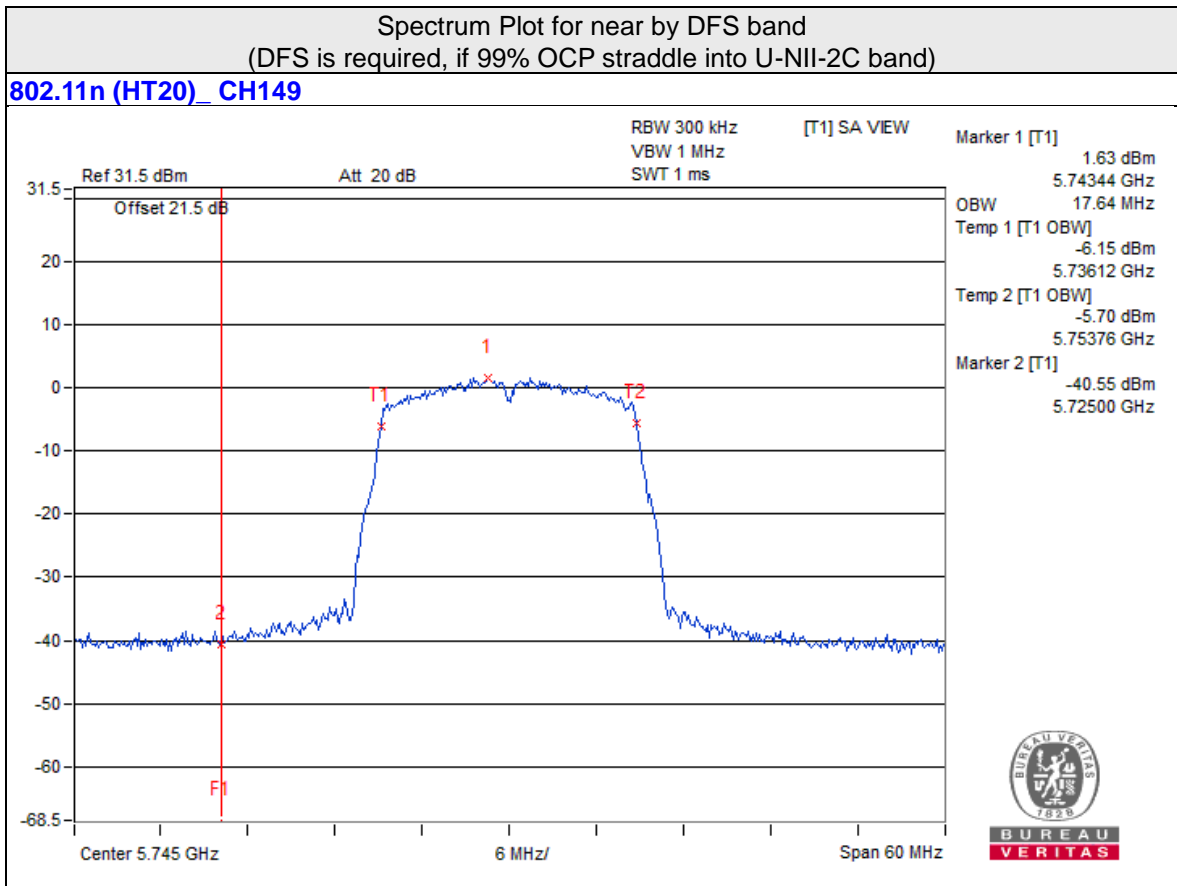
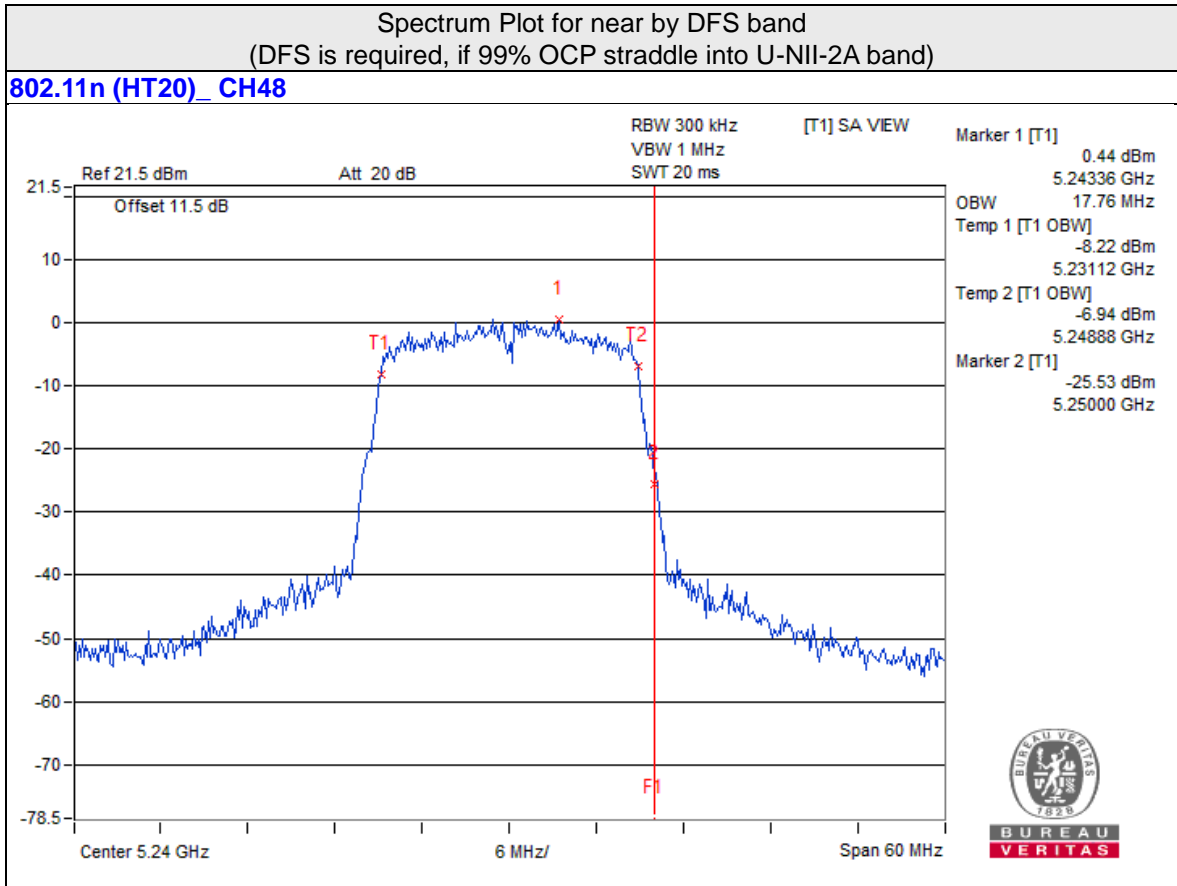
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to SAMPLE. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean power of a given emission.

4.4.4 Test Results

802.11n (HT20)

| Channel | Channel Frequency (MHz) | Occupied Bandwidth (MHz) |
|---------|-------------------------|--------------------------|
| 36 | 5180 | 17.76 |
| 40 | 5200 | 17.64 |
| 48 | 5240 | 17.76 |
| 149 | 5745 | 17.64 |
| 157 | 5785 | 17.64 |
| 165 | 5825 | 17.64 |



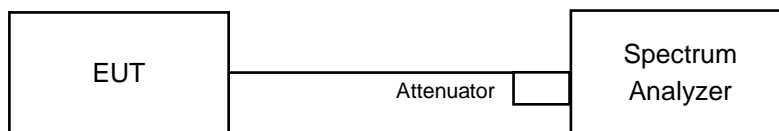


4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

| Operation Band | EUT Category | | Limit |
|----------------|--------------|-----------------------------------|---------------|
| U-NII-1 | | Outdoor Access Point | 17dBm/ MHz |
| | | Fixed point-to-point Access Point | |
| | √ | Indoor Access Point | |
| | | Client device | |
| U-NII-2A | | | 11dBm/ MHz |
| U-NII-2C | | | 11dBm/ MHz |
| U-NII-3 | √ | | 30dBm/ 500kHz |

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For U-NII-1 band:

Using method SA-1

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to "free run".
4. Trace average at least 100 traces in power averaging mode.
In order to obtain results more easily, change max hold to view as following. It has no effect on the result.
5. Record the max value

For U-NII-3 band:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500\text{ kHz}/300\text{ kHz})$
5. Sweep time = auto, trigger set to "free run".
6. Trace average at least 100 traces in power averaging mode.
In order to obtain results more easily, change max hold to view as following. It has no effect on the result.
7. Record the max value and add $10\log(1/\text{duty cycle})$

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

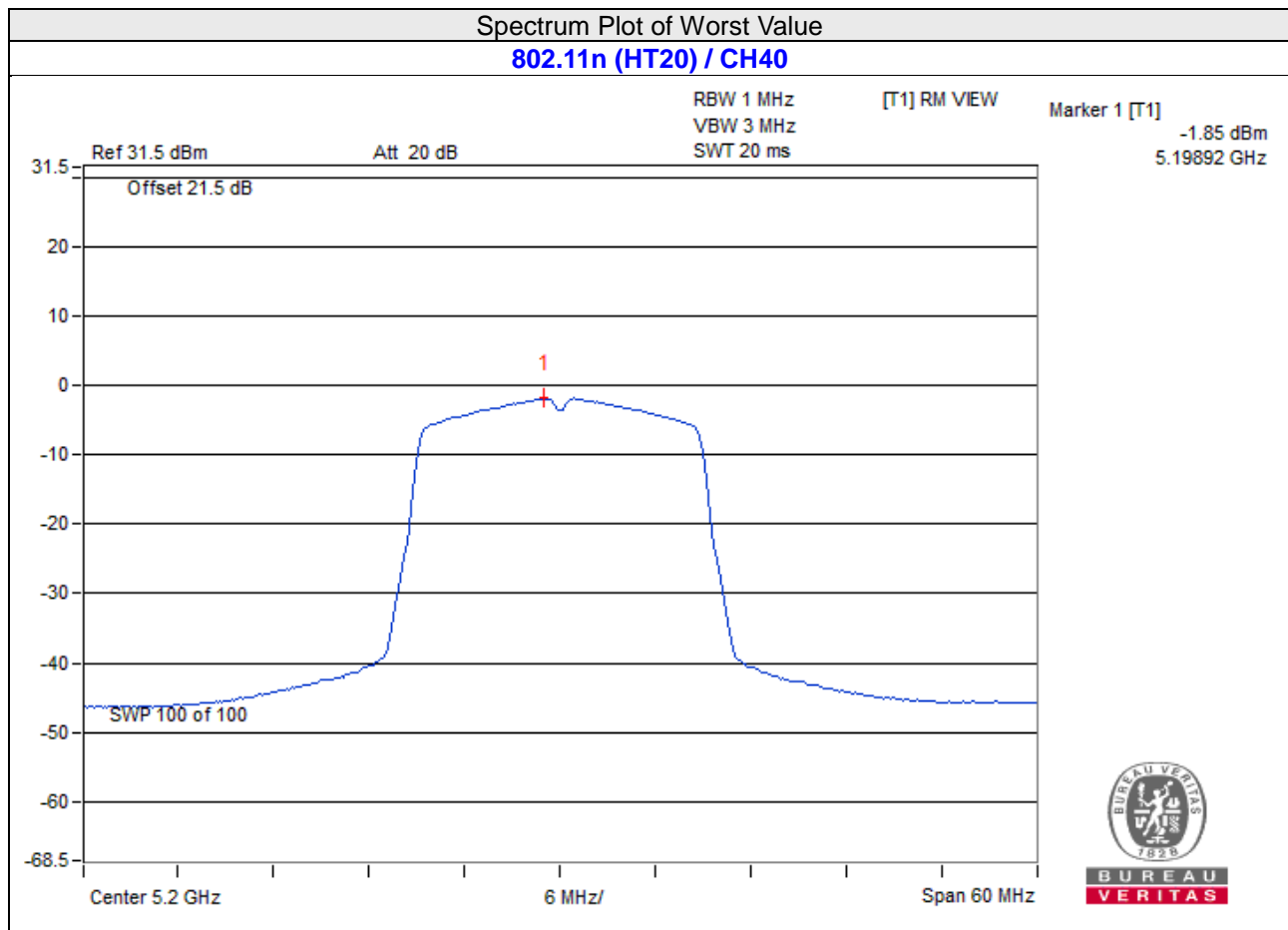
Same as Item 4.3.6.

4.5.7 Test Results

For U-NII-1:

802.11n (HT20)

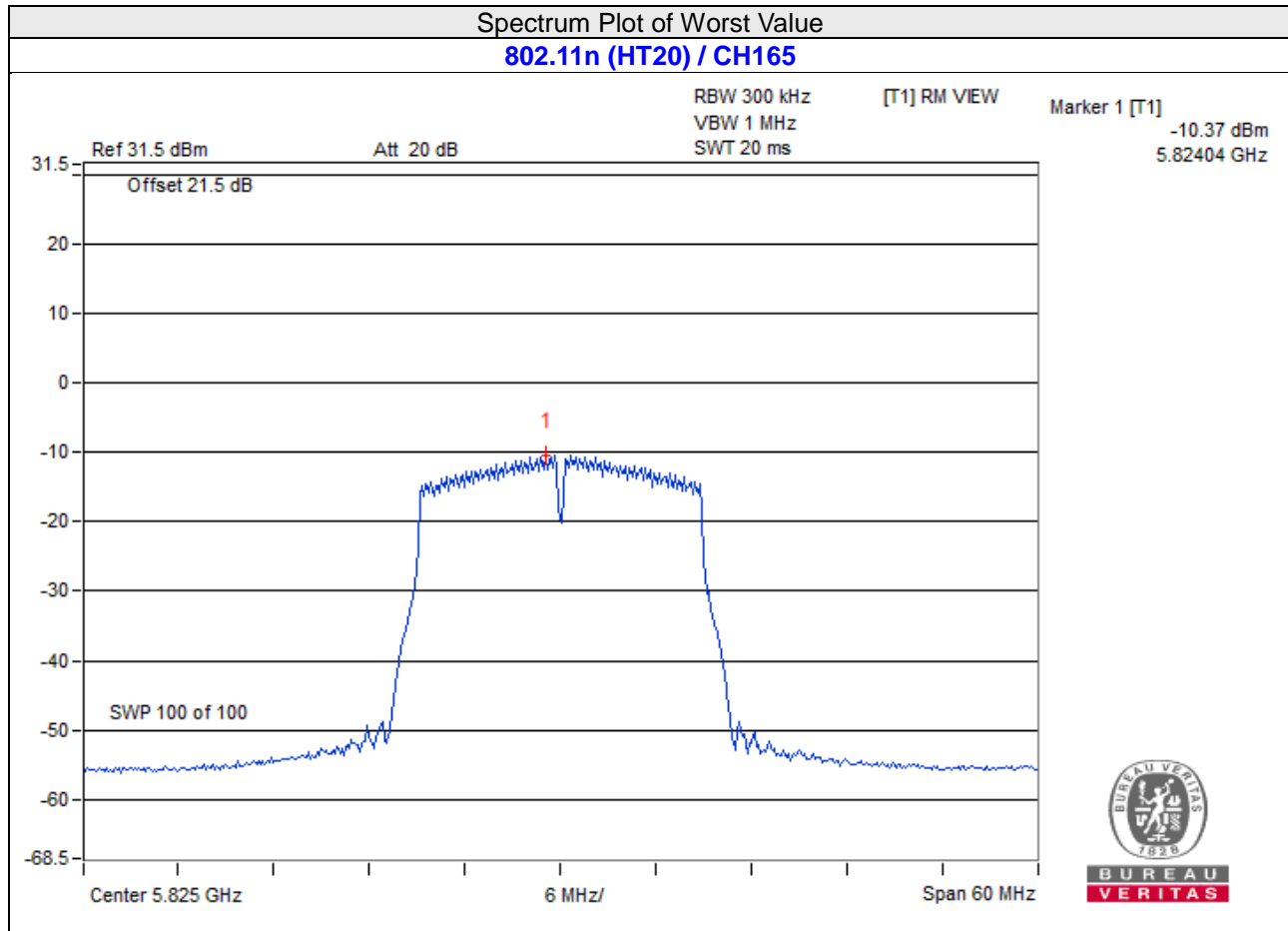
| Chan. | Chan. Freq. (MHz) | PSD (dBm/MHz) | MAX. Limit (dBm/MHz) | Pass / Fail |
|-------|-------------------|---------------|----------------------|-------------|
| 36 | 5180 | -2.03 | 17 | Pass |
| 40 | 5200 | -1.85 | 17 | Pass |
| 48 | 5240 | -1.86 | 17 | Pass |



For U-NII-3:

802.11n (HT20)

| Chan. | Freq. (MHz) | PSD (dBm/300kHz) | PSD (dBm/500kHz) | Limit (dBm/500kHz) | Pass /Fail |
|-------|-------------|------------------|------------------|--------------------|------------|
| 149 | 5745 | -10.45 | -8.23 | 30.00 | Pass |
| 157 | 5785 | -10.44 | -8.22 | 30.00 | Pass |
| 165 | 5825 | -10.37 | -8.15 | 30.00 | Pass |

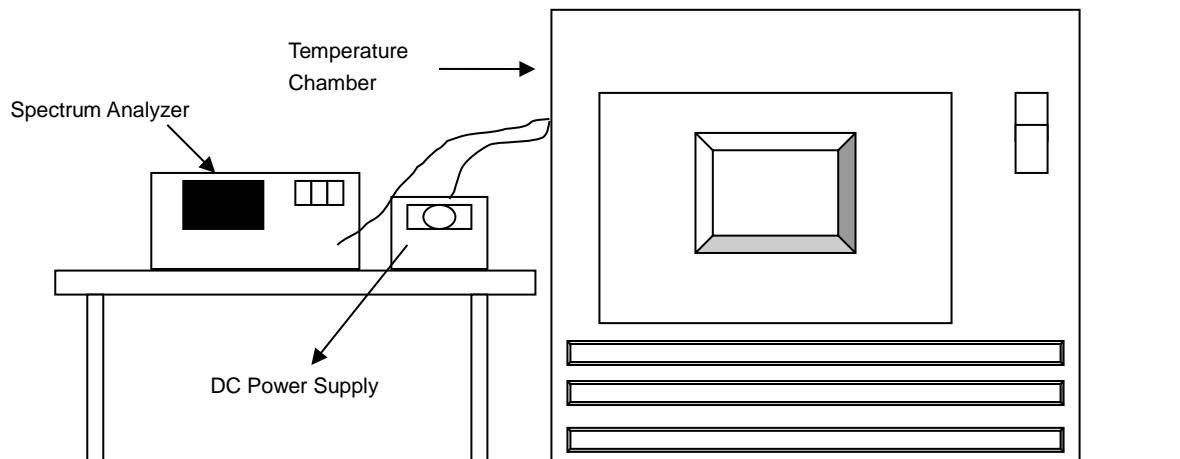


4.6 Frequency Stability Measurement

4.6.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
- Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.6.7 Test Results

| Frequency Stability Versus Temp. | | | | | | | | | |
|---|---------------------------|---------------------------------|------------------|---------------------------------|------------------|---------------------------------|------------------|---------------------------------|------------------|
| Operating Frequency: 5180 MHz | | | | | | | | | |
| TEMP. (°C) | Power Supply (Vdc) | 0 Minute | | 2 Minutes | | 5 Minutes | | 10 Minutes | |
| | | Measured Frequency (MHz) | Pass/Fail | Measured Frequency (MHz) | Pass/Fail | Measured Frequency (MHz) | Pass/Fail | Measured Frequency (MHz) | Pass/Fail |
| 60 | 3.3 | 5179.993 | PASS | 5179.9937 | PASS | 5179.9934 | PASS | 5179.9978 | PASS |
| 50 | 3.3 | 5179.9942 | PASS | 5179.9972 | PASS | 5179.9974 | PASS | 5179.9945 | PASS |
| 40 | 3.3 | 5180.0007 | PASS | 5179.9979 | PASS | 5179.9999 | PASS | 5179.9983 | PASS |
| 30 | 3.3 | 5179.9766 | PASS | 5179.9764 | PASS | 5179.9768 | PASS | 5179.9735 | PASS |
| 20 | 3.3 | 5179.979 | PASS | 5179.976 | PASS | 5179.9791 | PASS | 5179.9802 | PASS |
| 10 | 3.3 | 5179.9921 | PASS | 5179.9899 | PASS | 5179.9924 | PASS | 5179.9921 | PASS |
| 0 | 3.3 | 5180.0187 | PASS | 5180.0188 | PASS | 5180.0195 | PASS | 5180.0206 | PASS |
| -10 | 3.3 | 5180.0071 | PASS | 5180.0082 | PASS | 5180.0082 | PASS | 5180.006 | PASS |

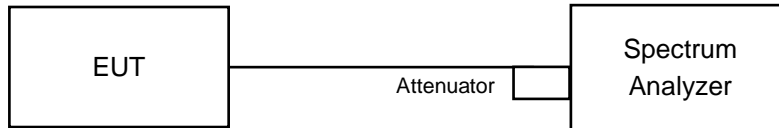
| Frequency Stability Versus Voltage | | | | | | | | | |
|---|---------------------------|---------------------------------|------------------|---------------------------------|------------------|---------------------------------|------------------|---------------------------------|------------------|
| Operating Frequency: 5180 MHz | | | | | | | | | |
| TEMP. (°C) | Power Supply (Vdc) | 0 Minute | | 2 Minutes | | 5 Minutes | | 10 Minutes | |
| | | Measured Frequency (MHz) | Pass/Fail | Measured Frequency (MHz) | Pass/Fail | Measured Frequency (MHz) | Pass/Fail | Measured Frequency (MHz) | Pass/Fail |
| 20 | 3.795 | 5179.9793 | PASS | 5179.9766 | PASS | 5179.9794 | PASS | 5179.9809 | PASS |
| | 3.3 | 5179.979 | PASS | 5179.976 | PASS | 5179.9791 | PASS | 5179.9802 | PASS |
| | 2.805 | 5179.978 | PASS | 5179.9757 | PASS | 5179.9792 | PASS | 5179.9795 | PASS |

4.7 6dB Bandwidth Measurement

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
In order to obtain results more easily, change max hold to view as following. It has no effect on the result.

4.7.5 Deviation from Test Standard

No deviation.

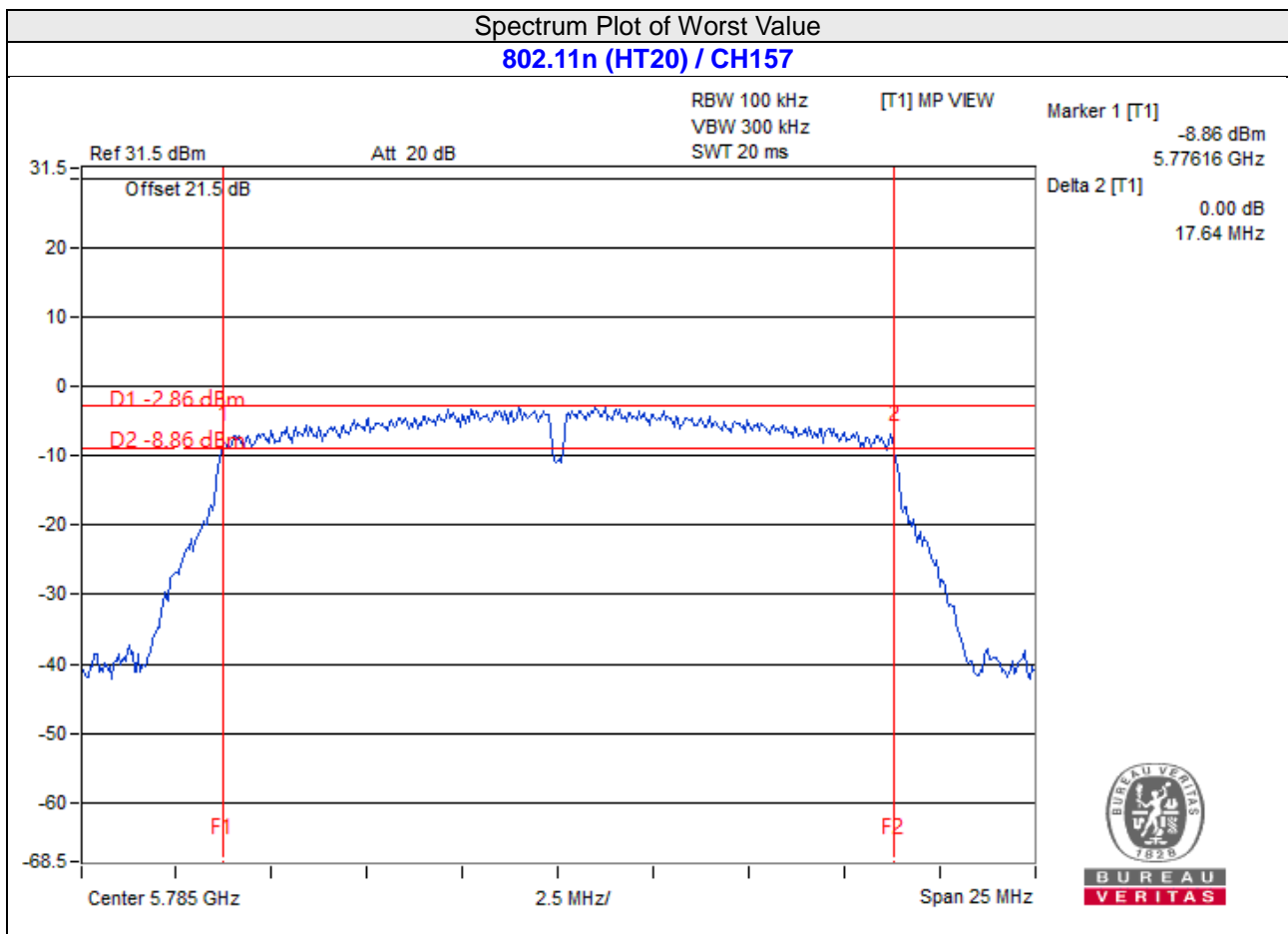
4.7.6 EUT Operating Condition

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

4.7.7 Test Results

802.11n (HT20)

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|---------------------|---------------------|-------------|
| 149 | 5745 | 17.66 | 0.5 | PASS |
| 157 | 5785 | 17.64 | 0.5 | PASS |
| 165 | 5825 | 17.65 | 0.5 | PASS |



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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