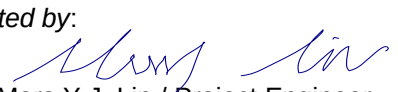


|                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                         |                                                                                                                                                                                                               |             |                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------|
| <b>Prüfbericht-Nr.:</b><br>Test Report No.:                                                                                                                                                                                                                                                                                                                                                                                                         | <b>50246761 001</b>                                                                     | <b>Auftrags-Nr.:</b><br>Order No.:                                                                                                                                                                            | 238104465   | Seite 1 von 124<br>Page 1 of 124 |
| <b>Kunden-Referenz-Nr.:</b><br>Client Reference No.:                                                                                                                                                                                                                                                                                                                                                                                                | N/A                                                                                     | <b>Auftragsdatum:</b><br>Order date:                                                                                                                                                                          | 14-Jan-2019 |                                  |
| <b>Auftraggeber:</b><br>Client:                                                                                                                                                                                                                                                                                                                                                                                                                     | 鴻海精密工業股份有限公司<br>新北市土城區中山路 66 號                                                          |                                                                                                                                                                                                               |             |                                  |
| <b>Prüfgegenstand:</b><br>Test item:                                                                                                                                                                                                                                                                                                                                                                                                                | BT5.0 + WLAN a/b/g/n/ac Combo Wireless Module                                           |                                                                                                                                                                                                               |             |                                  |
| <b>Bezeichnung / Typ-Nr.:</b><br>Identification / Type No.:                                                                                                                                                                                                                                                                                                                                                                                         | WBU042-IG5V, WBU042-IG                                                                  |                                                                                                                                                                                                               |             |                                  |
| <b>Auftrags-Inhalt:</b><br>Order content:                                                                                                                                                                                                                                                                                                                                                                                                           | NCC Test report (WiFi 5G)                                                               |                                                                                                                                                                                                               |             |                                  |
| <b>Prüfgrundlage:</b><br>Test specification:                                                                                                                                                                                                                                                                                                                                                                                                        | NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2018)<br>Section 4.7 |                                                                                                                                                                                                               |             |                                  |
| <b>Wareneingangsdatum:</b><br>Date of receipt:                                                                                                                                                                                                                                                                                                                                                                                                      | 14-Feb-2019                                                                             |                                                                                                                                                                                                               |             |                                  |
| <b>Prüfmuster-Nr.:</b><br>Test sample No.:                                                                                                                                                                                                                                                                                                                                                                                                          | A000877050-008, 009                                                                     |                                                                                                                                                                                                               |             |                                  |
| <b>Prüfzeitraum:</b><br>Testing period:                                                                                                                                                                                                                                                                                                                                                                                                             | 14-Feb-2019 ~ 10-Jun-2019                                                               |                                                                                                                                                                                                               |             |                                  |
| <b>Ort der Prüfung:</b><br>Place of testing:                                                                                                                                                                                                                                                                                                                                                                                                        | EMC/RF Laboratory Taipei                                                                |                                                                                                                                                                                                               |             |                                  |
| <b>Prüflaboratorium:</b><br>Testing laboratory:                                                                                                                                                                                                                                                                                                                                                                                                     | TUV Rheinland Taiwan Ltd.                                                               |                                                                                                                                                                                                               |             |                                  |
| <b>Prüfergebnis*:</b><br>Test result*:                                                                                                                                                                                                                                                                                                                                                                                                              | Pass                                                                                    |                                                                                                                                                                                                               |             |                                  |
| <b>geprüft von / tested by:</b>                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                         | <b>kontrolliert von / reviewed by:</b>                                                                                                                                                                        |             |                                  |
| <br>2019-06-11 Mars Y.J. Lin / Project Engineer<br>Datum Name / Stellung Unterschrift<br>Date(Report Date) Name / Position Signature                                                                                                                                                                                                                             |                                                                                         | <br>2019-06-11 Rene Charton / Expert, Electrical<br>Datum Name / Stellung Unterschrift<br>Date Name / Position Signature |             |                                  |
| <b>Sonstiges / Other:</b><br>WBU042-IG and WBU042-IG5V use the same RF chip and the same PCB layout, the difference between WBU042-IG5V and WBU042-IG is: WBU042-IG5V more WBU042-IG one Regulator.                                                                                                                                                                                                                                                 |                                                                                         |                                                                                                                                                                                                               |             |                                  |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br>Condition of the test item at delivery:                                                                                                                                                                                                                                                                                                                                                     |                                                                                         | Prüfmuster vollständig und unbeschädigt<br>Test item complete and undamaged                                                                                                                                   |             |                                  |
| * Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft<br>P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet<br>Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor<br>P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested                   |                                                                                         |                                                                                                                                                                                                               |             |                                  |
| <b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b><br>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark. |                                                                                         |                                                                                                                                                                                                               |             |                                  |

## TEST SUMMARY

### 5.1.1 ANTENNA REQUIREMENT

RESULT: Passed

### 5.1.2 DUTY CYCLE

RESULT: Passed

### 5.1.3 MAXIMUM CONDUCTED AVERAGE OUTPUT POWER

RESULT: Passed

### 5.1.4 26dB & 99% BANDWIDTH

RESULT: Passed

### 5.1.5 6dB BANDWIDTH

RESULT: Passed

### 5.1.6 POWER DENSITY

RESULT: Passed

### 5.1.7 SPURIOUS EMISSION

RESULT: Passed

### 5.1.8 DYNAMIC FREQUENCY SELECTION

RESULT: Passed

### 5.2.1 MAINS CONDUCTED EMISSIONS

RESULT: Passed

### 6.1.1 ELECTROMAGNETIC FIELDS

RESULT: Passed

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## 1. General Remarks

### 1.1 Complementary Materials

These attachments are integral parts of this test report:

**Appendix P: Photo Documentation internal view**  
(File Name: 50246761 001APPENDIXP)

**Appendix D: Test Result of Radiated Emissions**  
(File Name: 50246761 001APPENDIXD)

Test Specifications

The following standards were applied.

**Table 1: Applied Standard and Test Levels**

| Radio                                                                                                          |
|----------------------------------------------------------------------------------------------------------------|
| NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2018)(107 年 1 月 10 日)<br>ANSI C63.10 (2013) |

### 1.2 Complementary Materials

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

## 2. Test Sites

### 2.1 Test Laboratory

TUV Rheinland Taiwan Ltd.  
Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.  
Taipei City 105  
Taiwan (R.O.C.)

### 2.2 Test Facility

TUV Rheinland Taiwan Ltd.

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.  
Taipei City 105  
Taiwan (R.O.C.)

TAF Accredited NCC Test Lab. No.:3567

TAF ISO17025 Certification effective period: 6<sup>th</sup>-May-2019 to 05<sup>th</sup>-May-2022



Testing Laboratory  
**3567**

## 2.3 List of Test and Measurement Instruments

**Table 2: List of Test and Measurement Equipment**

| Kind of Equipment             | Manu-facturer  | Type         | S/N         | Last Calibration | Next Calibration |
|-------------------------------|----------------|--------------|-------------|------------------|------------------|
| Test Software                 | Farad          | EZ_EMC       | Ver. TUV3A1 | N/A              | N/A              |
| Spectrum Analyzer             | R&S            | FSV 40       | 100921      | 2019/05/02       | 2020/05/02       |
| EXA Signal Analyzer           | KEYSIGHT       | N9010A       | MY52221334  | 2019/02/05       | 2020/02/04       |
| Preamplifier (30MHz -1GHz)    | HP             | 8447F        | 2805A03335  | 2018/08/14       | 2019/08/14       |
| Preamplifier (18 GHz -40 GHz) | COM-POWER      | PAM-840      | 461257      | 2019/01/18       | 2020/01/18       |
| Pre-Amplifier (1GHz~18GHz)    | EM Electronics | EM01G18G     | 60558       | 2018/11/21       | 2019/11/21       |
| Bilog Antenna                 | TESEQ          | CBL6111D     | 29804       | 2018/08/18       | 2019/08/18       |
| Horn Antenna                  | ETS-Lindgren   | 3117         | 201918      | 2018/08/18       | 2019/08/18       |
| Horn Antenna (18GHz~40GHz)    | COM-POWER      | AH-840       | 101029      | 2018/11/28       | 2019/11/28       |
| Loop Antenna                  | Schwarzbeck    | FMZB 1513    | 1513-076    | 2018/06/14       | 2019/06/14       |
| EMI Test Receiver             | R&S            | ESR 7        | 101549      | 2018/11/10       | 2019/11/10       |
| Spectrum Analyzer             | R&S            | FSL3         | 101943      | 2018/09/07       | 2019/09/07       |
| LISN (1 phase)                | R&S            | ENV216       | 101243      | 2018/06/18       | 2019/06/17       |
| LISN                          | R&S            | ENV216       | 101262      | 2018/06/22       | 2019/06/21       |
| Temp. & Humid. Chamber        | Giant Force    | GCT-099-40-S | MAF0103-007 | 2019/03/09       | 2021/03/09       |

| Kind of Equipment                | Manu-facturer | Type              | S/N        | Last Calibration | Next Calibration |
|----------------------------------|---------------|-------------------|------------|------------------|------------------|
| Spectrum Analyzer                | Agilent       | N9010A            | MY53470241 | 2019/06/04       | 2020/06/03       |
| Test Software                    | Agilent       | 301893 testsystem | V2.1.1     | N/A              | N/A              |
| Power sensor                     | Agilent       | U2021XA           | MY54020001 | 2019/03/31       | 2020/03/31       |
| Signal Generator                 | R&S           | SMU200            | 104260     | 2018/09/06       | 2019/09/05       |
| EXG-B RF Analog Signal Generator | Agilent       | N5171B            | MY53050377 | 2019/04/10       | 2020/04/09       |
| MXG-B RF Vector Signal Generator | Agilent       | N5182B            | MY53050524 | 2019/04/10       | 2020/04/09       |
| Embedded Attenuator              | Keysight      | AD211             | TW5451121  | N/A              | N/A              |

## 2.4 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

## 2.5 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular schedule using in house standards or comparisons.

## 2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements .

**Table 3: Emission Measurement Uncertainty**

| Parameter                     | Uncertainty |
|-------------------------------|-------------|
| Radio Frequency               | ± 0.1 ppm   |
| RF power, conducted           | ± 1.5 dB    |
| RF power density, conducted   | ± 3 dB      |
| spurious emissions, conducted | ± 3 dB      |
| all emissions, radiated       | ± 6 dB      |
| Temperature                   | ± 1 °C      |
| Humidity                      | ± 5 %       |
| DC and low frequency voltages | ±3 %        |

### 3. General Product Information

#### 3.1 Product Function and Intended Use

The EUT is a WiFi 802.11 a/b/g/n/ac + Bluetooth 5.0 Combo module. It contains a WiFi 5G compatible module enabling the user to communicate data through a Wireless interface. For details refer to the User Guide, Data Sheet and Block Diagram.

#### 3.2 System Details and Ratings

**Table 4: Basic Information of EUT**

| Item                        | EUT information                               |
|-----------------------------|-----------------------------------------------|
| Kind of Equipment/Test Item | BT5.0 + WLAN a/b/g/n/ac Combo Wireless Module |
| Type Identification         | WBU042-IG5V, WBU042-IG                        |
| Brand name                  | Foxconn                                       |

**Table 5: Technical Specification of EUT**

| Technical Specification | Value                                                                                                    |
|-------------------------|----------------------------------------------------------------------------------------------------------|
| Operating Frequencies   | Band 1 : 5180 – 5240MHz<br>Band 2 : 5260 – 5320MHz<br>Band 3 : 5500 – 5720MHz<br>Band 4 : 5745 – 5825MHz |
| Channel Spacing         | 10 MHz                                                                                                   |
| Channel number          | 25 for 20MHz bandwidth ;<br>12 for 40MHz bandwidth ;<br>6 for 80MHz bandwidth ;                          |
| Operation Voltage       | 5Vdc for WBU042-IG5V<br>3.3Vdc for WBU042-IG                                                             |
| Modulation              | 802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM)<br>802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM,   |
| Antenna gain            | Ant 1: 2.77 dBi<br>Ant 2: 2.86 dBi                                                                       |
| Wireless Type           | Slave without radar detection                                                                            |
| Product Type            | 802.11a: WLAN (2TX , 2RX)<br>802.11n: WLAN (2TX , 2RX)<br>802.11ac: WLAN (2TX , 2RX)                     |

**Table 6: Channel Frequency Table**

| Band                         | Channel | Frequency (MHz) | Bandwidth<br>20M | Bandwidth<br>40M | Bandwidth<br>80M |
|------------------------------|---------|-----------------|------------------|------------------|------------------|
| U-NII-1<br>(Band 1)          | 36      | 5180            | V                |                  |                  |
|                              | 38      | 5190            |                  | V                |                  |
|                              | 40      | 5200            | V                |                  |                  |
|                              | 42      | 5210            |                  |                  | V                |
|                              | 44      | 5220            | V                |                  |                  |
|                              | 46      | 5230            |                  | V                |                  |
|                              | 48      | 5240            | V                |                  |                  |
| U-NII-2A<br>(Band 2)         | 52      | 5260            | V                |                  |                  |
|                              | 54      | 5270            |                  | V                |                  |
|                              | 56      | 5280            | V                |                  |                  |
|                              | 58      | 5290            |                  |                  | V                |
|                              | 60      | 5300            | V                |                  |                  |
|                              | 62      | 5310            |                  | V                |                  |
|                              | 64      | 5320            | V                |                  |                  |
| U-NII-2C<br>(Band 3)         | 100     | 5500            | V                |                  |                  |
|                              | 102     | 5510            |                  | V                |                  |
|                              | 104     | 5520            | V                |                  |                  |
|                              | 106     | 5530            |                  |                  | V                |
|                              | 108     | 5540            | V                |                  |                  |
|                              | 110     | 5550            |                  | V                |                  |
|                              | 112     | 5560            | V                |                  |                  |
|                              | 116     | 5580            | V                |                  |                  |
|                              | 118     | 5590            |                  | V                |                  |
|                              | 120     | 5600            | V                |                  |                  |
|                              | 122     | 5610            |                  |                  | V                |
|                              | 124     | 5620            | V                |                  |                  |
|                              | 126     | 5630            |                  | V                |                  |
|                              | 128     | 5640            | V                |                  |                  |
|                              | 132     | 5660            | V                |                  |                  |
|                              | 134     | 5670            |                  | V                |                  |
|                              | 136     | 5680            | V                |                  |                  |
|                              | 140     | 5700            | V                |                  |                  |
| U-NII-2C<br>Straddle Channel | 138     | 5690            |                  |                  | V                |
|                              | 142     | 5710            |                  | V                |                  |
|                              | 144     | 5720            | V                |                  |                  |
| U-NII-3<br>(Band 4)          | 149     | 5745            | V                |                  |                  |
|                              | 151     | 5755            |                  | V                |                  |
|                              | 153     | 5765            | V                |                  |                  |
|                              | 155     | 5775            |                  |                  | V                |
|                              | 157     | 5785            | V                |                  |                  |
|                              | 159     | 5795            |                  | V                |                  |
|                              | 161     | 5805            | V                |                  |                  |
|                              | 165     | 5825            | V                |                  |                  |

### **3.3 Independent Operation Modes**

Basic operation modes are:

- A. Transmitting
- B. Receiver
- C. Normal Link

### **3.4 Noise Generating and Noise Suppressing Parts**

Refer to the Block Diagram.

### **3.5 Submitted Documents**

- Block Diagram
- Instruction Manual
- Rating Label
- Technical Description

## 4. Test Set-up and Operation Modes

### 4.1 Principle of Configuration Selection

The test modes were adapted accordingly in reference to the instructions for use.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

**Table 7: Table for Parameters of Test Software Setting**

| UNII Band   | NCB: 20MHz |                    |                     | NCB: 40MHz |                     | NCB: 80MHz |                     |
|-------------|------------|--------------------|---------------------|------------|---------------------|------------|---------------------|
|             | Channel    | Mode               |                     | Channel    | Mode                | Channel    | Mode                |
|             |            | 802.11a<br>Setting | 802.11ac<br>Setting |            | 802.11ac<br>Setting |            | 802.11ac<br>Setting |
| Band 1      | <b>36</b>  | 12                 | 16                  | <b>38</b>  | 1A                  | <b>42</b>  | 19                  |
|             | <b>40</b>  | 11                 | 14                  | <b>46</b>  | 1A                  |            |                     |
|             | <b>48</b>  | 10                 | 15                  |            |                     |            |                     |
| Band 2      | <b>52</b>  | 16                 | 19                  | <b>54</b>  | 1A                  | <b>58</b>  | 1A                  |
|             | <b>60</b>  | 15                 | 1A                  | <b>62</b>  | 1B                  |            |                     |
|             | <b>64</b>  | 15                 | 1A                  |            |                     |            |                     |
| Band 3      | <b>100</b> | 14                 | 18                  | <b>102</b> | 18                  | <b>106</b> | 16                  |
|             | <b>116</b> | 14                 | 18                  | <b>110</b> | 17                  | <b>132</b> | 17                  |
|             | <b>140</b> | 16                 | 19                  | <b>134</b> | 17                  |            |                     |
| Straddle CH | <b>144</b> | 18                 | 1C                  | <b>142</b> | 1B                  | <b>138</b> | 18                  |
| Band 4      | <b>149</b> | 16                 | 19                  | <b>151</b> | 19                  | <b>155</b> | 18                  |
|             | <b>157</b> | 15                 | 19                  | <b>159</b> | 19                  |            |                     |
|             | <b>165</b> | 12                 | 17                  |            |                     |            |                     |

## 4.2 Test Operation and Test Software

Setup for testing: Test samples are provided with USB interface which makes it possible to control them through a test software installed on a notebook computer.

This software "MT7668 QATool" was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 3.3 as appropriate.

The samples were used as follows:  
A000877050-008 for Conducted test  
A000877050-009 for Radiated test

The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report.

Full test was applied on all test modes, but only worst case was shown

IEEE 802.11a mode:

Band 1 Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

Band 2 Channel Low (5260MHz), Channel Mid (5300MHz) and Channel High (5320MHz) with 6Mbps data rate were chosen for full testing.

Band 3 Channel Low (5500MHz), Channel Mid (5580MHz) and Channel High (5700MHz) with 6Mbps data rate were chosen for full testing.

Band 4 Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 6Mbps data rate were chosen for full testing.

Straddle Channel 5720MHz with 6Mbps data rate were chosen for full testing.

IEEE 802.11ac VHT20 mode:

Band 1 Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 2 Channel Low (5260MHz), Channel Mid (5300MHz) and Channel High (5320MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 3 Channel Low (5500MHz), Channel Mid (5580MHz) and Channel High (5700MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 4 Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with MCS0/NSS1 data rate were chosen for full testing.

Straddle Channel 5720MHz with MCS0/NSS1 data rate were chosen for full testing.

IEEE 802.11ac VHT40 mode:

Band 1 Channel Low (5190MHz) and Channel High (5230MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 2 Channel Low (5270MHz) and Channel High (5310MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 3 Channel Low (5510MHz), Channel Mid (5550MHz) and Channel High (5670MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 4 Channel Low (5755MHz) and Channel High (5795MHz) with MCS0/NSS1 data rate were chosen for full testing.

Straddle Channel 5710MHz with MCS0/NSS1 data rate were chosen for full testing.

IEEE 802.11ac VHT80 mode:

Band 1 Channel Low (5120MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 2 Channel Low (5290MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 3 Channel Low (5530MHz) and Channel High (5610MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 4 Channel Low (5775MHz) with MCS0/NSS1 data rate were chosen for full testing.

Straddle Channel 5690MHz with MCS0/NSS1 data rate were chosen for full testing.

For ISSED test, the channel 5610 don't use.

### 4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

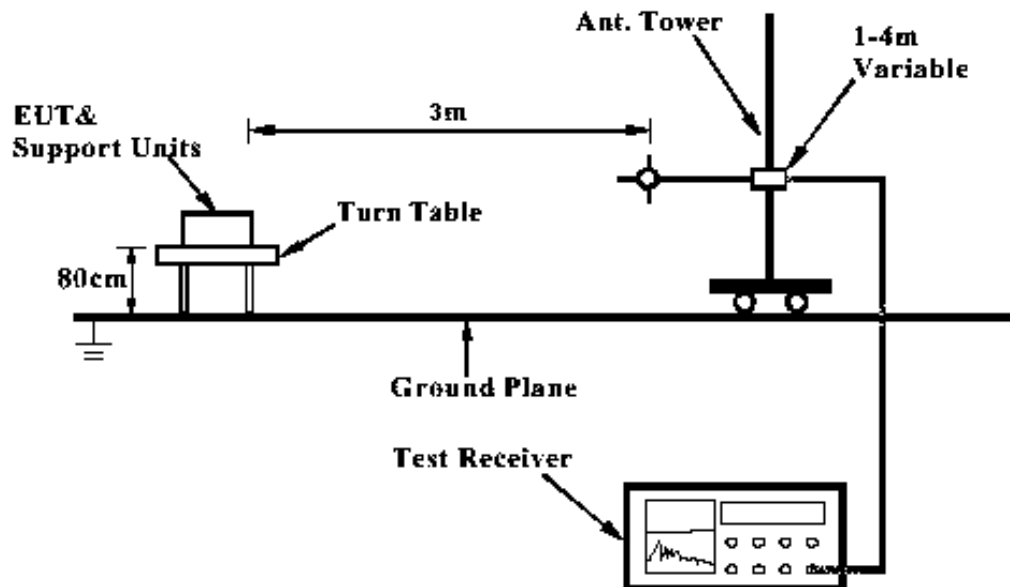
| Kind of Equipment | Manufacturer | Model Name | S/N           |
|-------------------|--------------|------------|---------------|
| Notebook(EMC-05)  | Lenovo       | TP00048A   | PB-0F8B2      |
| Smart WiFi Router | NETGEAR      | AC2600     | 4H75745800509 |

### 4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

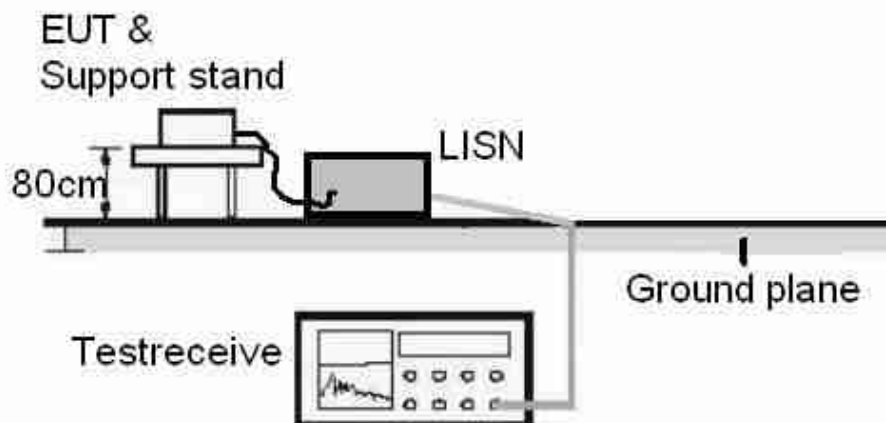
## 4.5 Test Setup Diagram

### Diagram of Measurement Configuration for Radiation Test

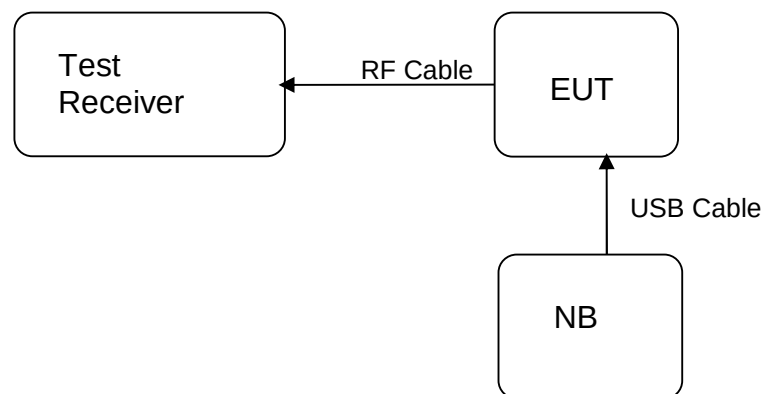


Note: Measurements above 1 GHz are done with a table height of 1.5m

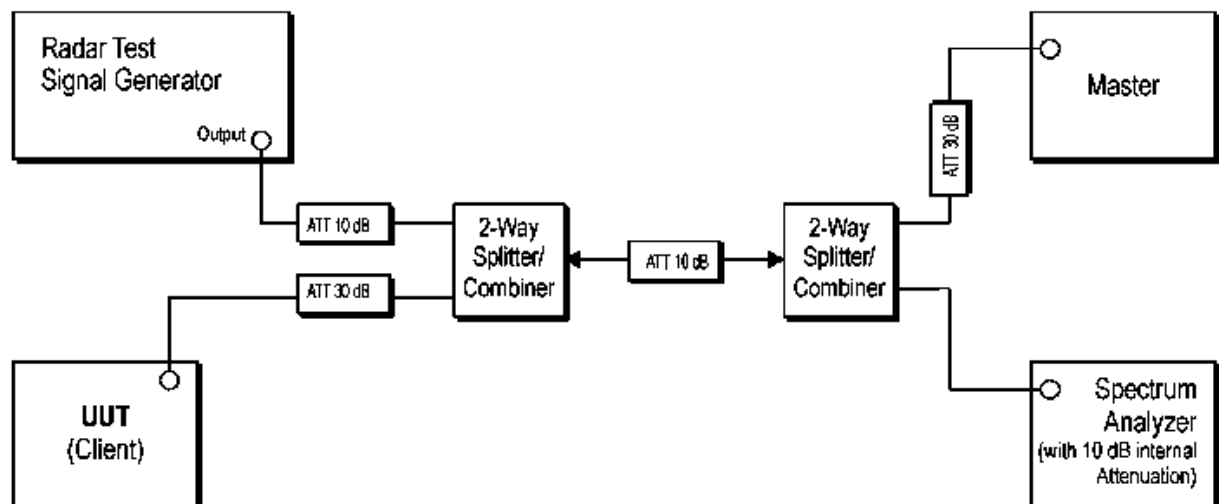
### Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



### Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



### Diagram of Measurement Configuration for DFS Test



## 5. Test Results

### 5.1 Transmitter Requirement & Test Suites

#### 5.1.1 Antenna Requirement

**RESULT:****Passed**

Test standard : LP0002(2018): 4.7.8, 4.7.3.1(4)(C), 4.7.3.2(3),  
4.7.3.3(3)

Requirement : use of approved antennas only with directional gains that  
do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 5.83 dBi. The antenna is a Pifa Antenna with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

### 5.1.2 Duty Cycle

**RESULT:****Passed**

Test standard : LP0002(2018)  
Basic standard : ANSI C63.10:2013  
Limit : None; for reporting purposes only  
Kind of test site : Shielded room / Conducted room

**Test setup**

Operation Mode : A

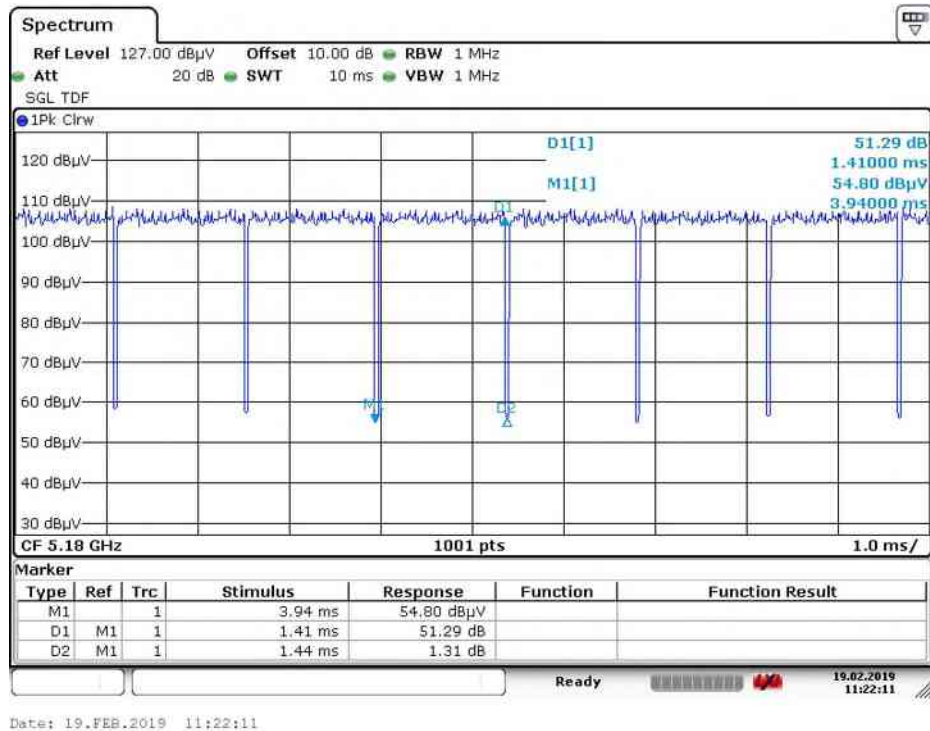
**Table 8: Test result of Duty Cycle**

| Mode           | On Time(ms) | On+Off Time(ms) | Duty Cycle (%) | Duty Factor (dB) |
|----------------|-------------|-----------------|----------------|------------------|
| 802.11a        | 1.410       | 1.440           | 97.92          | 0.09             |
| 802.11ac VHT20 | 1.310       | 1.350           | 97.04          | 0.13             |
| 802.11ac VHT40 | 0.660       | 0.690           | 95.65          | 0.19             |
| 802.11ac VHT80 | 0.330       | 0.370           | 89.19          | 0.50             |

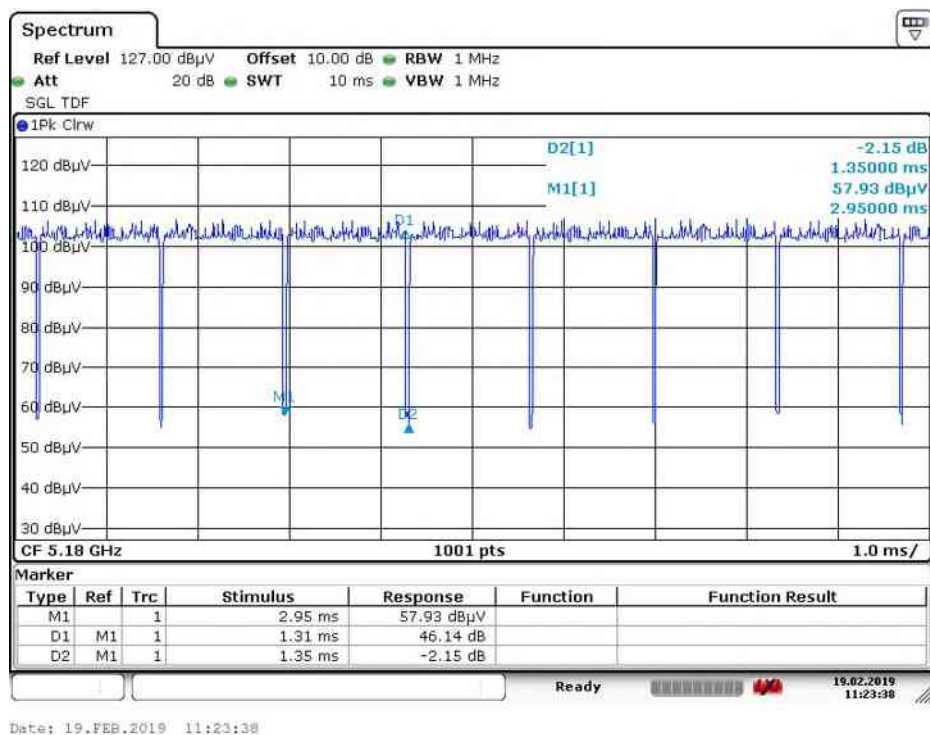
The duty factor is  $10\log (1/ (\text{Duty Cycle (\%)} / 100))$ .

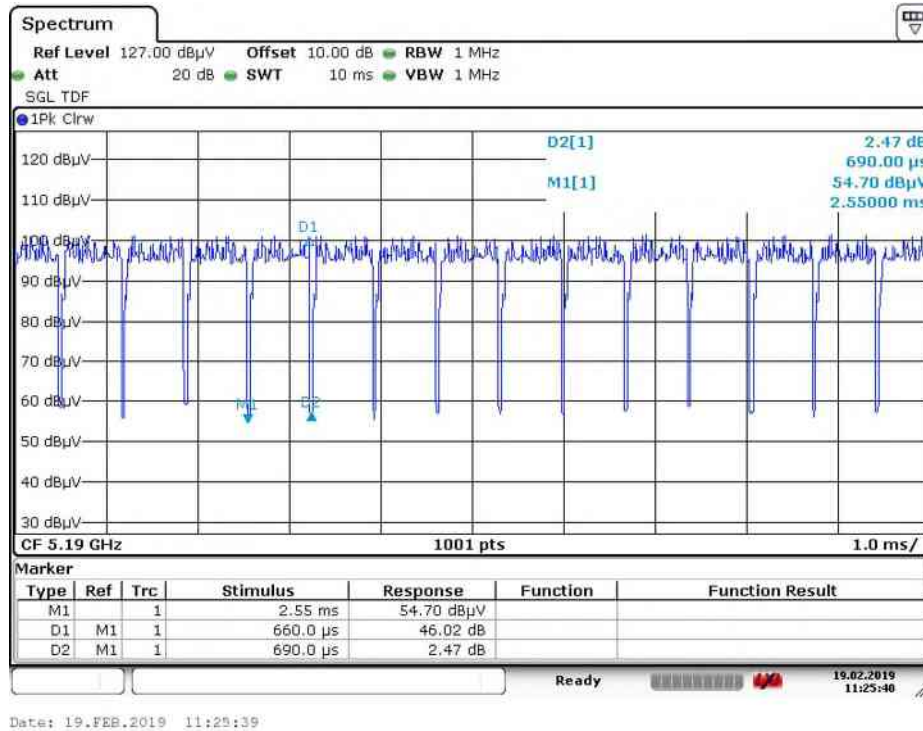
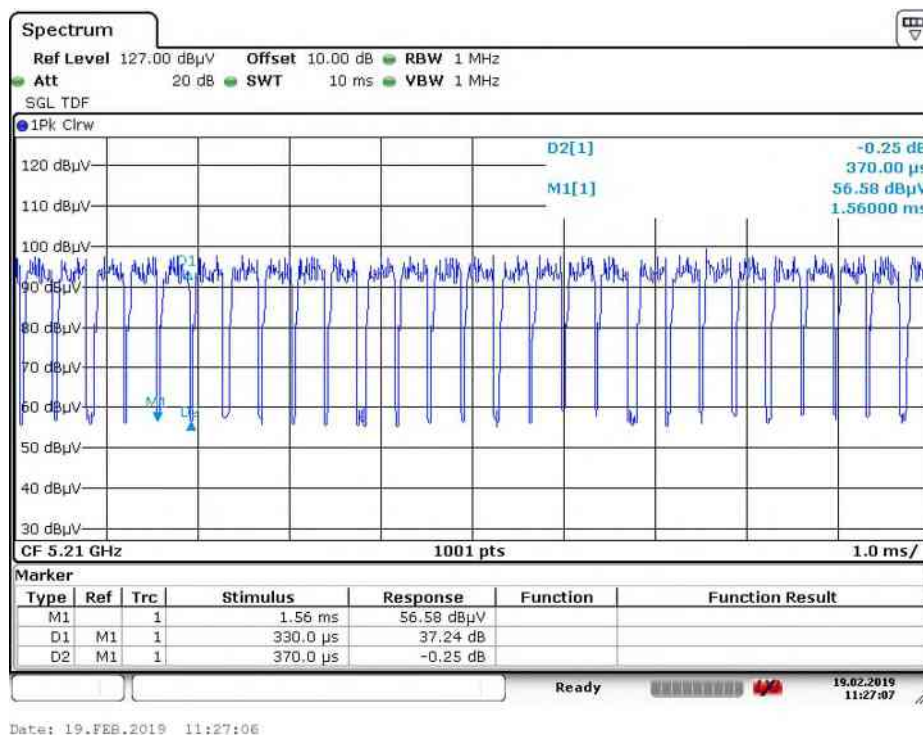
## Test Plot of Duty Cycle

802.11a



802.11ac VHT20



**802.11ac VHT40**

**802.11ac VHT80**


### 5.1.3 Maximum Conducted Average Output Power

**RESULT:****Passed**

|                   |   |                                                     |
|-------------------|---|-----------------------------------------------------|
| Test standard     | : | LP0002(2018): 4.7.3.1(4)(A), 4.7.3.2(1), 4.7.3.3(1) |
| Basic standard    | : | ANSI C63.10:2013                                    |
| Kind of test site | : | Shielded room                                       |

**Test setup**

|                |   |                      |
|----------------|---|----------------------|
| Test Channel   | : | Refer to the Table 7 |
| Operation Mode | : | A                    |

|                      |   |             |
|----------------------|---|-------------|
| Ambient temperature  | : | 20-24 °C    |
| Relative humidity    | : | 50-65 %     |
| Atmospheric pressure | : | 100-103 kPa |

**NCC Limit**

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

**Table 9: NCC Test result of Average Output Power**

| Mode              | Channel Frequency (MHz) | Average Output Power |             |             | Limit (dBm) |
|-------------------|-------------------------|----------------------|-------------|-------------|-------------|
|                   |                         | Ant 1 (dBm)          | Ant 2 (dBm) | Total (dBm) |             |
| 802.11a           | 5180                    | 10.98                | 10.36       | 13.69       | 24.00       |
|                   | 5200                    | 10.99                | 10.01       | 13.54       | 24.00       |
|                   | 5240                    | 10.96                | 10.37       | 13.69       | 24.00       |
|                   | 5260                    | 13.98                | 13.84       | 16.92       | 23.81       |
|                   | 5300                    | 13.99                | 13.74       | 16.88       | 23.84       |
|                   | 5320                    | 13.83                | 13.77       | 16.81       | 23.96       |
|                   | 5500                    | 13.88                | 13.26       | 16.59       | 23.85       |
|                   | 5580                    | 13.96                | 13.34       | 16.67       | 24.00       |
|                   | 5700                    | 13.94                | 13.85       | 16.91       | 23.95       |
|                   | 5720 (U-NII-2C)         | 14.00                | 13.49       | 16.76       | 23.37       |
|                   | 5720 (U-NII-3)          | 5.96                 | 5.59        | 8.79        | 30.00       |
|                   | 5745                    | 13.98                | 13.78       | 16.89       | 30.00       |
|                   | 5785                    | 13.98                | 13.62       | 16.81       | 30.00       |
|                   | 5825                    | 13.94                | 13.24       | 16.61       | 30.00       |
| 802.11ac<br>VHT20 | 5180                    | 10.84                | 10.36       | 13.62       | 24.00       |
|                   | 5200                    | 10.99                | 9.54        | 13.34       | 24.00       |
|                   | 5240                    | 10.97                | 10.12       | 13.58       | 24.00       |
|                   | 5260                    | 13.84                | 13.37       | 16.62       | 24.00       |
|                   | 5300                    | 13.94                | 13.56       | 16.76       | 24.00       |
|                   | 5320                    | 13.99                | 13.30       | 16.67       | 24.00       |
|                   | 5500                    | 13.98                | 13.21       | 16.62       | 24.00       |
|                   | 5580                    | 13.99                | 13.23       | 16.64       | 24.00       |
|                   | 5700                    | 13.89                | 13.51       | 16.71       | 23.98       |
|                   | 5720 (U-NII-2C)         | 13.86                | 13.42       | 16.66       | 22.97       |
|                   | 5720 (U-NII-3)          | 6.40                 | 6.18        | 9.30        | 30.00       |
|                   | 5745                    | 13.85                | 13.38       | 16.63       | 30.00       |
|                   | 5785                    | 13.86                | 13.29       | 16.59       | 30.00       |
|                   | 5825                    | 13.98                | 13.54       | 16.78       | 30.00       |
| 802.11ac<br>VHT40 | 5190                    | 13.99                | 13.36       | 16.70       | 24.00       |
|                   | 5230                    | 13.98                | 13.48       | 16.75       | 24.00       |
|                   | 5270                    | 13.93                | 13.24       | 16.61       | 24.00       |
|                   | 5310                    | 13.99                | 13.23       | 16.64       | 24.00       |
|                   | 5510                    | 13.98                | 12.92       | 16.49       | 24.00       |
|                   | 5550                    | 13.84                | 12.81       | 16.37       | 24.00       |
|                   | 5670                    | 13.86                | 12.73       | 16.34       | 24.00       |
|                   | 5710 (U-NII-2C)         | 13.74                | 13.10       | 16.44       | 24.00       |
|                   | 5710 (U-NII-3)          | 1.48                 | 0.93        | 4.22        | 30.00       |
|                   | 5755                    | 13.98                | 13.26       | 16.65       | 30.00       |
|                   | 5795                    | 13.94                | 13.24       | 16.61       | 30.00       |

| Mode           | Channel Frequency (MHz) | Conducted Average Output Power |             |             | Limit (dBm) |
|----------------|-------------------------|--------------------------------|-------------|-------------|-------------|
|                |                         | Ant 1 (dBm)                    | Ant 2 (dBm) | Total (dBm) |             |
| 802.11ac VHT80 | 5210                    | 12.98                          | 12.84       | 15.92       | 24.00       |
|                | 5290                    | 12.96                          | 12.15       | 15.58       | 24.00       |
|                | 5530                    | 12.93                          | 11.68       | 15.36       | 24.00       |
|                | 5610                    | 12.84                          | 11.52       | 15.24       | 24.00       |
|                | 5690 (U-NII-2C)         | 12.79                          | 11.24       | 16.44       | 24.00       |
|                | 5690 (U-NII-3)          | -3.20                          | -4.04       | -0.59       | 30.00       |
|                | 5775                    | 12.98                          | 12.39       | 15.71       | 30.00       |

For 802.11a 5260MHz, the power limit is using  $11 \text{ dBm} + 10 \log B$ , where B is the 19.09MHz, So, the limit equal  $11+10\log(19.09)$ , equal 23.81dBm.

For 802.11a 5300MHz, the power limit is using  $11 \text{ dBm} + 10 \log B$ , where B is the 19.23MHz, So, the limit equal  $11+10\log(19.09)$ , equal 23.84dBm.

For 802.11a 5320MHz, the power limit is using  $11 \text{ dBm} + 10 \log B$ , where B is the 19.76MHz, So, the limit equal  $11+10\log(19.09)$ , equal 23.96dBm.

For 802.11a 5500MHz, the power limit is using  $11 \text{ dBm} + 10 \log B$ , where B is the 19.27MHz, So, the limit equal  $11+10\log(19.09)$ , equal 23.85dBm.

For 802.11a 5700MHz, the power limit is using  $11 \text{ dBm} + 10 \log B$ , where B is the 19.71MHz, So, the limit equal  $11+10\log(19.09)$ , equal 23.95dBm.

For 802.11a 5720MHz, the power limit is using  $11 \text{ dBm} + 10 \log B$ , where B is the 17.24MHz, So, the limit equal  $11+10\log(19.09)$ , equal 23.37dBm.

For 802.11ac VHT20 5700MHz, the power limit is using  $11 \text{ dBm} + 10 \log B$ , where B is the 19.86MHz, So, the limit equal  $11+10\log(19.09)$ , equal 23.98dBm.

For 802.11ac VHT20 5720MHz, the power limit is using  $11 \text{ dBm} + 10 \log B$ , where B is the 15.74MHz, So, the limit equal  $11+10\log(19.09)$ , equal 22.97dBm.

## Test Plot of NCC Straddle Channel Power

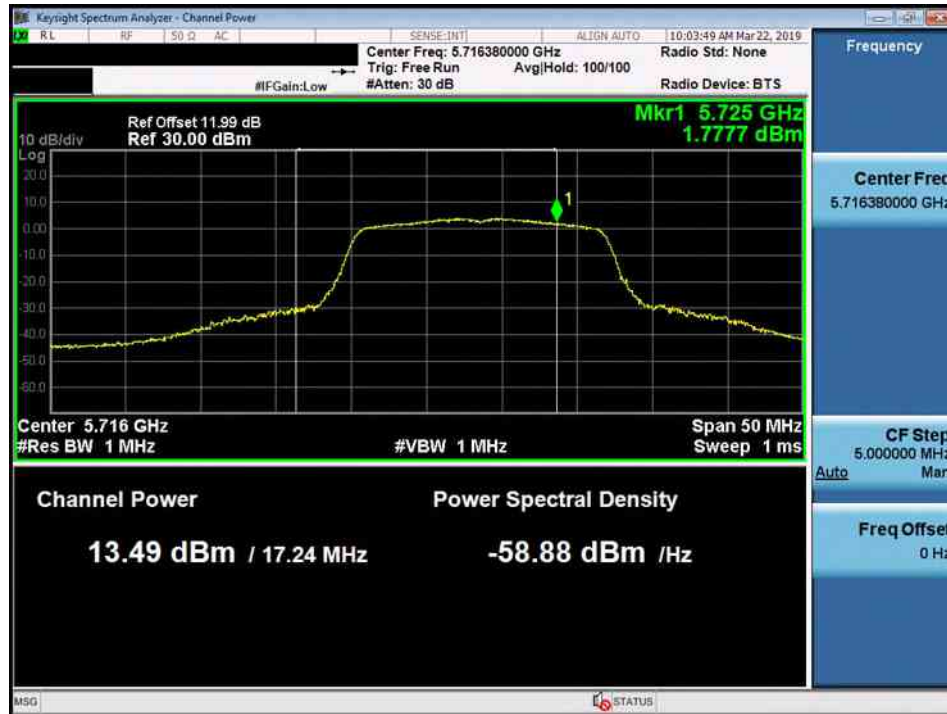
802.11a 5720MHz U-NII-2C Ant 1



802.11a 5720MHz U-NII-3 Ant1



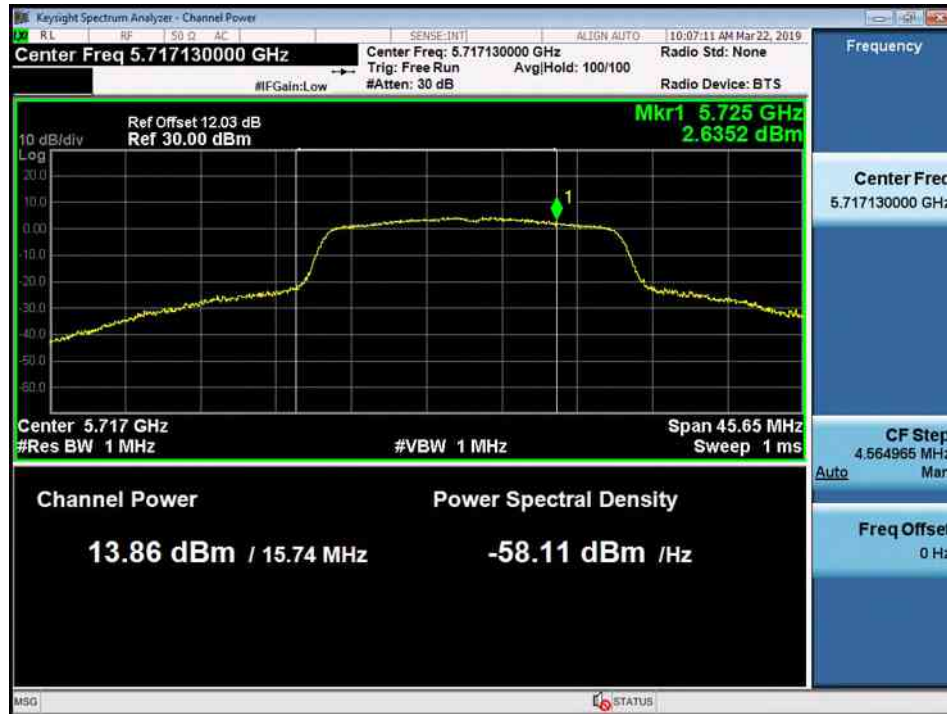
**802.11a 5720MHz U-NII-2C Ant 2**



**802.11a 5720MHz U-NII-3 Ant2**



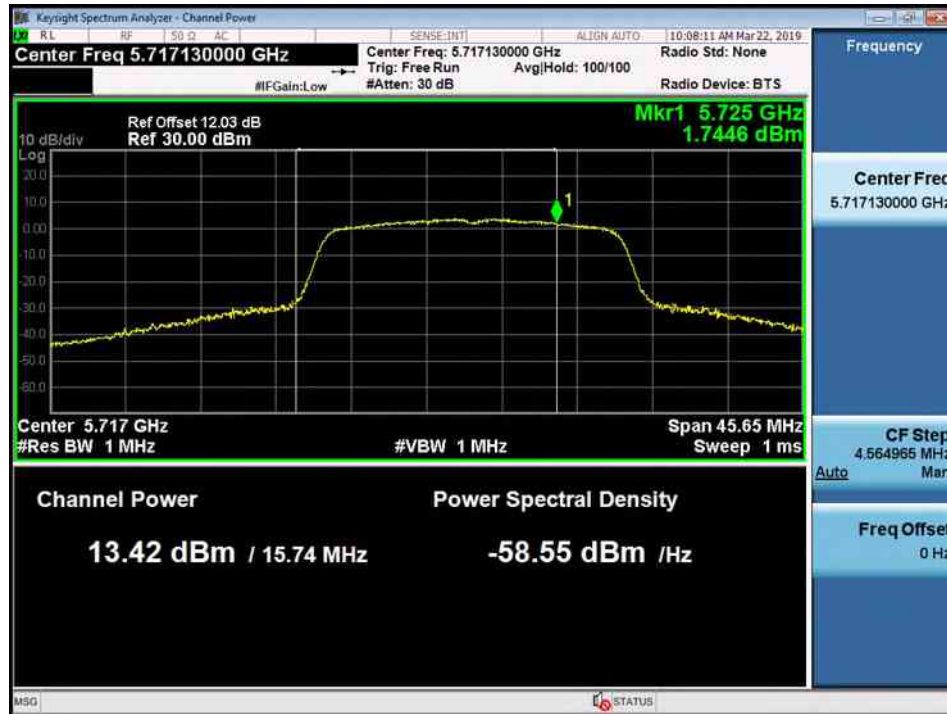
**802.11ac VHT20 5720MHz U-NII-2C Ant 1**



**802.11ac VHT20 5720MHz U-NII-3 Ant1**



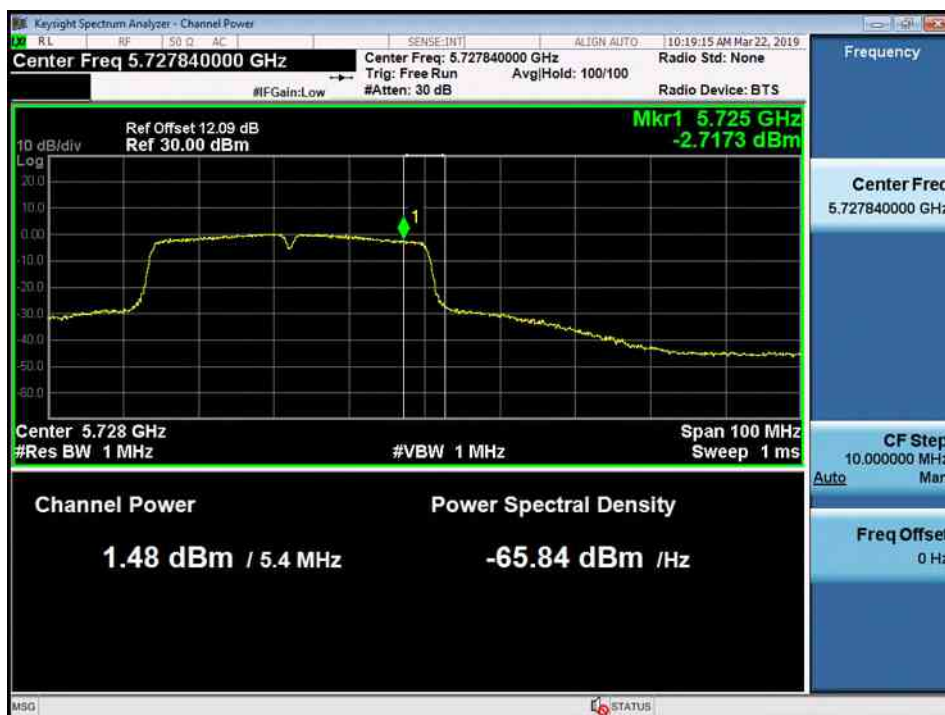
### 802.11ac VHT20 5720MHz U-NII-2C Ant 2



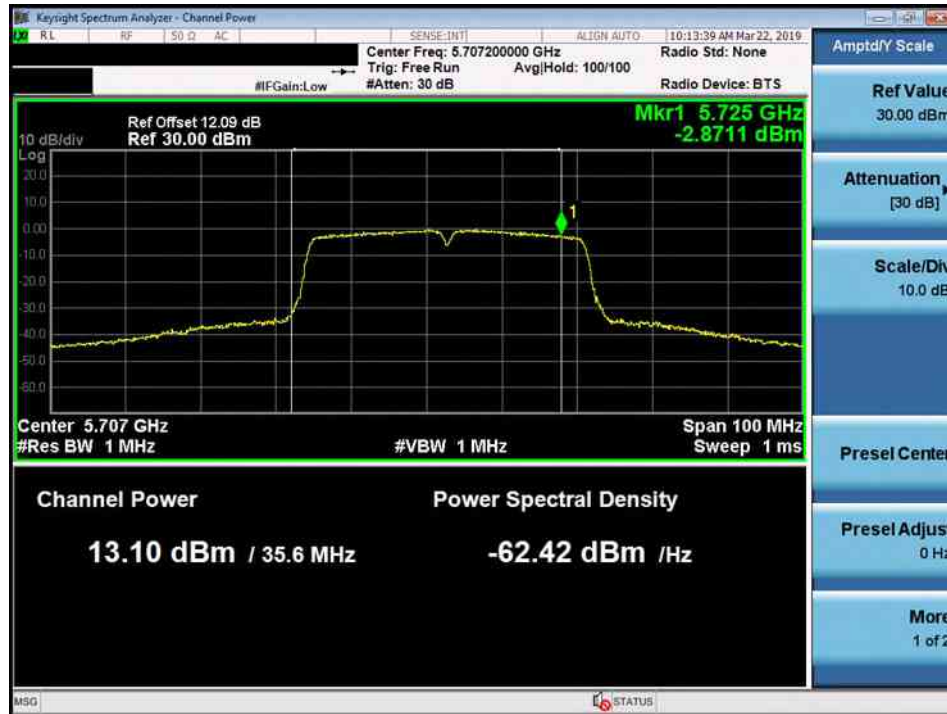
### 802.11ac VHT20 5720MHz U-NII-3 Ant2



**802.11ac VHT40 5710MHz U-NII-2C Ant 1**

**802.11ac VHT40 5710MHz U-NII-3 Ant1**


### 802.11ac VHT40 5710MHz U-NII-2C Ant 2



### 802.11ac VHT40 5710MHz U-NII-3 Ant2



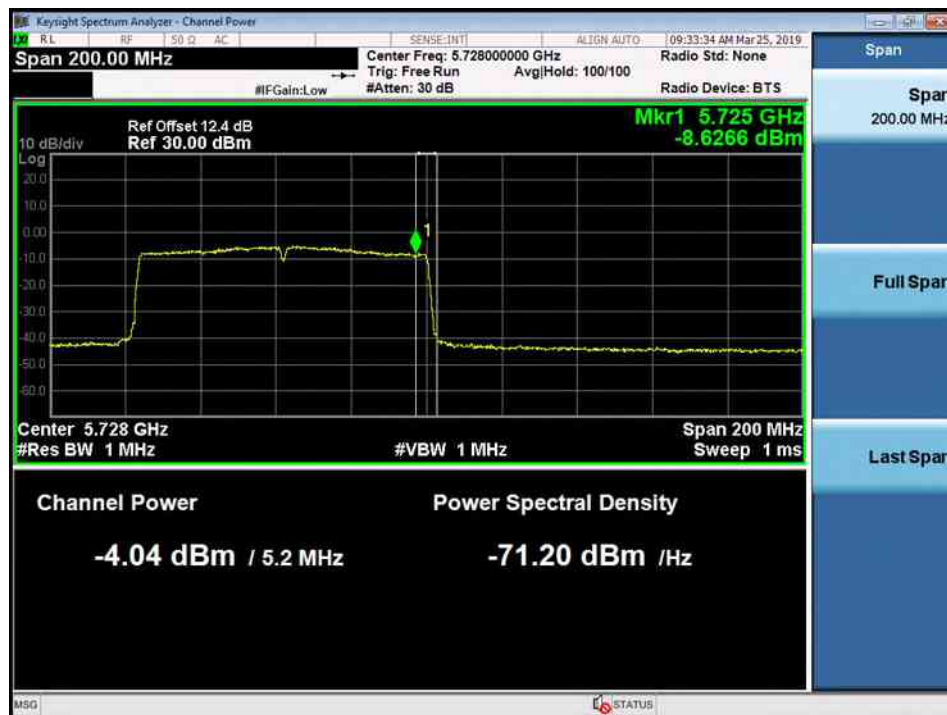
**802.11ac VHT80 5690MHz U-NII-2C Ant 1**

**802.11ac VHT80 5690MHz U-NII-3 Ant1**


### 802.11ac VHT80 5690MHz U-NII-2C Ant 2



### 802.11ac 5690MHz U-NII-3 Ant2



### 5.1.4 26dB & 99% Bandwidth

**RESULT:**
**Passed**

Test standard : LP0002(2018): 4.7.2.3

Basic standard : ANSI C63.10:2013

Kind of test site : Conducted room

**Test setup**

Test Channel : Refer to the Table 7

Operation Mode : A

**Table 10: Test result of 26dB & 99% Bandwidth**

| Mode           | Channel Frequency (MHz) | 26dB Bandwidth (MHz) | 99% Bandwidth (MHz) |
|----------------|-------------------------|----------------------|---------------------|
| 802.11a        | 5180                    | 19.91                | 16.87               |
|                | 5200                    | 19.03                | 15.78               |
|                | 5240                    | 20.05                | 16.85               |
|                | 5260                    | 19.09                | 15.49               |
|                | 5300                    | 19.23                | 16.46               |
|                | 5320                    | 19.76                | 16.79               |
|                | 5500                    | 19.27                | 16.12               |
|                | 5580                    | 20.03                | 16.86               |
|                | 5700                    | 19.71                | 15.88               |
|                | 5720 U-NII-2C           | 17.24                | 13.64               |
|                | 5720 U-NII-3            | 4.72                 | 3.25                |
|                | 5745                    | 20.56                | 16.17               |
|                | 5785                    | 19.74                | 16.90               |
|                | 5825                    | 24.92                | 16.88               |
| 802.11ac VHT20 | 5180                    | 20.03                | 17.64               |
|                | 5200                    | 19.93                | 17.02               |
|                | 5240                    | 20.12                | 17.75               |
|                | 5260                    | 20.07                | 17.75               |
|                | 5300                    | 20.66                | 17.53               |
|                | 5320                    | 20.54                | 17.50               |
|                | 5500                    | 20.01                | 17.30               |
|                | 5580                    | 20.15                | 17.47               |
|                | 5700                    | 19.86                | 17.14               |
|                | 5720 U-NII-2C           | 15.74                | 14.18               |
|                | 5720 U-NII-3            | 5.02                 | 3.63                |

|                |                    |       |       |
|----------------|--------------------|-------|-------|
|                | 5745               | 20.78 | 17.25 |
|                | 5785               | 20.44 | 17.22 |
|                | 5825               | 23.89 | 17.83 |
| 802.11ac VHT40 | 5190               | 41.33 | 37.01 |
|                | 5230               | 41.25 | 36.31 |
|                | 5270               | 41.03 | 36.01 |
|                | 5310               | 42.69 | 36.59 |
|                | 5510               | 41.10 | 35.90 |
|                | 5550               | 41.23 | 36.81 |
|                | 5670               | 41.33 | 37.06 |
|                | 5710 U-NII-2C      | 35.60 | 33.28 |
|                | 5710 U-NII-3       | 5.40  | 2.90  |
|                | 5755               | 41.33 | 36.11 |
|                | 5795               | 41.92 | 36.88 |
|                |                    |       |       |
| 802.11ac VHT80 | 5210               | 81.16 | 75.88 |
|                | 5290               | 81.69 | 75.32 |
|                | 5530               | 81.09 | 76.18 |
|                | 5610<br>(FCC Only) | 81.30 | 75.19 |
|                | 5690 U-NII-2C      | 75.40 | 73.40 |
|                | 5690 U-NII-3       | 5.20  | 2.98  |
|                | 5775               | 81.21 | 76.19 |

## Test Plot of 26dB & 99% Bandwidth

802.11a 5180MHz



802.11a 5200MHz



### 802.11a 5240MHz



### 802.11a 5260MHz



**802.11a 5300MHz**

**802.11a 5320MHz**


### 802.11a 5500MHz



### 802.11a 5580MHz



### 802.11a 5700MHz



### 802.11a 5745MHz



### 802.11a 5785MHz



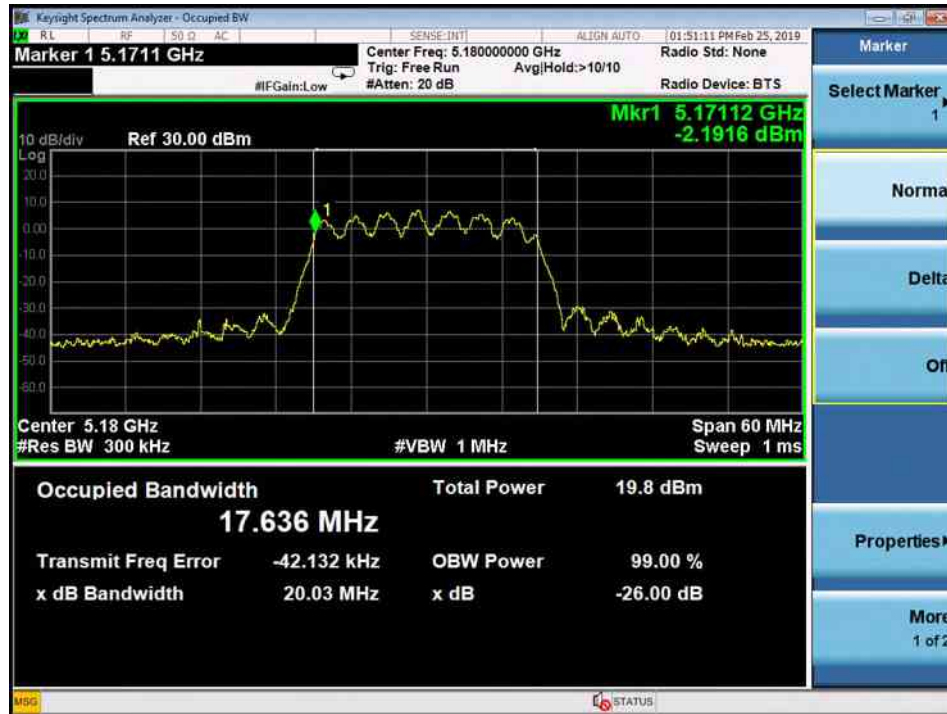
### 802.11a 5825MHz



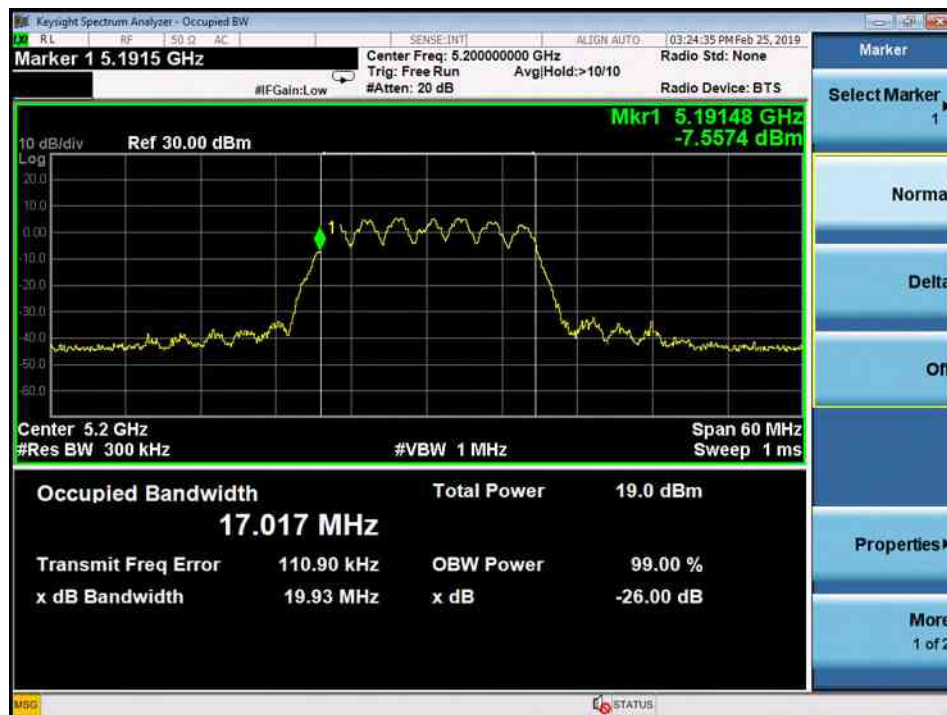
**802.11a 5720MHz 26dB**

**802.11a 5720MHz 99%**


### 802.11ac VHT20 5180MHz



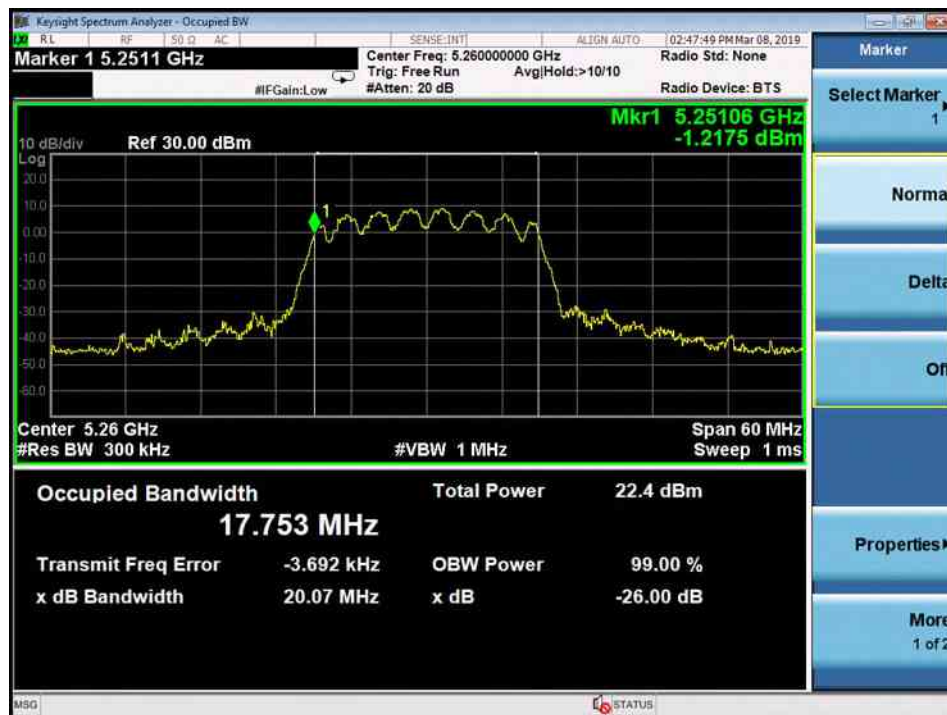
### 802.11ac VHT20 5200MHz



### 802.11ac VHT20 5240MHz



### 802.11ac VHT20 5260MHz



### 802.11ac VHT20 5300MHz



### 802.11ac VHT20 5320MHz



### 802.11ac VHT20 5500MHz



### 802.11ac VHT20 5580MHz



**802.11ac VHT20 5700MHz**

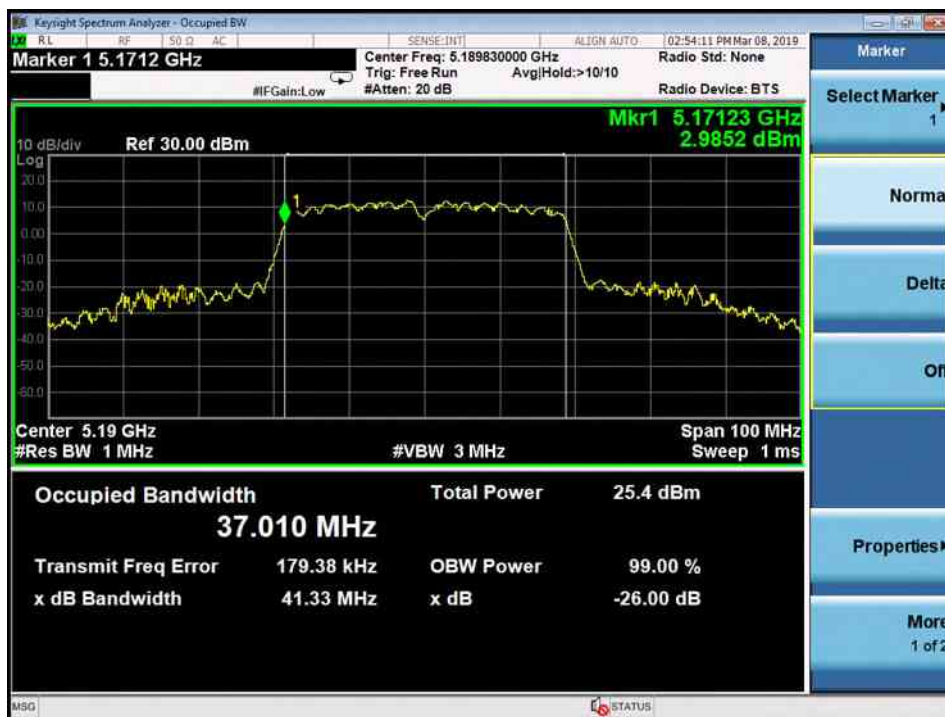
**802.11ac VHT20 5745MHz**


**802.11ac VHT20 5785MHz**

**802.11ac VHT20 5825MHz**


**802.11ac VHT20 5720MHz 26dB**

**802.11ac VHT20 5720MHz 99%**


**802.11ac VHT40 5190MHz**

**802.11ac VHT40 5230MHz**


### 802.11ac VHT40 5270MHz



### 802.11ac VHT40 5310MHz



**802.11ac VHT40 5510MHz**

**802.11ac VHT40 5550MHz**


### 802.11ac VHT40 5670MHz



### 802.11ac VHT40 5755MHz



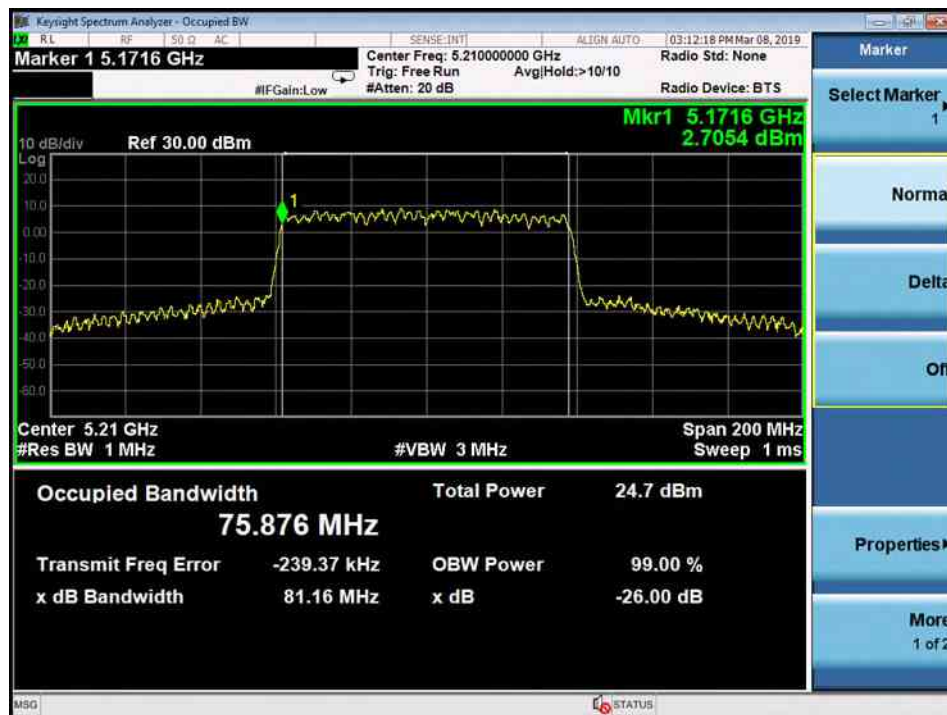
**802.11ac VHT40 5795MHz**

**802.11ac VHT40 5710MHz 26dB**

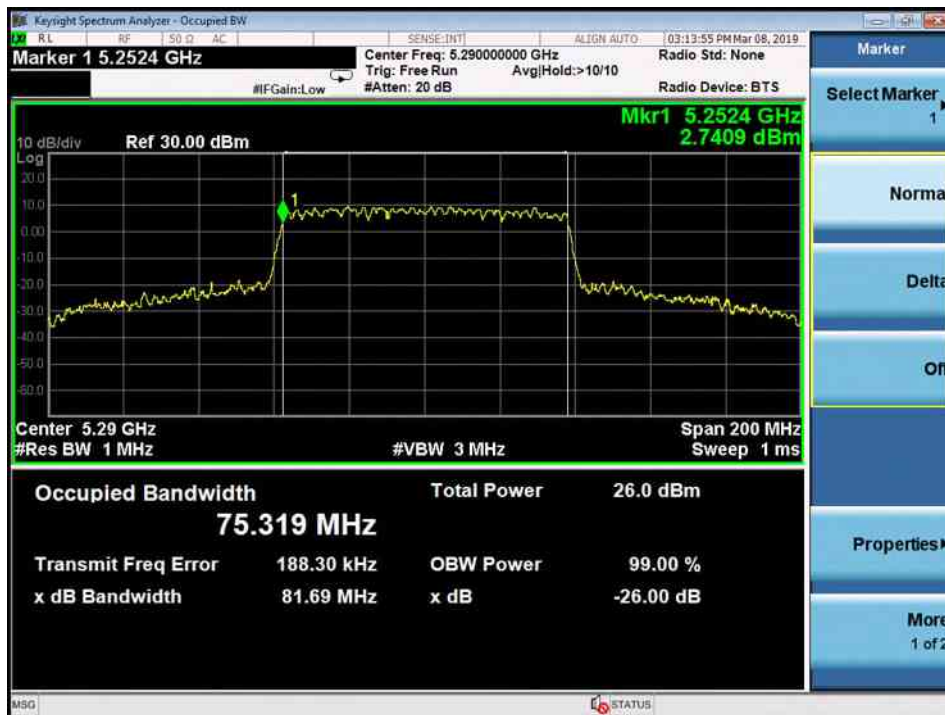

**802.11ac VHT40 5710MHz 99%**



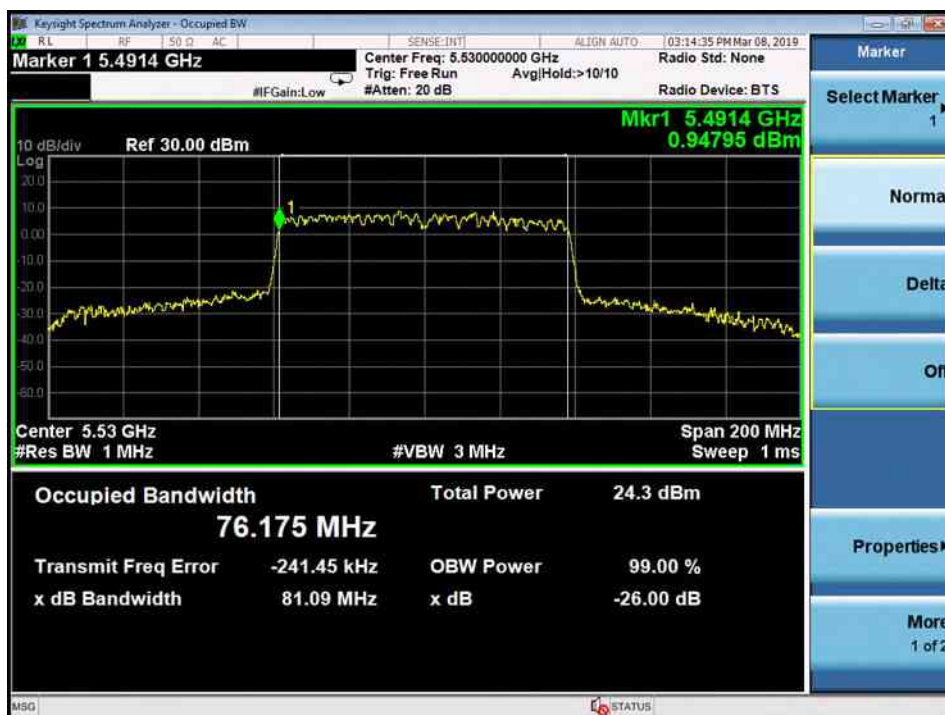
**802.11ac VHT80 5210MHz**



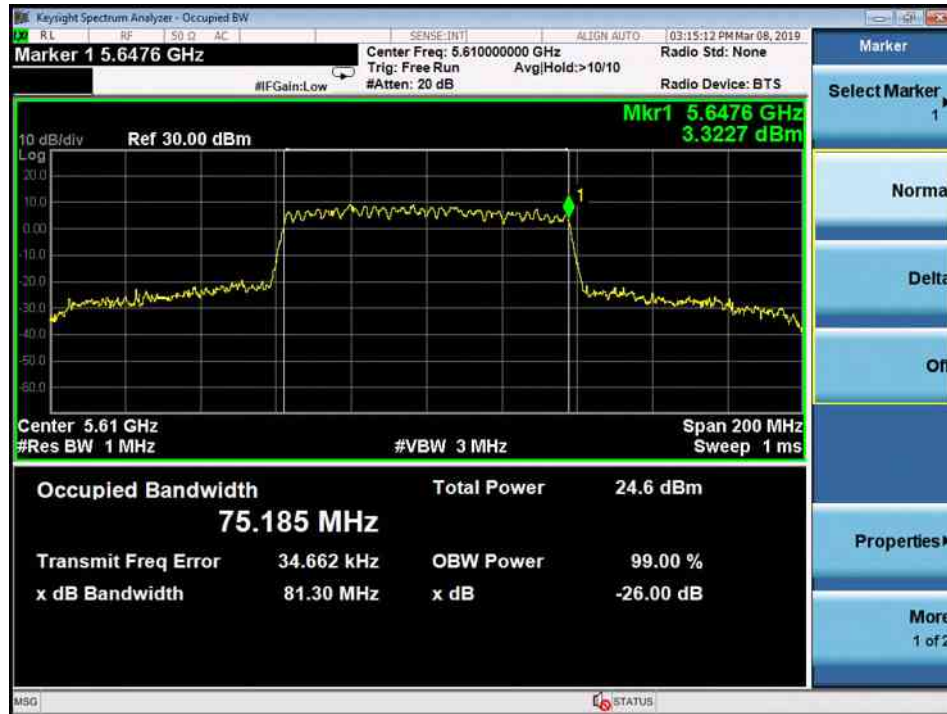
### 802.11ac VHT80 5290MHz



### 802.11ac VHT80 5530MHz

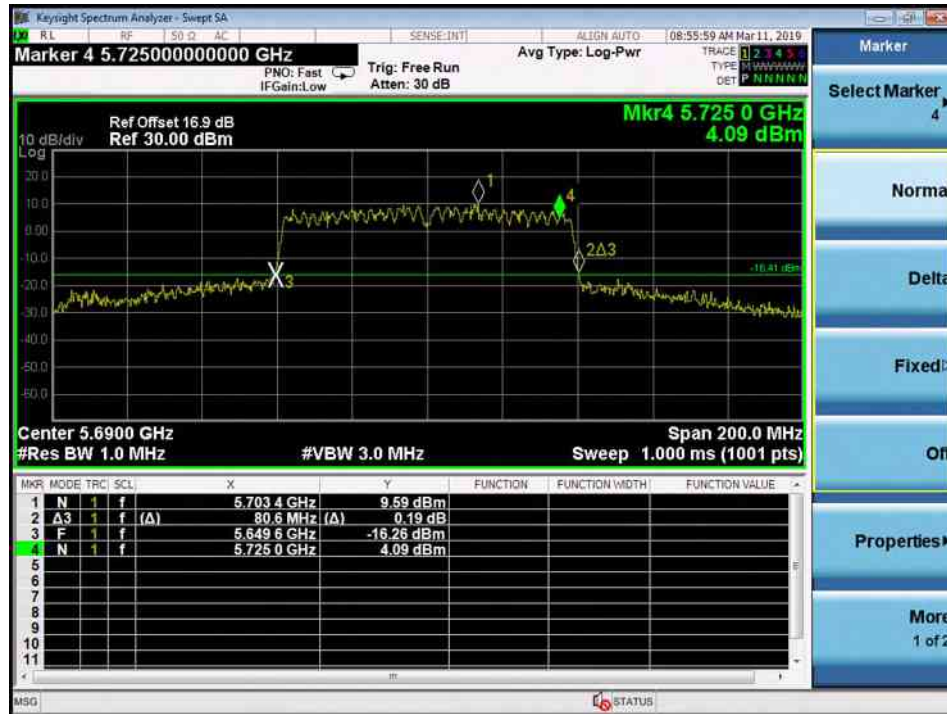


### 802.11ac VHT80 5610MHz



### 802.11ac VHT80 5775MHz



**802.11ac VHT80 5690MHz 26dB**

**802.11ac VHT80 5690MHz 99%**


### 5.1.5 6dB Bandwidth

**RESULT:**
**Passed**

Test standard : LP0002(2018): 4.7.5  
 Basic standard : ANSI C63.10:2013  
 Kind of test site : Conducted room

**Test setup**

Test Channel : Refer to the Table 7  
 Operation Mode : A

**Table 11: Test result of 6dB Bandwidth**

| Mode           | Channel Frequency (MHz) | 6dB Bandwidth (MHz) | 6dB Bandwidth Limit (kHz) | Result |
|----------------|-------------------------|---------------------|---------------------------|--------|
| 802.11a        | 5720                    | 2.52                | >500                      | Pass   |
|                | 5745                    | 15.16               | >500                      | Pass   |
|                | 5785                    | 12.29               | >500                      | Pass   |
|                | 5825                    | 15.12               | >500                      | Pass   |
| 802.11ac VHT20 | 5720                    | 2.48                | >500                      | Pass   |
|                | 5745                    | 13.27               | >500                      | Pass   |
|                | 5785                    | 13.28               | >500                      | Pass   |
|                | 5825                    | 13.27               | >500                      | Pass   |
| 802.11ac VHT40 | 5710                    | 2.48                | >500                      | Pass   |
|                | 5755                    | 35.20               | >500                      | Pass   |
|                | 5795                    | 33.99               | >500                      | Pass   |
| 802.11ac VHT80 | 5690                    | 2.60                | >500                      | Pass   |
|                | 5775                    | 74.47               | >500                      | Pass   |

## Test Plot of 6dB Bandwidth

802.11a

5720MHz



5745MHz



### 5785MHz



### 5825MHz

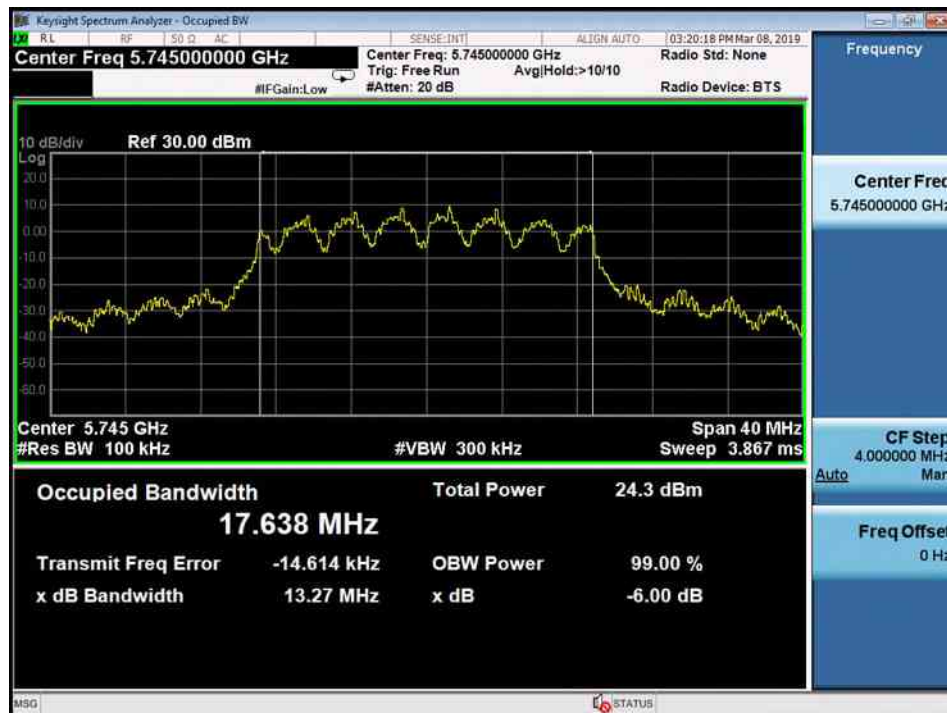


802.11ac VHT20

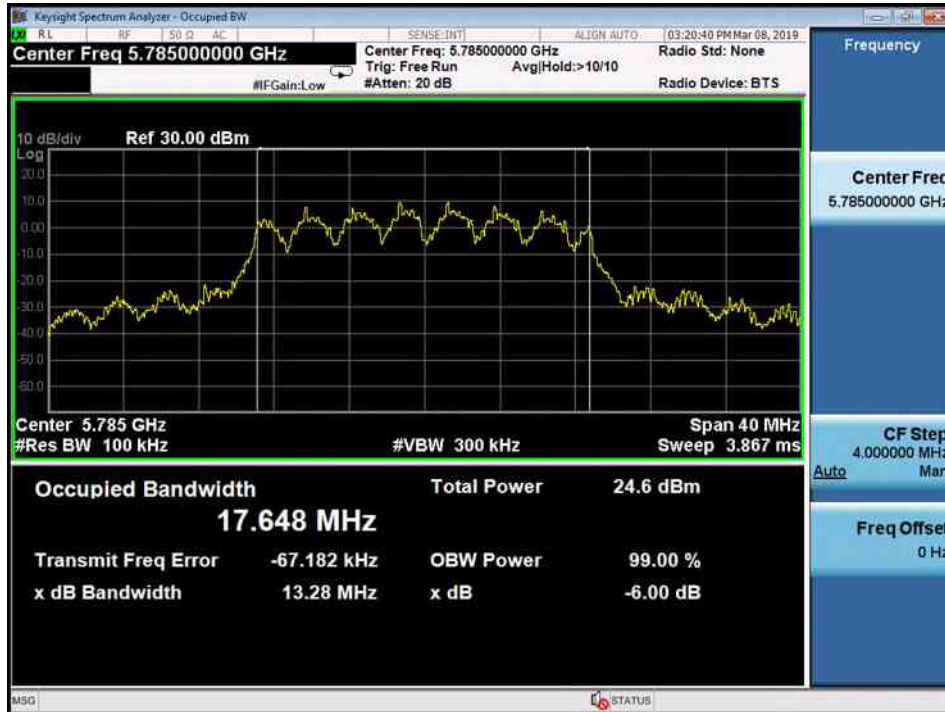
5720MHz



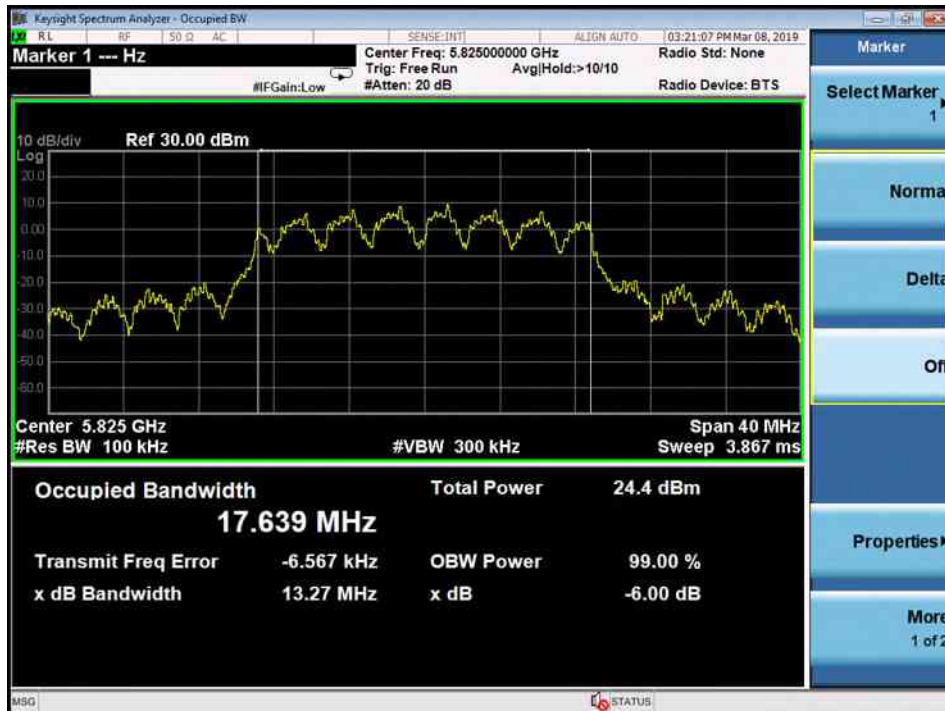
5745MHz



### 5785MHz

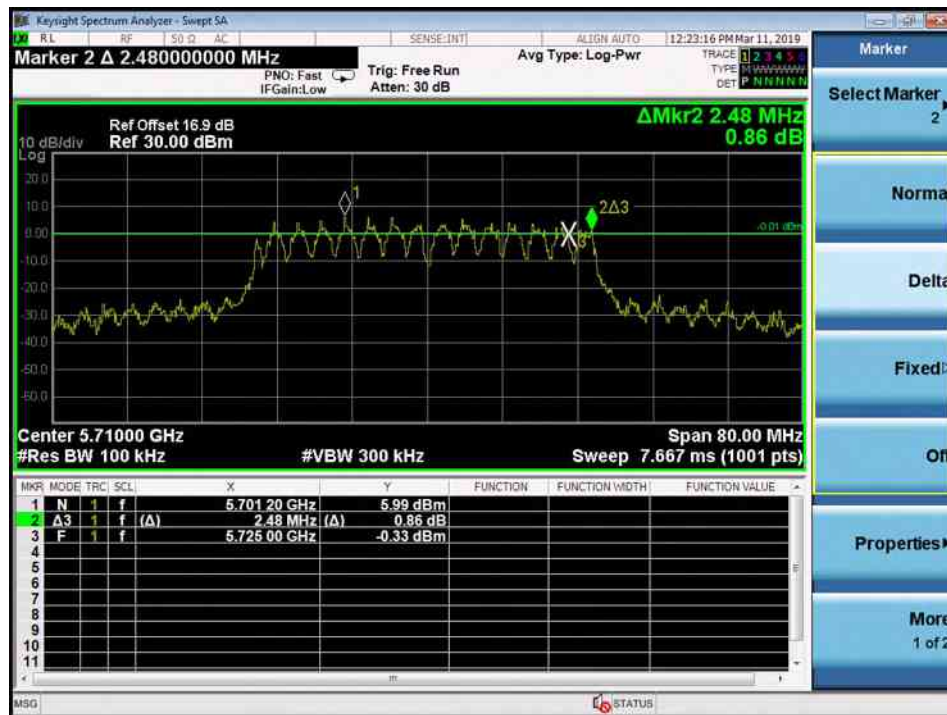


### 5825MHz

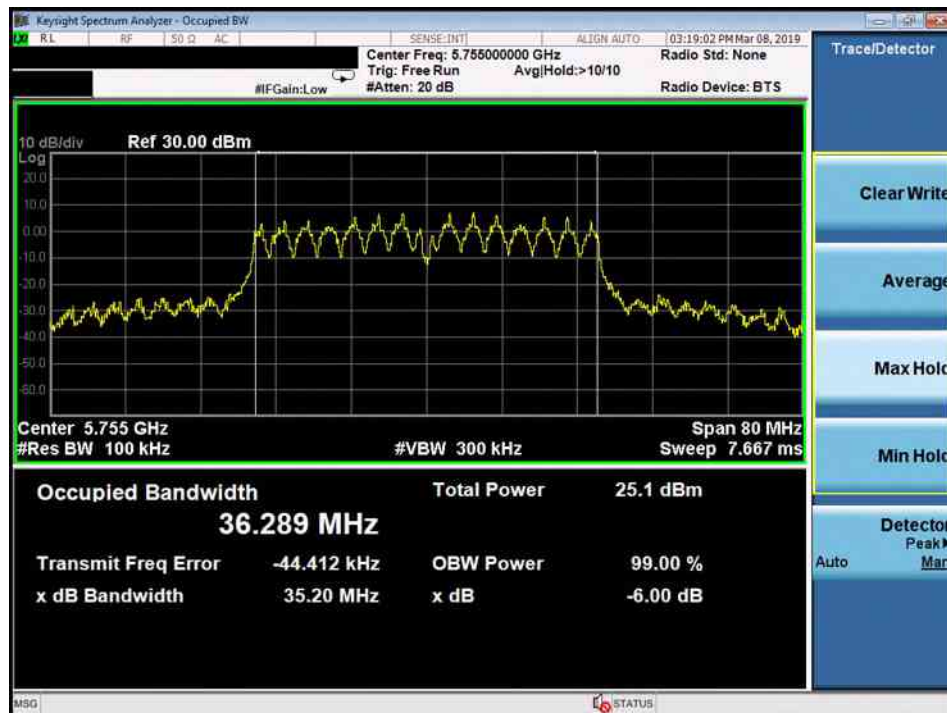


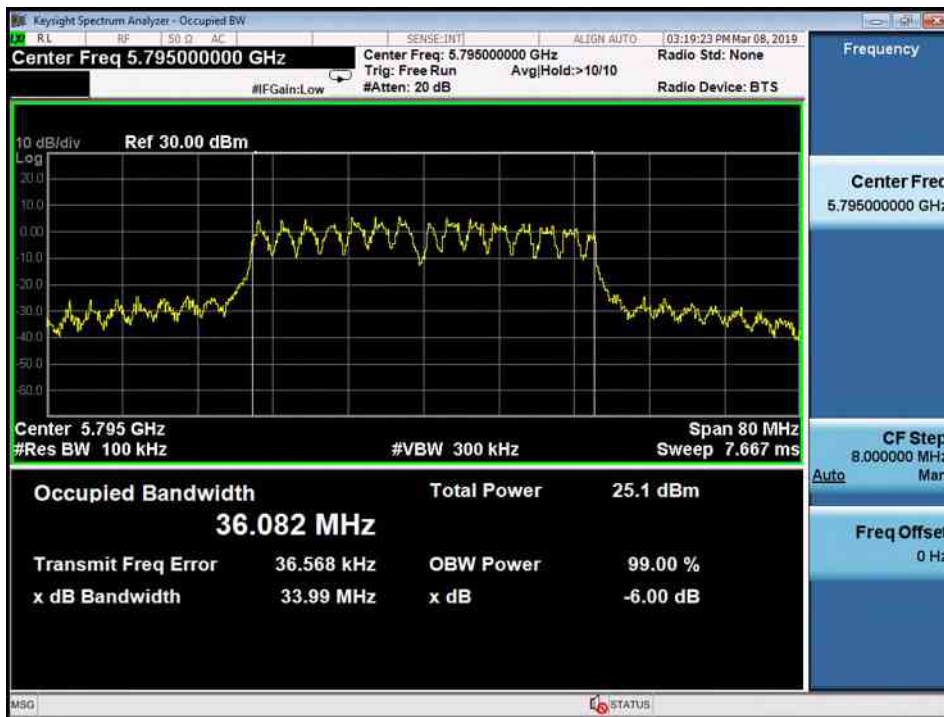
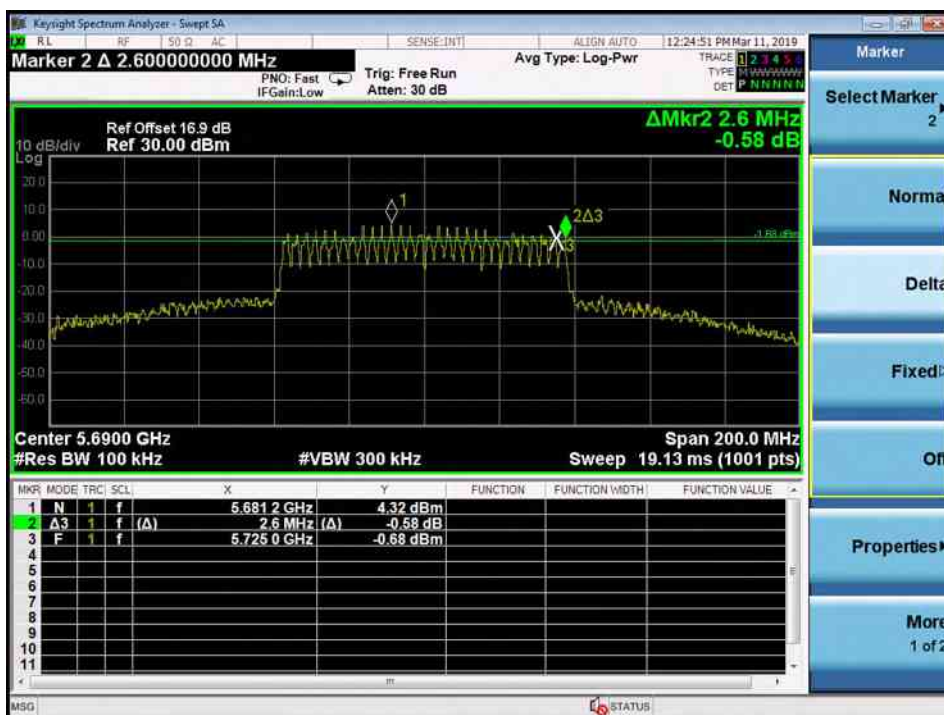
802.11ac VHT40

5710MHz

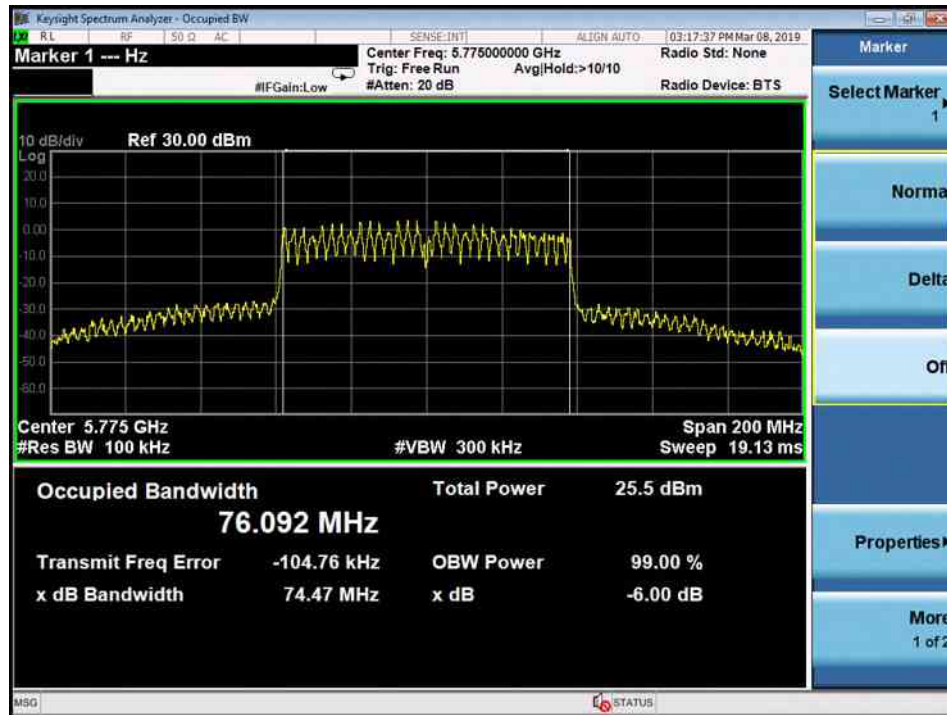


5755MHz



**5795MHz**

**802.11ac VHT80**  
**5690MHz**


### 5755MHz



### 5.1.6 Power Density

**RESULT:****Passed**

Test standard : LP0002(2018): 4.7.3.1(4)(B), 4.7.3.2(2), 4.7.3.3(2)  
Basic standard : ANSI C63.10:2013, LP0002(2018): 4.7.3.4(2)  
Kind of test site : Shielded room

**Test setup**

Test Channel : Refer to the table 7  
Operation Mode : A

**NCC Limit :**

For client devices in the 5.15-5.25 GHz band, the maximum conducted power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the band 5.725-5.85 GHz, the maximum conducted power spectral density shall not exceed 30 dBm in any 500-kHz band.

**Table 12: Test result of NCC Power Density**

| Mode           | Channel Frequency (MHz) | Conducted Power Density |                 |                 |                    | Power Density Limit                |
|----------------|-------------------------|-------------------------|-----------------|-----------------|--------------------|------------------------------------|
|                |                         | Ant 1 (dBm/MHz)         | Ant 2 (dBm/MHz) | Total (dBm/MHz) | Total (dBm/500kHz) | B1-B3 (dBm/MHz)<br>B4 (dBm/500kHz) |
| 802.11a        | 5180                    | 1.38                    | 0.68            | 4.05            | -                  | 11.00                              |
|                | 5200                    | 1.44                    | 0.67            | 4.08            | -                  | 11.00                              |
|                | 5240                    | 1.37                    | 0.44            | 3.94            | -                  | 11.00                              |
|                | 5260                    | 4.04                    | 2.54            | 6.36            | -                  | 11.00                              |
|                | 5300                    | 4.90                    | 2.67            | 6.94            | -                  | 11.00                              |
|                | 5320                    | 4.83                    | 3.25            | 7.12            | -                  | 11.00                              |
|                | 5500                    | 4.25                    | 2.08            | 6.31            | -                  | 11.00                              |
|                | 5580                    | 4.90                    | 2.26            | 6.79            | -                  | 11.00                              |
|                | 5700                    | 4.04                    | 3.78            | 6.92            | -                  | 11.00                              |
|                | 5720 (U-NII-2C)         | 4.75                    | 4.43            | 7.60            | -                  | 11.00                              |
|                | 5720 (U-NII-3)          | 2.81                    | 1.77            | 5.33            | 2.32               | 30.00                              |
|                | 5745                    | 3.94                    | 3.60            | 6.79            | 3.78               | 30.00                              |
|                | 5785                    | 3.71                    | 3.09            | 6.42            | 3.41               | 30.00                              |
|                | 5825                    | 3.75                    | 4.67            | 7.25            | 4.24               | 30.00                              |
| 802.11ac VHT20 | 5180                    | 1.17                    | 0.50            | 3.85            | -                  | 11.00                              |
|                | 5200                    | 1.28                    | 0.43            | 3.89            | -                  | 11.00                              |
|                | 5240                    | 1.45                    | 0.59            | 4.05            | -                  | 11.00                              |
|                | 5260                    | 3.71                    | 2.28            | 6.07            | -                  | 11.00                              |
|                | 5300                    | 5.01                    | 3.27            | 7.24            | -                  | 11.00                              |
|                | 5320                    | 5.03                    | 3.76            | 7.45            | -                  | 11.00                              |
|                | 5500                    | 3.92                    | 2.02            | 6.09            | -                  | 11.00                              |
|                | 5580                    | 4.91                    | 2.44            | 6.86            | -                  | 11.00                              |
|                | 5700                    | 3.84                    | 3.33            | 6.60            | -                  | 11.00                              |
|                | 5720 (U-NII-2C)         | 4.49                    | 4.73            | 7.62            | -                  | 11.00                              |
|                | 5720 (U-NII-3)          | 2.88                    | 2.63            | 5.77            | 2.76               | 30.00                              |
|                | 5745                    | 3.72                    | 3.41            | 6.58            | 3.57               | 30.00                              |
|                | 5785                    | 3.26                    | 3.11            | 6.19            | 3.18               | 30.00                              |
|                | 5825                    | 3.46                    | 3.36            | 6.42            | 3.41               | 30.00                              |
| 802.11ac VHT40 | 5190                    | 0.78                    | -0.77           | 3.08            | -                  | 11.00                              |
|                | 5230                    | 0.21                    | -0.37           | 2.94            | -                  | 11.00                              |
|                | 5270                    | 1.14                    | -0.69           | 3.33            | -                  | 11.00                              |
|                | 5310                    | 1.94                    | 0.16            | 4.15            | -                  | 11.00                              |
|                | 5510                    | 0.23                    | -1.92           | 2.30            | -                  | 11.00                              |
|                | 5550                    | 0.60                    | -1.75           | 2.59            | -                  | 11.00                              |
|                | 5670                    | 0.24                    | -1.96           | 2.29            | -                  | 11.00                              |
|                | 5710 (U-NII-2C)         | 0.87                    | 0.91            | 3.90            | -                  | 11.00                              |
|                | 5710 (U-NII-3)          | -0.79                   | -1.70           | 1.79            | -1.22              | 30.00                              |
|                | 5755                    | 0.63                    | 0.04            | 3.35            | 0.34               | 30.00                              |
|                | 5795                    | 0.48                    | -0.04           | 3.24            | 0.23               | 30.00                              |

| Mode           | Channel Frequency (MHz) | Conducted Power Density |                 |                 |                    | Power Density Limit                |
|----------------|-------------------------|-------------------------|-----------------|-----------------|--------------------|------------------------------------|
|                |                         | Ant 1 (dBm/MHz)         | Ant 2 (dBm/MHz) | Total (dBm/MHz) | Total (dBm/500kHz) | B1-B3 (dBm/MHz)<br>B4 (dBm/500kHz) |
| 802.11ac VHT80 | 5210                    | -4.41                   | -4.52           | -1.45           | -                  | 11.00                              |
|                | 5290                    | -3.05                   | -4.30           | -0.62           | -                  | 11.00                              |
|                | 5530                    | -4.54                   | -5.97           | -2.19           | -                  | 11.00                              |
|                | 5610                    | -3.36                   | -5.72           | -1.37           | -                  | 11.00                              |
|                | 5690 (U-NII-2C)         | -1.62                   | -3.71           | 0.47            | -                  | 11.00                              |
|                | 5690 (U-NII-3)          | -2.68                   | -4.82           | -0.61           | -3.62              | 30.00                              |
|                | 5775                    | -4.53                   | -4.18           | -1.34           | -4.35              | 30.00                              |

The formula dBm/MHz and dBm/500kHz is converted equal to Total (dBm/MHz)+10log(500kHz/1MHz).

## Test Plot of NCC Power Density Ant1

802.11a 5180MHz



802.11a 5200MHz



**802.11a 5240MHz**

**802.11a 5260MHz**


### 802.11a 5300MHz



### 802.11a 5320MHz



### 802.11a 5500MHz



### 802.11a 5580MHz



### 802.11a 5700MHz



### 802.11a 5745MHz



**802.11a 5785MHz**

**802.11a 5825MHz**


### 802.11a 5720MHz U-NII-2C



### 802.11a 5720MHz U-NII-3



**802.11ac VHT20 5180MHz**

**802.11ac VHT20 5200MHz**


### 802.11ac VHT20 5240MHz



### 802.11ac VHT20 5260MHz



### 802.11ac VHT20 5300MHz



### 802.11ac VHT20 5320MHz



### 802.11ac VHT20 5500MHz



### 802.11ac VHT20 5580MHz



**802.11ac VHT20 5700MHz**

**802.11ac VHT20 5745MHz**


**802.11ac VHT20 5785MHz**

**802.11ac VHT20 5825MHz**


### 802.11ac VHT20 5720MHz U-NII-2C



### 802.11ac VHT20 5720MHz U-NII-3



**802.11ac VHT40 5190MHz**

**802.11ac VHT40 5230MHz**


### 802.11ac VHT40 5270MHz



### 802.11ac VHT40 5310MHz



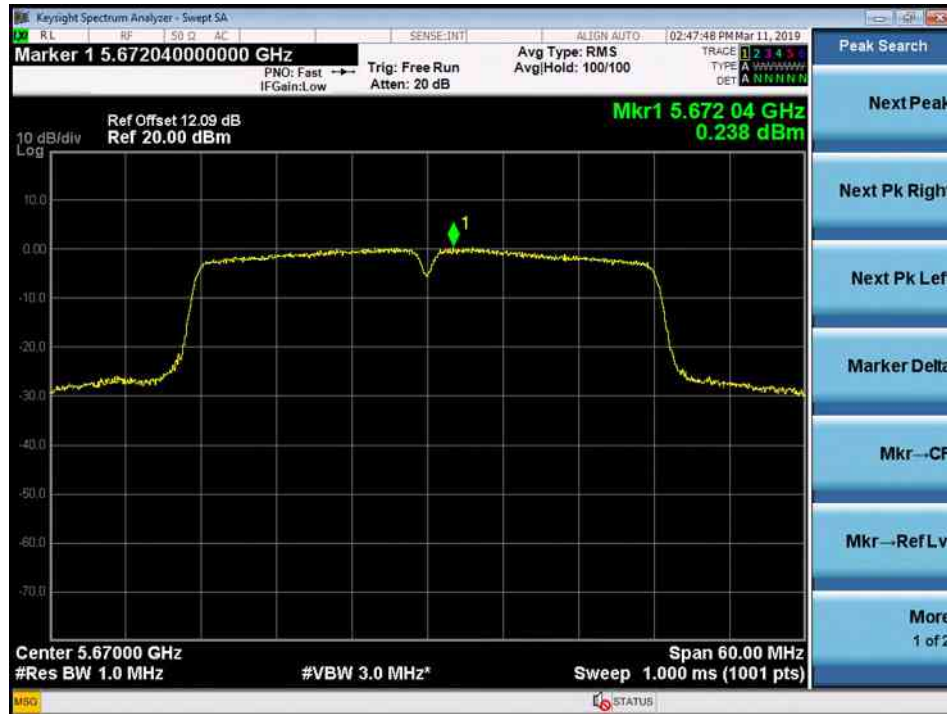
### 802.11ac VHT40 5510MHz



### 802.11ac VHT40 5550MHz



### 802.11ac VHT40 5670MHz



### 802.11ac VHT40 5755MHz



### 802.11ac VHT40 5795MHz



### 802.11ac VHT40 5710MHz U-NII-2C



### 802.11ac VHT40 5710MHz U-NII-3



### 802.11ac VHT80 5210MHz



### 802.11ac VHT80 5290MHz



### 802.11ac VHT80 5530MHz



**802.11ac VHT80 5610MHz**



**802.11ac VHT80 5775MHz**



### 802.11ac VHT80 5690MHz U-NII-2C



### 802.11ac VHT80 5690MHz U-NII-3



## Test Plot of NCC Power Density Ant2

802.11a 5180MHz



802.11a 5200MHz



### 802.11a 5240MHz



### 802.11a 5260MHz



### 802.11a 5300MHz



### 802.11a 5320MHz



### 802.11a 5500MHz



### 802.11a 5580MHz



**802.11a 5700MHz**

**802.11a 5745MHz**


### 802.11a 5785MHz



### 802.11a 5825MHz



**802.11a 5720MHz U-NII-2C**

**802.11a 5720MHz U-NII-3**


**802.11ac VHT20 5180MHz**



**802.11ac VHT20 5200MHz**



### 802.11ac VHT20 5240MHz



### 802.11ac VHT20 5260MHz



**802.11ac VHT20 5300MHz**

**802.11ac VHT20 5320MHz**


**802.11ac VHT20 5500MHz**

**802.11ac VHT20 5580MHz**


**802.11ac VHT20 5700MHz**

**802.11ac VHT20 5745MHz**


**802.11ac VHT20 5785MHz**



**802.11ac VHT20 5825MHz**



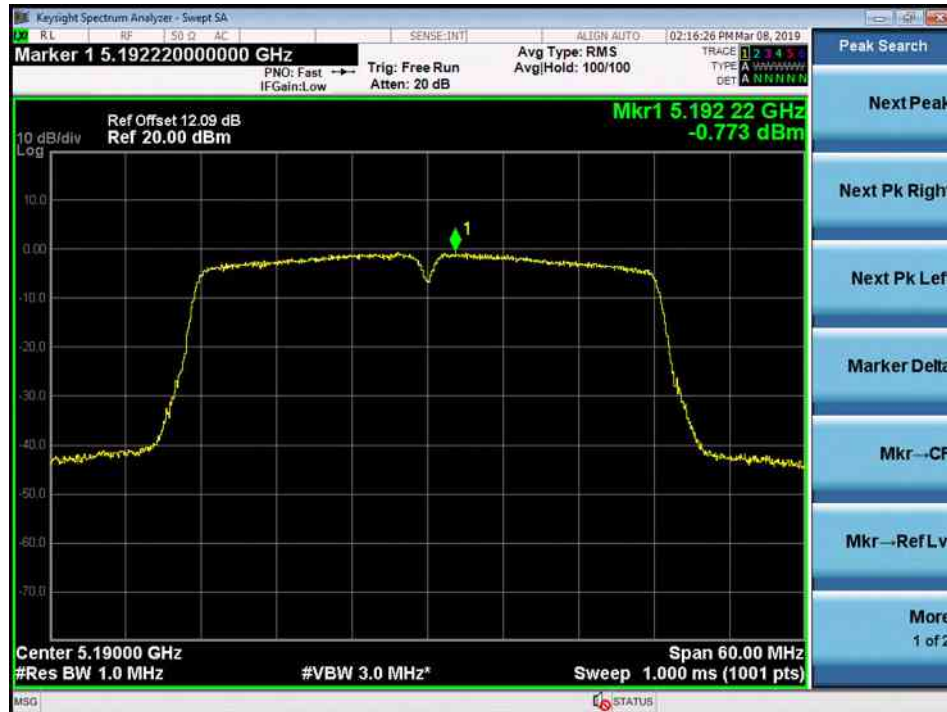
### 802.11ac VHT20 5720MHz U-NII-2C



### 802.11ac VHT20 5720MHz U-NII-3



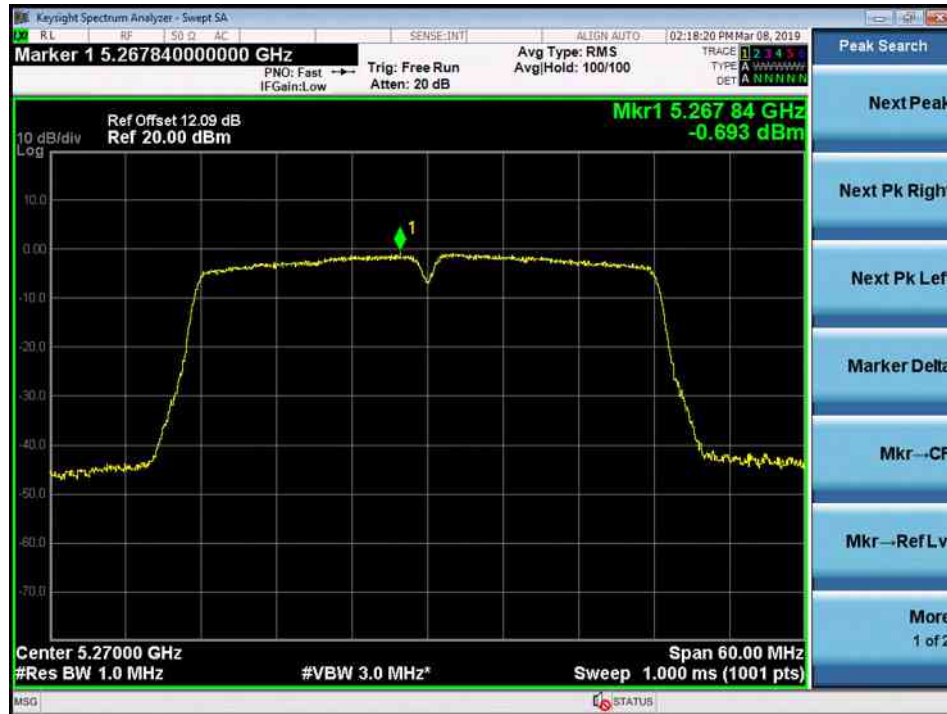
### 802.11ac VHT40 5190MHz



### 802.11ac VHT40 5230MHz



### 802.11ac VHT40 5270MHz



### 802.11ac VHT40 5310MHz



**802.11ac VHT40 5510MHz**



**802.11ac VHT40 5550MHz**



### 802.11ac VHT40 5670MHz



### 802.11ac VHT40 5755MHz



### 802.11ac VHT40 5795MHz



### 802.11ac VHT40 5710MHz U-NII-2C



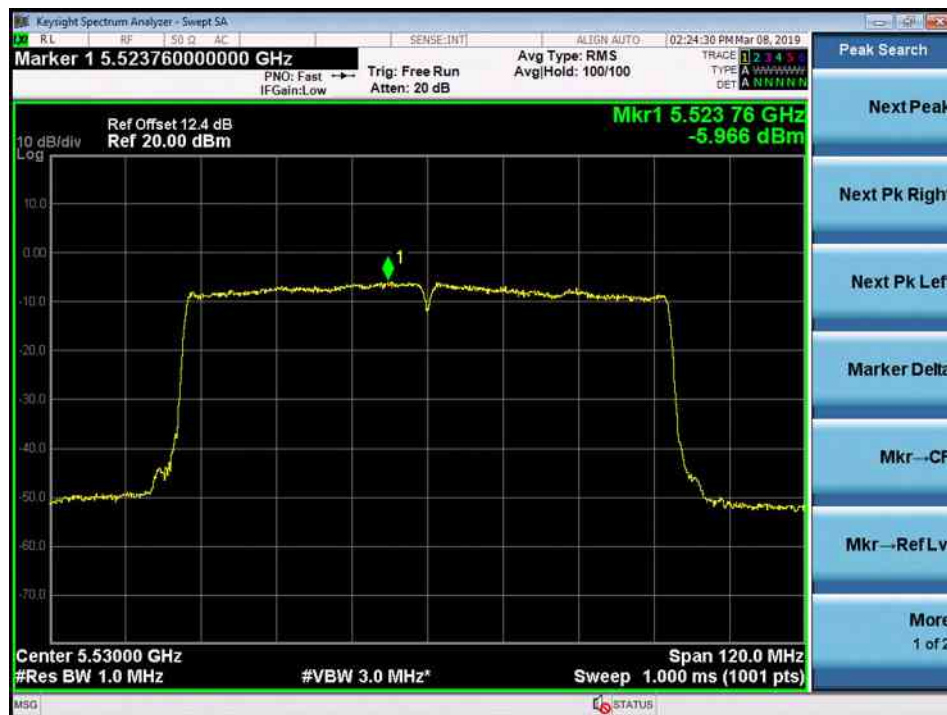
### 802.11ac VHT40 5710MHz U-NII-3



### 802.11ac VHT80 5210MHz



**802.11ac VHT80 5290MHz**

**802.11ac VHT80 5530MHz**


**802.11ac VHT80 5610MHz**

**802.11ac VHT80 5775MHz**


### 802.11ac VHT80 5690MHz U-NII-2C



### 802.11ac VHT80 5690MHz U-NII-3



### 5.1.7 Spurious Emission

**RESULT:****Passed**

Test standard : LP0002(2018): 4.7.4  
Basic standard : ANSI C63.10: 2013  
Limits : Radiated emissions which fall in the restricted bands, as defined in LP0002(2018): 2.7 , must comply with the radiated emission limits specified in LP0002(2018): 2.8

Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in LP0002(2018): 2.8

Kind of test site : 3m Semi-Anechoic Chamber

**Test setup**

Test Channel : Refer to Appendix D  
Operation mode : A,B

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

Testing was carried out within frequency range 9kHz to the tenth harmonic. For details refer to Appendix D. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report.

## 5.1.8 Dynamic Frequency Selection

**RESULT:**
**Passed**

Test standard : NCC LP0002(2018): 4.7.7.2  
 Basic standard : ANSI C63.10:2013  
 Kind of test site : Shielded room

**Test setup**

Test Channel : 80M, 5290MHz, 5530MHz  
 Operation Mode : C

Requirement :

| Requirement                              | Operational Mode                             |                                |
|------------------------------------------|----------------------------------------------|--------------------------------|
|                                          | Master Device or Client with Radar Detection | Client Without Radar Detection |
| <i>DFS Detection Threshold</i>           | Yes                                          | Not required                   |
| <i>Channel Closing Transmission Time</i> | Yes                                          | Yes                            |
| <i>Channel Move Time</i>                 | Yes                                          | Yes                            |
| <i>U-NII Detection Bandwidth</i>         | Yes                                          | Not required                   |

| Additional requirements for devices with multiple bandwidth modes  | Master Device or Client with Radar Detection | Client Without Radar Detection                       |
|--------------------------------------------------------------------|----------------------------------------------|------------------------------------------------------|
| <i>U-NII Detection Bandwidth and Statistical Performance Check</i> | All BW modes must be tested                  | Not required                                         |
| <i>Channel Move Time and Channel Closing Transmission Time</i>     | Test using widest BW mode available          | Test using the widest BW mode available for the link |
| <i>All other tests</i>                                             | Any single BW mode                           | Not required                                         |

**Note:** Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

Limit :

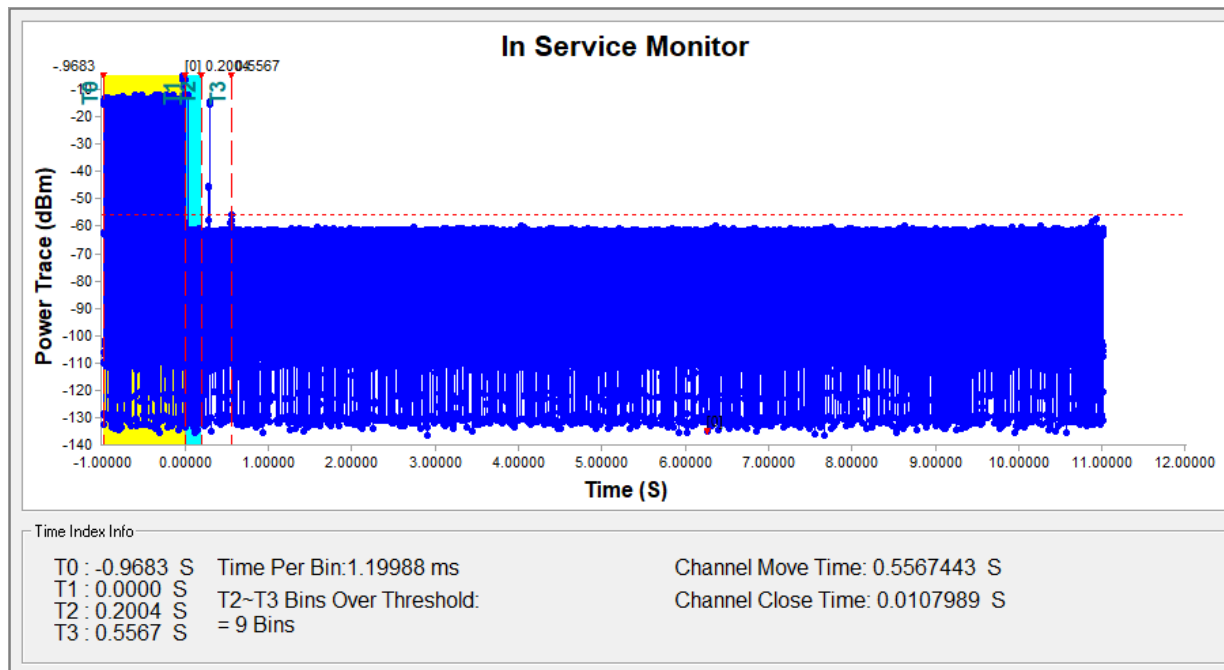
| Parameter                                | Value                                                                                                     |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| <i>Non-occupancy period</i>              | Minimum 30 minutes                                                                                        |
| <i>Channel Availability Check Time</i>   | 60 seconds                                                                                                |
| <i>Channel Move Time</i>                 | 10 seconds<br>See Note 1.                                                                                 |
| <i>Channel Closing Transmission Time</i> | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period.<br>See Notes 1 and 2. |
| <i>U-NII Detection Bandwidth</i>         | Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.                                   |

**Note 1:** *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

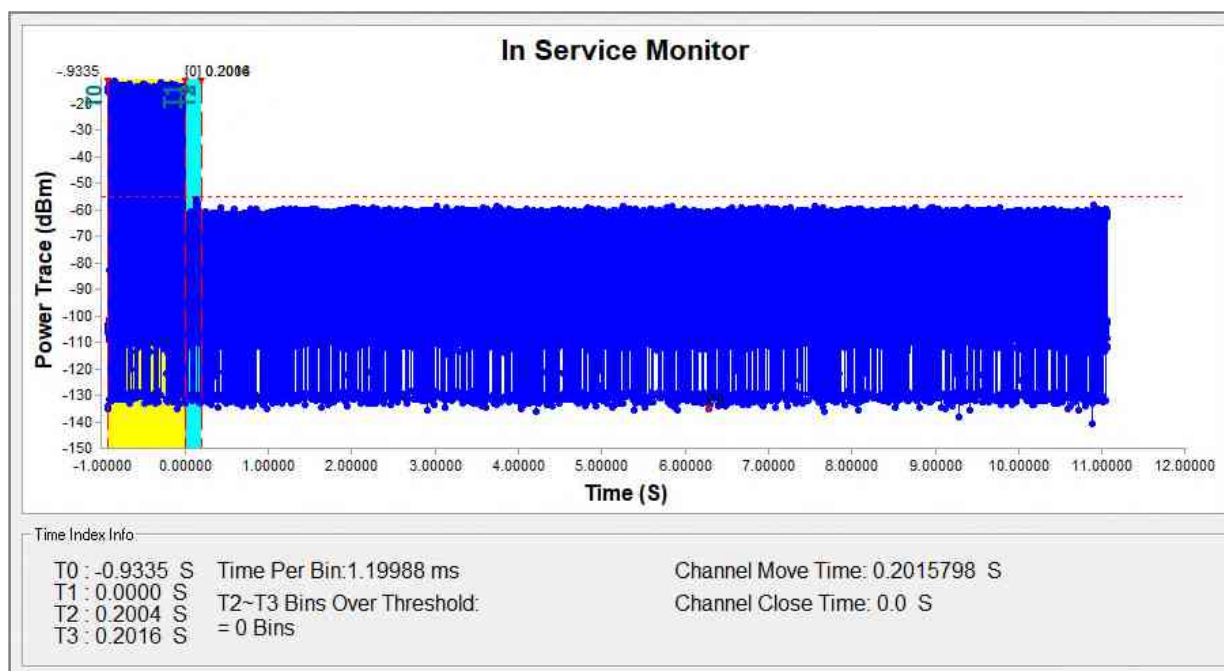
**Note 2:** The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

**Note 3:** During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

## Test Plot of Bandwidth 80M 5290MHz DFS Result



## Test Plot of Bandwidth 80M 5530MHz DFS Result



## 5.2 Mains Emissions

### 5.2.1 Mains Conducted Emissions

**RESULT:****Passed**

|                   |   |                                                                                                                             |
|-------------------|---|-----------------------------------------------------------------------------------------------------------------------------|
| Test standard     | : | LP0002(2018): 2.3                                                                                                           |
| Limits            | : | Mains Conducted emissions as defined in above test standards must comply with the mains conducted emission limits specified |
| Kind of test site | : | Shielded Room                                                                                                               |

**Test setup**

|                      |   |                     |
|----------------------|---|---------------------|
| Test Channel         | : | Refer to Appendix D |
| Operation mode       | : | A                   |
| Ambient temperature  | : | 20-24°C             |
| Relative humidity    | : | 50-65%              |
| Atmospheric pressure | : | 100-103 kPa         |

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

Remark: For details refer to Appendix D.

## 6. Safety Human exposure

### 6.1 Radio Frequency Exposure Compliance

#### 6.1.1 Electromagnetic Fields

**RESULT:****Passed**

Test standard : NCC LP0002(2018): 5.20.2.2

Separation distance is more than 20 cm, thus mobile device exposure limits can be applied.

**NCC Maximum Exposure:**

| Mode           | Frequency (MHz) | Antenna Gain (dBi) | Antenna Gain (numeric) | Maximum Output Power (dBm) | Output Power (mW) | Power Density (S)(mW/cm <sup>2</sup> ) | Test Result |
|----------------|-----------------|--------------------|------------------------|----------------------------|-------------------|----------------------------------------|-------------|
| 802.11ac VHT20 | 5260            | 2.86               | 1.9320                 | 16.92                      | 49.21             | 0.018925                               | Pass        |

**Limit NCC: 1500-100,000 MHz 1.0 mW/cm<sup>2</sup>**

## 7. Photographs of the Test Set-Up

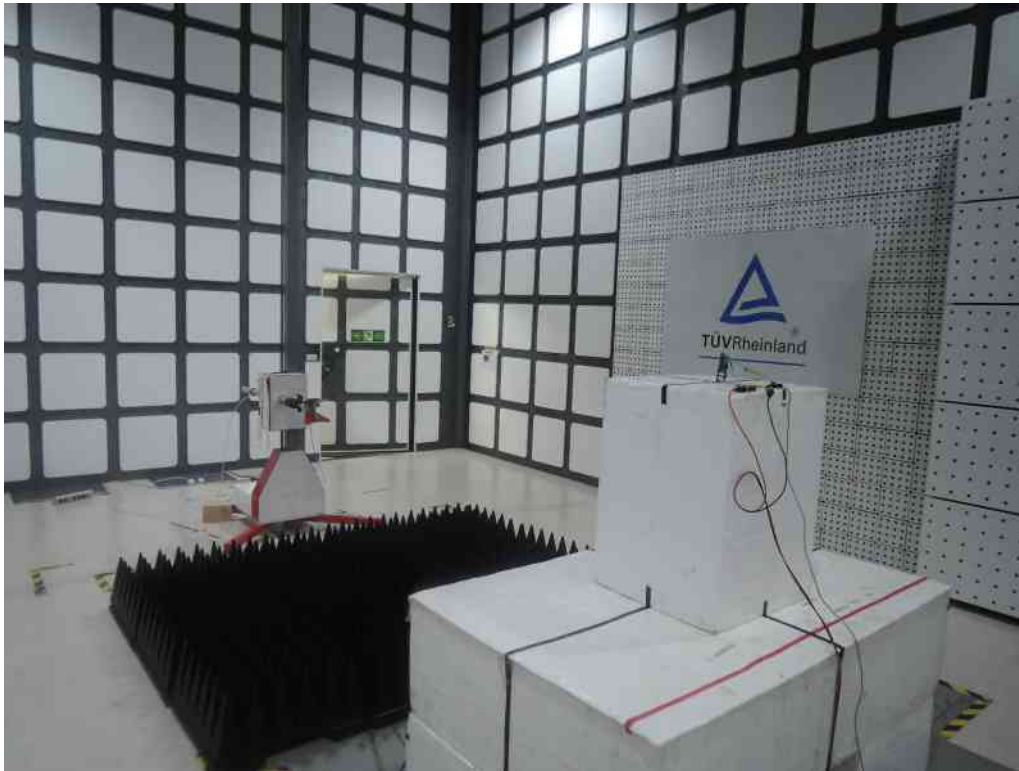
**Photograph 1: Set-up for Spurious Emissions (Front View)**



**Photograph 2: Set-up for Spurious Emissions (Back View 1)**



**Photograph 3: Set-up for Spurious Emissions (Back View 2)**



**Photograph 4: Set-up for Conducted testing**



**Photograph 5: Set-up for AC Mains (Front)**



**Photograph 6: Set-up for AC Mains (Back)**



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