



# TEST REPORT

**Test Report No. : UL-RPT-RP-11909763-3216-FCC-UNII1**

**Applicant** : SIEMENS AG  
**Model No.** : MPCIE-R1-ABGNAC-U4  
**FCC ID** : LYHRAPACV1  
**Technology** : WLAN 5 GHz  
**Test Standard(s)** : FCC Parts 15.207, 15.209(a) & 15.407

For details of applied tests refer to test result summary

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2. The results in this report apply only to the sample tested.
3. The test results in this report are traceable to the national or international standards.
4. Test Report Version 1.0
5. Result of the tested sample: **PASS**

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Date: 16 January 2020

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Date: 16 January 2020



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D-PL-19381-02-00

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## **1. Customer Information**

### **1.1.Applicant Information**

|                                |                                                        |
|--------------------------------|--------------------------------------------------------|
| <b>Company Name:</b>           | SIEMENS AG                                             |
| <b>Company Address:</b>        | Östliche Rheinbrückenstr. 50, 76187 Karlsruhe, Germany |
| <b>Contact Person:</b>         | Dr. Malgorzata Janson                                  |
| <b>Contact E-Mail Address:</b> | malgorzata.janson@siemens.com                          |
| <b>Contact Phone No.:</b>      | + 49 721 595 2606                                      |

### **1.2.Manufacturer Information**

|                                |                           |
|--------------------------------|---------------------------|
| <b>Company Name:</b>           | SIEMENS AG                |
| <b>Company Address:</b>        | 76181 Karlsruhe, Germany  |
| <b>Contact Person:</b>         | Mr. Kilian Löser          |
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| <b>Contact Phone No.:</b>      | +49 911 895-5363          |

## **2. Summary of Testing**

### **2.1. General Information**

#### **Applied Standards**

|                                 |                                                                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Specification Reference:</b> | 47CFR15.407 and 47CFR15.403                                                                                                                                               |
| <b>Specification Title:</b>     | Code of Federal Regulations Volume 47 (Telecommunications):<br>Part 15 Subpart E (Unlicensed National Information Infrastructure Devices) –<br>Sections 15.403 and 15.407 |
| <b>Specification Reference:</b> | 47CFR15.207 and 47CFR15.209                                                                                                                                               |
| <b>Specification Title:</b>     | Code of Federal Regulations Volume 47 (Telecommunications):<br>Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209                                     |
| <b>Test Firm Registration:</b>  | 399704                                                                                                                                                                    |

#### **Location**

|                             |                                                                                    |
|-----------------------------|------------------------------------------------------------------------------------|
| <b>Location of Testing:</b> | UL International Germany GmbH<br>Hedelfinger Str. 61<br>70327 Stuttgart<br>Germany |
|-----------------------------|------------------------------------------------------------------------------------|

#### **Date information**

|                      |                                     |
|----------------------|-------------------------------------|
| <b>Order Date:</b>   | 26 September 2017                   |
| <b>EUT arrived:</b>  | 26 January 2018                     |
| <b>Test Dates:</b>   | 07 November 2018 to 21 October 2019 |
| <b>EUT returned:</b> | -/-                                 |

## 2.2. Summary of Test Results

| Clause                   | Measurement (5.15-5.25 GHz band)                                  | Complied                            | Did not comply           | Not performed            | Not applicable                      |
|--------------------------|-------------------------------------------------------------------|-------------------------------------|--------------------------|--------------------------|-------------------------------------|
| Part 15.207              | Transmitter AC Conducted Emissions                                | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Part 15.403(i)           | Transmitter 26 dB Emission Bandwidth                              | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Part 15.35(c)            | Transmitter Duty Cycle                                            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Part 15.407(a)(1)(iv)    | Transmitter Maximum Conducted Output Power                        | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Part 15.407(a)(1)(iv)    | Transmitter Peak Power Spectral Density                           | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Part 15.407(b)/15.209(a) | Transmitter Out of Band Radiated Emissions                        | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Part 15.407(b)/15.209(a) | Transmitter Band Edge Radiated Emissions                          | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Part 15.407(g)           | Transmitter Frequency Stability (Temperature & Voltage Variation) | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Part 15.407(h)(1)        | Transmitter Power Control                                         | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

### Note:

- As per applicant's user manual Frequency stability is better than 20 ppm which ensures that the signal remains in the allocated bands under all operational conditions stated in the user manual.

## 2.3. Methods and Procedures

|            |                                                                                                                          |
|------------|--------------------------------------------------------------------------------------------------------------------------|
| Reference: | ANSI C63.10-2013                                                                                                         |
| Title:     | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices                           |
| Reference: | KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 December 14, 2017                                          |
| Title:     | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E |
| Reference: | KDB 662911 D01 Multiple Transmitter Output v02r01 October 31, 2013                                                       |
| Title:     | Emissions Testing of Transmitters with Multiple Outputs in the Same Band                                                 |
| Reference: | KDB 174176 D01 Line Conducted FAQ v01r01 June 3, 2015                                                                    |
| Title:     | AC Power-Line Conducted Emissions Frequently Asked Questions                                                             |

## 2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

### **3. Equipment Under Test (EUT)**

#### **3.1. Identification of Equipment Under Test (EUT)**

|                          |                                     |
|--------------------------|-------------------------------------|
| Brand Name:              | SIEMENS                             |
| Model Name or Number:    | MPCIE-R1-ABGNAC-U4                  |
| Model Type:              | A5E36528526                         |
| Serial/ Fixed IP Number: | 192.168.0.80 (Radiated Test Sample) |
| Hardware Version Number: | 1                                   |
| Software Version Number: | T01.00.00                           |
| FCC ID :                 | LYHRAPACV1                          |

|                          |                                      |
|--------------------------|--------------------------------------|
| Brand Name:              | SIEMENS                              |
| Model Name or Number:    | MPCIE-R1-ABGNAC-U4                   |
| Model Type:              | A5E36528526                          |
| Serial/ Fixed IP Number: | 192.168.0.60 (Conducted Test Sample) |
| Hardware Version Number: | 1                                    |
| Software Version Number: | T01.00.00                            |
| FCC ID:                  | LYHRAPACV1                           |

#### **3.2. Description of EUT**

The equipment under test was a 4 X 4 MIMO radio module supporting WLAN 2.4 GHz & WLAN 5 GHz technologies.

#### **3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

**3.4. Additional Information Related to Testing**

|                                                    |                                       |                                                                                                                                                  |                         |
|----------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Technology Tested:                                 | WLAN (IEEE 802.11a,n, ac)             |                                                                                                                                                  |                         |
| Type of Unit:                                      | Transceiver                           |                                                                                                                                                  |                         |
| Test Evaluation Board Power Supply Requirement(s): | Nominal                               | 24.0 V DC                                                                                                                                        |                         |
|                                                    | Minimum                               | 16.8 V DC                                                                                                                                        |                         |
|                                                    | Maximum                               | 31.2 V DC                                                                                                                                        |                         |
| EUT Power Supply Requirement(s):                   | Power Range                           | 3.3 V DC ± 5 %                                                                                                                                   | 520 mA                  |
|                                                    | Power Range                           | 5.0 V DC ± 5 %                                                                                                                                   | 700 mA                  |
| Supported Modulation Types:                        | BPSK, QPSK, 16QAM, 64QAM, 256QAM      |                                                                                                                                                  |                         |
| Supported Data rates:                              | 802.11a                               | 6, 9, 12, 18, 24, 36 ,48 & 54 Mbit/s (SISO or MIMO)                                                                                              |                         |
|                                                    | 802.11n HT20                          | MCS0 to MCS7 (1 spatial stream)<br>MCS8 to MCS15 (2 spatial streams)<br>MCS16 to MCS23 (3 spatial streams)<br>MCS24 to MCS31 (4 spatial streams) |                         |
|                                                    | 802.11n HT40                          | MCS0 to MCS7 (1 spatial stream)<br>MCS8 to MCS15 (2 spatial streams)<br>MCS16 to MCS23 (3 spatial streams)<br>MCS24 to MCS31 (4 spatial streams) |                         |
|                                                    | 802.11ac HT20                         | MCS0 to MCS8 (up to 4 spatial streams)                                                                                                           |                         |
|                                                    | 802.11ac HT40                         | MCS0 to MCS9 (up to 4 spatial streams)                                                                                                           |                         |
|                                                    | 802.11ac HT80                         | MCS0 to MCS9 (up to 4 spatial streams)                                                                                                           |                         |
| Antenna Gains:                                     | Refer section 3.5 Antenna Information |                                                                                                                                                  |                         |
| Maximum Conducted Output Power:                    | 20 MHz                                | 17.6 dBm                                                                                                                                         |                         |
|                                                    | 40 MHz                                | 17.1 dBm                                                                                                                                         |                         |
|                                                    | 80 MHz                                | 15.9 dBm                                                                                                                                         |                         |
| Transceiver Frequency Band:                        | 5150 MHz to 5250 MHz [U-NII-1 Band]   |                                                                                                                                                  |                         |
| Nominal Channel Bandwidth                          | 20 MHz                                |                                                                                                                                                  |                         |
| Transmit Channels Tested:                          | Channel ID                            | Channel Number                                                                                                                                   | Channel Frequency (MHz) |
|                                                    | Bottom                                | 36                                                                                                                                               | 5180                    |
|                                                    | Bottom +1                             | 40                                                                                                                                               | 5200                    |
|                                                    | Middle / Top -1                       | 44                                                                                                                                               | 5220                    |
|                                                    | Top                                   | 48                                                                                                                                               | 5240                    |
| Nominal Channel Bandwidth                          | 40 MHz                                |                                                                                                                                                  |                         |
| Transmit Channels Tested:                          | Bottom                                | 38                                                                                                                                               | 5190                    |
|                                                    | Top                                   | 46                                                                                                                                               | 5230                    |
| Nominal Channel Bandwidth                          | 80 MHz                                |                                                                                                                                                  |                         |
| Transmit Channels Tested:                          | Single                                | 42                                                                                                                                               | 5210                    |

### 3.5. Antenna Information

Antenna types with highest antenna gains amongst their supported radiation patterns were used for the EUT testing:

|                                     |                     |
|-------------------------------------|---------------------|
| <b>Antenna Group:</b>               | 8 dBi Antenna Group |
| <b>Antenna Radiation Type:</b>      | Omni Directional    |
| <b>Antenna Model Number:</b>        | ANT795-6MN          |
| <b>Antenna Gain:</b>                | 8 dBi @ 5 GHz       |
| <b>Antenna Beamwidth:</b>           | 150°                |
| <b>Antenna Connector Type:</b>      | N                   |
| <b>Manufacturer Article Number:</b> | 6GK5795-6MN10-0AA6  |
| <b>Batch Number:</b>                | 1000744236          |

|                                     |                     |
|-------------------------------------|---------------------|
| <b>Antenna Group:</b>               | 9 dBi Antenna Group |
| <b>Antenna Radiation Type:</b>      | Sector              |
| <b>Antenna Model Number:</b>        | ANT795-6DC          |
| <b>Antenna Gain:</b>                | 9 dBi @ 5 GHz       |
| <b>Antenna Beamwidth:</b>           | 55°H / 55°V         |
| <b>Antenna Connector Type:</b>      | N                   |
| <b>Manufacturer Article Number:</b> | 6GK5795-6DC00-0AA0  |
| <b>Batch Number:</b>                | 006.707039          |

|                                     |                      |
|-------------------------------------|----------------------|
| <b>Antenna Group:</b>               | 23 dBi Antenna Group |
| <b>Antenna Radiation Type:</b>      | Directed             |
| <b>Antenna Model Number:</b>        | ANT793-8DK           |
| <b>Antenna Gain:</b>                | 23 dBi @ 5 GHz       |
| <b>Antenna Cable Loss:</b>          | 8.8 dB @ 5 GHz       |
| <b>Effective Antenna Gain:</b>      | 14.2 dBi @ 5 GHz     |
| <b>Antenna Beamwidth:</b>           | 9° H / 9° V          |
| <b>Antenna Connector Type:</b>      | N                    |
| <b>Manufacturer Article Number:</b> | 6GK5793-8DK00-0AA0   |
| <b>Batch Number:</b>                | 02 722467            |

### 3.6. Support Equipment

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

#### A. Support Equipment (In-house)

| Item | Description                        | Brand Name          | Model Name or Number | Serial Number   |
|------|------------------------------------|---------------------|----------------------|-----------------|
| 1    | Laptop                             | Lenovo              | L560                 | MP-16X73B 16/11 |
| 2    | Lab DC Power Supply                | Conrad Electronic   | PS-2403D             | Not stated      |
| 3    | Lab Voltage Rectifier Power Supply | Spitzenberger Spies | PAS 5000             | A2464 00/2 0200 |

#### B. Support Equipment (Manufacturer supplied)

| Item | Description                                                                                                                 | Brand Name                           | Model Name or Number                            | Serial Number |
|------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------------------------------|---------------|
| 1    | DC Power Supply Cable<br>(Length: 2 m   Quantity: 2 Pcs)                                                                    | --                                   | Standard 2 wire cable                           | --            |
| 2    | M12- RJ45 Ethernet Cable<br>(Length: 2 m   Quantity: 2 Pcs)                                                                 | SIEMENS                              | LEONI L INDUSTRIAL ETHERNET FLEXIBLE 6XV1870-2E | --            |
| 3    | N-N Connector Antenna Cable<br>(Length: 10 m   Quantity: 4 Pcs)                                                             | SIEMENS<br>Simatic Net Antenna Cable | 6XV1875-5AN10 J39                               | --            |
| 4    | Test Evaluation Board<br>(Quantity: 2 Pcs)                                                                                  | SIEMENS                              | A5E36374290-AE GTW 18 94V-0                     | --            |
| 5    | UMCC- N Connector Cable<br>(Length: 0.25 m   Quantity: 4 Pcs)                                                               | SIEMENS                              | --                                              | --            |
| 6    | N Connector-50 $\Omega$ Terminations<br>(Quantity: 4 Pcs)                                                                   | SIEMENS                              | --                                              | --            |
| 7    | SIMATIC PS 307 Power Supply<br>(Input: AC 120 /230 V   2.3 /1.2 A   50-60 Hz)<br>(Output: DC 24 V  5 A)   (Quantity: 1 Pcs) | SIEMENS                              | 6ES7307-1EA01-0AA0                              | YSU/HO 165357 |

## 4. Operation and Monitoring of the EUT during Testing

### 4.1. Operating Modes

The EUT was tested in the following operating mode(s):

☒ **Continuously transmitting modulated carrier with combination of**

- **Maximum Power Settings** [refer section 4.3]
- **Test Channels** [refer section 3.4 ]
- **Worst Case\* SISO and MIMO modes :**
  - o 802.11a: 6 Mbit/s / SISO Mode
  - o 802.11n HT20: MCS0 / SISO Mode
  - o 802.11n HT40: MCS0 / SISO Mode
  - o 802.11ac HT20: MCS0 / SISO Mode
  - o 802.11ac HT40: MCS0 / SISO Mode
  - o 802.11ac HT80: MCS0 / SISO Mode
  - o 802.11a: 6 Mbit/s / MIMO Modes
  - o 802.11n HT20: MCS0 / MIMO Modes
  - o 802.11n HT40: MCS0 / MIMO Modes
  - o 802.11ac HT20: MCS0 / MIMO Modes
  - o 802.11ac HT40: MCS0 / MIMO Modes
  - o 802.11ac HT80: MCS0 / MIMO Modes

\*Multiple supported modulation schemes, nominal channel bandwidths and SISO/MIMO configurations were initially investigated to determine the above mentioned worst case data rates.

## **4.2. Configuration and Peripherals**

The EUT was tested in the following configuration(s):

- **EUT Power Supply:**

- o For AC Conducted measurement EUT(the radio module) was mounted on Test Evaluation Board. Using Siemens SIMATIC PS 307 Power Supply, 24 V DC was supplied to this board; which in turn supplying 3.3 V DC to EUT.
- o For all conducted measurements EUT(the radio module) was mounted on Test Evaluation Board. Using Lab DC Power Supply 24 V DC was supplied to this board; which in turn supplying 3.3 V DC to EUT.
- o For all radiated measurements EUT(the radio module) was mounted on Test Evaluation Board. Using Lab Voltage Rectifier Power Supply 24 V DC was supplied to this board; which in turn supplying 3.3 V DC to EUT.

- **Test Mode Activation:**

- o For continuous transmit tests the EUT was controlled using the chipset manufacturers 'cli' console over tera-term and putty. This was run from within the terminal application on the EUT. The application was used to enable continuous transmission mode and to select the test channels, data rates and modulation schemes as required.

- **Worst Case Mode Determination:**

- o Multiple supported modulation schemes, nominal channel bandwidths and SISO+MIMO Modes configurations were initially investigated to determine worst case modes.
- o The data rates that produced worst case results for each 802.11 mode (a/n/ac) were then used for measurements presented in this report.

- **Conducted Measurements:**

- o RF Output Power, Power Spectral Density measured separately on each Port with all supported SISO & MIMO Port combinations.
- o For Occupied Channel Bandwidth & Duty Cycles were computed with worst case SISO mode; as they found to be independent of number of transmitter chains used.
- o Conducted spurious emissions measurements were performed with SISO Mode; as this port was found to have the worst case in terms of power settings amongst all supported possible SISO & MIMO Port combinations.

- **AC Conducted Emissions Measurements:**

- o AC conducted tests were performed with all listed Antenna Groups with MIMO Port 1+2+3+4, employing maximum possible Antennas.
- o The Toyo EMI Software EP5/CE Ver 4.0.1. was used for these measurements.

- **Radiated Band Edge Measurements:**

- o Radiated Band edge emissions were performed with Antenna types listed in section 3.5 with all possible MIMO Port combinations.
- o Radiated Band edge emissions were performed with the EUT & Antennas in the orientation simulating the worst case spurious emissions.

- **Radiated Cabinet Emission Measurements:**

- o Transmitter cabinet radiated emissions were performed by terminating EUT's all 4-MIMO Ports with 50  $\Omega$  (proper impedance matching) and with maximum supported power settings amongst all supported SISO & MIMO Port combinations as well as amongst listed Antenna types.
- o EMC32 V10.1.0 Software & Toyo EP5/RE Ver 4.0.1 were used for these measurements.

- **Applicable to all Tests:**

- o For all the measurements and Antennas beam forming gain of 0 dBi have been assumed.
- o All the supplied antennas listed in section 3.5 have been tested with power settings in section 4.3.
- o During testing unused EUT ports were terminated as listed in section 4.3.

### 4.3. Used Power Settings & Port Terminations

The EUT was configured with following GUI Power Settings (PWL) & test channels for 8 dBi Antenna configurations.

| 5150 MHz to 5250 MHz [U-NII-1 Band]                      |        |    |    |    |        |    |        |
|----------------------------------------------------------|--------|----|----|----|--------|----|--------|
| 8 dBi Antenna Group                                      |        |    |    |    |        |    |        |
| SISO Port 1 (Note 1)                                     |        |    |    |    |        |    |        |
| Nominal Channel Bandwidth                                | 20 MHz |    |    |    | 40 MHz |    |        |
| Test Channel                                             | 36     | 40 | 44 | 48 |        |    |        |
| a-mode: 6 Mbit                                           | 15     | 18 | 18 | 18 | 38     | 46 | 80 MHz |
| n-mode : MCS0                                            | 15     | 18 | 18 | 18 | 15     | 15 | 42     |
| ac-mode: MCS0                                            | 15     | 18 | 18 | 18 | 15     | 15 | 15     |
| Note 1: Unused Ports 2,3 & 4 Terminated with 50 $\Omega$ |        |    |    |    |        |    |        |
| MIMO Port 1+2 (Note 2)                                   |        |    |    |    |        |    |        |
| Nominal Channel Bandwidth                                | 20 MHz |    |    |    | 40 MHz |    |        |
| Test Channel                                             | 36     | 40 | 44 | 48 |        |    |        |
| a-mode: 6 Mbit                                           | 16     | 17 | 17 | 17 | 38     | 46 | 80 MHz |
| n-mode : MCS0                                            | 16     | 17 | 17 | 17 | 18     | 18 | 42     |
| ac-mode: MCS0                                            | 16     | 17 | 17 | 17 | 18     | 18 | 18     |
| Note 2: Unused Ports 3 & 4 Terminated with 50 $\Omega$   |        |    |    |    |        |    |        |
| MIMO Port 1+2+3 (Note 3)                                 |        |    |    |    |        |    |        |
| Nominal Channel Bandwidth                                | 20 MHz |    |    |    | 40 MHz |    |        |
| Test Channel                                             | 36     | 40 | 44 | 48 |        |    |        |
| a-mode: 6 Mbit                                           | 13     | 15 | 15 | 15 | 38     | 46 | 80 MHz |
| n-mode : MCS0                                            | 13     | 15 | 15 | 15 | 14     | 14 | 42     |
| ac-mode: MCS0                                            | 13     | 15 | 15 | 15 | 14     | 14 | 14     |
| Note 3: Unused Port 4 Terminated with 50 $\Omega$        |        |    |    |    |        |    |        |
| MIMO Port 1+2+3+4 (Note 4)                               |        |    |    |    |        |    |        |
| Nominal Channel Bandwidth                                | 20 MHz |    |    |    | 40 MHz |    |        |
| Test Channel                                             | 36     | 40 | 44 | 48 |        |    |        |
| a-mode: 6 Mbit                                           | 13     | 14 | 14 | 14 | 38     | 46 | 80 MHz |
| n-mode : MCS0                                            | 13     | 14 | 14 | 14 | 15     | 15 | 42     |
| ac-mode: MCS0                                            | 13     | 14 | 14 | 14 | 15     | 15 | 15     |
| Note 4: None of the Port was Terminated with 50 $\Omega$ |        |    |    |    |        |    |        |

The EUT was configured with following GUI Power Settings (PWL) & test channels for 9 dBi Antenna configurations.

| 5150 MHz to 5250 MHz [U-NII-1 Band]                        |        |       |    |    |        |    |        |
|------------------------------------------------------------|--------|-------|----|----|--------|----|--------|
| 9 dBi Antenna Group                                        |        |       |    |    |        |    |        |
| SISO Port 1 (Note 1)                                       |        |       |    |    |        |    |        |
| Nominal Channel Bandwidth                                  | 20 MHz |       |    |    |        |    |        |
| Test Channel                                               | 36     | 40    | 44 | 48 | 40 MHz |    |        |
| a-mode: 6 Mbit                                             | 12     | 17    | 17 | 17 | 38     | 46 | 80 MHz |
| n-mode : MCS0                                              | 12     | 17    | 17 | 17 | 12     | 12 | 42     |
| ac-mode: MCS0                                              | 12     | 17    | 17 | 17 | 12     | 12 | 12     |
| Note 1: Unused Ports 2,3 & 4 Terminated with 50 $\Omega$   |        |       |    |    |        |    |        |
| MIMO Port 1+2 (Note 2)                                     |        |       |    |    |        |    |        |
| Nominal Channel Bandwidth                                  | 20 MHz |       |    |    |        |    |        |
| Test Channel                                               | 36     | 40    | 44 | 48 | 40 MHz |    |        |
| a-mode: 6 Mbit                                             | 10     | 16    | 16 | 16 | 38     | 46 | 80 MHz |
| n-mode : MCS0                                              | 10     | 16    | 16 | 16 | 12     | 12 | 42     |
| ac-mode: MCS0                                              | 10     | 16    | 16 | 16 | 12     | 12 | 12     |
| Note 2: Unused Ports 3 & 4 Terminated with 50 $\Omega$     |        |       |    |    |        |    |        |
| MIMO Port 1+2+3 (Note 3)                                   |        |       |    |    |        |    |        |
| Nominal Channel Bandwidth                                  | 20 MHz |       |    |    |        |    |        |
| Test Channel                                               | 36     | 40    | 44 | 48 | 40 MHz |    |        |
| a-mode: 6 Mbit                                             | 12     | 14    | 14 | 14 | 38     | 46 | 80 MHz |
| n-mode : MCS0                                              | 12     | 14    | 14 | 14 | 13     | 13 | 42     |
| ac-mode: MCS0                                              | 12     | 14    | 14 | 14 | 13     | 13 | 13     |
| Note 3: Unused Port 4 Terminated with 50 $\Omega$          |        |       |    |    |        |    |        |
| MIMO Port 1+2+3+4 (Note 4)                                 |        |       |    |    |        |    |        |
| Nominal Channel Bandwidth                                  | 20 MHz |       |    |    |        |    |        |
| Test Channel                                               | 36     | 40    | 44 | 48 | 40 MHz |    |        |
| a-mode: 6 Mbit                                             | 11     | N/T** | 11 | 11 | 38     | 46 | 80 MHz |
| n-mode : MCS0                                              | 11     | N/T** | 11 | 11 | 15     | 15 | 42     |
| ac-mode: MCS0                                              | 11     | N/T** | 11 | 11 | 15     | 15 | 15     |
| Note 4: None of the Port was Terminated with 50 $\Omega$   |        |       |    |    |        |    |        |
| N/T** : CH40 not tested as it has same PWL as that of CH36 |        |       |    |    |        |    |        |

The EUT was configured with following GUI Power Settings (PWL) & test channels for 23 dBi Antenna configurations.

| 5150 MHz to 5250 MHz [U-NII-1 Band]                        |        |       |    |    |        |    |        |
|------------------------------------------------------------|--------|-------|----|----|--------|----|--------|
| 23 dBi Antenna Group                                       |        |       |    |    |        |    |        |
| SISO Port 1 (Note 1)                                       |        |       |    |    |        |    |        |
| Nominal Channel Bandwidth                                  | 20 MHz |       |    |    |        |    |        |
| Test Channel                                               | 36     | 40    | 44 | 48 | 40 MHz |    |        |
| a-mode: 6 Mbit                                             | 7      | 13    | 13 | 13 | 38     | 46 | 80 MHz |
| n-mode : MCS0                                              | 7      | 13    | 13 | 13 | 13     | 13 | 42     |
| ac-mode: MCS0                                              | 7      | 13    | 13 | 13 | 13     | 13 | 7      |
| Note 1: Unused Ports 2,3 & 4 Terminated with 50 Ω          |        |       |    |    |        |    |        |
| MIMO Port 1+2 (Note 2)                                     |        |       |    |    |        |    |        |
| Nominal Channel Bandwidth                                  | 20 MHz |       |    |    |        |    |        |
| Test Channel                                               | 36     | 40    | 44 | 48 | 40 MHz |    |        |
| a-mode: 6 Mbit                                             | 7      | 11    | 11 | 11 | 38     | 46 | 80 MHz |
| n-mode : MCS0                                              | 7      | 11    | 11 | 11 | 13     | 13 | 42     |
| ac-mode: MCS0                                              | 7      | 11    | 11 | 11 | 13     | 13 | 7      |
| Note 2: Unused Ports 3 & 4 Terminated with 50 Ω            |        |       |    |    |        |    |        |
| MIMO Port 1+2+3 (Note 3)                                   |        |       |    |    |        |    |        |
| Nominal Channel Bandwidth                                  | 20 MHz |       |    |    |        |    |        |
| Test Channel                                               | 36     | 40    | 44 | 48 | 40 MHz |    |        |
| a-mode: 6 Mbit                                             | 8      | 9     | 9  | 9  | 38     | 46 | 80 MHz |
| n-mode : MCS0                                              | 8      | 9     | 9  | 9  | 8      | 8  | 42     |
| ac-mode: MCS0                                              | 8      | 9     | 9  | 9  | 8      | 8  | 8      |
| Note 3: Unused Port 4 Terminated with 50 Ω                 |        |       |    |    |        |    |        |
| MIMO Port 1+2+3+4 (Note 4)                                 |        |       |    |    |        |    |        |
| Nominal Channel Bandwidth                                  | 20 MHz |       |    |    |        |    |        |
| Test Channel                                               | 36     | 40    | 44 | 48 | 40 MHz |    |        |
| a-mode: 6 Mbit                                             | 7      | N/T** | 7  | 7  | 38     | 46 | 80 MHz |
| n-mode : MCS0                                              | 7      | N/T** | 7  | 7  | 9      | 9  | 42     |
| ac-mode: MCS0                                              | 7      | N/T** | 7  | 7  | 9      | 9  | 9      |
| Note 4: None of the Port was Terminated with 50 Ω          |        |       |    |    |        |    |        |
| N/T** : CH40 not tested as it has same PWL as that of CH36 |        |       |    |    |        |    |        |

#### 4.4. Used RF Cables

For radiated band edge & AC conducted emission measurements performed with Antennas, EUT ports were connected with following RF cables to the different antenna type.

For further details refer Section 3. B.

| Antenna Group Type                                                                                                                                                                                                                                                                         | EUT to Antennas Cable Details |                    |                      |                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------|----------------------|------------------------|
|                                                                                                                                                                                                                                                                                            | SISO Mode Port 1              | MIMO Mode Port 1+2 | MIMO Mode Port 1+2+3 | MIMO Mode Port 1+2+3+4 |
| 8 dBi Antenna Group                                                                                                                                                                                                                                                                        | UMCC- N Connector Cables      |                    |                      |                        |
| 9 dBi Antenna Group                                                                                                                                                                                                                                                                        | UMCC- N Connector Cables      |                    |                      |                        |
| 23 dBi Antenna Group                                                                                                                                                                                                                                                                       | N-N Connector Antenna Cables* |                    |                      |                        |
| *As per applicant's declaration 23 dBi Antenna Group radiated tests have been carried out with N-N Connector Antenna Cable (10 m) having maximum loss of 8.8 dB @ 5 GHz bands. An RF level offset was entered in GUI settings to compensate the loss of those N-N Connector Antenna Cable. |                               |                    |                      |                        |

For radiated cabinet emissions measurements performed without Antennas, EUT ports were connected to 50  $\Omega$  terminations with following RF cables.

For further details refer Section 3. B.

| Antenna Group Type   | EUT to 50 $\Omega$ Terminations Cable Details |
|----------------------|-----------------------------------------------|
|                      | MIMO Mode Port 1+2+3+4                        |
| 8 dBi Antenna Group  | UMCC- N Connector Cables                      |
| 9 dBi Antenna Group  | UMCC- N Connector Cables                      |
| 23 dBi Antenna Group | UMCC- N Connector Cables                      |

## **5. Measurements, Examinations and Derived Results**

### **5.1. General Comments**

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 6 *Measurement Uncertainty* for details.

In accordance with DAkkS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

## 5.2. Test Results

### 5.2.1. Transmitter AC Conducted Spurious Emissions

#### Test Summary:

|                            |                                            |             |                            |
|----------------------------|--------------------------------------------|-------------|----------------------------|
| Test Engineers:            | Krume Ivanov, Bernd Woerl & Vladimir Eppel | Test Dates: | 20 May 2019 & 19 July 2019 |
| Test Sample Serial Number: | 192.168.0.80 & 192.168.0.60                |             |                            |
| Test Site Identification   | SR 7/8                                     |             |                            |

|                   |                                                          |
|-------------------|----------------------------------------------------------|
| FCC Reference:    | Part 15.207                                              |
| Test Method Used: | ANSI C63.10 Section 6.2 / FCC KDB 174176 and notes below |

#### Environmental Conditions:

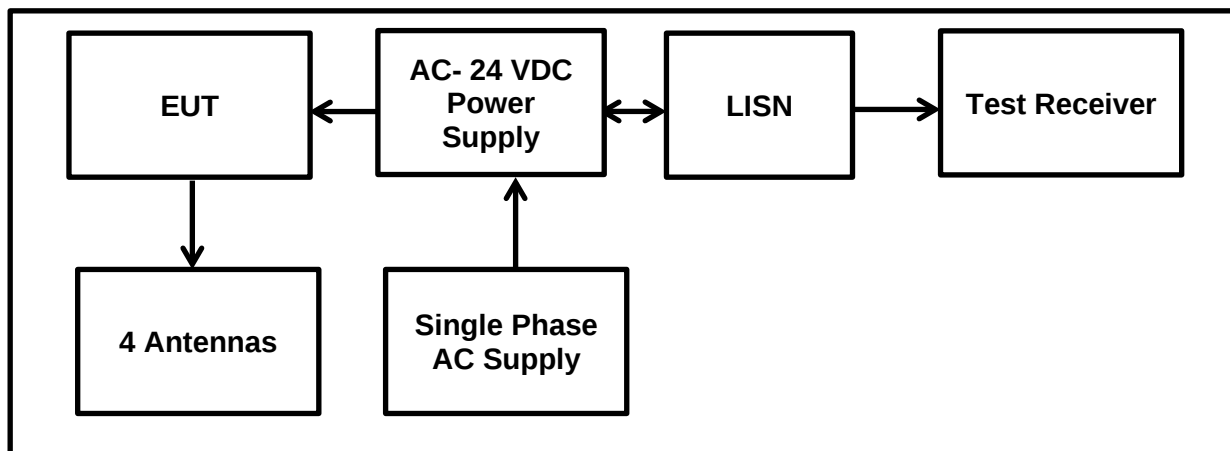
|                        |          |
|------------------------|----------|
| Temperature (°C):      | 21       |
| Relative Humidity (%): | 35 to 41 |

#### Settings of the Instrument

|          |                          |
|----------|--------------------------|
| Detector | Quasi Peak/ Average Peak |
|----------|--------------------------|

#### Notes:

1. Measurement software used: Toyo EMI Software; CE measurement software EP5/CE Ver 4.0.1.
2. The EUT was powered by supplying 24 V DC.
3. In accordance with FCC KDB 174176 Q4; the SIEMENS SIMATIC PS 307 Power Supply was connected to 120 VAC 60 Hz single phase supply via a LISN.
4. The HEWLETT PACKARD E3620A Power Supply was connected to 240 VAC 60 Hz single phase supply via a LISN.
5. AC conducted tests were performed with :
  - a. each type of listed Antenna Groups.
  - b. maximum power setting (PWL) amongst all supported U-N-II bands & SISO-MIMO modes
  - c. MIMO Port 1+2+3+4 employing maximum possible Antennas
6. Measurements were performed in shielded room (SR7/ 8 Asset Number 1603671). The EUT was placed at a height of 80 cm above the reference ground plane and in a distance of 40 cm from the vertical ground plane at the edge of the table.
7. Pre-scans were performed and markers placed on the highest live and neutral measured levels. Final measurements were performed on the marker frequencies and the results entered into the tables below.
8. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
9. The final measured value, for the given emission, in the table below incorporates the cable loss. Calculation: Level = test receiver reading + path loss (cable attenuation + correction LISN).

**Transmitter AC Conducted Spurious Emissions (continued)****Test setup:**

**Transmitter AC Conducted Spurious Emissions (continued) :****Results: Live (L1) / Quasi Peak / 120 VAC 60 Hz / 8 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.17255         | Live (L1)  | 35.0                | 9.9                    | 44.9              | 64.8              | 19.9           | Complied |
| 0.19709         | Live (L1)  | 29.6                | 9.9                    | 39.5              | 63.7              | 24.2           | Complied |
| 0.22966         | Live (L1)  | 31.4                | 9.9                    | 41.3              | 62.5              | 21.2           | Complied |
| 0.27174         | Live (L1)  | 27.0                | 9.8                    | 36.8              | 61.1              | 24.3           | Complied |
| 0.37996         | Live (L1)  | 24.4                | 9.9                    | 34.3              | 58.3              | 24.0           | Complied |
| 3.55912         | Live (L1)  | 23.9                | 9.9                    | 33.8              | 56.0              | 22.2           | Complied |

**Results: Live (L1) / Average / 120 VAC 60 Hz / 8 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.17255         | Live (L1)  | 27.5                | 9.9                    | 37.4              | 54.8              | 17.4           | Complied |
| 0.19709         | Live (L1)  | 16.6                | 9.9                    | 26.5              | 53.7              | 27.2           | Complied |
| 0.22966         | Live (L1)  | 25.2                | 9.9                    | 35.1              | 52.5              | 17.4           | Complied |
| 0.27174         | Live (L1)  | 13.8                | 9.8                    | 23.6              | 51.1              | 27.5           | Complied |
| 0.37996         | Live (L1)  | 10.1                | 9.9                    | 20.0              | 48.3              | 28.3           | Complied |
| 3.55912         | Live (L1)  | 9.6                 | 9.9                    | 19.5              | 46.0              | 26.5           | Complied |

**Result: Pass**

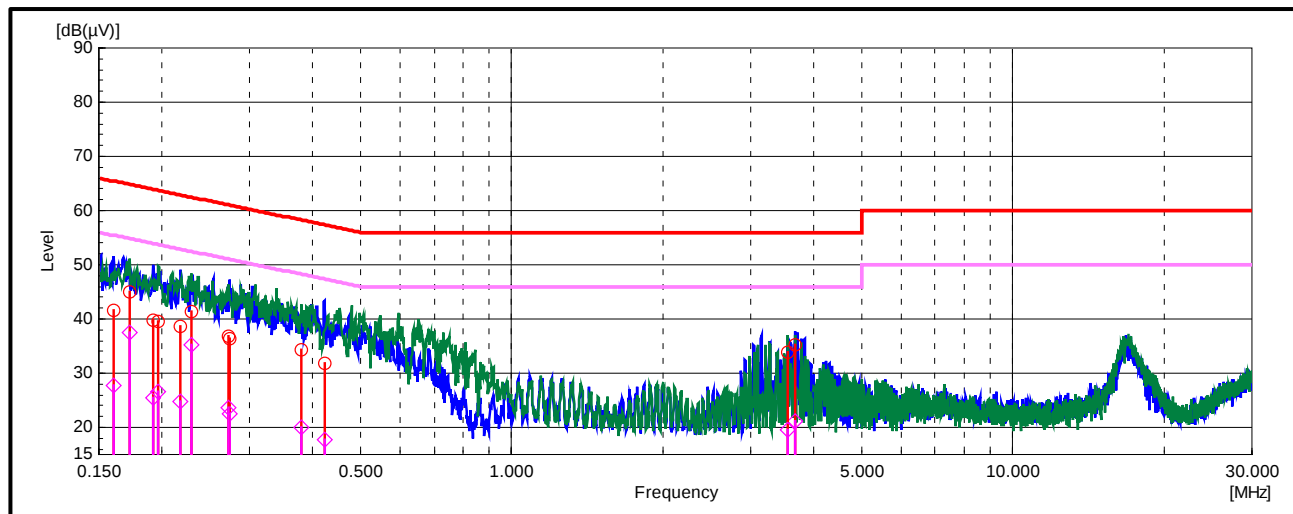
**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral (N) / Quasi Peak / 120 VAC 60 Hz / 8 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.16052         | Neutral (N) | 31.7                | 9.9                    | 41.6              | 65.4              | 23.8           | Complied |
| 0.19259         | Neutral (N) | 29.8                | 9.9                    | 39.7              | 63.9              | 24.2           | Complied |
| 0.21864         | Neutral (N) | 28.7                | 9.9                    | 38.6              | 62.9              | 24.3           | Complied |
| 0.27375         | Neutral (N) | 26.6                | 9.8                    | 36.4              | 61.0              | 24.6           | Complied |
| 0.42305         | Neutral (N) | 21.9                | 9.9                    | 31.8              | 57.4              | 25.6           | Complied |
| 3.67535         | Neutral (N) | 25.3                | 9.9                    | 35.2              | 56.0              | 20.8           | Complied |

**Results: Neutral (N) / Average / 120 VAC 60 Hz / 8 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.16052         | Neutral (N) | 17.7                | 9.9                    | 27.6              | 55.4              | 27.8           | Complied |
| 0.19259         | Neutral (N) | 15.6                | 9.9                    | 25.5              | 53.9              | 28.4           | Complied |
| 0.21864         | Neutral (N) | 14.8                | 9.9                    | 24.7              | 52.9              | 28.2           | Complied |
| 0.27375         | Neutral (N) | 12.6                | 9.8                    | 22.4              | 51.0              | 28.6           | Complied |
| 0.42305         | Neutral (N) | 7.9                 | 9.9                    | 17.8              | 47.4              | 29.6           | Complied |
| 3.67535         | Neutral (N) | 11.2                | 9.9                    | 21.1              | 46.0              | 24.9           | Complied |

**Result: Pass**

**Transmitter AC Conducted Spurious Emissions (continued)****Plot: Live and Neutral Line / 8 dBi Antenna Group**

Note: The plots show the max hold (peak detector) pre-scan results measured. Blue graph represents the result of the N-Line; green graph - the results for L1-Line. The bar graphs indicate the final measurement result applying the dedicated detector at selected frequencies for each limit line (red cycle for quasi peak limit; violet cycle for average limit).

| Legend (Conducted Emissions) |                                                       |
|------------------------------|-------------------------------------------------------|
| Items                        | Description                                           |
|                              | Blue graph is the result of peak measurement phase L  |
|                              | Green graph is the result of peak measurement phase N |
|                              | Limit line <b>Quasi-Peak</b>                          |
|                              | Limit line <b>Average</b>                             |
|                              | Final item <b>Quasi-Peak</b>                          |
|                              | Final item <b>Average</b>                             |

**Transmitter AC Conducted Spurious Emissions (continued) :****Results: Live (L1) / Quasi Peak / 240 VAC 60 Hz / 8 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.17555         | Live (L1)  | 7.1                 | 9.9                    | 17                | 64.7              | 47.7           | Complied |
| 0.25857         | Live (L1)  | 8.6                 | 9.8                    | 18.4              | 61.5              | 43.1           | Complied |
| 0.38882         | Live (L1)  | 10.7                | 9.9                    | 20.6              | 58.1              | 37.5           | Complied |
| 0.46824         | Live (L1)  | 0                   | 9.9                    | 9.9               | 56.5              | 46.6           | Complied |
| 0.67561         | Live (L1)  | -2                  | 10                     | 8                 | 56                | 48             | Complied |

**Results: Live (L1) / Average / 240 VAC 60 Hz / 8 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.17555         | Live (L1)  | 2                   | 9.9                    | 11.9              | 54.7              | 42.8           | Complied |
| 0.25857         | Live (L1)  | 1.3                 | 9.8                    | 11.1              | 51.5              | 40.4           | Complied |
| 0.38882         | Live (L1)  | -3.3                | 9.9                    | 6.6               | 48.1              | 41.5           | Complied |
| 0.46824         | Live (L1)  | -5.6                | 9.9                    | 4.3               | 46.5              | 42.2           | Complied |
| 0.67561         | Live (L1)  | -6.5                | 10                     | 3.5               | 46                | 42.5           | Complied |

**Result: Pass**

**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral (N) / Quasi Peak / 240 VAC 60 Hz / 8 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 10.48709        | Neutral (N) | 21.2                | 10                     | 31.2              | 60                | 28.8           | Complied |
| 12.24203        | Neutral (N) | 16.4                | 10                     | 26.4              | 60                | 33.6           | Complied |
| 13.98332        | Neutral (N) | 21.4                | 10.1                   | 31.5              | 60                | 28.5           | Complied |
| 14.99043        | Neutral (N) | 19.8                | 10.1                   | 29.9              | 60                | 30.1           | Complied |
| 15.30866        | Neutral (N) | 20.6                | 10.1                   | 30.7              | 60                | 29.3           | Complied |
| 15.7246         | Neutral (N) | 19.7                | 10.1                   | 29.8              | 60                | 30.2           | Complied |
| 19.22728        | Neutral (N) | 16.1                | 10.1                   | 26.2              | 60                | 33.8           | Complied |

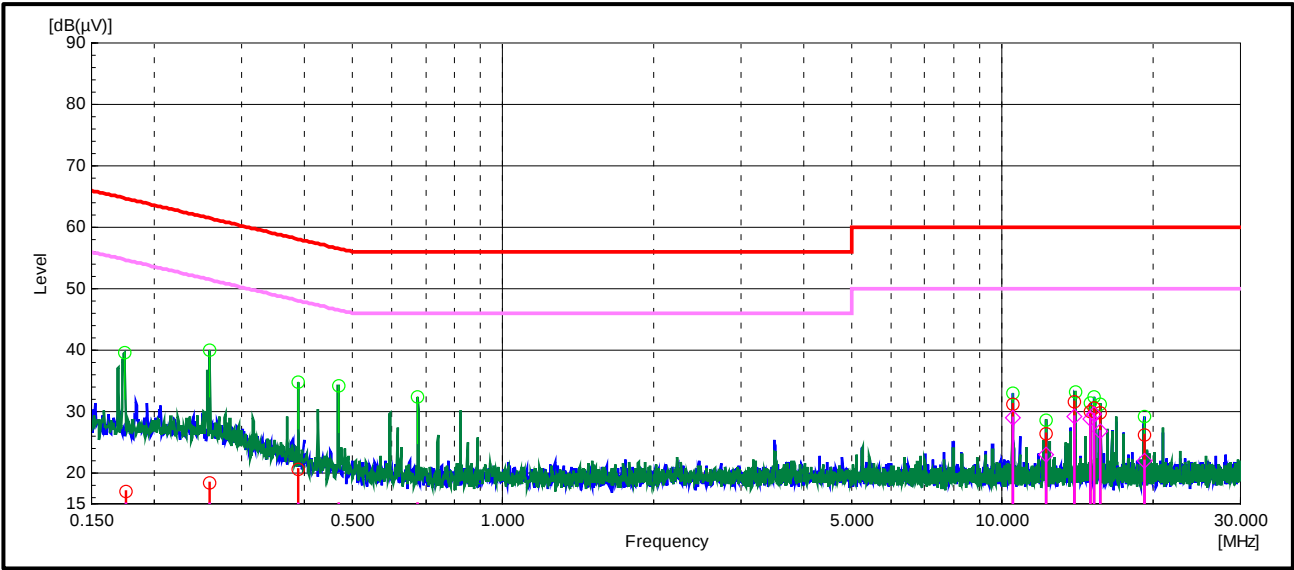
**Results: Neutral (N) / Average / 240 VAC 60 Hz / 8 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 10.48709        | Neutral (N) | 19                  | 10                     | 29                | 50                | 21             | Complied |
| 12.24203        | Neutral (N) | 12.9                | 10                     | 22.9              | 50                | 27.1           | Complied |
| 13.98332        | Neutral (N) | 19                  | 10.1                   | 29.1              | 50                | 20.9           | Complied |
| 14.99043        | Neutral (N) | 18.6                | 10.1                   | 28.7              | 50                | 21.3           | Complied |
| 15.30866        | Neutral (N) | 19.6                | 10.1                   | 29.7              | 50                | 20.3           | Complied |
| 15.7246         | Neutral (N) | 16.6                | 10.1                   | 26.7              | 50                | 23.3           | Complied |
| 19.22728        | Neutral (N) | 11.9                | 10.1                   | 22                | 50                | 28             | Complied |

**Result: Pass**

Transmitter AC Conducted Spurious Emissions (continued)

Plot: Live and Neutral Line / 8 dBi Antenna Group



Note: The plots show the max hold (peak detector) pre-scan results measured. Blue graph represents the result of the N-Line; green graph - the results for L1-Line. The bar graphs indicate the final measurement result applying the dedicated detector at selected frequencies for each limit line (red cycle for quasi peak limit; violet cycle for average limit).

| Legend (Conducted Emissions) |                                                       |
|------------------------------|-------------------------------------------------------|
| Items                        | Description                                           |
|                              | Blue graph is the result of peak measurement phase L  |
|                              | Green graph is the result of peak measurement phase N |
|                              | Limit line <b>Quasi-Peak</b>                          |
|                              | Limit line <b>Average</b>                             |
|                              | Final item <b>Quasi-Peak</b>                          |
|                              | Final item <b>Average</b>                             |

**Transmitter AC Conducted Spurious Emissions (continued) :****Results: Live (L1) / Quasi Peak / 120 VAC 60 Hz / 9 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.17255         | Live (L1)  | 34.0                | 9.9                    | 43.9              | 64.8              | 20.9           | Complied |
| 0.23116         | Live (L1)  | 29.7                | 9.9                    | 39.6              | 62.4              | 22.8           | Complied |
| 0.28327         | Live (L1)  | 27.0                | 9.8                    | 36.8              | 60.7              | 23.9           | Complied |
| 0.32735         | Live (L1)  | 24.6                | 9.8                    | 34.4              | 59.5              | 25.1           | Complied |
| 3.21443         | Live (L1)  | 22.5                | 9.9                    | 32.4              | 56.0              | 23.6           | Complied |
| 18.75551        | Live (L1)  | 24.7                | 10.1                   | 34.8              | 60.0              | 25.2           | Complied |

**Results: Live (L1) / Average / 120 VAC 60 Hz / 9 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.17255         | Live (L1)  | 26.4                | 9.9                    | 36.3              | 54.8              | 18.5           | Complied |
| 0.23116         | Live (L1)  | 23.4                | 9.9                    | 33.3              | 52.4              | 19.1           | Complied |
| 0.28327         | Live (L1)  | 20.1                | 9.8                    | 29.9              | 50.7              | 20.8           | Complied |
| 0.32735         | Live (L1)  | 13.1                | 9.8                    | 22.9              | 49.5              | 26.6           | Complied |
| 3.21443         | Live (L1)  | 9.2                 | 9.9                    | 19.1              | 46.0              | 26.9           | Complied |
| 18.75551        | Live (L1)  | 20.1                | 10.1                   | 30.2              | 50.0              | 19.8           | Complied |

**Result: Pass**

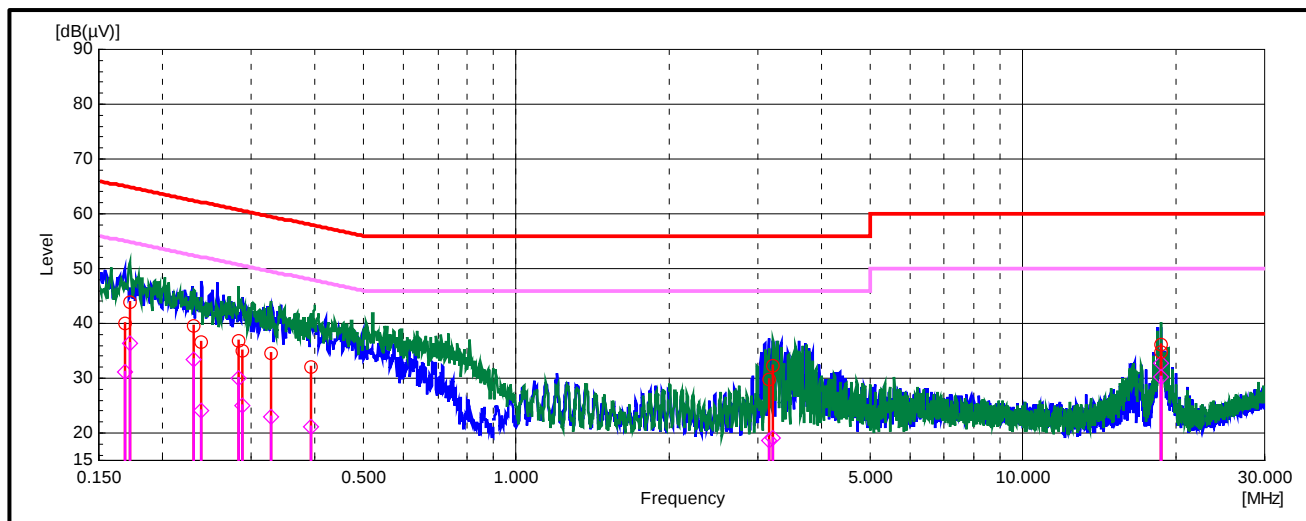
**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral (N) / Quasi Peak / 120 VAC 60 Hz / 9 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.16854         | Neutral (N) | 30.2                | 9.9                    | 40.1              | 65.0              | 24.9           | Complied |
| 0.23918         | Neutral (N) | 26.8                | 9.9                    | 36.7              | 62.1              | 25.4           | Complied |
| 0.28878         | Neutral (N) | 25.2                | 9.8                    | 35.0              | 60.6              | 25.6           | Complied |
| 0.39248         | Neutral (N) | 22.1                | 9.9                    | 32.0              | 58.0              | 26.0           | Complied |
| 3.1503          | Neutral (N) | 19.9                | 9.9                    | 29.8              | 56.0              | 26.2           | Complied |
| 18.75551        | Neutral (N) | 25.9                | 10.1                   | 36.0              | 60.0              | 24.0           | Complied |

**Results: Neutral (N) / Average / 120 VAC 60 Hz / 9 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.16854         | Neutral (N) | 21.1                | 9.9                    | 31.0              | 55.0              | 24.0           | Complied |
| 0.23918         | Neutral (N) | 14.2                | 9.9                    | 24.1              | 52.1              | 28.0           | Complied |
| 0.28878         | Neutral (N) | 15.3                | 9.8                    | 25.1              | 50.6              | 25.5           | Complied |
| 0.39248         | Neutral (N) | 11.3                | 9.9                    | 21.2              | 48.0              | 26.8           | Complied |
| 3.1503          | Neutral (N) | 8.8                 | 9.9                    | 18.7              | 46.0              | 27.3           | Complied |
| 18.75551        | Neutral (N) | 22.6                | 10.1                   | 32.7              | 50.0              | 17.3           | Complied |

**Result: Pass**

**Transmitter AC Conducted Spurious Emissions (continued)****Plot: Live and Neutral Line / 9 dBi Antenna Group**

Note: The plots show the max hold (peak detector) pre-scan results measured. Blue graph represents the result of the N-Line; green graph - the results for L1-Line. The bar graphs indicate the final measurement result applying the dedicated detector at selected frequencies for each limit line (red cycle for quasi peak limit; violet cycle for average limit).

| Legend (Conducted Emissions) |                                                       |
|------------------------------|-------------------------------------------------------|
| Items                        | Description                                           |
|                              | Blue graph is the result of peak measurement phase L  |
|                              | Green graph is the result of peak measurement phase N |
|                              | Limit line <b>Quasi-Peak</b>                          |
|                              | Limit line <b>Average</b>                             |
|                              | Final item <b>Quasi-Peak</b>                          |
|                              | Final item <b>Average</b>                             |

**Transmitter AC Conducted Spurious Emissions (continued) :****Results: Live (L1) / Quasi Peak / 240 VAC 60 Hz / 9 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 14.67249        | Live (L1)  | 15.6                | 10.1                   | 25.7              | 60                | 34.3           | Complied |
| 14.99504        | Live (L1)  | 18.1                | 10.1                   | 28.2              | 60                | 31.8           | Complied |
| 15.31498        | Live (L1)  | 15.7                | 10.1                   | 25.8              | 60                | 34.2           | Complied |
| 16.26669        | Live (L1)  | 15.6                | 10.1                   | 25.7              | 60                | 34.3           | Complied |
| 16.90486        | Live (L1)  | 15.5                | 10.1                   | 25.6              | 60                | 34.4           | Complied |
| 20.98711        | Live (L1)  | 13.1                | 10.2                   | 23.3              | 60                | 36.7           | Complied |

**Results: Live (L1) / Average / 240 VAC 60 Hz / 9 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 14.67249        | Live (L1)  | 13.9                | 10.1                   | 24                | 50                | 26             | Complied |
| 14.99504        | Live (L1)  | 16.9                | 10.1                   | 27                | 50                | 23             | Complied |
| 15.31498        | Live (L1)  | 14.5                | 10.1                   | 24.6              | 50                | 25.4           | Complied |
| 16.26669        | Live (L1)  | 13.6                | 10.1                   | 23.7              | 50                | 26.3           | Complied |
| 16.90486        | Live (L1)  | 11.3                | 10.1                   | 21.4              | 50                | 28.6           | Complied |
| 20.98711        | Live (L1)  | 8.8                 | 10.2                   | 19                | 50                | 31             | Complied |

**Result: Pass**

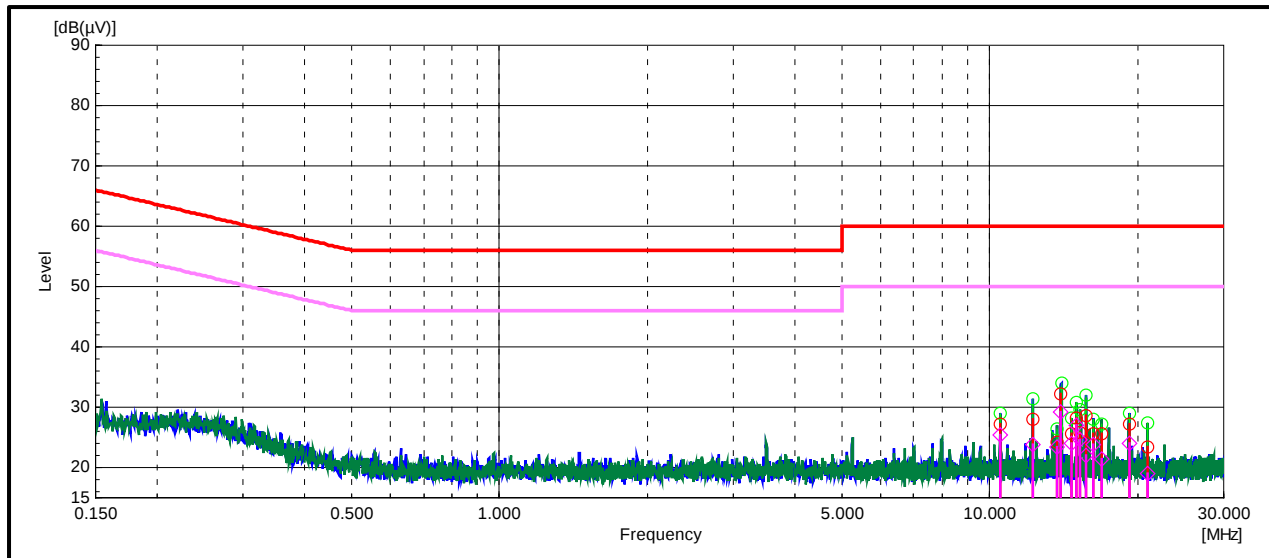
**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral (N) / Quasi Peak / 240 VAC 60 Hz / 9 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 10.48908        | Neutral (N) | 17.2                | 10                     | 27.2              | 60                | 32.8           | Complied |
| 12.23251        | Neutral (N) | 18                  | 10                     | 28                | 60                | 32             | Complied |
| 13.71799        | Neutral (N) | 14.2                | 10.1                   | 24.3              | 60                | 35.7           | Complied |
| 13.98101        | Neutral (N) | 22                  | 10.1                   | 32.1              | 60                | 27.9           | Complied |
| 15.74483        | Neutral (N) | 18.5                | 10.1                   | 28.6              | 60                | 31.4           | Complied |
| 19.23389        | Neutral (N) | 17.1                | 10.1                   | 27.2              | 60                | 32.8           | Complied |

**Results: Neutral (N) / Average / 240 VAC 60 Hz / 9 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 10.48908        | Neutral (N) | 15.4                | 10                     | 25.4              | 50                | 24.6           | Complied |
| 12.23251        | Neutral (N) | 13.8                | 10                     | 23.8              | 50                | 26.2           | Complied |
| 13.71799        | Neutral (N) | 13.2                | 10.1                   | 23.3              | 50                | 26.7           | Complied |
| 13.98101        | Neutral (N) | 19                  | 10.1                   | 29.1              | 50                | 20.9           | Complied |
| 15.74483        | Neutral (N) | 11.8                | 10.1                   | 21.9              | 50                | 28.1           | Complied |
| 19.23389        | Neutral (N) | 13.9                | 10.1                   | 24                | 50                | 26             | Complied |

**Result: Pass**

**Transmitter AC Conducted Spurious Emissions (continued)****Plot: Live and Neutral Line / 9 dBi Antenna Group**

*Note: The plots show the max hold (peak detector) pre-scan results measured. Blue graph represents the result of the N-Line; green graph - the results for L1-Line. The bar graphs indicate the final measurement result applying the dedicated detector at selected frequencies for each limit line (red cycle for quasi peak limit; violet cycle for average limit).*

| Legend (Conducted Emissions) |                                                       |
|------------------------------|-------------------------------------------------------|
| Items                        | Description                                           |
|                              | Blue graph is the result of peak measurement phase L  |
|                              | Green graph is the result of peak measurement phase N |
|                              | Limit line <b>Quasi-Peak</b>                          |
|                              | Limit line <b>Average</b>                             |
|                              | Final item <b>Quasi-Peak</b>                          |
|                              | Final item <b>Average</b>                             |

**Transmitter AC Conducted Spurious Emissions (continued) :****Results: Live (L1) / Quasi Peak / 120 VAC 60 Hz / 23 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.171           | Live (L1)  | 34.2                | 9.9                    | 44.1              | 64.9              | 20.8           | Complied |
| 0.21033         | Live (L1)  | 29.1                | 9.9                    | 39                | 63.2              | 24.2           | Complied |
| 0.28539         | Live (L1)  | 28.3                | 9.8                    | 38.1              | 60.7              | 22.6           | Complied |
| 3.38635         | Live (L1)  | 20.4                | 9.9                    | 30.3              | 56                | 25.7           | Complied |
| 14.01017        | Live (L1)  | 20.2                | 10.1                   | 30.3              | 60                | 29.7           | Complied |
| 16.83191        | Live (L1)  | 19.1                | 10.1                   | 29.2              | 60                | 30.8           | Complied |

**Results: Live (L1) / Average / 120 VAC 60 Hz / 23 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.171           | Live (L1)  | 27                  | 9.9                    | 36.9              | 54.9              | 18             | Complied |
| 0.21033         | Live (L1)  | 15.9                | 9.9                    | 25.8              | 53.2              | 27.4           | Complied |
| 0.28539         | Live (L1)  | 21.7                | 9.8                    | 31.5              | 50.7              | 19.2           | Complied |
| 3.38635         | Live (L1)  | 6.7                 | 9.9                    | 16.6              | 46                | 29.4           | Complied |
| 14.01017        | Live (L1)  | 16.7                | 10.1                   | 26.8              | 50                | 23.2           | Complied |
| 16.83191        | Live (L1)  | 7.3                 | 10.1                   | 17.4              | 50                | 32.6           | Complied |

**Result: Pass**

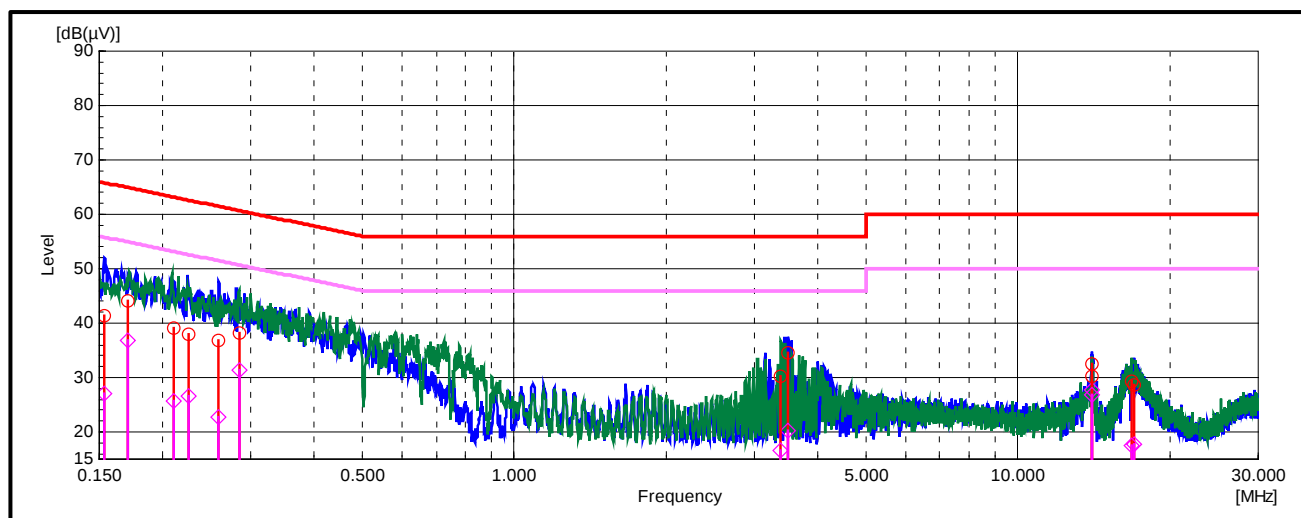
**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral (N) / Quasi Peak / 120 VAC 60 Hz / 23 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.15357         | Neutral (N) | 31.5                | 9.9                    | 41.4              | 65.8              | 24.4           | Complied |
| 0.22514         | Neutral (N) | 28.1                | 9.9                    | 38                | 62.6              | 24.6           | Complied |
| 0.25823         | Neutral (N) | 26.9                | 9.8                    | 36.7              | 61.5              | 24.8           | Complied |
| 3.50455         | Neutral (N) | 24.7                | 9.9                    | 34.6              | 56                | 21.4           | Complied |
| 14.00496        | Neutral (N) | 22.3                | 10.1                   | 32.4              | 60                | 27.6           | Complied |
| 16.98672        | Neutral (N) | 18.5                | 10.1                   | 28.6              | 60                | 31.4           | Complied |

**Results: Neutral (N) / Average / 120 VAC 60 Hz / 23 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 0.15357         | Neutral (N) | 17.2                | 9.9                    | 27.1              | 55.8              | 28.7           | Complied |
| 0.22514         | Neutral (N) | 16.6                | 9.9                    | 26.5              | 52.6              | 26.1           | Complied |
| 0.25823         | Neutral (N) | 13                  | 9.8                    | 22.8              | 51.5              | 28.7           | Complied |
| 3.50455         | Neutral (N) | 10.3                | 9.9                    | 20.2              | 46                | 25.8           | Complied |
| 14.00496        | Neutral (N) | 17.7                | 10.1                   | 27.8              | 50                | 22.2           | Complied |
| 16.98672        | Neutral (N) | 7.7                 | 10.1                   | 17.8              | 50                | 32.2           | Complied |

**Result: Pass**

**Transmitter AC Conducted Spurious Emissions (continued)****Plot: Live and Neutral Line / 23 dBi Antenna Group**

Note: The plots show the max hold (peak detector) pre-scan results measured. Blue graph represents the result of the N-Line; green graph - the results for L1-Line. The bar graphs indicate the final measurement result applying the dedicated detector at selected frequencies for each limit line (red cycle for quasi peak limit; violet cycle for average limit).

| Legend (Conducted Emissions) |                                                       |
|------------------------------|-------------------------------------------------------|
| Items                        | Description                                           |
|                              | Blue graph is the result of peak measurement phase L  |
|                              | Green graph is the result of peak measurement phase N |
|                              | Limit line <b>Quasi-Peak</b>                          |
|                              | Limit line <b>Average</b>                             |
|                              | Final item <b>Quasi-Peak</b>                          |
|                              | Final item <b>Average</b>                             |

**Transmitter AC Conducted Spurious Emissions (continued) :****Results: Live (L1) / Quasi Peak / 240 VAC 60 Hz / 23 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 5.24425         | Live (L1)  | 13                  | 9.9                    | 22.9              | 60                | 37.1           | Complied |
| 13.7218         | Live (L1)  | 15.3                | 10.1                   | 25.4              | 60                | 34.6           | Complied |
| 13.98743        | Live (L1)  | 25                  | 10.1                   | 35.1              | 60                | 24.9           | Complied |
| 15.31708        | Live (L1)  | 14.9                | 10.1                   | 25                | 60                | 35             | Complied |
| 19.22463        | Live (L1)  | 14.4                | 10.1                   | 24.5              | 60                | 35.5           | Complied |
| 20.97461        | Live (L1)  | 12.4                | 10.2                   | 22.6              | 60                | 37.4           | Complied |

**Results: Live (L1) / Average / 240 VAC 60 Hz / 23 dBi Antenna Group**

| Frequency [MHz] | Line Phase | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 5.24425         | Live (L1)  | 12.1                | 9.9                    | 22                | 50                | 28             | Complied |
| 13.7218         | Live (L1)  | 13.9                | 10.1                   | 24                | 50                | 26             | Complied |
| 13.98743        | Live (L1)  | 22.8                | 10.1                   | 32.9              | 50                | 17.1           | Complied |
| 15.31708        | Live (L1)  | 14.2                | 10.1                   | 24.3              | 50                | 25.7           | Complied |
| 19.22463        | Live (L1)  | 11.2                | 10.1                   | 21.3              | 50                | 28.7           | Complied |
| 20.97461        | Live (L1)  | 8.6                 | 10.2                   | 18.8              | 50                | 31.2           | Complied |

**Result: Pass**

**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral (N) / Quasi Peak / 240 VAC 60 Hz / 23 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading QP [dB(μV)] | Correction Factor [dB] | Level QP [dB(μV)] | Limit QP [dB(μV)] | Margin QP [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 10.49494        | Neutral (N) | 16.6                | 10                     | 26.6              | 60                | 33.4           | Complied |
| 12.24374        | Neutral (N) | 18                  | 10                     | 28                | 60                | 32             | Complied |
| 13.52721        | Neutral (N) | 12.5                | 10.1                   | 22.6              | 60                | 37.4           | Complied |
| 14.68001        | Neutral (N) | 16.8                | 10.1                   | 26.9              | 60                | 33.1           | Complied |
| 14.99885        | Neutral (N) | 18.6                | 10.1                   | 28.7              | 60                | 31.3           | Complied |
| 15.73102        | Neutral (N) | 16.1                | 10.1                   | 26.2              | 60                | 33.8           | Complied |

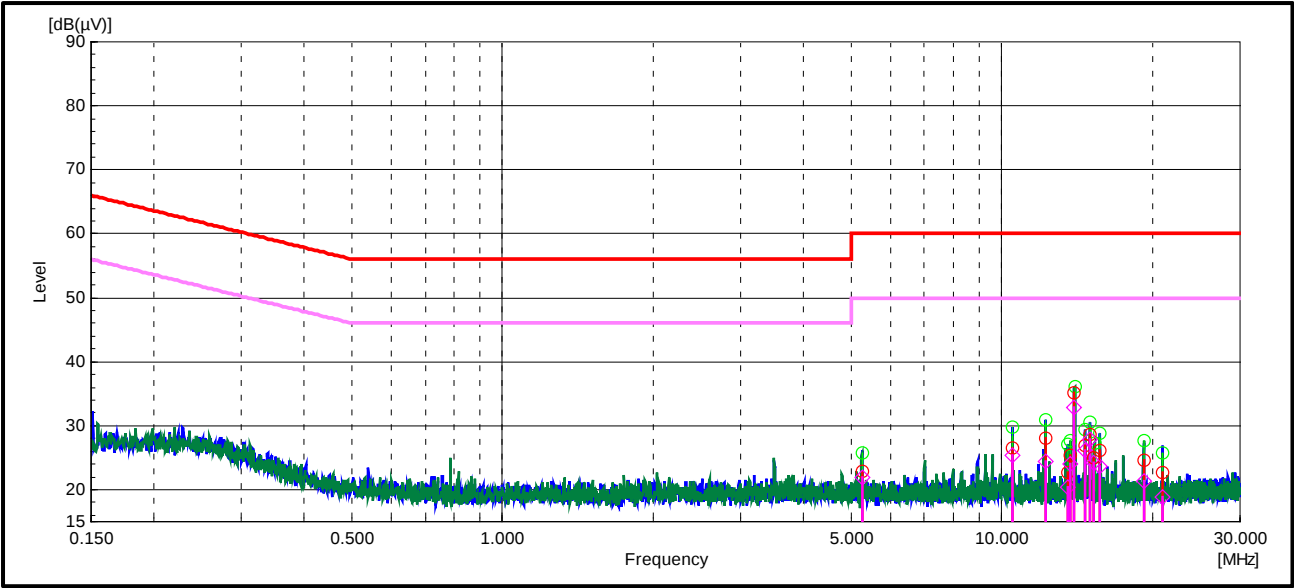
**Results: Neutral (N) / Average / 240 VAC 60 Hz / 23 dBi Antenna Group**

| Frequency [MHz] | Line Phase  | Reading AV [dB(μV)] | Correction Factor [dB] | Level AV [dB(μV)] | Limit AV [dB(μV)] | Margin AV [dB] | Result   |
|-----------------|-------------|---------------------|------------------------|-------------------|-------------------|----------------|----------|
| 10.49494        | Neutral (N) | 15.4                | 10                     | 25.4              | 50                | 24.6           | Complied |
| 12.24374        | Neutral (N) | 14.4                | 10                     | 24.4              | 50                | 25.6           | Complied |
| 13.52721        | Neutral (N) | 10.3                | 10.1                   | 20.4              | 50                | 29.6           | Complied |
| 14.68001        | Neutral (N) | 16.1                | 10.1                   | 26.2              | 50                | 23.8           | Complied |
| 14.99885        | Neutral (N) | 17.7                | 10.1                   | 27.8              | 50                | 22.2           | Complied |
| 15.73102        | Neutral (N) | 13.5                | 10.1                   | 23.6              | 50                | 26.4           | Complied |

**Result: Pass**

Transmitter AC Conducted Spurious Emissions (continued)

Plot: Live and Neutral Line / 23 dBi Antenna Group



Note: The plots show the max hold (peak detector) pre-scan results measured. Blue graph represents the result of the N-Line; green graph - the results for L1-Line. The bar graphs indicate the final measurement result applying the dedicated detector at selected frequencies for each limit line (red cycle for quasi peak limit; violet cycle for average limit).

| Legend (Conducted Emissions) |                                                       |
|------------------------------|-------------------------------------------------------|
| Items                        | Description                                           |
|                              | Blue graph is the result of peak measurement phase L  |
|                              | Green graph is the result of peak measurement phase N |
|                              | Limit line <b>Quasi-Peak</b>                          |
|                              | Limit line <b>Average</b>                             |
|                              | Final item <b>Quasi-Peak</b>                          |
|                              | Final item <b>Average</b>                             |

**5.2.2. Transmitter 26 dB Emission Bandwidth****Test Summary:**

|                                   |                     |                   |                                          |
|-----------------------------------|---------------------|-------------------|------------------------------------------|
| <b>Test Engineer:</b>             | Abdoufataou Salifou | <b>Test Date:</b> | 14 February 2019 to<br>26 September 2019 |
| <b>Test Sample Serial Number:</b> | 192.168.0.60        |                   |                                          |
| <b>Test Site Identification</b>   | SR 9                |                   |                                          |

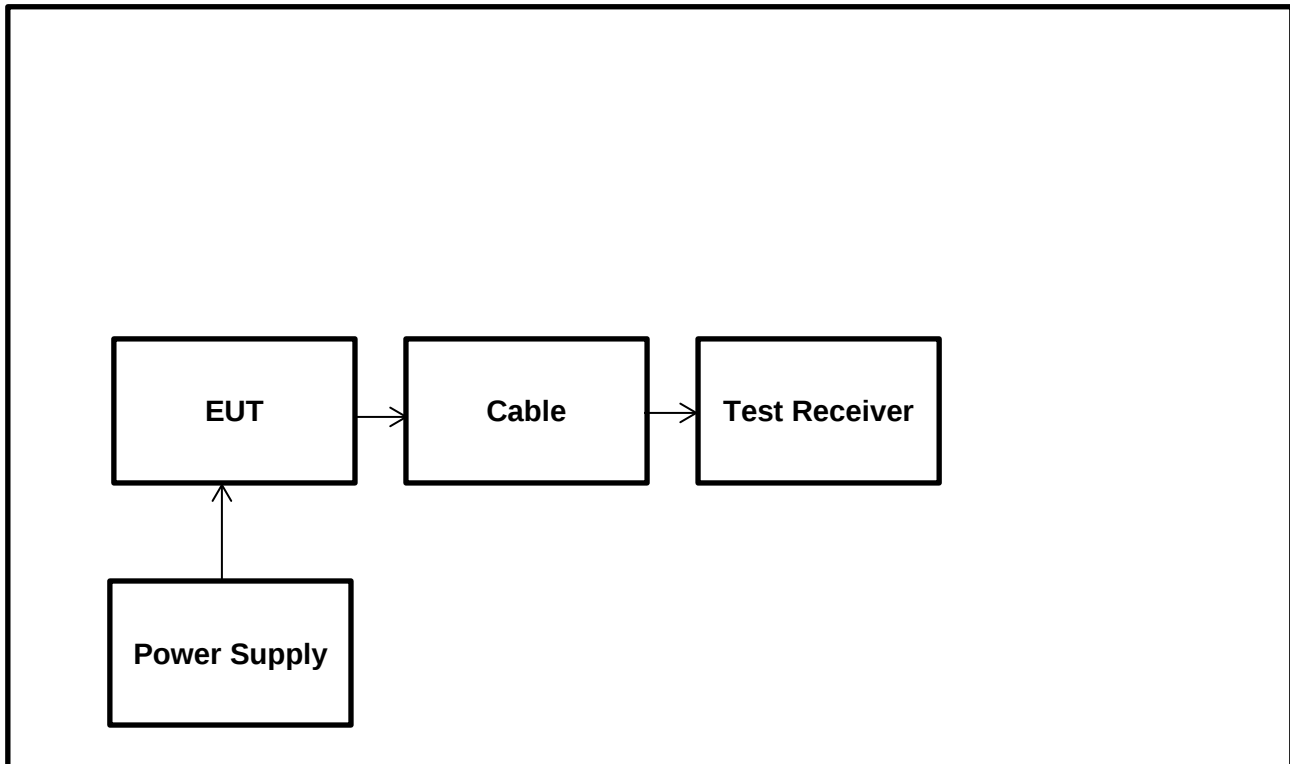
|                          |                                |
|--------------------------|--------------------------------|
| <b>FCC Reference:</b>    | Part 15.403(i)                 |
| <b>Test Method Used:</b> | KDB 789033 D02 Section II.C.1. |

**Environmental Conditions:**

|                               |          |
|-------------------------------|----------|
| <b>Temperatures (°C):</b>     | 21 to 25 |
| <b>Relative Humidity (%):</b> | 25 to 44 |

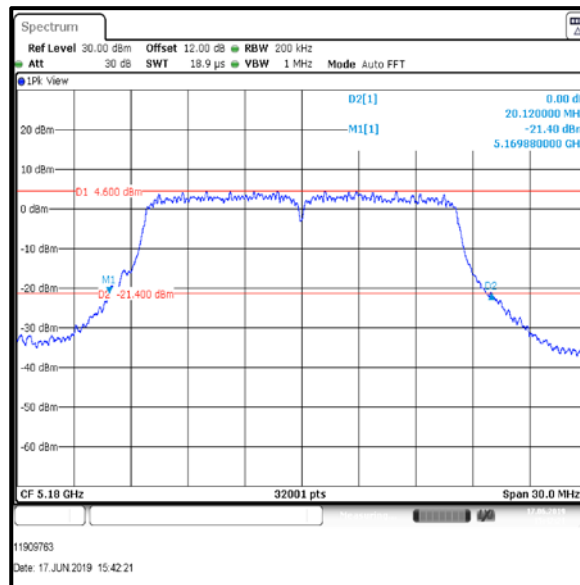
**Notes:**

1. All configurations supported by the EUT were investigated on the one channel in accordance with KDB 789033 Section II.C.1. Emission Bandwidth (EBW) test procedure.
2. Final measurements were performed in each supported operating band using the above configurations on the bottom, middle and top or single channels.
3. Plots for all data rates are archived on the Company server and available for inspection upon request.
4. 26 dB Emission Bandwidth were measured with worst case SISO mode; as they found to be same independent of number of transmitter chains used.
5. The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values takes into consideration the external attenuation correction factors. The RF cable attenuation (maximum 2.0 dB@5GHz) from the EUT to Analyzer including the 10 dB attenuation at the Spectrum Analyzer input was added as a reference level offset (12.0 dB) to each of the conducted plots.

**Transmitter 26 dB Emission Bandwidth (continued)****Test Setup:**

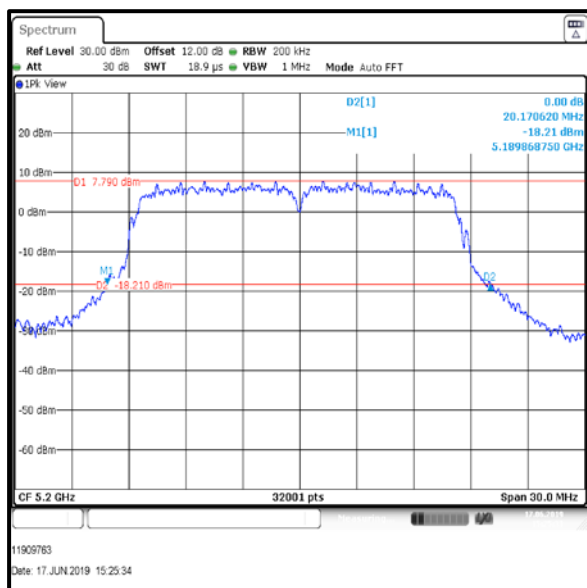
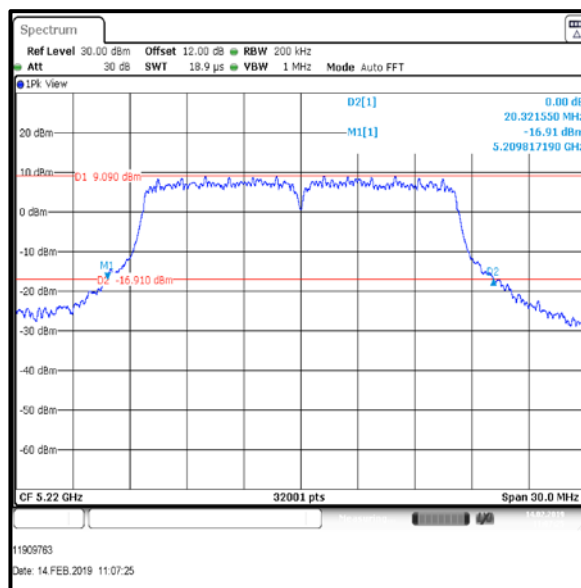
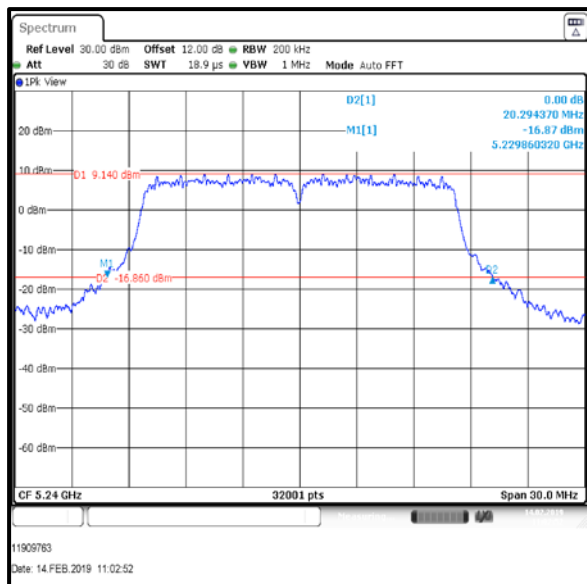
**Transmitter 26 dB Emission Bandwidth (continued)****8 dBi Antenna Group****Results: 802.11a / 20 MHz / 6 Mbps / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5180            | 20.120                         |

**Bottom Channel****Result: Pass**

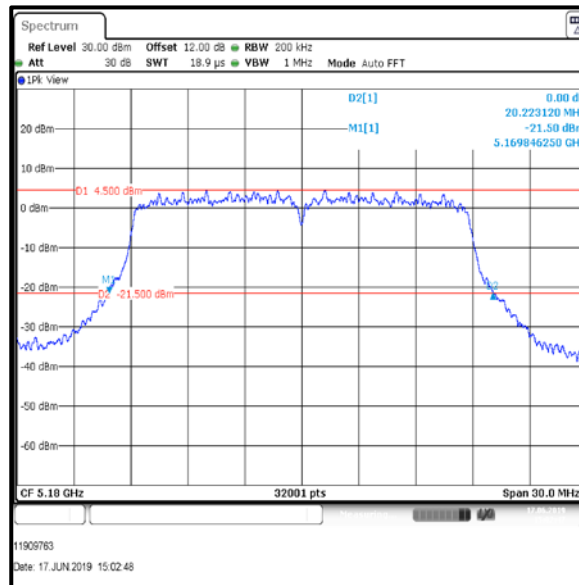
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11a / 20 MHz / 6 Mbps / SISO / Port 1 / PWL 18 / 8 dBi Antenna Group**

| Channel   | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|-----------|-----------------|--------------------------------|
| Bottom +1 | 5200            | 20.171                         |
| Middle    | 5220            | 20.322                         |
| Top       | 5240            | 20.294                         |

**Bottom +1 Channel****Middle Channel****Top Channel****Result: Pass**

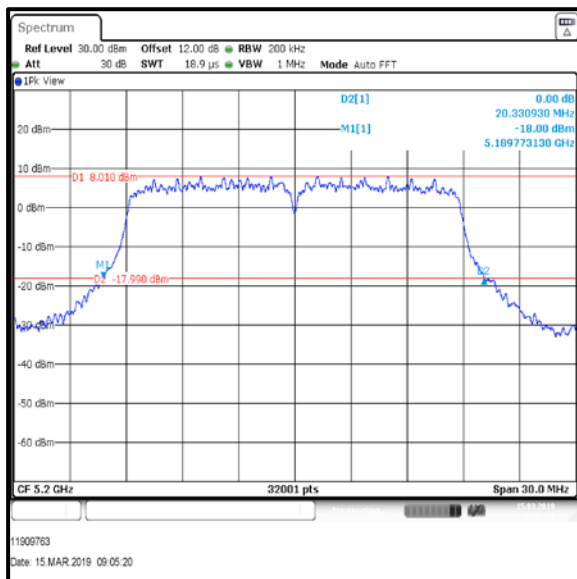
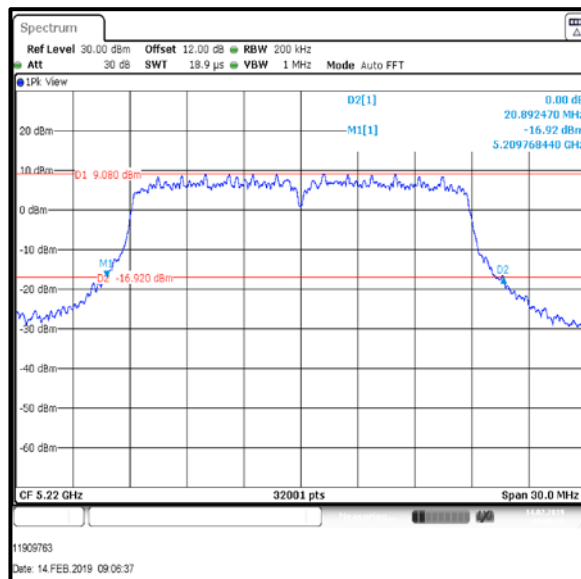
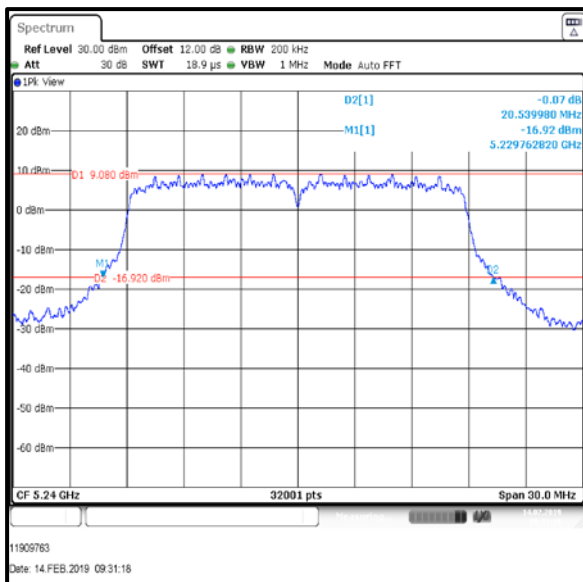
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11n / 20 MHz / MCS0 / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5180            | 20.223                         |

**Bottom Channel****Result: Pass**

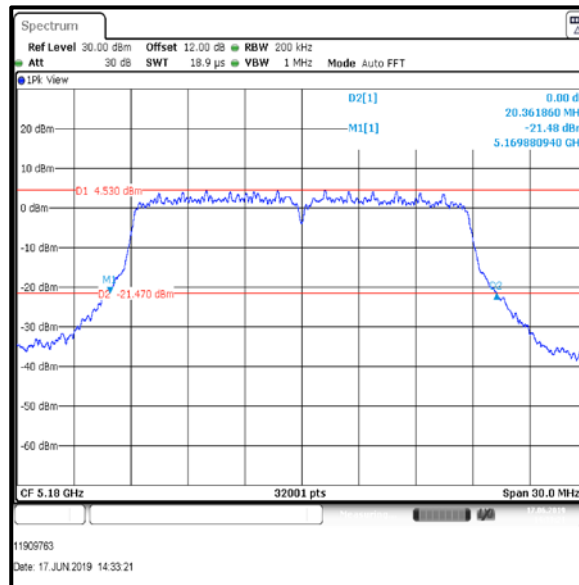
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11n / 20 MHz / MCS0 / SISO / Port 1 / PWL 18 / 8 dBi Antenna Group**

| Channel   | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|-----------|-----------------|--------------------------------|
| Bottom +1 | 5200            | 20.330                         |
| Middle    | 5220            | 20.892                         |
| Top       | 5240            | 20.540                         |

**Bottom +1 Channel****Middle Channel****Top Channel****Result: Pass**

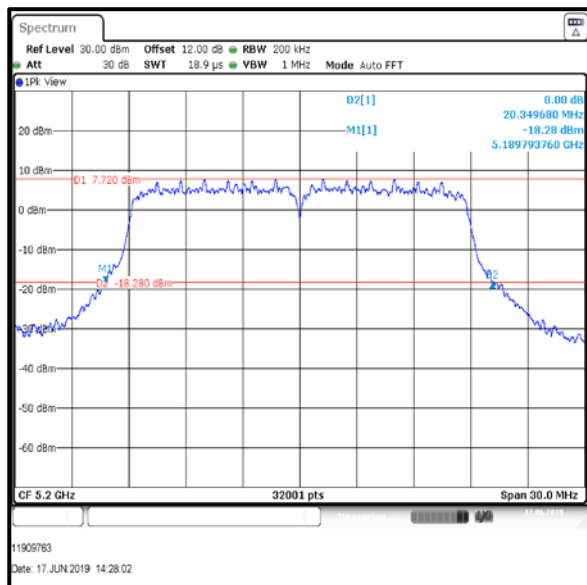
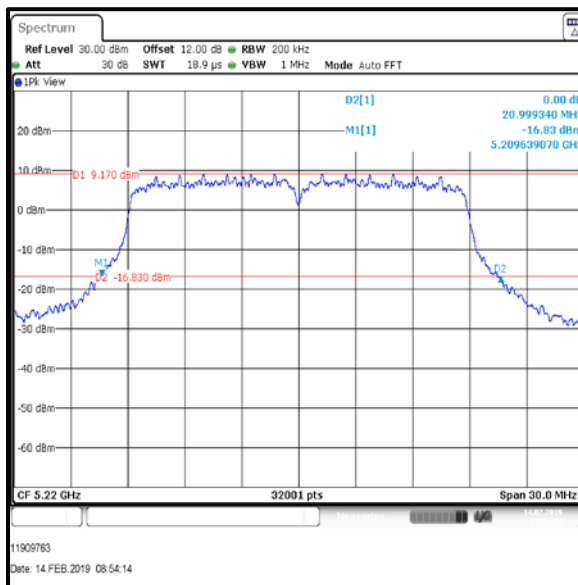
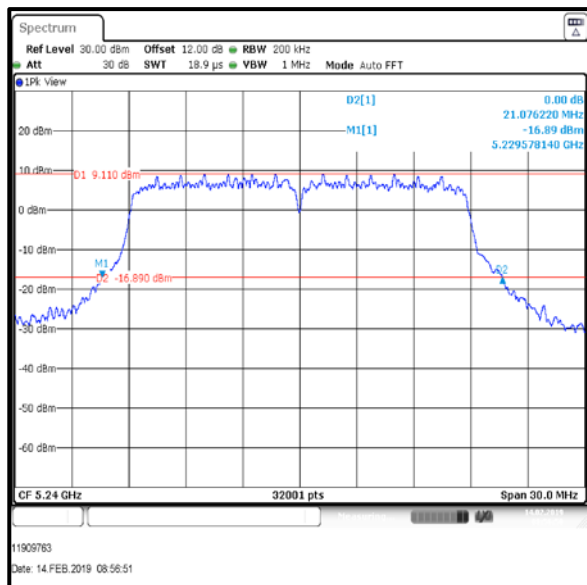
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / 20 MHz / MCS0 / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5180            | 20.362                         |

**Bottom Channel****Result: Pass**

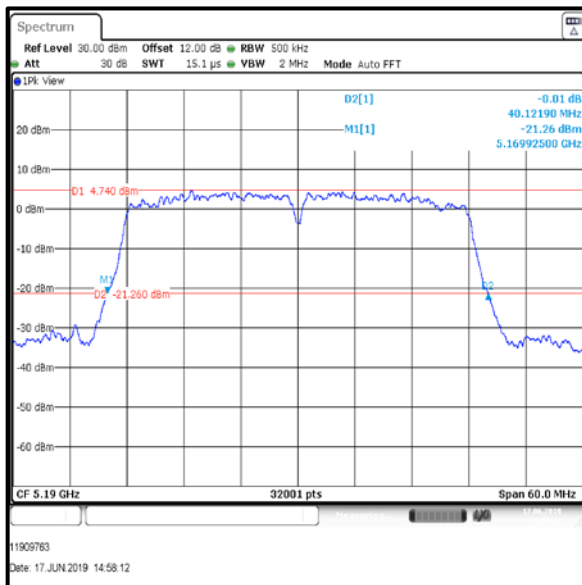
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / 20 MHz / MCS0 / SISO / Port 1 / PWL 18 / 8 dBi Antenna Group**

| Channel   | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|-----------|-----------------|--------------------------------|
| Bottom +1 | 5200            | 20.350                         |
| Middle    | 5240            | 20.999                         |
| Top       | 5240            | 21.076                         |

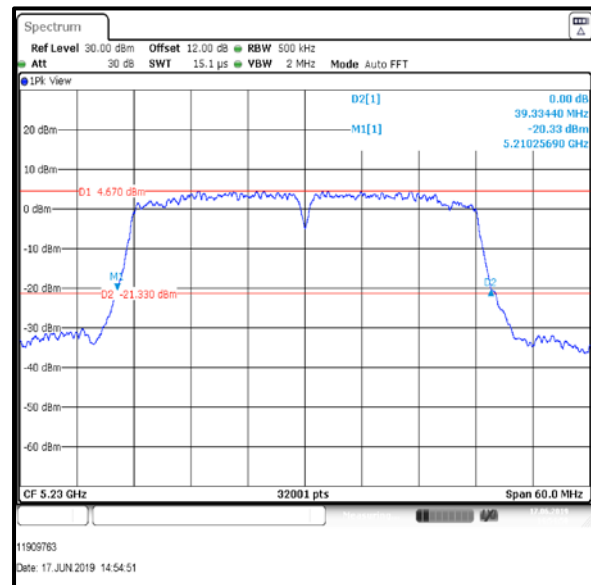
**Bottom +1 Channel****Middle Channel****Top Channel****Result: Pass**

**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11n / HT40 / MCS0 / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5190            | 40.122                         |
| Top     | 5230            | 39.334                         |



Bottom Channel

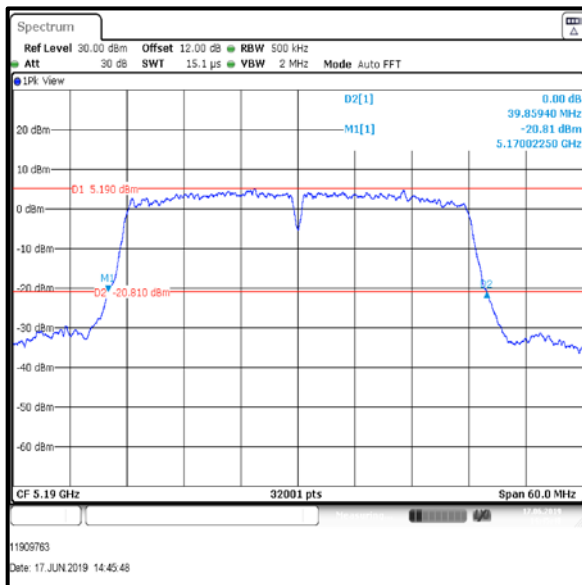


Top Channel

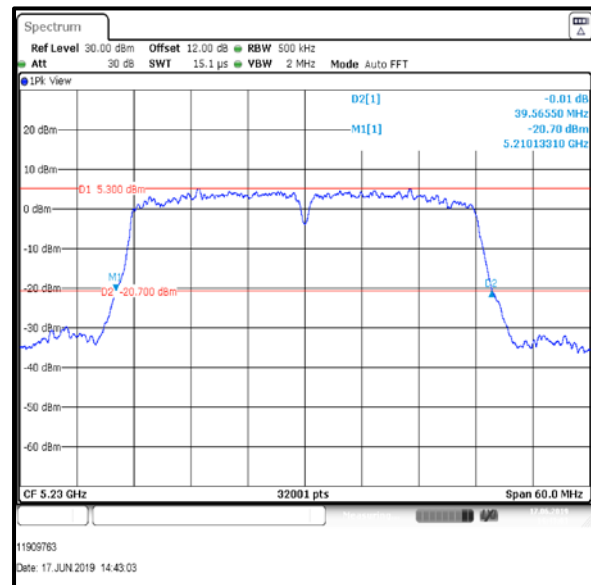
**Result: Pass**

**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / HT40 / MCS0 / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5190            | 39.859                         |
| Top     | 5230            | 39.566                         |



Bottom Channel

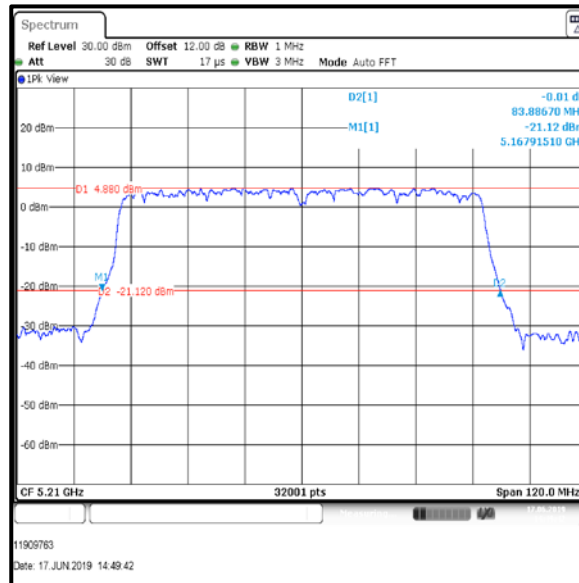


Top Channel

**Result: Pass**

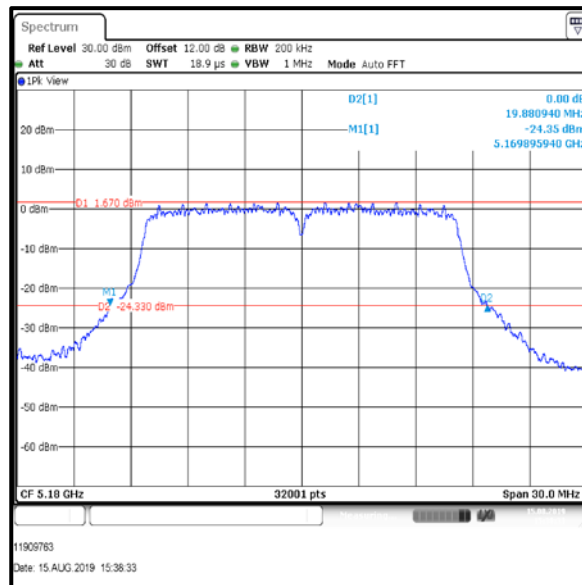
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / HT80 / MCS0 / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Single  | 5210            | 83.887                         |

**Single Channel****Result: Pass**

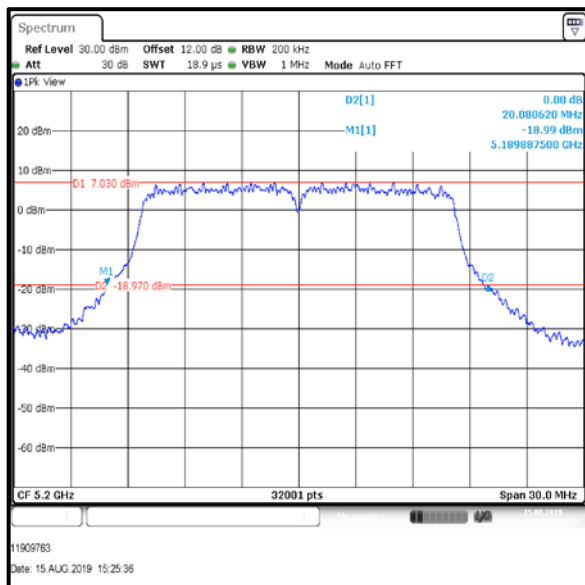
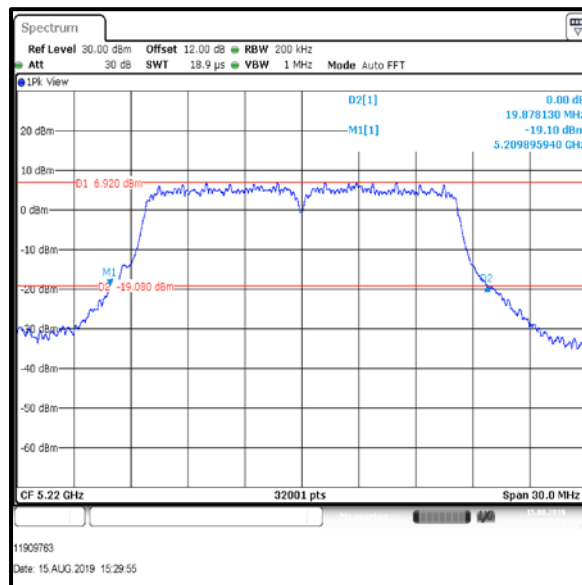
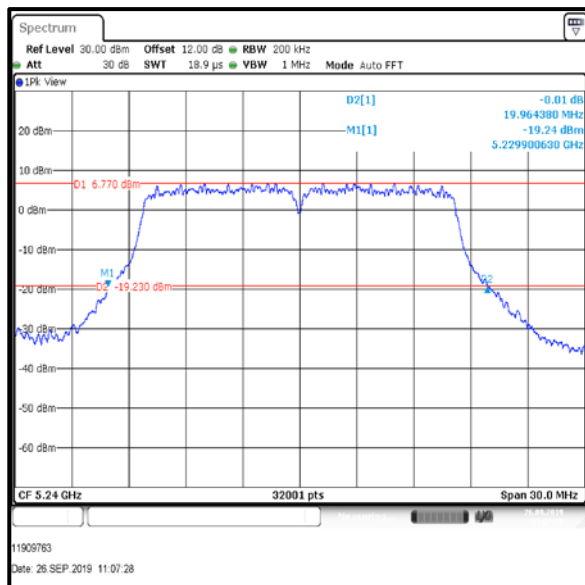
**Transmitter 26 dB Emission Bandwidth (continued)****9 dBi Antenna Group****Results: 802.11a / 20 MHz / 6 Mbps / SISO / Port 1 / PWL 12 / 9 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5180            | 19.880                         |

**Bottom Channel****Result: Pass**

**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11a / 20 MHz / 6 Mbps / SISO / Port 1 / PWL 17 / 9 dBi Antenna Group**

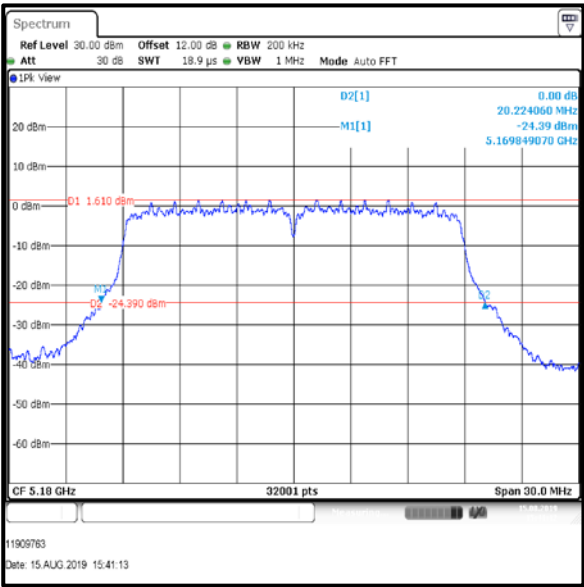
| Channel   | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|-----------|-----------------|--------------------------------|
| Bottom +1 | 5200            | 20.080                         |
| Middle    | 5220            | 19.878                         |
| Top       | 5240            | 19.964                         |

**Bottom +1 Channel****Middle Channel****Top Channel****Result: Pass**

Transmitter 26 dB Emission Bandwidth (continued)

Results: 802.11n / 20 MHz / MCS0 / SISO / Port 1 / PWL 12 / 9 dBi Antenna Group

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5180            | 20.224                         |

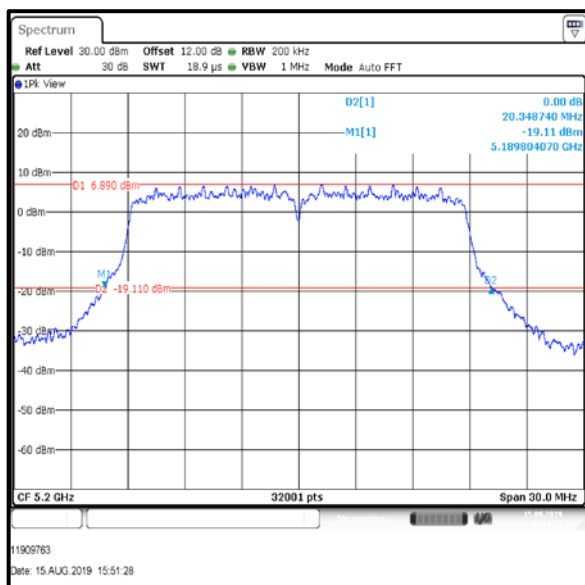
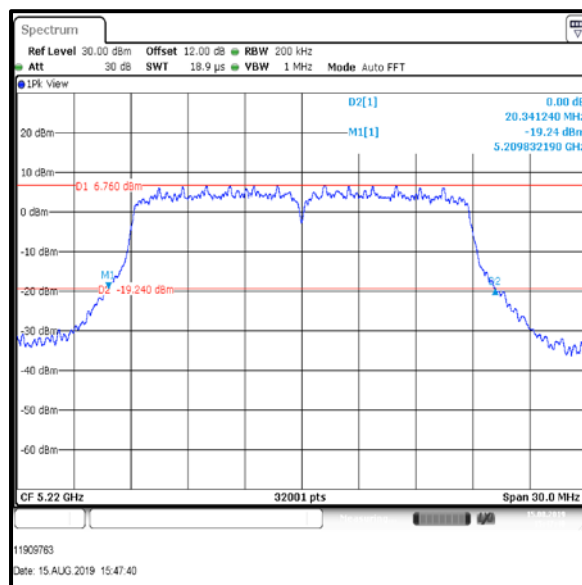
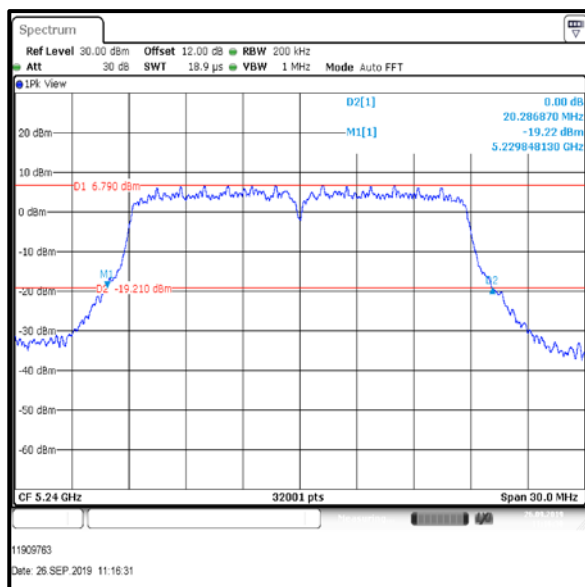


Bottom Channel

Result: Pass

**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11n / 20 MHz / MCS0 / SISO / Port 1 / PWL 17 / 9 dBi Antenna Group**

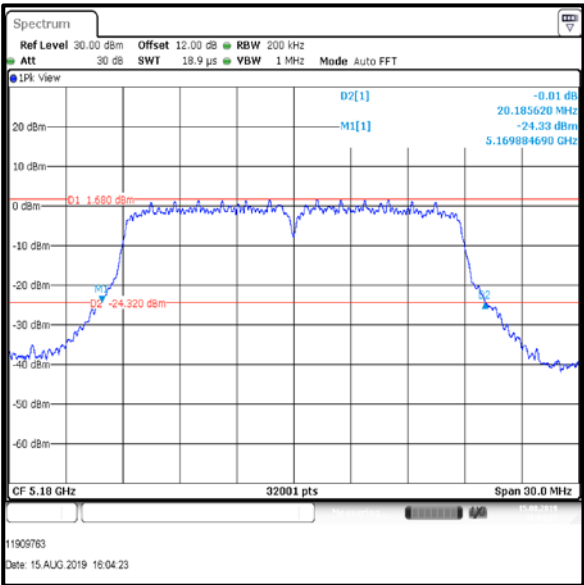
| Channel   | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|-----------|-----------------|--------------------------------|
| Bottom +1 | 5200            | 20.349                         |
| Middle    | 5220            | 20.341                         |
| Top       | 5240            | 20.287                         |

**Bottom +1 Channel****Middle Channel****Top Channel****Result: Pass**

Transmitter 26 dB Emission Bandwidth (continued)

Results: 802.11ac / 20 MHz / MCS0 / SISO / Port 1 / PWL 12 / 9 dBi Antenna Group

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5180            | 20.186                         |

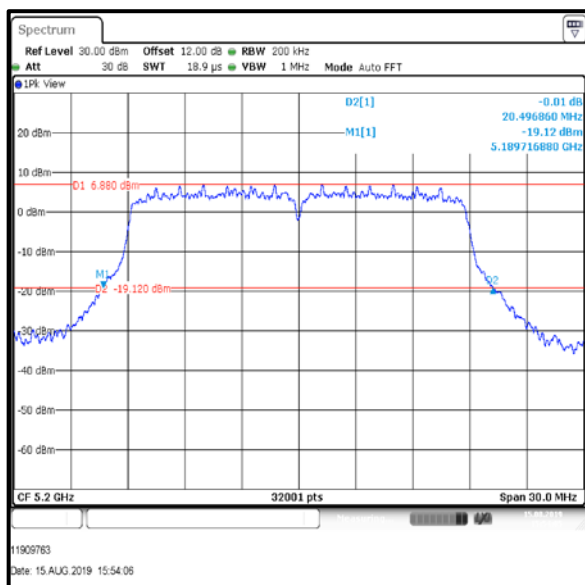
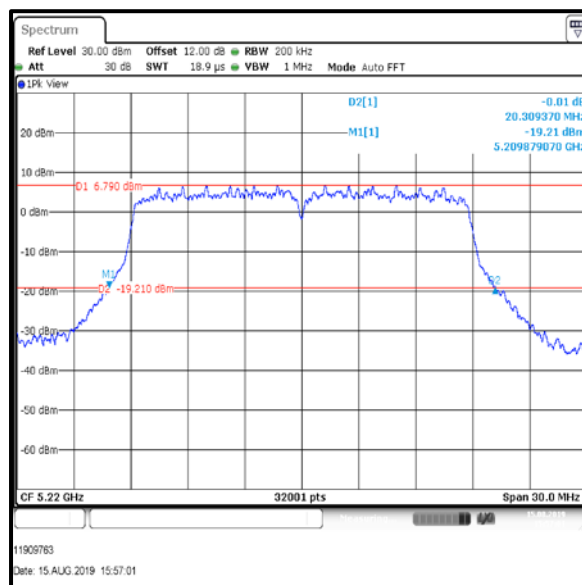
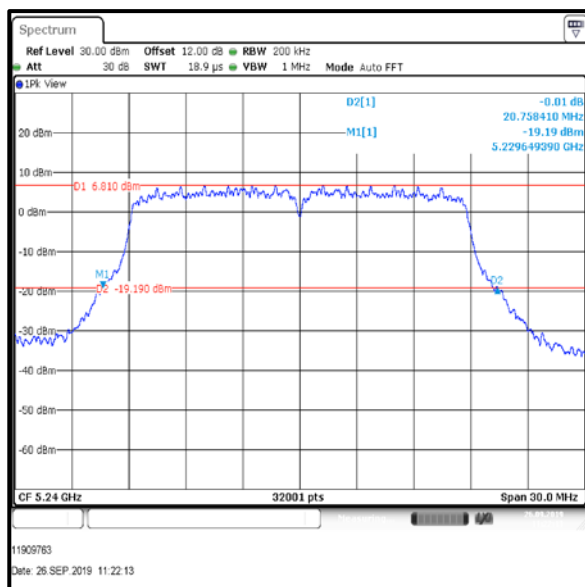


Bottom Channel

Result: Pass

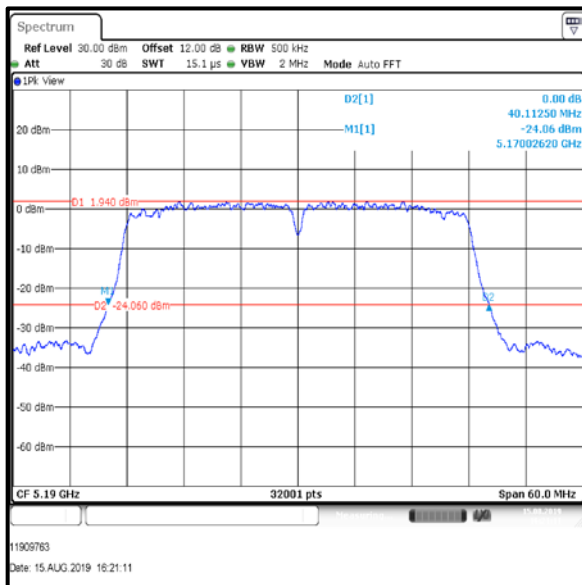
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / 20 MHz / MCS0 / SISO / Port 1 / PWL 17 / 9 dBi Antenna Group**

| Channel   | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|-----------|-----------------|--------------------------------|
| Bottom +1 | 5200            | 20.497                         |
| Middle    | 5220            | 20.309                         |
| Top       | 5240            | 20.758                         |

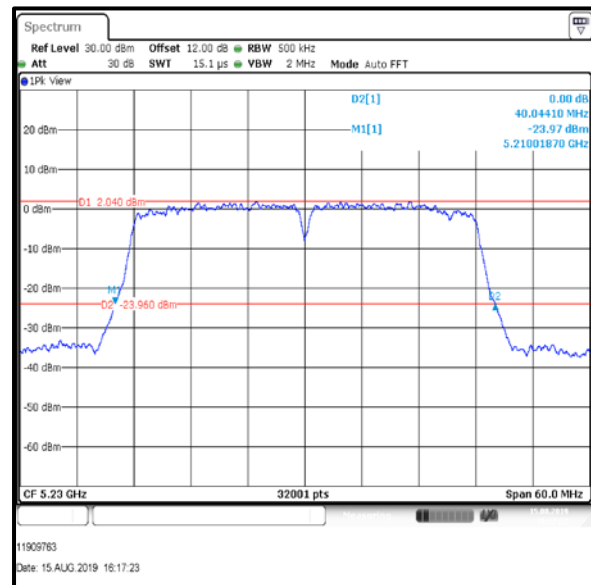
**Bottom +1 Channel****Middle Channel****Top Channel****Result: Pass**

**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11n / HT40 / MCS0 / SISO / Port 1 / PWL 12 / 9 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5190            | 40.112                         |
| Top     | 5230            | 40.044                         |



Bottom Channel

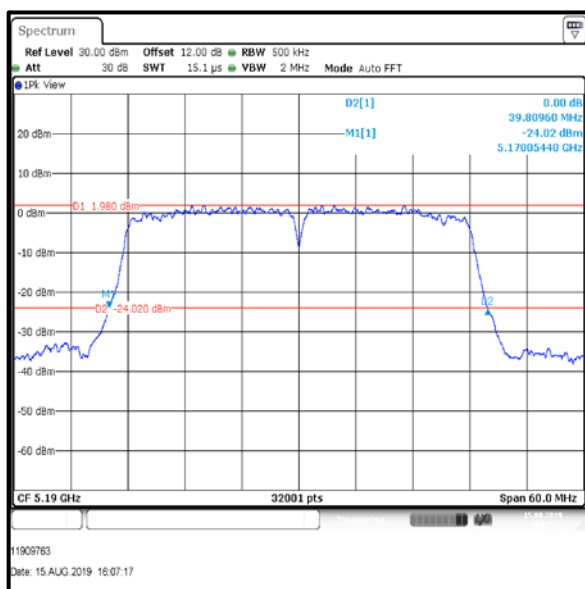


Top Channel

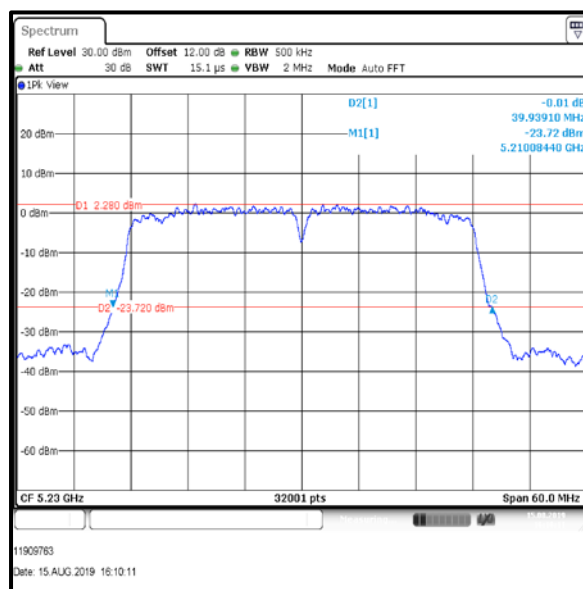
**Result: Pass**

**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / HT40 / MCS0 / SISO / Port 1 / PWL 12 / 9 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5190            | 39.810                         |
| Top     | 5230            | 39.939                         |



Bottom Channel

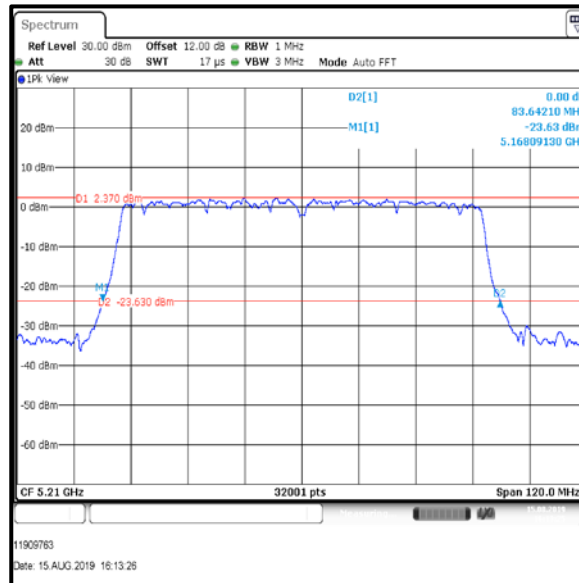


Top Channel

**Result: Pass**

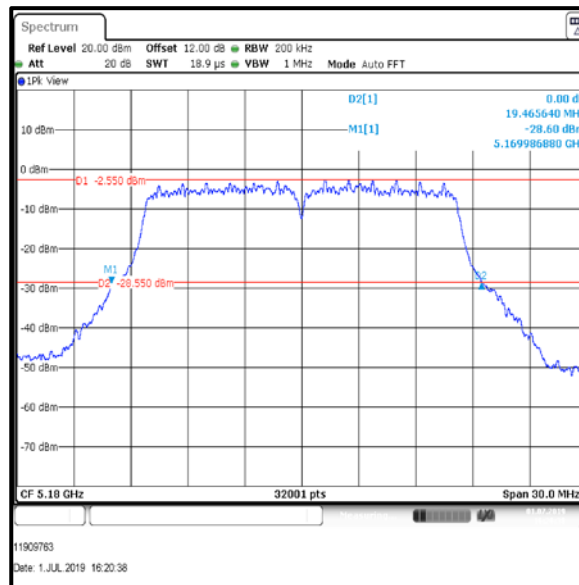
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / HT80 / MCS0 / SISO / Port 1 / PWL 12 / 9 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Single  | 5210            | 83.642                         |

**Single Channel****Result: Pass**

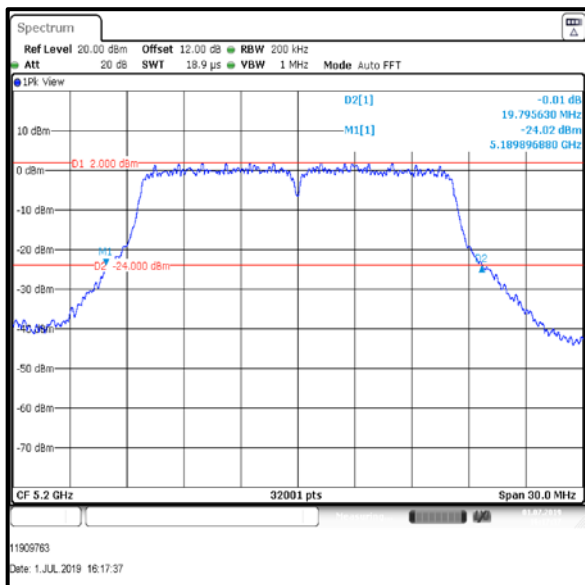
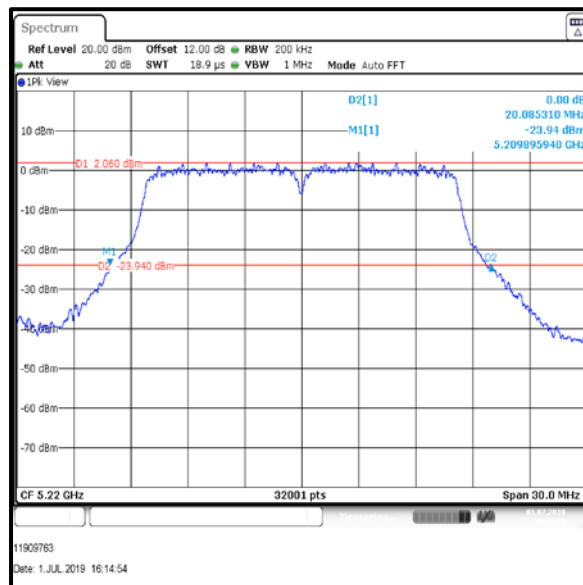
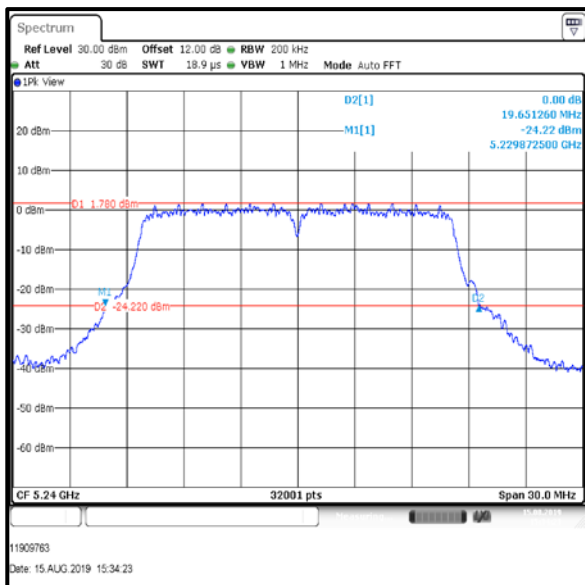
**Transmitter 26 dB Emission Bandwidth (continued)****23 dBi Antenna Group****Results: 802.11a / 20 MHz / 6 Mbps / SISO / Port 1 / PWL 7 / 23 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5180            | 19.466                         |

**Bottom Channel****Result: Pass**

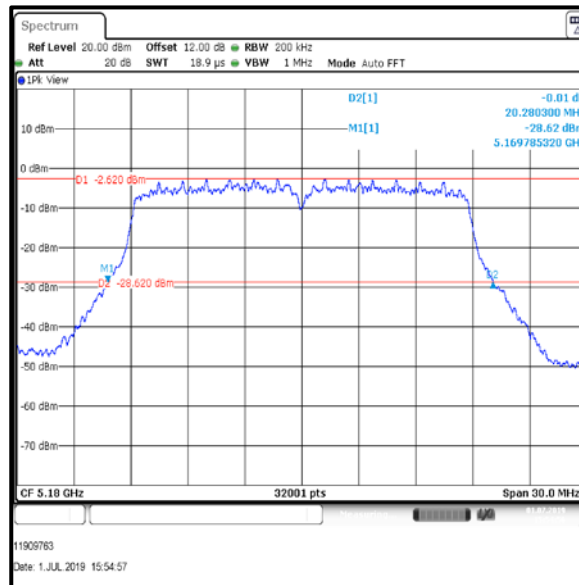
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11a / 20 MHz / 6 Mbps / SISO / Port 1 / PWL 13 / 23 dBi Antenna Group**

| Channel   | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|-----------|-----------------|--------------------------------|
| Bottom +1 | 5200            | 19.796                         |
| Middle    | 5220            | 20.085                         |
| Top       | 5240            | 19.651                         |

**Bottom +1 Channel****Middle Channel****Top Channel****Result: Pass**

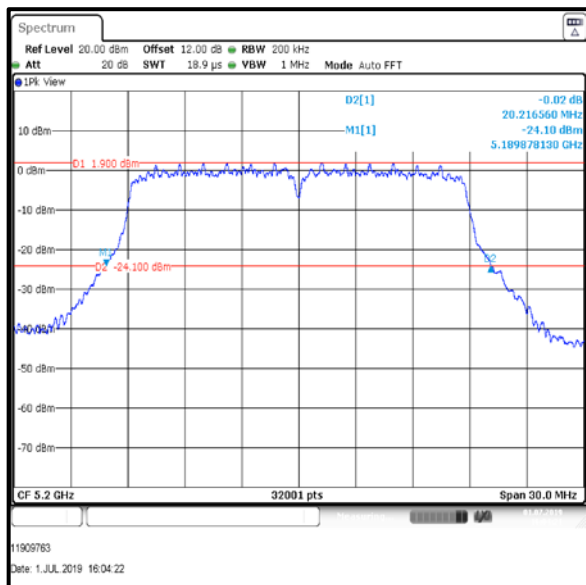
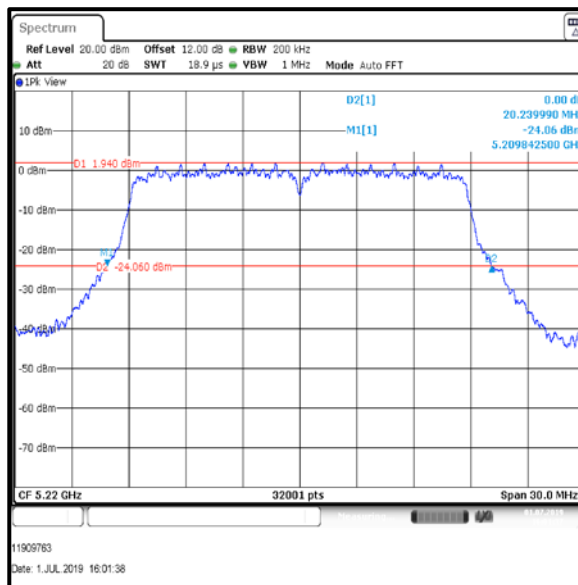
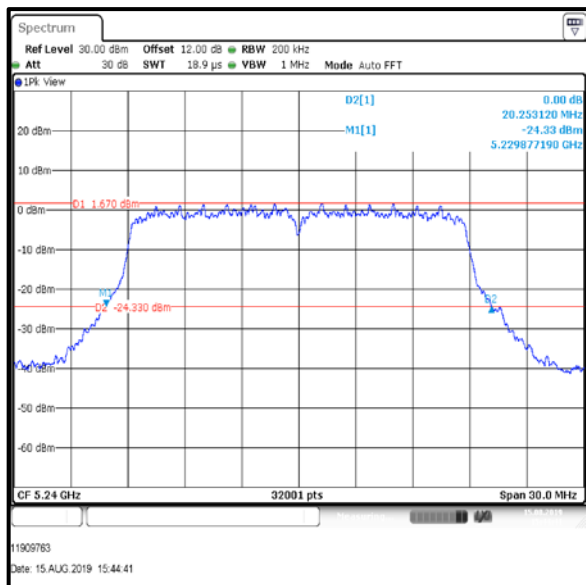
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11n / 20 MHz / MCS0 / SISO / Port 1 / PWL 7 / 23 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5180            | 20.280                         |

**Bottom Channel****Result: Pass**

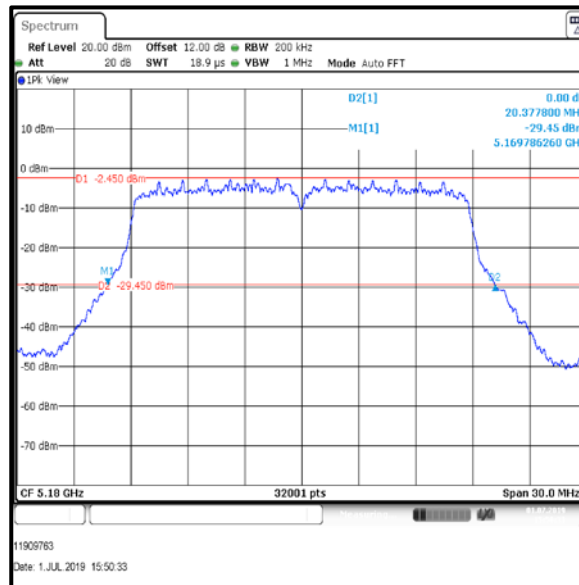
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11n / 20 MHz / MCS0 / SISO / Port 1 / PWL 13 / 23dBi Antenna Group**

| Channel   | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|-----------|-----------------|--------------------------------|
| Bottom +1 | 5200            | 20.217                         |
| Middle    | 5220            | 20.240                         |
| Top       | 5240            | 20.253                         |

**Bottom +1 Channel****Middle Channel****Top Channel****Result: Pass**

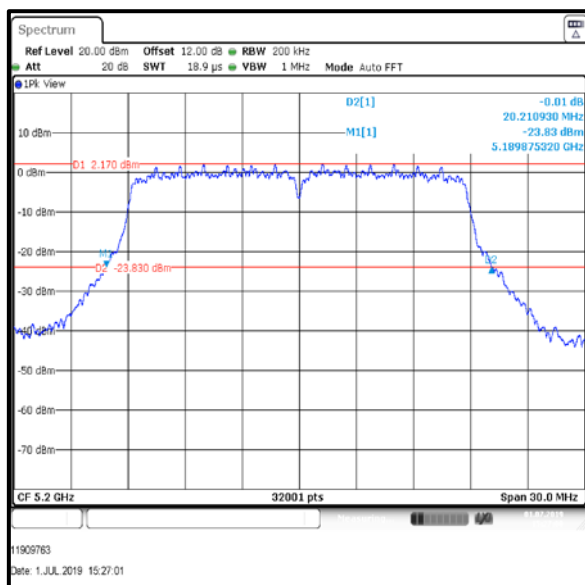
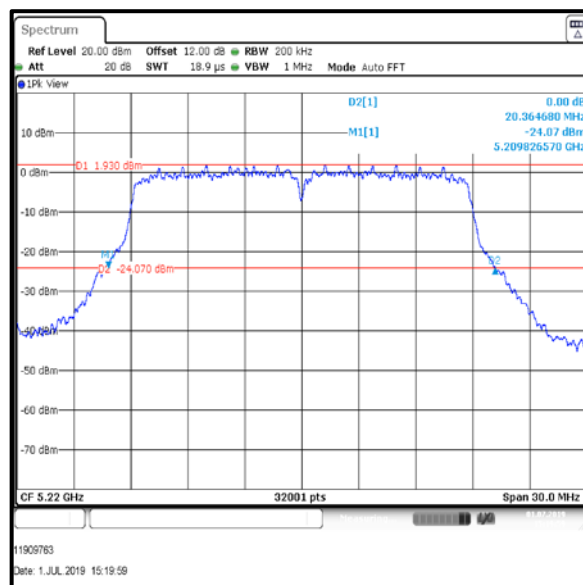
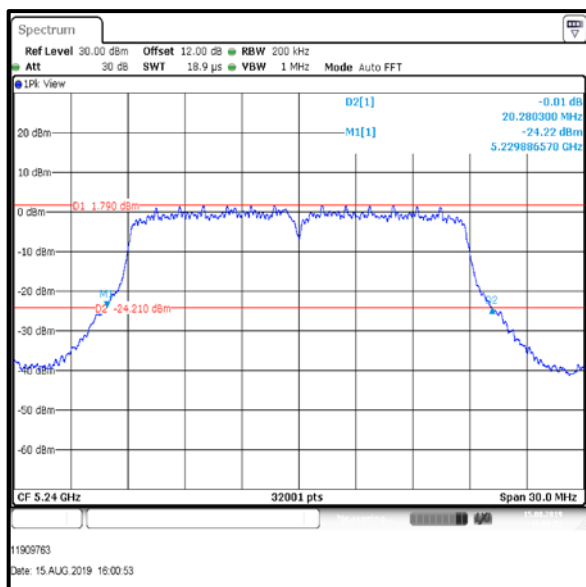
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / 20 MHz / MCS0 / SISO / Port 1 / PWL 7 / 23 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5180            | 20.378                         |

**Bottom Channel****Result: Pass**

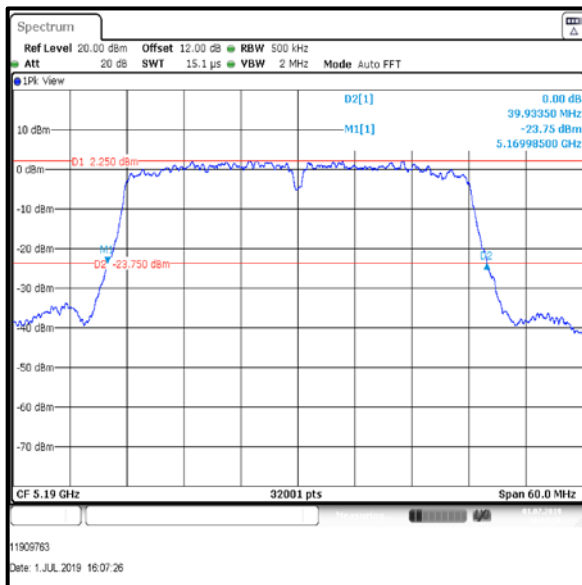
**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / 20 MHz / MCS0 / SISO / Port 1 / PWL 13 / 23 dBi Antenna Group**

| Channel   | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|-----------|-----------------|--------------------------------|
| Bottom +1 | 5200            | 20.211                         |
| Middle    | 5220            | 20.365                         |
| Top       | 5240            | 20.280                         |

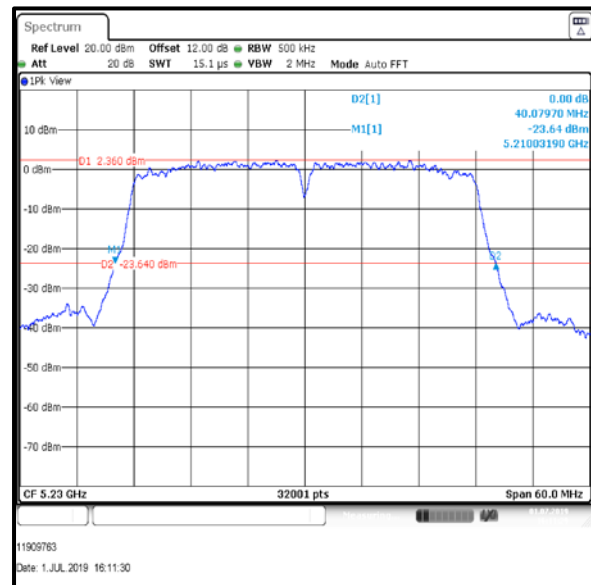
**Bottom +1 Channel****Middle Channel****Top Channel****Result: Pass**

**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11n / HT40 / MCS0 / SISO / Port 1 / PWL 10 / 23 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5190            | 39.933                         |
| Top     | 5230            | 40.080                         |



Bottom Channel

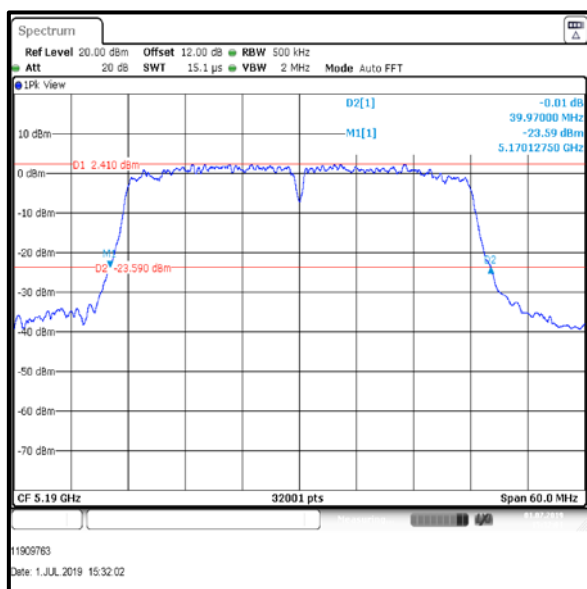


Top Channel

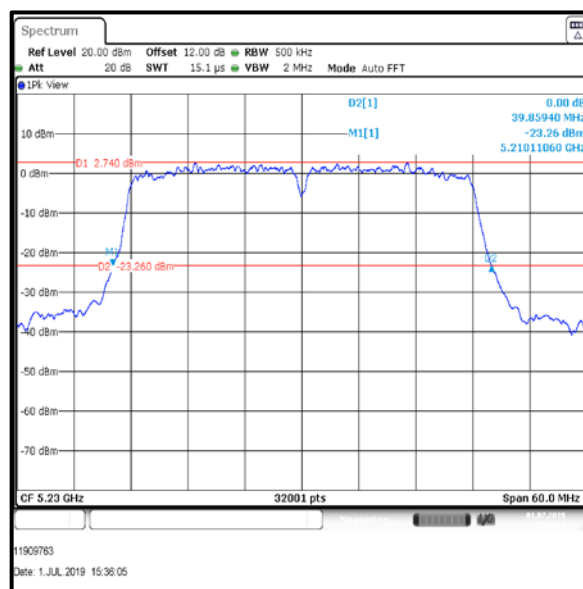
**Result: Pass**

**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / HT40 / MCS0 / SISO / Port 1 / PWL 10 / 23 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Bottom  | 5190            | 39.970                         |
| Top     | 5230            | 39.859                         |



Bottom Channel

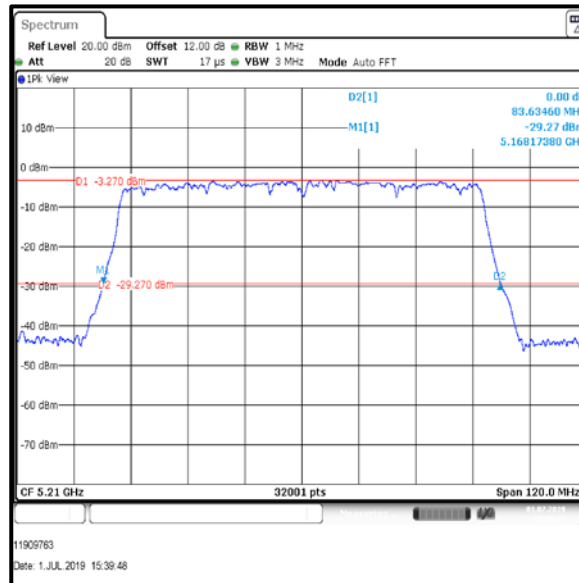


Top Channel

**Result: Pass**

**Transmitter 26 dB Emission Bandwidth (continued)****Results: 802.11ac / HT80 / MCS0 / SISO / Port 1 / PWL 7 / 23 dBi Antenna Group**

| Channel | Frequency (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Single  | 5210            | 83.635                         |

**Single Channel****Result: Pass**

**5.2.3. Transmitter Duty Cycle****Test Summary:**

|                                   |                     |                   |                  |
|-----------------------------------|---------------------|-------------------|------------------|
| <b>Test Engineer:</b>             | Abdoufataou Salifou | <b>Test Date:</b> | 07 November 2018 |
| <b>Test Sample Serial Number:</b> | 192.168.0.60        |                   |                  |
| <b>Test Site Identification</b>   | SR 9                |                   |                  |

|                          |                                  |
|--------------------------|----------------------------------|
| <b>FCC Reference:</b>    | Part 15.35(c)                    |
| <b>Test Method Used:</b> | KDB 789033 D02 Section II.B.2.b) |

**Environmental Conditions:**

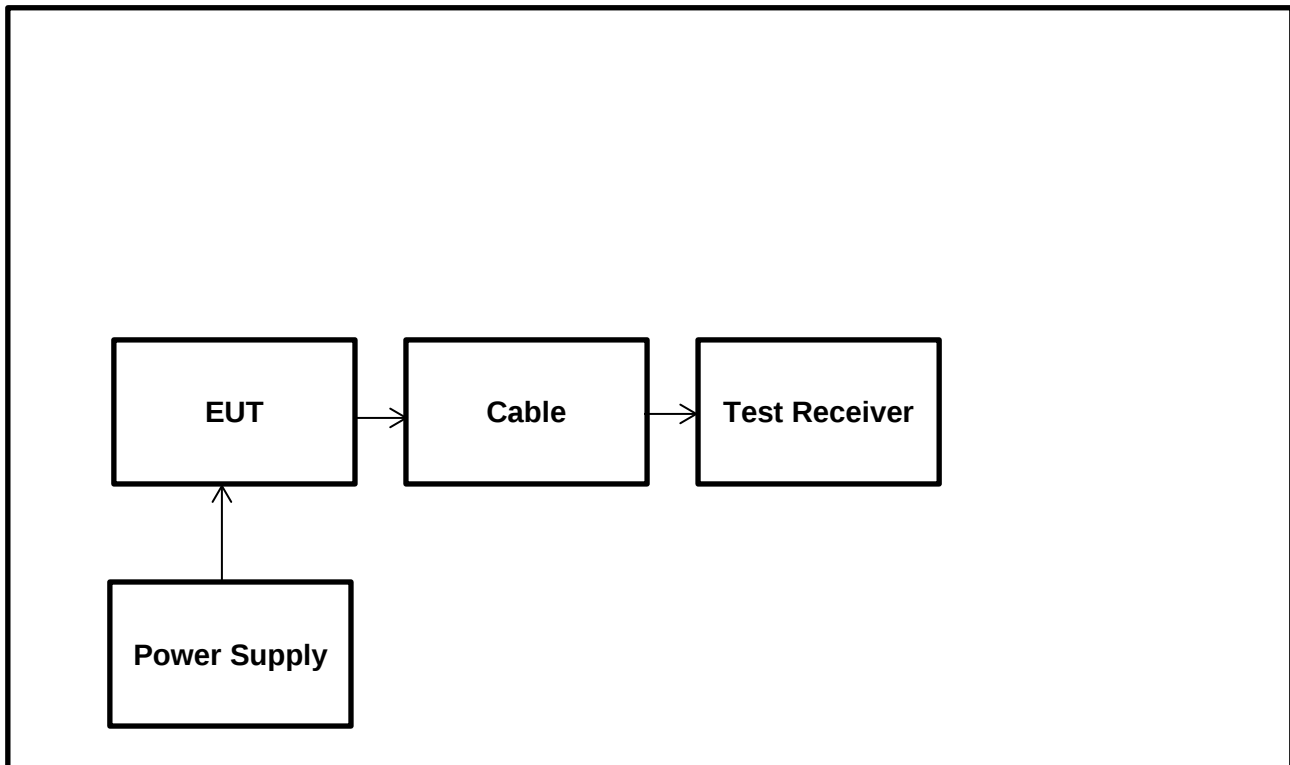
|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 23 |
| <b>Relative Humidity (%):</b> | 30 |

**Note:**

1. During initial investigations it is found that EUT was transmitting with Duty Cycle  $\leq 98\%$ .
2. In order to assist with the determination of the average level of fundamental and spurious emissions field strength, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:  

$$\text{Duty Cycle (\%)} = 100 \times [\text{On Time (T}_{\text{ON}})] / [\text{Period(T}_{\text{ON}} + \text{T}_{\text{OFF}}) \text{ or } 100\text{ms whichever is the lesser}]$$

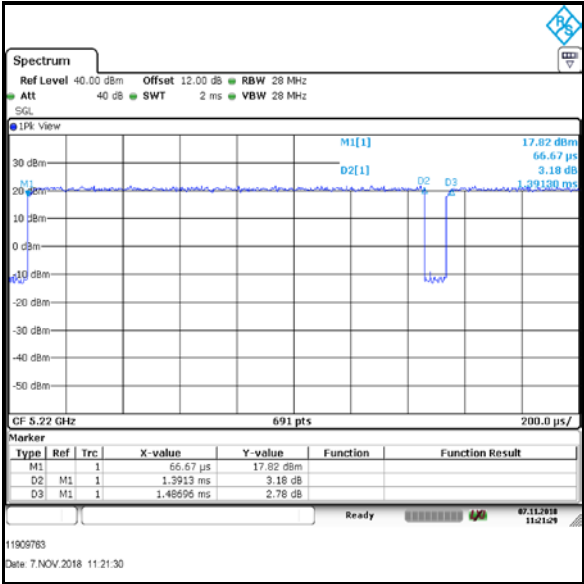
$$\text{Duty Cycle Correction Factor} = 10 \log 1 / [\text{On Time (T}_{\text{ON}})] / [\text{Period(T}_{\text{ON}} + \text{T}_{\text{OFF}}) \text{ or } 100\text{ms whichever is the lesser}]$$
3. Duty cycles were measured with worst case SISO mode; as they found to be same independent of number of transmitter chains used.
4. These results are valid for all supported SISO & MIMO modes as well as for listed Antenna groups.
5. The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values takes into consideration the external attenuation correction factors. The RF cable attenuation (maximum 2.0 dB@5GHz) from the EUT to Analyzer including the 10 dB attenuation at the Spectrum Analyzer input was added as a reference level offset (12.0 dB) to each of the conducted plots.

**Transmitter Duty Cycle (continued)****Test Setup:**

Transmitter Duty Cycle (continued)

Results: 802.11a / 20 MHz / 6 Mbps

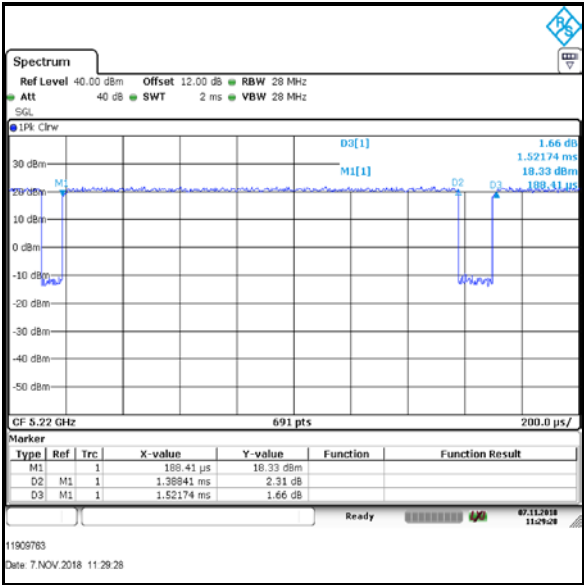
| Pulse On Time (T <sub>ON</sub> )<br>(ms) | Pulse Period (T <sub>ON</sub> +T <sub>OFF</sub> )<br>(ms) | Duty Cycle<br>(%) | Duty Cycle Correction Factor<br>(dB) |
|------------------------------------------|-----------------------------------------------------------|-------------------|--------------------------------------|
| 1.391                                    | 1.487                                                     | 93.54             | 0.3                                  |



Transmitter Duty Cycle (continued)

Results: 802.11n / 20 MHz / MCS0

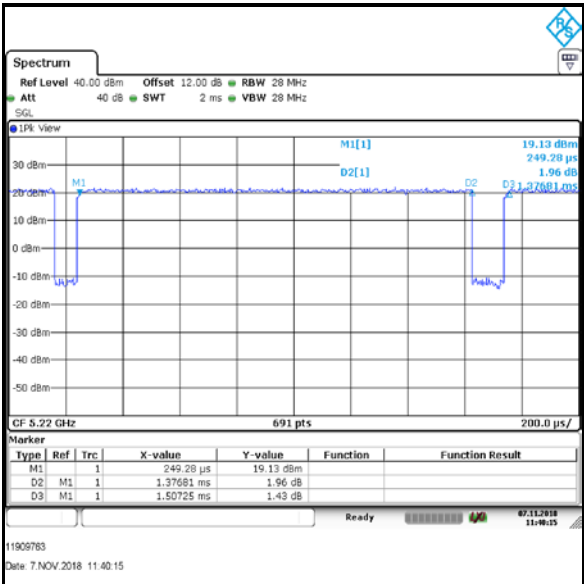
| Pulse On Time (T <sub>ON</sub> )<br>(ms) | Pulse Period (T <sub>ON</sub> +T <sub>OFF</sub> )<br>(ms) | Duty Cycle<br>(%) | Duty Cycle Correction Factor<br>(dB) |
|------------------------------------------|-----------------------------------------------------------|-------------------|--------------------------------------|
| 1.388                                    | 1.522                                                     | 91.19             | 0.5                                  |



Transmitter Duty Cycle (continued)

Results: 802.11ac / 20 MHz / MCS0

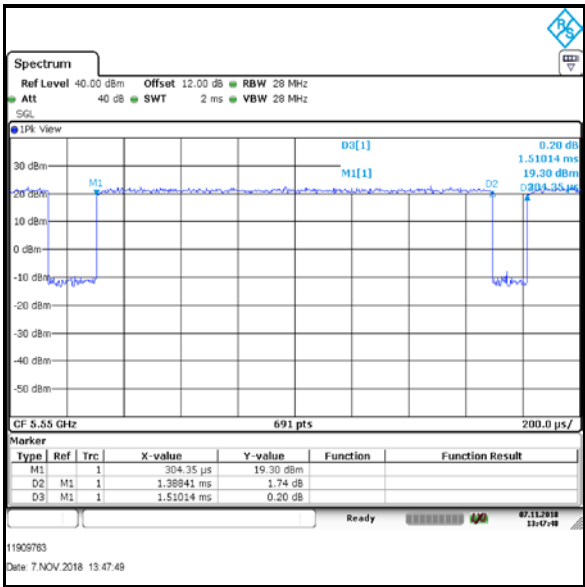
| Pulse On Time (T <sub>ON</sub> ) (ms) | Pulse Period (T <sub>ON</sub> +T <sub>OFF</sub> ) (ms) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) |
|---------------------------------------|--------------------------------------------------------|----------------|-----------------------------------|
| 1.377                                 | 1.507                                                  | 91.37          | 0.4                               |



Transmitter Duty Cycle (continued)

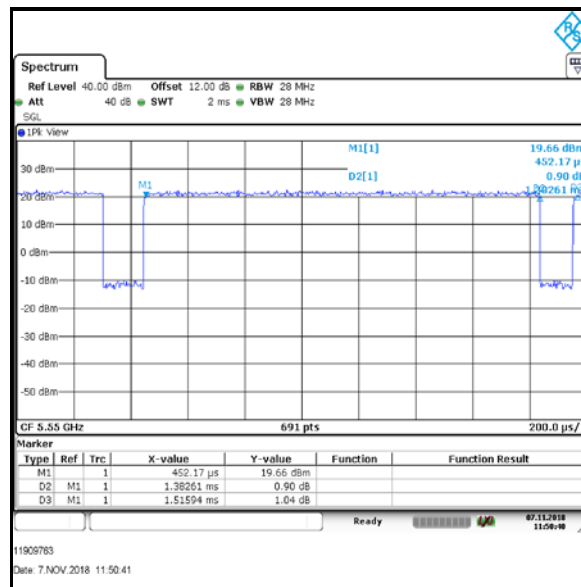
Results: 802.11n / 40 MHz / MCS0

| Pulse On Time (T <sub>ON</sub> ) (ms) | Pulse Period (T <sub>ON</sub> +T <sub>OFF</sub> ) (ms) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) |
|---------------------------------------|--------------------------------------------------------|----------------|-----------------------------------|
| 1.388                                 | 1.510                                                  | 91.92          | 0.4                               |



**Transmitter Duty Cycle (continued)****Results: 802.11ac / 40 MHz / MCS0**

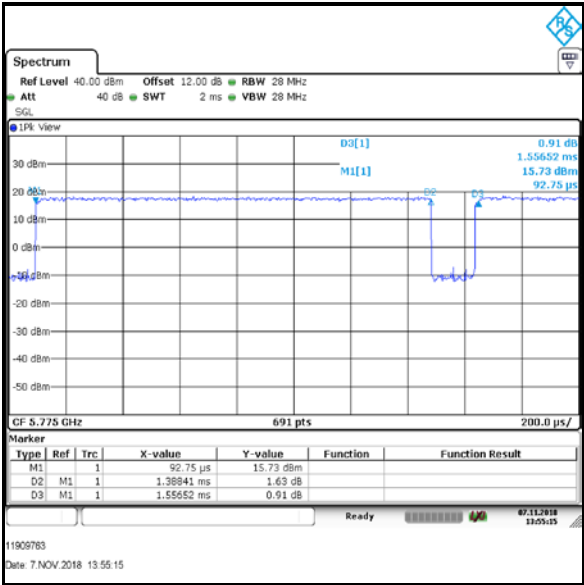
| Pulse On Time (T <sub>ON</sub> )<br>(ms) | Pulse Period (T <sub>ON</sub> + T <sub>OFF</sub> )<br>(ms) | Duty Cycle<br>(%) | Duty Cycle Correction Factor<br>(dB) |
|------------------------------------------|------------------------------------------------------------|-------------------|--------------------------------------|
| 1.383                                    | 1.516                                                      | 91.22             | 0.4                                  |



Transmitter Duty Cycle (continued)

Results: 802.11ac / 80 MHz / MCS0

| Pulse On Time (T <sub>ON</sub> )<br>(ms) | Pulse Period (T <sub>ON</sub> +T <sub>OFF</sub> )<br>(ms) | Duty Cycle<br>(%) | Duty Cycle Correction Factor<br>(dB) |
|------------------------------------------|-----------------------------------------------------------|-------------------|--------------------------------------|
| 1.388                                    | 1.556                                                     | 89.20             | 0.5                                  |



**5.2.4. Transmitter Maximum Conducted Output Power****Test Summary:**

|                                   |                     |                    |                                       |
|-----------------------------------|---------------------|--------------------|---------------------------------------|
| <b>Test Engineer:</b>             | Abdoufataou Salifou | <b>Test Dates:</b> | 27 February 2019 to 20 September 2019 |
| <b>Test Sample Serial Number:</b> | 192.168.0.60        |                    |                                       |
| <b>Test Site Identification</b>   | SR 9                |                    |                                       |

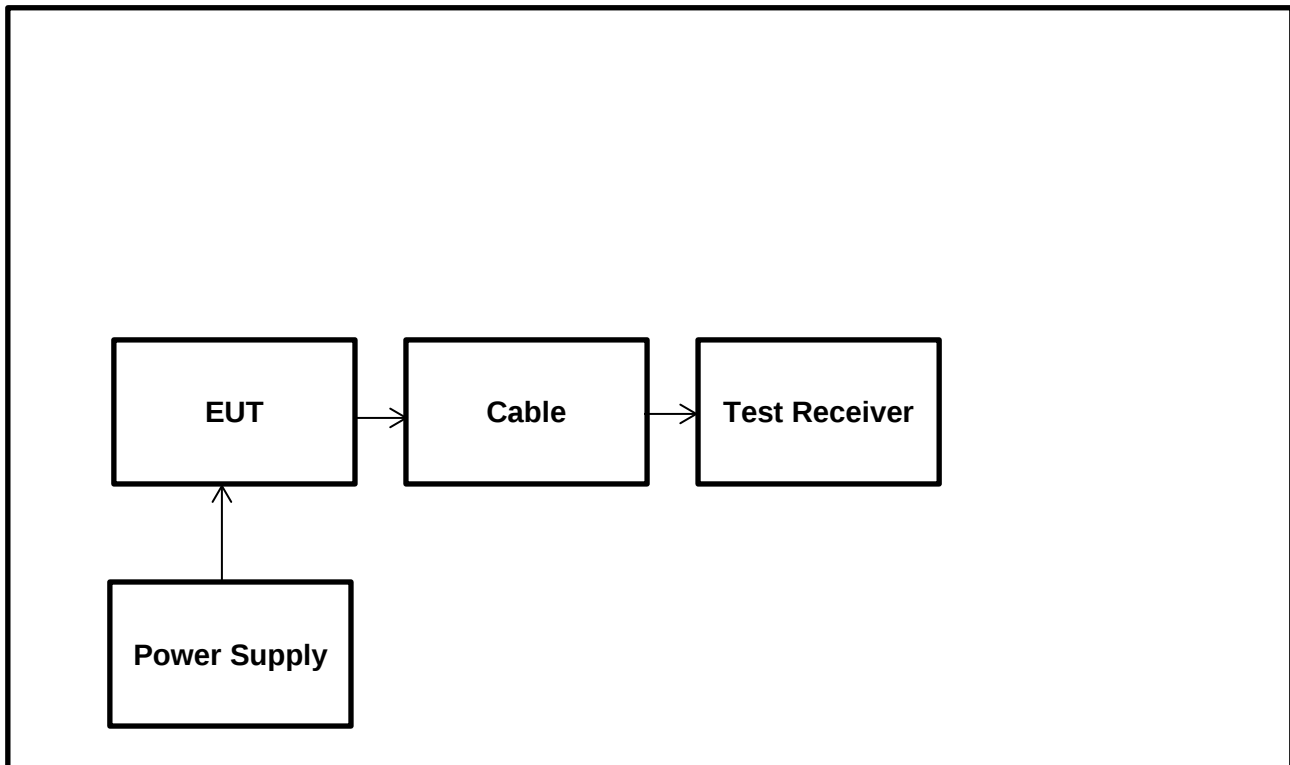
|                          |                                                                  |
|--------------------------|------------------------------------------------------------------|
| <b>FCC Reference:</b>    | Part 15.407(a)(1)(iv)                                            |
| <b>Test Method Used:</b> | KDB 789033 D02 Section II.E.2.d)<br>KDB 662911 D01 Section E) 1) |

**Environmental Conditions:**

|                               |          |
|-------------------------------|----------|
| <b>Temperature (°C):</b>      | 20 to 28 |
| <b>Relative Humidity (%):</b> | 27 to 33 |

**Notes:**

- For conducted power tests where the duty cycle is <98%, the measurements were performed in accordance with FCC KDB 789033 II.E.2.d) Method SA-2. The signal analyser's integration function was used to integrate across the 99% emission bandwidth. The resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. An RMS detector was used and sweep time was set to auto and 300 traces performed. The span was set to encompass the entire 99% occupied bandwidth. The channel power results are recorded in the tables below.
- For all data rates the EUT was transmitting at <98% duty cycle, the calculated duty cycle in section 5.2.3 was added to the measured power in order to compute the average power during the actual transmission time.
- The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values takes into consideration the external attenuation correction factors. The RF cable attenuation (maximum 2.0 dB@5GHz) from the EUT to Analyzer including the 10 dB attenuation at the Spectrum Analyzer input was added as a reference level offset (12.0 dB) to each of the conducted plots.
- For MIMO, power was measured across relevant ports and then combined using the measure-and-sum technique stated in FCC KDB 662911 D01 Section E)1).
- The EUT may be used either as Master or as Client WLAN device, so the EUT has been tested to the limits for a client device as these are more stringent.
- The EUT antennas have a directional gain of > 6 dBi.
- In accordance with 15.407(a)(1)(iv), transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power limits shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- Therefore reduced maximum conducted output power limits are as follows:
  - 8 dBi Antenna Group :
    - Therefore the limit of 24 dBm has been reduced by 2 dB to 22 dBm
  - 9 dBi Antenna Group :
    - Therefore the limit of 24 dBm has been reduced by 3 dB to 21 dBm
  - 23 dBi Antenna Group:
    - As per applicant's declaration 23 dBi Antenna shall be only used with RF cable of length 10 m having 8.8 dB Attenuation @ 5 GHz bands.
    - Effective Antenna Gain = 23 dBi – 8.8 dB = 14.2 dBi
    - Therefore the limit of 24 dBm has been reduced by 8.2 dB to 15.8 dBm

**Transmitter Maximum Conducted Output Power (continued)****Test Setup:**

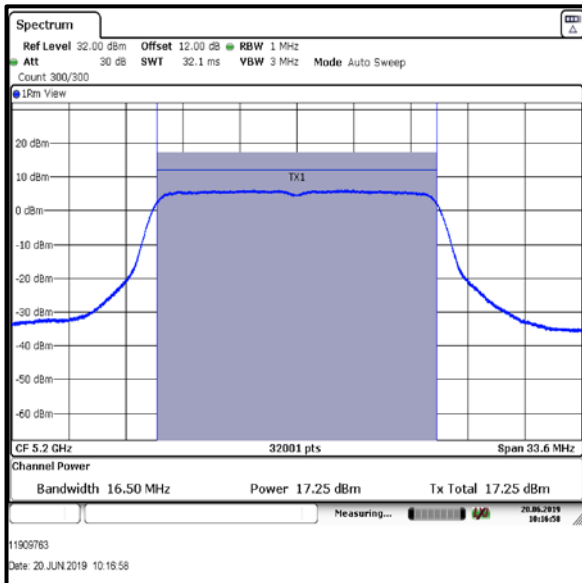
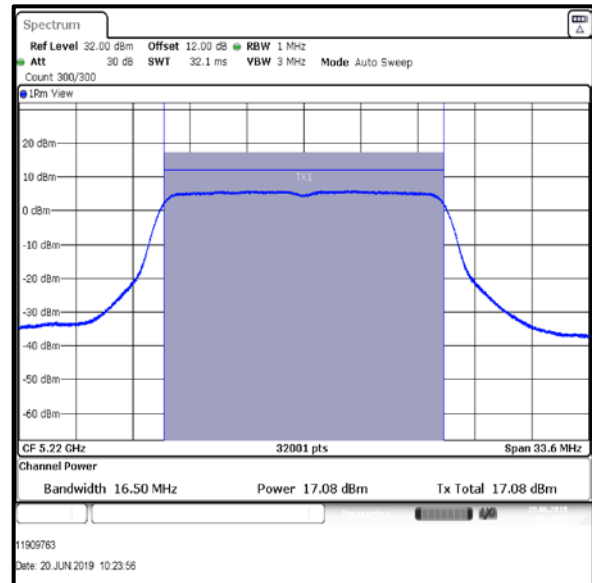
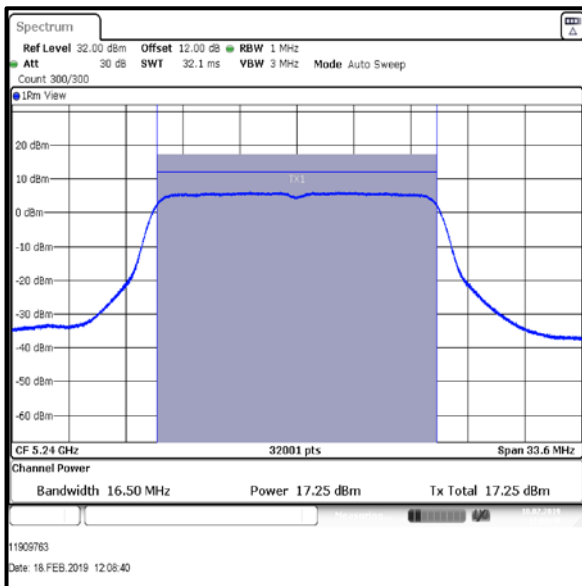
**Transmitter Maximum Conducted Output Power (continued)****8 dBi Antenna Group****Results: 802.11a / 20 MHz / 6 Mbps / SISO / Port 1 / PWL 18 / 8 dBi Antenna Group**

| Channel   | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------|-----------------------|----------------------------|---------------------------------|-------------|-------------|----------|
| Bottom +1 | 17.3                  | 0.3                        | 17.6                            | 22.0        | 4.4         | Complied |
| Middle    | 17.1                  | 0.3                        | 17.4                            | 22.0        | 4.6         | Complied |
| Top       | 17.3                  | 0.3                        | 17.6                            | 22.0        | 4.4         | Complied |

**De Facto EIRP Limit Comparison**

| Channel   | Corrected Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|-----------|---------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom +1 | 17.6                            | 8.0                            | 25.6       | 30.0                      | 4.4         | Complied |
| Middle    | 17.4                            | 8.0                            | 25.4       | 30.0                      | 4.6         | Complied |
| Top       | 17.6                            | 8.0                            | 25.6       | 30.0                      | 4.4         | Complied |

**Result: Pass**

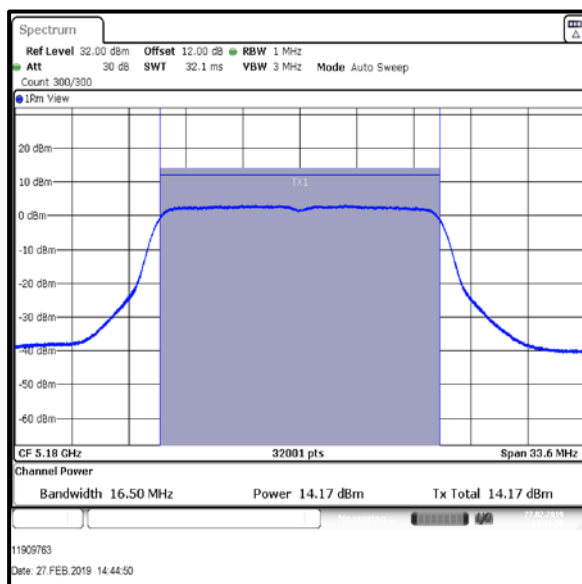
**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11a / 20 MHz / 6 Mbps / SISO / Port 1 / PWL 18 / 8 dBi Antenna Group****Bottom +1 Channel****Middle Channel****Top Channel**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11a / 20 MHz / 6 Mbps / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------------|----------------------------|---------------------------------|-------------|-------------|----------|
| Bottom  | 14.2                  | 0.3                        | 14.5                            | 22.0        | 7.5         | Complied |

**De Facto EIRP Limit Comparison**

| Channel | Corrected Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|---------|---------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom  | 14.5                            | 8.0                            | 22.5       | 30.0                      | 7.5         | Complied |

**Bottom Channel****Result: Pass**

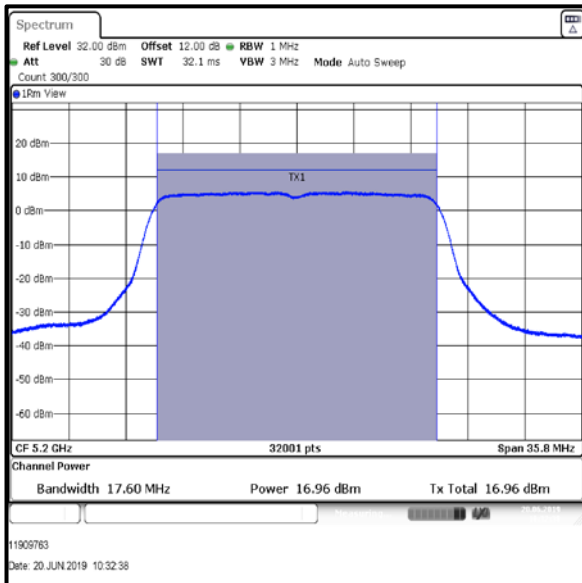
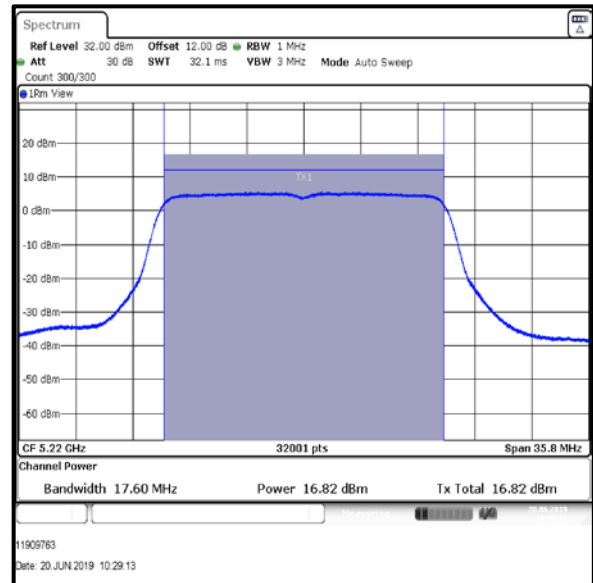
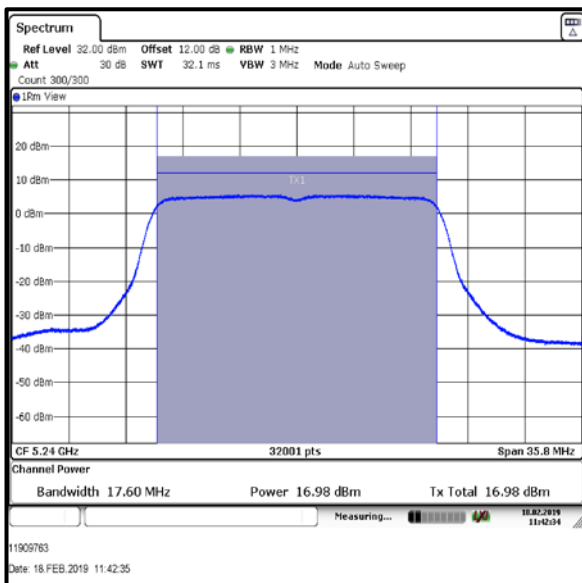
**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11n / 20 MHz / MCS0 / SISO / Port 1 / PWL 18 / 8 dBi Antenna Group**

| Channel   | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------|-----------------------|----------------------------|---------------------------------|-------------|-------------|----------|
| Bottom +1 | 17.0                  | 0.5                        | 17.5                            | 22.0        | 4.5         | Complied |
| Middle    | 16.8                  | 0.5                        | 17.3                            | 22.0        | 4.7         | Complied |
| Top       | 17.0                  | 0.5                        | 17.5                            | 22.0        | 4.5         | Complied |

**De Facto EIRP Limit Comparison**

| Channel   | Corrected Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|-----------|---------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom +1 | 17.5                            | 8.0                            | 25.5       | 30.0                      | 4.5         | Complied |
| Middle    | 17.3                            | 8.0                            | 25.3       | 30.0                      | 4.7         | Complied |
| Top       | 17.5                            | 8.0                            | 25.5       | 30.0                      | 4.5         | Complied |

**Result: Pass**

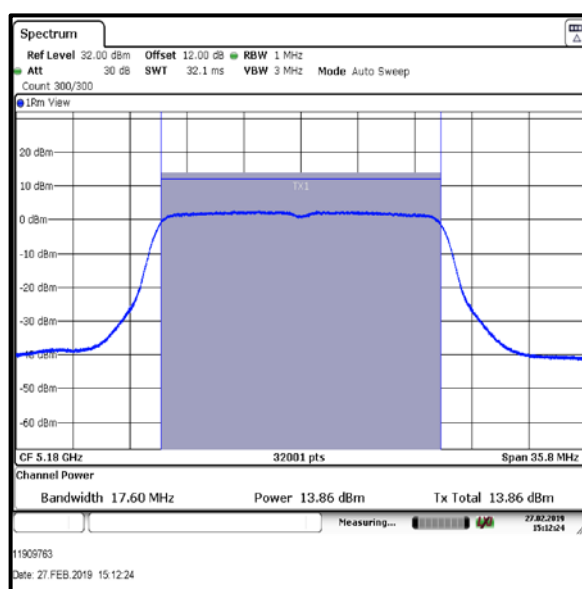
**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11n / 20 MHz / MCS0 / SISO / Port 1 / PWL 18 / 8 dBi Antenna Group****Bottom +1 Channel****Middle Channel****Top Channel**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11n / 20 MHz / MCS0 / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------------|----------------------------|---------------------------------|-------------|-------------|----------|
| Bottom  | 13.9                  | 0.5                        | 14.4                            | 22.0        | 7.6         | Complied |

**De Facto EIRP Limit Comparison**

| Channel | Corrected Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|---------|---------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom  | 14.4                            | 8.0                            | 22.4       | 30.0                      | 7.6         | Complied |

**Bottom Channel****Result: Pass**

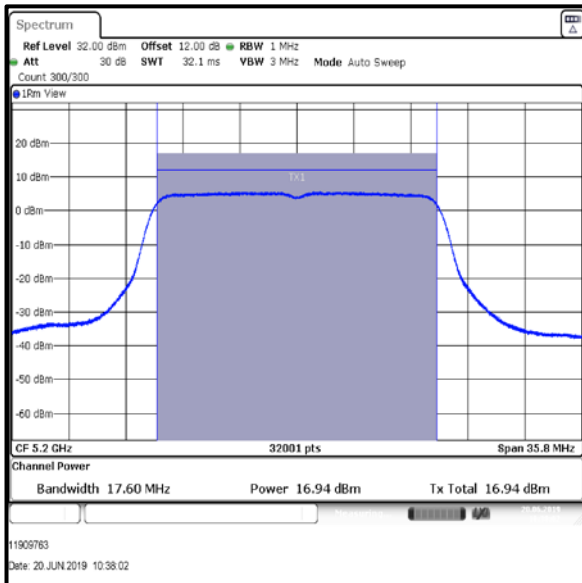
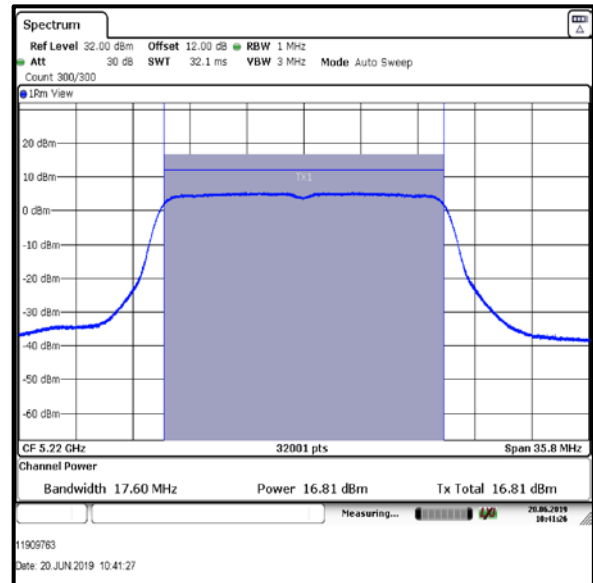
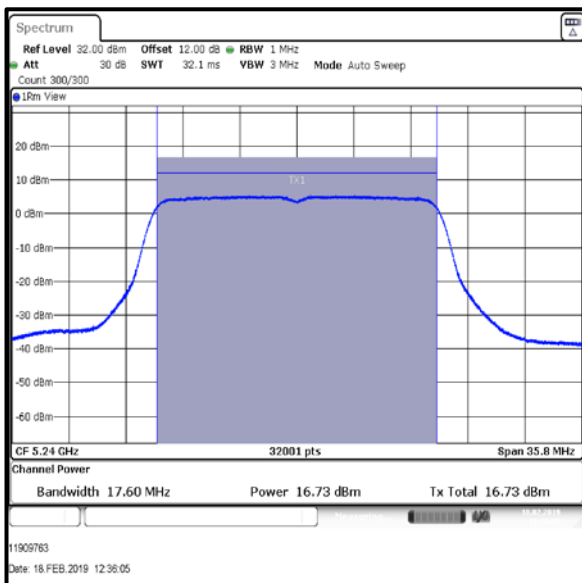
**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11ac / 20 MHz / MCS0 / SISO / Port 1 / PWL 18 / 8 dBi Antenna Group**

| Channel   | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------|-----------------------|----------------------------|---------------------------------|-------------|-------------|----------|
| Bottom +1 | 16.9                  | 0.4                        | 17.3                            | 22.0        | 4.7         | Complied |
| Middle    | 16.8                  | 0.4                        | 17.2                            | 22.0        | 4.8         | Complied |
| Top       | 16.7                  | 0.4                        | 17.1                            | 22.0        | 8.2         | Complied |

**De Facto EIRP Limit Comparison**

| Channel   | Corrected Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|-----------|---------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom +1 | 17.2                            | 8.0                            | 25.2       | 30.0                      | 4.8         | Complied |
| Middle    | 17.3                            | 8.0                            | 25.3       | 30.0                      | 4.7         | Complied |
| Top       | 17.1                            | 8.0                            | 25.1       | 30.0                      | 4.9         | Complied |

**Result: Pass**

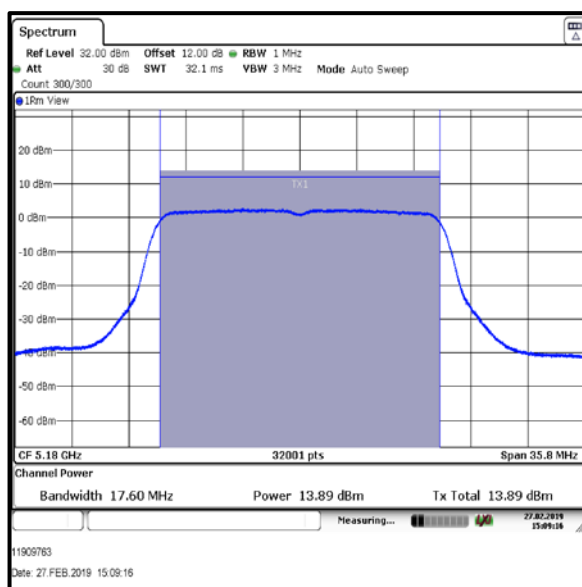
**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11ac / 20 MHz / MCS0 / SISO / Port 1 / PWL 18 / 8 dBi Antenna Group****Bottom +1 Channel****Middle Channel****Top Channel**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11ac / 20 MHz / MCS0 / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------------|----------------------------|---------------------------------|-------------|-------------|----------|
| Bottom  | 13.9                  | 0.4                        | 14.3                            | 22.0        | 7.7         | Complied |

**De Facto EIRP Limit Comparison**

| Channel | Corrected Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|---------|---------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom  | 14.3                            | 8.0                            | 22.3       | 30.0                      | 7.7         | Complied |

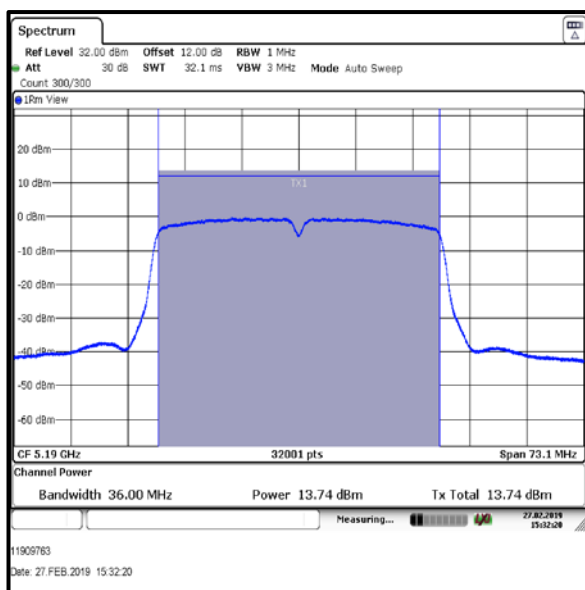
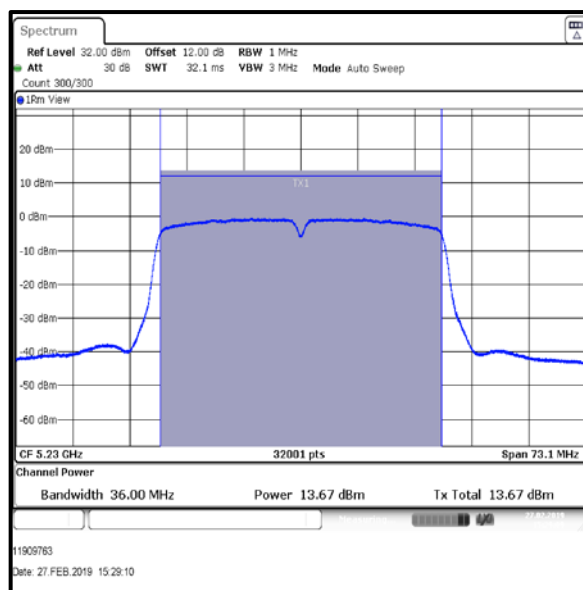
**Bottom Channel****Result: Pass**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11n / HT40 / MCS0 / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------------|----------------------------|---------------------------------|-------------|-------------|----------|
| Bottom  | 13.7                  | 0.4                        | 14.1                            | 22.0        | 7.9         | Complied |
| Top     | 13.7                  | 0.4                        | 14.1                            | 22.0        | 7.9         | Complied |

**De Facto EIRP Limit Comparison**

| Channel | Corrected Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|---------|---------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom  | 14.1                            | 8.0                            | 22.1       | 30.0                      | 7.9         | Complied |
| Top     | 14.1                            | 8.0                            | 22.1       | 30.0                      | 7.9         | Complied |

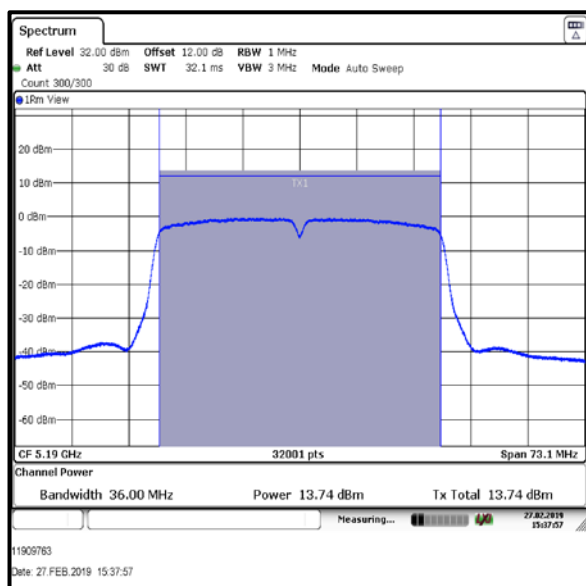
**Bottom Channel****Top Channel****Result: Pass**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11ac / HT40 / MCS0 / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

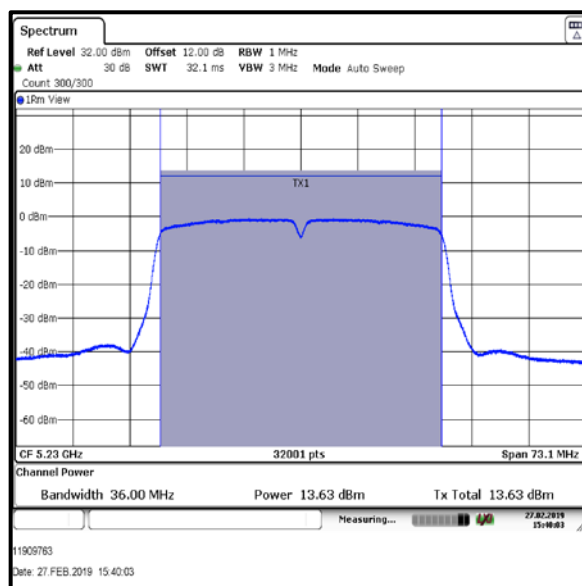
| Channel | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------------|----------------------------|---------------------------------|-------------|-------------|----------|
| Bottom  | 13.7                  | 0.4                        | 14.1                            | 22.0        | 7.9         | Complied |
| Top     | 13.6                  | 0.4                        | 14.0                            | 22.0        | 8.0         | Complied |

**De Facto EIRP Limit Comparison**

| Channel | Corrected Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|---------|---------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom  | 14.1                            | 8.0                            | 22.1       | 30.0                      | 7.9         | Complied |
| Top     | 14.0                            | 8.0                            | 22.0       | 30.0                      | 8.0         | Complied |



Bottom Channel



Top Channel

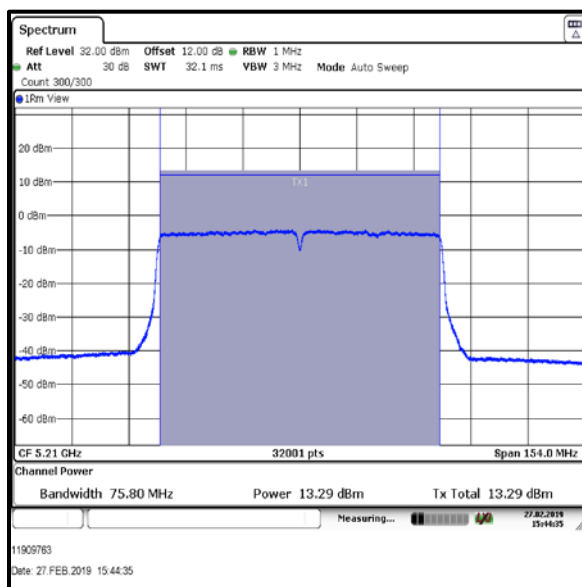
**Result: Pass**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11ac / HT80 / MCS0 / SISO / Port 1 / PWL 15 / 8 dBi Antenna Group**

| Channel | Frequency (MHz) | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------|-----------------------|----------------------------|---------------------------------|-------------|-------------|----------|
| Single  | 5210            | 13.3                  | 0.5                        | 13.8                            | 22.0        | 8.2         | Complied |

**De Facto EIRP Limit Comparison**

| Channel | Corrected Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|---------|---------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Single  | 13.8                            | 8.0                            | 21.8       | 30.0                      | 8.2         | Complied |

**Single Channel****Result: Pass**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11a / 20 MHz / 6Mbps / MIMO / Port 1+2 / PWL 17 / 8 dBi Antenna Group**

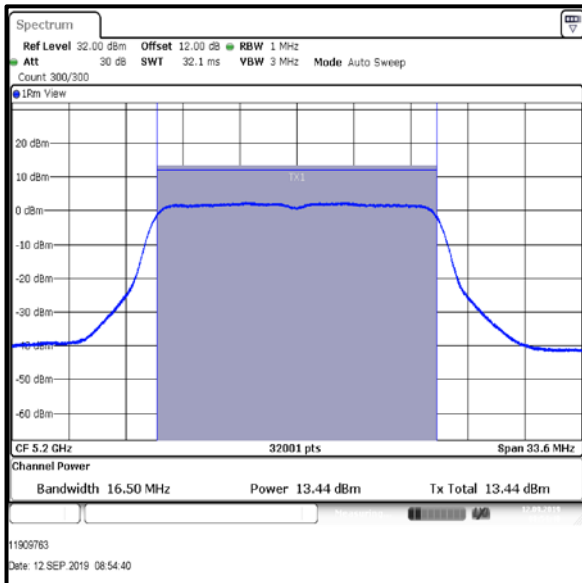
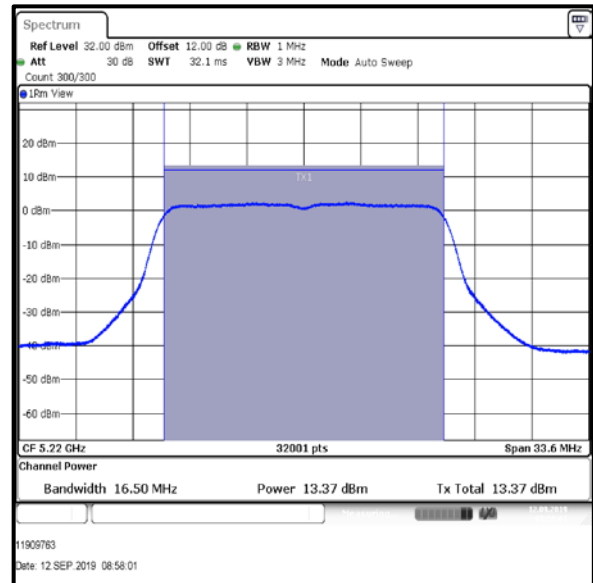
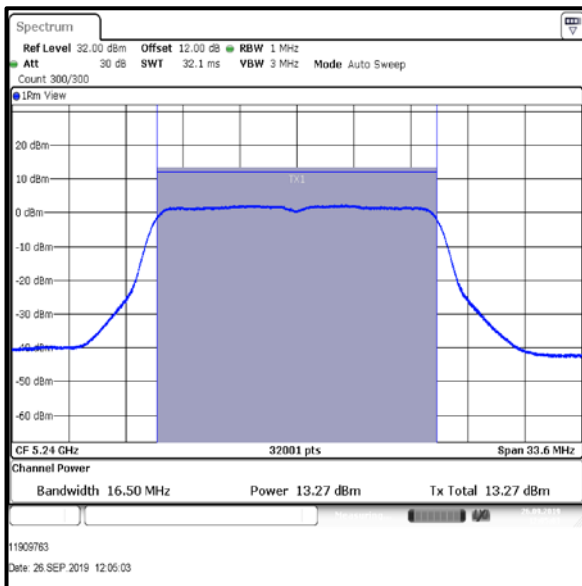
| Channel   | Port 1                |                            |                                 | Port 2                |                            |                                 |
|-----------|-----------------------|----------------------------|---------------------------------|-----------------------|----------------------------|---------------------------------|
|           | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) |
| Bottom +1 | 13.4                  | 0.3                        | 13.7                            | 13.3                  | 0.3                        | 13.6                            |
| Middle    | 13.4                  | 0.3                        | 13.7                            | 13.2                  | 0.3                        | 13.5                            |
| Top       | 13.3                  | 0.3                        | 13.6                            | 13.1                  | 0.3                        | 13.4                            |

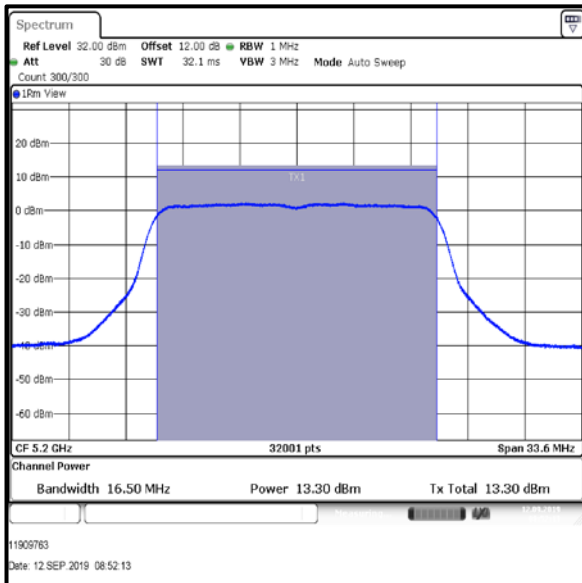
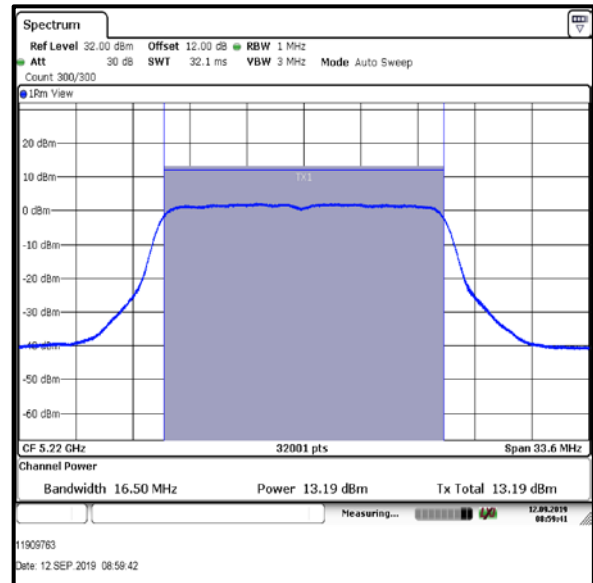
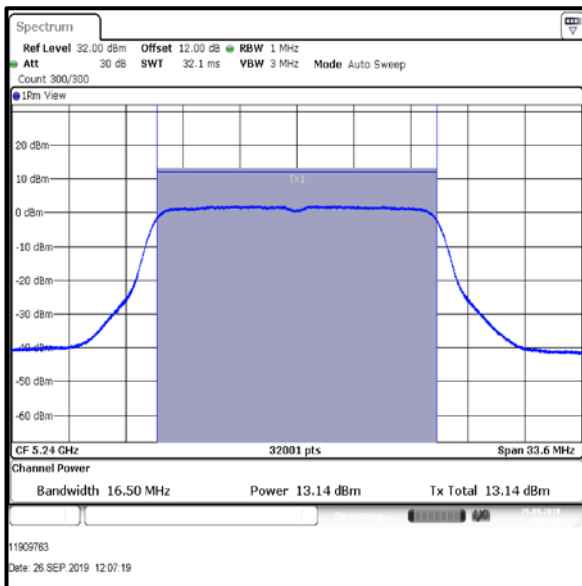
| Channel   | Corrected Conducted Power Port 1 (dBm) | Corrected Conducted Power Port 2 (dBm) | Port 1+2 Combined Conducted Power (dBm) | Conducted Power Limit (dBm) | Margin (dB) | Result   |
|-----------|----------------------------------------|----------------------------------------|-----------------------------------------|-----------------------------|-------------|----------|
| Bottom +1 | 13.7                                   | 13.6                                   | 16.7                                    | 22.0                        | 5.3         | Complied |
| Middle    | 13.7                                   | 13.5                                   | 16.6                                    | 22.0                        | 5.4         | Complied |
| Top       | 13.6                                   | 13.4                                   | 16.5                                    | 22.0                        | 5.5         | Complied |

**De Facto EIRP Limit Comparison**

| Channel   | Port 1+2 Combined Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|-----------|-----------------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom +1 | 16.7                                    | 8.0                            | 24.7       | 30.0                      | 5.3         | Complied |
| Middle    | 16.6                                    | 8.0                            | 24.6       | 30.0                      | 5.4         | Complied |
| Top       | 16.5                                    | 8.0                            | 24.5       | 30.0                      | 5.5         | Complied |

**Result: Pass**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11a / 20 MHz / 6Mbps / MIMO / Port 1 / PWL 17 / 8 dBi Antenna Group****Bottom +1 Channel****Middle Channel****Top Channel**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11a / 20 MHz / 6Mbps / MIMO / Port 2 / PWL 17 / 8 dBi Antenna Group****Bottom +1 Channel****Middle Channel****Top Channel**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11a / 20 MHz / 6Mbps / MIMO / Port 1+2 / PWL 16 / 8 dBi Antenna Group**

| Channel | Port 1                |                            |                                 | Port 2                |                            |                                 |
|---------|-----------------------|----------------------------|---------------------------------|-----------------------|----------------------------|---------------------------------|
|         | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) |
| Bottom  | 12.3                  | 0.3                        | 12.6                            | 11.9                  | 0.3                        | 12.2                            |

| Channel | Corrected Conducted Power Port 1 (dBm) | Corrected Conducted Power Port 2 (dBm) | Port 1+2 Combined Conducted Power (dBm) | Conducted Power Limit (dBm) | Margin (dB) | Result   |
|---------|----------------------------------------|----------------------------------------|-----------------------------------------|-----------------------------|-------------|----------|
| Bottom  | 12.6                                   | 12.2                                   | 15.4                                    | 22.0                        | 6.6         | Complied |

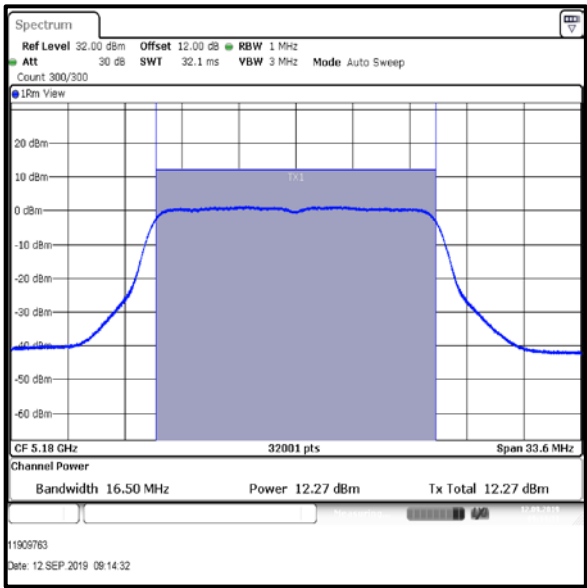
**De Facto EIRP Limit Comparison**

| Channel | Port 1+2 Combined Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom  | 15.4                                    | 8.0                            | 23.4       | 30.0                      | 6.6         | Complied |

**Result: Pass**

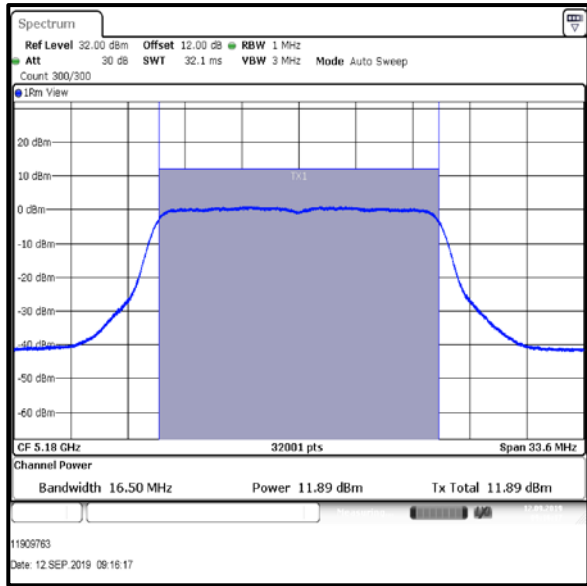
**Transmitter Maximum Conducted Output Power (continued)**

**Results: 802.11a / 20 MHz / 6Mbps / MIMO / Port 1 / PWL 16 / 8 dBi Antenna Group**



Bottom Channel

**Results: 802.11a / 20 MHz / 6Mbps / MIMO / Port 2 / PWL 16 / 8 dBi Antenna Group**



Bottom Channel

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11n / 20 MHz / MCS0 / MIMO / Port 1+2 / PWL 17 / 8 dBi Antenna Group**

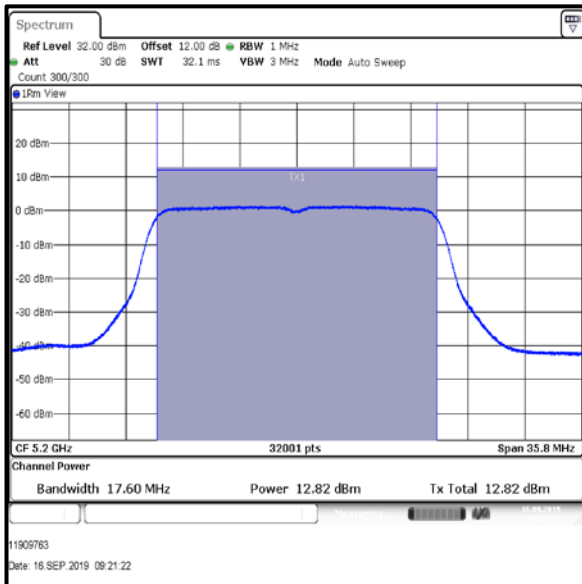
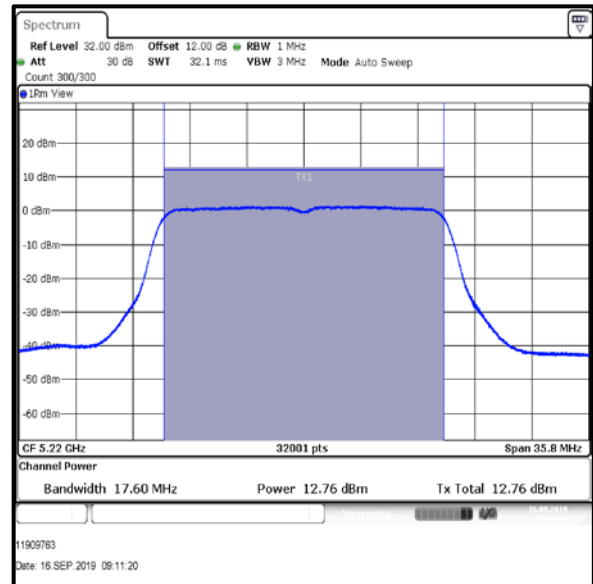
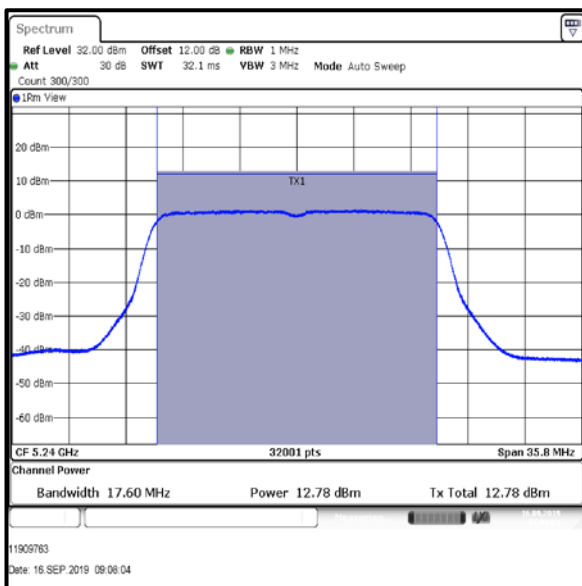
| Channel   | Port 1                |                            |                                 | Port 2                |                            |                                 |
|-----------|-----------------------|----------------------------|---------------------------------|-----------------------|----------------------------|---------------------------------|
|           | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) |
| Bottom +1 | 12.8                  | 0.5                        | 13.3                            | 12.7                  | 0.5                        | 13.2                            |
| Middle    | 12.8                  | 0.5                        | 13.3                            | 12.7                  | 0.5                        | 13.2                            |
| Top       | 12.8                  | 0.3                        | 13.1                            | 12.7                  | 0.3                        | 13.0                            |

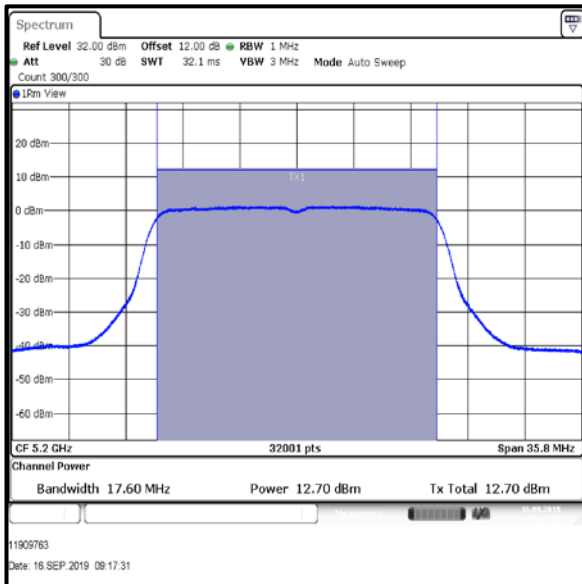
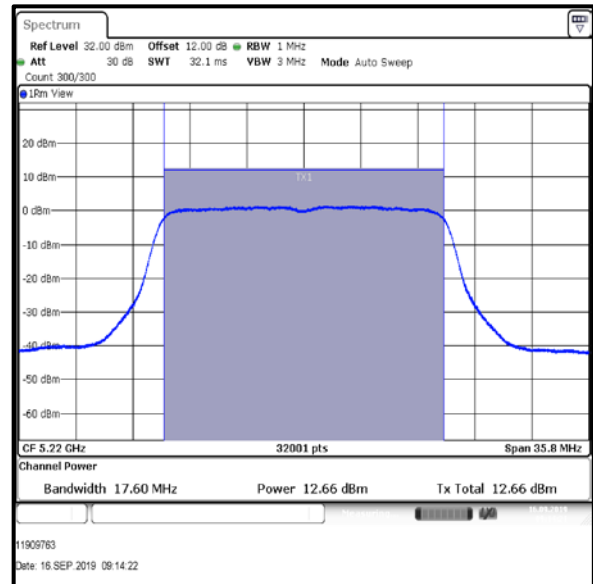
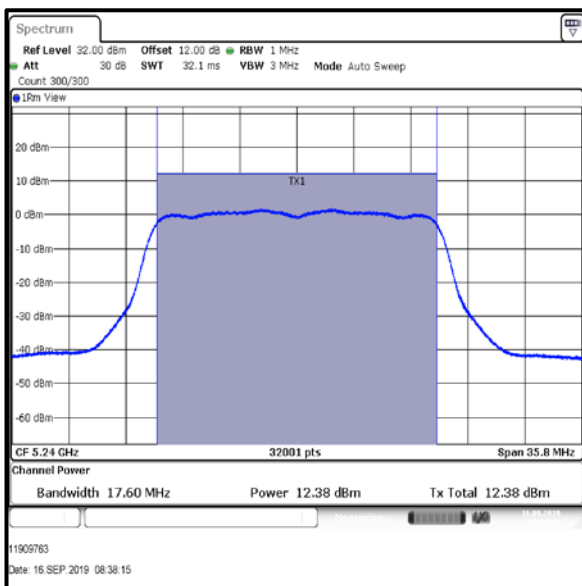
| Channel   | Corrected Conducted Power Port 1 (dBm) | Corrected Conducted Power Port 2 (dBm) | Port 1+2 Combined Conducted Power (dBm) | Conducted Power Limit (dBm) | Margin (dB) | Result   |
|-----------|----------------------------------------|----------------------------------------|-----------------------------------------|-----------------------------|-------------|----------|
| Bottom +1 | 13.3                                   | 13.2                                   | 16.3                                    | 22.0                        | 5.7         | Complied |
| Middle    | 13.3                                   | 13.2                                   | 16.3                                    | 22.0                        | 5.7         | Complied |
| Top       | 13.1                                   | 13.0                                   | 16.1                                    | 22.0                        | 5.9         | Complied |

**De Facto EIRP Limit Comparison**

| Channel   | Port 1+2 Combined Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|-----------|-----------------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom +1 | 16.3                                    | 8.0                            | 24.3       | 30.0                      | 5.7         | Complied |
| Middle    | 16.3                                    | 8.0                            | 24.3       | 30.0                      | 5.7         | Complied |
| Top       | 16.1                                    | 8.0                            | 24.1       | 30.0                      | 5.9         | Complied |

**Result: Pass**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11n / 20 MHz / MCS0 / MIMO / Port 1 / PWL 17 / 8 dBi Antenna Group****Bottom +1 Channel****Middle Channel****Top Channel**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11n / 20 MHz / MCS0 / MIMO / Port 2 / PWL 17 / 8 dBi Antenna Group****Bottom +1 Channel****Middle Channel****Top Channel**

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11n / 20 MHz / MCS0 / MIMO / Port 1+2 / PVL 16 / 8 dBi Antenna Group**

| Channel | Port 1                |                            |                                 | Port 2                |                            |                                 |
|---------|-----------------------|----------------------------|---------------------------------|-----------------------|----------------------------|---------------------------------|
|         | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) |
| Bottom  | 11.8                  | 0.5                        | 12.3                            | 11.8                  | 0.5                        | 12.3                            |

| Channel | Corrected Conducted Power Port 1 (dBm) | Corrected Conducted Power Port 2 (dBm) | Port 1+2 Combined Conducted Power (dBm) | Conducted Power Limit (dBm) | Margin (dB) | Result   |
|---------|----------------------------------------|----------------------------------------|-----------------------------------------|-----------------------------|-------------|----------|
| Bottom  | 12.3                                   | 12.3                                   | 15.3                                    | 22.0                        | 6.7         | Complied |

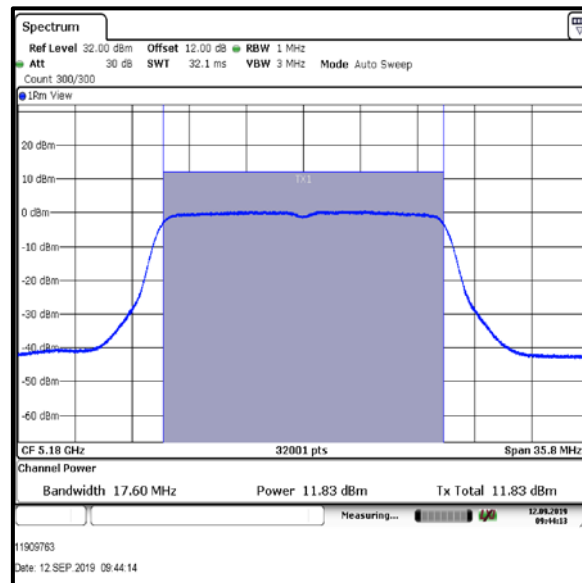
**De Facto EIRP Limit Comparison**

| Channel | Port 1+2 Combined Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom  | 15.3                                    | 8.0                            | 23.3       | 30.0                      | 6.7         | Complied |

**Result: Pass**

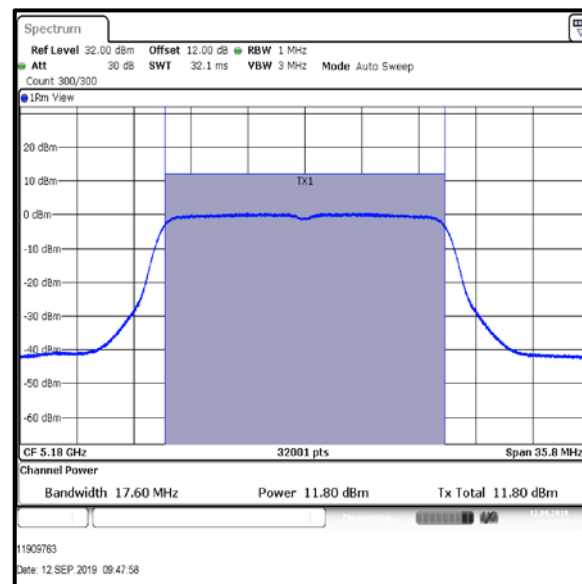
### Transmitter Maximum Conducted Output Power (continued)

**Results: 802.11n / 20 MHz / MCS0 / MIMO / Port 1 / PWL 16 / 8 dBi Antenna Group**



### Bottom Channel

**Results: 802.11n / 20 MHz / MCS0 / MIMO / Port 2 / PWL 16 / 8 dBi Antenna Group**



### Bottom Channel

**Transmitter Maximum Conducted Output Power (continued)****Results: 802.11ac / 20 MHz / MCS0 / MIMO / Port 1+2 / PWL 17 / 8 dBi Antenna Group**

| Channel   | Port 1                |                            |                                 | Port 2                |                            |                                 |
|-----------|-----------------------|----------------------------|---------------------------------|-----------------------|----------------------------|---------------------------------|
|           | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) | Conducted Power (dBm) | Duty Cycle Correction (dB) | Corrected Conducted Power (dBm) |
| Bottom +1 | 12.5                  | 0.4                        | 12.9                            | 12.5                  | 0.4                        | 12.9                            |
| Middle    | 12.5                  | 0.4                        | 12.9                            | 12.4                  | 0.4                        | 12.8                            |
| Top       | 12.5                  | 0.4                        | 12.9                            | 12.4                  | 0.4                        | 12.8                            |

| Channel   | Corrected Conducted Power Port 1 (dBm) | Corrected Conducted Power Port 2 (dBm) | Port 1+2 Combined Conducted Power (dBm) | Conducted Power Limit (dBm) | Margin (dB) | Result   |
|-----------|----------------------------------------|----------------------------------------|-----------------------------------------|-----------------------------|-------------|----------|
| Bottom +1 | 12.9                                   | 12.9                                   | 15.9                                    | 22.0                        | 6.1         | Complied |
| Middle    | 12.9                                   | 12.8                                   | 15.9                                    | 22.0                        | 6.1         | Complied |
| Top       | 12.9                                   | 12.8                                   | 15.9                                    | 22.0                        | 6.1         | Complied |

**De Facto EIRP Limit Comparison**

| Channel   | Port 1+2 Combined Conducted Power (dBm) | Directional Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result   |
|-----------|-----------------------------------------|--------------------------------|------------|---------------------------|-------------|----------|
| Bottom +1 | 15.9                                    | 8.0                            | 23.9       | 30.0                      | 6.1         | Complied |
| Middle    | 15.9                                    | 8.0                            | 23.9       | 30.0                      | 6.1         | Complied |
| Top       | 15.9                                    | 8.0                            | 23.9       | 30.0                      | 6.1         | Complied |

**Result: Pass**