

**ETSI EN 300 440 V2.1.1 (2017-03)**

**TEST REPORT**

*For*

**WIFI+BT Module**

**MODEL NUMBER: WXT52M2511**

**REPORT NUMBER: 4791023025-1-RF-5**

**ISSUE DATE: October 26, 2023**

*Prepared for*

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## Revision History

| Rev. | Issue Date       | Revisions     | Revised By |
|------|------------------|---------------|------------|
| V0   | October 26, 2023 | Initial Issue |            |

## Summary of Test Results

| Test Item                                          | Clause         | Limit/Requirement | Result |
|----------------------------------------------------|----------------|-------------------|--------|
| Normal And Extreme Conditions                      | N/A            | Clause 5.1.2      | Pass   |
| Equivalent Isotropically Radiated Power (e.i.r.p.) | Clause 4.2.2.3 | Clause 4.2.2      | Pass   |
| Permitted Range Of Operating Frequencies           | Clause 4.2.3.3 | Clause 4.2.3      | Pass   |
| Unwanted Emissions In The Spurious Domain          | Clause 4.2.4.3 | Clause 4.2.4      | Pass   |
| Duty Cycle                                         | Clause 4.2.5.3 | Clause 4.2.5      | Pass   |
| Adjacent Channel Selectivity                       | Clause 4.3.3.3 | Clause 4.3.3      | Pass   |
| Blocking Or Desensitization                        | Clause 4.3.4.3 | Clause 4.3.4      | Pass   |
| Receiver Spurious Radiations                       | Clause 4.3.5.3 | Clause 4.3.5      | Pass   |

\*This test report is only published to and used by the applicant, and it is not for evidence purpose in China.

\*The measurement result for the sample received is <Pass> according to <ETSI EN 300 440 V2.1.1 (2017-03)> when <Simple Acceptance> decision rule is applied.

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## 1. ATTESTATION OF TEST RESULTS

### Applicant Information

Company Name: Hui Zhou Gaoshengda Technology Co.,LTD  
Address: No.2,Jin-da Road,Huinan High-tech Industrial Park,Hui-ao Avenue,Huizhou City,Guangdong,China

### Manufacturer Information

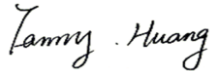
Company Name: Hui Zhou Gaoshengda Technology Co.,LTD  
Address: No.2,Jin-da Road,Huinan High-tech Industrial Park,Hui-ao Avenue,Huizhou City,Guangdong,China

### EUT Information

EUT Name: WIFI+BT Module  
Model: WXT52M2511  
Brand: GSD  
Sample Received Date: October 8, 2023  
Sample Status: Normal  
Sample ID: 6522183  
Date of Tested: October 11, 2023 to October 26, 2023

| APPLICABLE STANDARDS             |              |
|----------------------------------|--------------|
| STANDARD                         | TEST RESULTS |
| ETSI EN 300 440 V2.1.1 (2017-03) | Pass         |

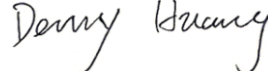
Prepared By:



Fanny Huang

Engineer Project Associate

Checked By:



Denny Huang

Senior Project Engineer

Approved By:



Stephen Guo

Operations Manager

## 2. TEST METHODOLOGY

All tests were performed in accordance with the standard ETSI EN 300 440 V2.1.1 (2017-03)

## 3. FACILITIES AND ACCREDITATION

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Accreditation Certificate | <p><b>A2LA (Certificate No.: 4102.01)</b><br/>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.</p> <p><b>FCC (FCC Designation No.: CN1187)</b><br/>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules</p> <p><b>ISED (Company No.: 21320)</b><br/>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046.</p> <p><b>VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)</b><br/>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793.<br/>Facility Name:<br/>Chamber D, the VCCI registration No. is G-20019 and R-20004<br/>Shielding Room B , the VCCI registration No. is C-20012 and T-20011</p> |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Note 1:

All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China.

### Note 2:

The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

### Note 3:

For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

### 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER                                                                                                                                                                                                                                                                     | UNCERTAINTY            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Radio Frequency                                                                                                                                                                                                                                                               | $3.5 \times 10^{(-7)}$ |
| RF power, conducted                                                                                                                                                                                                                                                           | $\pm 2.5$ dB           |
| Radiated emission of transmitter, valid to 26,5 GHz                                                                                                                                                                                                                           | $\pm 6$ dB             |
| Radiated emission of transmitter, valid between 26,5 GHz and 66 GHz                                                                                                                                                                                                           | $\pm 8$ dB             |
| Radiated emission of receiver, valid to 26,5 GHz                                                                                                                                                                                                                              | $\pm 6$ dB             |
| Radiated emission of receiver, valid between 26,5 GHz and 66 GHz                                                                                                                                                                                                              | $\pm 8$ dB             |
| Temperature                                                                                                                                                                                                                                                                   | $\pm 1$ °C             |
| Humidity                                                                                                                                                                                                                                                                      | $\pm 5$ %              |
| Voltage (DC)                                                                                                                                                                                                                                                                  | $\pm 1$ %              |
| Voltage (AC, < 10 kHz)                                                                                                                                                                                                                                                        | $\pm 2$ %              |
| NOTE: For radiated emissions above 26,5 GHz it may not be possible to achieve measurement uncertainties complying with the levels specified in this table. In these cases alone it is acceptable to employ the alternative interpretation procedure specified in clause 10.1. |                        |

For the test methods, according to the present document the uncertainty figures shall be calculated according to the methods described in the TR 100 028 [i.4] and shall correspond to an expansion factor (coverage factor)  $k = 1,96$  or  $k = 2$  (which provide confidence levels of respectively 95 % and 95,45 % in case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).



## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

|                     |                                                                                                                                                                                                                          |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT Name            | WIFI+BT Module                                                                                                                                                                                                           |
| Model               | WXT52M2511                                                                                                                                                                                                               |
| Radio Technology    | WLAN (IEEE 802.11a/n HT20/HT40/ac VHT20/VHT40/VHT80/ax HE20/HE40/HE80)                                                                                                                                                   |
| Operation frequency | 5745-5825 MHz                                                                                                                                                                                                            |
| Modulation          | IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11ac: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11ax: OFDMA(1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK) |
| Power Supply        | DC 5 V                                                                                                                                                                                                                   |

### 5.2. DESCRIPTION OF EQUIPMENT CATEGORY

The product family of short range radio devices is divided into three receiver categories, each having a set of relevant receiver requirements and minimum performance criteria. The set of receiver requirements depends on the choice of receiver category by the equipment provider.

| EUT belong to                       | Receiver category | Relevant receiver clauses                                                          | Risk assessment of receiver performance                                                                                             |
|-------------------------------------|-------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | 1                 | Adjacent channel selectivity<br>Blocking or desensitization<br>Spurious radiations | Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person).      |
| <input type="checkbox"/>            | 2                 | Blocking or desensitization<br>Spurious radiations                                 | Medium reliable SRD communication media e.g. causing Inconvenience to persons, which cannot simply be overcome by other means.      |
| <input type="checkbox"/>            | 3                 | Spurious radiations                                                                | Standard reliable SRD communication media e.g. Inconvenience to persons, which can simply be overcome by other means (e.g. manual). |

### 5.3. CHANNEL LIST

| Channel List For Bandwidth=20 MHz |                 |         |                 |         |                 |         |                 |
|-----------------------------------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| Channel                           | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 149                               | 5745            | 153     | 5765            | 157     | 5785            | 161     | 5805            |
| 165                               | 5825            | /       | /               | /       | /               | /       | /               |

| Channel List For Bandwidth=40 MHz |                 |         |                 |         |                 |         |                 |
|-----------------------------------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| Channel                           | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 151                               | 5755            | 159     | 5795            | /       | /               | /       | /               |

| Channel List For Bandwidth=80 MHz |                 |         |                 |         |                 |         |                 |
|-----------------------------------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| Channel                           | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 155                               | 5775            | /       | /               | /       | /               | /       | /               |

### 5.4. MAXIMUM POWER

| IEE Std. 802.11 | Frequency Range (MHz) | Number of Transmit chains (NTX) | Maximum EIRP (dBm) |
|-----------------|-----------------------|---------------------------------|--------------------|
| a               | 5745-5825             | 2                               | 13.11              |
| n HT20          | 5745-5825             | 2                               | 13.22              |
| n HT40          | 5755-5795             | 2                               | 13.18              |
| ac VHT80        | 5775                  | 2                               | 13.09              |
| ax HE20         | 5745-5825             | 2                               | 13.29              |
| ax HE40         | 5755-5795             | 2                               | 13.37              |
| ax HE80         | 5775                  | 2                               | 12.96              |

Note: 802.11 ac VHT20/VHT40 test data cover by 802.11 n HT20/HT40.

## 5.5. TEST CHANNEL CONFIGURATION

| Test Mode           | Test Channel | Frequency |
|---------------------|--------------|-----------|
| IEEE 802.11a        | Low          | 5745MHz   |
|                     | Middle       | 5785MHz   |
|                     | High         | 5825MHz   |
| IEEE 802.11n HT20   | Low          | 5745MHz   |
|                     | Middle       | 5785MHz   |
|                     | High         | 5825MHz   |
| IEEE 802.11n HT40   | Low          | 5755MHz   |
|                     | High         | 5795MHz   |
| IEEE 802.11ac VHT20 | Low          | 5745MHz   |
|                     | Middle       | 5785MHz   |
|                     | High         | 5825MHz   |
| IEEE 802.11ac VHT40 | Low          | 5755MHz   |
|                     | High         | 5795MHz   |
| IEEE 802.11ac VHT80 | Low          | 5775MHz   |
| IEEE 802.11ax HE20  | Low          | 5745MHz   |
|                     | Middle       | 5785MHz   |
|                     | High         | 5825MHz   |
| IEEE 802.11ax HE40  | Low          | 5755MHz   |
|                     | High         | 5795MHz   |
| IEEE 802.11ax HE80  | Low          | 5775MHz   |

## 5.6. THE WORSE CASE POWER SETTING PARAMETER

| The Worse Case Power Setting Parameter |         |
|----------------------------------------|---------|
| Test Software                          | QA Tool |

| Mode       | Rate | Channel | Soft set value        |      |
|------------|------|---------|-----------------------|------|
|            |      |         | ANT1                  | ANT2 |
| 11a        | 6M   | 149     | 11                    | 11   |
|            |      | 157     | 11                    | 11   |
|            |      | 165     | 11                    | 11   |
| 11n HT20   | MCS0 | 149     | 8                     | 8    |
|            |      | 157     | 8                     | 8    |
|            |      | 165     | 8                     | 8    |
| 11n HT40   | MCS0 | 151     | 8                     | 8    |
|            |      | 159     | 8                     | 8    |
| 11ac VHT20 | MCS0 | 149     | Cover by 802.11n HT20 |      |
|            |      | 157     |                       |      |
|            |      | 165     |                       |      |
| 11ac VHT40 | MCS0 | 151     | Cover by 802.11n HT40 |      |
|            |      | 159     |                       |      |
| 11ac VHT80 | MCS0 | 155     | 9.5                   | 9.5  |
| 11ax HE20  | MCS0 | 149     | 11                    | 11   |
|            |      | 157     | 11                    | 11   |
|            |      | 165     | 11                    | 11   |
| 11ax HE40  | MCS0 | 151     | 11                    | 11   |
|            |      | 159     | 11                    | 11   |
| 11ax HE80  | MCS0 | 155     | 11.5                  | 11.5 |

## WORST-CASE CONFIGURATIONS

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

Controlled in test mode using a software application on the EUT supplied by customer. The application was used to enable a continuous transmission and to select the mode, test channels, bandwidth, data rates as required.

For SISO modes, there are two transmission antennas. The antenna used in any given time can be either ANTENNA 1 or ANTENNA 2. All antenna ports have the same power; output power measurement for SISO modes on both antennas are reported.

For 2TX MIMO modes, ANTENNA 1 and ANTENNA 2, used at the same time.

Worst-case data rates as provided by the client were:

802.11a mode: 6 Mbps  
802.11n HT20 mode: MCS0  
802.11n HT40 mode: MCS0  
802.11ac VHT20 mode: MCS0  
802.11ac VHT40 mode: MCS0  
802.11ac VHT80 mode: MCS0  
802.11ax HE20 mode: MCS0  
802.11ax HE40 mode: MCS0  
802.11ax HE80 mode: MCS0

802.11ac VHT20 and VHT40 mode are different from 802.11nHT20 and HT40 only in control messages and have the same power settings, so for these 4 modes, only 802.11n HT20 and 802.11n HT40 modes data are recorded in the report .

802.11a support SISO mode, two antenna have the same power setting, so only the worst data for antenna 1 are recorded in the report.

The measured additional path loss was included in any path loss calculations for all RF cable used during tested.

RF output power, power spectral density tests separately on each port with all supported SISO & MIMO port combinations.

Duty cycle and occupied channel bandwidth tests, only SISO mode and one chain were tested since the duty cycle and bandwidth does not change depending on chains used.

Conducted unwanted emissions tests 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.

Radiated unwanted emissions tests were performed with the MIMO modes. These were found to be the worst modulation scheme with regards to emissions after preliminary investigations and, as this mode emits the highest conducted output power level, it was deemed to be the worst case.

## DESCRIPTION OF AVAILABLE ANTENNAS

| Antenna | Frequency (MHz) | Antenna Type | Maximum Antenna Gain (dBi) |
|---------|-----------------|--------------|----------------------------|
| 1       | 5745 ~ 5825     | PCB Antenna  | 3.93                       |
| 2       | 5745 ~ 5825     | PCB Antenna  | 3.87                       |

| IEEE Std. 802.11 | Transmit and Receive Mode                    | Description                                                   |
|------------------|----------------------------------------------|---------------------------------------------------------------|
| a                | <input checked="" type="checkbox"/> 2TX, 2RX | Antenna 1 to 2 can be used as transmitting/receiving antenna. |
| n HT20           | <input checked="" type="checkbox"/> 2TX, 2RX | Antenna 1 to 2 can be used as transmitting/receiving antenna. |
| n HT40           | <input checked="" type="checkbox"/> 2TX, 2RX | Antenna 1 to 2 can be used as transmitting/receiving antenna. |
| ac VHT20         | <input checked="" type="checkbox"/> 2TX, 2RX | Antenna 1 to 2 can be used as transmitting/receiving antenna. |
| ac VHT40         | <input checked="" type="checkbox"/> 2TX, 2RX | Antenna 1 to 2 can be used as transmitting/receiving antenna. |
| ac VHT80         | <input checked="" type="checkbox"/> 2TX, 2RX | Antenna 1 to 2 can be used as transmitting/receiving antenna. |
| ax HE20          | <input checked="" type="checkbox"/> 2TX, 2RX | Antenna 1 to 2 can be used as transmitting/receiving antenna. |
| ax HE40          | <input checked="" type="checkbox"/> 2TX, 2RX | Antenna 1 to 2 can be used as transmitting/receiving antenna. |
| ax HE80          | <input checked="" type="checkbox"/> 2TX, 2RX | Antenna 1 to 2 can be used as transmitting/receiving antenna. |

Note: The value of the antenna gain was declared by customer.

## 5.7. SUPPORT UNITS FOR SYSTEM TEST

### SUPPORT EQUIPMENT

| Item | Equipment | Brand Name | Model Name | Remarks  |
|------|-----------|------------|------------|----------|
| 1    | Laptop    | Lenovo     | E42-80     | R303U5AG |

### I/O CABLES

| Cable No | Port | Connector Type | Cable Type | Cable Length(m) | Remarks |
|----------|------|----------------|------------|-----------------|---------|
| 1        | USB  | /              | /          | 1.0             | /       |

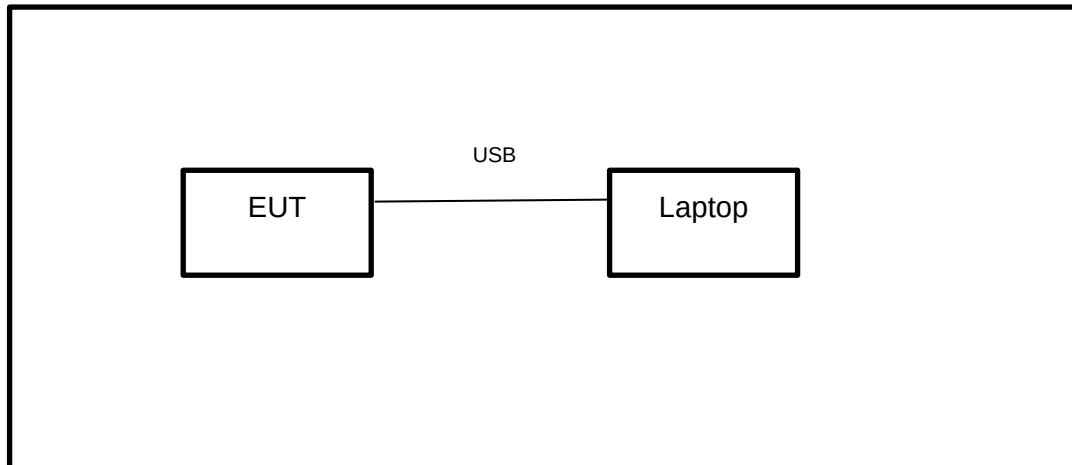
### ACCESSORIES

| Item | Accessory | Brand Name | Model Name | Description |
|------|-----------|------------|------------|-------------|
| /    | /         | /          | /          | /           |

### TEST SETUP

The EUT can work in engineering mode with a software through a Laptop.

### SETUP DIAGRAM FOR TESTS



## 6. MEASURING EQUIPMENT AND SOFTWARE USED

| R&S TS 8997 Test System             |                 |                         |                  |                 |               |               |
|-------------------------------------|-----------------|-------------------------|------------------|-----------------|---------------|---------------|
| Equipment                           | Manufacturer    | Model No.               | Serial No.       | Upper Last Cal. | Last Cal.     | Due. Date     |
| Power sensor, Power Meter           | R&S             | OSP120                  | 100921           | /               | Mar.31, 2023  | Mar.30, 2024  |
| Vector Signal Generator             | R&S             | SMBV100A                | 261637           | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| Signal Generator                    | R&S             | SMB100A                 | 178553           | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| Signal Analyzer                     | R&S             | FSV40                   | 101118           | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| Software                            |                 |                         |                  |                 |               |               |
| Description                         | Manufacturer    |                         | Name             |                 | Version       |               |
| For R&S TS 8997 Test System         | Rohde & Schwarz |                         | EMC 32           |                 | 10.60.10      |               |
| Tonsend RF Test System              |                 |                         |                  |                 |               |               |
| Equipment                           | Manufacturer    | Model No.               | Serial No.       | Upper Last Cal. | Last Cal.     | Due. Date     |
| Wideband Radio Communication Tester | R&S             | CMW500                  | 155523           | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| Wireless Connectivity Tester        | R&S             | CMW270                  | 1201.0002N75-102 | Sep.28, 2022    | Sep.27, 2023  | Sep.26, 2024  |
| PXA Signal Analyzer                 | Keysight        | N9030A                  | MY55410512       | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| MXG Vector Signal Generator         | Keysight        | N5182B                  | MY56200284       | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| MXG Vector Signal Generator         | Keysight        | N5172B                  | MY56200301       | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| DC power supply                     | Keysight        | E3642A                  | MY55159130       | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| Temperature & Humidity Chamber      | SANMOOD         | SG-80-CC-2              | 2088             | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| Attenuator                          | Aglient         | 8495B                   | 2814a12853       | Oct.18, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| RF Control Unit                     | Tonscend        | JS0806-2                | 23B80620666      | /               | April 18,2023 | April 17,2024 |
| Software                            |                 |                         |                  |                 |               |               |
| Description                         | Manufacturer    | Name                    |                  |                 | Version       |               |
| Tonsend SRD Test System             | Tonsend         | JS1120-3 RF Test System |                  |                 | V3.2.22       |               |



| RSE Test System          |              |                                          |                        |                 |               |               |
|--------------------------|--------------|------------------------------------------|------------------------|-----------------|---------------|---------------|
| Equipment                | Manufacturer | Model No.                                | Serial No.             | Upper Last Cal. | Last Cal.     | Due. Date     |
| Spectrum Analyzer        | R&S          | FSW                                      | 1312.8000K26-103950-sj | Oct. 18, 2022   | Oct.12, 2023  | Oct.11, 2024  |
| Trilog broadband antenna | Schwarzbeck  | VULB9163                                 | 01061                  | /               | Feb.7,2023    | Feb.6,2026    |
| Horn Antenna             | ETS-Lindgren | 3117                                     | 00213191               | /               | Feb.7,2023    | Feb.6,2026    |
| Preamplifier             | TDK          | PA-02-0118                               | TRS-305-00067          | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| Preamplifier             | TDK          | PA-02-0118                               | TRS-305-00066          | Jun.19,2023     | Oct.12, 2023  | Oct.11, 2024  |
| High Gain Horn Antenna   | Schwarzbeck  | BBHA-9170                                | 697                    | /               | July 20, 2021 | July 19, 2024 |
| Preamplifier             | TDK          | PA-02-2                                  | TRS-307-00002          | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| Preamplifier             | TDK          | PA-02-3                                  | TRS-308-00002          | Oct.17, 2022    | Oct.12, 2023  | Oct.11, 2024  |
| Band Reject Filter       | Wainwright   | WRCJV12-5695-5725-5850-5880-40SS         | 4                      | /               | Dec.01,2022   | Nov.30,2023   |
| Band Reject Filter       | Wainwright   | WRCJV20-5120-5150-5350-5380-60SS         | 2                      | /               | Dec.01,2022   | Nov.30,2023   |
| Band Reject Filter       | Wainwright   | WRCJV20-5440-5470-5725-5755-60SS         | 1                      | /               | Dec.01,2022   | Nov.30,2023   |
| Band Reject Filter       | Wainwright   | WRCJV8-2350-2400-2483.5-2533.5-40SS      | 4                      | /               | Dec.01,2022   | Nov.30,2023   |
| Notch Filter             | Wainwright   | WRCT5-901.6-902.3-902.5-903.2-40SS       | 1                      | /               | Dec.01,2022   | Nov.30,2023   |
| Band Reject Filter       | Wainwright   | WRCD5-1746.4-1747.25-1747.55-1748.4-40SS | 1                      | /               | Dec.01,2022   | Nov.30,2023   |
| Highpass Filter          | Wainwright   | WHKX10-5850-6500-1800-40SS               | 4                      | /               | Dec.01,2022   | Nov.30,2023   |
| Highpass Filter          | Wainwright   | WHKX10-2700-3000-1800-40SS               | 24                     | /               | Dec.01,2022   | Nov.30,2023   |

| Software                |              |                  |         |
|-------------------------|--------------|------------------|---------|
| Description             | Manufacturer | Name             | Version |
| For TDK RSE Test System | TDK          | TDK Emission lab | V10.81  |

| Other Instrument           |              |           |            |                 |              |              |
|----------------------------|--------------|-----------|------------|-----------------|--------------|--------------|
| Equipment                  | Manufacturer | Model No. | Serial No. | Upper Last Cal. | Last Cal.    | Due. Date    |
| Temperature humidity probe | OMEGA        | ITHX-SD-5 | 18470007   | Oct.22, 2022    | Oct.19, 2023 | Oct.18, 2024 |
| Barometer                  | Yiyi         | Baro      | N/A        | Oct.24, 2022    | Oct.19, 2023 | Oct.18, 2024 |
| Attenuator                 | Agilent      | 8495B     | 2814a12853 | Oct.18, 2022    | Oct.12, 2023 | Oct.11, 2024 |

## 7. TEST PROCEDURES AND RESULTS

### 7.1. NORMAL AND EXTREME CONDITIONS

#### REQUIREMENT

None; for reporting purposes only.

#### RESULTS

|                      | Normal Test Conditions                    | Extreme Test Conditions      |
|----------------------|-------------------------------------------|------------------------------|
| Relative Humidity    | 45 % ~ 70 %                               | /                            |
| Atmospheric Pressure | 100 kPa ~ 102 kPa                         | /                            |
| Temperature          | NT (Normal Temperature):<br>22 °C ~ 28 °C | /                            |
| Supply Voltage       | NV (Normal Voltage): DC 5 V               | LT (Low Temperature): -10 °C |
|                      |                                           | HT (High Temperature): 70 °C |
|                      |                                           | /                            |

#### DESCRIPTION

Pass

## 7.2. EQUIVALENT ISOTROPICALLY RADIATED POWER (E.I.R.P.)

### LIMITS

Please refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.2.2.4

| Maximum radiated peak power (e.i.r.p.) |                 |                                                                  |
|----------------------------------------|-----------------|------------------------------------------------------------------|
| Frequency Bands                        | Power           | Application                                                      |
| 2400 MHz to 2483.5 MHz                 | 10 mW e.i.r.p.  | Non-specific short range devices                                 |
| 2400 MHz to 2483.5 MHz                 | 25 mW e.i.r.p.  | Radio determination devices                                      |
| (a) 2446 MHz to 2454 MHz               | 500 mW e.i.r.p. | Radio Frequency Identification (RFID) devices                    |
| (b) 2446 MHz to 2454 MHz               | 4 W e.i.r.p.    | Radio Frequency Identification (RFID) devices                    |
| 5725 MHz to 5875 MHz                   | 25 mW e.i.r.p.  | Non-specific short range devices                                 |
| 9200 MHz to 9500 MHz                   | 25 mW e.i.r.p.  | Radio determination devices                                      |
| 9500 MHz to 9975 MHz                   | 25 mW e.i.r.p.  | Radio determination devices                                      |
| 10,5 GHz to 10,6 GHz                   | 500 mW e.i.r.p. | Radio determination devices                                      |
| 13,4 GHz to 14,0 GHz                   | 25 mW e.i.r.p.  | Radio determination devices                                      |
| 17,1 GHz to 17,3 GHz                   | 400 mW e.i.r.p. | Radio determination devices                                      |
| 24,00 GHz to 24,25 GHz                 | 100 mW e.i.r.p. | Non-specific short range devices and Radio determination devices |

### TEST PROCEDURE

Refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.2.2.3

| Measurement                                               |                                               |
|-----------------------------------------------------------|-----------------------------------------------|
| <input checked="" type="checkbox"/> Conducted measurement | <input type="checkbox"/> Radiated measurement |

The test procedure shall be as follows:

Step 1:

- using a suitable means, the output of the transmitter shall be coupled to a matched diode detector;
- the output of the diode detector shall be connected to the vertical channel of an oscilloscope;
- the combination of the diode detector and the oscilloscope shall be capable of faithfully reproducing the envelope peaks and the duty cycle of the transmitter output signal;
- the observed duty cycle of the transmitter (Tx on/(Tx on + Tx off)) shall be noted as x, ( $0 < x < 1$ ) and recorded.

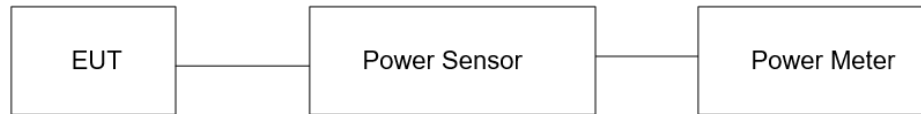
Step 2:

- the average output power of the transmitter shall be determined using a wideband, calibrated RF power meter with a matched thermocouple detector or an equivalent thereof and, where applicable, with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The observed value shall be recorded as "A" (in dBm);
- the e.i.r.p. shall be calculated from the above measured power output A, the observed duty cycle x, and the applicable antenna assembly gain "G" in dBi, according to the formula:
  - $P = A + G + 10 \log (1/x)$ ;
  - P shall not exceed the value specified in clause 4.2.2.4.

The measurement shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range.

These frequencies shall be recorded. FHSS equipment shall be made to hop continuously to each of these three frequencies separately.

#### **TEST SETUP**



#### **TEST ENVIRONMENT**

|                     |          |                   |        |
|---------------------|----------|-------------------|--------|
| Temperature         | 22.4°C   | Relative Humidity | 58%    |
| Atmosphere Pressure | 101.2kPa | Test Voltage      | DC 5 V |

#### **TEST DATE / ENGINEER**

|           |                  |         |             |
|-----------|------------------|---------|-------------|
| Test Date | October 19, 2023 | Test By | Walker Yuan |
|-----------|------------------|---------|-------------|

#### **TEST RESULTS**

Please refer to section "Test Data" - Appendix C

### 7.3. PERMITTED RANGE OF OPERATING FREQUENCIES

#### LIMITS

The width of the power spectrum envelope is  $f_H - f_L$  for a given operating frequency. In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allowed band. The frequency range is determined by the lowest value of  $f_L$  and the highest value of  $f_H$  resulting from the adjustment of the equipment to the lowest and highest operating frequencies.

The occupied bandwidth (i.e. the bandwidth in which 99 % of the wanted emission is contained) of the transmitter shall fall within the assigned frequency band.

For all equipment the frequency range shall lie within the frequency band given by clause 4.2.2.4, table 2. For non-harmonized frequency bands the available frequency range may differ between national administrations.

#### TEST PROCEDURE

Refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.2.3.3

| Measurement                                               |                                               |
|-----------------------------------------------------------|-----------------------------------------------|
| <input checked="" type="checkbox"/> Conducted measurement | <input type="checkbox"/> Radiated measurement |

The permitted range of operating frequencies includes all frequencies on which the equipment may operate within an assigned frequency band. The operating frequency range shall be declared by the manufacturer.

The frequency range of the equipment is determined by the lowest and highest frequencies occupied by the power envelope in accordance with clause 4.2.2.4, table 2.

$f_H$  is the highest frequency of the power envelope, it is the frequency furthest above the frequency of maximum power where the output power envelope drops below the level of -75 dBm/Hz spectral power density (e.g. -30 dBm if measured in a 30 kHz reference bandwidth) e.i.r.p.

$f_L$  is the lowest frequency of the power envelope; it is the frequency furthest below the frequency of maximum power where the output power drops below the level of -75 dBm/Hz spectral power density (e.g. -30 dBm if measured in a 30 kHz reference bandwidth) e.i.r.p.

The occupied bandwidths and OCW of the transmitter shall be declared. Where differing modes of emission are available, all modes and their associated bandwidths shall be stated.

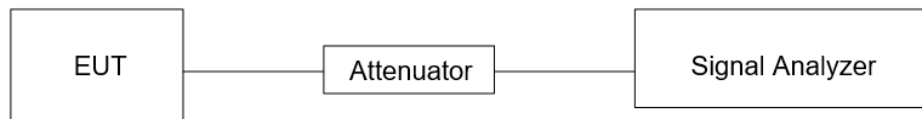
The range of frequencies, determined by clause 4.2.3, shall be specified in the test report.

The measurement procedure shall be as follows:

- a) put the spectrum analyzer in video averaging mode with a minimum of 50 sweeps selected;

- b) select the lowest operating frequency of the equipment under test and activate the transmitter with modulation applied. The RF emission of the equipment shall be displayed on the spectrum analyzer;
- c) using the marker of the spectrum analyzer, find the lowest frequency below the operating frequency at which the spectral power density drops below the level given in clause 4.2.3. This frequency shall be recorded in the test report;
- d) select the highest operating frequency of the equipment under test and find the highest frequency at which the spectral power density drops below the value given in clause 4.2.3. This frequency shall be recorded in the test report;
- e) the difference between the frequencies measured in steps c) and d) is the operating frequency range. It shall be recorded in the test report.
- This measurement shall be repeated for each frequency range declared by the manufacturer.

### **TEST SETUP**



### **TEST ENVIRONMENT**

|                     |          |                   |        |
|---------------------|----------|-------------------|--------|
| Temperature         | 22.4℃    | Relative Humidity | 58%    |
| Atmosphere Pressure | 101.2kPa | Test Voltage      | DC 5 V |

### **TEST DATE / ENGINEER**

|           |                  |         |             |
|-----------|------------------|---------|-------------|
| Test Date | October 19, 2023 | Test By | Walker Yuan |
|-----------|------------------|---------|-------------|

### **TEST RESULTS**

Please refer to section "Test Data" - Appendix D

## 7.4. UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

### LIMITS

| Transmitter Unwanted Emissions In The Spurious Domain |                                                           |           |
|-------------------------------------------------------|-----------------------------------------------------------|-----------|
| Frequency Range                                       | Maximum Power Limit (E.R.P.(≤1 GHz)<br>E.I.R.P.(> 1 GHz)) | Bandwidth |
| 30 MHz to 47 MHz                                      | -36 dBm                                                   | 100 kHz   |
| 47 MHz to 74 MHz                                      | -54 dBm                                                   | 100 kHz   |
| 74 MHz to 87.5 MHz                                    | -36 dBm                                                   | 100 kHz   |
| 87.5 MHz to 108 MHz                                   | -54 dBm                                                   | 100 kHz   |
| 108 MHz to 174 MHz                                    | -36 dBm                                                   | 100 kHz   |
| 174 MHz to 230 MHz                                    | -54 dBm                                                   | 100 kHz   |
| 230 MHz to 470 MHz                                    | -36 dBm                                                   | 100 kHz   |
| 470 MHz to 862 MHz                                    | -54 dBm                                                   | 100 kHz   |
| 862 MHz to 1 GHz                                      | -36 dBm                                                   | 100 kHz   |
| 1 GHz ~ 26 GHz                                        | -30 dBm                                                   | 1 MHz     |

### TEST PROCEDURE

Please refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.2.4.3.3

| Measurement                                               |                                                          |
|-----------------------------------------------------------|----------------------------------------------------------|
| <input checked="" type="checkbox"/> Conducted measurement | <input checked="" type="checkbox"/> Radiated measurement |

#### Method of measurement - Conducted Spurious Emission

This method of measurement applies to transmitters having a permanent antenna connector.

a) The transmitter shall be connected to a measuring receiver through a test load, 50 Ω power attenuator, and if necessary, an appropriate filter to avoid overload of the measuring receiver. The bandwidth of the measuring receiver shall be adjusted until the sensitivity of the measuring receiver is at least 6 dB below the spurious emission limit given in table 3, see clause 4.2.4.4. This bandwidth shall be recorded in the test report. For the measurement of spurious emissions below the second harmonic of the carrier frequency, the filter used shall be a high "Q" (notch) filter centred on the transmitter carrier frequency, which attenuates this signal by at least 30 dB.

For the measurement of spurious emissions at and above the second harmonic of the carrier frequency the filter used shall be a high pass filter with a stop band rejection exceeding 40 dB. The cut-off frequency of the high pass filter shall be approximately 1,5 times the transmitter carrier frequency.

Precautions may be required to ensure that the test load does not generate or that the high pass filter does not attenuate, the harmonics of the carrier.



b) The transmitter shall be unmodulated and operating at the maximum limit of its specified power range. If modulation cannot be inhibited then the test shall be carried out with modulation (see clause 5.8.1) and this fact shall be recorded in the test report.

c) For carrier frequencies in the range 1 GHz to 20 GHz the frequency of the measuring receiver shall be adjusted over the frequency range 25 MHz to 10 times the carrier frequency, not exceeding 40 GHz. For carrier frequencies above 20 GHz the measuring receiver shall be tuned over the range 25 MHz up to twice the carrier frequency, not exceeding 66 GHz. The frequency and level of every spurious emission found shall be noted.

The emissions within the channel occupied by the transmitter carrier and, for channelized systems its adjacent channels, shall not be recorded.

d) If the measuring receiver has not been calibrated in terms of power level at the transmitter output, the level of any detected components shall be determined by replacing the transmitter by the signal generator and adjusting it to reproduce the frequency and level of every spurious emission noted in step c). The absolute power level of each of the emissions shall be noted.

## Method of measurement - Radiated Spurious Emission

This method of measurement applies to transmitters having an integral antenna.

a) A test site selected from annex B which fulfils the requirements of the specified frequency range of this measurement shall be used. The test antenna shall be oriented initially for vertical polarization and connected to a measuring receiver, through a suitable filter to avoid overloading of the measuring receiver if required.

The bandwidth of the measuring receiver shall be adjusted until the sensitivity of the measuring receiver, after allowing for the coupling loss, is at least 6 dB below the spurious emission limit given in table 3, see clause 4.2.4.4. This bandwidth shall be recorded in the test report.

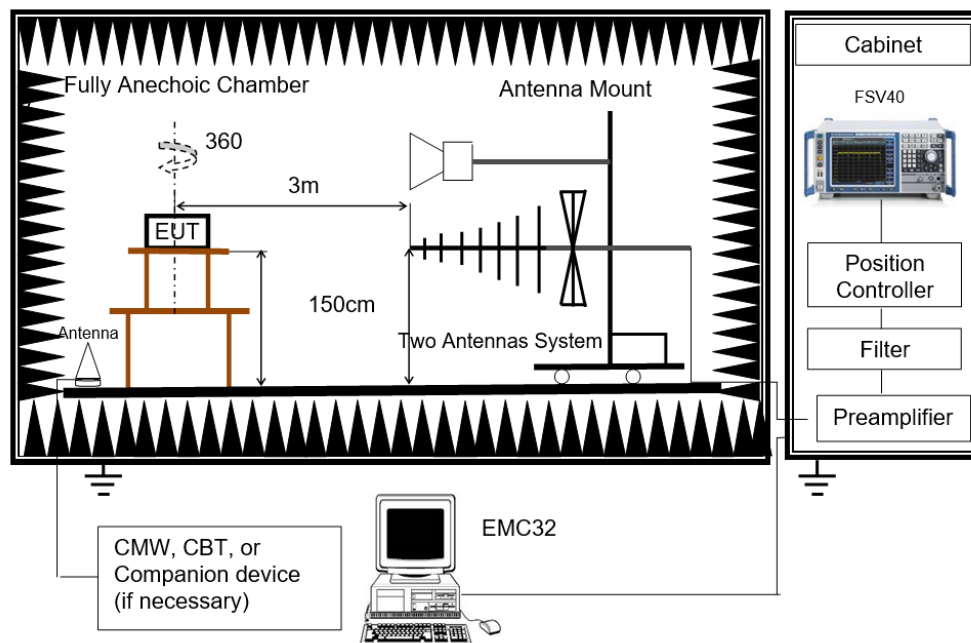
For the measurement of spurious emissions below the second harmonic of the carrier frequency the optional filter used shall be a high "Q" (notch) filter centred on the transmitter carrier frequency and attenuating this signal by at least 30 dB.

For the measurement of spurious emissions at and above the second harmonic of the carrier frequency the optional filter used shall be a high pass filter with a stop band rejection exceeding 40 dB. The cut-off frequency of the high pass filter shall be approximately 1,5 times the transmitter carrier frequency.

The transmitter under test shall be placed on the support in its standard position and shall be switched on without modulation. If modulation cannot be inhibited then the test shall be carried out with modulation (see clause 6.1) and this fact shall be recorded in the test report.

b) The same method of measurement as steps b) and k) of clause 4.2.4.3.2 shall be used.

### TEST SETUP



**TEST ENVIRONMENT**

|                     |          |                   |        |
|---------------------|----------|-------------------|--------|
| Temperature         | 22.4°C   | Relative Humidity | 58%    |
| Atmosphere Pressure | 101.2kPa | Test Voltage      | DC 5 V |

**TEST DATE / ENGINEER**

|           |                  |         |             |
|-----------|------------------|---------|-------------|
| Test Date | October 19, 2023 | Test By | Walker Yuan |
|-----------|------------------|---------|-------------|

**TEST RESULTS**

Please refer to section "Test Data" - Appendix E

## 7.5. DUTY CYCLE

### LIMITS

Table 4 defines the maximum duty cycle within a 1 hour period.

**Table 4: Duty cycle limits**

| Frequency Band             | Duty cycle                   | Application                                                                               | Notes                               |
|----------------------------|------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------|
| 2 400 MHz to 2 483,5 MHz   | No Restriction               | Generic use                                                                               |                                     |
| 2 400 MHz to 2 483,5 MHz   | No Restriction               | Detection, movement and alert applications                                                |                                     |
| (a) 2 446 MHz to 2 454 MHz | No Restriction               | RFID                                                                                      | Limits shown in annex D shall apply |
| (b) 2 446 MHz to 2 454 MHz | ≤ 15 %                       | RFID                                                                                      | Limits shown in annex D shall apply |
| 5 725 MHz to 5 875 MHz     | No Restriction               | Generic use                                                                               |                                     |
| 9 200 MHz to 9 500 MHz     | No Restriction               | Radiodetermination: radar, detection, movement and alert applications                     |                                     |
| 9 500 MHz to 9 975 MHz     | No Restriction               | Radiodetermination: radar, detection, movement and alert applications                     |                                     |
| 10,5 GHz to 10,6 GHz       | No Restriction               | Radiodetermination: radar, detection, movement and alert applications                     |                                     |
| 13,4 GHz to 14,0 GHz       | No Restriction               | Radiodetermination: radar, detection, movement and alert applications                     |                                     |
| 17,1 GHz to 17,3 GHz       | DAA or equivalent techniques | Radiodetermination: GBSAR detecting and movement and alert applications                   | Limits shown in annex F shall apply |
| 24,00 GHz to 24,25 GHz     | No Restriction               | Generic use and for Radiodetermination: radar, detection, movement and alert applications |                                     |

For devices with a 100 % duty cycle transmitting an unmodulated carrier most of the time, a time-out shut-off facility shall be implemented in order to improve the efficient use of spectrum. The method of implementation shall be declared by the manufacturer.

No restriction for 2 400 MHz to 2 483,5 MHz devices, just for reporting purposes only.

### TEST PROCEDURE

Refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.2.5.3

| Measurement                                               |                                               |
|-----------------------------------------------------------|-----------------------------------------------|
| <input checked="" type="checkbox"/> Conducted measurement | <input type="checkbox"/> Radiated measurement |

An assessment of the overall Duty Cycle shall be made for a representative period of  $T_{obs}$  over the observation bandwidth  $F_{obs}$ . Unless otherwise specified,  $T_{obs}$  is 1 hour and the observation bandwidth  $F_{obs}$  is the operational frequency band.

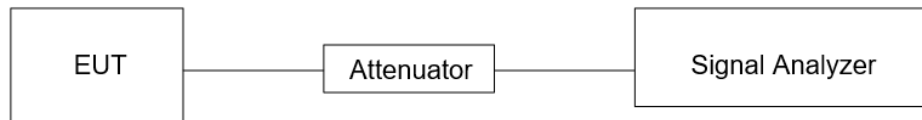
The representative period shall be the most active one in normal use of the device. As a guide "Normal use" is considered as representing the behaviour of the device during transmission of 99 % of the [emissions] generated during its operational lifetime.

Procedures such setup, commissioning, and maintenance are not considered part of normal operation.

For manual operated or event dependant devices, with or without software controlled functions, the manufacturer shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmitter remains on until the trigger is released or the device is manually reset. The manufacturer shall also give a description of the application for the device and include a typical usage pattern. The typical usage pattern as declared by the manufacturer shall be used to determine the duty cycle and compare to the limit in table 4.

Where an acknowledgement is required, the additional transmitter on-time shall be included and declared by the manufacturer.

#### **TEST SETUP**



#### **TEST ENVIRONMENT**

|                     |          |                   |        |
|---------------------|----------|-------------------|--------|
| Temperature         | 22.4℃    | Relative Humidity | 58%    |
| Atmosphere Pressure | 101.2kPa | Test Voltage      | DC 5 V |

#### **TEST DATE / ENGINEER**

|           |                  |         |             |
|-----------|------------------|---------|-------------|
| Test Date | October 19, 2023 | Test By | Walker Yuan |
|-----------|------------------|---------|-------------|

#### **TEST RESULTS**

Please refer to section "Test Data" - Appendix A

## 7.6. ADJACENT CHANNEL SELECTIVITY

### LIMITS

The adjacent channel selectivity of the equipment under specified conditions shall not be less than the levels of the unwanted signal as stated in table 6.

**Table 6: Limit for adjacent channel selectivity**

| Receiver category | Limit       |
|-------------------|-------------|
| 1                 | -30 dBm + k |
| 2                 | No limit    |
| 3                 | No limit    |

The correction factor, k, is as follows:

$$k = -20\log f - 10\log BW$$

Where:

- f is the frequency in GHz;
  - BW is the occupied bandwidth in MHz.
- The factor k is limited within the following:
- -40 dB < k < 0 dB.

### TEST PROCEDURE

Please refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.3.3.3

| Measurement                                               |                                               |
|-----------------------------------------------------------|-----------------------------------------------|
| <input checked="" type="checkbox"/> Conducted measurement | <input type="checkbox"/> Radiated measurement |

This measurement shall be conducted under normal conditions.

Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:

- a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna; or
- b) directly to the receiver permanent or temporary antenna connector.

The method of coupling to the receiver shall be stated in the test report.

Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal.

Signal generator B shall be unmodulated and shall be adjusted to the adjacent channel centre frequency immediately above that of the wanted signal.

Initially signal generator B shall be switched off and using signal generator A the level that still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB.

Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.

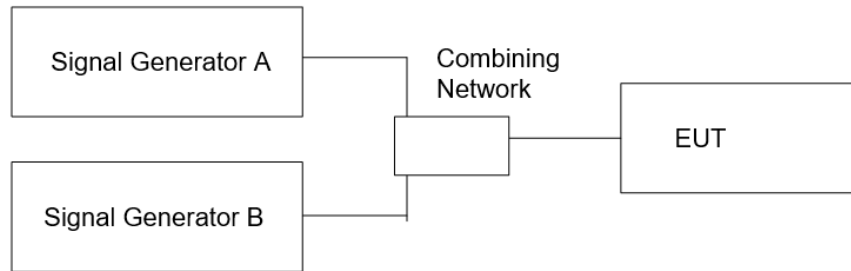
The measurements shall be repeated with signal generator B unmodulated and adjusted to the adjacent channel centre immediately below the wanted signal.

The adjacent channel selectivity shall be recorded for the upper and lower adjacent channels as the level in dBm of the unwanted signal.

For tagging systems (e.g. RF identification, anti-theft, access control, location and similar systems) signal generator A may be replaced by a physical tag positioned at 70 % of the measured system range in metres.

In this case, the adjacent selectivity shall be recorded as the level in dBm of lowest level of the unwanted signal (generator B) resulting in a non-read of the tag.

### **TEST SETUP**



### **TEST ENVIRONMENT**

|                     |          |                   |        |
|---------------------|----------|-------------------|--------|
| Temperature         | 22.4°C   | Relative Humidity | 58%    |
| Atmosphere Pressure | 101.2kPa | Test Voltage      | DC 5 V |

### **TEST DATE / ENGINEER**

|           |                  |         |             |
|-----------|------------------|---------|-------------|
| Test Date | October 19, 2023 | Test By | Walker Yuan |
|-----------|------------------|---------|-------------|

### **TEST RESULTS**

Please refer to section "Test Data" - Appendix H

## 7.7. BLOCKING OR DESENSITIZATION

### LIMITS

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table 7, except at frequencies on which spurious responses are found.

**Table 7: Limits for blocking or desensitization**

| Receiver category | Limit       |
|-------------------|-------------|
| 1                 | -30 dBm + k |
| 2                 | -45 dBm + k |
| 3                 | No limit    |

The correction factor, k, is as follows:

$$k = -20\log f - 10\log BW$$

Where:

- f is the frequency in GHz;
  - BW is the occupied bandwidth in MHz.
- The factor k is limited within the following:
- -40 dB < k < 0 dB.

### TEST PROCEDURE

Please refer to ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.3.4.3

| Measurement                                               |                                               |
|-----------------------------------------------------------|-----------------------------------------------|
| <input checked="" type="checkbox"/> Conducted measurement | <input type="checkbox"/> Radiated measurement |

This measurement shall be conducted under normal conditions.

Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:

- a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna; or
- b) directly to the receiver permanent or temporary antenna connector.

The method of coupling to the receiver shall be stated in the test report.

Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal.

Signal generator B shall be unmodulated and shall be adjusted to a test frequency at approximately 10 times, 20 times and 50 times of the occupied bandwidth above upper band edge of occupied bandwidth.

Initially signal generator B shall be switched off and using signal generator A the level which still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB.

Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.

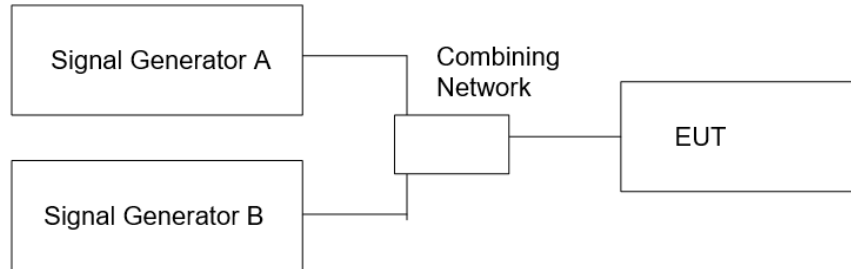
The measurement shall be repeated with the test frequency for signal generator B at approximately 10 times, 20 times and 50 times of the occupied bandwidth below the lower band edge of the occupied bandwidth.



The blocking or desensitization shall be recorded as the level in dBm of lowest level of the unwanted signal (generator B).

For tagging systems (e.g. RF identification, anti-theft, access control, location and similar systems) signal generator A may be replaced by a physical tag positioned at 70 % of the measured system range in metres. In this case, the blocking or desensitization shall be recorded as the ratio in dB of lowest level of the unwanted signal (generator B) resulting in a non-read of the tag. to the declared sensitivity of the receiver +3 dB.

### **TEST SETUP**



### **TEST ENVIRONMENT**

|                     |          |                   |        |
|---------------------|----------|-------------------|--------|
| Temperature         | 22.4°C   | Relative Humidity | 58%    |
| Atmosphere Pressure | 101.2kPa | Test Voltage      | DC 5 V |

### **TEST DATE / ENGINEER**

|           |                  |         |             |
|-----------|------------------|---------|-------------|
| Test Date | October 19, 2023 | Test By | Walker Yuan |
|-----------|------------------|---------|-------------|

### **TEST RESULTS**

Please refer to section "Test Data" - Appendix G

## 7.8. RECEIVER SPURIOUS RADIATIONS

### LIMITS

| Receiver Spurious Emissions |                                                                     |                       |
|-----------------------------|---------------------------------------------------------------------|-----------------------|
| Frequency Range             | Maximum Power Limit (E.R.P.( $\leq 1$ GHz)<br>E.I.R.P.( $> 1$ GHz)) | Measurement Bandwidth |
| 30 MHz ~ 1 GHz              | -57 dBm                                                             | 100 kHz               |
| 1 GHz ~ 26 GHz              | -47 dBm                                                             | 1 MHz                 |

### TEST PROCEDURE

ETSI EN 300 440 V2.1.1 (2017-03) Clause 4.3.5.3

| Measurement                                               |                                                          |
|-----------------------------------------------------------|----------------------------------------------------------|
| <input checked="" type="checkbox"/> Conducted measurement | <input checked="" type="checkbox"/> Radiated measurement |

#### Method of measurement conducted spurious components

This method of measurement applies to receivers having a permanent antenna connector.

A test load, 50  $\Omega$  power attenuator, may be used to protect the measuring receiver (see clause 6.5) against damage when testing a receiver combined in one unit with a transmitter.

The measuring receiver used shall have sufficient dynamic range and sensitivity to achieve the required measurement accuracy at the specified limit. The bandwidth of the measuring receiver shall be adjusted until the sensitivity of the measuring receiver is at least 6 dB below the spurious emission limit given in clause 4.3.5.4. This bandwidth shall be recorded in the test report:

- The receiver input terminals shall be connected to a measuring receiver having an input impedance of 50  $\Omega$  and the receiver is switched on.
- For carrier frequencies in the range 1 GHz to 20 GHz the frequency of the measuring receiver shall be adjusted over the frequency range 25 MHz to 10 times the carrier frequency, not exceeding 40 GHz. For carrier frequencies above 20 GHz the measuring receiver shall be tuned over the range 25 MHz up to twice the carrier frequency not exceeding 66 GHz. The frequency and the absolute power level of each of the spurious components found shall be noted.
- If the detecting device is not calibrated in terms of power input, the level of any detected components shall be determined by replacing the receiver by the signal generator and adjusting it to reproduce the frequency and level of every spurious component noted in step b). The absolute power level of each spurious component shall be noted.
- The frequency and level of each spurious emission measured and the bandwidth of the measuring receiver shall be recorded in the test report.

#### Method of measurement radiated spurious components

This method of measurement applies to receivers having a permanent antenna connector.

- A test site selected from annex B which fulfils the requirements of the specified frequency range of this measurement shall be used. The test antenna shall be oriented initially for vertical polarization and connected to a measuring receiver. The bandwidth of the measuring receiver shall be adjusted until the sensitivity of the measuring receiver is at least 6 dB below the spurious emission limit given in clause 4.3.5.4. This bandwidth shall be recorded in the test report. The receiver under test shall be placed on the support in its standard position.

- For carrier frequencies in the range 1 GHz to 20 GHz the frequency of the measuring receiver shall be adjusted over the frequency range 25 MHz to 10 times the carrier frequency, not exceeding 40 GHz. For carrier frequencies above 20 GHz the measuring receiver shall be tuned over the range 25 MHz up to twice the carrier frequency not exceeding 66 GHz. The frequency of each spurious component shall be noted. If the test site is disturbed by radiation coming from

outside the site, this qualitative search may be performed in a screened room with reduced distance between the transmitter and the test antenna.

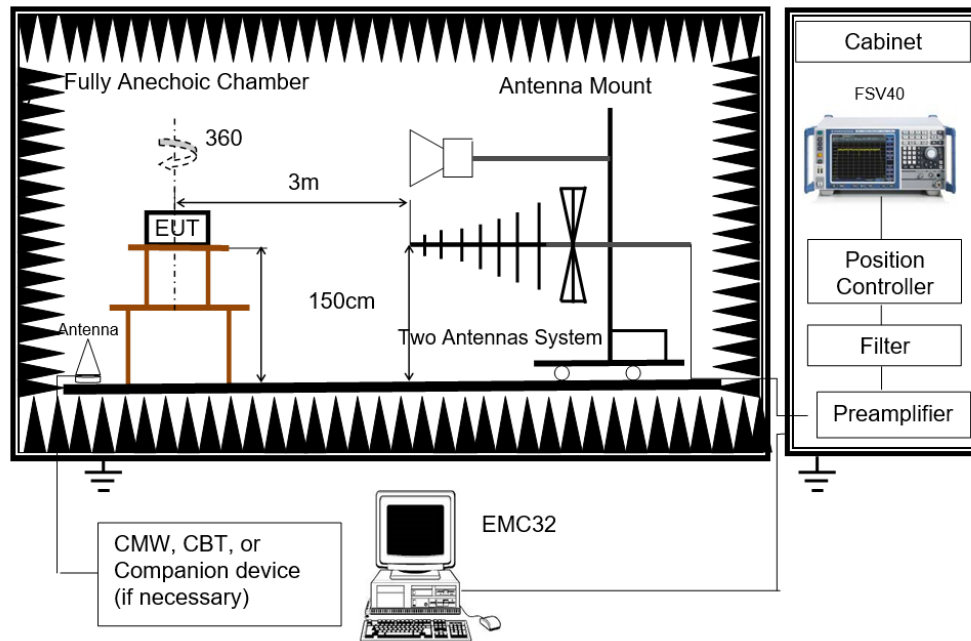
c) At each frequency at which a component has been detected, the measuring receiver shall be tuned and the test antenna shall be raised or lowered through the specified height range until the maximum signal level is detected on the measuring receiver.

d) The receiver shall be rotated up to 360° about a vertical axis, to maximize the received signal.

e) The test antenna shall be raised or lowered again through the specified height range until a maximum is obtained. This level shall be noted.

f) The substitution antenna (see clause B.3.2) shall replace the receiver antenna in the same position and in vertical polarization. It shall be connected to the signal generator.

## TEST SETUP



## TEST ENVIRONMENT

|                     |          |                   |        |
|---------------------|----------|-------------------|--------|
| Temperature         | 22.4°C   | Relative Humidity | 58%    |
| Atmosphere Pressure | 101.2kPa | Test Voltage      | DC 5 V |

## TEST DATE / ENGINEER

|           |                  |         |             |
|-----------|------------------|---------|-------------|
| Test Date | October 19, 2023 | Test By | Walker Yuan |
|-----------|------------------|---------|-------------|

## TEST RESULTS

Please refer to section "Test Data" - Appendix F

## 8. TEST DATA

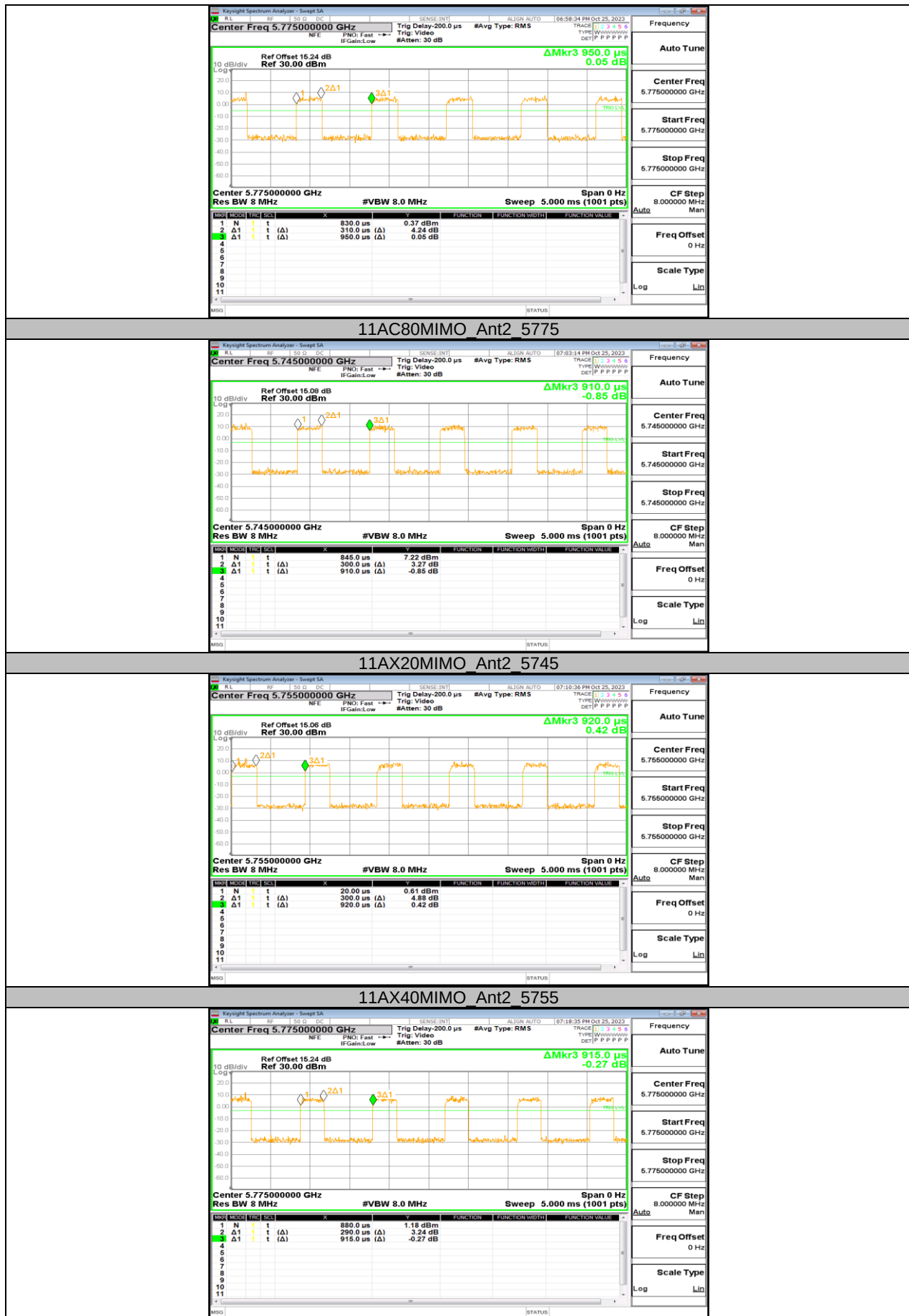
### 8.1. APPENDIX A: DUTY CYCLE

#### 8.1.1. Test Result

| TestMode   | Antenna | Frequency[MHz] | Transmission<br>Duration [ms] | Transmission<br>Period [ms] | Duty Cycle<br>[%] |
|------------|---------|----------------|-------------------------------|-----------------------------|-------------------|
| 11A        | Ant2    | 5745           | 1.39                          | 2.02                        | 68.81             |
| 11N20MIMO  | Ant2    | 5745           | 1.29                          | 1.92                        | 67.19             |
| 11N40MIMO  | Ant2    | 5755           | 0.64                          | 1.25                        | 51.20             |
| 11AC80MIMO | Ant2    | 5775           | 0.31                          | 0.95                        | 32.63             |
| 11AX20MIMO | Ant2    | 5745           | 0.30                          | 0.91                        | 32.97             |
| 11AX40MIMO | Ant2    | 5755           | 0.30                          | 0.92                        | 32.61             |
| 11AX80MIMO | Ant2    | 5775           | 0.29                          | 0.92                        | 31.52             |

## 8.1.2. Test Graphs





|                      |
|----------------------|
| 11AX80MIMO_Ant2_5775 |
|----------------------|

## 8.2. APPENDIX B: OCCUPIED BANDWIDTH

### 8.2.1. Test Result

| TestMode   | Antenna | Frequency[MHz] | OCB[MHz] | Limit[MHz]   | Verdict |
|------------|---------|----------------|----------|--------------|---------|
| 11A        | Ant2    | 5745           | 16.389   | 5725 to 5875 | PASS    |
|            |         | 5825           | 16.413   | 5725 to 5875 | PASS    |
| 11N20MIMO  | Ant2    | 5745           | 17.633   | 5725 to 5875 | PASS    |
|            |         | 5825           | 17.635   | 5725 to 5875 | PASS    |
| 11N40MIMO  | Ant2    | 5755           | 35.947   | 5725 to 5875 | PASS    |
|            |         | 5795           | 35.962   | 5725 to 5875 | PASS    |
| 11AC80MIMO | Ant2    | 5775           | 75.357   | 5725 to 5875 | PASS    |
| 11AX20MIMO | Ant2    | 5745           | 18.878   | 5725 to 5875 | PASS    |
|            |         | 5825           | 18.856   | 5725 to 5875 | PASS    |
| 11AX40MIMO | Ant2    | 5755           | 37.576   | 5725 to 5875 | PASS    |
|            |         | 5795           | 37.597   | 5725 to 5875 | PASS    |
| 11AX80MIMO | Ant2    | 5775           | 76.827   | 5725 to 5875 | PASS    |

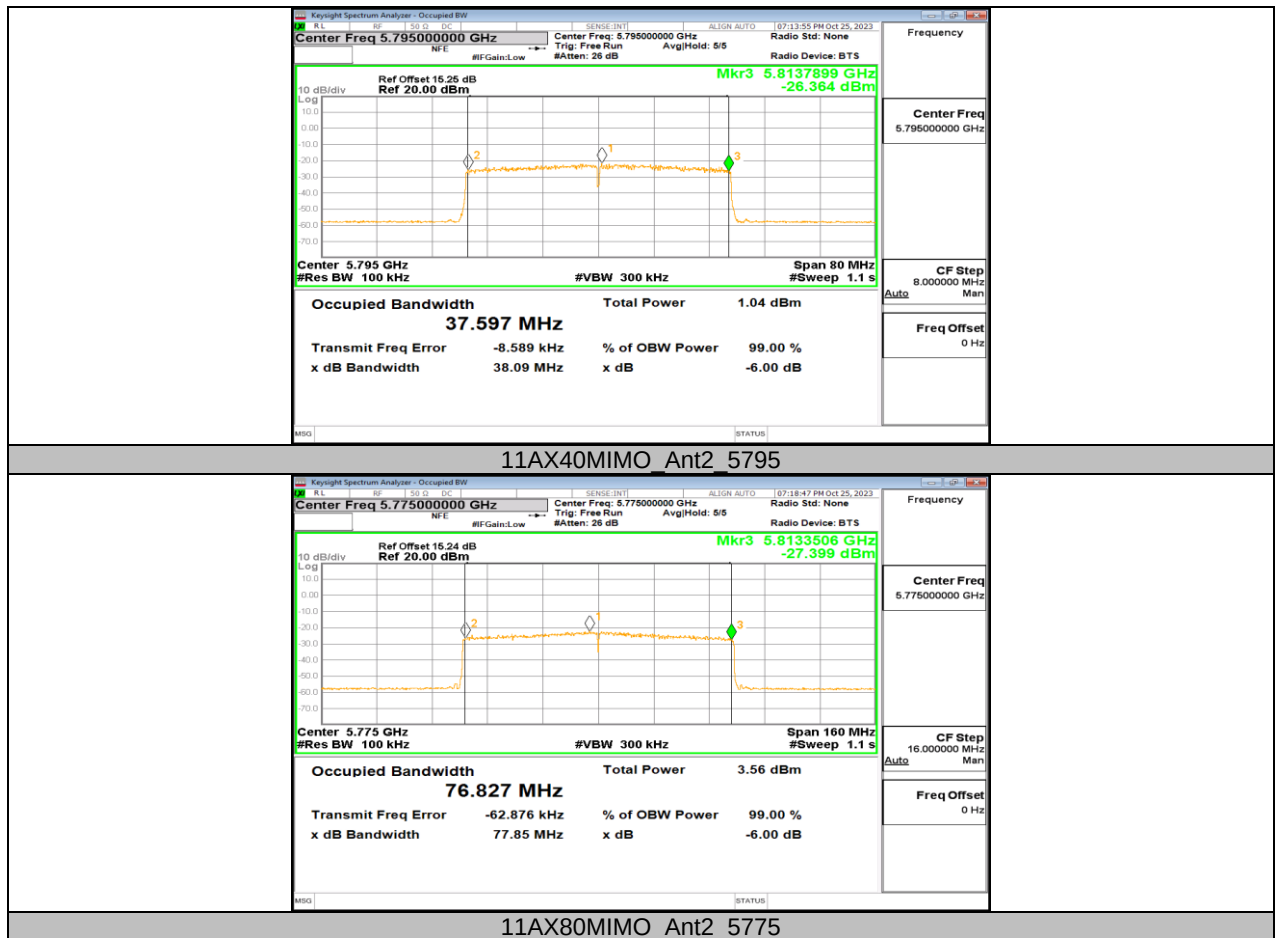


## 8.2.2. Test Graphs









### 8.3. APPENDIX C: EFFECTIVE RADIATED POWER

#### 8.3.1. Test Result

| TestCondition | Test Mode  | Antenna | Frequency [MHz] | EIRP [dBm] | EIRP Limit [dBm] | Verdict |
|---------------|------------|---------|-----------------|------------|------------------|---------|
| NTNV          | 11A        | Ant1    | 5745            | 12.91      | 13.98            | PASS    |
|               |            | Ant2    | 5745            | 12.84      | 13.98            | PASS    |
|               |            | Ant1    | 5785            | 12.96      | 13.98            | PASS    |
|               |            | Ant2    | 5785            | 13.09      | 13.98            | PASS    |
|               |            | Ant1    | 5825            | 13.09      | 13.98            | PASS    |
|               |            | Ant2    | 5825            | 13.11      | 13.98            | PASS    |
|               | 11N20MIMO  | total   | 5745            | 12.74      | 13.98            | PASS    |
|               |            | total   | 5785            | 13.22      | 13.98            | PASS    |
|               |            | total   | 5825            | 13.18      | 13.98            | PASS    |
|               | 11N40MIMO  | total   | 5755            | 12.89      | 13.98            | PASS    |
|               |            | total   | 5795            | 13.18      | 13.98            | PASS    |
|               | 11AC80MIMO | total   | 5775            | 13.09      | 13.98            | PASS    |
|               | 11AX20MIMO | total   | 5745            | 12.88      | 13.98            | PASS    |
|               |            | total   | 5785            | 13.19      | 13.98            | PASS    |
|               |            | total   | 5825            | 13.29      | 13.98            | PASS    |
|               | 11AX40MIMO | total   | 5755            | 13.24      | 13.98            | PASS    |
|               |            | total   | 5795            | 13.37      | 13.98            | PASS    |
|               | 11AX80MIMO | total   | 5775            | 12.96      | 13.98            | PASS    |

| TestCondition | Test Mode  | Antenna | Frequency [MHz] | EIRP [dBm] | EIRP Limit [dBm] | Verdict |
|---------------|------------|---------|-----------------|------------|------------------|---------|
| LTVN          | 11A        | Ant1    | 5745            | 12.66      | 13.98            | PASS    |
|               |            | Ant2    | 5745            | 12.56      | 13.98            | PASS    |
|               |            | Ant1    | 5785            | 12.66      | 13.98            | PASS    |
|               |            | Ant2    | 5785            | 12.69      | 13.98            | PASS    |
|               |            | Ant1    | 5825            | 12.82      | 13.98            | PASS    |
|               |            | Ant2    | 5825            | 12.81      | 13.98            | PASS    |
|               | 11N20MIMO  | total   | 5745            | 12.34      | 13.98            | PASS    |
|               |            | total   | 5785            | 12.93      | 13.98            | PASS    |
|               |            | total   | 5825            | 12.86      | 13.98            | PASS    |
|               | 11N40MIMO  | total   | 5755            | 12.51      | 13.98            | PASS    |
|               |            | total   | 5795            | 12.90      | 13.98            | PASS    |
|               | 11AC80MIMO | total   | 5775            | 12.84      | 13.98            | PASS    |
|               | 11AX20MIMO | total   | 5745            | 12.62      | 13.98            | PASS    |
|               |            | total   | 5785            | 12.90      | 13.98            | PASS    |
|               |            | total   | 5825            | 12.92      | 13.98            | PASS    |
|               | 11AX40MIMO | total   | 5755            | 12.94      | 13.98            | PASS    |
|               |            | total   | 5795            | 13.01      | 13.98            | PASS    |
|               | 11AX80MIMO | total   | 5775            | 12.65      | 13.98            | PASS    |

| TestCondition | Test Mode  | Antenna | Frequency [MHz] | EIRP [dBm] | EIRP Limit [dBm] | Verdict |
|---------------|------------|---------|-----------------|------------|------------------|---------|
| HTNV          | 11A        | Ant1    | 5745            | 12.65      | 13.98            | PASS    |
|               |            | Ant2    | 5745            | 12.56      | 13.98            | PASS    |
|               |            | Ant1    | 5785            | 12.61      | 13.98            | PASS    |
|               |            | Ant2    | 5785            | 12.83      | 13.98            | PASS    |
|               |            | Ant1    | 5825            | 12.69      | 13.98            | PASS    |
|               |            | Ant2    | 5825            | 12.77      | 13.98            | PASS    |
|               | 11N20MIMO  | total   | 5745            | 12.47      | 13.98            | PASS    |
|               |            | total   | 5785            | 12.85      | 13.98            | PASS    |
|               |            | total   | 5825            | 12.83      | 13.98            | PASS    |
|               | 11N40MIMO  | total   | 5755            | 12.54      | 13.98            | PASS    |
|               |            | total   | 5795            | 12.83      | 13.98            | PASS    |
|               | 11AC80MIMO | total   | 5775            | 12.72      | 13.98            | PASS    |
|               | 11AX20MIMO | total   | 5745            | 12.53      | 13.98            | PASS    |
|               |            | total   | 5785            | 12.88      | 13.98            | PASS    |
|               |            | total   | 5825            | 12.91      | 13.98            | PASS    |
|               | 11AX40MIMO | total   | 5755            | 12.92      | 13.98            | PASS    |
|               |            | total   | 5795            | 13.00      | 13.98            | PASS    |
|               | 11AX80MIMO | total   | 5775            | 12.64      | 13.98            | PASS    |

## 8.4. APPENDIX D: PERMITTED RANGE OF OPERATING FREQUENCIES

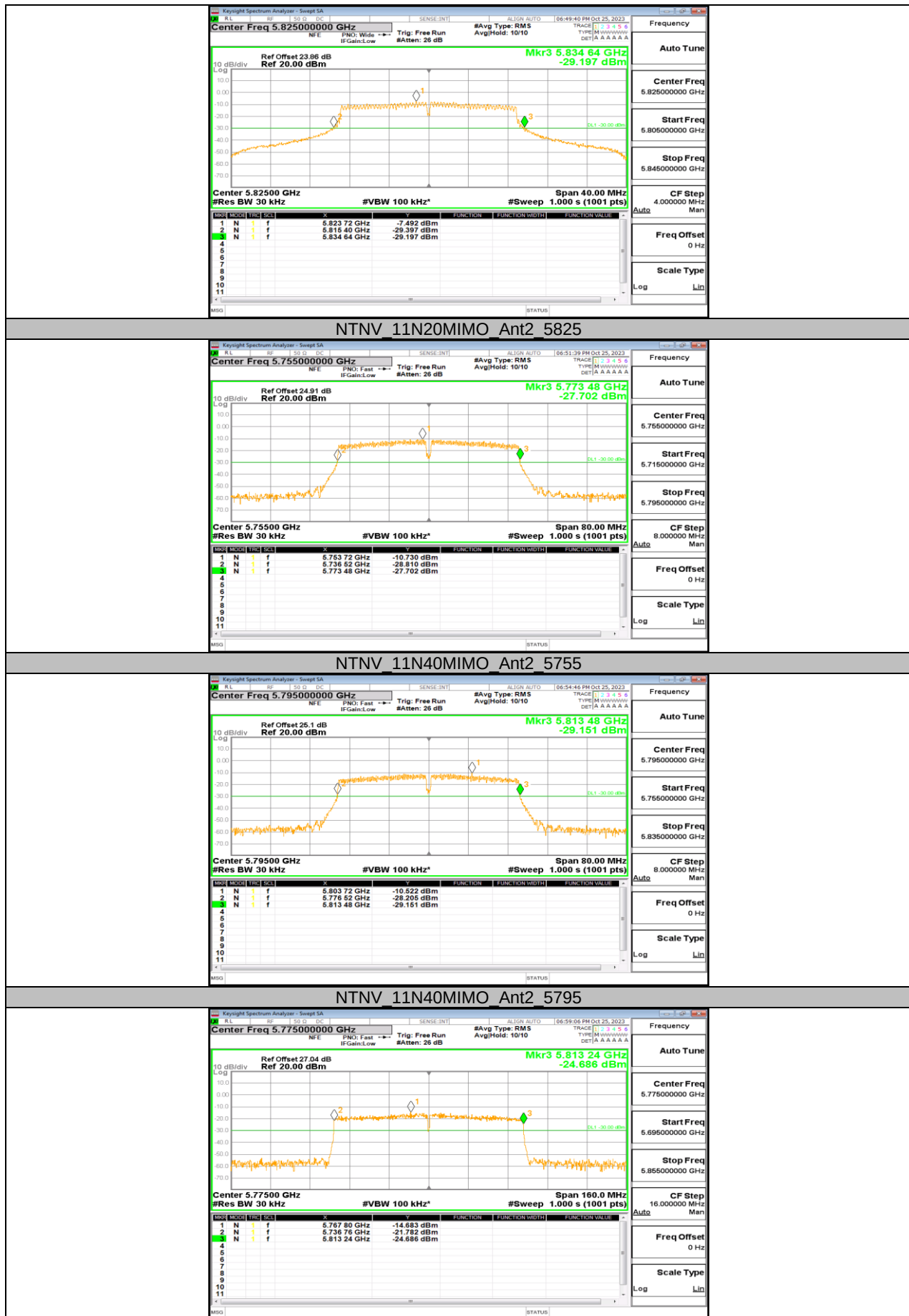
### 8.4.1. Test Result

| TestCondition | TestMode   | Antenna | Frequency[MHz] | FL [MHz] | FH[MHz] | Limit[MHz]   | Verdict |
|---------------|------------|---------|----------------|----------|---------|--------------|---------|
| NTNV          | 11A        | Ant2    | 5745           | 5736.00  | 5753.80 | 5725 to 5875 | PASS    |
|               |            |         | 5825           | 5815.80  | 5834.00 | 5725 to 5875 | PASS    |
|               | 11N20MIMO  | Ant2    | 5745           | 5735.16  | 5754.60 | 5725 to 5875 | PASS    |
|               |            |         | 5825           | 5815.40  | 5834.64 | 5725 to 5875 | PASS    |
|               | 11N40MIMO  | Ant2    | 5755           | 5736.52  | 5773.48 | 5725 to 5875 | PASS    |
|               |            |         | 5795           | 5776.52  | 5813.48 | 5725 to 5875 | PASS    |
|               | 11AC80MIMO | Ant2    | 5775           | 5736.76  | 5813.24 | 5725 to 5875 | PASS    |
|               | 11AX20MIMO | Ant2    | 5745           | 5735.36  | 5754.64 | 5725 to 5875 | PASS    |
|               |            |         | 5825           | 5815.40  | 5834.64 | 5725 to 5875 | PASS    |
|               | 11AX40MIMO | Ant2    | 5755           | 5735.88  | 5774.12 | 5725 to 5875 | PASS    |
|               |            |         | 5795           | 5775.88  | 5814.12 | 5725 to 5875 | PASS    |
|               | 11AX80MIMO | Ant2    | 5775           | 5735.96  | 5814.04 | 5725 to 5875 | PASS    |

## 8.4.2. Test Graphs











## 8.5. APPENDIX E: UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

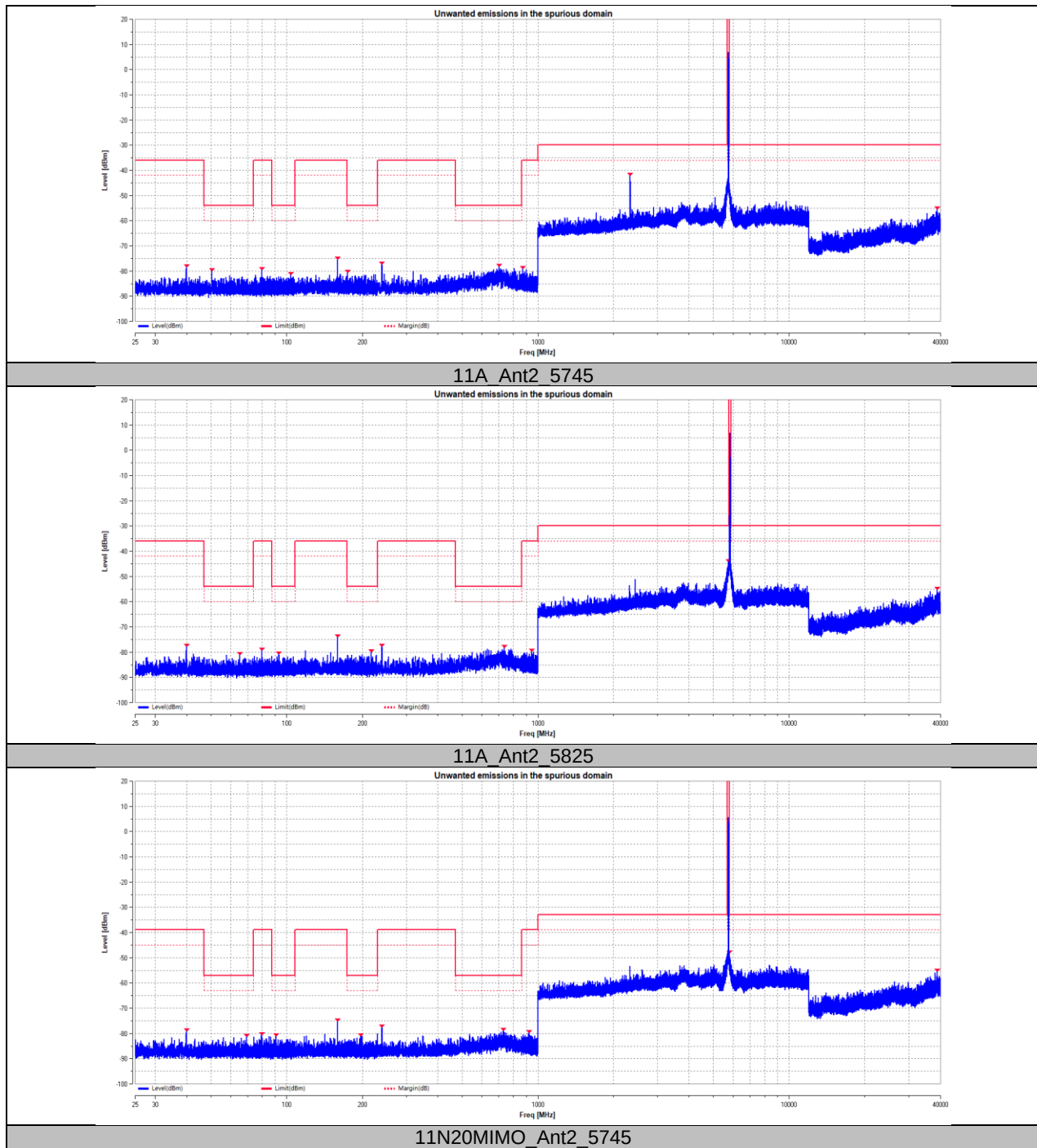
### 8.5.1. Test Result-Pre-scan

| TestMode  | Antenna | Frequency[MHz] | Freq. [MHz] | Level[dBm] | Limit[dBm] | Verdict |
|-----------|---------|----------------|-------------|------------|------------|---------|
| 11A       | Ant2    | 5745           | 40          | -78.51     | -36        | PASS    |
|           |         |                | 50.59       | -80.06     | -54        | PASS    |
|           |         |                | 79.99       | -79.64     | -36        | PASS    |
|           |         |                | 104.27      | -81.66     | -54        | PASS    |
|           |         |                | 160.01      | -75.4      | -36        | PASS    |
|           |         |                | 174.9       | -80.64     | -54        | PASS    |
|           |         |                | 240.08      | -77.38     | -36        | PASS    |
|           |         |                | 701.28      | -78.37     | -54        | PASS    |
|           |         |                | 870.14      | -79.11     | -36        | PASS    |
|           |         |                | 2329.58     | -42.16     | -30        | PASS    |
|           |         |                | 38818.36    | -55.65     | -30        | PASS    |
|           |         | 5825           | 40.03       | -77.91     | -36        | PASS    |
|           |         |                | 65.31       | -81.16     | -54        | PASS    |
|           |         |                | 79.99       | -79.46     | -36        | PASS    |
|           |         |                | 93.38       | -80.98     | -54        | PASS    |
|           |         |                | 160.01      | -74.27     | -36        | PASS    |
|           |         |                | 217.85      | -80.1      | -54        | PASS    |
|           |         |                | 240.08      | -77.96     | -36        | PASS    |
|           |         |                | 737.74      | -78.34     | -54        | PASS    |
|           |         |                | 945.35      | -79.93     | -36        | PASS    |
|           |         |                | 5725.39     | -44.45     | -30        | PASS    |
|           |         |                | 38879.96    | -55.25     | -30        | PASS    |
| 11N20MIMO | Ant2    | 5745           | 40.03       | -79.16     | -39.01     | PASS    |
|           |         |                | 69.52       | -81.4      | -57.01     | PASS    |
|           |         |                | 80.02       | -80.74     | -39.01     | PASS    |
|           |         |                | 90.9        | -81.2      | -57.01     | PASS    |
|           |         |                | 160.01      | -75.34     | -39.01     | PASS    |
|           |         |                | 197.97      | -81.12     | -57.01     | PASS    |
|           |         |                | 240.08      | -77.62     | -39.01     | PASS    |
|           |         |                | 731.07      | -79.06     | -57.01     | PASS    |
|           |         |                | 925.34      | -79.82     | -39.01     | PASS    |
|           |         |                | 5795.79     | -48.22     | -33.01     | PASS    |
|           |         |                | 38774.49    | -55.49     | -33.01     | PASS    |
|           |         | 5825           | 39.98       | -78.72     | -39.01     | PASS    |
|           |         |                | 63.71       | -81.99     | -57.01     | PASS    |
|           |         |                | 79.99       | -79.27     | -39.01     | PASS    |
|           |         |                | 96.03       | -79.74     | -57.01     | PASS    |
|           |         |                | 160.01      | -75.05     | -39.01     | PASS    |
|           |         |                | 199.98      | -80.25     | -57.01     | PASS    |
|           |         |                | 240.08      | -77.89     | -39.01     | PASS    |
|           |         |                | 731.46      | -79.23     | -57.01     | PASS    |
|           |         |                | 923.41      | -80.08     | -39.01     | PASS    |
|           |         |                | 5765.73     | -47.51     | -33.01     | PASS    |
|           |         |                | 39688.26    | -56.51     | -33.01     | PASS    |
| 11N40MIMO | Ant2    | 5755           | 27.49       | -76.54     | -39.01     | PASS    |
|           |         |                | 54.16       | -80.51     | -57.01     | PASS    |
|           |         |                | 79.99       | -80.72     | -39.01     | PASS    |
|           |         |                | 97.34       | -81.18     | -57.01     | PASS    |
|           |         |                | 160.01      | -74.83     | -39.01     | PASS    |
|           |         |                | 210.68      | -79.45     | -57.01     | PASS    |
|           |         |                | 240.08      | -76.81     | -39.01     | PASS    |
|           |         |                | 755.38      | -77.66     | -57.01     | PASS    |
|           |         |                | 895.26      | -80.58     | -39.01     | PASS    |
|           |         |                | 5633.72     | -49.13     | -33.01     | PASS    |
|           |         |                | 38805.29    | -55.33     | -33.01     | PASS    |

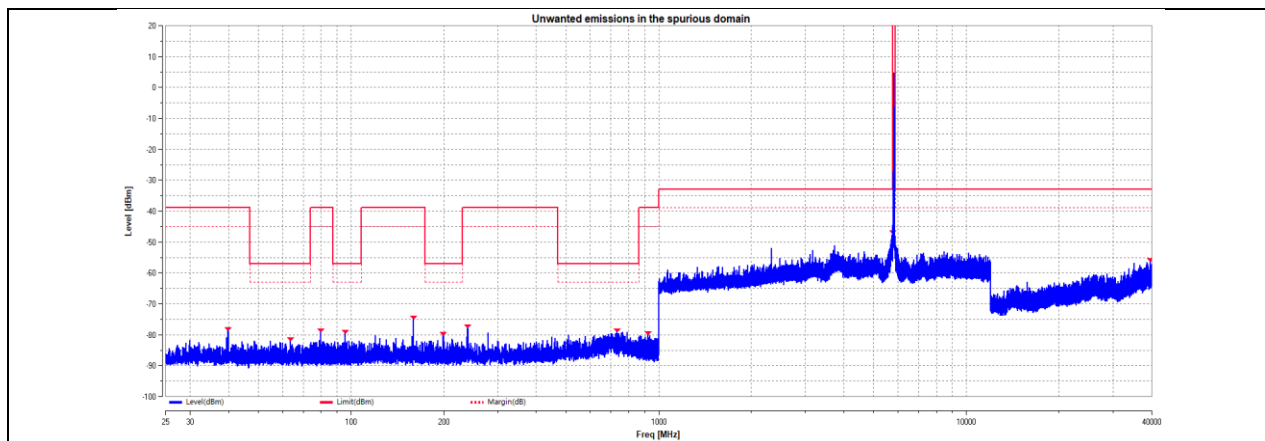
|            |      |      |          |        |        |      |
|------------|------|------|----------|--------|--------|------|
|            |      | 5795 | 29.99    | -75.52 | -39.01 | PASS |
|            |      |      | 52.27    | -81.89 | -57.01 | PASS |
|            |      |      | 80.01    | -79.42 | -39.01 | PASS |
|            |      |      | 88.28    | -80.88 | -57.01 | PASS |
|            |      |      | 160.01   | -75.41 | -39.01 | PASS |
|            |      |      | 201.44   | -81.21 | -57.01 | PASS |
|            |      |      | 240.08   | -77.41 | -39.01 | PASS |
|            |      |      | 733.03   | -78.64 | -57.01 | PASS |
|            |      |      | 973.92   | -80.14 | -39.01 | PASS |
|            |      |      | 5681.39  | -47.94 | -33.01 | PASS |
|            |      |      | 38717.56 | -56.79 | -33.01 | PASS |
| 11AC80MIMO | Ant2 | 5775 | 45.02    | -75.21 | -39.01 | PASS |
|            |      |      | 60.01    | -63.7  | -57.01 | PASS |
|            |      |      | 80.02    | -79.45 | -39.01 | PASS |
|            |      |      | 105.64   | -81.07 | -57.01 | PASS |
|            |      |      | 160.01   | -74.4  | -39.01 | PASS |
|            |      |      | 197.07   | -80.84 | -57.01 | PASS |
|            |      |      | 240.08   | -77.23 | -39.01 | PASS |
|            |      |      | 713.04   | -79.33 | -57.01 | PASS |
|            |      |      | 874.56   | -80.1  | -39.01 | PASS |
|            |      |      | 10276.24 | -53.14 | -33.01 | PASS |
|            |      |      | 38480.48 | -56.47 | -33.01 | PASS |
| 11AX20MIMO | Ant2 | 5745 | 39.98    | -77.74 | -39.01 | PASS |
|            |      |      | 57.94    | -80.4  | -57.01 | PASS |
|            |      |      | 74.7     | -79.58 | -39.01 | PASS |
|            |      |      | 104.25   | -81.06 | -57.01 | PASS |
|            |      |      | 160.01   | -74.96 | -39.01 | PASS |
|            |      |      | 199.98   | -80.61 | -57.01 | PASS |
|            |      |      | 240.08   | -76.96 | -39.01 | PASS |
|            |      |      | 752.24   | -78.62 | -57.01 | PASS |
|            |      |      | 883.53   | -80.19 | -39.01 | PASS |
|            |      |      | 5690.92  | -49.93 | -33.01 | PASS |
|            |      | 5825 | 37999.8  | -56.43 | -33.01 | PASS |
|            |      |      | 40       | -77.03 | -39.01 | PASS |
|            |      |      | 48.92    | -81.21 | -57.01 | PASS |
|            |      |      | 79.99    | -79.53 | -39.01 | PASS |
|            |      |      | 106.05   | -81.43 | -57.01 | PASS |
|            |      |      | 160.01   | -75.03 | -39.01 | PASS |
|            |      |      | 210.01   | -80.31 | -57.01 | PASS |
|            |      |      | 240.08   | -77.59 | -39.01 | PASS |
|            |      |      | 779.68   | -78    | -57.01 | PASS |
|            |      |      | 888.5    | -79.98 | -39.01 | PASS |
| 11AX40MIMO | Ant2 | 5755 | 5773.43  | -50    | -33.01 | PASS |
|            |      |      | 37133.64 | -54.64 | -33.01 | PASS |
|            |      |      | 39.98    | -78    | -39.01 | PASS |
|            |      |      | 61.99    | -81.29 | -57.01 | PASS |
|            |      |      | 79.99    | -80.37 | -39.01 | PASS |
|            |      |      | 96.17    | -81.16 | -57.01 | PASS |
|            |      |      | 160.01   | -75.36 | -39.01 | PASS |
|            |      |      | 202.73   | -80.8  | -57.01 | PASS |
|            |      |      | 240.08   | -76.16 | -39.01 | PASS |
|            |      |      | 729.11   | -79    | -57.01 | PASS |
|            |      | 5795 | 921.75   | -79.8  | -39.01 | PASS |
|            |      |      | 5631.15  | -50.98 | -33.01 | PASS |
|            |      |      | 38557.02 | -55.17 | -33.01 | PASS |
|            |      |      | 27.35    | -78.49 | -39.01 | PASS |
|            |      |      | 62.2     | -81.33 | -57.01 | PASS |
|            |      |      | 79.98    | -80.29 | -39.01 | PASS |
|            |      |      | 91.89    | -81.06 | -57.01 | PASS |
|            |      |      | 160.01   | -74.54 | -39.01 | PASS |
|            |      |      | 186.21   | -79.9  | -57.01 | PASS |
|            |      |      | 240.08   | -76.98 | -39.01 | PASS |
|            |      |      | 699.71   | -77.28 | -57.01 | PASS |
|            |      |      | 886.29   | -79.9  | -39.01 | PASS |

|            |      |      |          |        |        |      |
|------------|------|------|----------|--------|--------|------|
|            |      |      | 5639.59  | -50.31 | -33.01 | PASS |
|            |      |      | 38185.54 | -55.83 | -33.01 | PASS |
| 11AX80MIMO | Ant2 | 5775 | 39.94    | -71.81 | -39.01 | PASS |
|            |      |      | 60.01    | -61.46 | -57.01 | PASS |
|            |      |      | 74.74    | -79.33 | -39.01 | PASS |
|            |      |      | 101.46   | -80.83 | -57.01 | PASS |
|            |      |      | 160.01   | -74.78 | -39.01 | PASS |
|            |      |      | 200.04   | -80.63 | -57.01 | PASS |
|            |      |      | 240.08   | -77.57 | -39.01 | PASS |
|            |      |      | 702.06   | -79.21 | -57.01 | PASS |
|            |      |      | 876.9    | -80.12 | -39.01 | PASS |
|            |      |      | 3792.63  | -52.38 | -33.01 | PASS |
|            |      |      | 38746.49 | -55.44 | -33.01 | PASS |

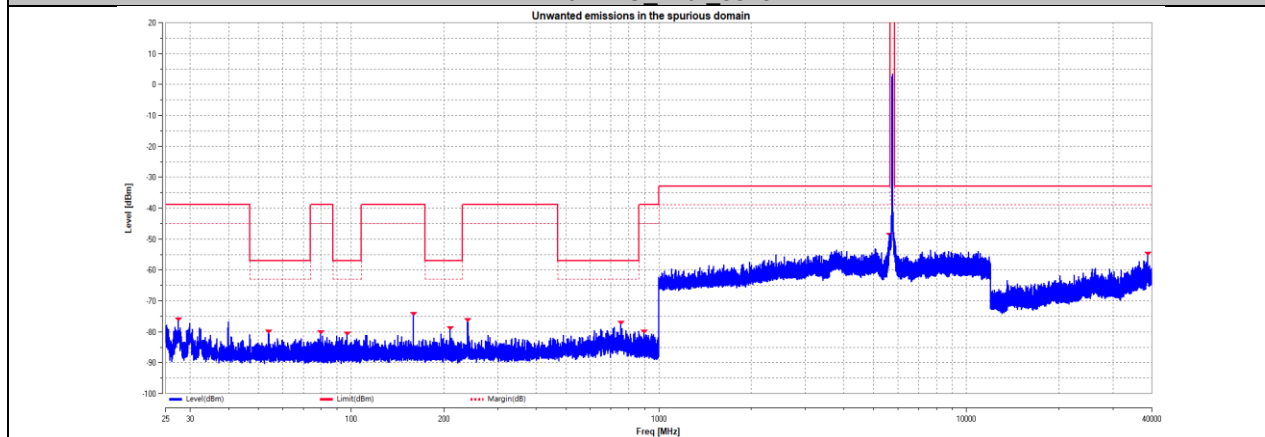
## 8.5.2. Test Graphs-Pre-scan



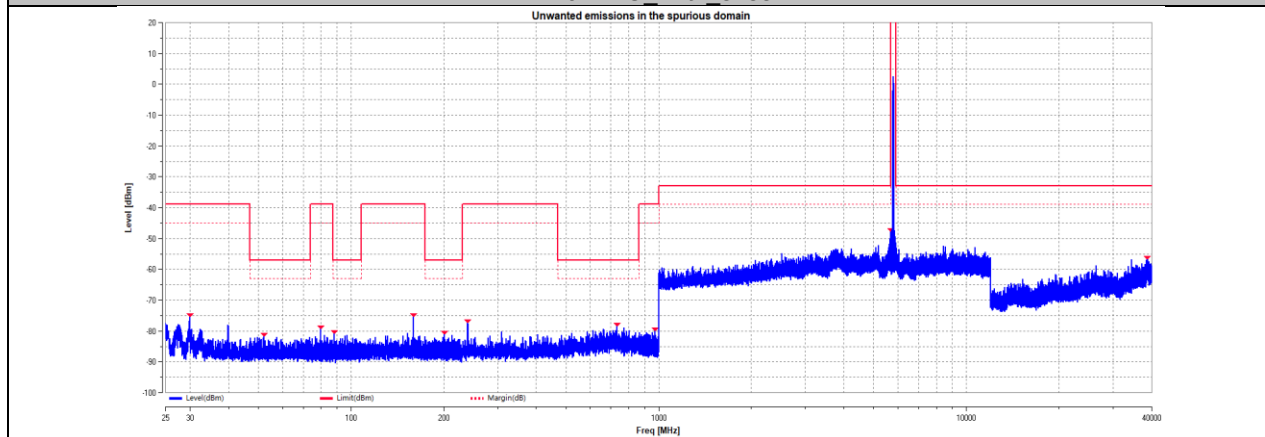




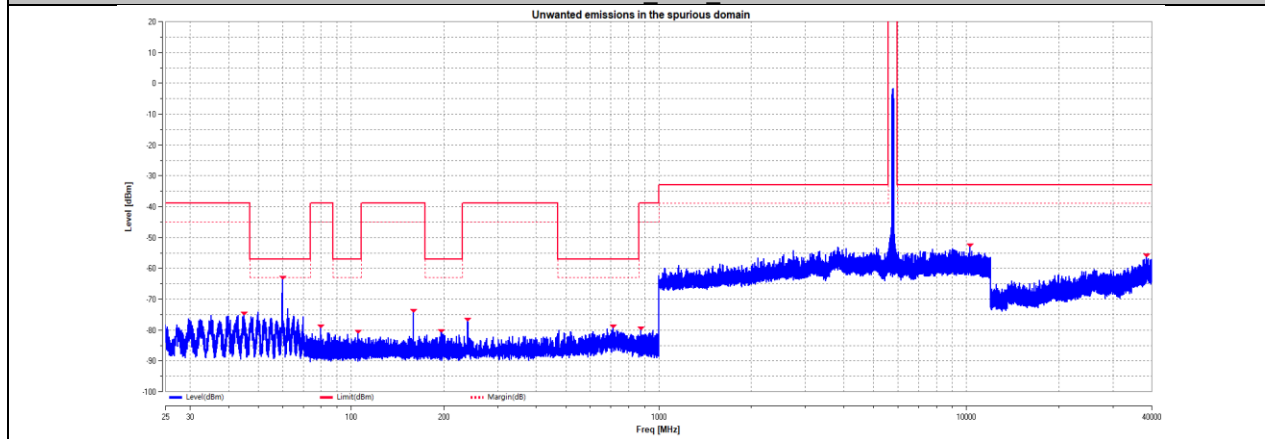
11N20MIMO\_Ant2\_5825



11N40MIMO\_Ant2\_5755

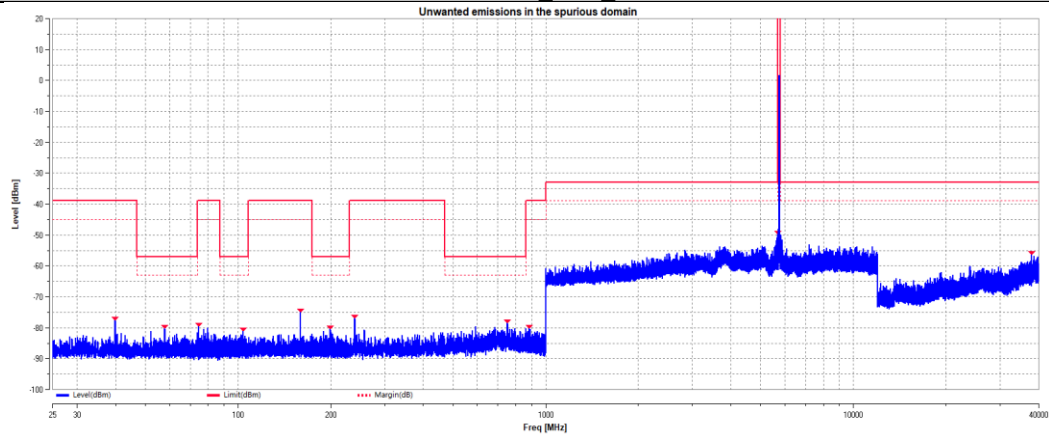


11N40MIMO\_Ant2\_5795

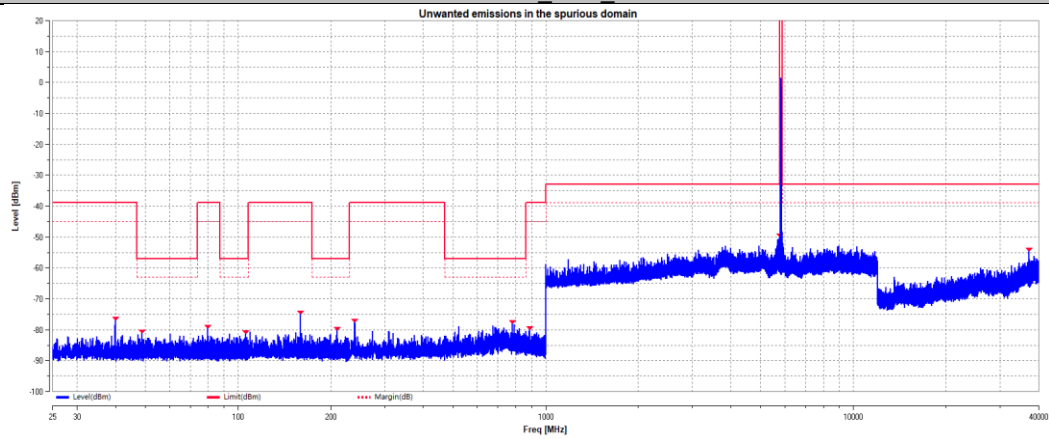




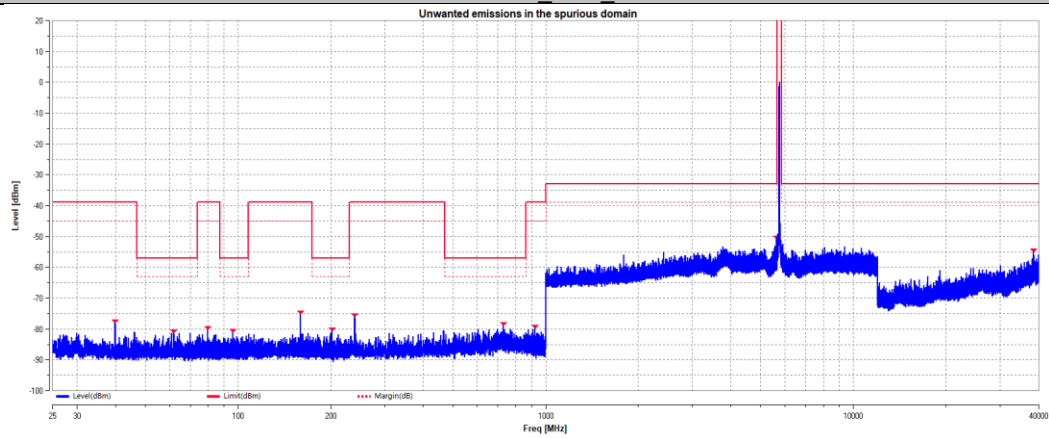
### 11AC80MIMO\_Ant2\_5775



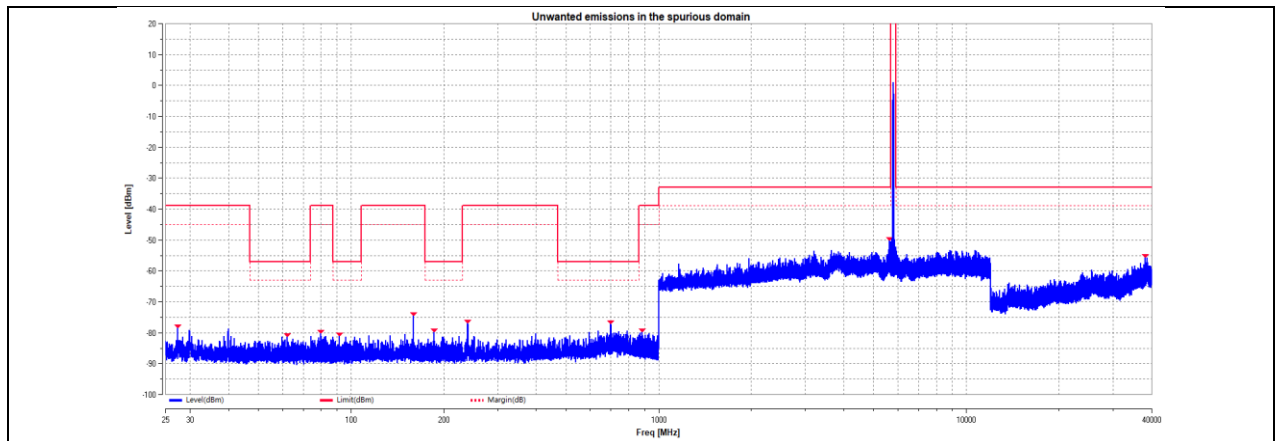
### 11AX20MIMO\_Ant2\_5745



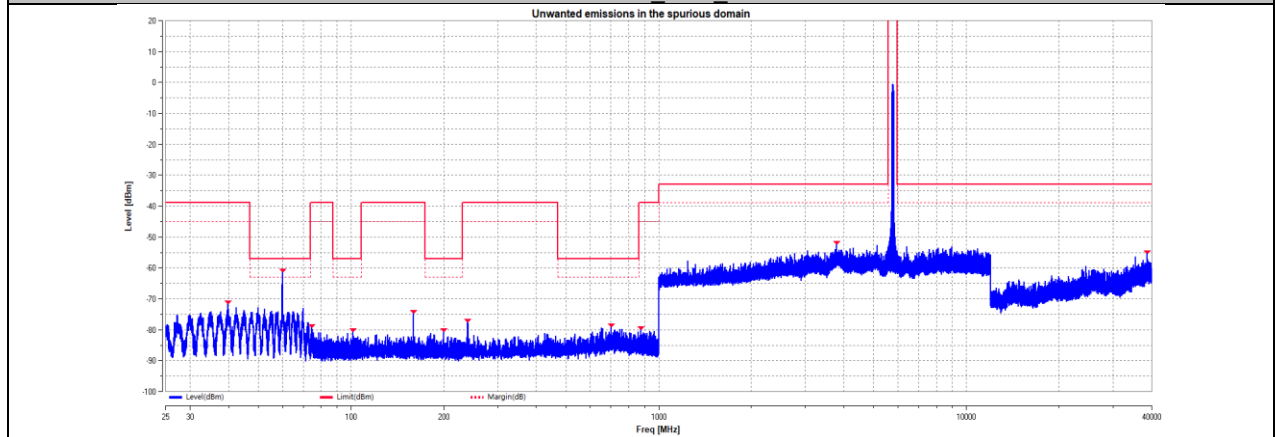
### 11AX20MIMO\_Ant2\_5825



### 11AX40MIMO\_Ant2\_5755



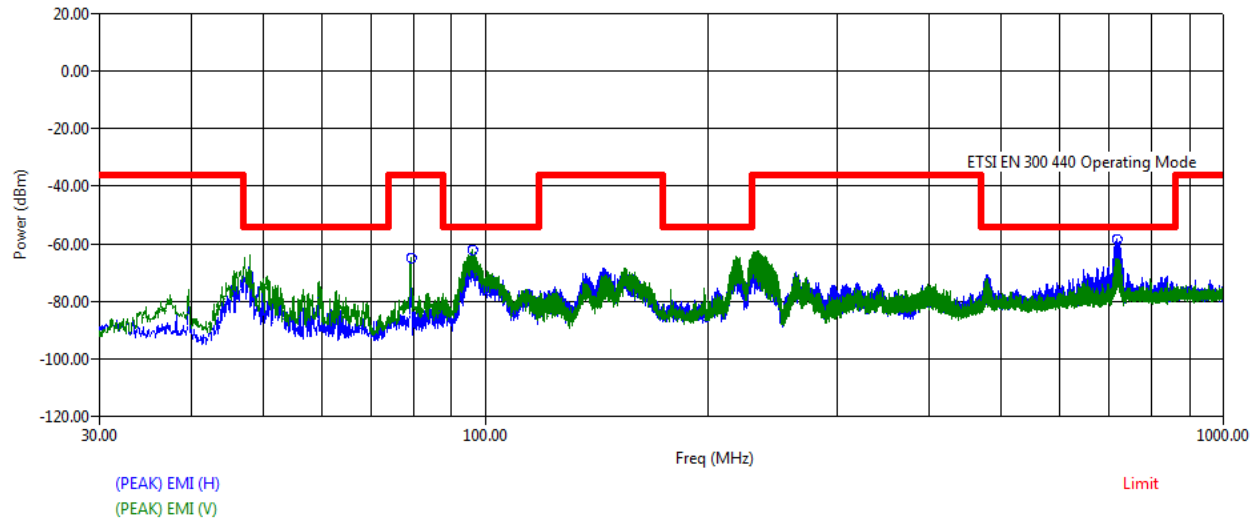
11AX40MIMO\_Ant2\_5795



11AX80MIMO\_Ant2\_5775

### 8.5.3. TX Radiated Test Result

| Unwanted emissions in the spurious domain 30 MHz ~ 1 GHz |              |               |                     |
|----------------------------------------------------------|--------------|---------------|---------------------|
| Measurement Method                                       | Radiated     | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11a SISO | Test Channel: | CH 149              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamplifier (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------------|----------------------|-------------|------------------------|
| 79.25      | 60.15                   | -86.81              | 0.00                | 1.12           | 43.00                 | -68.53               | -36.00      | -32.53                 |
| 96.15      | 61.24                   | -87.28              | 0.00                | 1.27           | 43.00                 | -67.78               | -54.00      | -13.78                 |
| 717.80     | 57.95                   | -77.09              | 0.00                | 3.63           | 42.75                 | -58.25               | -54.00      | -4.25                  |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamplifier (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 79.25      | 64.50                   | -87.41              | 0.00                | 1.12           | 43.00                 | -64.78               | -36.00      | -28.78                 |
| 96.15      | 66.77                   | -86.96              | 0.00                | 1.27           | 43.00                 | -61.93               | -54.00      | -7.93                  |
| 717.80     | 48.68                   | -76.47              | 0.00                | 3.63           | 42.75                 | -66.91               | -54.00      | -12.91                 |

Note:

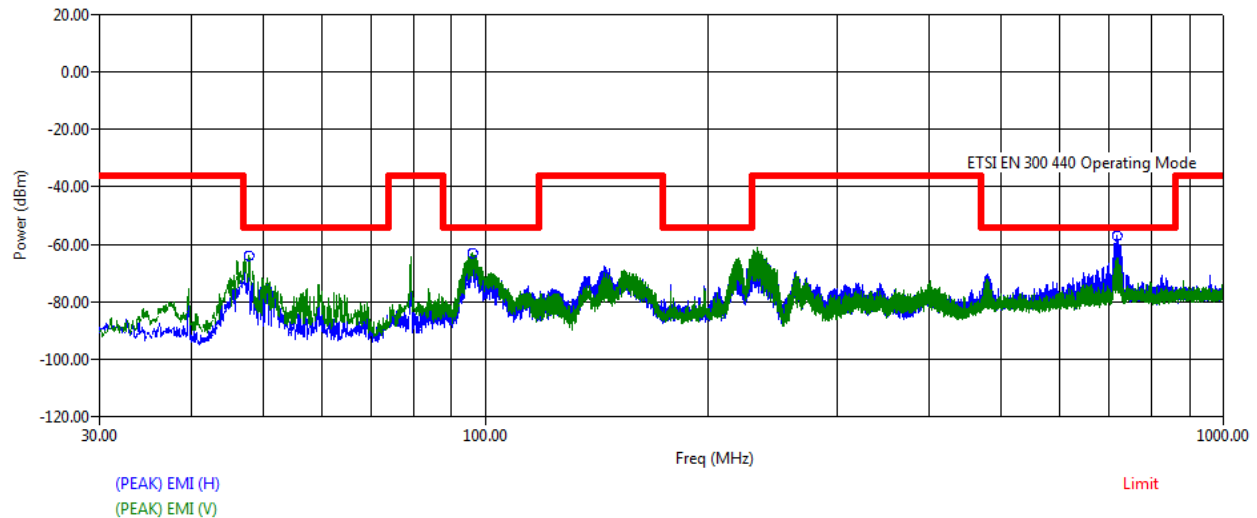
(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Preamp (H)

(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Preamp (V)

(RMS) Margin (H) = (RMS) EMI (H) - Limit

(RMS) Margin (V) = (RMS) EMI (V) - Limit

| Unwanted emissions in the spurious domain 30 MHz ~ 1 GHz |              |               |                     |
|----------------------------------------------------------|--------------|---------------|---------------------|
| Measurement Method                                       | Radiated     | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11a SISO | Test Channel: | CH 165              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamp (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------|----------------------|-------------|------------------------|
| 47.85      | 56.55                   | -85.17              | 0.00                | 0.88           | 43.00           | -70.74               | -54.00      | -16.74                 |
| 96.10      | 61.87                   | -87.29              | 0.00                | 1.27           | 43.00           | -67.16               | -54.00      | -13.16                 |
| 717.15     | 59.46                   | -77.12              | 0.00                | 3.62           | 42.75           | -56.78               | -54.00      | -2.78                  |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamp (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 47.85      | 60.62                   | -82.30              | 0.00                | 0.88           | 43.00           | -63.81               | -54.00      | -9.81                  |
| 96.10      | 65.52                   | -86.97              | 0.00                | 1.27           | 43.00           | -63.18               | -54.00      | -9.18                  |
| 717.15     | 49.19                   | -76.51              | 0.00                | 3.62           | 42.75           | -66.44               | -54.00      | -12.44                 |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Preamp (H)

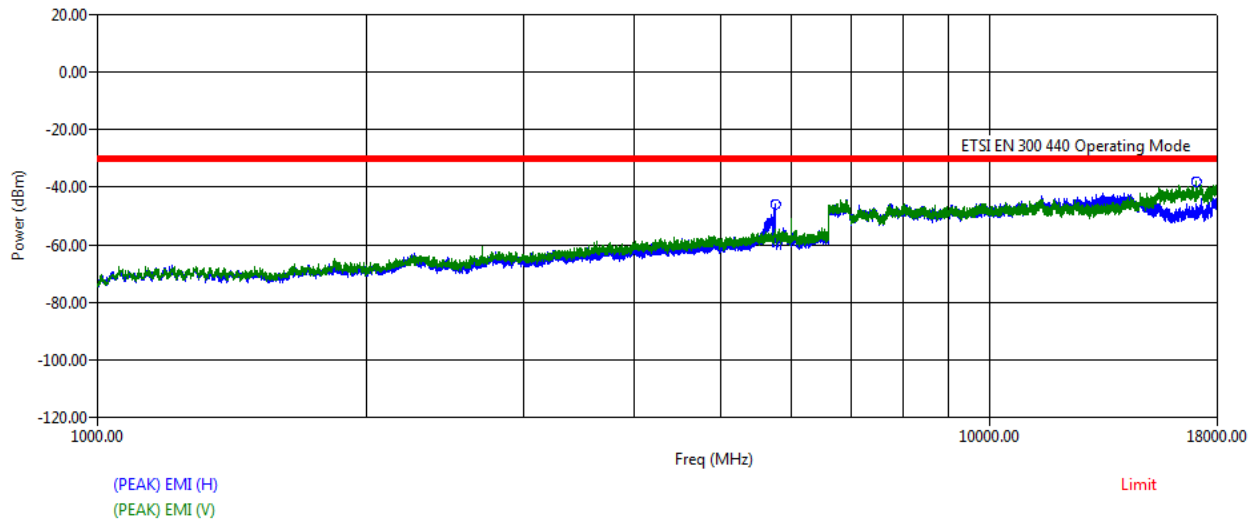
(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Preamp (V)

(RMS) Margin (H) = (RMS) EMI (H) – Limit

(RMS) Margin (V) = (RMS) EMI (V) – Limit

Note: All test modes and antennas have been tested, but only the worst case data recorded in the report.

| Unwanted emissions in the spurious domain 1 GHz ~ 18 GHz |              |               |                     |
|----------------------------------------------------------|--------------|---------------|---------------------|
| Measurement Method                                       | Radiated     | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11a SISO | Test Channel: | CH 149              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamp (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------|----------------------|-------------|------------------------|
| 5744.00    | 44.08                   | -60.98              | 0.00                | 13.92          | 42.79           | -45.76               | -30.00      | -15.76                 |
| 17054.50   | 30.24                   | -59.06              | 0.00                | 20.90          | 39.51           | -47.43               | -30.00      | -17.43                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamp (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5744.00    | 33.20                   | -59.60              | 0.00                | 13.92          | 42.79           | -55.27               | -30.00      | -25.27                 |
| 17054.50   | 33.25                   | -52.71              | 0.00                | 20.90          | 39.51           | -38.07               | -30.00      | -8.07                  |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Premp (H)

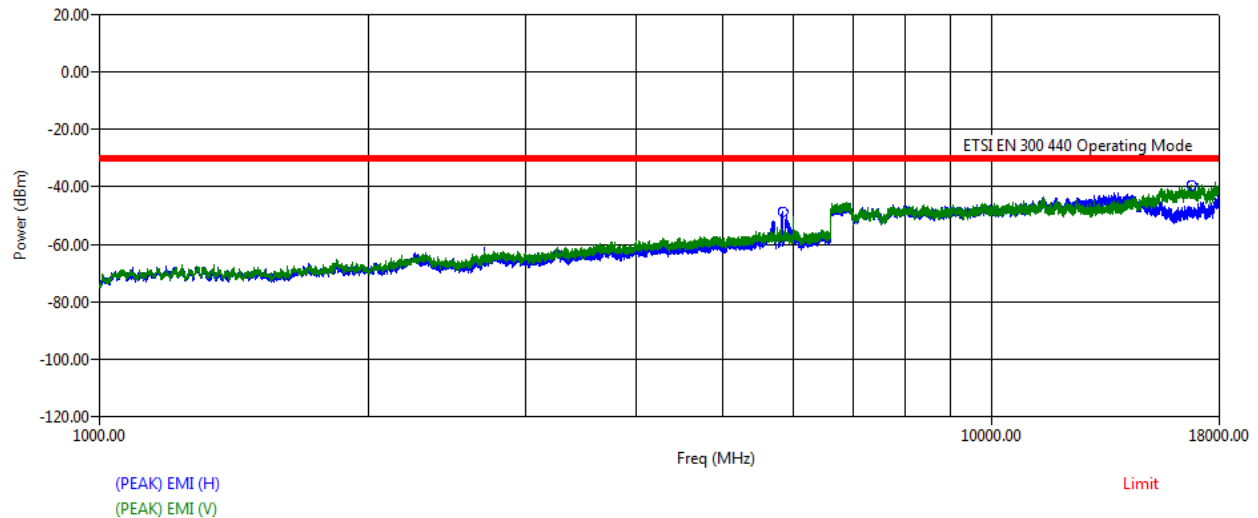
(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Premp (V)

(RMS) Margin (H) = (RMS) EMI (H) – Limit

(RMS) Margin (V) = (RMS) EMI (V) – Limit

Note: Band reject filter was used during test.

| Unwanted emissions in the spurious domain 1 GHz ~ 18 GHz |              |               |                     |
|----------------------------------------------------------|--------------|---------------|---------------------|
| Measurement Method                                       | Radiated     | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11a SISO | Test Channel: | CH 165              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamplifier (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------------|----------------------|-------------|------------------------|
| 5827.00    | 41.27                   | -60.86              | 0.00                | 13.88          | 42.73                 | -48.44               | -30.00      | -18.44                 |
| 16760.50   | 30.59                   | -60.38              | 0.00                | 20.50          | 39.83                 | -49.12               | -30.00      | -19.12                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamplifier (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5827.00    | 29.88                   | -59.42              | 0.00                | 13.88          | 42.73                 | -58.40               | -30.00      | -28.40                 |
| 16760.50   | 33.99                   | -53.90              | 0.00                | 20.50          | 39.83                 | -39.25               | -30.00      | -9.25                  |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Preamplifier (H)

(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Preamplifier (V)

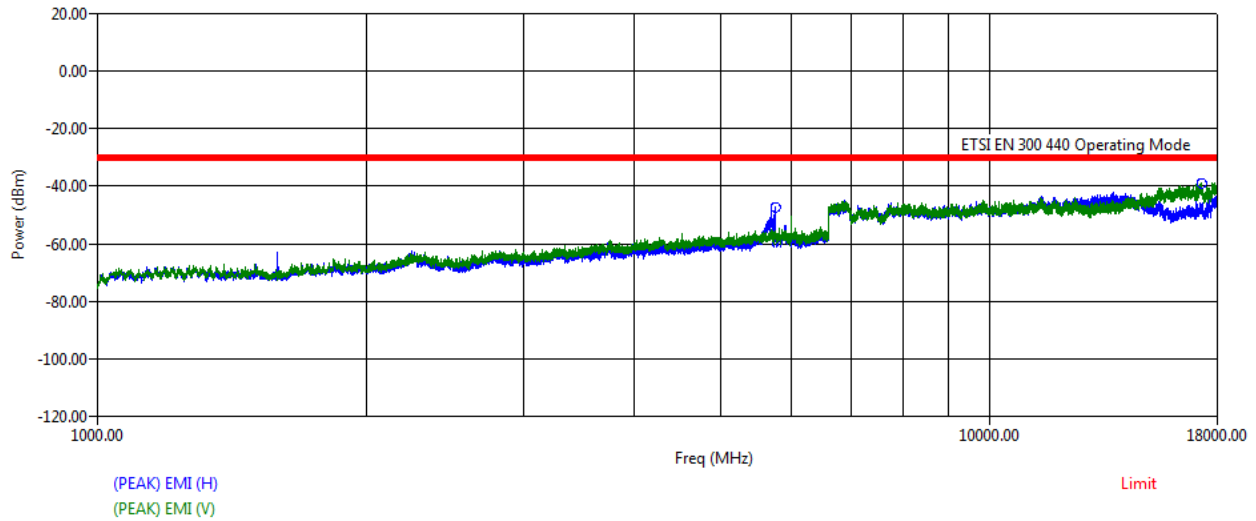
(RMS) Margin (H) = (RMS) EMI (H) - Limit

(RMS) Margin (V) = (RMS) EMI (V) - Limit

Note: Band reject filter was used during test.

### Unwanted emissions in the spurious domain 1 GHz ~ 18 GHz

|                    |                   |               |                     |
|--------------------|-------------------|---------------|---------------------|
| Measurement Method | Radiated          | Polar:        | Horizontal/Vertical |
| Test Mode:         | 802.11n HT20 MIMO | Test Channel: | CH 149              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamp (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------|----------------------|-------------|------------------------|
| 5744.00    | 42.75                   | -60.98              | 0.00                | 13.92          | 42.79           | -47.10               | -30.00      | -17.10                 |
| 17279.00   | 29.20                   | -58.84              | 0.00                | 21.75          | 39.14           | -47.03               | -30.00      | -17.03                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamp (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5744.00    | 32.71                   | -59.60              | 0.00                | 13.92          | 42.79           | -55.75               | -30.00      | -25.75                 |
| 17279.00   | 31.25                   | -52.59              | 0.00                | 21.75          | 39.14           | -38.74               | -30.00      | -8.74                  |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Preamp (H)

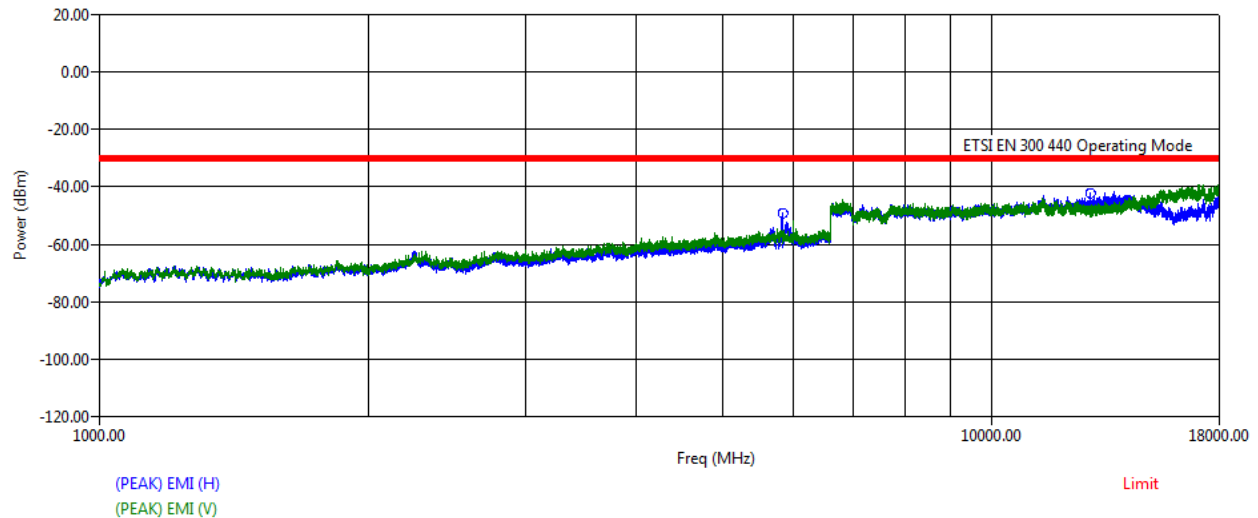
(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Preamp (V)

(RMS) Margin (H) = (RMS) EMI (H) – Limit

(RMS) Margin (V) = (RMS) EMI (V) - Limit

Note: Band reject filter was used during test.

| Unwanted emissions in the spurious domain 1 GHz ~ 18 GHz |                   |               |                     |
|----------------------------------------------------------|-------------------|---------------|---------------------|
| Measurement Method                                       | Radiated          | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11n HT20 MIMO | Test Channel: | CH 165              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamp (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------|----------------------|-------------|------------------------|
| 5827.50    | 40.61                   | -60.86              | 0.00                | 13.88          | 42.73           | -49.10               | -30.00      | -19.10                 |
| 12879.50   | 38.83                   | -56.86              | 0.00                | 17.30          | 41.36           | -42.09               | -30.00      | -12.09                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamp (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5827.50    | 29.57                   | -59.42              | 0.00                | 13.88          | 42.73           | -58.70               | -30.00      | -28.70                 |
| 12879.50   | 35.33                   | -59.20              | 0.00                | 17.30          | 41.36           | -47.92               | -30.00      | -17.92                 |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Premp (H)

(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Premp (V)

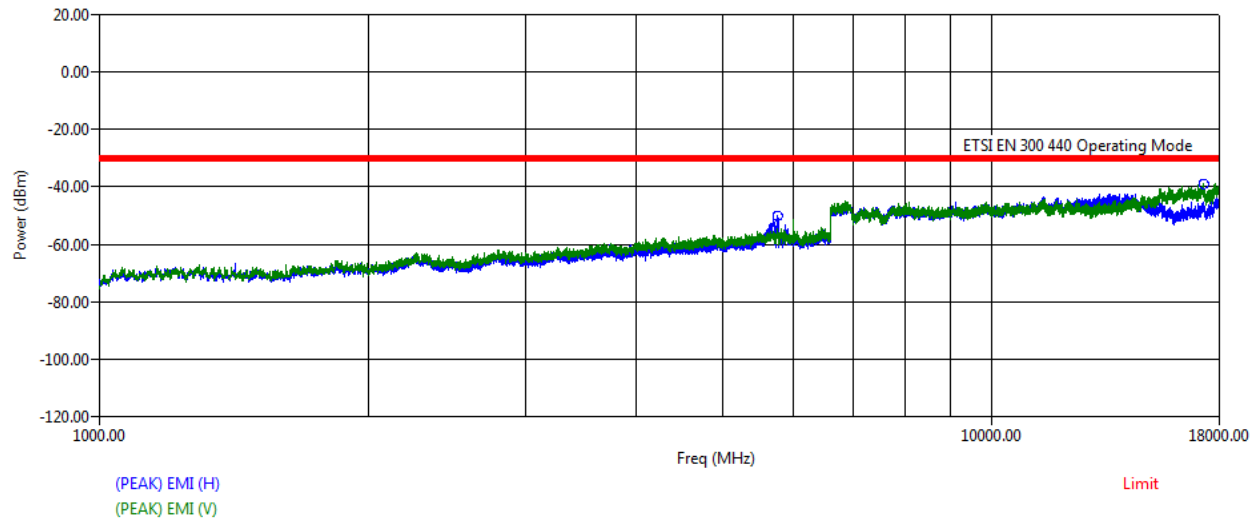
(RMS) Margin (H) = (RMS) EMI (H) – Limit

(RMS) Margin (V) = (RMS) EMI (V) - Limit

Note: Band reject filter was used during test.



| Unwanted emissions in the spurious domain 1 GHz ~ 18 GHz |                   |               |                     |
|----------------------------------------------------------|-------------------|---------------|---------------------|
| Measurement Method                                       | Radiated          | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11n HT40 MIMO | Test Channel: | CH 151              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamp (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------|----------------------|-------------|------------------------|
| 5754.00    | 39.88                   | -61.01              | 0.00                | 13.92          | 42.78           | -49.99               | -30.00      | -19.99                 |
| 17270.50   | 29.88                   | -58.75              | 0.00                | 21.73          | 39.16           | -46.30               | -30.00      | -16.30                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamp (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5754.00    | 32.51                   | -59.55              | 0.00                | 13.92          | 42.78           | -55.91               | -30.00      | -25.91                 |
| 17270.50   | 30.97                   | -52.49              | 0.00                | 21.73          | 39.16           | -38.96               | -30.00      | -8.96                  |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Preamp (H)

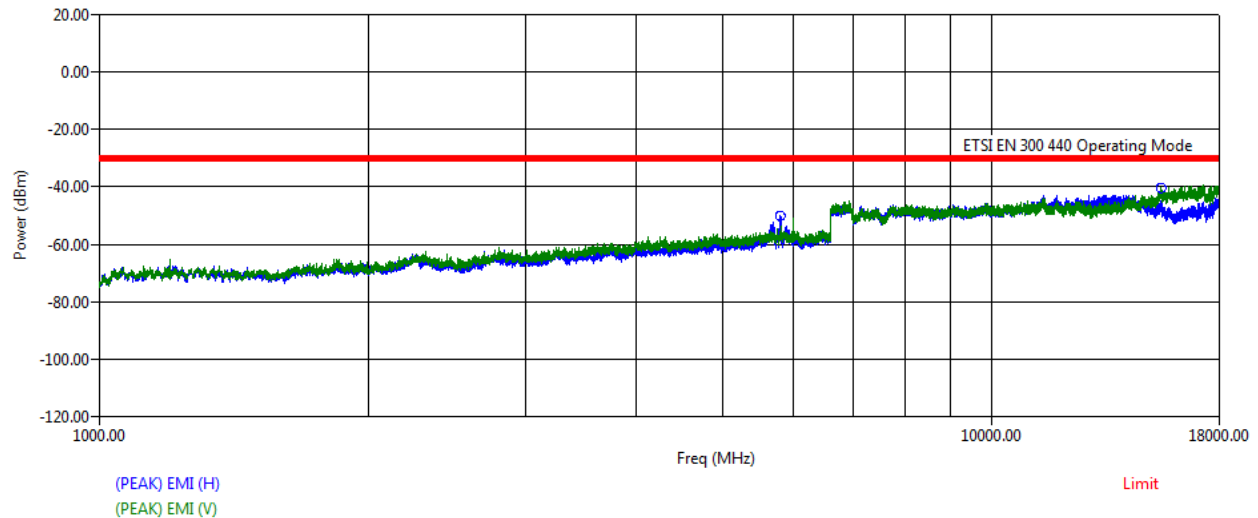
(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Preamp (V)

(RMS) Margin (H) = (RMS) EMI (H) – Limit

(RMS) Margin (V) = (RMS) EMI (V) – Limit

Note: Band reject filter was used during test.

| Unwanted emissions in the spurious domain 1 GHz ~ 18 GHz |                   |               |                     |
|----------------------------------------------------------|-------------------|---------------|---------------------|
| Measurement Method                                       | Radiated          | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11n HT40 MIMO | Test Channel: | CH 159              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamp (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------|----------------------|-------------|------------------------|
| 5797.50    | 40.21                   | -61.19              | 0.00                | 13.90          | 42.75           | -49.83               | -30.00      | -19.83                 |
| 15482.00   | 34.49                   | -60.42              | 0.00                | 20.34          | 40.70           | -46.29               | -30.00      | -16.29                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamp (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5797.50    | 31.98                   | -59.57              | 0.00                | 13.90          | 42.75           | -56.43               | -30.00      | -26.43                 |
| 15482.00   | 35.57                   | -55.59              | 0.00                | 20.34          | 40.70           | -40.38               | -30.00      | -10.38                 |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Premp (H)

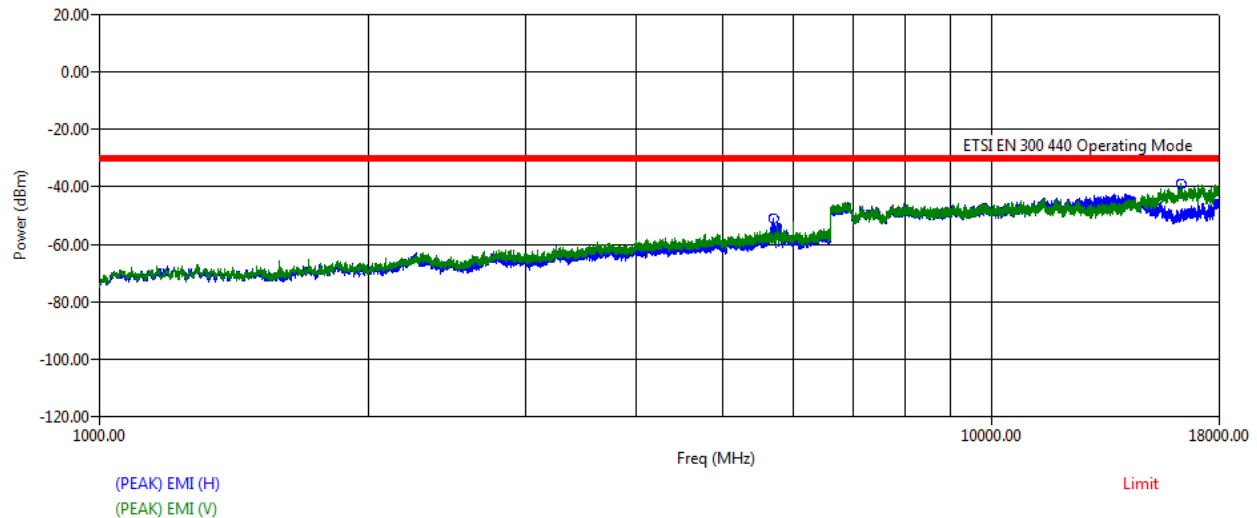
(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Premp (V)

(RMS) Margin (H) = (RMS) EMI (H) – Limit

(RMS) Margin (V) = (RMS) EMI (V) – Limit

Note: Band reject filter was used during test.

| Transmitter unwanted emissions in the spurious domain 1GHz - 18 GHz |                     |               |                     |
|---------------------------------------------------------------------|---------------------|---------------|---------------------|
| Measurement Method                                                  | Radiated            | Polar:        | Horizontal/Vertical |
| Test Mode:                                                          | 802.11ac VHT80 MIMO | Test Channel: | CH 155              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamp (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------|----------------------|-------------|------------------------|
| 5684.00    | 39.21                   | -60.93              | 0.00                | 13.76          | 42.84           | -50.81               | -30.00      | -20.81                 |
| 16301.50   | 29.33                   | -61.51              | 0.00                | 20.23          | 40.29           | -52.24               | -30.00      | -22.24                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamp (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5684.00    | 30.40                   | -59.93              | 0.00                | 13.76          | 42.84           | -58.61               | -30.00      | -28.61                 |
| 16301.50   | 34.90                   | -53.69              | 0.00                | 20.23          | 40.29           | -38.85               | -30.00      | -8.85                  |

#### Note:

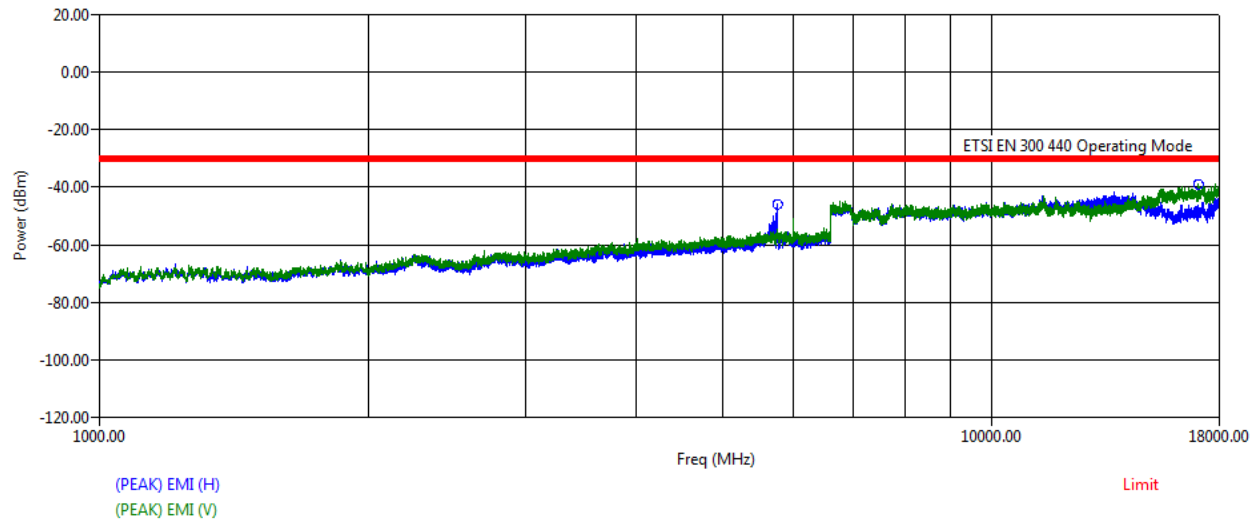
(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Preamp (H)

(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Preamp (V)

(RMS) Margin (H) = (RMS) EMI (H) - Limit

(RMS) Margin (V) = (RMS) EMI (V) - Limit

| Unwanted emissions in the spurious domain 1 GHz ~ 18 GHz |                    |               |                     |
|----------------------------------------------------------|--------------------|---------------|---------------------|
| Measurement Method                                       | Radiated           | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11ax HE20 MIMO | Test Channel: | CH 149              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamp (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------|----------------------|-------------|------------------------|
| 5744.00    | 43.92                   | -60.98              | 0.00                | 13.92          | 42.79           | -45.93               | -30.00      | -15.93                 |
| 17031.00   | 30.24                   | -59.29              | 0.00                | 20.96          | 39.55           | -47.64               | -30.00      | -17.64                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamp (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5744.00    | 31.35                   | -59.60              | 0.00                | 13.92          | 42.79           | -57.12               | -30.00      | -27.12                 |
| 17031.00   | 32.66                   | -52.84              | 0.00                | 20.96          | 39.55           | -38.77               | -30.00      | -8.77                  |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Premp (H)

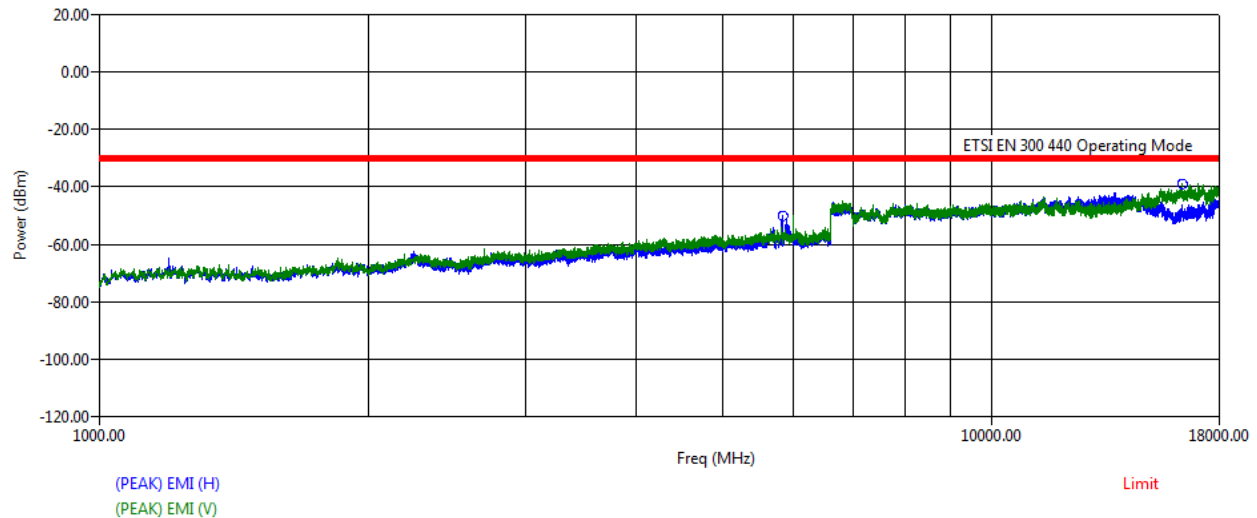
(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Premp (V)

(RMS) Margin (H) = (RMS) EMI (H) – Limit

(RMS) Margin (V) = (RMS) EMI (V) - Limit

Note: Band reject filter was used during test.

| Unwanted emissions in the spurious domain 1 GHz ~ 18 GHz |                    |               |                     |
|----------------------------------------------------------|--------------------|---------------|---------------------|
| Measurement Method                                       | Radiated           | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11ax HE20 MIMO | Test Channel: | CH 165              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamplifier (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------------|----------------------|-------------|------------------------|
| 5826.50    | 39.64                   | -60.87              | 0.00                | 13.88          | 42.73                 | -50.08               | -30.00      | -20.08                 |
| 16326.50   | 32.50                   | -61.21              | 0.00                | 20.22          | 40.27                 | -48.75               | -30.00      | -18.75                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamplifier (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5826.50    | 30.03                   | -59.43              | 0.00                | 13.88          | 42.73                 | -58.25               | -30.00      | -28.25                 |
| 16326.50   | 34.96                   | -53.69              | 0.00                | 20.22          | 40.27                 | -38.78               | -30.00      | -8.78                  |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Preamplifier (H)

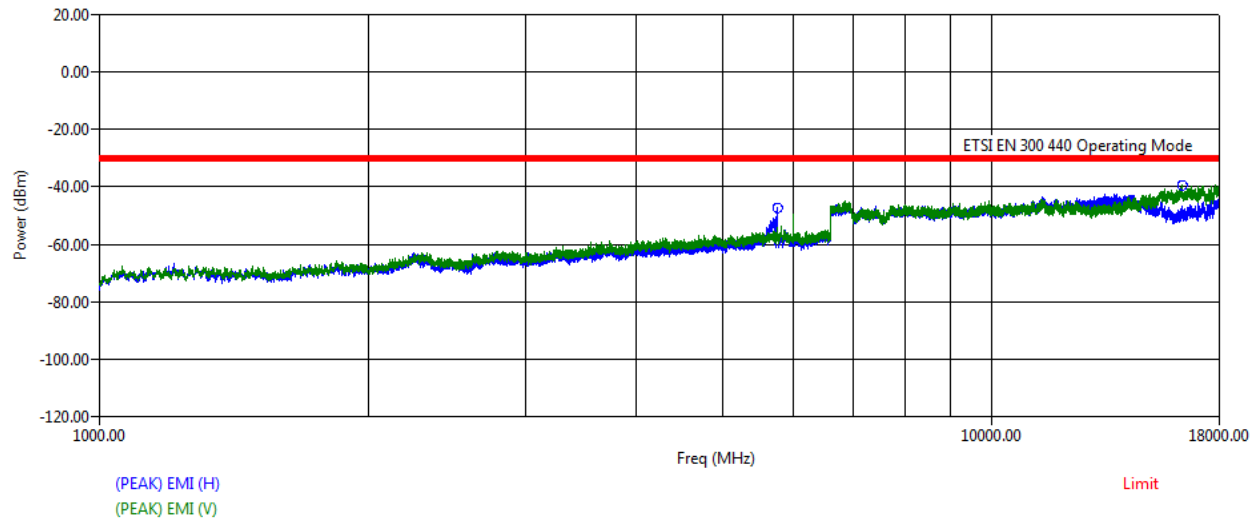
(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Preamplifier (V)

(RMS) Margin (H) = (RMS) EMI (H) - Limit

(RMS) Margin (V) = (RMS) EMI (V) - Limit

Note: Band reject filter was used during test.

| Unwanted emissions in the spurious domain 1 GHz ~ 18 GHz |                    |               |                     |
|----------------------------------------------------------|--------------------|---------------|---------------------|
| Measurement Method                                       | Radiated           | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11ax HE40 MIMO | Test Channel: | CH 151              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamp (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------|----------------------|-------------|------------------------|
| 5744.00    | 42.54                   | -60.98              | 0.00                | 13.92          | 42.79           | -47.31               | -30.00      | -17.31                 |
| 16329.50   | 31.62                   | -61.17              | 0.00                | 20.22          | 40.26           | -49.60               | -30.00      | -19.60                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamp (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5744.00    | 32.82                   | -59.60              | 0.00                | 13.92          | 42.79           | -55.64               | -30.00      | -25.64                 |
| 16329.50   | 34.45                   | -53.69              | 0.00                | 20.22          | 40.26           | -39.28               | -30.00      | -9.28                  |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Premp (H)

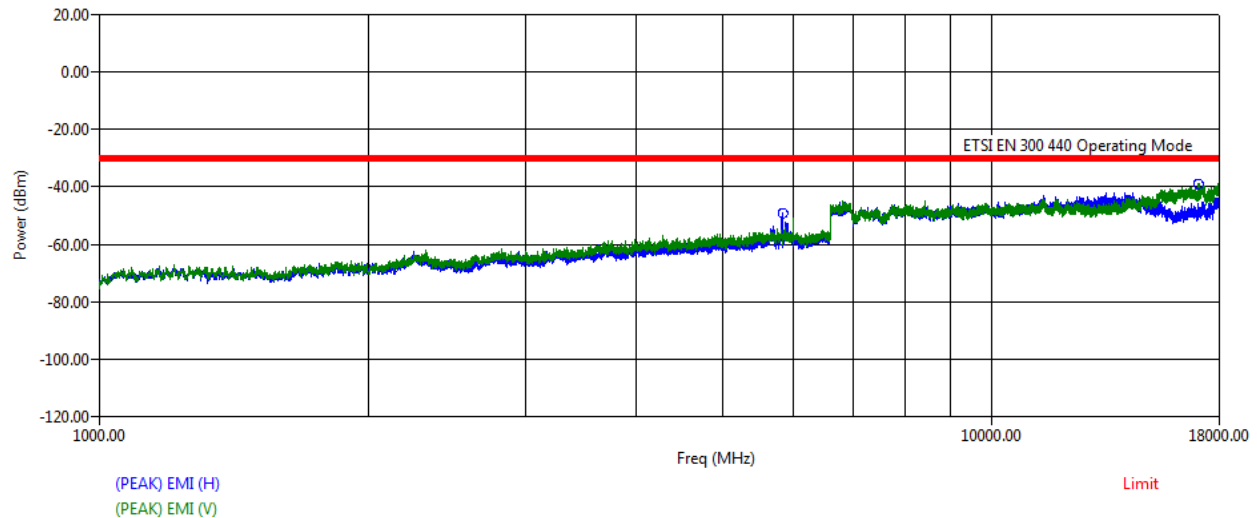
(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Premp (V)

(RMS) Margin (H) = (RMS) EMI (H) – Limit

(RMS) Margin (V) = (RMS) EMI (V) – Limit

Note: Band reject filter was used during test.

| Unwanted emissions in the spurious domain 1 GHz ~ 18 GHz |                    |               |                     |
|----------------------------------------------------------|--------------------|---------------|---------------------|
| Measurement Method                                       | Radiated           | Polar:        | Horizontal/Vertical |
| Test Mode:                                               | 802.11ax HE40 MIMO | Test Channel: | CH 159              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamplifier (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------------|----------------------|-------------|------------------------|
| 5830.00    | 40.74                   | -60.83              | 0.00                | 13.88          | 42.73                 | -48.94               | -30.00      | -18.94                 |
| 17056.00   | 29.76                   | -59.10              | 0.00                | 20.89          | 39.51                 | -47.95               | -30.00      | -17.95                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamplifier (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5830.00    | 29.30                   | -59.41              | 0.00                | 13.88          | 42.73                 | -58.96               | -30.00      | -28.96                 |
| 17056.00   | 32.33                   | -52.75              | 0.00                | 20.89          | 39.51                 | -39.04               | -30.00      | -9.04                  |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Preamplifier (H)

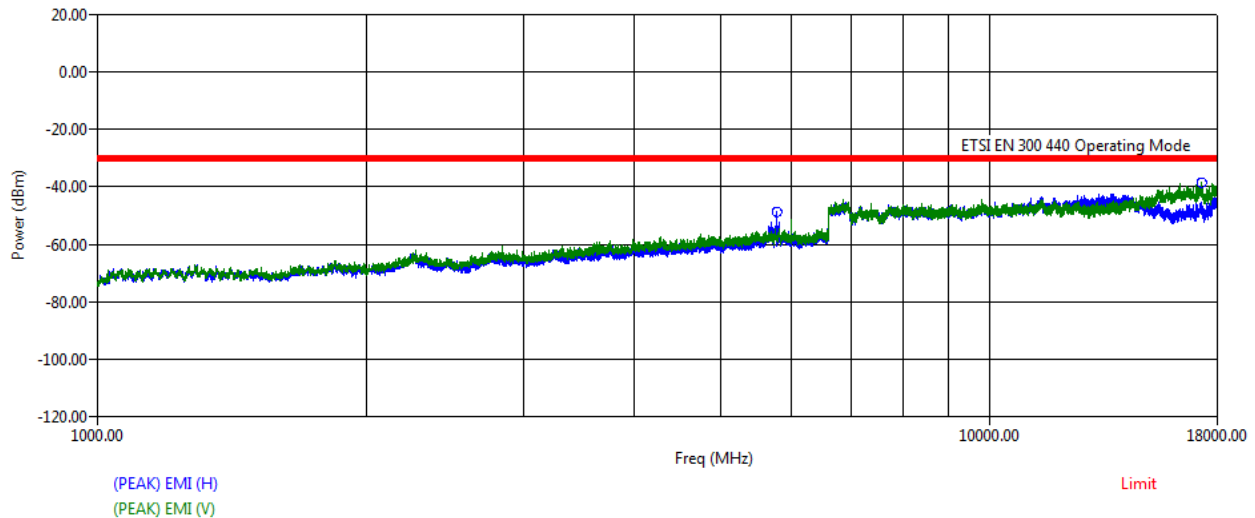
(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Preamplifier (V)

(RMS) Margin (H) = (RMS) EMI (H) - Limit

(RMS) Margin (V) = (RMS) EMI (V) - Limit

Note: Band reject filter was used during test.

| Transmitter unwanted emissions in the spurious domain 1GHz - 18 GHz |                    |               |                     |
|---------------------------------------------------------------------|--------------------|---------------|---------------------|
| Measurement Method                                                  | Radiated           | Polar:        | Horizontal/Vertical |
| Test Mode:                                                          | 802.11ax HE80 MIMO | Test Channel: | CH 155              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Cable (H) (dB) | Preamp (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|----------------|-----------------|----------------------|-------------|------------------------|
| 5767.50    | 41.30                   | -61.06              | 0.00                | 13.91          | 42.77           | -48.62               | -30.00      | -18.62                 |
| 17274.50   | 29.21                   | -58.79              | 0.00                | 21.74          | 39.15           | -47.00               | -30.00      | -17.00                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Cable (V) (dB) | Preamp (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 5767.50    | 29.92                   | -59.56              | 0.00                | 13.91          | 42.77           | -58.50               | -30.00      | -28.50                 |
| 17274.50   | 31.35                   | -52.54              | 0.00                | 21.74          | 39.15           | -38.60               | -30.00      | -8.60                  |

#### Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Premp (H)  
(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Premp (V)  
(RMS) Margin (H) = (RMS) EMI (H) – Limit  
(RMS) Margin (V) = (RMS) EMI (V) - Limit

Note: 1. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for band reject filter losses.

2. All the modes and antennas had been tested, but only the worst data were recorded in the report.

3. The low frequency, which started from 18 GHz to 26 GHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

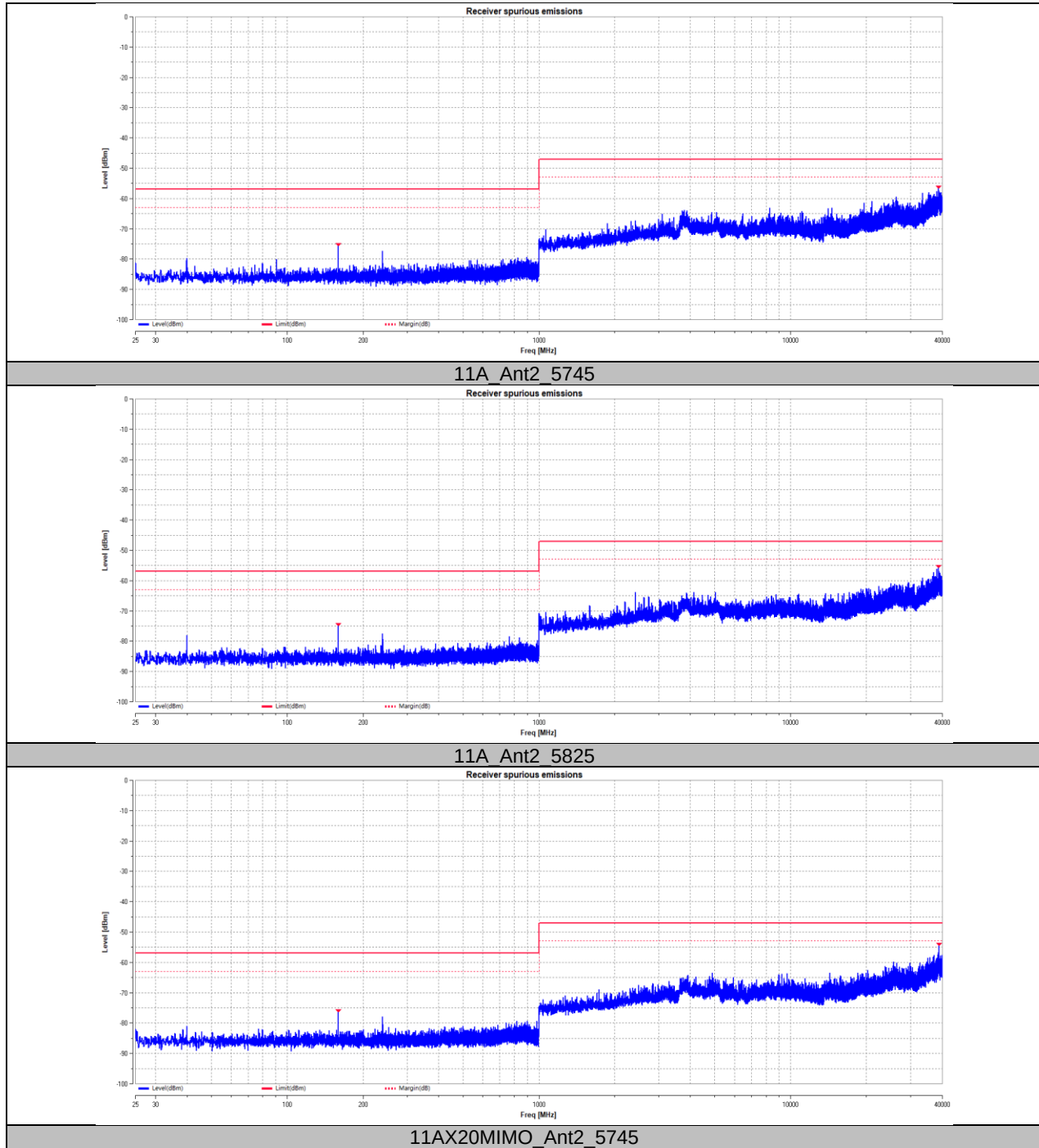


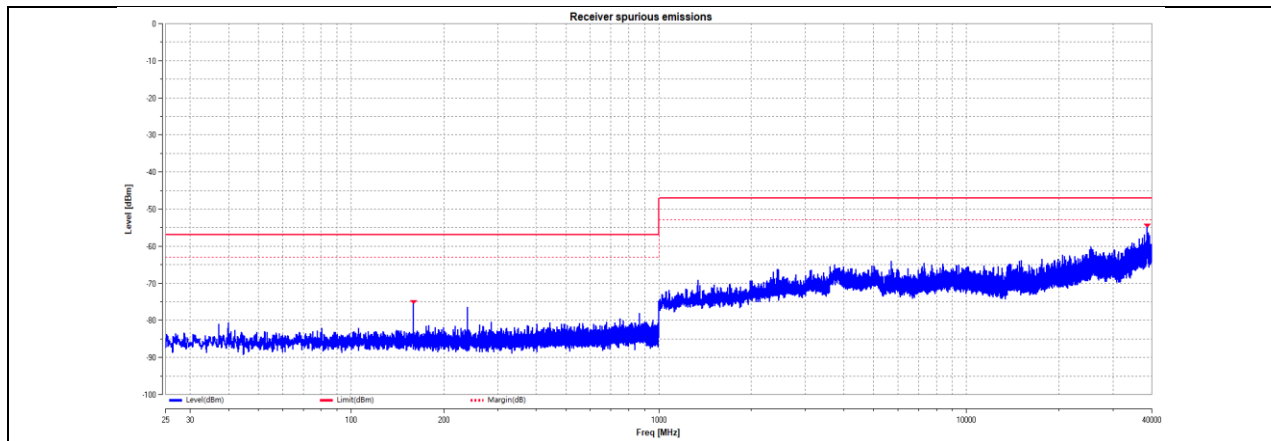
## 8.6. APPENDIX F: RECEIVER SPURIOUS EMISSIONS

### 8.6.1. Test Result-Pre-scan

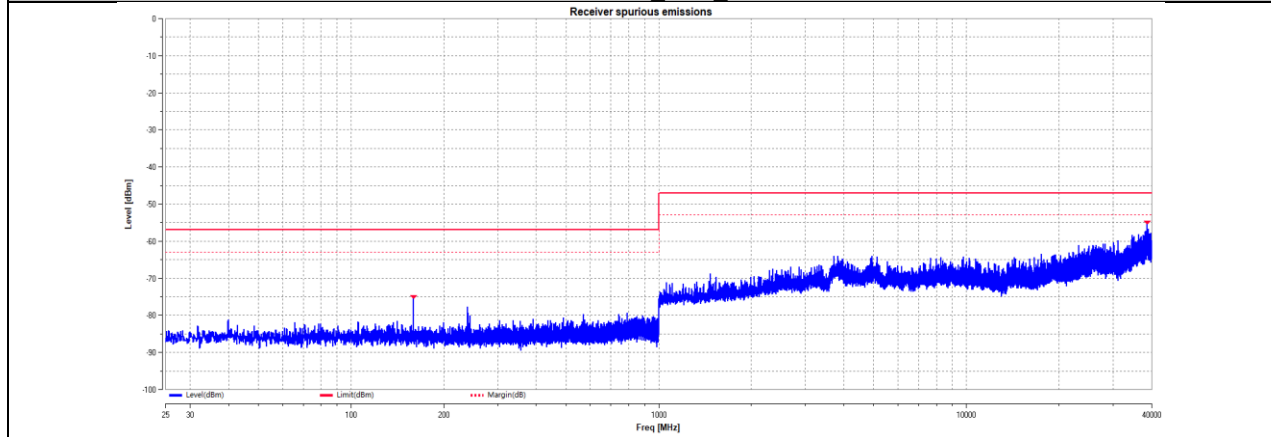
| TestMode   | Antenna | Frequency[MHz] | Freq. [MHz] | Level[dBm] | Limit[dBm] | Verdict |
|------------|---------|----------------|-------------|------------|------------|---------|
| 11A        | Ant2    | 5745           | 160.05      | -75.64     | -57.00     | PASS    |
|            |         |                | 38655.76    | -56.78     | -47.00     | PASS    |
|            |         | 5825           | 160.05      | -74.97     | -57.00     | PASS    |
|            |         |                | 38702.56    | -55.82     | -47.00     | PASS    |
| 11AX20MIMO | Ant2    | 5745           | 160.05      | -76.45     | -57.00     | PASS    |
|            |         |                | 38767.56    | -54.64     | -47.00     | PASS    |
|            |         | 5825           | 160.05      | -75.58     | -57.00     | PASS    |
|            |         |                | 38664.86    | -54.92     | -47.00     | PASS    |
| 11AX40MIMO | Ant2    | 5755           | 160.05      | -75.62     | -57.00     | PASS    |
|            |         |                | 38703.86    | -55.48     | -47.00     | PASS    |
|            |         | 5795           | 159.95      | -75.97     | -57.00     | PASS    |
|            |         |                | 38750.66    | -56.02     | -47.00     | PASS    |
| 11AX80MIMO | Ant2    | 5775           | 160.05      | -75.98     | -57.00     | PASS    |
|            |         |                | 38503.65    | -55.86     | -47.00     | PASS    |

## 8.6.2. Test Graphs-Pre-scan

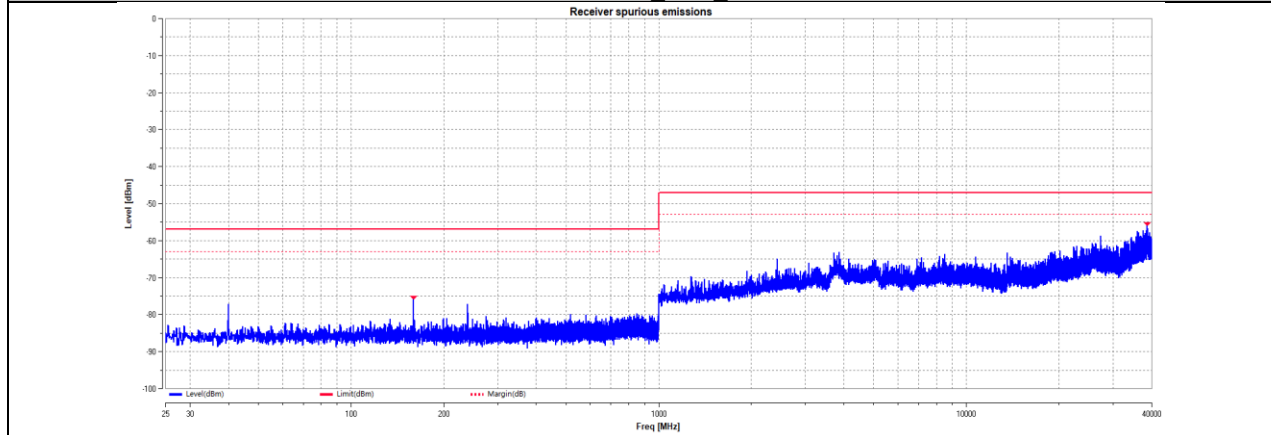




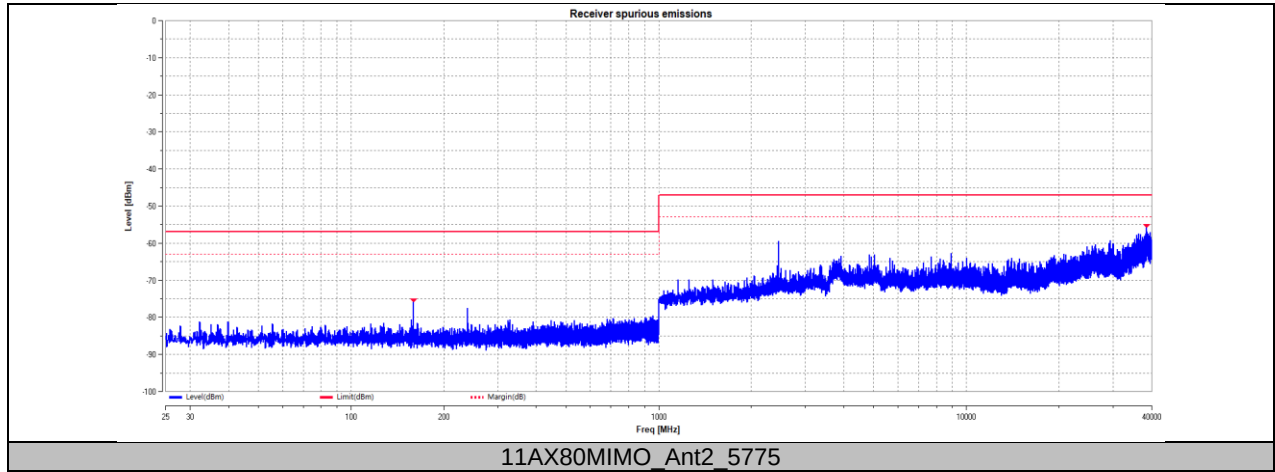
11AX20MIMO\_Ant2\_5825



11AX40MIMO\_Ant2\_5755

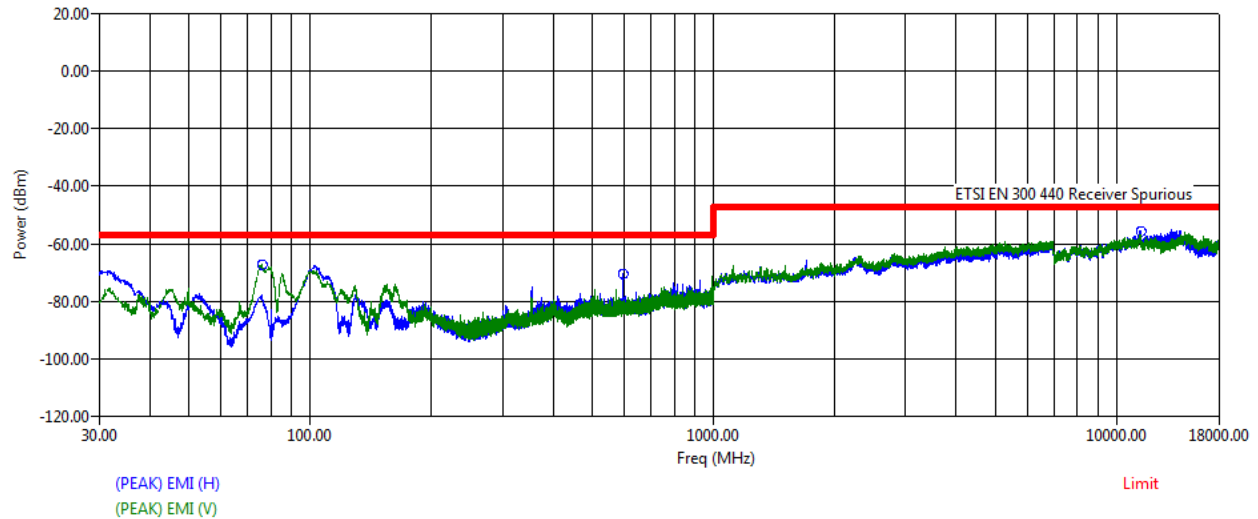


11AX40MIMO\_Ant2\_5795



### 8.6.3. RX Radiated Test Result

| Receiver emissions spurious 30 MHz - 18 GHz |              |               |                     |
|---------------------------------------------|--------------|---------------|---------------------|
| Measurement Method                          | Radiated     | Polar:        | Horizontal/Vertical |
| Test Mode:                                  | 802.11a SISO | Test Channel: | CH 149              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Preamplifier (H) (dB) | Cable (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|-----------------------|----------------|----------------------|-------------|------------------------|
| 75.65      | 50.87                   | -87.03              | 0.00                | 43.00                 | 1.10           | -78.07               | -57.00      | -21.07                 |
| 597.60     | 47.28                   | -78.24              | 0.00                | 42.82                 | 3.30           | -70.48               | -57.00      | -13.48                 |
| 11450.50   | 32.21                   | -55.96              | 0.00                | 47.20                 | 15.41          | -55.54               | -47.00      | -8.54                  |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Preamplifier (V) (dB) | Cable (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 75.65      | 62.13                   | -87.39              | 0.00                | 43.00                 | 1.10           | -67.17               | -57.00      | -10.17                 |
| 597.60     | 35.18                   | -78.55              | 0.00                | 42.82                 | 3.30           | -82.89               | -57.00      | -25.89                 |
| 11450.50   | 31.46                   | -56.46              | 0.00                | 47.20                 | 15.41          | -56.79               | -47.00      | -9.79                  |

Note:

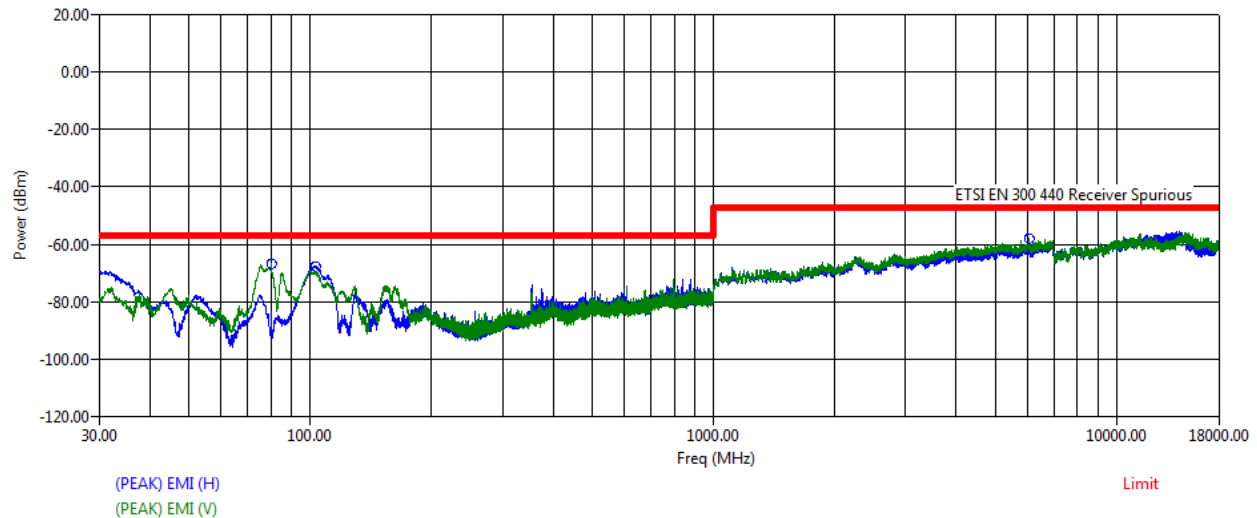
(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Preamp (H)

(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Preamp (V)

(RMS) Margin (H) = (RMS) EMI (H) - Limit

(RMS) Margin (V) = (RMS) EMI (V) - Limit

| Receiver emissions spurious 30 MHz - 18 GHz |              |               |                     |
|---------------------------------------------|--------------|---------------|---------------------|
| Measurement Method                          | Radiated     | Polar:        | Horizontal/Vertical |
| Test Mode:                                  | 802.11a SISO | Test Channel: | CH 165              |



| Freq (MHz) | (PEAK) Trace (H) (dBuV) | ERP Factor (H) (dB) | Transducer (H) (dB) | Preamp (H) (dB) | Cable (H) (dB) | (PEAK) EMI (H) (dBm) | Limit (dBm) | (PEAK) Margin (H) (dB) |
|------------|-------------------------|---------------------|---------------------|-----------------|----------------|----------------------|-------------|------------------------|
| 80.00      | 45.47                   | -86.76              | 0.00                | 43.00           | 1.13           | -83.16               | -57.00      | -26.16                 |
| 103.00     | 60.32                   | -86.11              | 0.00                | 43.00           | 1.29           | -67.51               | -57.00      | -10.51                 |
| 6055.50    | 35.57                   | -59.93              | 0.00                | 48.10           | 10.85          | -61.61               | -47.00      | -14.61                 |
| Freq (MHz) | (PEAK) Trace (V) (dBuV) | ERP Factor (V) (dB) | Transducer (V) (dB) | Preamp (V) (dB) | Cable (V) (dB) | (PEAK) EMI (V) (dBm) | Limit (dBm) | (PEAK) Margin (V) (dB) |
| 80.00      | 62.68                   | -87.41              | 0.00                | 43.00           | 1.13           | -66.60               | -57.00      | -9.60                  |
| 103.00     | 57.71                   | -86.24              | 0.00                | 43.00           | 1.29           | -70.25               | -57.00      | -13.25                 |
| 6055.50    | 38.08                   | -58.52              | 0.00                | 48.10           | 10.85          | -57.69               | -47.00      | -10.69                 |

Note:

(RMS) EMI (H) = (RMS) Trace (H) + ERP Factor (H) + Transducer (H) + Cable (H) - Premp (H)

(RMS) EMI (V) = (RMS) Trace (V) + ERP Factor (V) + Transducer (V) + Cable (H) - Premp (V)

(RMS) Margin (H) = (RMS) EMI (H) - Limit

(RMS) Margin (V) = (RMS) EMI (V) - Limit

Note: 1. All test modes and antennas have been tested, but only the worst case data recorded in the report.

2. The low frequency, which started from 18 GHz to 26GHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

## 8.7. APPENDIX G: BLOCKING

### 8.7.1. Test Result

| 802.11a                      |                            |                                  |                                                   |                                 |       |        |
|------------------------------|----------------------------|----------------------------------|---------------------------------------------------|---------------------------------|-------|--------|
| Performance Criteria PER=10% |                            |                                  |                                                   |                                 |       |        |
| Pmin = -89 dBm               |                            |                                  |                                                   |                                 |       |        |
| EUT Channel                  | Signal Generator Frequency | Performance Criteria at Pmin+3dB | Performance Criteria at worst case blocking level | Worst Case Blocking Level (dBm) | Limit | Result |
| (MHz)                        | (MHz)                      | (PER %)                          | (PER %)                                           |                                 | (dBm) |        |
| 5745                         | 5581                       | 0.30                             | 8.50                                              | -49                             | -57   | PASS   |
|                              | 5417                       | 0.60                             | 9.20                                              | -42                             | -57   | PASS   |
|                              | 4926                       | 1.10                             | 9.30                                              | -41                             | -57   | PASS   |
| 5825                         | 5989                       | 1.20                             | 7.40                                              | -45                             | -57   | PASS   |
|                              | 6153                       | 0.40                             | 8.50                                              | -53                             | -57   | PASS   |
|                              | 6646                       | 1.10                             | 8.10                                              | -50                             | -57   | PASS   |

Note: All test modes and antennas have been tested, but only the worst case data recorded in the report.

## 8.8. APPENDIX H: ADJACENT CHANNEL SELECTIVITY

### 8.8.1. Test Result

| 802.11a     |                  |                            |                                  |                      |                                                           |                          |             |        |
|-------------|------------------|----------------------------|----------------------------------|----------------------|-----------------------------------------------------------|--------------------------|-------------|--------|
| EUT Channel | Adjacent Channel | Signal Generator A Power+3 | Performance Criteria at Pmin+3dB | Performance Criteria | Performance Criteria at worst case blocking level (PER %) | Signal Generator B Power | Limit (dBm) | Result |
| (MHz)       | (MHz)            | (dBm)                      | (PER %)                          |                      |                                                           | (dBm)                    |             |        |
| 5745        | 5725             | -97                        | 0.30                             | 10%                  | 8.50                                                      | -45                      | -57         | PASS   |
|             | 5765             | -97                        | 0.10                             | 10%                  | 8.90                                                      | -42                      | -57         | PASS   |
| 5825        | 5805             | -92                        | 1.20                             | 10%                  | 9.20                                                      | -49                      | -57         | PASS   |
|             | 5845             | -92                        | 0.70                             | 10%                  | 8.30                                                      | -45                      | -57         | PASS   |

Note: All test modes and antennas have been tested, but only the worst case data recorded in the report.



## APPENDIX: PHOTOGRAPHS OF TEST CONFIGURATION



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**END OF REPORT**