

Report No.: FR7D1249-12

# RADIO TEST REPORT

FCC ID : NKR-DHURAZ68

Equipment: DHUR-AZ68 11a/b/g/n/ac 2x2 module

Brand Name : WNC

Model Name : DHUR-AZ68

Applicant : Wistron NeWeb Corporation

20 Park Avenue II, Hsinchu Science Park, Hsinchu

308, Taiwan

Manufacturer : Wistron NeWeb Corporation

20 Park Avenue II, Hsinchu Science Park, Hsinchu

308, Taiwan

Standard : 47 CFR FCC Part 15.407

The product was received on Oct. 20, 2017, and testing was started from Apr. 02, 2018 and completed on Apr. 23, 2018. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

TEL: 886-3-656-9065

FAX: 886-3-656-9085

Report Template No.: CB-A12\_1 Ver1.4

Page Number : 1 of 23

Issued Date : Jul. 06, 2023

Report Version : 01

# **Table of Contents**

| Histo | tory of this test report3                |    |  |  |  |
|-------|--|----|--|--|--|
| Sumi  | mary of Test Result                      | 4  |  |  |  |
| 1     | General Description                      |    |  |  |  |
| 1.1   | Information                              |    |  |  |  |
| 1.2   | Testing Applied Standards                |    |  |  |  |
| 1.3   | Testing Location Information             | 8  |  |  |  |
| 1.4   | Measurement Uncertainty                  | 8  |  |  |  |
| 2     | Test Configuration of EUT                | 9  |  |  |  |
| 2.1   | Test Channel Mode                        | 9  |  |  |  |
| 2.2   | The Worst Case Measurement Configuration | 10 |  |  |  |
| 2.3   | EUT Operation during Test                | 11 |  |  |  |
| 2.4   | Accessories                              | 11 |  |  |  |
| 2.5   | Support Equipment                        | 11 |  |  |  |
| 2.6   | Test Setup Diagram                       | 12 |  |  |  |
| 3     | Transmitter Test Result                  | 13 |  |  |  |
| 3.1   | Emission Bandwidth                       | 13 |  |  |  |
| 3.2   | Maximum Conducted Output Power           | 15 |  |  |  |
| 3.3   | Peak Power Spectral Density              | 17 |  |  |  |
| 3.4   | Unwanted Emissions                       | 20 |  |  |  |
| 4     | Test Equipment and Calibration Data      | 23 |  |  |  |

Appendix A. Test Results of Emission Bandwidth

Appendix B. Test Results of Maximum Conducted Output Power

Appendix C. Test Results of Peak Power Spectral Density

**Appendix D. Test Results of Unwanted Emissions** 

**Appendix E. Test Photos** 

Photographs of EUT v01

TEL: 886-3-656-9065 FAX: 886-3-656-9085

Report Template No.: CB-A12\_1 Ver1.4

Page Number : 2 of 23 Issued Date

Report Version : 01

: Jul. 06, 2023

Report No. : FR7D1249-12

# History of this test report

Report No. : FR7D1249-12

| Report No.  | Version | Description             | Issued Date   |
|-------------|---------|-------------------------|---------------|
| FR7D1249-12 | 01      | Initial issue of report | Jul. 06, 2023 |
|             |         |                         |               |
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TEL: 886-3-656-9065 Page Number : 3 of 23 FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

# **Summary of Test Result**

Report No.: FR7D1249-12

| Report<br>Clause | Ref Std.<br>Clause | Test Items                     | Result<br>(PASS/FAIL) | Remark |
|------------------|--------------------|--------------------------------|-----------------------|--------|
| 1.1.2            | 15.203             | Antenna Requirement            | PASS                  | -      |
| 3.1              | 15.407(a)          | Emission Bandwidth             | PASS                  | -      |
| 3.2              | 15.407(a)          | Maximum Conducted Output Power | PASS                  | -      |
| 3.3              | 15.407(a)          | Peak Power Spectral Density    | PASS                  | -      |
| 3.4              | 15.407(b)          | Unwanted Emissions             | PASS                  | -      |

### **Conformity Assessment Condition:**

- 1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
- 2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

#### Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen

Report Producer: Sandy Chuang

TEL: 886-3-656-9065 Page Number : 4 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

| Frequency Range (MHz) | IEEE Std. 802.11         | Ch. Frequency (MHz) | Channel Number |
|-----------------------|--------------------------|---------------------|----------------|
| 5250-5350             | o n (UT20) oo (\(\UT20\) | 5260-5320           | 52-64 [4]      |
| 5470-5725             | a, n (HT20), ac (VHT20)  | 5500-5700           | 100-140 [11]   |
| 5250-5350             | n (UT40) on (V/UT40)     | 5270-5310           | 54-62 [2]      |
| 5470-5725             | n (HT40), ac (VHT40)     | 5510-5670           | 102-134 [5]    |
| 5250-5350             | oo (V/UT90)              | 5290                | 58 [1]         |
| 5470-5725             | ac (VHT80)               | 5530-5610           | 106-122 [2]    |

Report No.: FR7D1249-12

| Band          | Mode           | BWch (MHz) | Nant |
|---------------|----------------|------------|------|
| 5.25-5.35GHz  | 802.11a        | 20         | 2TX  |
| 5.25-5.35GHz  | 802.11n HT20   | 20         | 2TX  |
| 5.25-5.35GHz  | 802.11ac VHT20 | 20         | 2TX  |
| 5.25-5.35GHz  | 802.11n HT40   | 40         | 2TX  |
| 5.25-5.35GHz  | 802.11ac VHT40 | 40         | 2TX  |
| 5.25-5.35GHz  | 802.11ac VHT80 | 80         | 2TX  |
| 5.47-5.725GHz | 802.11a        | 20         | 2TX  |
| 5.47-5.725GHz | 802.11n HT20   | 20         | 2TX  |
| 5.47-5.725GHz | 802.11ac VHT20 | 20         | 2TX  |
| 5.47-5.725GHz | 802.11n HT40   | 40         | 2TX  |
| 5.47-5.725GHz | 802.11ac VHT40 | 40         | 2TX  |
| 5.47-5.725GHz | 802.11ac VHT80 | 80         | 2TX  |

#### Note:

- 11a, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- VHT20, VHT40 and VHT80 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.
- BWch is the nominal channel bandwidth.
- Nss-Min is the minimum number of spatial streams.
- Nant is the number of outputs. e.g., 2(2,3) means have 2 outputs for port 2 and port 3. 2 means have 2 outputs for port 1 and port 2.

TEL: 886-3-656-9065 Page Number : 5 of 23 FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

### 1.1.2 Antenna Information

|     |      |      |       |               |                 | Gain (dB  | i)     |      |             |
|-----|------|------|-------|---------------|-----------------|-----------|--------|------|-------------|
| Set | Ant. | Port | Brand | Model Name    | Antenna Type    | Connector | WLAN   | WLAN | Divista eth |
|     |      |      |       |               |                 |           | 2.4GHz | 5GHz | Bluetooth   |
| 1   | 1    | 1    | WNC   | DHUR-AZ68ANT0 | Printed Antenna | N/A       | 5.31   | 5.92 | -           |
| '   | 2    | 2    | WNC   | DHUR-AZ68ANT1 | Printed Antenna | N/A       | 5.26   | 5.91 | -           |
| 2   | 3    | 1    | WNC   | 81.EK615.G69  | PIFA Antenna    | I-PEX     | 3.71   | 5.21 | -           |
| ~   | 4    | 2    | WNC   | 81.EK615.G68  | PIFA Antenna    | I-PEX     | 2.44   | 6.64 | -           |
| 3   | 5    | 1    | WNC   | 81.EK615.G66  | PIFA Antenna    | I-PEX     | 2.02   | 5.20 | -           |
| 3   | 6    | 2    | WNC   | 81.EK615.G65  | PIFA Antenna    | I-PEX     | 0.64   | 5.06 | -           |
|     | 7    | 1    | WNC   | 81.EK615.G72  | PIFA Antenna    | I-PEX     | 1.08   | 3.67 | -           |
| 4   | 8    | 2    | WNC   | 81.EK615.G71  | PIFA Antenna    | I-PEX     | 0.68   | 2.47 | -           |
| _   | 9    | 1    | WNC   | 81.EK615.G56  | PIFA Antenna    | I-PEX     | 1.97   | 3.83 | -           |
| 5   | 10   | 2    | WNC   | 81.EK615.G57  | PIFA Antenna    | I-PEX     | 1.73   | 3.88 | -           |
| 6   | 11   | 1    | WNC   | 81.EK615.G58  | PIFA Antenna    | I-PEX     | -      | -    | 5.85        |
| 7   | 12   | 1    | WNC   | 81.EK615.G59  | PIFA Antenna    | I-PEX     | -      | -    | 4.03        |
| 8   | 13   | 1    | WNC   | 81.EK615.G51  | PIFA Antenna    | I-PEX     | -      | _    | 1.29        |
| 9   | 14   | 1    | WNC   | 81.EK615.G64  | PIFA Antenna    | I-PEX     | -      | -    | -0.5        |
| 10  | 15   | 1    | WNC   | 81.EK615.G67  | PIFA Antenna    | I-PEX     | -      | -    | 1.84        |
| 11  | 16   | 1    | WNC   | 81.EK615.G70  | PIFA Antenna    | I-PEX     | -      | -    | 0.73        |

Report No.: FR7D1249-12

Note1: The above information was declared by manufacturer.

Note2: The EUT has eleven set antennas, and they have total of sixteen antennas.

### For 2.4GHz / 5GHz WLAN function (2TX/2RX):

Antenna set 1~5 support 2.4GHz / 5GHz WLAN function.

Antenna set 2~5 are the same type antennas, only the higher gain antenna "Set 2" was tested and recorded in the report.

Port 1 and Port 2 could transmit/receive simultaneously.

### For Bluetooth function (1TX/1RX):

Antenna set 6~11 support Bluetooth function.

Antenna set 6~11 are the same type antennas, only the higher gain antenna "Set 6" was tested and recorded in the report.

Only Port 1 can be used as transmitting/receiving.

TEL: 886-3-656-9065 Page Number : 6 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

## 1.1.3 Mode Test Duty Cycle

| Mode           | DC | DCF(dB) | T(s)           | VBW(Hz) ≥ 1/T  |
|----------------|----|---------|----------------|----------------|
| 802.11a        | 1  | 0       | n/a (DC>=0.98) | n/a (DC>=0.98) |
| 802.11ac VHT20 | 1  | 0       | n/a (DC>=0.98) | n/a (DC>=0.98) |
| 802.11ac VHT40 | 1  | 0       | n/a (DC>=0.98) | n/a (DC>=0.98) |
| 802.11ac VHT80 | 1  | 0       | n/a (DC>=0.98) | n/a (DC>=0.98) |

Report No.: FR7D1249-12

## 1.1.4 EUT Operational Condition

| EUT Power Type              |             | From host system  |             |                      |  |  |
|-----------------------------|-------------|-------------------|-------------|----------------------|--|--|
| Beamforming Function        |             | With beamforming  | $\boxtimes$ | Without beamforming  |  |  |
| Weather Band                | $\boxtimes$ | With 5600~5650MHz |             | Without 5600~5650MHz |  |  |
| Function                    |             | Outdoor P2M       |             | Indoor P2M           |  |  |
| runction                    |             | Fixed P2P         | $\boxtimes$ | Client               |  |  |
| TPC Function                | $\boxtimes$ | With TPC          |             | Without TPC          |  |  |
| Channel Puncturing Function |             | Supported         | $\boxtimes$ | Unsupported          |  |  |
| Support RU                  | $\boxtimes$ | Full RU           |             | Partial RU           |  |  |
| Test Software Version       |             | QATool_Dbg        |             |                      |  |  |

Note: The above information was declared by manufacturer.

## 1.1.5 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FR7D1249-03 Below is the table for the change of the product with respect to the original one.

| Modifications                        | Performance Checking                             |
|--------------------------------------|--|
| Adding model name for antenna set 1. | After evaluation, it is not necessary to verify. |

Note: The rest results were based on original test report.

TEL: 886-3-656-9065 Page Number : 7 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

## 1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

Report No.: FR7D1249-12

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 789033 D02 v02r01

The following reference test guidance is not within the scope of accreditation of TAF.

FCC KDB 662911 D01 v02r01

## 1.3 Testing Location Information

Testing Location Information

Test Lab.: Sporton International Inc. Hsinchu Laboratory

Hsinchu ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

(TAF: 3787) TEL: 886-3-656-9065 FAX: 886-3-656-9085

Test site Designation No. TW3787 with FCC.
Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

| Test Condition | Test Site No. | Test Engineer           | Test Environment | Test Date                   |
|----------------|---------------|-------------------------|------------------|-----------------------------|
| RF Conducted   | TH01-CB       | Serway Li               | 25°C / 55%       | Apr. 19, 2018~Apr. 23, 2018 |
| Radiated       | 03CH01-CB     | Eddie Weng & Justin Lin | 22°C / 54%       | Apr. 02, 2018~Apr. 23, 2018 |

## 1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

| Total (saeed en a eeverage lacter (it 2) |                        |                          |
|--|------------------------|--------------------------|
| Test Items                               | Uncertainty            | Remark                   |
| Radiated Emission (1GHz ~ 18GHz)         | 3.7 dB                 | Confidence levels of 95% |
| Radiated Emission (18GHz ~ 40GHz)        | 3.5 dB                 | Confidence levels of 95% |
| Conducted Emission                       | 1.7 dB                 | Confidence levels of 95% |
| Output Power Measurement                 | 1.33 dB                | Confidence levels of 95% |
| Power Density Measurement                | 1.27 dB                | Confidence levels of 95% |
| Bandwidth Measurement                    | 9.74 x10 <sup>-8</sup> | Confidence levels of 95% |

TEL: 886-3-656-9065 Page Number : 8 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

# 2 Test Configuration of EUT

# 2.1 Test Channel Mode

| Mode                           | Power Setting |
|--------------------------------|---------------|
| 802.11a_Nss1,(6Mbps)_2TX       | -             |
| 5260MHz                        | 20            |
| 5300MHz                        | 20            |
| 5320MHz                        | 21            |
| 5500MHz                        | 20            |
| 5580MHz                        | 21            |
| 5700MHz                        | 1E            |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | -             |
| 5260MHz                        | 22            |
| 5300MHz                        | 22            |
| 5320MHz                        | 22            |
| 5500MHz                        | 24            |
| 5580MHz                        | 22            |
| 5700MHz                        | 21            |
| 802.11ac VHT40_Nss1,(MCS0)_2TX | -             |
| 5270MHz                        | 28            |
| 5310MHz                        | 21            |
| 5510MHz                        | 1F            |
| 5550MHz                        | 28            |
| 5670MHz                        | 23            |
| 802.11ac VHT80_Nss1,(MCS0)_2TX | -             |
| 5290MHz                        | 1F            |
| 5530MHz                        | 1F            |
| 5610MHz                        | 25            |

Report No. : FR7D1249-12

### Note:

• VHT20/VHT40 covers HT20/HT40, due to same modulation. The power setting for 802.11n HT20 and HT40 are the same or lower than 802.11ac VHT20 and VHT40.

 TEL: 886-3-656-9065
 Page Number
 : 9 of 23

 FAX: 886-3-656-9085
 Issued Date
 : Jul. 06, 2023

# 2.2 The Worst Case Measurement Configuration

| The Worst Case Mode for Following Conformance Tests   |  |  |
|---|--|--|
| Tests Item  Emission Bandwidth  Maximum Conducted Output Power  Peak Power Spectral Density |  |  |
| Test Condition Conducted measurement at transmit chains                                     |  |  |

Report No. : FR7D1249-12

| The Worst Case Mode for Following Conformance Tests  |  |  |
|--|--|--|
| Tests Item Unwanted Emissions  |  |  |
| Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used i regardless of spatial multiplexing MIMO configuration), the radiated test be performed with highest antenna gain of each antenna type. |  |  |
| Operating Mode > 1GHz CTX  |  |  |
| The EUT was performed at X axis, Y axis and Z axis position. The worst case was found at Y axis, so measurement will follow this same test configuration.  |  |  |
| 1 EUT Y axis with Set 2 antennas (5GHz WLAN function)  |  |  |

| The Worst Case Mode for Following Conformance Tests                                   |   |  |
|---|---|--|
| Tests Item  | Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation |  |
| Operating Mode  |   |  |
| 1   | EUT with Set 1 and Set 6 antennas (2.4GHz WLAN + Bluetooth function)    |  |
| 2   | EUT with Set 1 and Set 6 antennas (5GHz WLAN + Bluetooth function)      |  |
| 3   | EUT with Set 2 and Set 6 antennas (2.4GHz WLAN + Bluetooth function)    |  |
| 4   | EUT with Set 2 and Set 6 antennas (5GHz WLAN + Bluetooth function)      |  |
| Refer to Sporton Test Report No.: FA7D1249-12 for Co-location RF Exposure Evaluation. |   |  |

TEL: 886-3-656-9065 Page Number : 10 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

# 2.3 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

### 2.4 Accessories

N/A

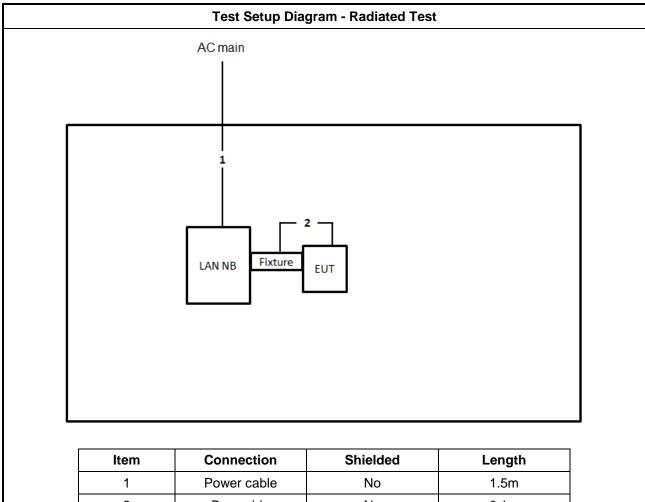
# 2.5 Support Equipment

|     | Support Equipment                          |      |              |     |  |  |
|-----|--|------|--------------|-----|--|--|
| No. | No. Equipment Brand Name Model Name FCC ID |      |              |     |  |  |
| 1   | NB   | DELL | E4300        | N/A |  |  |
| 2   | Fixture                                    | WNC  | 48DHUR09.SGB | N/A |  |  |

Report No.: FR7D1249-12

TEL: 886-3-656-9065 Page Number : 11 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

#### **Test Setup Diagram** 2.6



Report No. : FR7D1249-12

| Item | Connection  | Shielded | Length |
|------|-------------|----------|--------|
| 1    | Power cable | No       | 1.5m   |
| 2    | Bus cable   | No       | 0.1m   |

TEL: 886-3-656-9065 Page Number : 12 of 23 FAX: 886-3-656-9085 : Jul. 06, 2023 Issued Date

# 3 Transmitter Test Result

## 3.1 Emission Bandwidth

### 3.1.1 Emission Bandwidth Limit

|             | Emission Bandwidth Limit  |  |  |  |  |
|-------------|---|--|--|--|--|
| UNI         | JNII Devices  |  |  |  |  |
|             | For the 5.15-5.25 GHz band, N/A   |  |  |  |  |
| $\boxtimes$ | For the 5.25-5.35 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm $\pm$ 10 log B, where B is the 26 dB emission bandwidth in MHz.        |  |  |  |  |
| $\boxtimes$ | For the $5.47-5.725$ GHz band, the maximum conducted output power shall not exceed the lesser of $250$ mW or $11$ dBm + $10$ log B, where B is the $26$ dB emission bandwidth in MHz. |  |  |  |  |
|             | For the 5.725-5.85 GHz band, 26 dB emission bandwidth ,N/A. 6 dB emission bandwidth ≥ 500kHz.   |  |  |  |  |
| LE-         | LAN Devices   |  |  |  |  |
|             | For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log B, dBm, whichever power is less. B is the $99\%$ emission bandwidth in MHz.                   |  |  |  |  |
|             | For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz                        |  |  |  |  |
|             | For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz |  |  |  |  |
|             | For the 5.725-5.85 GHz band, 6 dB emission bandwidth ≥ 500kHz.  |  |  |  |  |

Report No. : FR7D1249-12

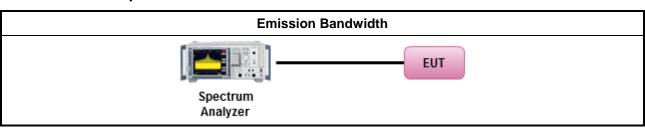
## 3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

### 3.1.3 Test Procedures

|   | Test Method  |   |  |  |
|---|--|---|--|--|
| • | For the emission bandwidth shall be measured using one of the options below: |   |  |  |
|   | $\boxtimes$  | Refer as FCC KDB 789033 D02, clause C for EBW and clause D for OBW measurement. |  |  |
|   |  | Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.              |  |  |
|   |  | Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.                          |  |  |

## 3.1.4 Test Setup



TEL: 886-3-656-9065 Page Number : 13 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

## 3.1.5 Test Result of Emission Bandwidth

Report No. : FR7D1249-12

Refer as Appendix A

TEL: 886-3-656-9065 Page Number : 14 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

# 3.2 Maximum Conducted Output Power

# 3.2.1 Maximum Conducted Output Power Limit

|             | Maximum Conducted Output Power Limit  |  |  |  |  |
|-------------|---|--|--|--|--|
| UNI         | JNII Devices  |  |  |  |  |
|             | For the 5.15-5.25 GHz band:   |  |  |  |  |
|             | <ul> <li>Outdoor AP: the maximum conducted output power (P<sub>Out</sub>) shall not exceed the lesser of 1 W. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 30 - (G<sub>TX</sub> - 6). e.i.r.p. at any elevation angle above 30 degrees ≤ 125mW [21dBm]</li> </ul> |  |  |  |  |
|             | Indoor AP: the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W. If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$   |  |  |  |  |
|             | Point-to-point AP: the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W If $G_{TX} > 23$ dBi, then $P_{Out} = 30 - (G_{TX} - 23)$ .  |  |  |  |  |
|             | ■ Mobile or Portable Client: the maximum conducted output power (P <sub>Out</sub> ) shall not exceed the lesser of 250 mW. If G <sub>TX</sub> > 6 dBi, then P <sub>Out</sub> = 24 - (G <sub>TX</sub> - 6).  |  |  |  |  |
| $\boxtimes$ | For the 5.25-5.35 GHz band, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$ .                        |  |  |  |  |
|             | For the 5.47-5.725 GHz band, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX}$ > 6 dBi, then $P_{Out}$ = 24 - ( $G_{TX}$ - 6).                     |  |  |  |  |
|             | For the 5.725-5.85 GHz band:  |  |  |  |  |
|             | <ul> <li>Point-to-multipoint systems (P2M): the maximum conducted output power (P<sub>Out</sub>) shall not exceed<br/>the lesser of 1 W. If G<sub>TX</sub> &gt; 6 dBi, then P<sub>Out</sub> = 30 - (G<sub>TX</sub> - 6).</li> </ul>                                       |  |  |  |  |
|             | <ul> <li>Point-to-point systems (P2P): the maximum conducted output power (P<sub>Out</sub>) shall not exceed the<br/>lesser of 1 W.</li> </ul>  |  |  |  |  |
| LE-         | LAN Devices   |  |  |  |  |
|             | For the 5.15-5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.  |  |  |  |  |
|             | For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz  |  |  |  |  |
|             | For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz   |  |  |  |  |
|             | For the 5.725-5.85 GHz band:  |  |  |  |  |
|             | Point-to-multipoint systems (P2M): the maximum conducted output power (P <sub>Out</sub> ) shall not exceed<br>the lesser of 1 W. If G <sub>TX</sub> > 6 dBi, then P <sub>Out</sub> = 30 − (G <sub>TX</sub> − 6).  |  |  |  |  |
|             | Point-to-point systems (P2P): the maximum conducted output power (P <sub>Out</sub> ) shall not exceed the lesser of 1 W.  |  |  |  |  |
|             | = maximum conducted output power in dBm,<br>= the maximum transmitting antenna directional gain in dBi.   |  |  |  |  |

Report No. : FR7D1249-12

TEL: 886-3-656-9065 Page Number : 15 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

## 3.2.2 Measuring Instruments

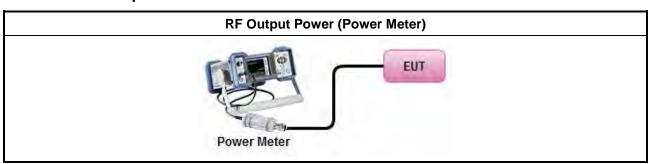
Refer a test equipment and calibration data table in this test report.

### 3.2.3 Test Procedures

|   | Test Method   |  |
|---|---|--|
| • | Maximum Conducted Output Power  |  |
|   | Average over on/off periods with duty factor  |  |
|   | Refer as FCC KDB 789033 D02, clause E Method SA-2 (spectral trace averaging).   |  |
|   | Refer as FCC KDB 789033 D02, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)  |  |
|   | Wideband RF power meter and average over on/off periods with duty factor  |  |
|   | Refer as FCC KDB 789033 D02, clause E Method PM-G (using an RF average power meter).  |  |
| • | For conducted measurement.  |  |
|   | If the EUT supports multiple transmit chains using options given below:<br>Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them. |  |
|   | If multiple transmit chains, EIRP calculation could be following as methods:  P <sub>total</sub> = P <sub>1</sub> + P <sub>2</sub> + + P <sub>n</sub> (calculated in linear unit [mW] and transfer to log unit [dBm])  EIRP <sub>total</sub> = P <sub>total</sub> + DG  |  |

Report No. : FR7D1249-12

## 3.2.4 Test Setup



# 3.2.5 Test Result of Maximum Conducted Output Power

Refer as Appendix B

TEL: 886-3-656-9065 Page Number : 16 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

# 3.3 Peak Power Spectral Density

# 3.3.1 Peak Power Spectral Density Limit

|             | Peak Power Spectral Density Limit   |  |  |
|-------------|---|--|--|
| UNI         | UNII Devices  |  |  |
|             | For the 5.15-5.25 GHz band:   |  |  |
|             | Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .  |  |  |
|             | Indoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .   |  |  |
|             | Point-to-point AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 23$ dBi, then $P_{Out} = 17 - (G_{TX} - 23)$ .   |  |  |
|             | <ul> <li>Mobile or Portable Client: the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If G<sub>TX</sub> &gt; 6 dBi,<br/>then PPSD= 11 - (G<sub>TX</sub> - 6)</li> </ul>  |  |  |
| $\boxtimes$ | For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If $G_{TX} > 6$ dBi, then PPSD= 11 – ( $G_{TX} - 6$ ).  |  |  |
| $\boxtimes$ | For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If $G_{TX} > 6$ dBi, then PPSD= 11 – ( $G_{TX} - 6$ ).   |  |  |
|             | For the 5.725-5.85 GHz band:  |  |  |
|             | Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$ .  |  |  |
|             | Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.   |  |  |
| LE-         | LAN Devices   |  |  |
|             | For the 5.15-5.25 GHz band, the e.i.r.p. peak power spectral density (PPSD) ≤ 10 dBm/MHz.   |  |  |
|             | For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz.  |  |  |
|             | <ul> <li>e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. at different elevations, where θ is the angle above the local horizontal plane (of the Earth) as shown below:</li> <li>-13 dBW/MHz for 0° ≤ θ &lt; 8°; -13 - 0.716 (θ-8) dBW/MHz for 8° ≤ θ &lt; 40°</li> <li>-35.9 - 1.22 (θ-40) dBW/MHz for 40° ≤ θ ≤ 45°; -42 dBW/MHz for θ &gt; 45°</li> </ul> |  |  |
|             | For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz.  |  |  |
|             | For the 5.725-5.85 GHz band:  |  |  |
|             | Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) $\leq$ 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$ .   |  |  |
|             | Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.   |  |  |
| pow         | <b>PPSD</b> = peak power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz $G_{TX}$ = the maximum transmitting antenna directional gain in dBi.   |  |  |

Report No. : FR7D1249-12

## 3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

TEL: 886-3-656-9065 Page Number : 17 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

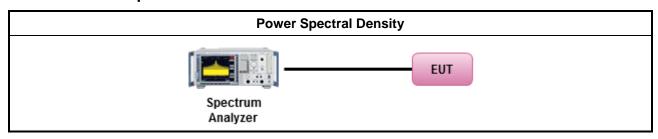
## 3.3.3 Test Procedures

|   |   | Test Method  |  |
|---|---|--|--|
| • | Peak power spectral density procedures that the same method as used to determine the conducted output power shall be used to determine the peak power spectral density and use the peak search function on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density shall be measured using below options: |  |  |
|   |   | Refer as FCC KDB 789033 D02, F)5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth   |  |
|   | [duty   | cycle ≥ 98% or external video / power trigger]   |  |
|   | $\boxtimes$   | Refer as FCC KDB 789033 D02, clause E Method SA-1 (spectral trace averaging).  |  |
|   |   | Refer as FCC KDB 789033 D02, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)   |  |
|   | duty  | cycle < 98% and average over on/off periods with duty factor   |  |
|   | $\boxtimes$   | Refer as FCC KDB 789033 D02, clause E Method SA-2 (spectral trace averaging).  |  |
|   |   | Refer as FCC KDB 789033 D02, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)   |  |
| • | For   | conducted measurement.   |  |
|   | •   | If the EUT supports multiple transmit chains using options given below:  |  |
|   |   | Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace. |  |
|   |   | Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,   |  |
|   |   | Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.  |  |
|   | •   | If multiple transmit chains, EIRP PPSD calculation could be following as methods: $PPSD_{total} = PPSD_1 + PPSD_2 + + PPSD_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = PPSD_{total} + DG$   |  |

**Report No.: FR7D1249-12** 

TEL: 886-3-656-9065 Page Number : 18 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

## 3.3.4 Test Setup



Report No.: FR7D1249-12

## 3.3.5 Test Result of Peak Power Spectral Density

Refer as Appendix C

TEL: 886-3-656-9065 Page Number : 19 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

### 3.4 Unwanted Emissions

#### 3.4.1 Transmitter Radiated Unwanted Emissions Limit

| Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit |                       |                         |                      |  |  |
|---|-----------------------|-------------------------|----------------------|--|--|
| Frequency Range (MHz)   | Field Strength (uV/m) | Field Strength (dBuV/m) | Measure Distance (m) |  |  |
| 0.009~0.490   | 2400/F(kHz)           | 48.5 - 13.8             | 300                  |  |  |
| 0.490~1.705   | 24000/F(kHz)          | 33.8 - 23               | 30                   |  |  |
| 1.705~30.0  | 30                    | 29                      | 30                   |  |  |
| 30~88   | 100                   | 40                      | 3                    |  |  |
| 88~216  | 150                   | 43.5                    | 3                    |  |  |
| 216~960   | 200                   | 46                      | 3                    |  |  |
| Above 960   | 500                   | 54                      | 3                    |  |  |

Report No.: FR7D1249-12

- Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

| Un-restricted band emissions above 1GHz Limit |   |  |  |  |  |  |
|---|---|--|--|--|--|--|
| Operating Band                                | Limit   |  |  |  |  |  |
| ☐ 5.15 - 5.25 GHz                             | e.i.r.p27 dBm [68.2 dBuV/m@3m]  |  |  |  |  |  |
| ⊠ 5.25 - 5.35 GHz                             | e.i.r.p27 dBm [68.2 dBuV/m@3m]  |  |  |  |  |  |
| ⊠ 5.47 - 5.725 GHz                            | e.i.r.p27 dBm [68.2 dBuV/m@3m]  |  |  |  |  |  |
| ☐ 5.725 - 5.85 GHz                            | all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. |  |  |  |  |  |

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of

TEL: 886-3-656-9065 Page Number : 20 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Report No.: FR7D1249-12

### 3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.4.3 Test Procedures

#### **Test Method**

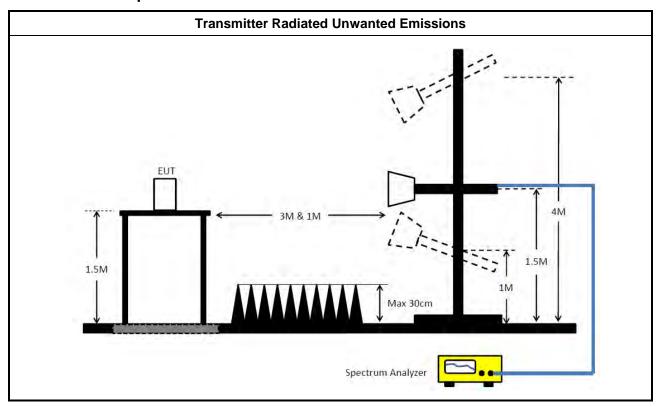
- Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].
- For the transmitter unwanted emissions shall be measured using following options below:
  - Refer as FCC KDB 789033 D02, clause H)2) for unwanted emissions into non-restricted bands.
  - Refer as FCC KDB 789033 D02, clause H)1) for unwanted emissions into restricted bands.
    - Refer as FCC KDB 789033 D02, H)6) Method AD (Trace Averaging).
    - Refer as FCC KDB 789033 D02, H)6) Method VB (Reduced VBW).
    - Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
    - Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
    - Refer as FCC KDB 789033 D02, clause H)5) measurement procedure peak limit.
    - Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.
- For radiated measurement.
  - Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
  - Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
  - Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.
- The any unwanted emissions level shall not exceed the fundamental emission level.
- All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

TEL: 886-3-656-9065 Page Number : 21 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

Report Version : 01

Report Template No.: CB-A12\_1 Ver1.4

## 3.4.4 Test Setup



Report No.: FR7D1249-12

### 3.4.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

### 3.4.6 Test Result of Transmitter Unwanted Emissions

Refer as Appendix D

TEL: 886-3-656-9065 Page Number : 22 of 23 FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023

# 4 Test Equipment and Calibration Data

| Instrument           | Brand       | Model No.           | Serial No.    | Characteristics   | Calibration<br>Date | Calibration<br>Due Date | Remark                   |
|----------------------|-------------|---------------------|---------------|-------------------|---------------------|-------------------------|--------------------------|
| Horn Antenna         | EMCO        | 3115                | 00075790      | 750MHz ~<br>18GHz | Nov. 20, 2017       | Nov. 19, 2018           | Radiation<br>(03CH01-CB) |
| Horn Antenna         | Schwarzbeck | BBHA 9170           | BBHA9170252   | 15GHz~40GHz       | Jul. 05, 2017       | Jul. 04, 2018           | Radiation<br>(03CH01-CB) |
| Pre-Amplifier        | Agilent     | 8449B               | 3008A02310    | 1GHz ~<br>26.5GHz | Jan. 09, 2018       | Jan. 08, 2019           | Radiation<br>(03CH01-CB) |
| Pre-Amplifier        | MITEQ       | TTA1840-35-HG       | 1864479       | 18GHz~40GHz       | Jul. 10, 2017       | Jul. 09, 2018           | Radiation<br>(03CH01-CB) |
| Spectrum<br>Analyzer | R&S         | FSP40               | 100056        | 9kHz~ 40GHz       | Nov. 23, 2017       | Nov. 22, 2018           | Radiation<br>(03CH01-CB) |
| RF Cable-high        | Woken       | High Cable-16       | N/A           | 1 GHz~18 GHz      | Oct. 11, 2017       | Oct. 10, 2018           | Radiation<br>(03CH01-CB) |
| RF Cable-high        | Woken       | High Cable-16+17    | N/A           | 1 GHz~18 GHz      | Oct. 11, 2017       | Oct. 10, 2018           | Radiation<br>(03CH01-CB) |
| RF Cable-high        | Woken       | High<br>Cable-40G#1 | N/A           | 18GHz~40 GHz      | Oct. 11, 2017       | Oct. 10, 2018           | Radiation<br>(03CH01-CB) |
| RF Cable-high        | Woken       | High<br>Cable-40G#2 | N/A           | 18GHz~40 GHz      | Oct. 11, 2017       | Oct. 10, 2018           | Radiation<br>(03CH01-CB) |
| Test Software        | SPORTON     | SENSE               | V5.10         | -                 | N.C.R.              | N.C.R.                  | Radiation<br>(03CH01-CB) |
| Spectrum<br>analyzer | R&S         | FSV40               | 100979        | 9kHz~40GHz        | Dec. 21, 2017       | Dec. 20, 2018           | Conducted<br>(TH01-CB)   |
| RF Cable-high        | Woken       | RG402               | High Cable-06 | 1GHz–<br>26.5 GHz | Oct. 11, 2017       | Oct. 10, 2018           | Conducted<br>(TH01-CB)   |
| RF Cable-high        | Woken       | RG402               | High Cable-07 | 1GHz–<br>26.5 GHz | Oct. 11, 2017       | Oct. 10, 2018           | Conducted<br>(TH01-CB)   |
| RF Cable-high        | Woken       | RG402               | High Cable-08 | 1GHz–<br>26.5 GHz | Oct. 11, 2017       | Oct. 10, 2018           | Conducted<br>(TH01-CB)   |
| RF Cable-high        | Woken       | RG402               | High Cable-09 | 1GHz-<br>26.5 GHz | Oct. 11, 2017       | Oct. 10, 2018           | Conducted<br>(TH01-CB)   |
| RF Cable-high        | Woken       | RG402               | High Cable-10 | 1GHz-<br>26.5 GHz | Oct. 11, 2017       | Oct. 10, 2018           | Conducted<br>(TH01-CB)   |
| Power Sensor         | Agilent     | U2021XA             | MY53410001    | 50MHz~18GHz       | Nov. 20, 2017       | Nov. 19, 2018           | Conducted<br>(TH01-CB)   |
| Test Software        | SPORTON     | SENSE               | V5.10         | -                 | N.C.R.              | N.C.R.                  | Conducted<br>(TH01-CB)   |

Report No.: FR7D1249-12

Note: Calibration Interval of instruments listed above is one year.

N.C.R. means Non-Calibration required.

TEL: 886-3-656-9065 Page Number : 23 of 23
FAX: 886-3-656-9085 Issued Date : Jul. 06, 2023



Appendix A **EBW** 

### **Summary**

| Mode                           | Max-N dB | Max-OBW | ITU-Code | Min-N dB | Min-OBW |
|--------------------------------|----------|---------|----------|----------|---------|
|                                | (Hz)     | (Hz)    |          | (Hz)     | (Hz)    |
| 5.25-5.35GHz                   | -        | -       | -        | -        | -       |
| 802.11a_Nss1,(6Mbps)_2TX       | 25.5M    | 16.442M | 16M4D1D  | 20.625M  | 16.392M |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | 25.475M  | 17.591M | 17M6D1D  | 20.625M  | 17.566M |
| 802.11ac VHT40_Nss1,(MCS0)_2TX | 77.15M   | 36.482M | 36M5D1D  | 40.85M   | 36.082M |
| 802.11ac VHT80_Nss1,(MCS0)_2TX | 81.7M    | 75.862M | 75M9D1D  | 81.5M    | 75.662M |
| 5.47-5.725GHz                  | -        | -       | -        | -        | -       |
| 802.11a_Nss1,(6Mbps)_2TX       | 30.375M  | 16.667M | 16M7D1D  | 23.75M   | 16.442M |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | 31.5M    | 17.716M | 17M7D1D  | 26.05M   | 17.641M |
| 802.11ac VHT40_Nss1,(MCS0)_2TX | 83.95M   | 37.781M | 37M8D1D  | 40.95M   | 36.082M |
| 802.11ac VHT80_Nss1,(MCS0)_2TX | 152.1M   | 76.262M | 76M3D1D  | 86.9M    | 75.762M |

Max-N dB = Maximum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;

Max-OBW = Maximum 99% occupied bandwidth;

Min-N dB = Minimum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;

**Min-OBW** = Minimum 99% occupied bandwidth;

Sporton International Inc. Hsinchu Laboratory

Page No. : FR7D1249-12 Report No.



EBW Appendix A

#### Result

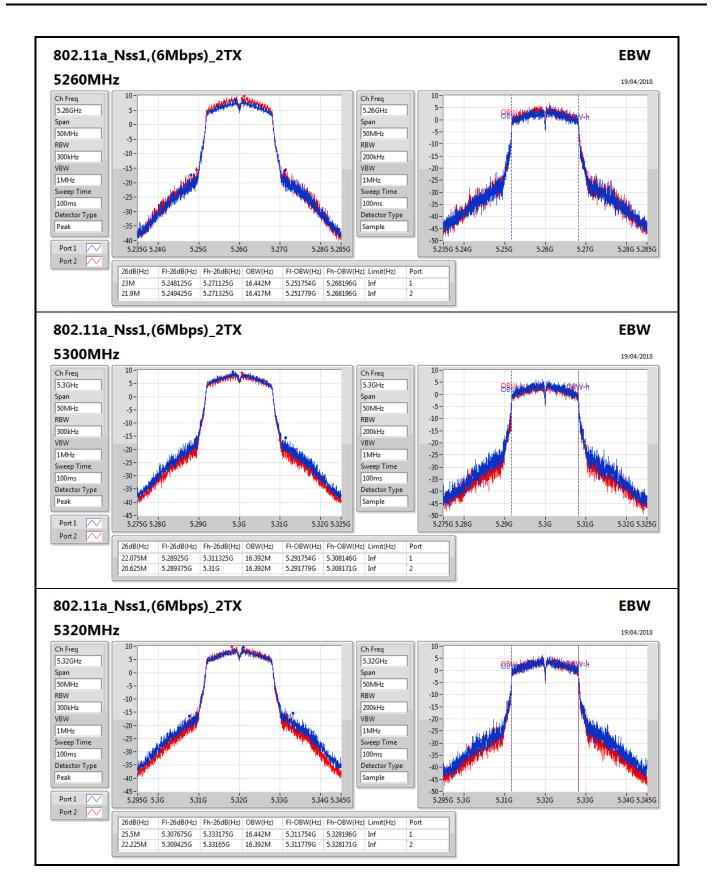
| Mode                           | Result | Limit | Port 1-N dB | Port 1-OBW | Port 2-N dB | Port 2-OBW |
|--------------------------------|--------|-------|-------------|------------|-------------|------------|
|                                |        | (Hz)  | (Hz)        | (Hz)       | (Hz)        | (Hz)       |
| 802.11a_Nss1,(6Mbps)_2TX       | -      | -     | -           | -          | -           | -          |
| 5260MHz                        | Pass   | Inf   | 23M         | 16.442M    | 21.9M       | 16.417M    |
| 5300MHz                        | Pass   | Inf   | 22.075M     | 16.392M    | 20.625M     | 16.392M    |
| 5320MHz                        | Pass   | Inf   | 25.5M       | 16.442M    | 22.225M     | 16.392M    |
| 5500MHz                        | Pass   | Inf   | 26.45M      | 16.492M    | 23.75M      | 16.442M    |
| 5580MHz                        | Pass   | Inf   | 30.375M     | 16.667M    | 28.5M       | 16.642M    |
| 5700MHz                        | Pass   | Inf   | 27.25M      | 16.542M    | 25.15M      | 16.442M    |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | -      | -     | -           | -          | -           | -          |
| 5260MHz                        | Pass   | Inf   | 23.55M      | 17.566M    | 20.625M     | 17.566M    |
| 5300MHz                        | Pass   | Inf   | 23.7M       | 17.591M    | 22.25M      | 17.566M    |
| 5320MHz                        | Pass   | Inf   | 25.475M     | 17.591M    | 23.125M     | 17.566M    |
| 5500MHz                        | Pass   | Inf   | 31.5M       | 17.691M    | 27.575M     | 17.666M    |
| 5580MHz                        | Pass   | Inf   | 30.875M     | 17.716M    | 27.775M     | 17.691M    |
| 5700MHz                        | Pass   | Inf   | 29.025M     | 17.691M    | 26.05M      | 17.641M    |
| 802.11ac VHT40_Nss1,(MCS0)_2TX | -      | -     | -           | -          | -           | -          |
| 5270MHz                        | Pass   | Inf   | 77.15M      | 36.482M    | 71.65M      | 36.382M    |
| 5310MHz                        | Pass   | Inf   | 41.05M      | 36.232M    | 40.85M      | 36.082M    |
| 5510MHz                        | Pass   | Inf   | 41.1M       | 36.082M    | 40.95M      | 36.132M    |
| 5550MHz                        | Pass   | Inf   | 83.95M      | 37.781M    | 81.25M      | 36.832M    |
| 5670MHz                        | Pass   | Inf   | 73.85M      | 36.382M    | 65.9M       | 36.332M    |
| 802.11ac VHT80_Nss1,(MCS0)_2TX | -      | -     | -           | -          | -           | -          |
| 5290MHz                        | Pass   | Inf   | 81.7M       | 75.662M    | 81.5M       | 75.862M    |
| 5530MHz                        | Pass   | Inf   | 86.9M       | 75.762M    | 91.7M       | 75.862M    |
| 5610MHz                        | Pass   | Inf   | 137.3M      | 76.262M    | 152.1M      | 76.162M    |

Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth;

Sporton International Inc. Hsinchu Laboratory Page No. : 2 of

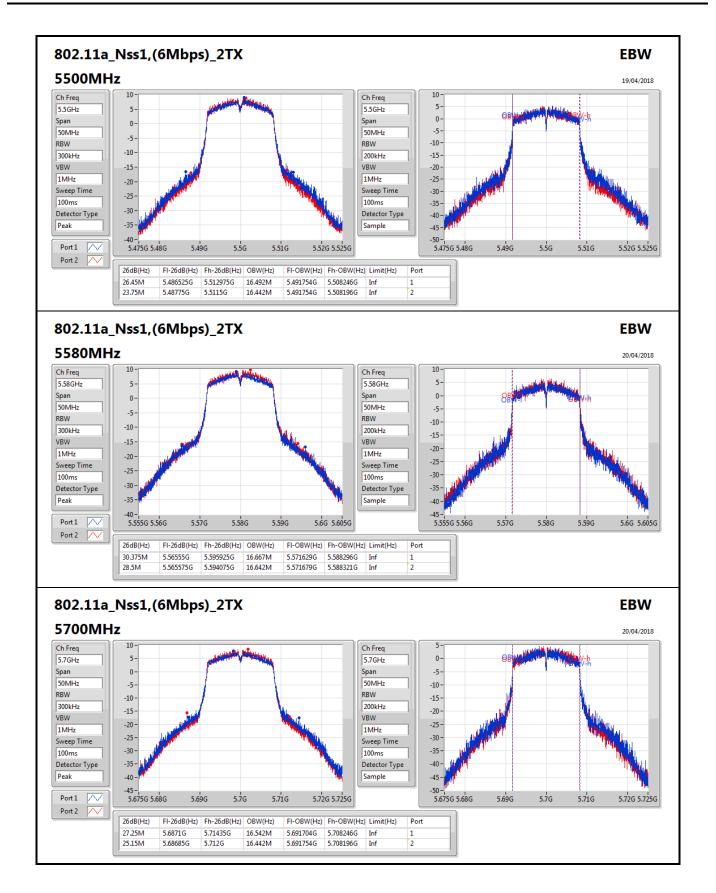
Report No. : FR7D1249-12





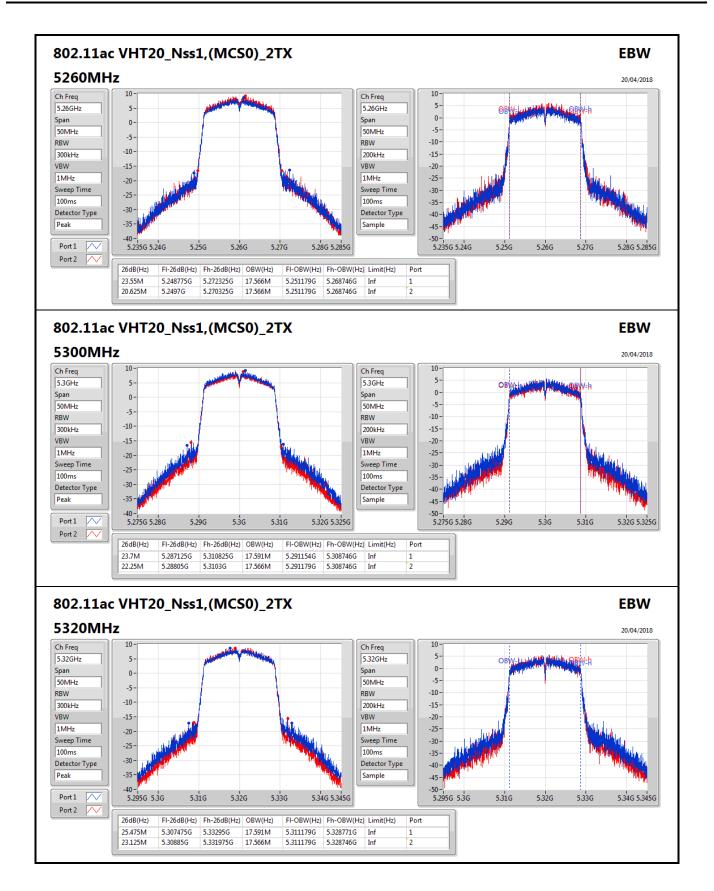
Page No. 3 of 9 Report No. : FR7D1249-12





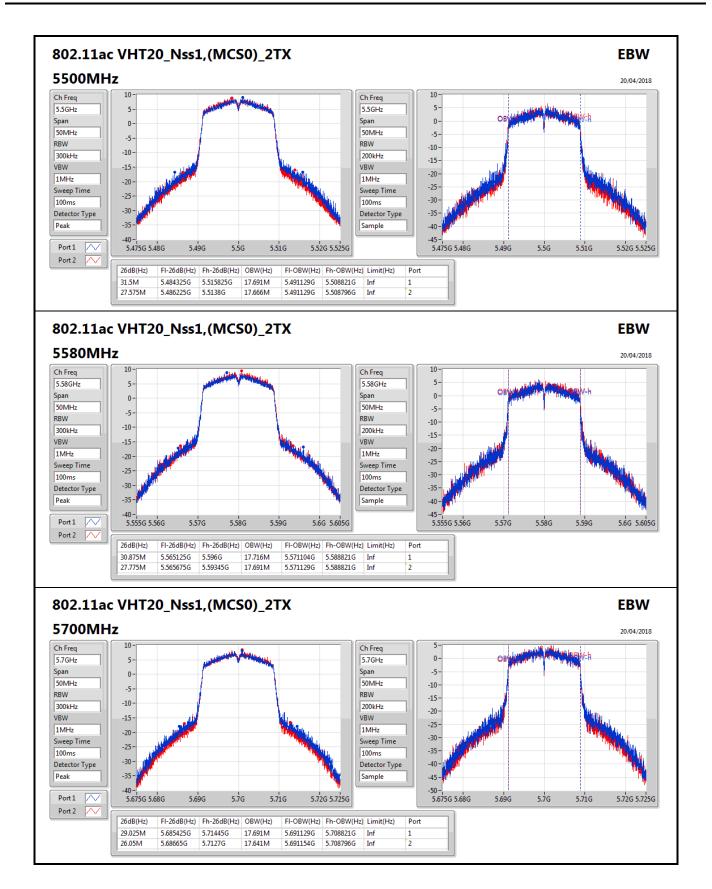
Page No. 4 of 9 Report No. : FR7D1249-12



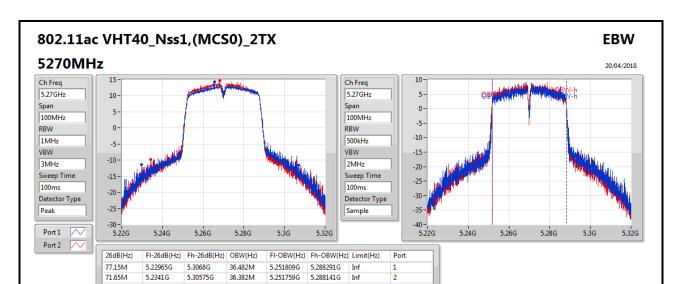


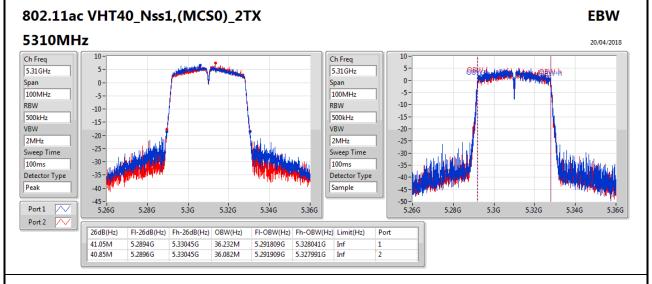
Page No. 5 of 9 Report No. : FR7D1249-12

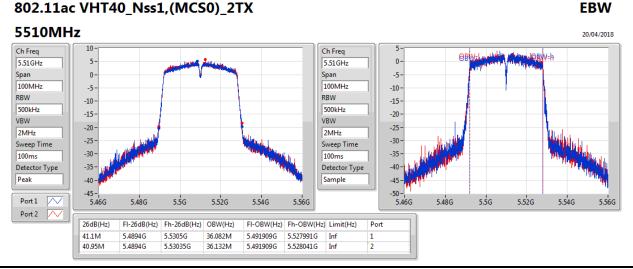




Page No. Report No. : FR7D1249-12 **EBW** 

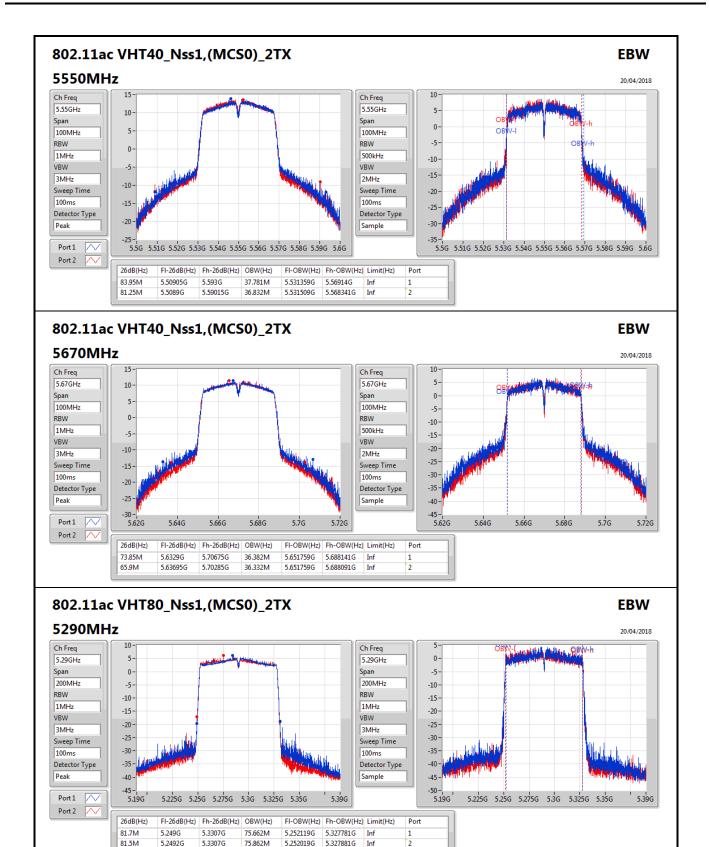






Page No. : 7 of 9

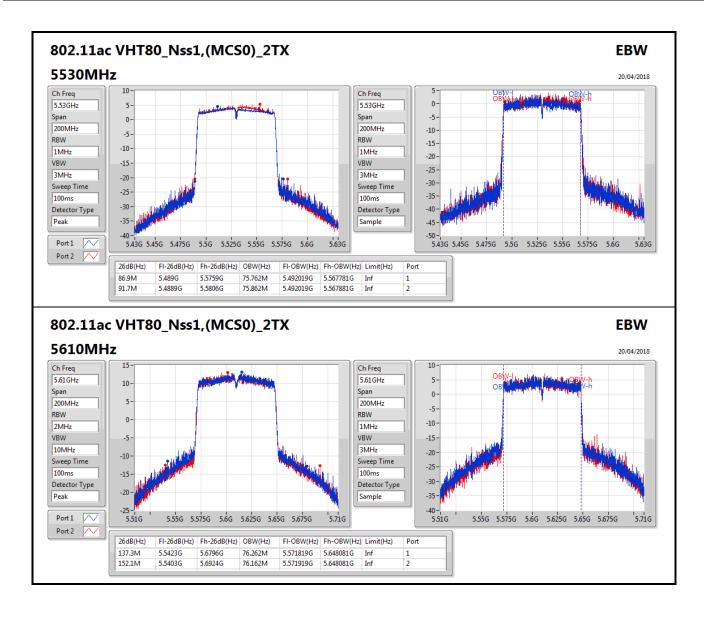
Report No. : FR7D1249-12



Page No. : 8 of 9

Report No. : FR7D1249-12





Page No. : FR7D1249-12 Report No.



Power Appendix B

Summary

| Mode                           | Total Power | Total Power |
|--------------------------------|-------------|-------------|
|                                | (dBm)       | (W)         |
| 5.25-5.35GHz                   | -           | -           |
| 802.11a_Nss1,(6Mbps)_2TX       | 20.71       | 0.11776     |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | 20.41       | 0.10990     |
| 802.11ac VHT40_Nss1,(MCS0)_2TX | 22.93       | 0.19634     |
| 802.11ac VHT80_Nss1,(MCS0)_2TX | 18.33       | 0.06808     |
| 5.47-5.725GHz                  | -           | -           |
| 802.11a_Nss1,(6Mbps)_2TX       | 20.60       | 0.11482     |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | 20.66       | 0.11641     |
| 802.11ac VHT40_Nss1,(MCS0)_2TX | 23.22       | 0.20989     |
| 802.11ac VHT80_Nss1,(MCS0)_2TX | 21.20       | 0.13183     |

Sporton International Inc. Hsinchu Laboratory

Page No. : 1 of 2

Report No. : FR7D1249-12



Power Appendix B

### Result

| Mode                           | Result | DG    | Port 1 | Port 2 | Total Power | Power Limit |
|--------------------------------|--------|-------|--------|--------|-------------|-------------|
|                                |        | (dBi) | (dBm)  | (dBm)  | (dBm)       | (dBm)       |
| 802.11a_Nss1,(6Mbps)_2TX       | -      | -     | -      | -      | -           | -           |
| 5260MHz                        | Pass   | 6.64  | 17.37  | 17.91  | 20.66       | 23.34       |
| 5300MHz                        | Pass   | 6.64  | 17.14  | 17.79  | 20.49       | 23.34       |
| 5320MHz                        | Pass   | 6.64  | 17.42  | 17.96  | 20.71       | 23.34       |
| 5500MHz                        | Pass   | 6.64  | 16.88  | 17.24  | 20.07       | 23.34       |
| 5580MHz                        | Pass   | 6.64  | 17.34  | 17.82  | 20.60       | 23.34       |
| 5700MHz                        | Pass   | 6.64  | 15.78  | 15.94  | 18.87       | 23.34       |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | -      | -     | -      | -      | -           | -           |
| 5260MHz                        | Pass   | 6.64  | 17.05  | 17.68  | 20.39       | 23.34       |
| 5300MHz                        | Pass   | 6.64  | 17.18  | 17.61  | 20.41       | 23.34       |
| 5320MHz                        | Pass   | 6.64  | 17.02  | 17.33  | 20.19       | 23.34       |
| 5500MHz                        | Pass   | 6.64  | 17.56  | 17.74  | 20.66       | 23.34       |
| 5580MHz                        | Pass   | 6.64  | 17.15  | 17.42  | 20.30       | 23.34       |
| 5700MHz                        | Pass   | 6.64  | 17.52  | 17.61  | 20.58       | 23.34       |
| 802.11ac VHT40_Nss1,(MCS0)_2TX | -      | -     | -      | -      | -           | -           |
| 5270MHz                        | Pass   | 6.64  | 19.67  | 20.15  | 22.93       | 23.34       |
| 5310MHz                        | Pass   | 6.64  | 16.23  | 16.41  | 19.33       | 23.34       |
| 5510MHz                        | Pass   | 6.64  | 14.81  | 15.21  | 18.02       | 23.34       |
| 5550MHz                        | Pass   | 6.64  | 20.18  | 20.23  | 23.22       | 23.34       |
| 5670MHz                        | Pass   | 6.64  | 17.56  | 17.73  | 20.66       | 23.34       |
| 802.11ac VHT80_Nss1,(MCS0)_2TX | -      | -     | -      | -      | -           | -           |
| 5290MHz                        | Pass   | 6.64  | 15.65  | 14.96  | 18.33       | 23.34       |
| 5530MHz                        | Pass   | 6.64  | 14.81  | 15.43  | 18.14       | 23.34       |
| 5610MHz                        | Pass   | 6.64  | 18.14  | 18.23  | 21.20       | 23.34       |

**DG** = Directional Gain;**Port X** = Port X output power

Sporton International Inc. Hsinchu Laboratory Page No. : 2 of 2

Report No. : FR7D1249-12



PSD Appendix C

Summary

| Mode                           | PD        |
|--------------------------------|-----------|
|                                | (dBm/RBW) |
| 5.25-5.35GHz                   | -         |
| 802.11a_Nss1,(6Mbps)_2TX       | 7.96      |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | 7.68      |
| 802.11ac VHT40_Nss1,(MCS0)_2TX | 6.69      |
| 802.11ac VHT80_Nss1,(MCS0)_2TX | -1.82     |
| 5.47-5.725GHz                  | -         |
| 802.11a_Nss1,(6Mbps)_2TX       | 7.94      |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | 7.66      |
| 802.11ac VHT40_Nss1,(MCS0)_2TX | 7.05      |
| 802.11ac VHT80_Nss1,(MCS0)_2TX | 1.16      |

**RBW** = 500kHz for 5.725-5.85GHz band / 1MHz for other band;

Sporton International Inc. Hsinchu Laboratory

Page No. : 1 of 9

Report No. : FR7D1249-12



Appendix C **PSD** 

#### Result

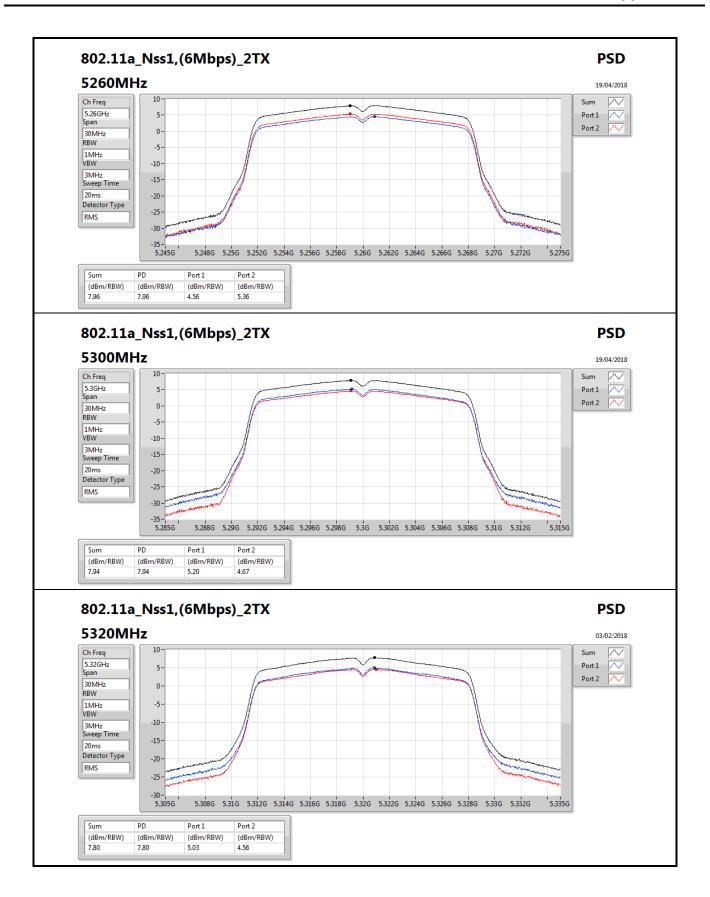
| Mode                           | Result | DG    | Port 1    | Port 2    | PD        | PD Limit  |
|--------------------------------|--------|-------|-----------|-----------|-----------|-----------|
|                                |        | (dBi) | (dBm/RBW) | (dBm/RBW) | (dBm/RBW) | (dBm/RBW) |
| 802.11a_Nss1,(6Mbps)_2TX       | -      | -     | -         | -         | -         | -         |
| 5260MHz                        | Pass   | 8.96  | 4.56      | 5.36      | 7.96      | 8.04      |
| 5300MHz                        | Pass   | 8.96  | 5.20      | 4.67      | 7.94      | 8.04      |
| 5320MHz                        | Pass   | 8.96  | 5.03      | 4.56      | 7.80      | 8.04      |
| 5500MHz                        | Pass   | 8.96  | 4.70      | 4.67      | 7.68      | 8.04      |
| 5580MHz                        | Pass   | 8.96  | 4.75      | 5.18      | 7.94      | 8.04      |
| 5700MHz                        | Pass   | 8.96  | 2.93      | 2.92      | 5.91      | 8.04      |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | -      | -     | -         | -         | -         | -         |
| 5260MHz                        | Pass   | 8.96  | 4.30      | 4.98      | 7.64      | 8.04      |
| 5300MHz                        | Pass   | 8.96  | 4.87      | 4.32      | 7.59      | 8.04      |
| 5320MHz                        | Pass   | 8.96  | 4.52      | 4.83      | 7.68      | 8.04      |
| 5500MHz                        | Pass   | 8.96  | 4.59      | 4.75      | 7.66      | 8.04      |
| 5580MHz                        | Pass   | 8.96  | 4.39      | 4.76      | 7.56      | 8.04      |
| 5700MHz                        | Pass   | 8.96  | 3.89      | 3.99      | 6.92      | 8.04      |
| 802.11ac VHT40_Nss1,(MCS0)_2TX | -      | -     | -         | -         | -         | -         |
| 5270MHz                        | Pass   | 8.96  | 3.18      | 4.18      | 6.69      | 8.04      |
| 5310MHz                        | Pass   | 8.96  | 0.29      | 0.15      | 3.20      | 8.04      |
| 5510MHz                        | Pass   | 8.96  | -0.93     | -0.73     | 2.17      | 8.04      |
| 5550MHz                        | Pass   | 8.96  | 3.89      | 4.20      | 7.05      | 8.04      |
| 5670MHz                        | Pass   | 8.96  | 1.22      | 1.47      | 4.31      | 8.04      |
| 802.11ac VHT80_Nss1,(MCS0)_2TX | -      | -     | -         | -         | -         | -         |
| 5290MHz                        | Pass   | 8.96  | -4.63     | -5.05     | -1.82     | 8.04      |
| 5530MHz                        | Pass   | 8.96  | -4.52     | -3.79     | -1.13     | 8.04      |
| 5610MHz                        | Pass   | 8.96  | -1.84     | -1.84     | 1.16      | 8.04      |

Sporton International Inc. Hsinchu Laboratory

Page No. : 2 of 9

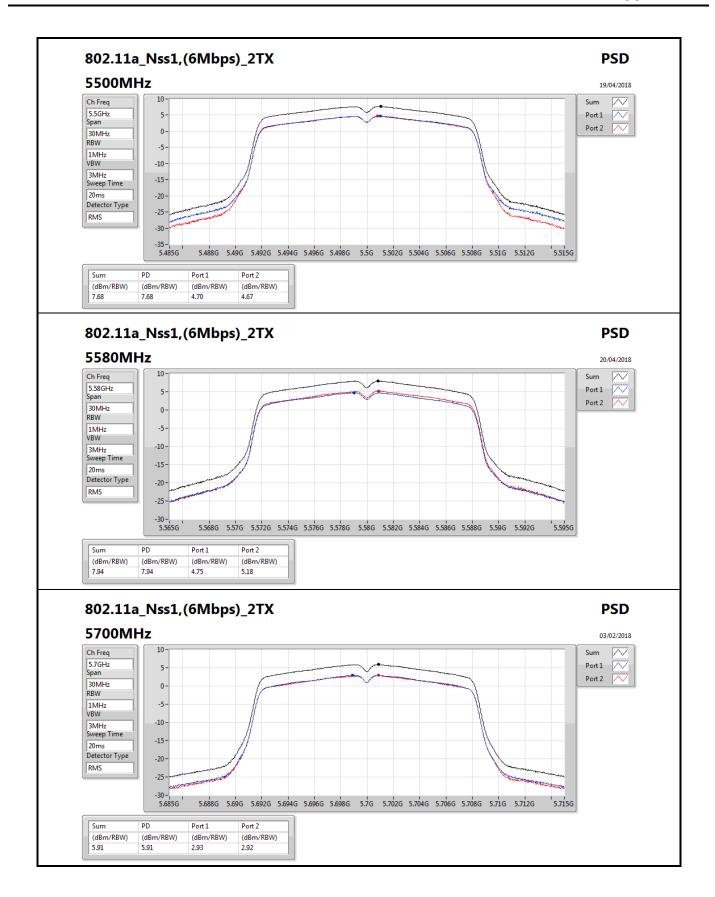
Report No. : FR7D1249-12

DG = Directional Gain; RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port Xpower density;



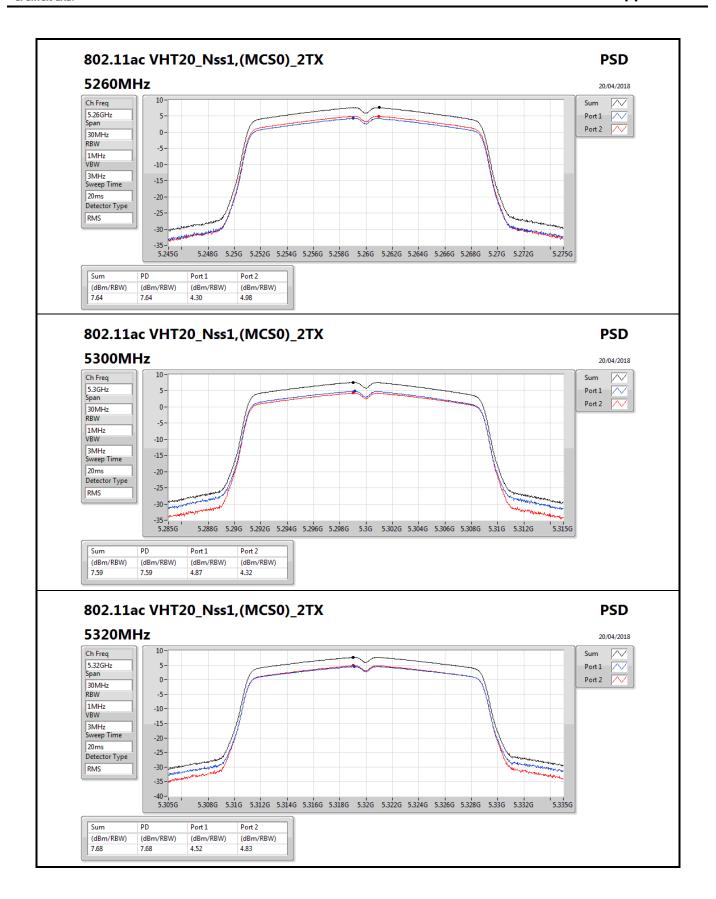
Page No. : 3 of 9

Report No. : FR7D1249-12



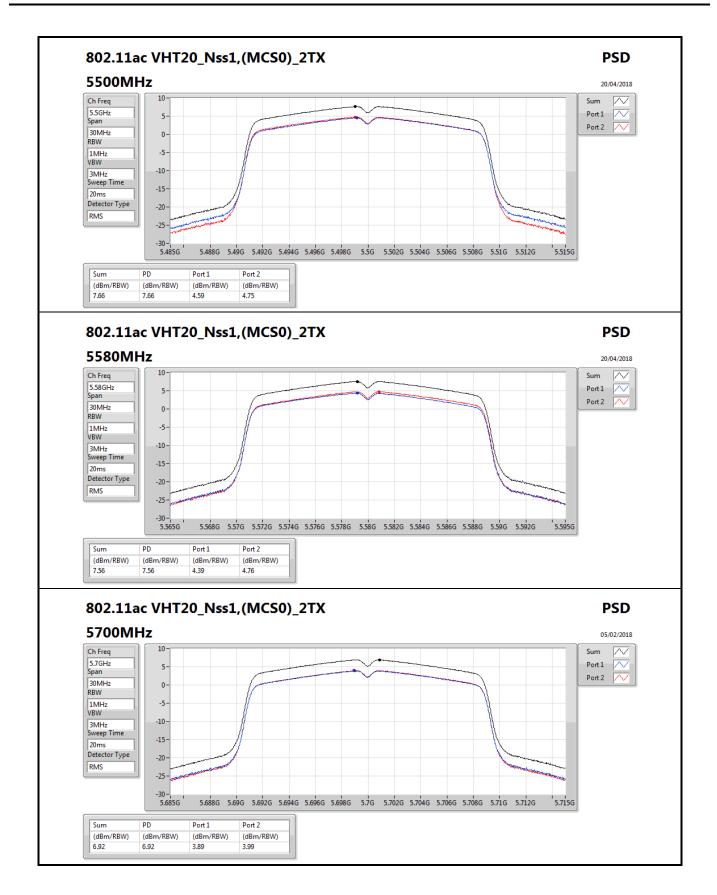
Page No. : 4 of 9

Report No. : FR7D1249-12



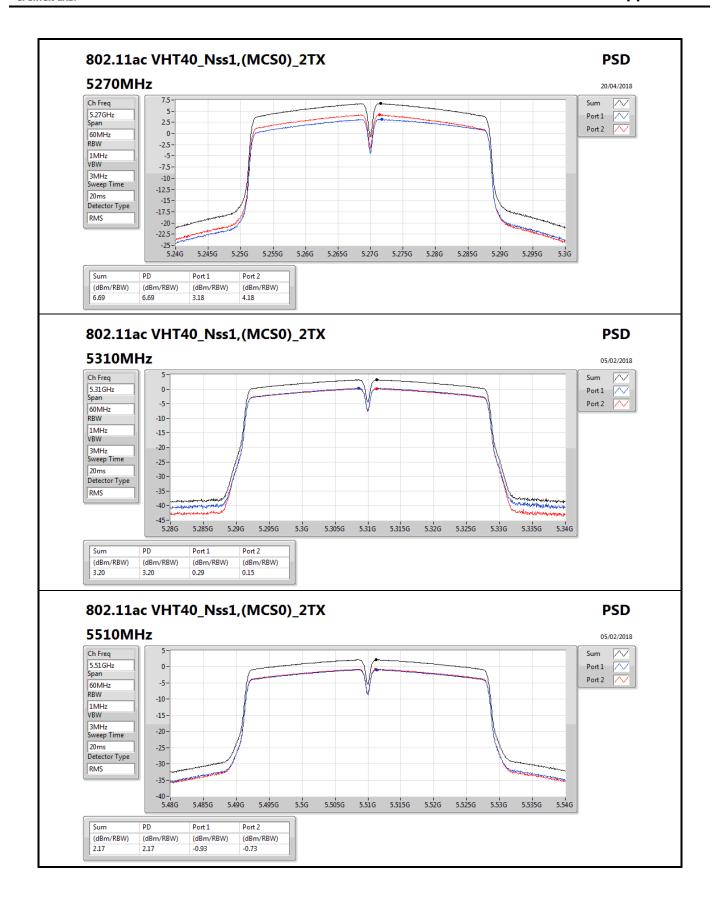
Page No. : 5 of 9

Report No. : FR7D1249-12



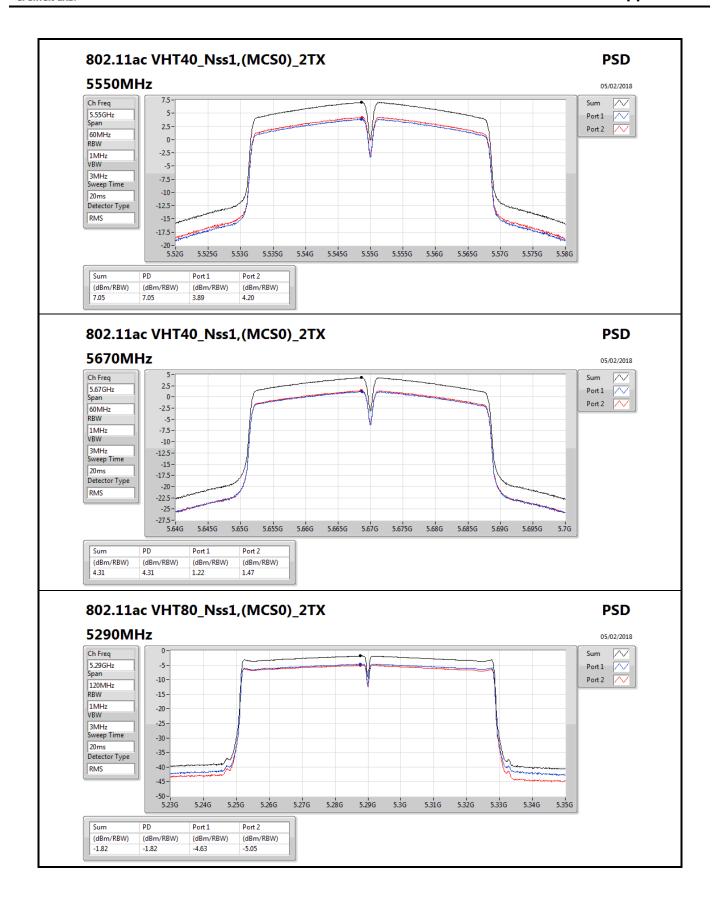
Page No. : 6 of 9

Report No. : FR7D1249-12



Page No. : 7 of 9

Report No. : FR7D1249-12

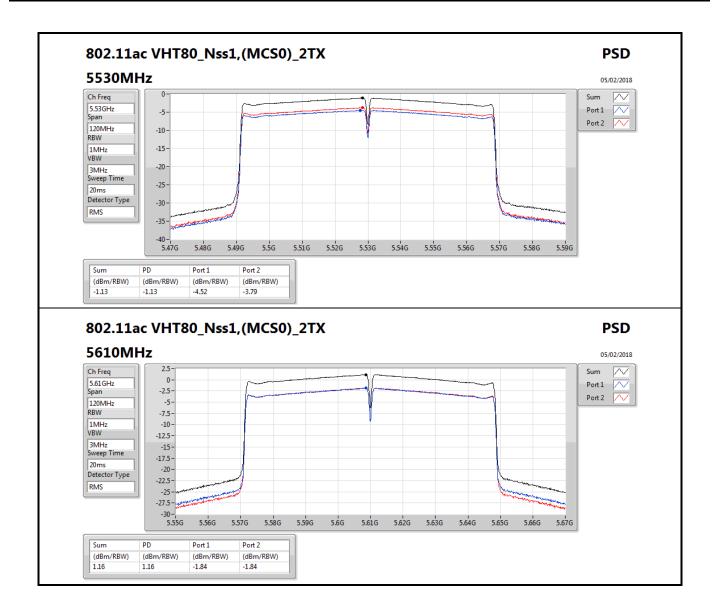


Page No. : 8 of 9

Report No. : FR7D1249-12

SPORTON LAB.

PSD Appendix C



Page No. : 9 of 9

Report No. : FR7D1249-12



RSE TX above 1GHz Appendix D

**Summary** 

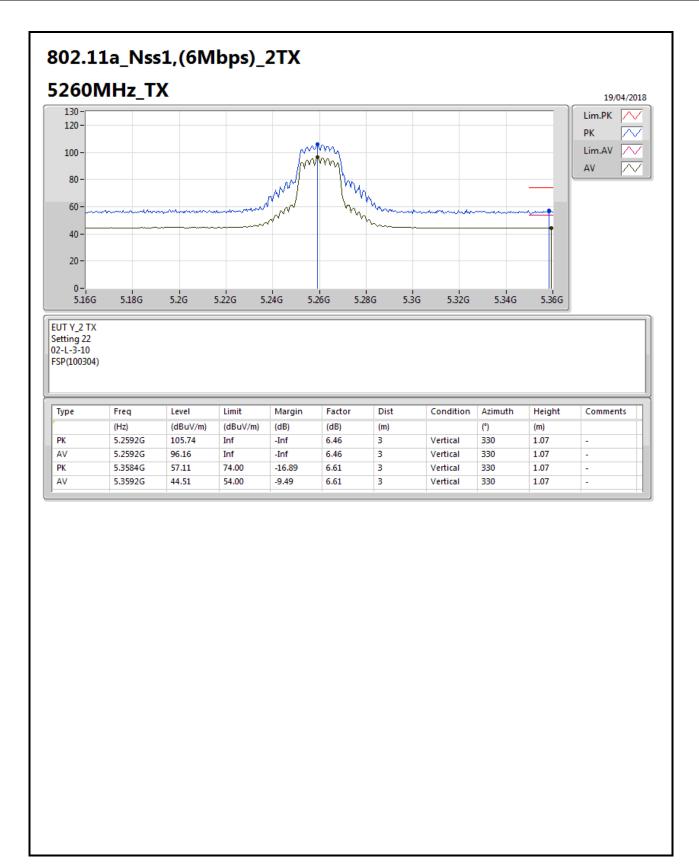
| Mode                           | Result | Туре | Freq    | Level    | Limit    | Margin | Factor | Dist | Condition  | Azimuth | Height | Comments |
|--------------------------------|--------|------|---------|----------|----------|--------|--------|------|------------|---------|--------|----------|
|                                |        |      | (Hz)    | (dBuV/m) | (dBuV/m) | (dB)   | (dB)   | (m)  |            | (°)     | (m)    |          |
| 5.47-5.725GHz                  | -      | -    | -       | -        | -        | -      | -      | -    | -          | -       | -      | -        |
| 802.11ac VHT20_Nss1,(MCS0)_2TX | Pass   | AV   | 5.4698G | 53.98    | 54.00    | -0.02  | 6.79   | 3    | Horizontal | 311     | 1.67   | -        |

Sporton International Inc. Hsinchu Laboratory

Page No. : 1 of 81

Report No. : FR7D1249-12

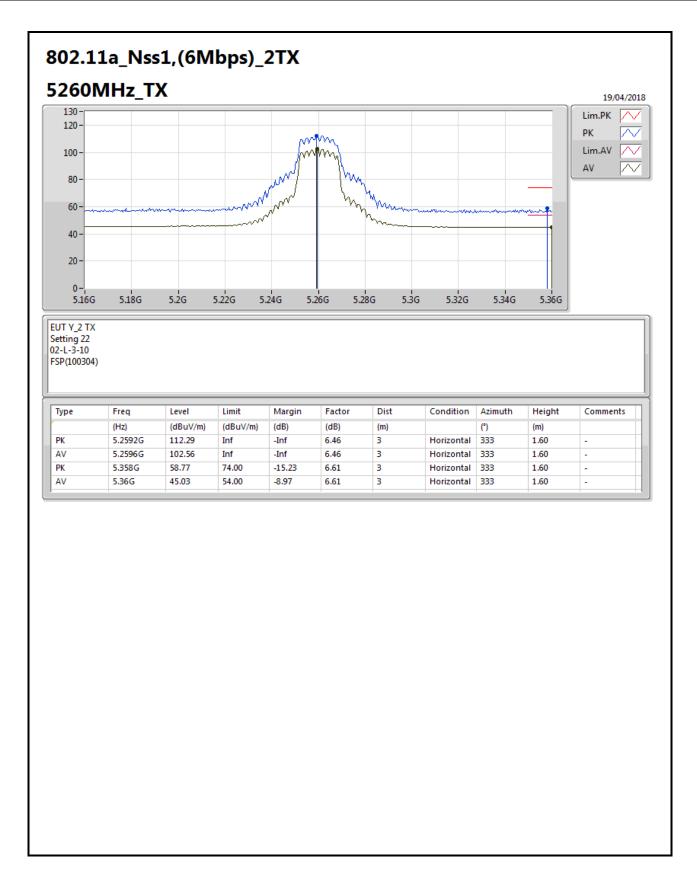




Page No. : 2 of 81

Report No. : FR7D1249-12

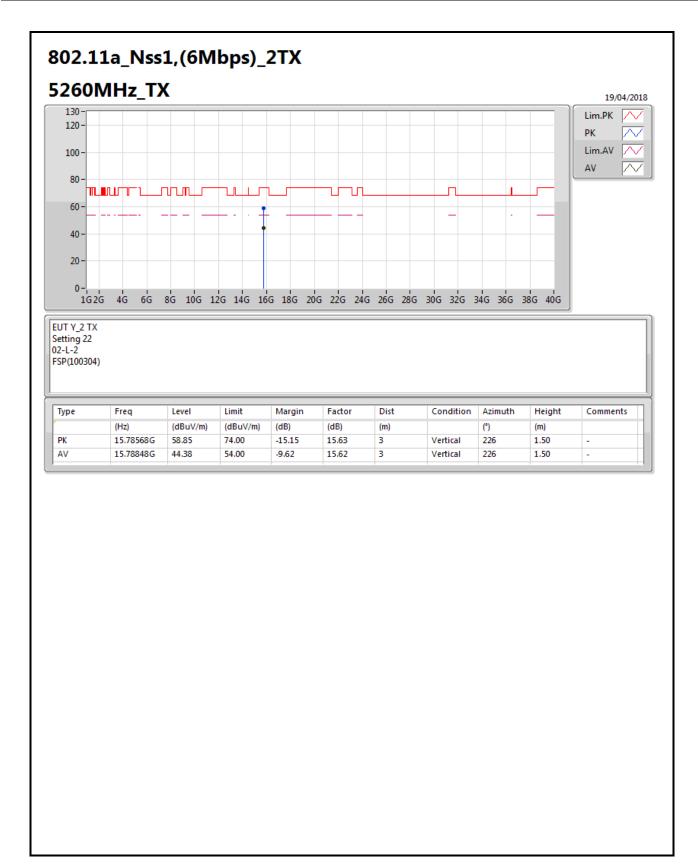




Page No. : 3 of 81

Report No. : FR7D1249-12

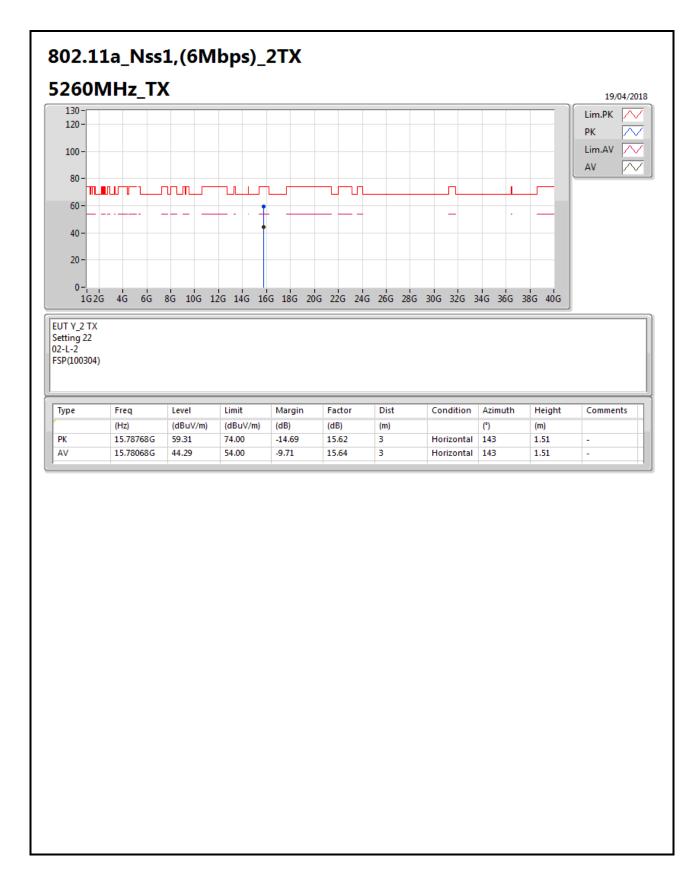




Page No. : 4 of 81

Report No. : FR7D1249-12

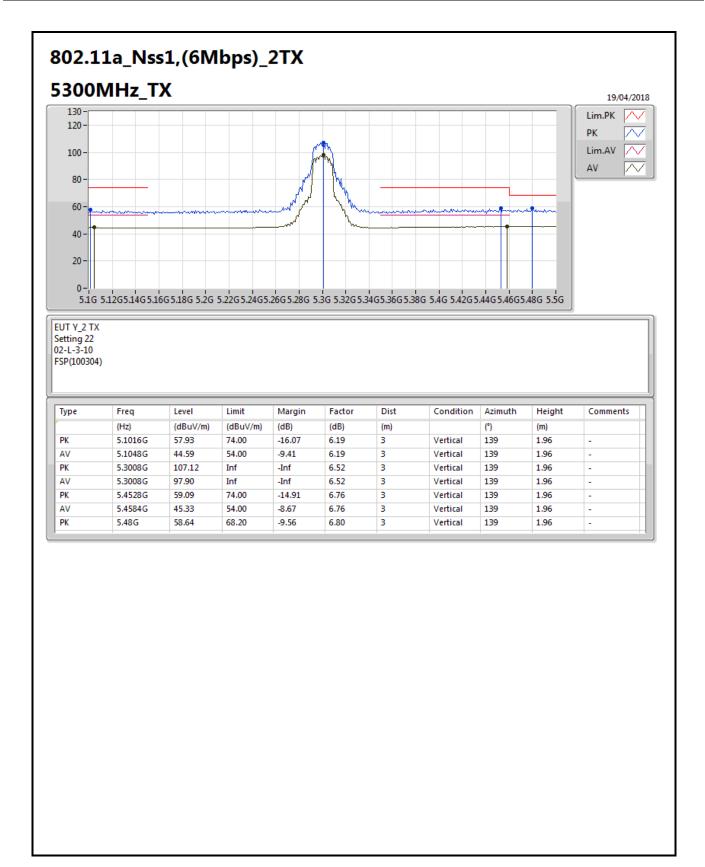




Page No. : 5 of 81

Report No. : FR7D1249-12

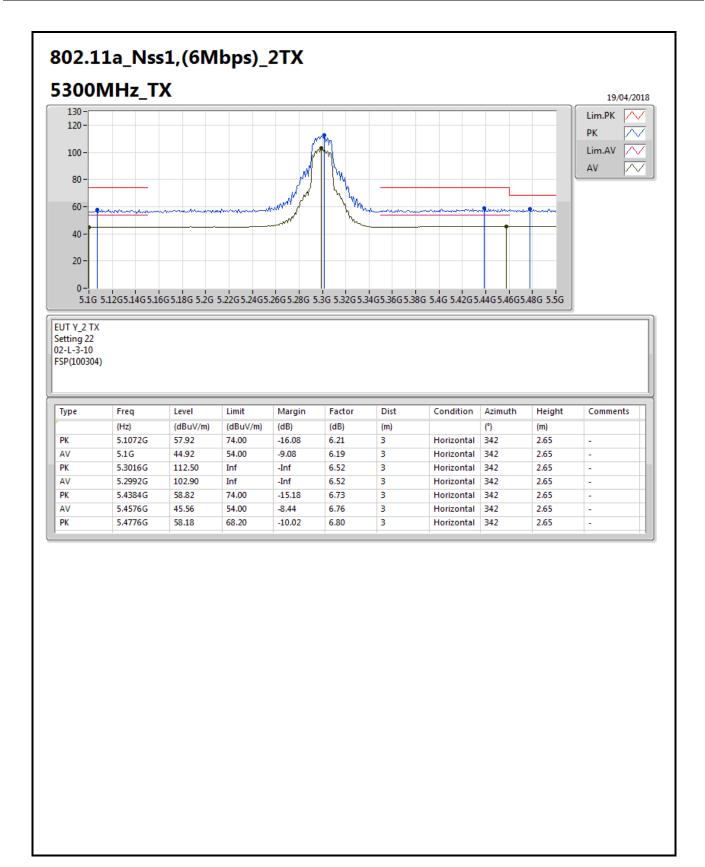




Page No. : 6 of 81

Report No. : FR7D1249-12

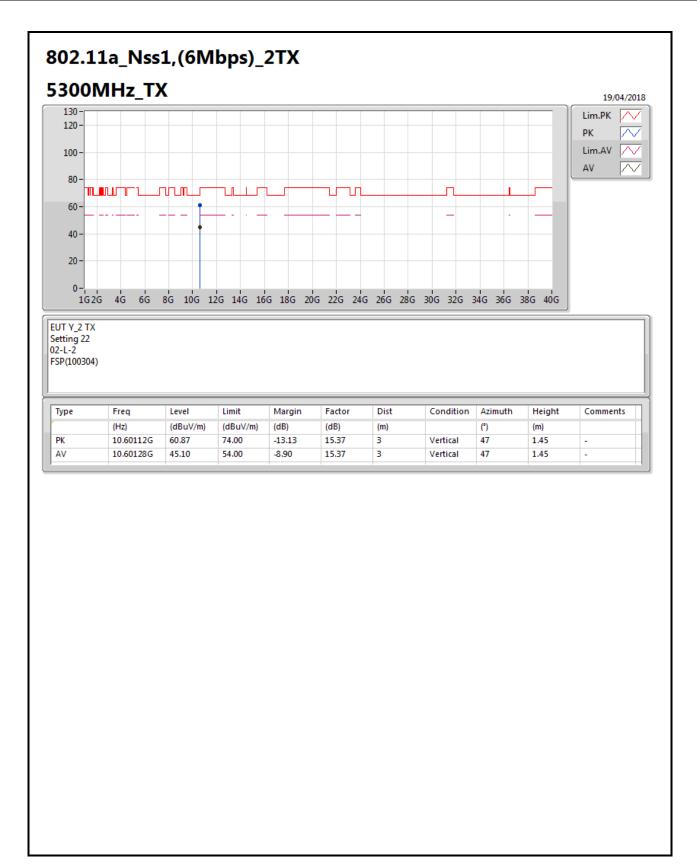




Page No. : 7 of 81

Report No. : FR7D1249-12

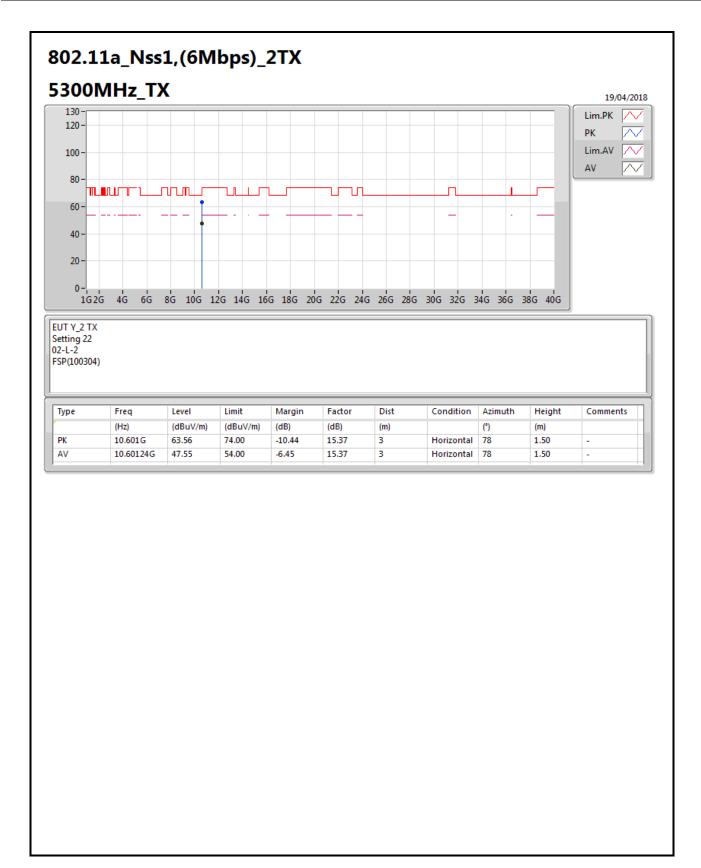




Page No. : 8 of 81

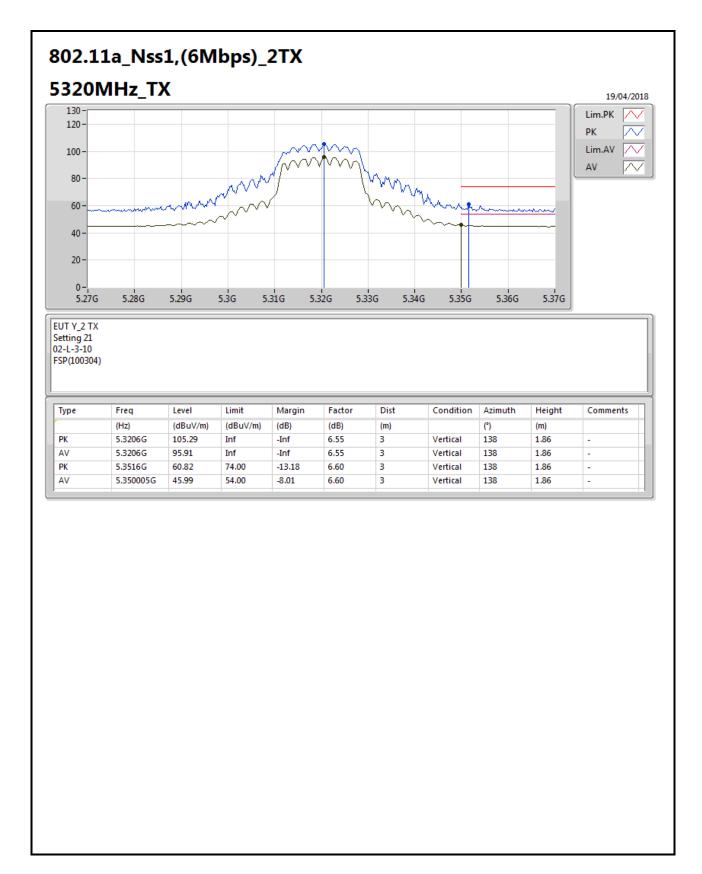
Report No. : FR7D1249-12





Page No. : 9 of 81 Report No. : FR7D1249-12

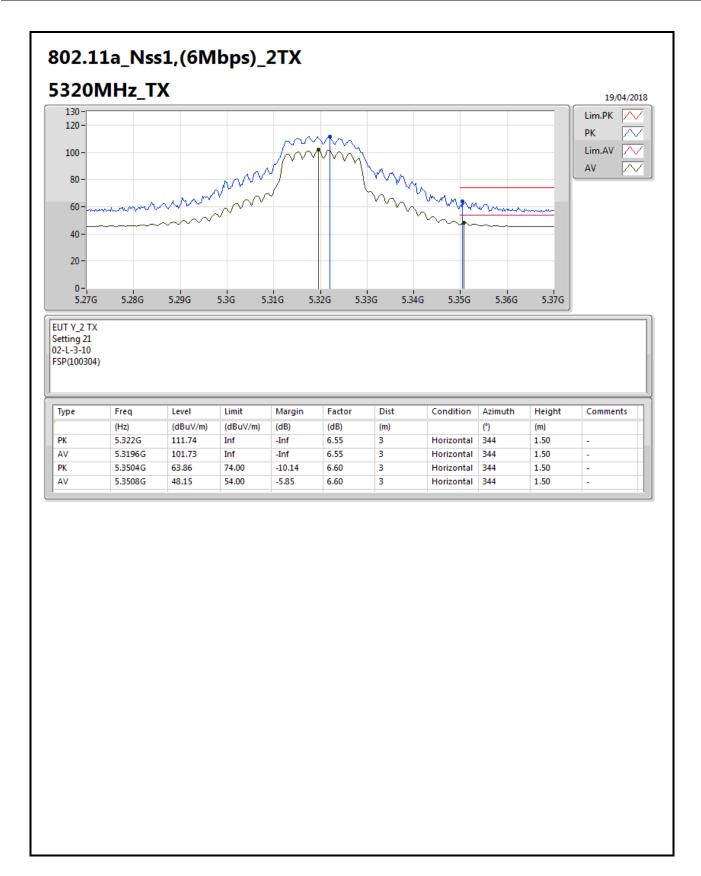




Page No. : 10 of 81

Report No. : FR7D1249-12

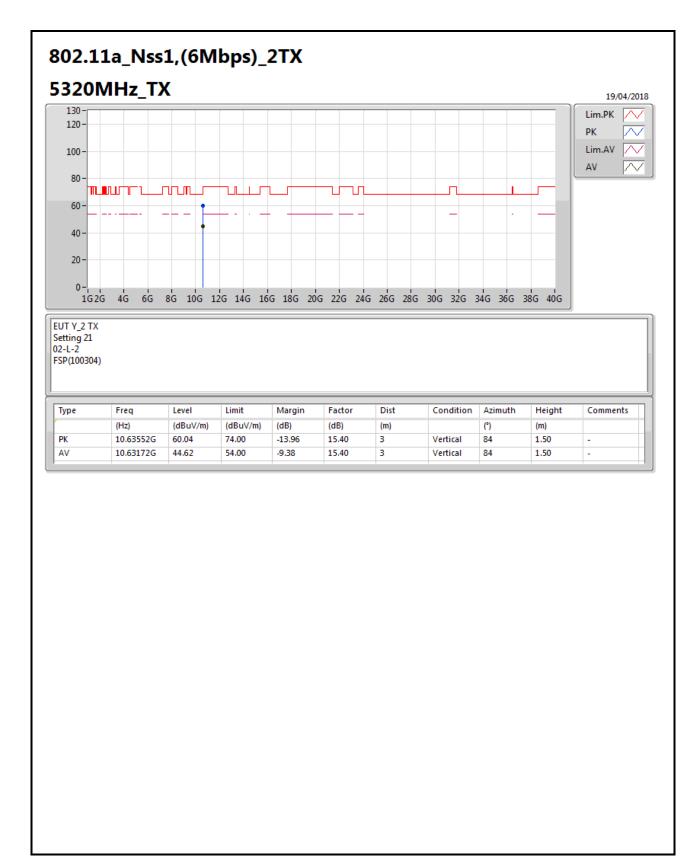




Page No. : 11 of 81

Report No. : FR7D1249-12

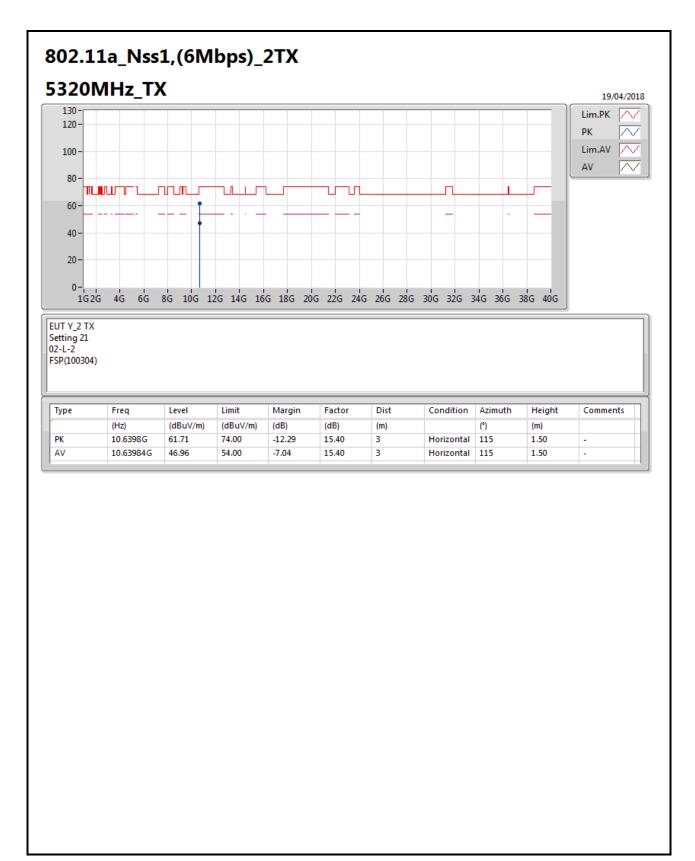




Page No. : 12 of 81

Report No. : FR7D1249-12

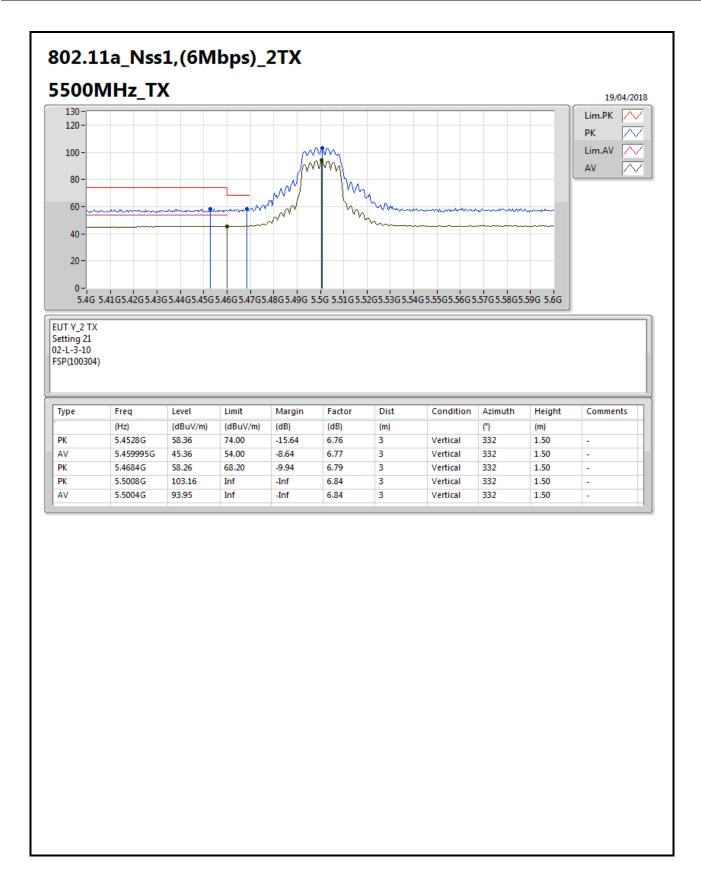




Page No. : 13 of 81

Report No. : FR7D1249-12

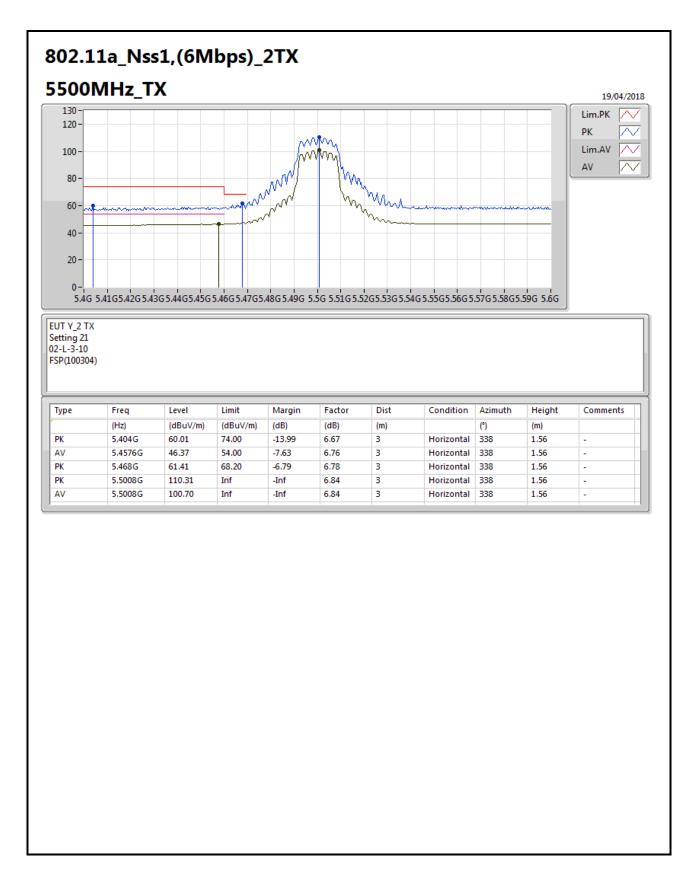




Page No. : 14 of 81

Report No. : FR7D1249-12

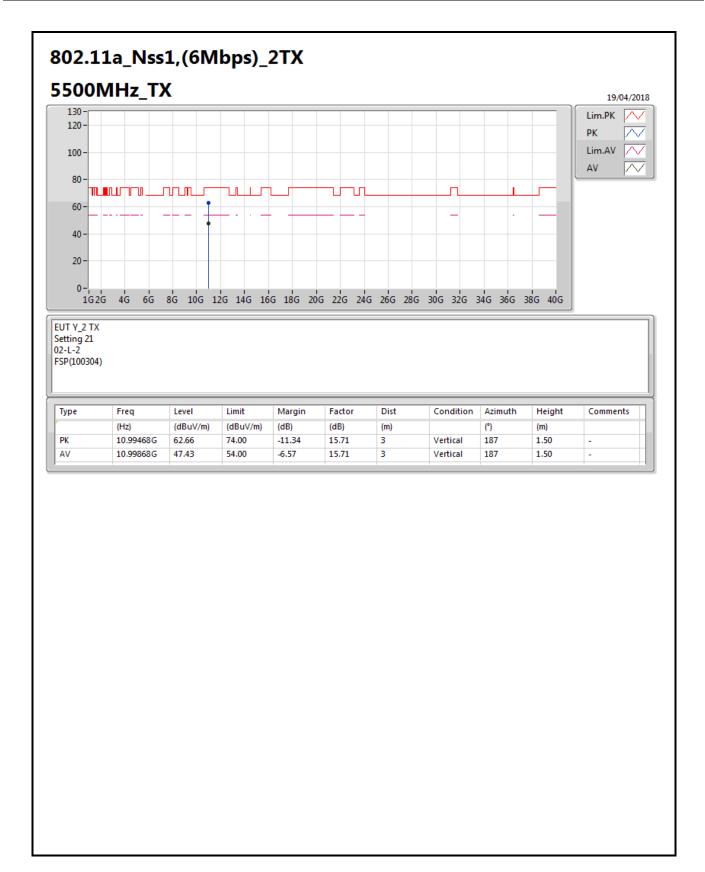




Page No. : 15 of 81

Report No. : FR7D1249-12

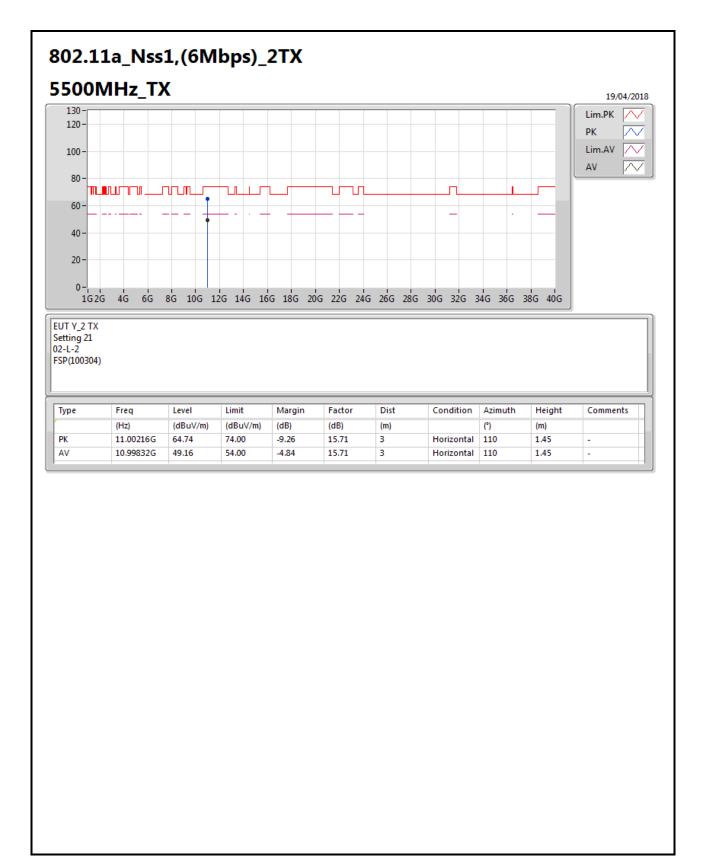




Page No. : 16 of 81

Report No. : FR7D1249-12

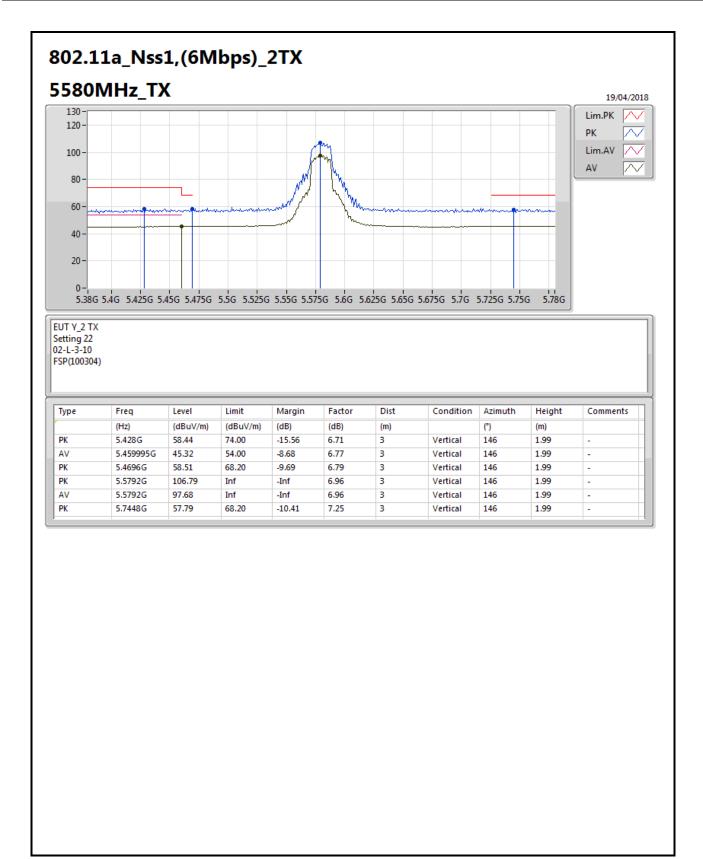




Page No. : 17 of 81

Report No. : FR7D1249-12

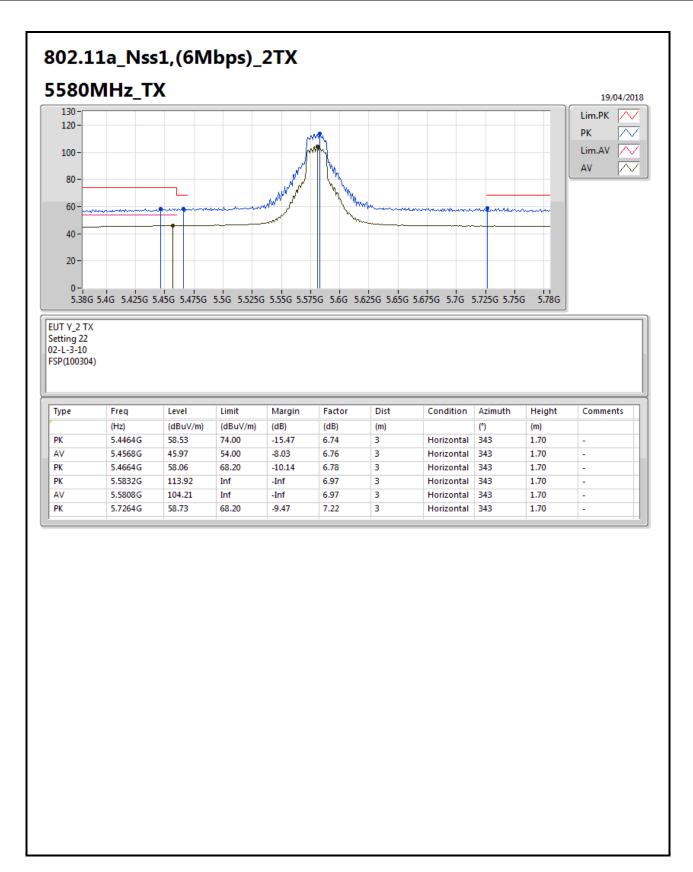




Page No. : 18 of 81

Report No. : FR7D1249-12

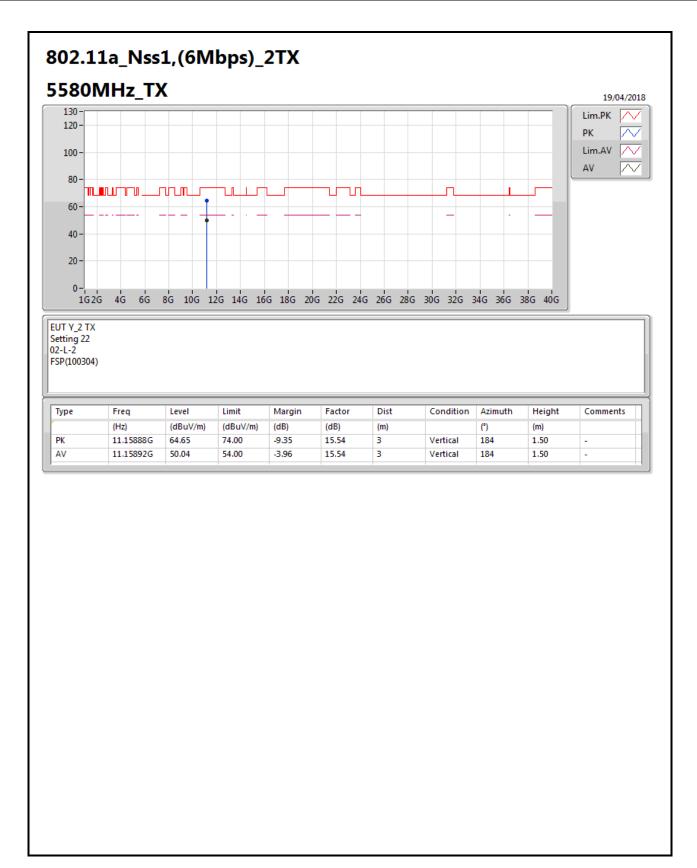




Page No. : 19 of 81

Report No. : FR7D1249-12

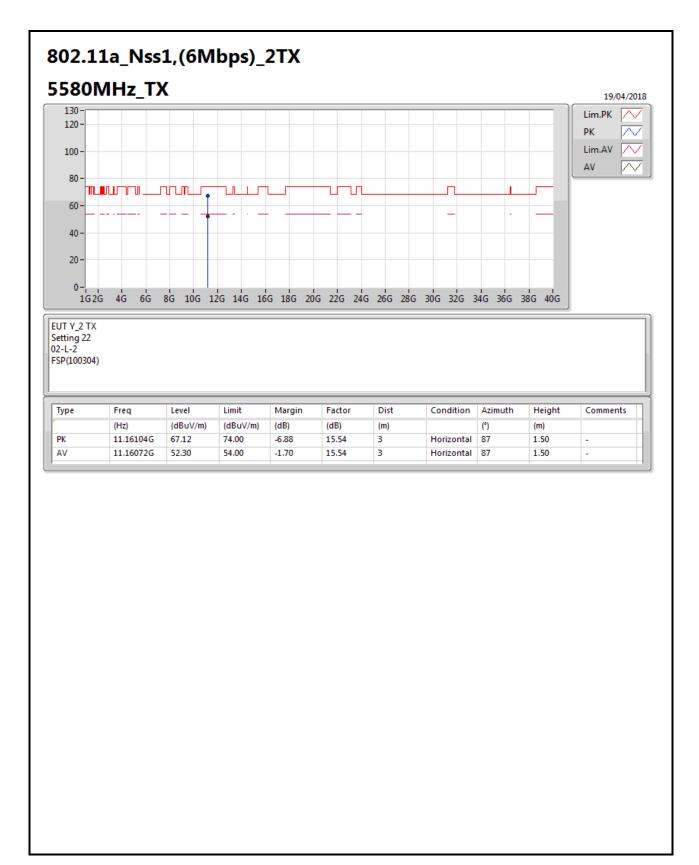




Page No. : 20 of 81

Report No. : FR7D1249-12

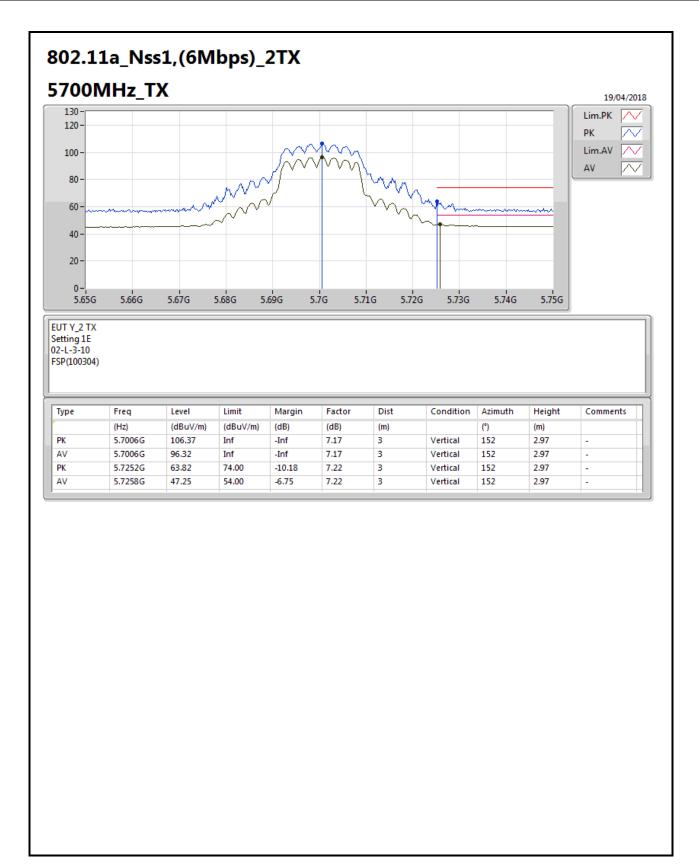




Page No. : 21 of 81

Report No. : FR7D1249-12

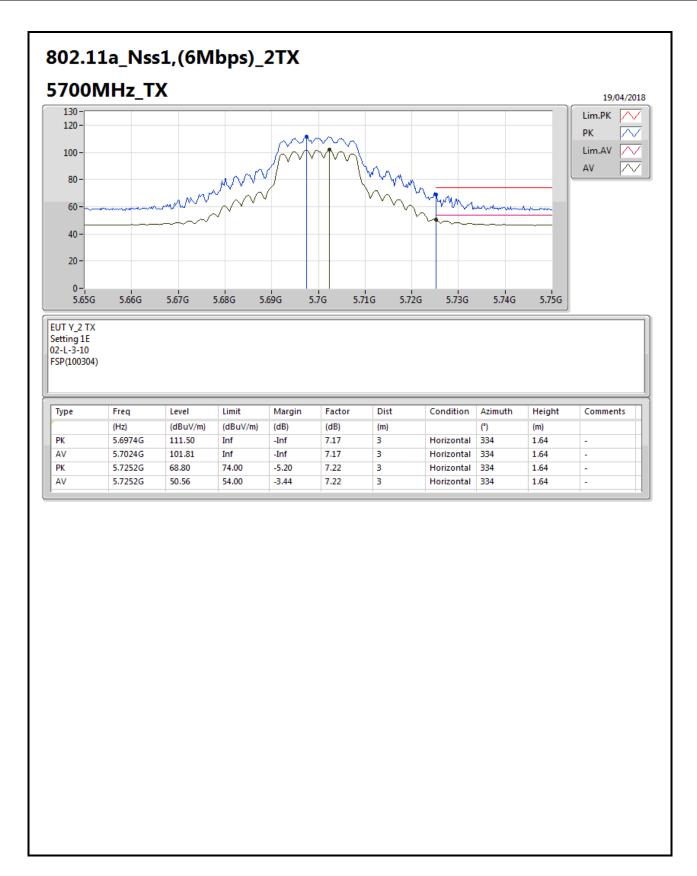




Page No. : 22 of 81

Report No. : FR7D1249-12

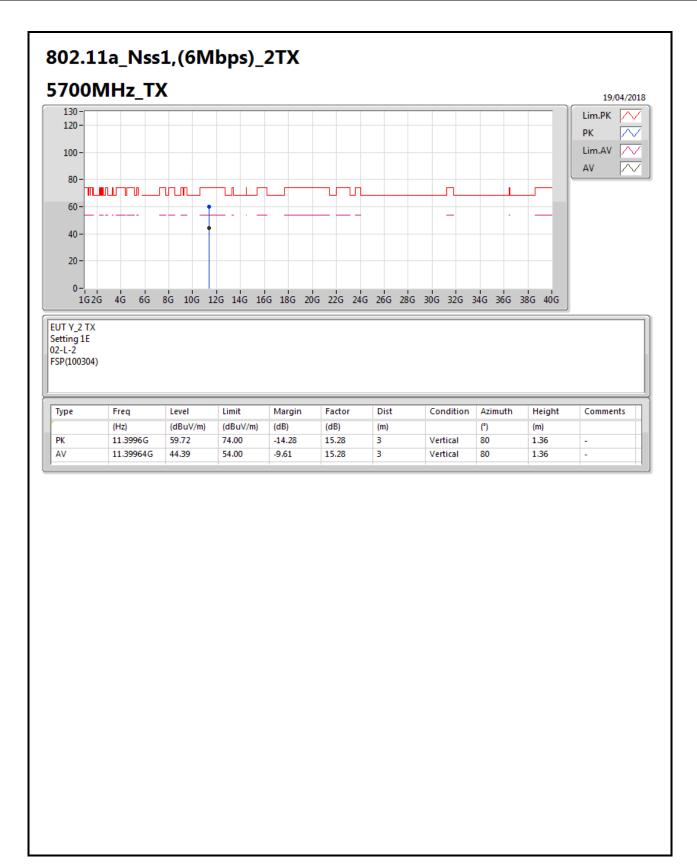




Page No. : 23 of 81

Report No. : FR7D1249-12

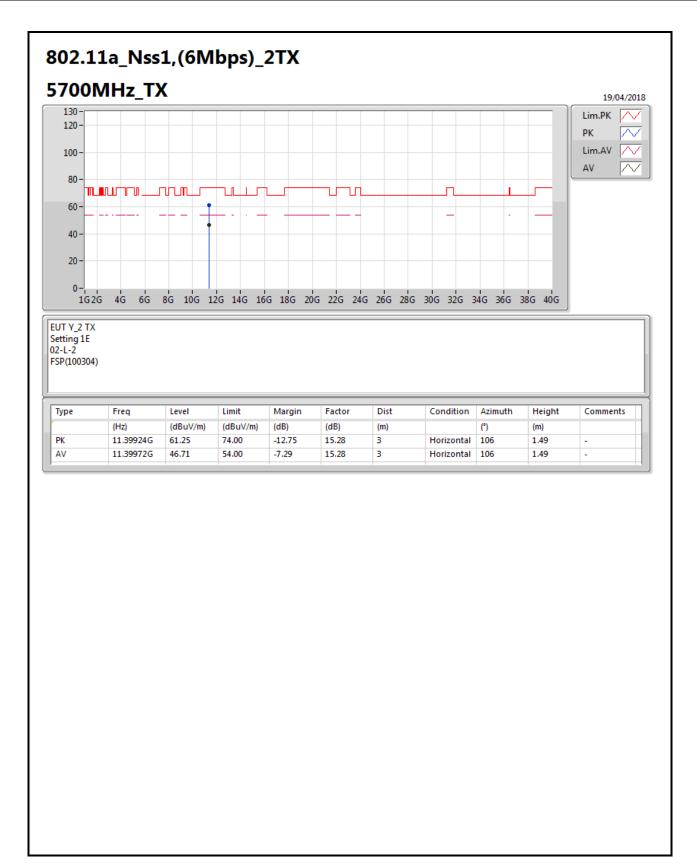




Page No. : 24 of 81

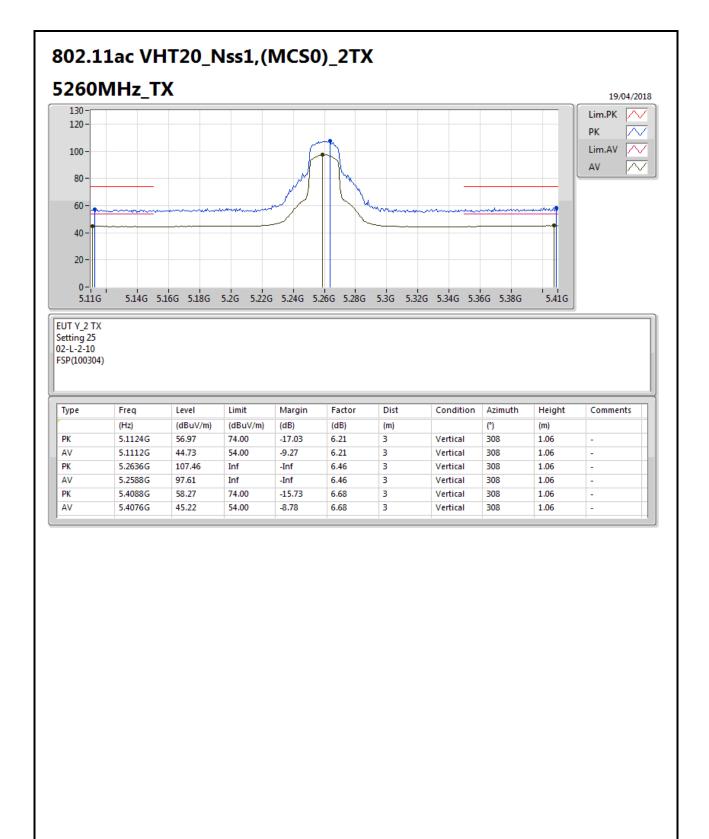
Report No. : FR7D1249-12





Page No. : 25 of 81 Report No. : FR7D1249-12

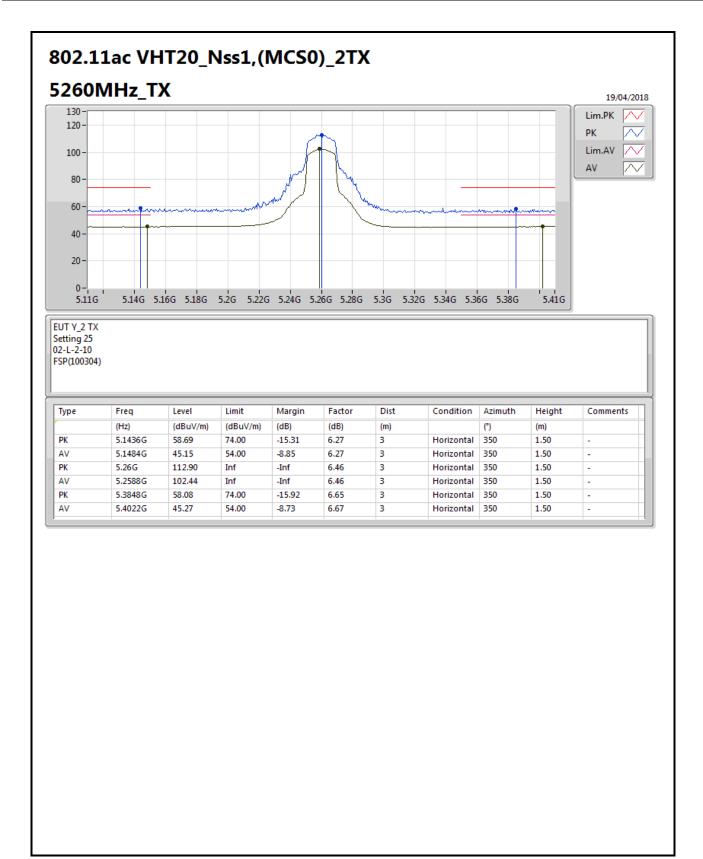




Page No. : 26 of 81

Report No. : FR7D1249-12

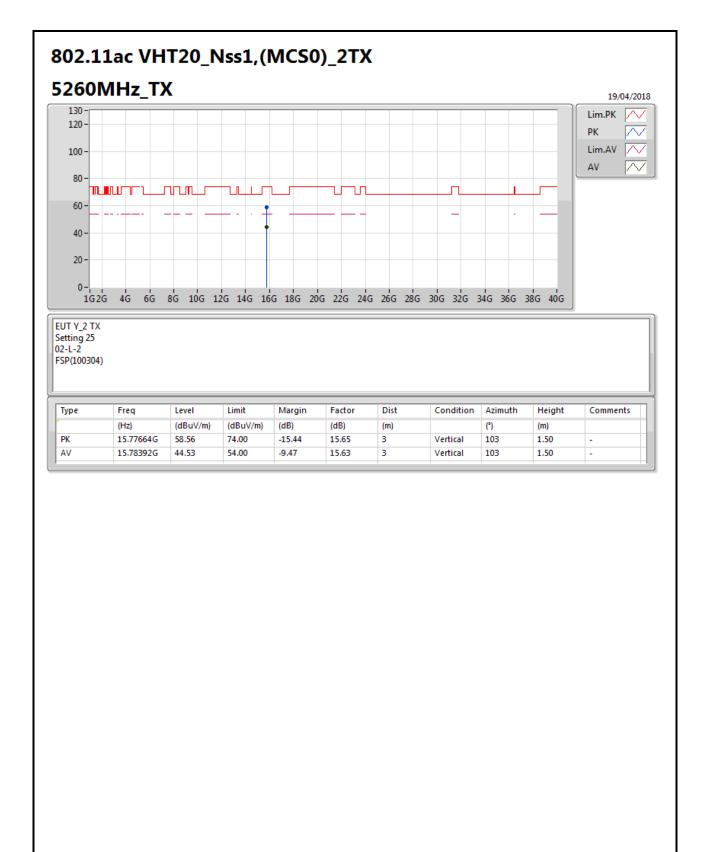




Page No. : 27 of 81

Report No. : FR7D1249-12

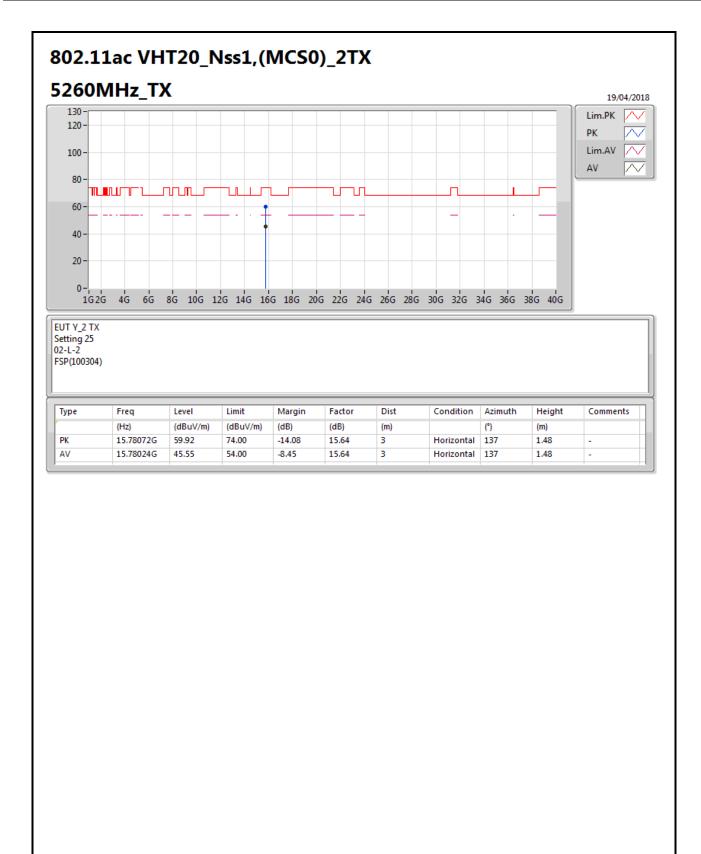




Page No. : 28 of 81

Report No. : FR7D1249-12

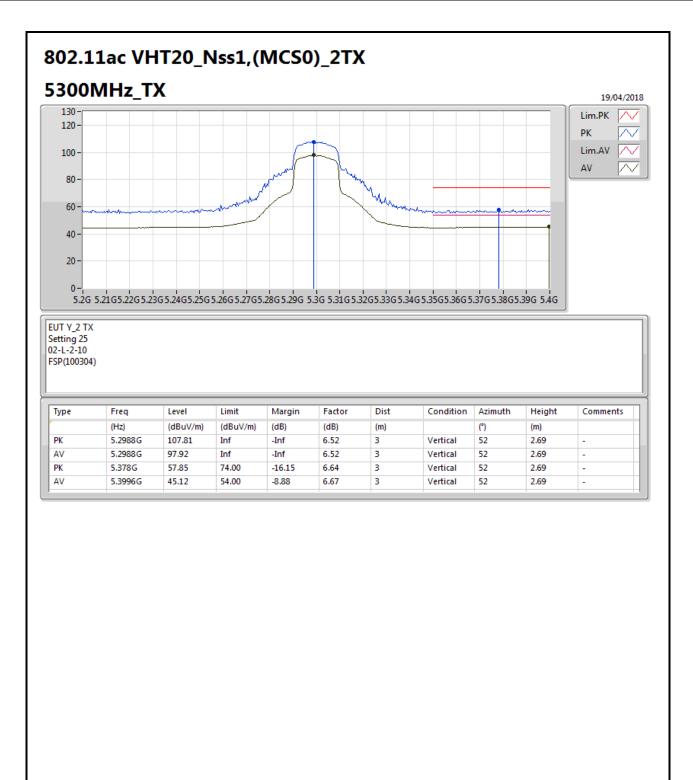




Page No. : 29 of 81

Report No. : FR7D1249-12

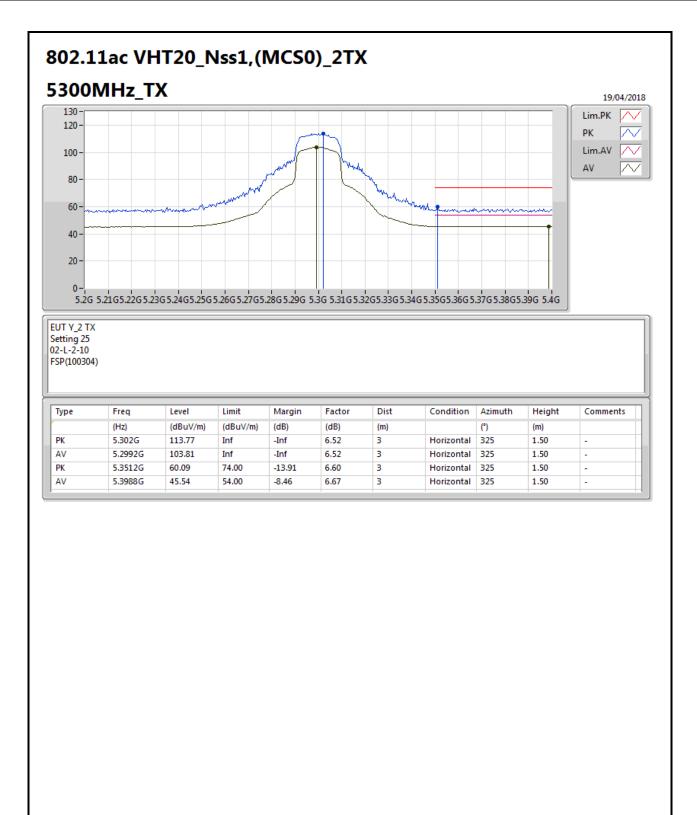




Page No. : 30 of 81

Report No. : FR7D1249-12

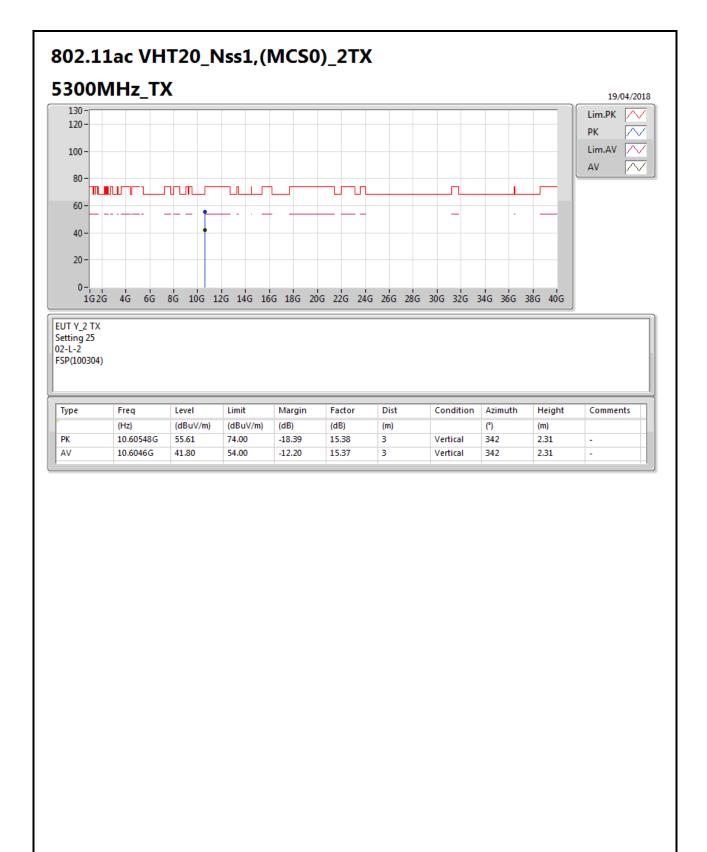




Page No. : 31 of 81

Report No. : FR7D1249-12

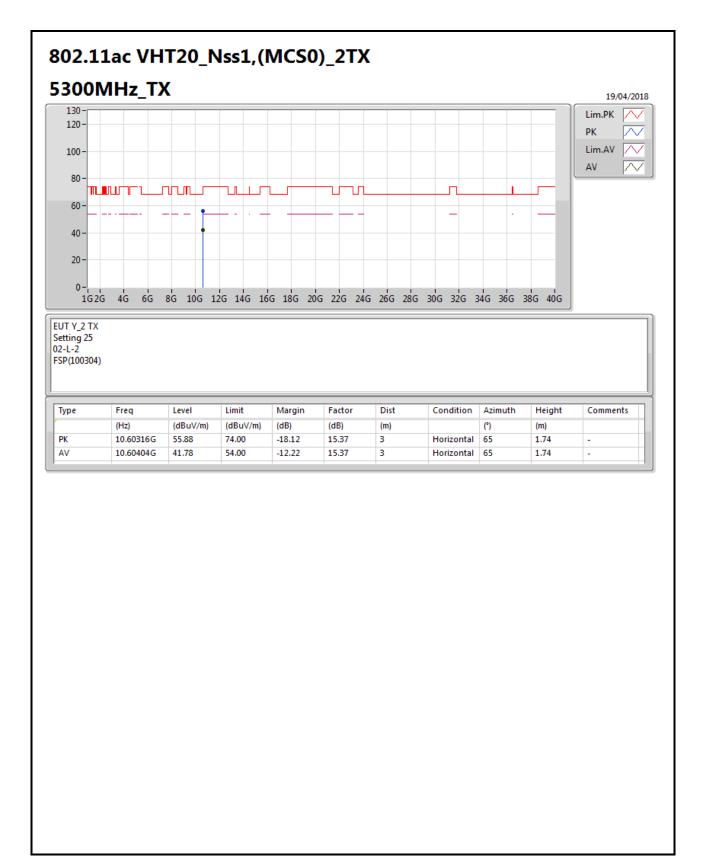




Page No. : 32 of 81

Report No. : FR7D1249-12

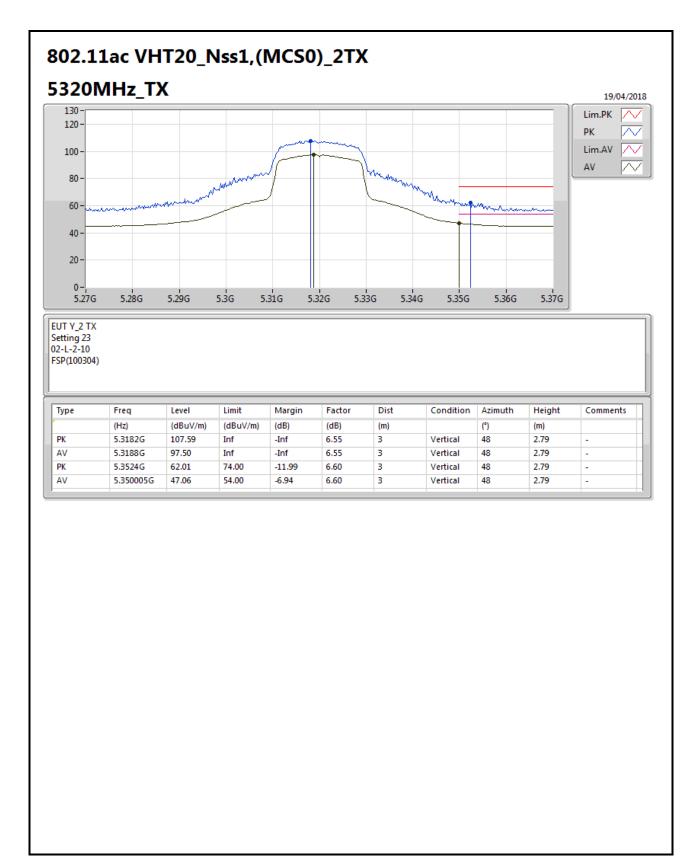




Page No. : 33 of 81

Report No. : FR7D1249-12

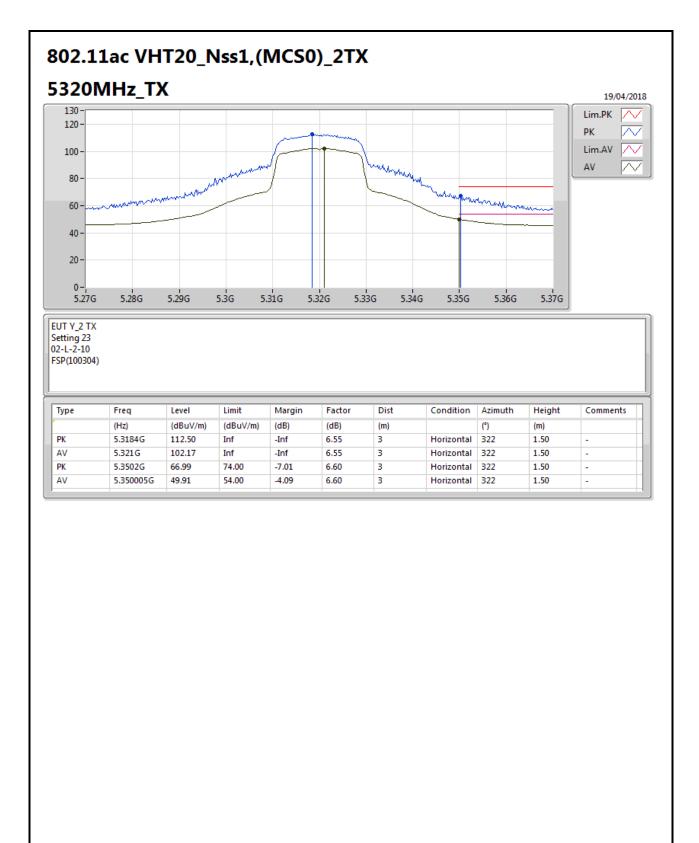




Page No. : 34 of 81

Report No. : FR7D1249-12

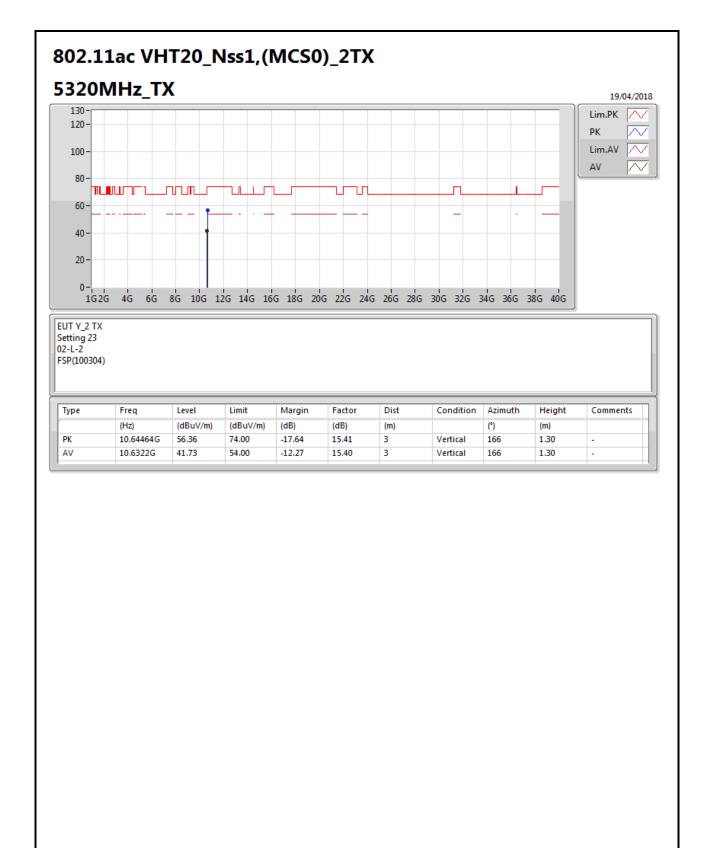




Page No. : 35 of 81

Report No. : FR7D1249-12

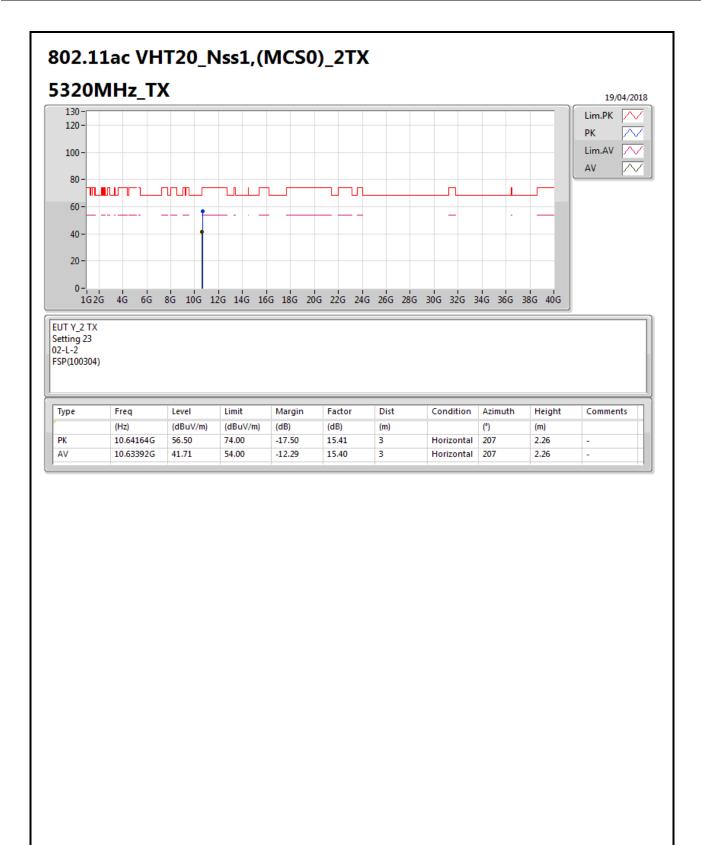




Page No. : 36 of 81

Report No. : FR7D1249-12

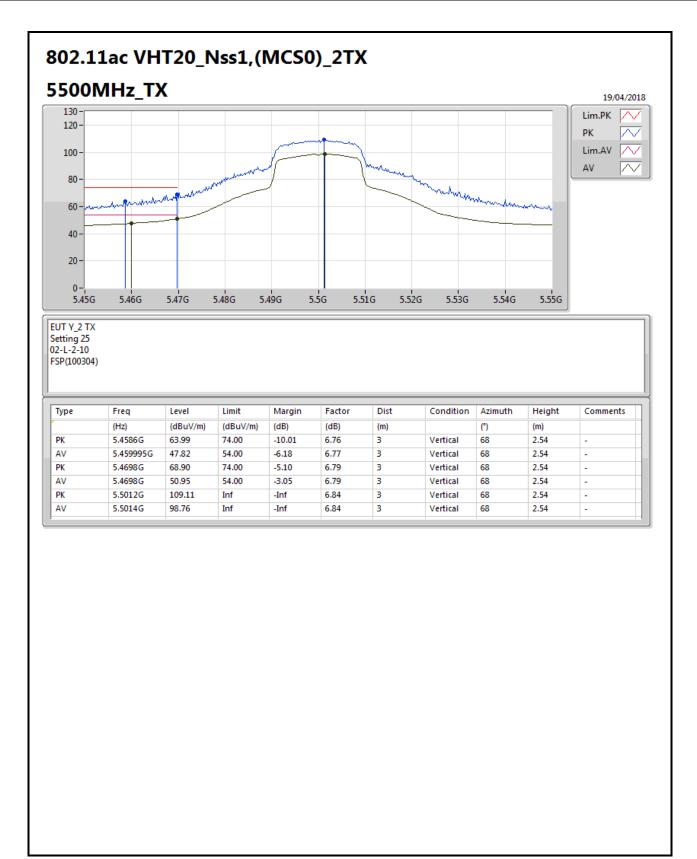




Page No. : 37 of 81

Report No. : FR7D1249-12

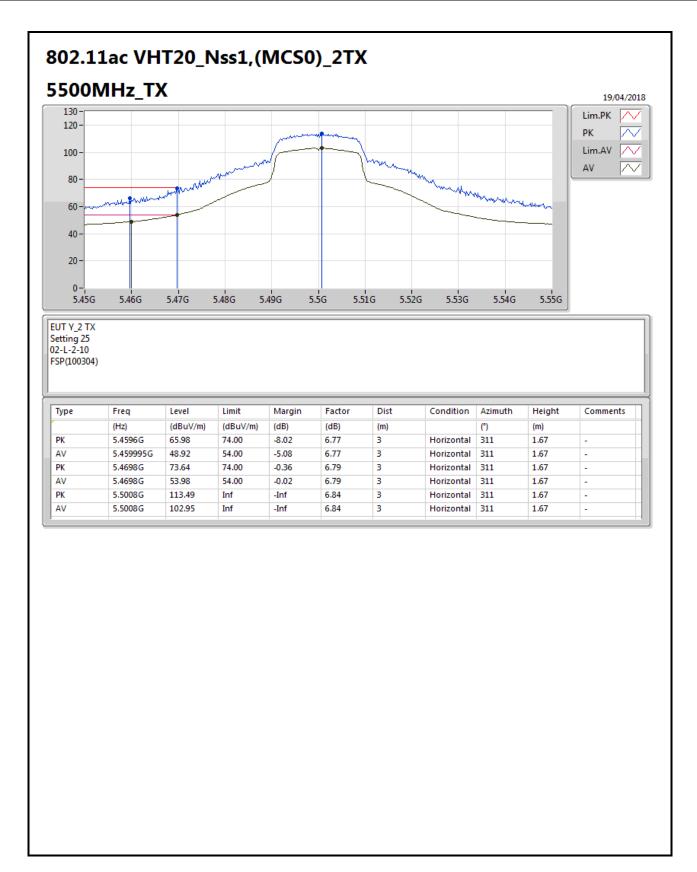




Page No. : 38 of 81

Report No. : FR7D1249-12

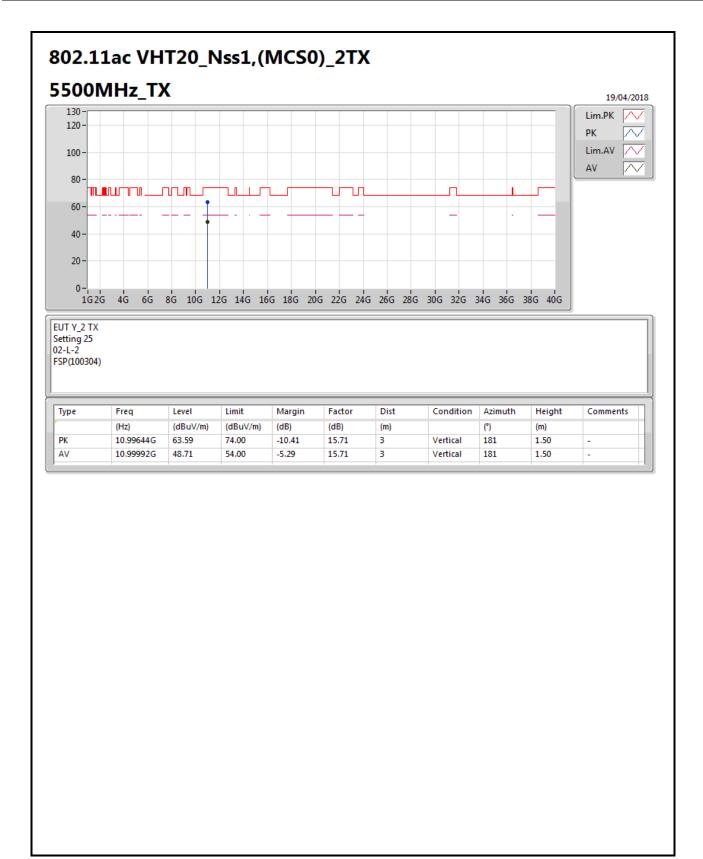




Page No. : 39 of 81

Report No. : FR7D1249-12

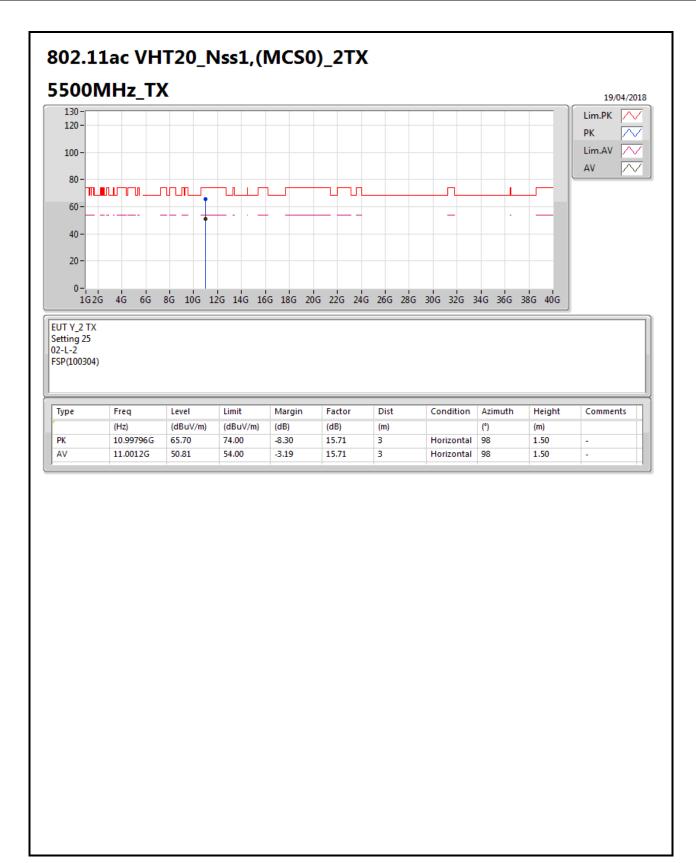




Page No. : 40 of 81

Report No. : FR7D1249-12

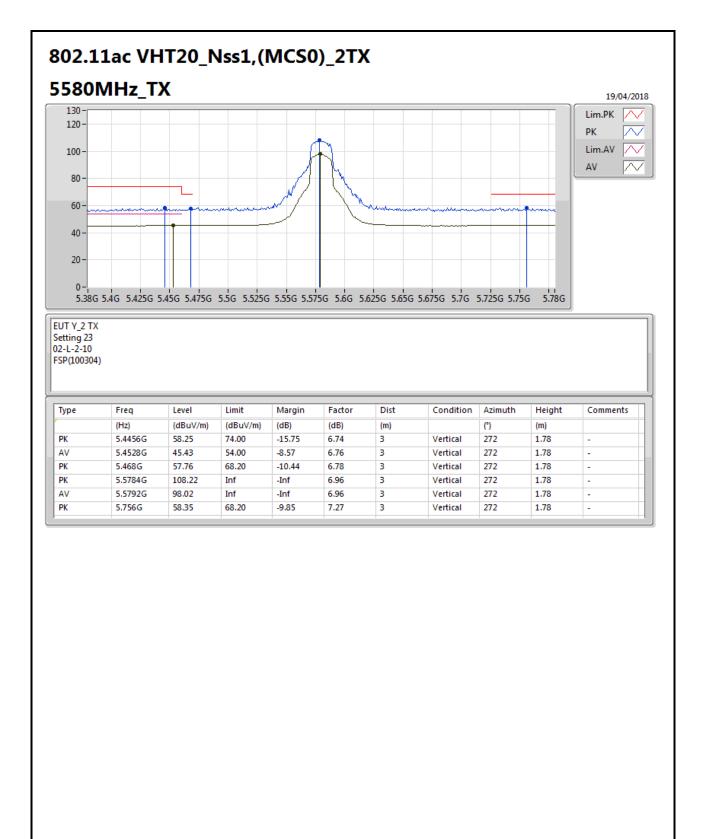




Page No. : 41 of 81

Report No. : FR7D1249-12

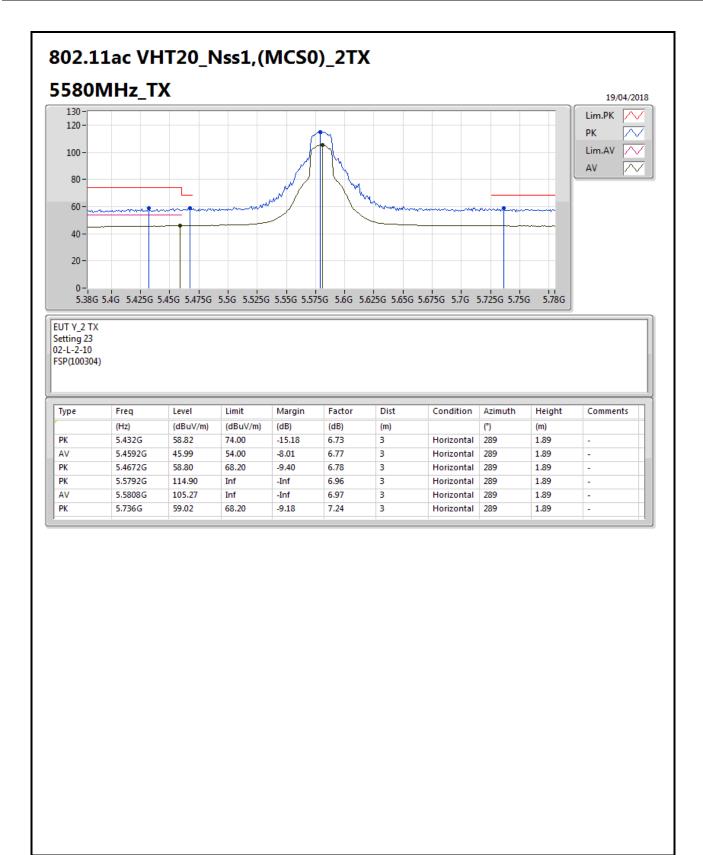




Page No. : 42 of 81

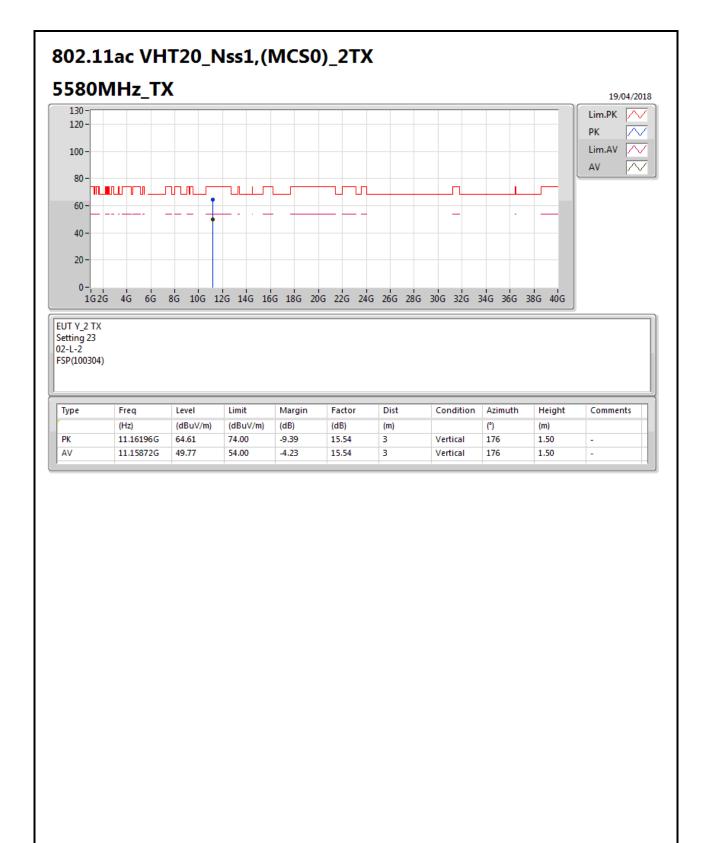
Report No. : FR7D1249-12





Page No. : 43 of 81 Report No. : FR7D1249-12

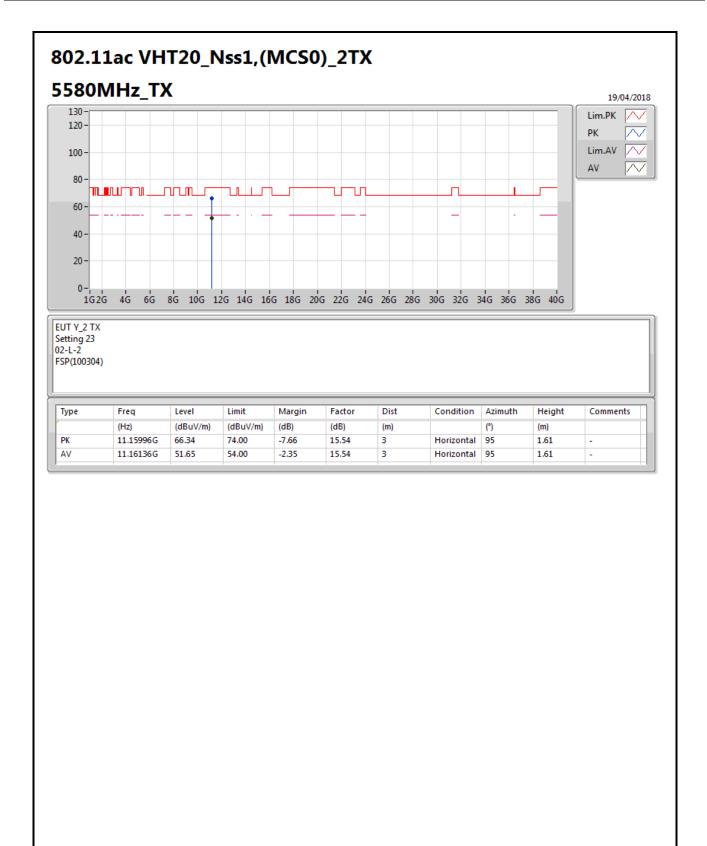




Page No. : 44 of 81

Report No. : FR7D1249-12

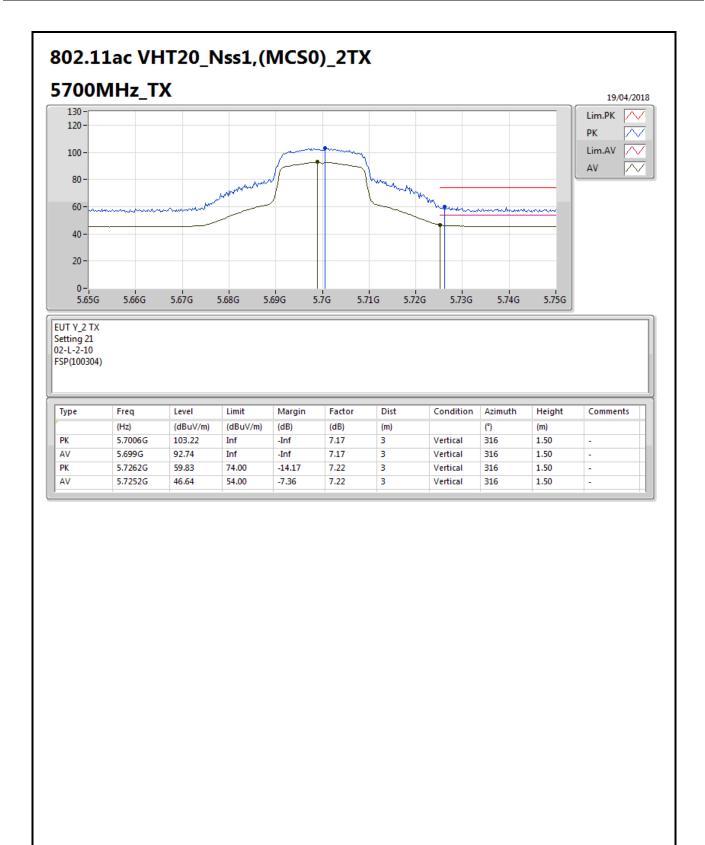




Page No. : 45 of 81

Report No. : FR7D1249-12

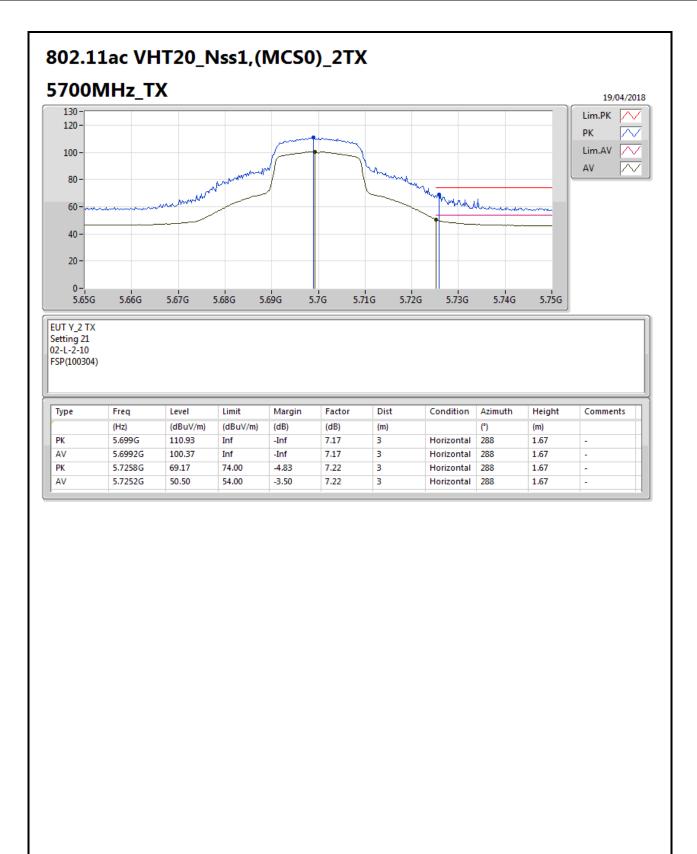




Page No. : 46 of 81

Report No. : FR7D1249-12

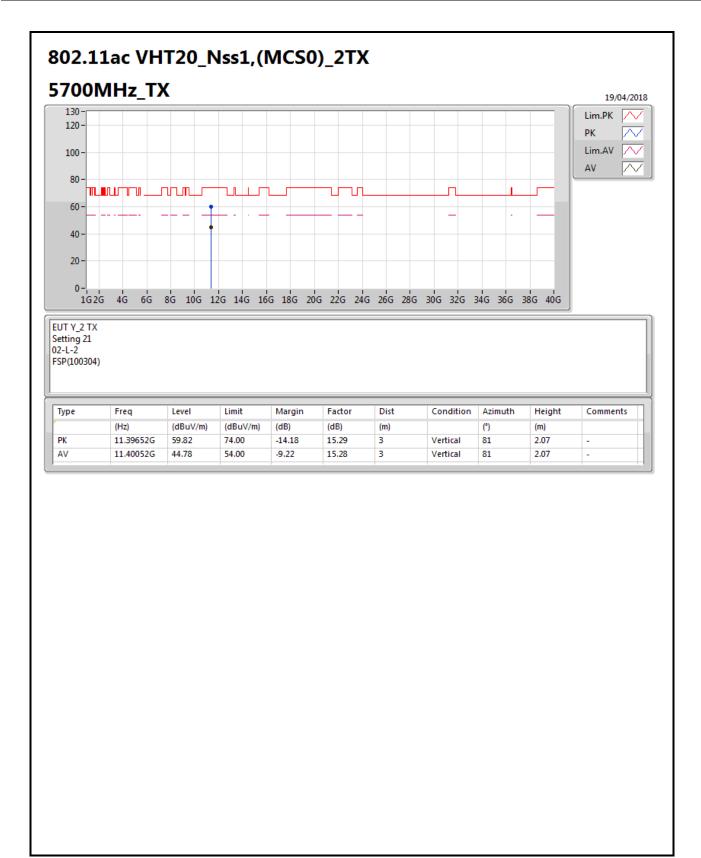




Page No. : 47 of 81

Report No. : FR7D1249-12

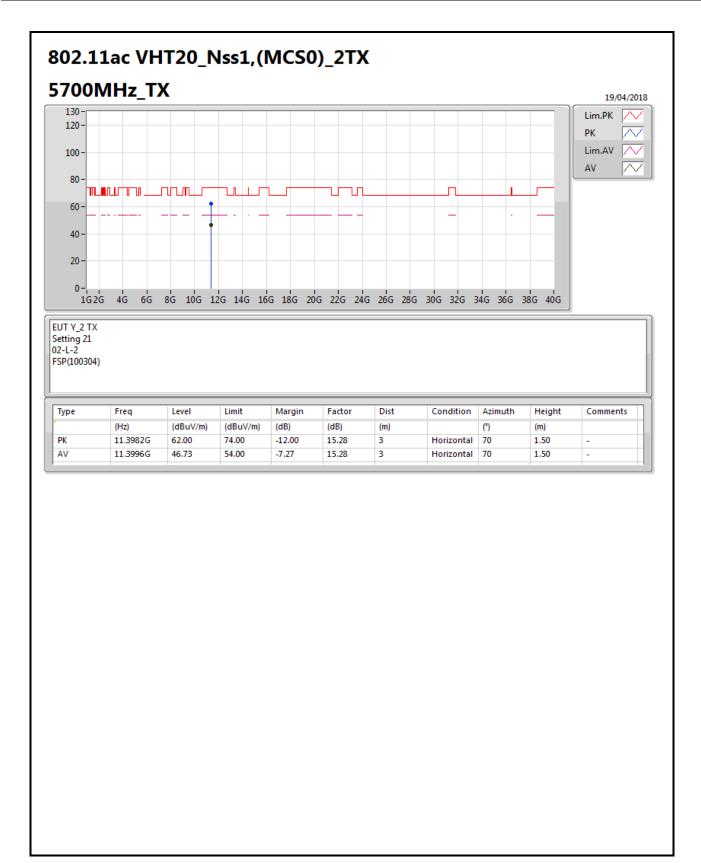




Page No. : 48 of 81

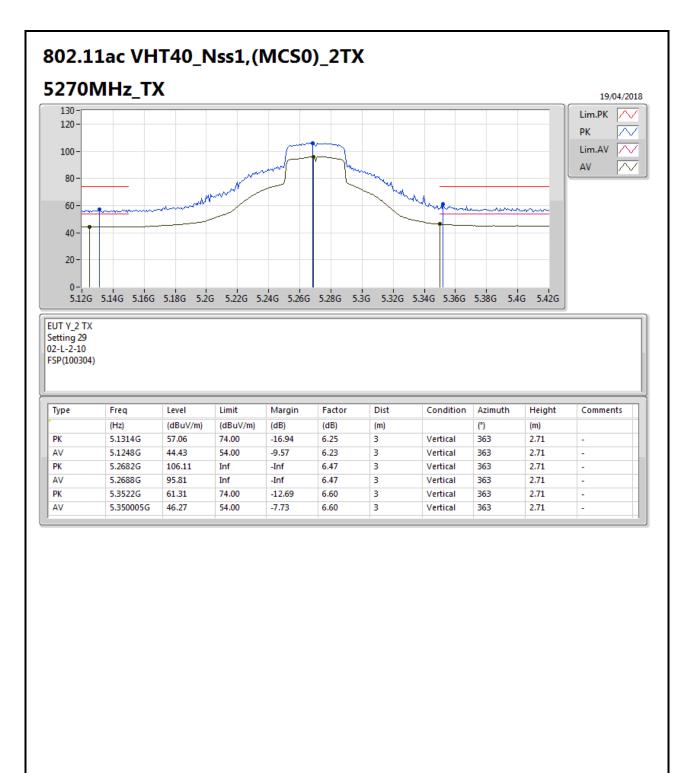
Report No. : FR7D1249-12





Page No. : 49 of 81 Report No. : FR7D1249-12

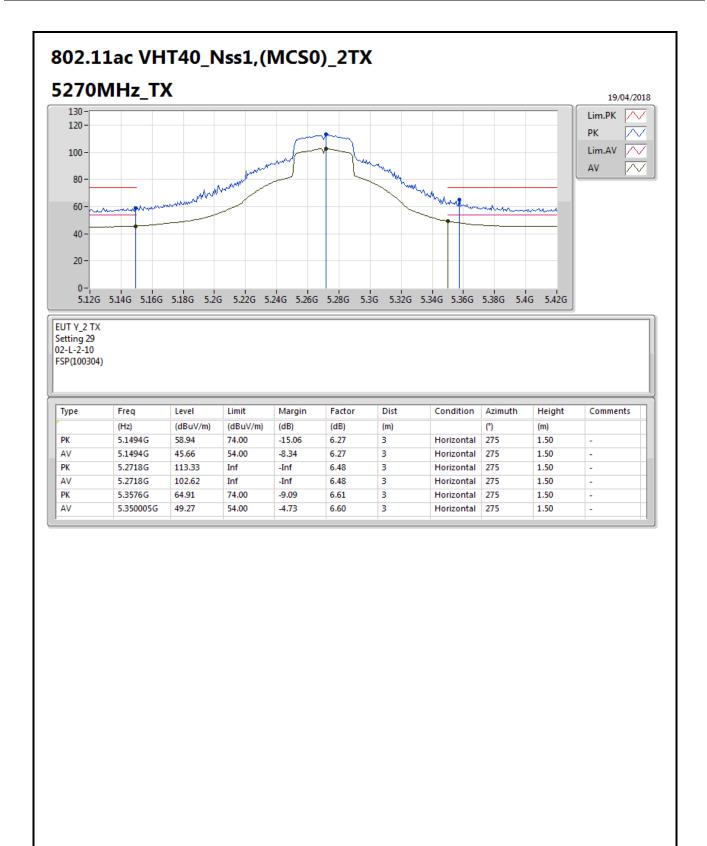




Page No. : 50 of 81

Report No. : FR7D1249-12

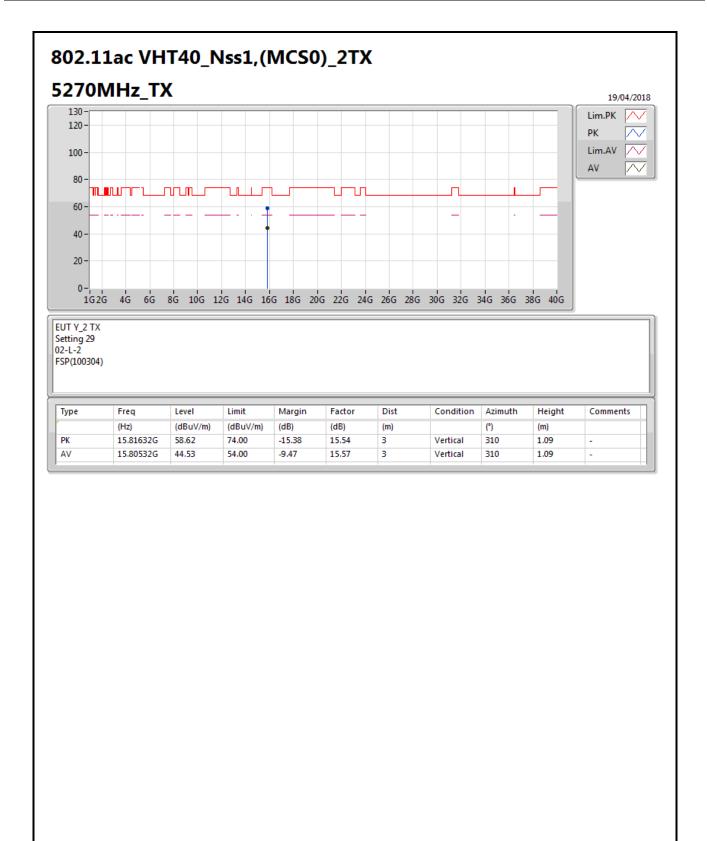




Page No. : 51 of 81

Report No. : FR7D1249-12

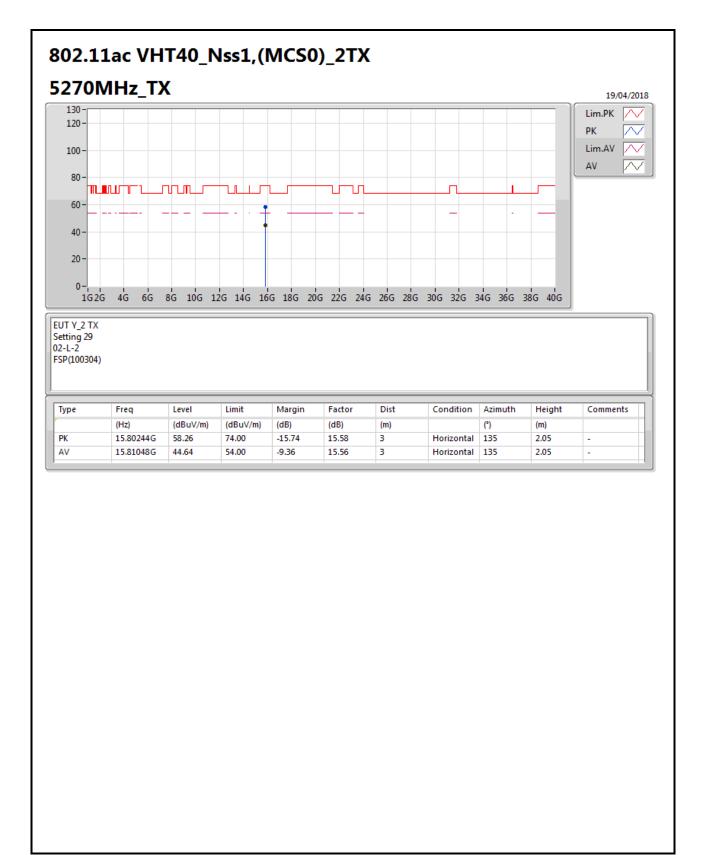




Page No. : 52 of 81

Report No. : FR7D1249-12

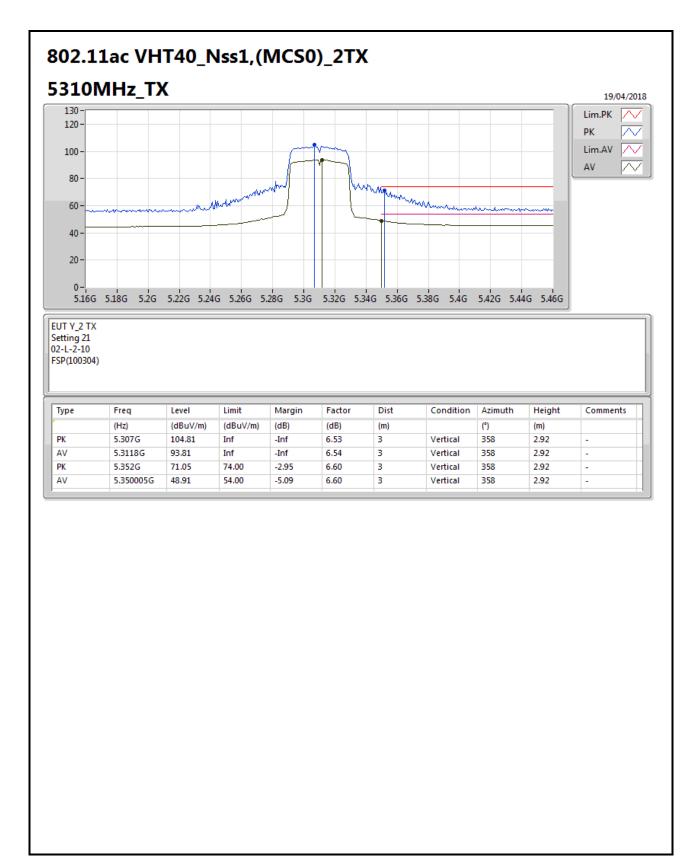




Page No. : 53 of 81

Report No. : FR7D1249-12

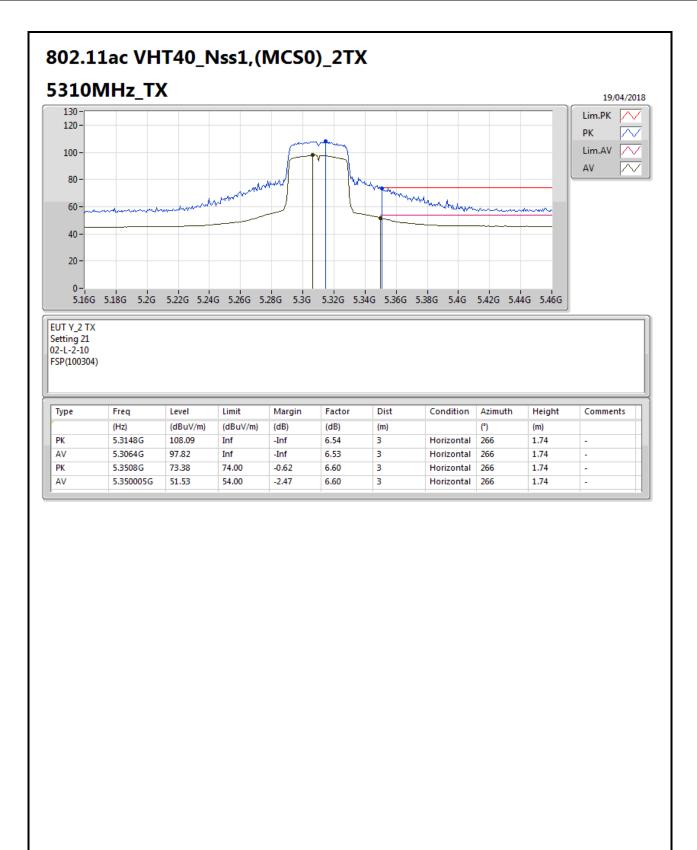




Page No. : 54 of 81

Report No. : FR7D1249-12

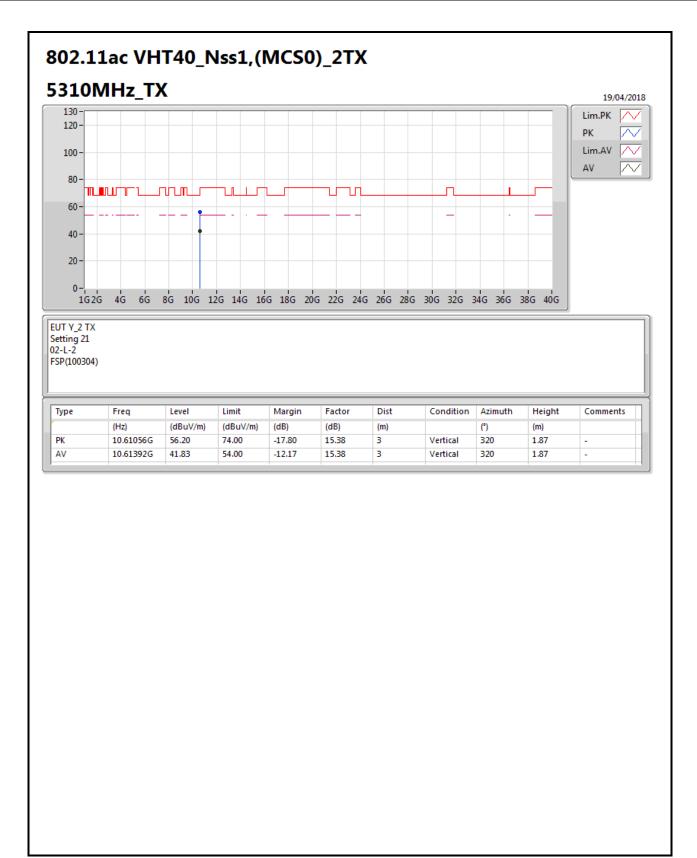




Page No. : 55 of 81

Report No. : FR7D1249-12

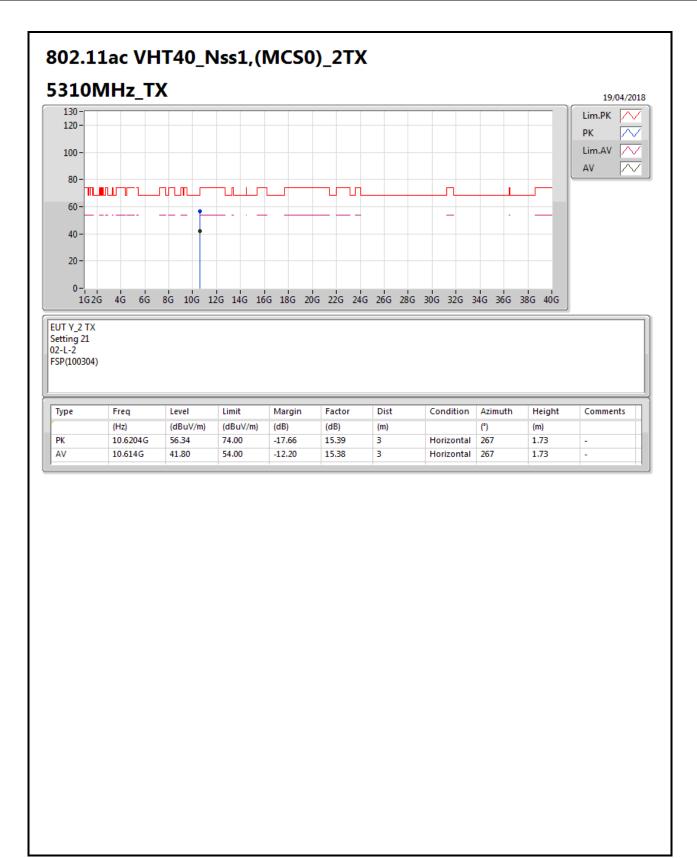




Page No. : 56 of 81

Report No. : FR7D1249-12

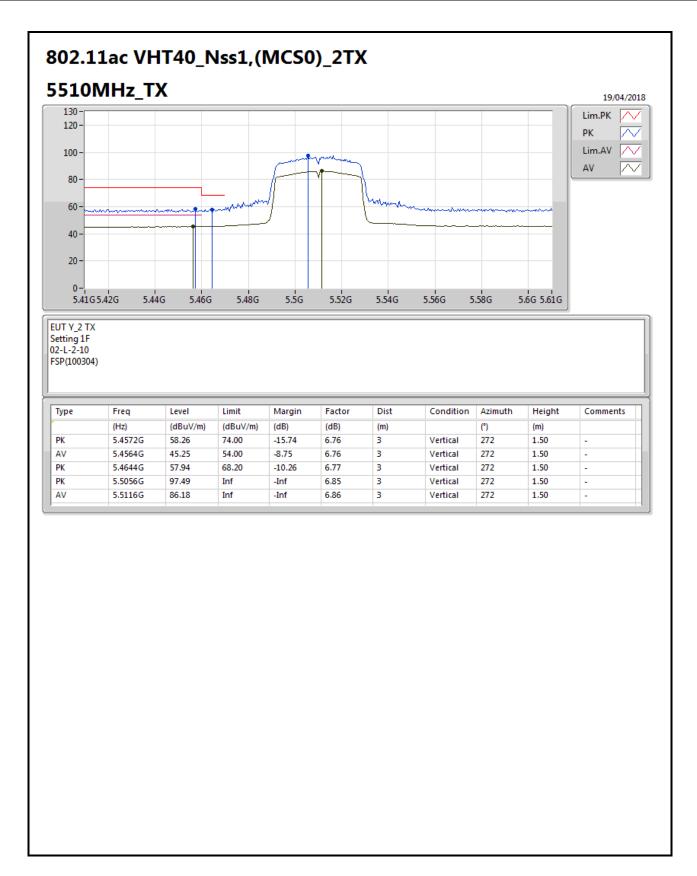




Page No. : 57 of 81

Report No. : FR7D1249-12

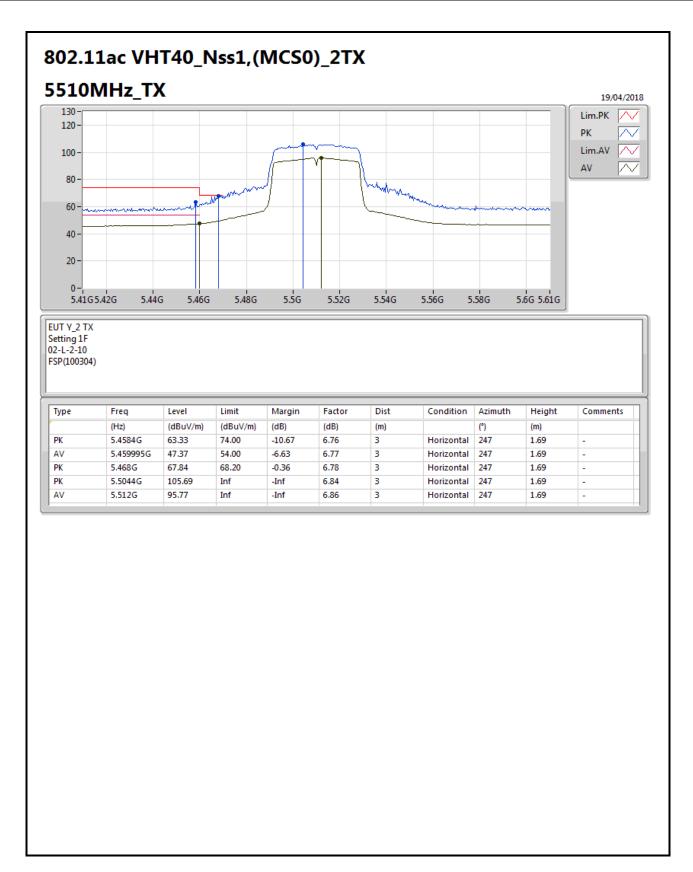




Page No. : 58 of 81

Report No. : FR7D1249-12

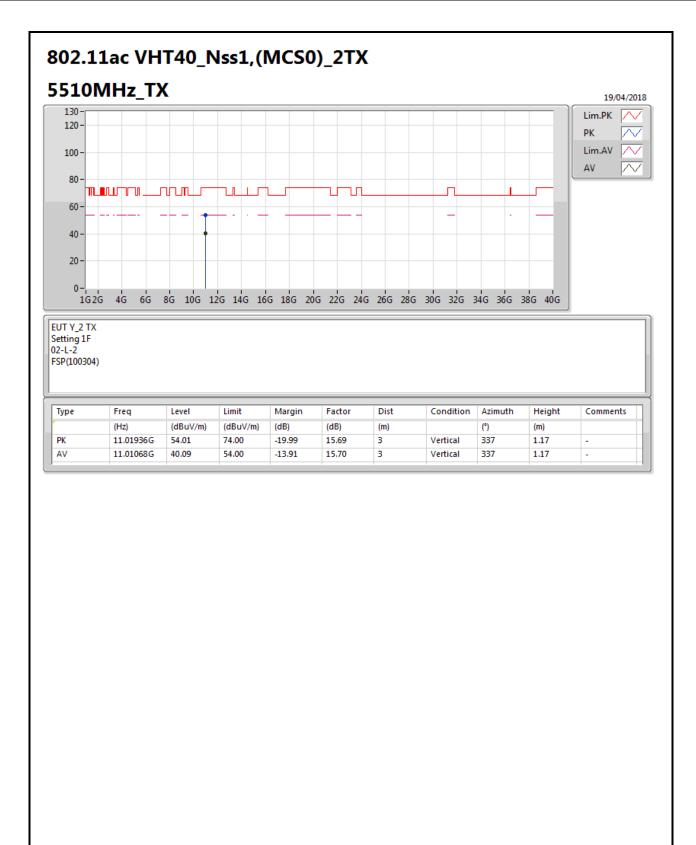




Page No. : 59 of 81

Report No. : FR7D1249-12

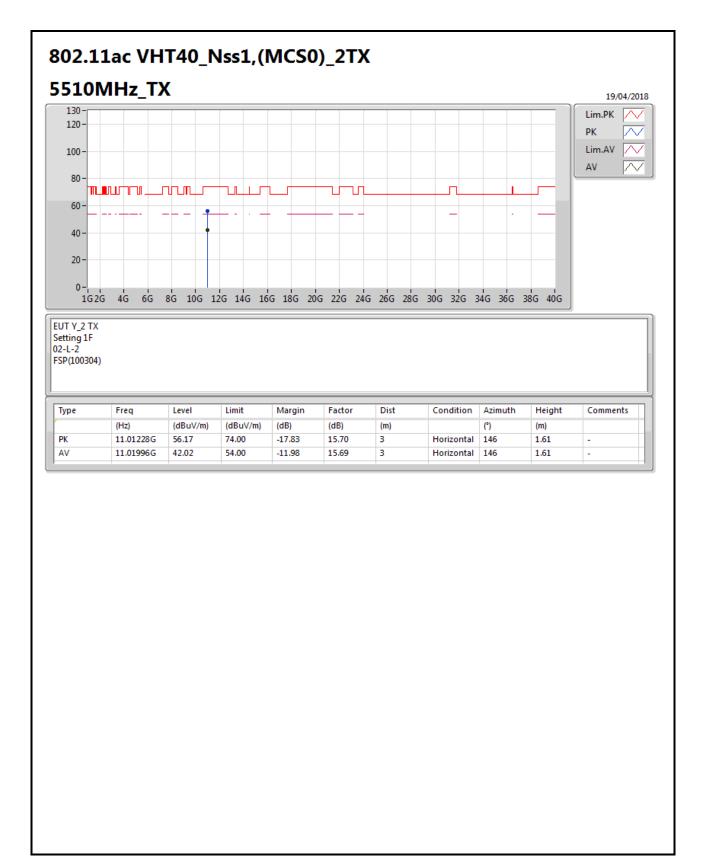




Page No. : 60 of 81

Report No. : FR7D1249-12

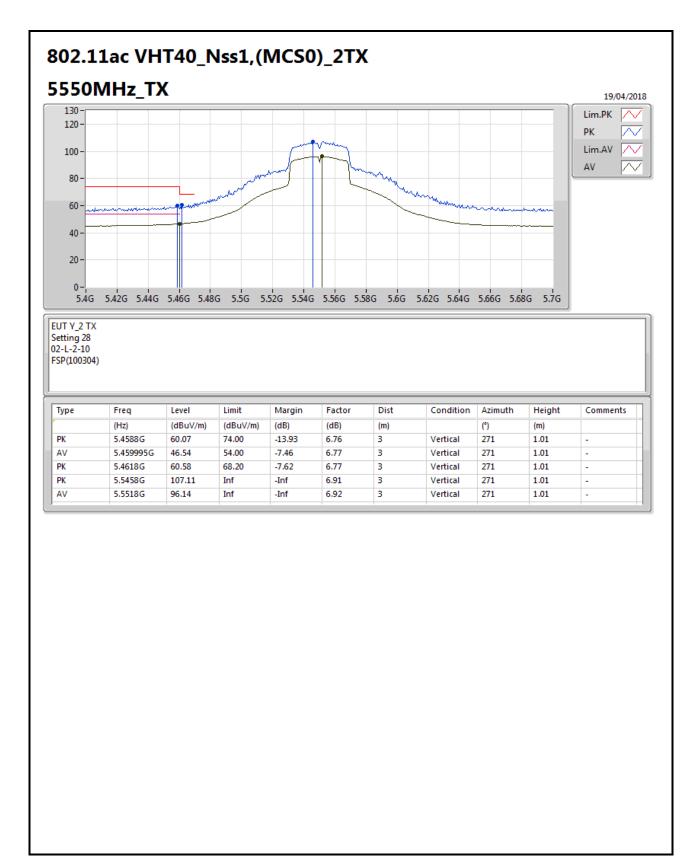




Page No. : 61 of 81

Report No. : FR7D1249-12

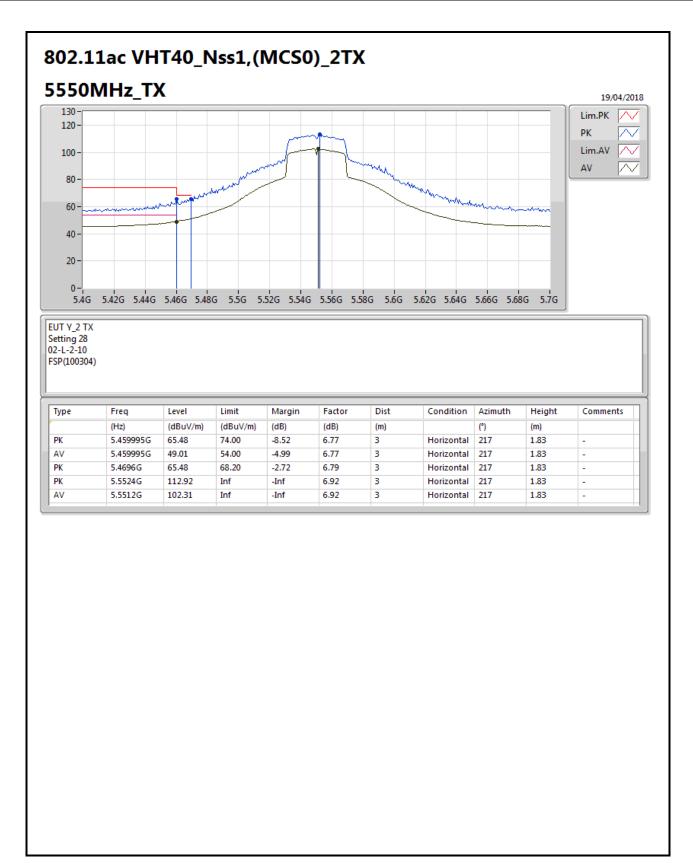




Page No. : 62 of 81

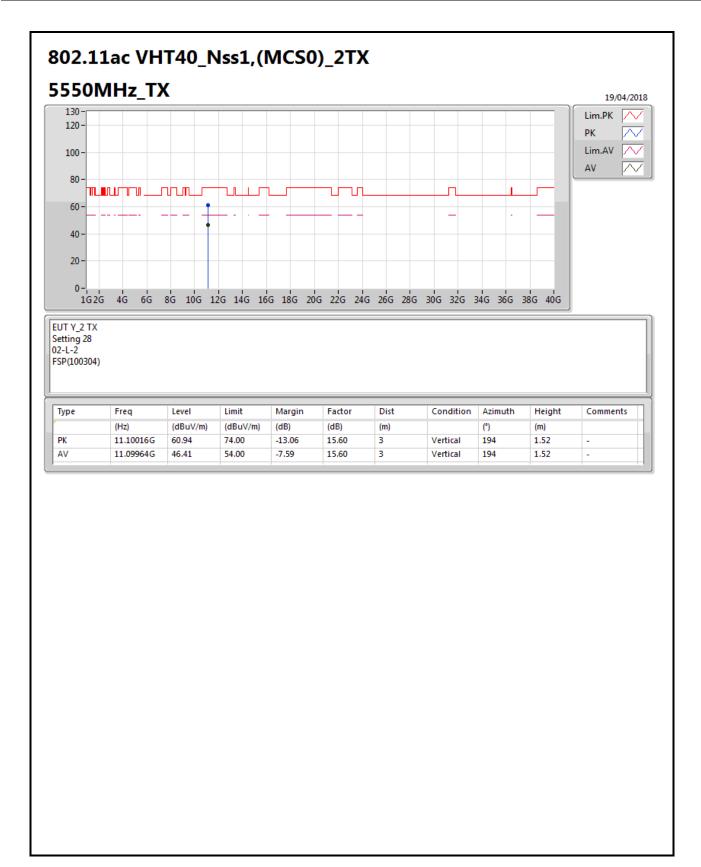
Report No. : FR7D1249-12





Page No. : 63 of 81 Report No. : FR7D1249-12

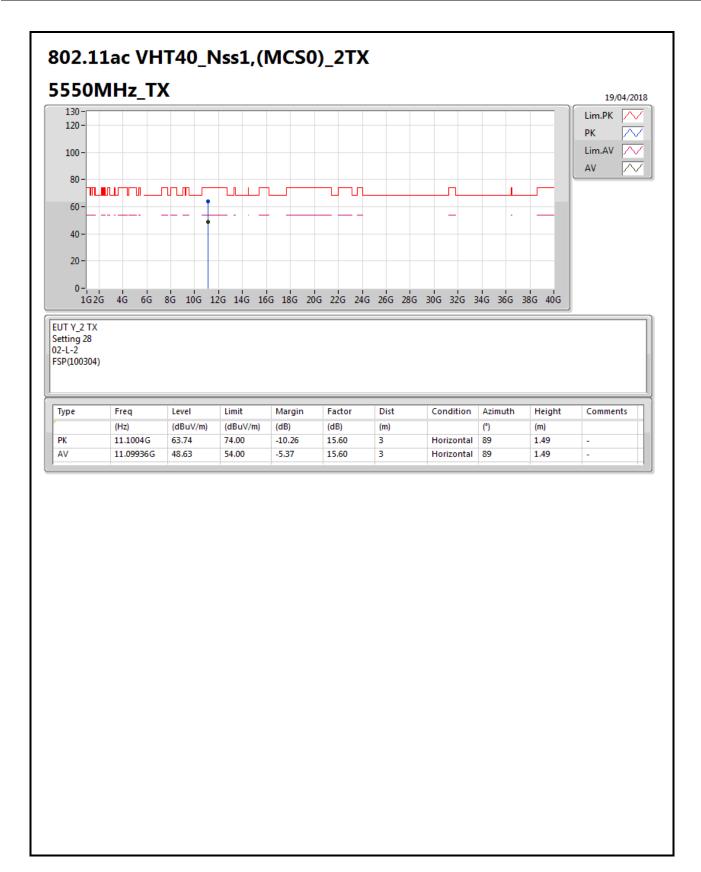




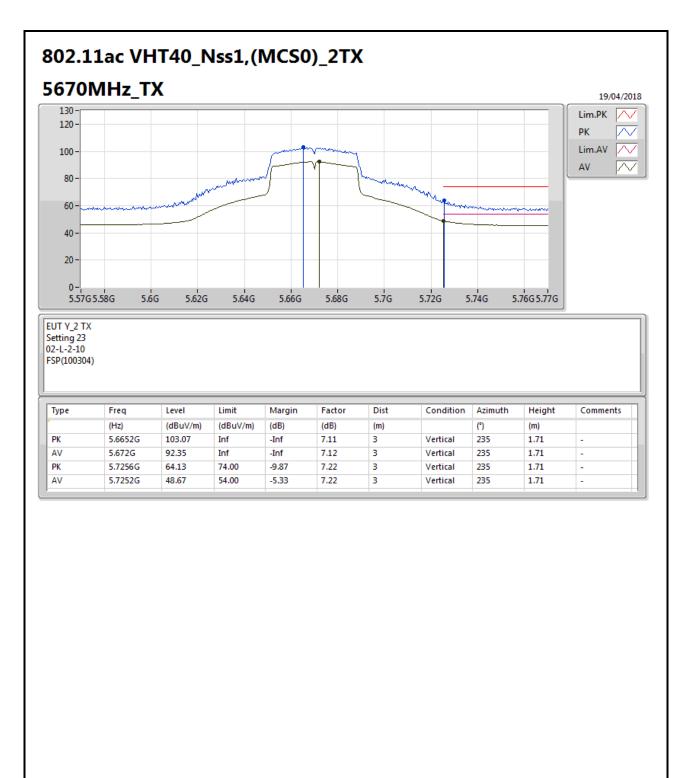
Page No. : 64 of 81

Report No. : FR7D1249-12





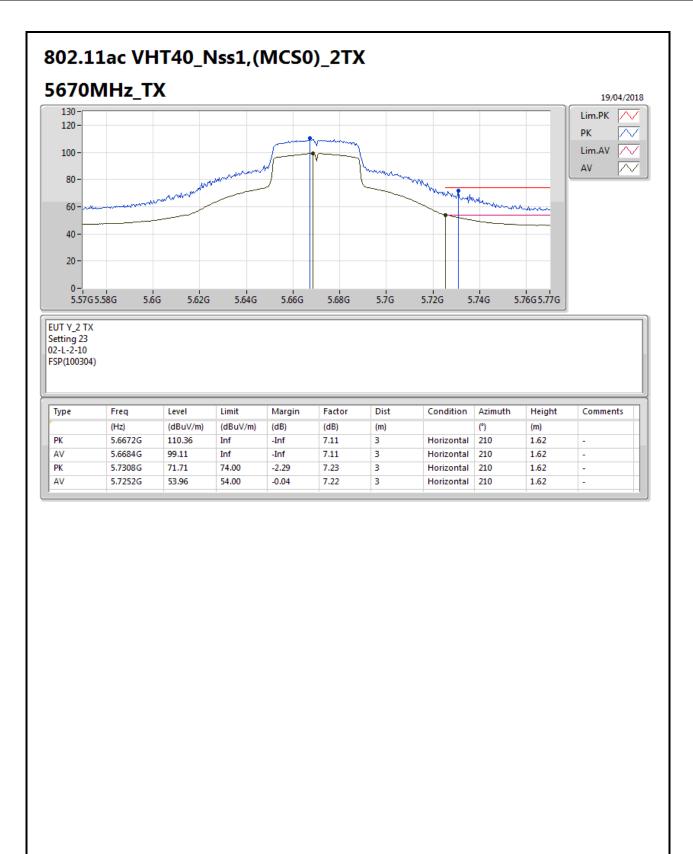




Page No. : 66 of 81

Report No. : FR7D1249-12

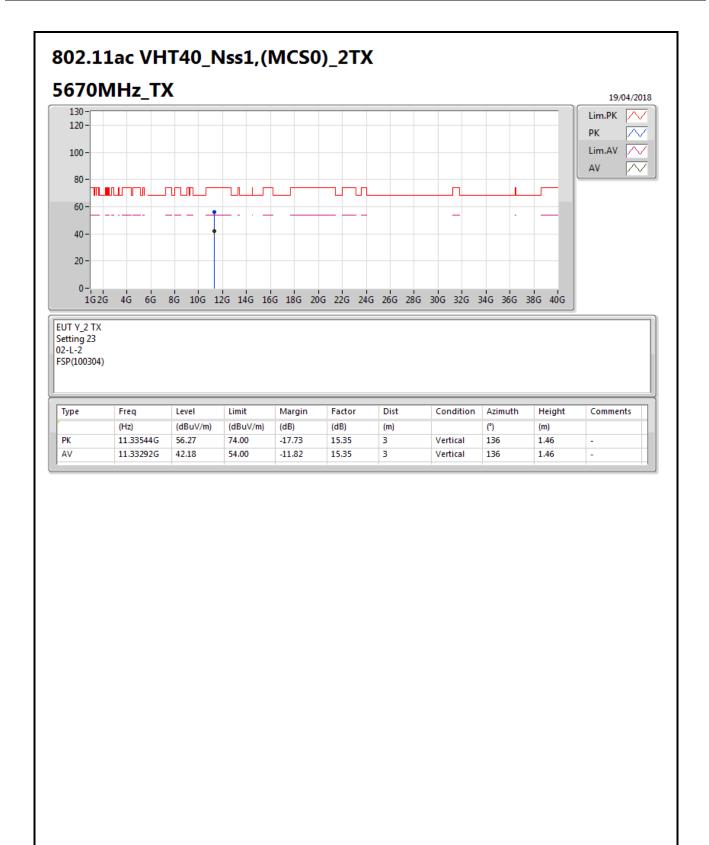




Page No. : 67 of 81

Report No. : FR7D1249-12

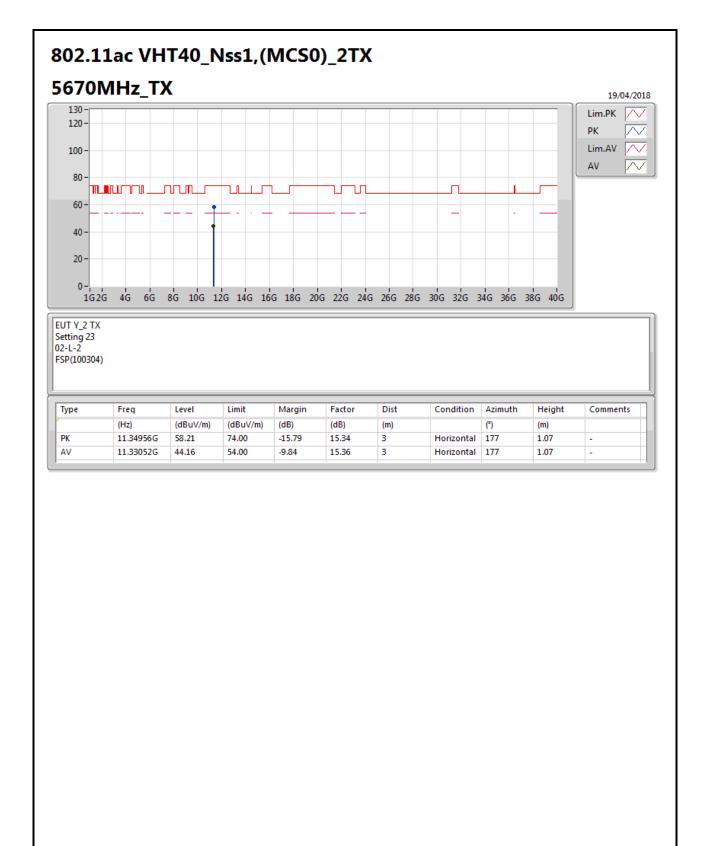




Page No. : 68 of 81

Report No. : FR7D1249-12

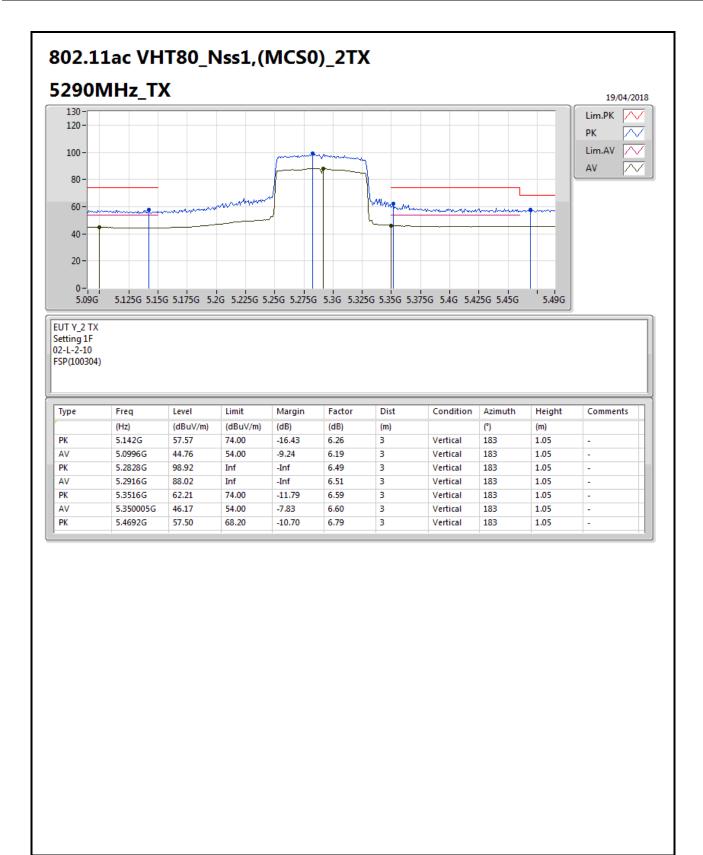




Page No. : 69 of 81

Report No. : FR7D1249-12

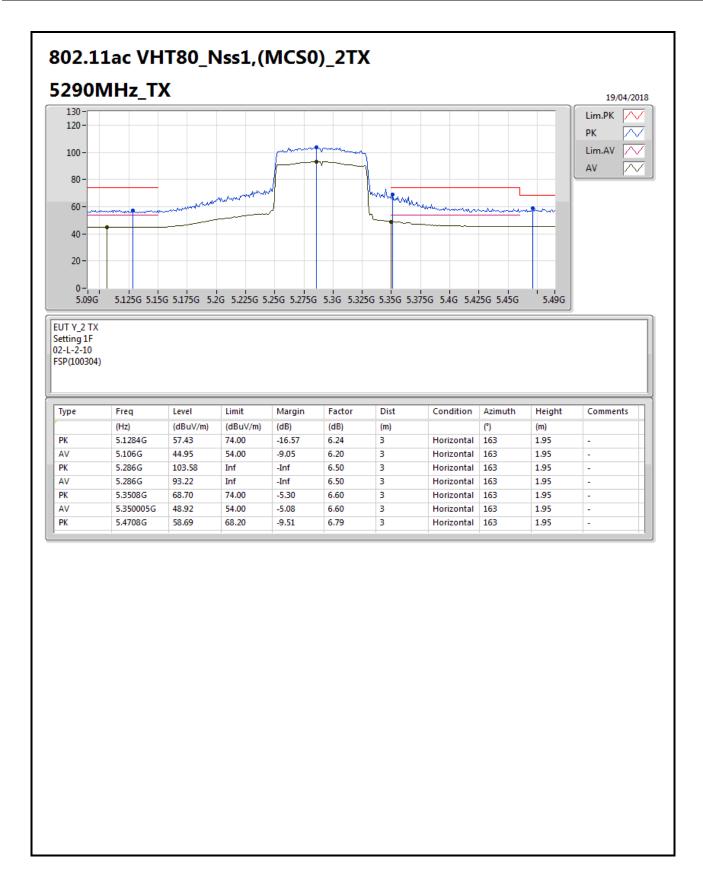




Page No. : 70 of 81

Report No. : FR7D1249-12

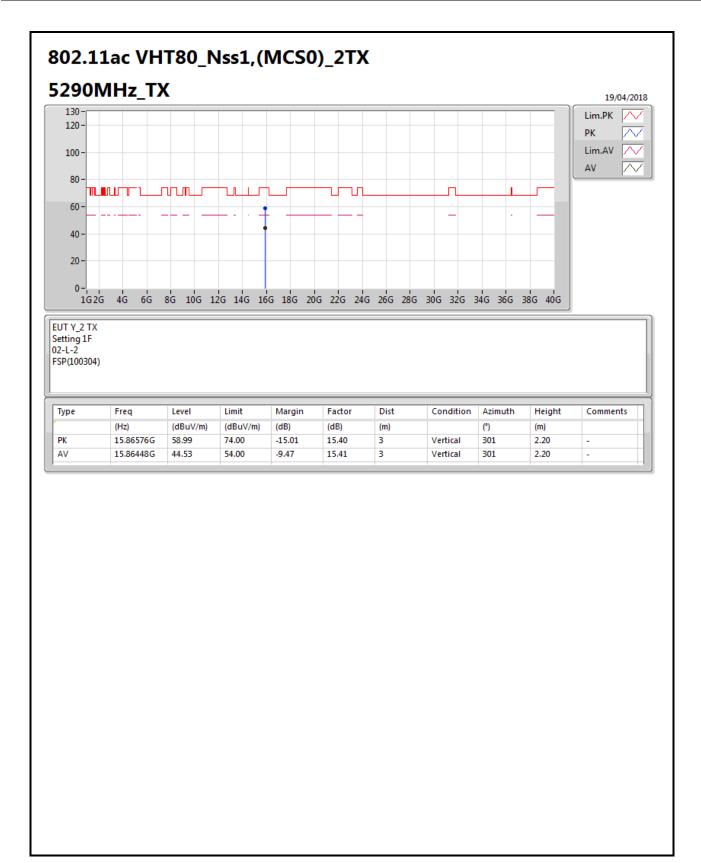




Page No. : 71 of 81

Report No. : FR7D1249-12

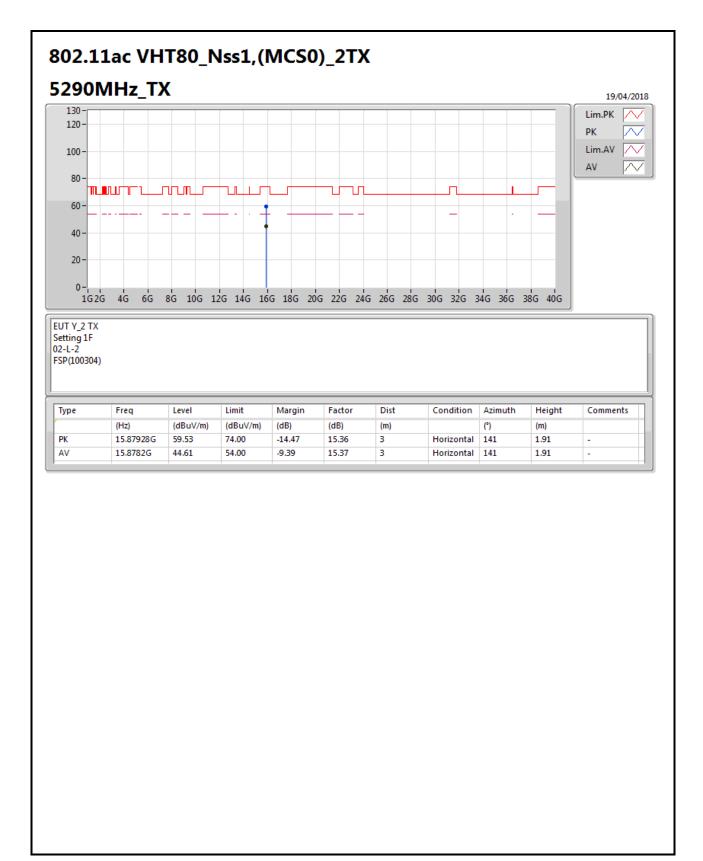




Page No. : 72 of 81

Report No. : FR7D1249-12

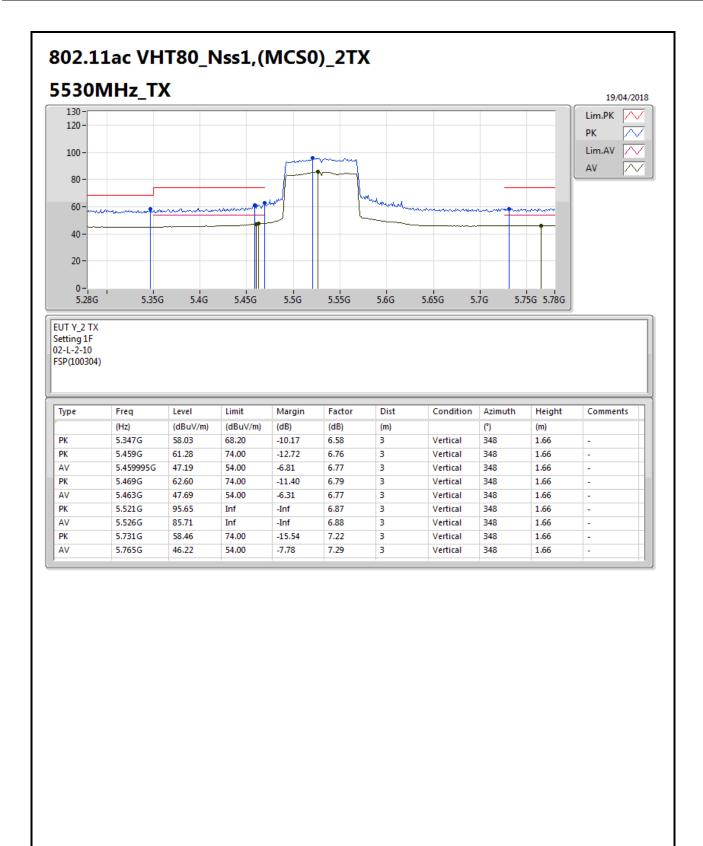




Page No. : 73 of 81

Report No. : FR7D1249-12

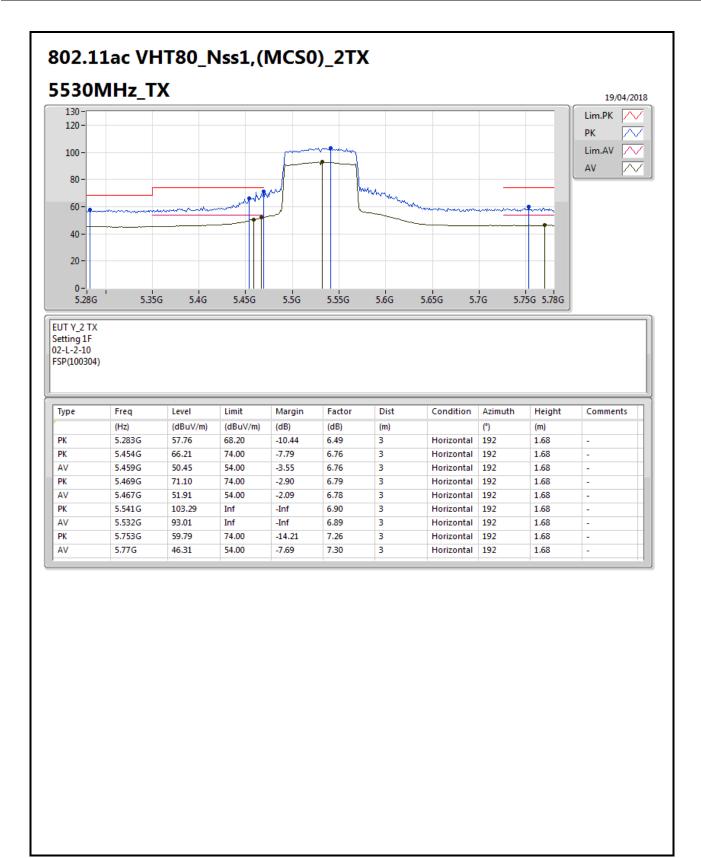




Page No. : 74 of 81

Report No. : FR7D1249-12

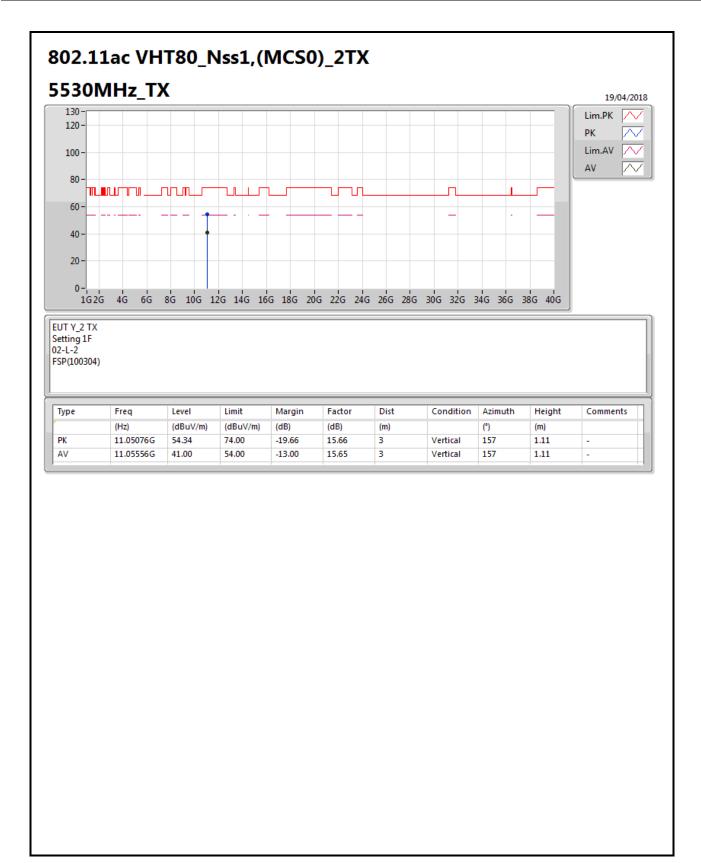




Page No. : 75 of 81

Report No. : FR7D1249-12

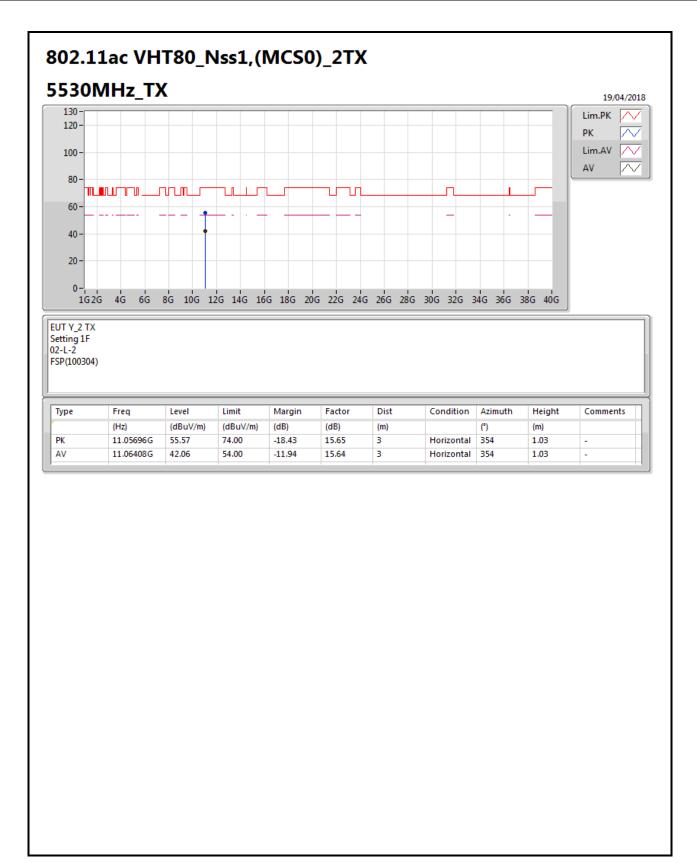




Page No. : 76 of 81

Report No. : FR7D1249-12

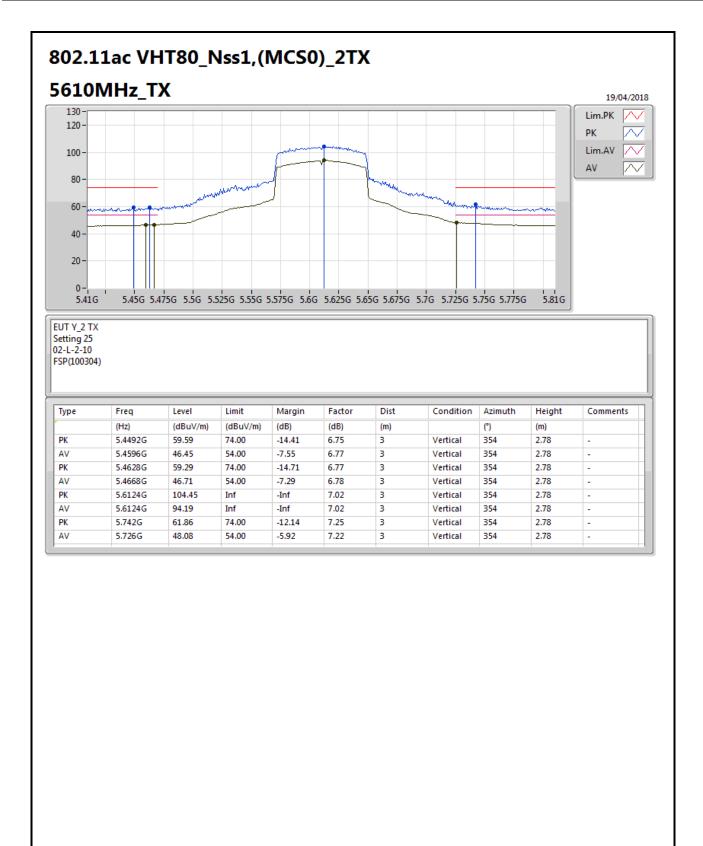




Page No. : 77 of 81

Report No. : FR7D1249-12

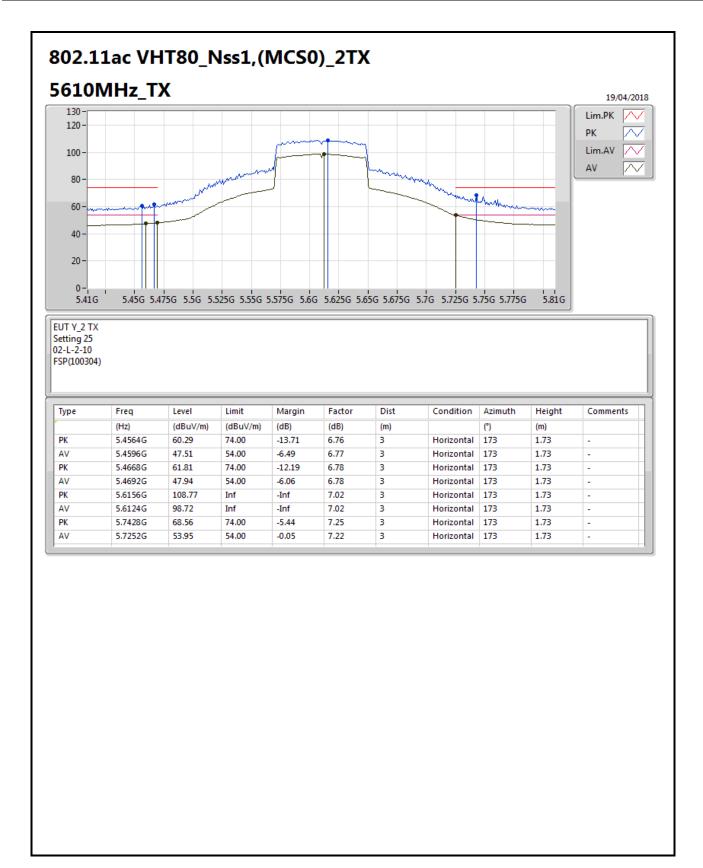




Page No. : 78 of 81

Report No. : FR7D1249-12

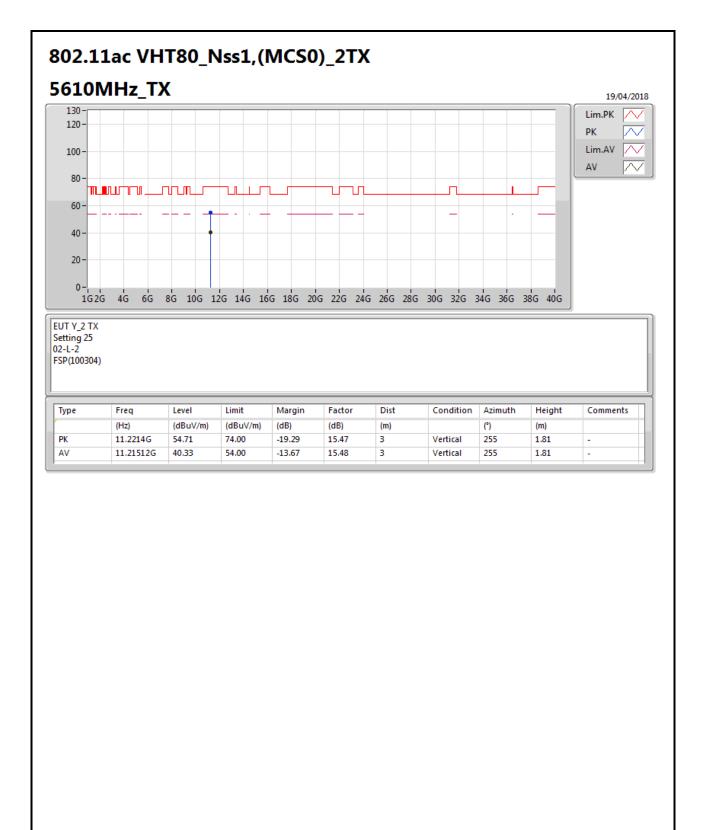




Page No. : 79 of 81

Report No. : FR7D1249-12

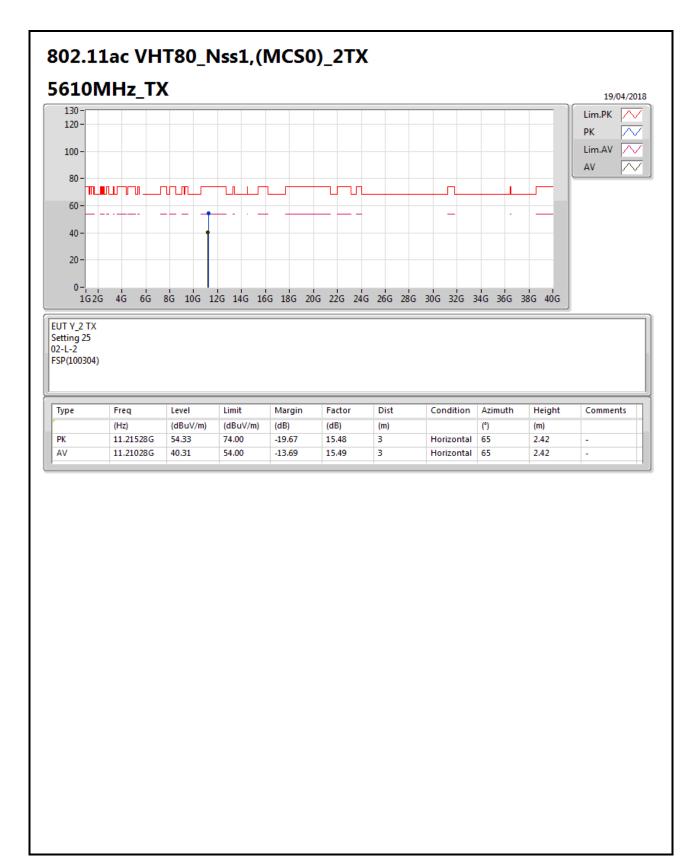




Page No. : 80 of 81

Report No. : FR7D1249-12





Page No. : 81 of 81

Report No. : FR7D1249-12