



FCC Test Report

Equipment : Wireless 802.11 ac/a/b/g/n Access Point
Brand Name : Senao Networks
Model No. : CAP7252AG, CAP7253AG
FCC ID : U2M-CAP7252AG
Standard : 47 CFR FCC Part 15.407
Operating Band : 5150 MHz – 5250 MHz
FCC Classification : NII
Applicant : Senao Networks, Inc.
3F, No. 529, Chung Cheng Rd., Hsintien, Taipei, Taiwan,
R.O.C

The product sample received on Apr. 16, 2014 and completely tested on Aug. 27, 2014. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



James Fan / Assistant Manager





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Summary of Test Result

| Conformance Test Specifications | | | | | |
|---------------------------------|------------------|--|---|---|----------|
| Report Clause | Ref. Std. Clause | Description | Measured | Limit | Result |
| 1.1.3 | 15.203 | Antenna Requirement | Antenna connector mechanism complied | FCC 15.203 | Complied |
| 3.1 | 15.207 | AC Power-line Conducted Emissions | [dBuV]: 0.374MHz 46.93 (Margin 1.47dB) - AV 52.37 (Margin 6.03dB) - QP | FCC 15.207 | Complied |
| 3.2 | 15.407(a) | Emission Bandwidth | Bandwidth [MHz] 20M: 31.01 / 40M: 48.23 80M: 93.22 | Information only | Complied |
| 3.3 | 15.407(a) | RF Output Power (Maximum Conducted (Average) Output Power) | Power [dBm] 5150-5250MHz: 28.15 | Power [dBm] 5150-5250MHz: 30 | Complied |
| 3.4 | 15.407(a) | Peak Power Spectral Density | PPSD [dBm/MHz] 5150-5250MHz: 15.76 | PPSD [dBm/MHz] 5150-5250MHz: 17 | Complied |
| 3.5 | 15.407(b) | Transmitter Unwanted Emissions and Band Edge | Restricted Bands [dBuV/m at 3m]: 5150.00MHz 73.00 (Margin 1.00dB) - PK | Non-Restricted Bands: \leq -27dBm (68.3dBuV/m@3m) Restricted Bands: FCC 15.209 | Complied |
| 3.6 | 15.407(g) | Frequency Stability | 7.0481 ppm | Signal shall remain in-band | Complied |



Revision History



1 General Description

1.1 Information

1.1.1 Feature of Equipment under Test

The following models are provided to this EUT.

| Brand Name | Model Name | Product Name | Description |
|----------------|------------|---|-------------------------|
| Senao Networks | CAP7252AG | Wireless 802.11 ac/a/b/g/n Access Point | Internal PIFA antenna |
| | CAP7253AG | | External Dipole antenna |

1.1.2 RF General Information

| RF General Information | | | | | | |
|-------------------------|------------------|-----------------|----------------|------------------------------------|-----------------------|-------------|
| Frequency Range (MHz) | IEEE Std. 802.11 | Ch. Freq. (MHz) | Channel Number | Transmit Chains (N _{TX}) | RF Output Power (dBm) | Co-location |
| Internal antenna | | | | | | |
| 5150-5250 | a | 5180-5240 | 36-48 [4] | 2 | 27.14 | Yes |
| 5150-5250 | n(HT20) | 5180-5240 | 36-48 [4] | 2 | 27.51 | Yes |
| 5150-5250 | n(HT40) | 5190-5230 | 38-46 [2] | 2 | 23.67 | Yes |
| 5150-5250 | ac(VHT20) | 5180-5240 | 36-48 [4] | 2 | 27.58 | Yes |
| 5150-5250 | ac(VHT40) | 5190-5230 | 38-46 [2] | 2 | 23.79 | Yes |
| 5150-5250 | ac(VHT80) | 5210 | 42 [1] | 2 | 14.30 | Yes |
| External antenna | | | | | | |
| 5150-5250 | a | 5180-5240 | 36-48 [4] | 2 | 28.15 | Yes |
| 5150-5250 | n(HT20) | 5180-5240 | 36-48 [4] | 2 | 27.68 | Yes |
| 5150-5250 | n(HT40) | 5190-5230 | 38-46 [2] | 2 | 25.10 | Yes |
| 5150-5250 | ac(VHT20) | 5180-5240 | 36-48 [4] | 2 | 27.77 | Yes |
| 5150-5250 | ac(VHT40) | 5190-5230 | 38-46 [2] | 2 | 25.22 | Yes |
| 5150-5250 | ac(VHT80) | 5210 | 42 [1] | 2 | 15.98 | Yes |

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.
Note 2: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
Note 3: 802.11ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.
Note 4: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other. (i.e., EUT has simultaneously co-transmitting that operating 2.4GHz and 5GHz.)



1.1.3 Antenna Information

| Antenna Category | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Integral antenna (antenna permanently attached) |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> Temporary RF connector provided |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path. |
| <input checked="" type="checkbox"/> | External antenna (dedicated antennas) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> Single power level with corresponding antenna(s). |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> Multiple power level and corresponding antenna(s). |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> RF connector provided |
| | <input checked="" type="checkbox"/> Unique antenna connector. (e.g., MMCX, U.FL, IPX, and RP-SMA, RP-N type...) |
| | <input type="checkbox"/> Standard antenna connector. (e.g., SMA, N, BNC, and TNC type...) |

| Antenna General Information | | | | | | |
|-----------------------------|--------------|--------|-----------|--|-----------|-----------|
| No. | Model | Type | Connector | Operating Frequencies (MHz) / Antenna Gain (dBi) | | |
| | | | | 2400~2483.5 | 5150~5250 | 5725~5850 |
| 1 | 5718A0075300 | PIFA | I-Pex | 3.52 | --- | |
| 2 | 5718A0074300 | PIFA | I-Pex | 3.16 | --- | |
| 3 | 5718A0077300 | PIFA | I-Pex | --- | 5.40 | 5.23 |
| 4 | 5718A0076300 | PIFA | I-Pex | --- | 4.08 | 5.68 |
| 5 | 7102A0300000 | Dipole | R SMA | 4.42 | --- | --- |
| 6 | 7102A0300000 | Dipole | R SMA | 4.42 | --- | --- |
| 7 | 7102A0301000 | Dipole | R SMA | --- | 3.18 | 2.95 |
| 8 | 7102A0301000 | Dipole | R SMA | --- | 3.18 | 2.95 |

1.1.4 Type of EUT

| Identify EUT | |
|-------------------------------------|---|
| EUT Serial Number | N/A |
| Presentation of Equipment | <input type="checkbox"/> Production ; <input checked="" type="checkbox"/> Pre-Production ; <input type="checkbox"/> Prototype |
| Type of EUT | |
| <input checked="" type="checkbox"/> | Stand-alone |
| <input type="checkbox"/> | Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: ... |
| <input type="checkbox"/> | Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: ... |



1.1.5 Test Signal Duty Cycle

| Operated Mode for Worst Duty Cycle | |
|---|---------------------------------------|
| <input type="checkbox"/> Operated normally mode for worst duty cycle | |
| <input checked="" type="checkbox"/> Operated test mode for worst duty cycle | |
| Test Signal Duty Cycle (x) | Power Duty Factor [dB] – (10 log 1/x) |
| <input checked="" type="checkbox"/> 98.26% - IEEE 802.11a | 0.08 |
| <input checked="" type="checkbox"/> 98.15% - IEEE 802.11ac (VHT20) | 0.08 |
| <input checked="" type="checkbox"/> 94.93% - IEEE 802.11ac (VHT40) | 0.23 |
| <input checked="" type="checkbox"/> 88.46% - IEEE 802.11ac (VHT80) | 0.53 |

1.1.6 EUT Operational Condition

| | | | |
|----------------|--|--|--|
| Supply Voltage | 12Vdc from adapter, 48Vdc from POE | | |
| Test Voltage | <input checked="" type="checkbox"/> Vnom (120 V) | <input checked="" type="checkbox"/> Vmax (138 V) | <input checked="" type="checkbox"/> Vmin (102 V) |
| Test Climatic | <input checked="" type="checkbox"/> Tnom (20°C) | <input checked="" type="checkbox"/> Tmax (50°C) | <input checked="" type="checkbox"/> Tmin (-30°C) |

1.2 Accessories and Support Equipment

| Accessories | | |
|-------------|---|--|
| No. | Equipment | Description |
| 1 | Power Supply Type 1 Adapter | Brand: Powertron Electronics Corp. Model: PA1015-2I I/P: 100-240Vac, 50-60Hz, 0.4A O/P: 12Vdc, 1.25A, 15W Power line: 1.2m non-shielded with one core |
| 2 | Power Supply Type 2 With POE injector (Model: NPE-5818) **Support unit only | Brand: Powertron Electronics Corp. Model: PA1040-480IB080 I/P: 100-240Vac, 50-60Hz, 1.5A O/P: 48Vdc, 0.8A, 38.4W max Power line: 1.5m non-shielded with one core |

| Support Equipment | | | | |
|-------------------|-----------|------------|------------|--------|
| No. | Equipment | Brand Name | Model Name | FCC ID |
| 1 | Notebook | DELL | E6440 | DoC |
| 2 | POE | Ruckus | NPE-5818 | --- |



1.3 Testing Applied Standards

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

- 47 CFR FCC Part 15
- ANSI C63.10-2009
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01
- FCC KDB 644545 D03 Guidance for IEEE 802 11ac New Rule v01
- FCC KDB 662911 v02r01

1.4 Testing Location Information

| Testing Location | | | | |
|-------------------|---------------|--|----------------------|-------------------------|
| | HWA YA | ADD : No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. | TEL : 886-3-327-3456 | FAX : 886-3-327-0973 |
| | ICC Lab | ADD : No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C. | TEL : 886-3-271-8640 | FAX : 886-3-327-0973 |
| Test Condition | Test Site No. | Test Engineer | Test Environment | Test Date |
| RF Conducted | TH01-HY | Mark Liao | 23°C / 64% | Aug. 27, 2014 |
| AC Conduction | *CO01-WS | Skys Huang | 22°C / 63% | Jul. 24, 2014 |
| Radiated Emission | *03CH01-WS | Anderson Hung | 20-23°C / 65-68% | Jun. 10 ~ Jul. 17, 2014 |

Test site registered number [657002] with FCC
Test site registered number [10807A-1] with IC

Note: * Sporton Lab subcontracts this test item to ICC lab (TAF:2732).

ICC lab is a TAF accreditation test firm and also is an approved provider of Sporton Lab.



1.5 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)

| Measurement Uncertainty | | |
|-----------------------------------|---------------|----------|
| Test Item | Uncertainty | Limit |
| AC power-line conducted emissions | ±2.92 dB | N/A |
| Emission bandwidth | ±1.42 % | N/A |
| RF output power, conducted | ±0.63 dB | N/A |
| Power density, conducted | ±0.81 dB | N/A |
| All emissions, radiated | 30 – 1000 MHz | ±3.26 dB |
| | Above 1 GHz | ±4.94 dB |
| Temperature | ±0.8 °C | N/A |
| Humidity | ±3 % | N/A |
| DC and low frequency voltages | ±3 % | N/A |
| Time | ±1.42 % | N/A |
| Duty Cycle | ±1.42 % | N/A |



2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

| Worst Modulation Used for Conformance Testing (5150-5250MHz) | | | |
|--|------------------------------------|-----------------|-----------------------|
| Modulation Mode | Transmit Chains (N _{TX}) | Data Rate / MCS | Worst Data Rate / MCS |
| 11a | 2 | 6-54Mbps | 6 Mbps |
| HT20 | 2 | MCS 0-15 | MCS 0 |
| HT40 | 2 | MCS 0-15 | MCS 0 |
| VHT20 | 2 | MCS 0-8 | MCS 0 |
| VHT40 | 2 | MCS 0-9 | MCS 0 |
| VHT80 | 2 | MCS 0-9 | MCS 0 |

2.2 The Worst Case Power Setting Parameter

| The Worst Case Power Setting Parameter (5150-5250MHz band) | | | | | | | |
|--|------------------------------------|----------------------|------|------|------------|------|------------|
| Test Software | ART2-GUI, Version: 4_9_575_5_CS_U3 | | | | | | |
| Internal antenna | | | | | | | |
| Modulation Mode | N _{TX} | Test Frequency (MHz) | | | | | |
| | | NCB: 20MHz | | | NCB: 40MHz | | NCB: 80MHz |
| | | 5180 | 5200 | 5240 | 5190 | 5230 | 5210 |
| 11a,6-54Mbps | 2 | 18 | 22 | 22.5 | -- | -- | -- |
| HT20,M0-15 | 2 | 17.5 | 22 | 23 | -- | -- | -- |
| HT40,M0-15 | 2 | -- | -- | -- | 13 | 20 | -- |
| VHT20,M0-8 | 2 | 17.5 | 22 | 23 | -- | -- | -- |
| VHT40,M0-9 | 2 | -- | -- | -- | 13 | 20 | -- |
| VHT80,M0-9 | 2 | -- | -- | -- | -- | -- | 10.5 |
| External antenna | | | | | | | |
| Modulation Mode | N _{TX} | Test Frequency (MHz) | | | | | |
| | | NCB: 20MHz | | | NCB: 40MHz | | NCB: 80MHz |
| | | 5180 | 5200 | 5240 | 5190 | 5230 | 5210 |
| 11a,6-54Mbps | 2 | 18 | 23 | 23 | -- | -- | -- |
| HT20,M0-15 | 2 | 18 | 22.5 | 21 | -- | -- | -- |
| HT40,M0-15 | 2 | -- | -- | -- | 13.5 | 21.5 | -- |
| VHT20,M0-8 | 2 | 18 | 22.5 | 21 | -- | -- | -- |
| VHT40,M0-9 | 2 | -- | -- | -- | 13.5 | 21.5 | -- |
| VHT80,M0-9 | 2 | -- | -- | -- | -- | -- | 12 |



2.3 The Worst Case Measurement Configuration

| The Worst Case Mode for Following Conformance Tests | |
|---|---|
| Tests Item | AC power-line conducted emissions |
| Condition | AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz |
| Operating Mode | Operating Mode Description |
| | <ol style="list-style-type: none">1. Internal antenna with adapter mode2. Internal antenna with POE mode3. External antenna with adapter mode4. External antenna with POE mode |

| The Worst Case Mode for Following Conformance Tests | |
|---|---|
| Tests Item | RF Output Power |
| Test Condition | Conducted measurement at transmit chains |
| Modulation Mode | 11a, HT20, HT40, VHT20, VHT40, VHT80 |
| Operating Mode | Operating Mode Description |
| | <ol style="list-style-type: none">1. Internal antenna with adapter mode2. External antenna with adapter mode |

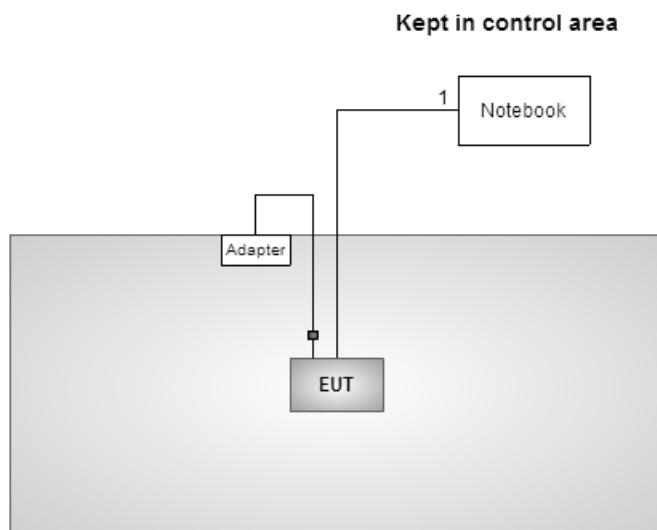
| The Worst Case Mode for Following Conformance Tests | |
|---|---|
| Tests Item | Peak Power Spectral Density, Emission Bandwidth |
| Test Condition | Conducted measurement at transmit chains |
| Modulation Mode | 11a, VHT20, VHT40, VHT80 |
| Operating Mode | Operating Mode Description |
| | <ol style="list-style-type: none">1. Internal antenna with adapter mode2. External antenna with adapter mode |



| The Worst Case Mode for Following Conformance Tests | | | | | | | |
|---|--|---------|---------|---------|--|--|--|
| Tests Item | Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions | | | | | | |
| Test Condition | Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type. | | | | | | |
| User Position | <input type="checkbox"/> EUT will be placed in fixed position. <input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes. The worst planes are Y-plane for internal antenna and X-plane for external antenna. <input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed two or three orthogonal planes. The worst planes is Z. | | | | | | |
| Operating Mode | <input checked="" type="checkbox"/> 1. Internal antenna with adapter mode <input checked="" type="checkbox"/> 2. Internal antenna with POE mode <input checked="" type="checkbox"/> 3. External antenna with adapter mode <input checked="" type="checkbox"/> 4. External antenna with POE mode | | | | | | |
| Modulation Mode | 11a, VHT20, VHT40, VHT80 | | | | | | |
| Orthogonal Planes of EUT | <table border="1"><thead><tr><th>X Plane</th><th>Y Plane</th><th>Z Plane</th></tr></thead><tbody><tr><td></td><td></td><td></td></tr></tbody></table> | X Plane | Y Plane | Z Plane | | | |
| X Plane | Y Plane | Z Plane | | | | | |
| | | | | | | | |

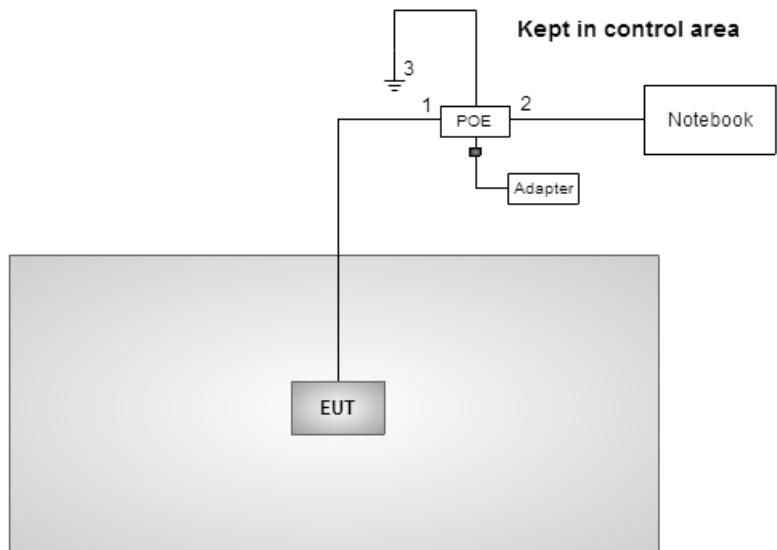
2.4 Test Setup Diagram

Test Setup Diagram - Radiated Test - adapter mode



1. RJ45, 10m non-shielded

Test Setup Diagram - Radiated Test - POE mode



1. RJ45, 10m non-shielded
2. RJ45, 1m non-shielded
3. 2m ground cable

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

| AC Power-line Conducted Emissions Limit | | |
|---|------------|-----------|
| Frequency Emission (MHz) | Quasi-Peak | Average |
| 0.15-0.5 | 66 - 56 * | 56 - 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

Note 1: * Decreases with the logarithm of the frequency.

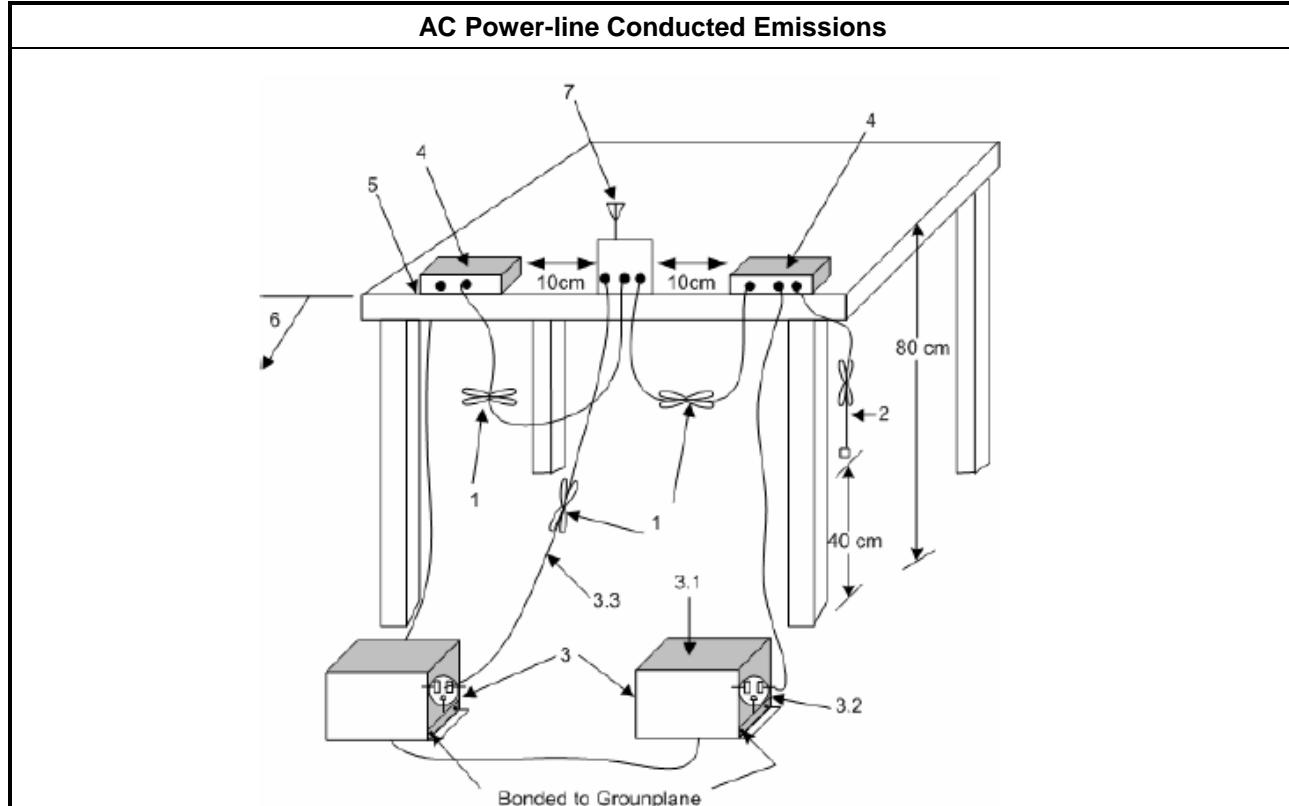
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

| Test Method |
|--|
| <input checked="" type="checkbox"/> Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions. |

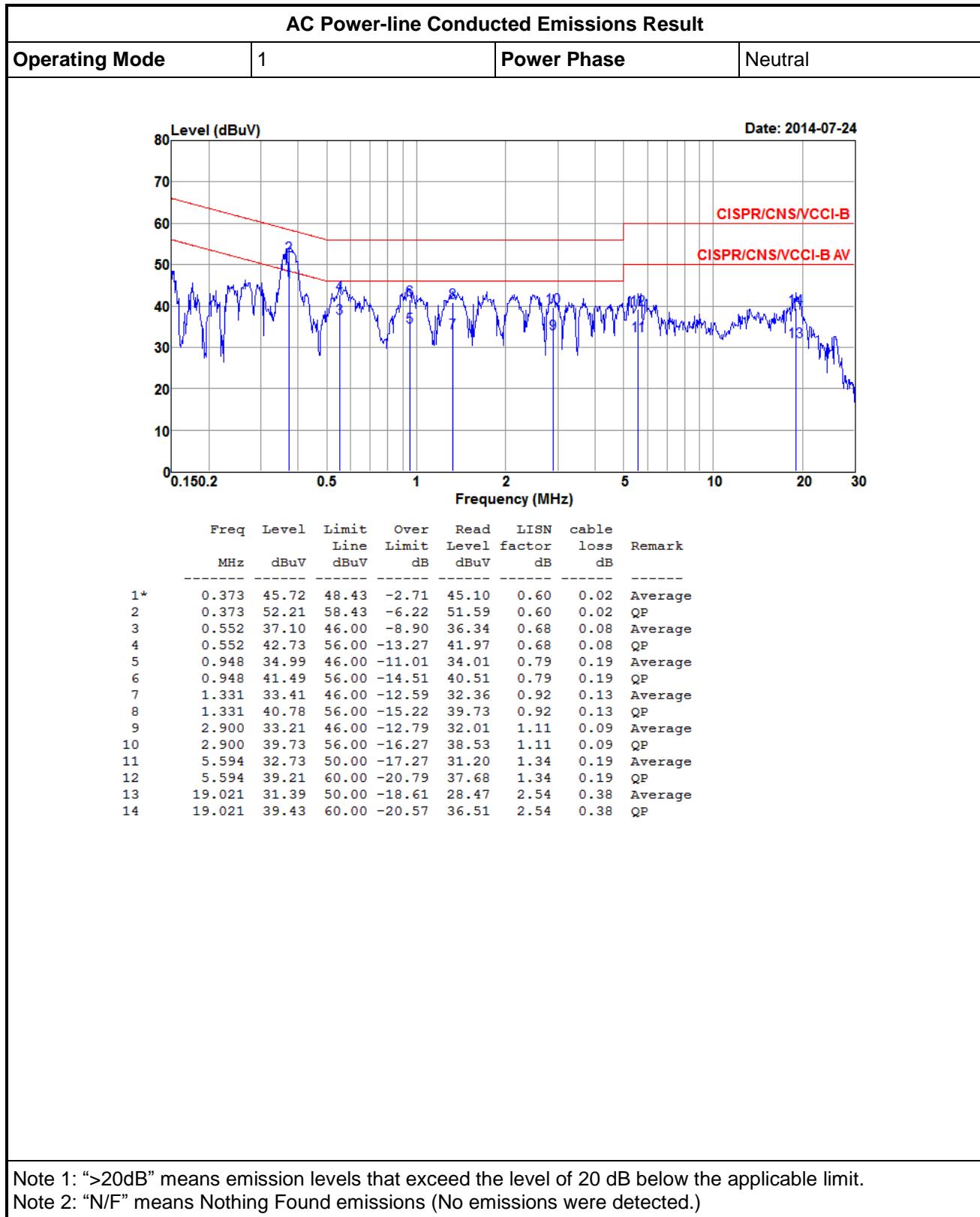
3.1.4 Test Setup

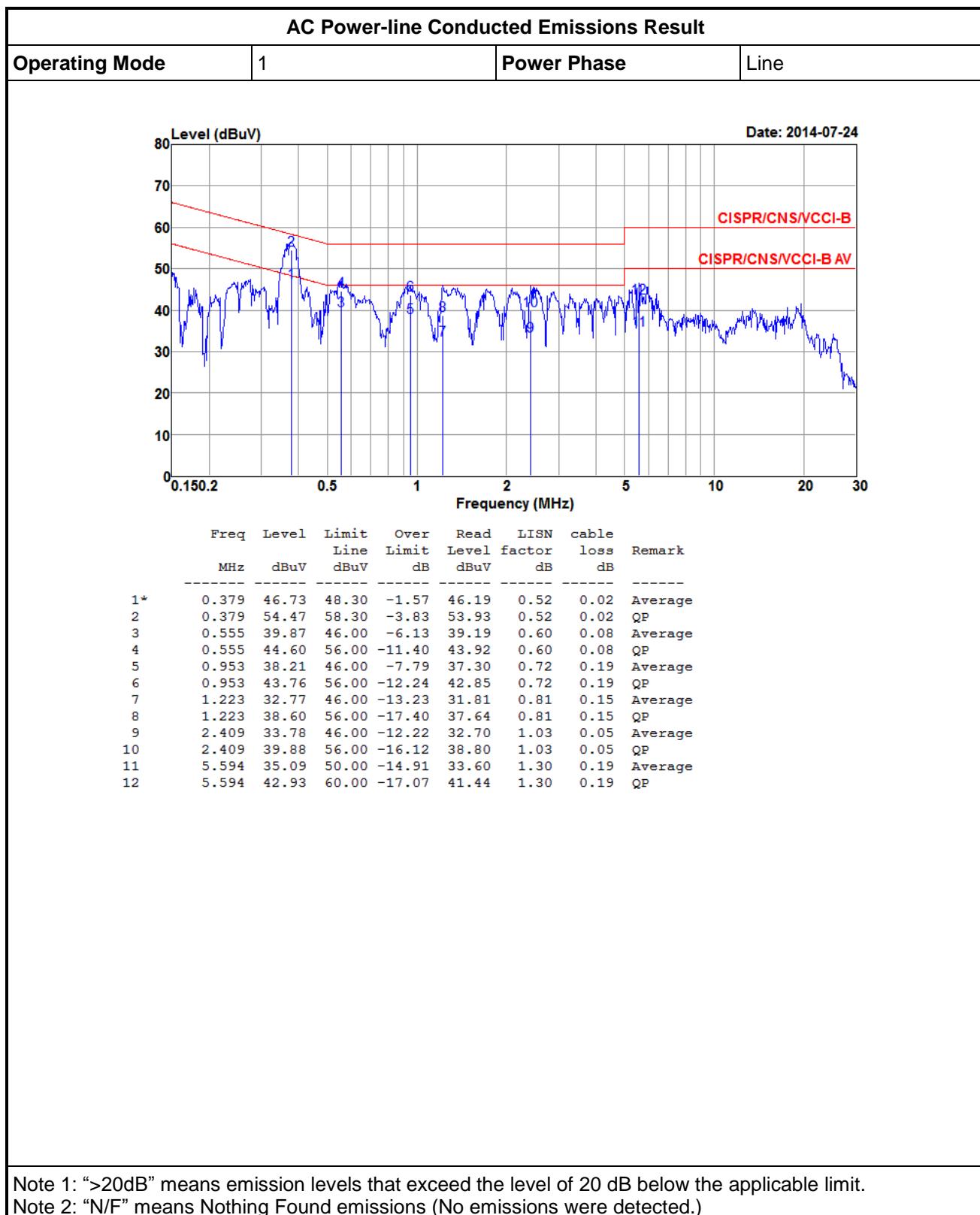




3.1.5 Test Result of AC Power-line Conducted Emissions

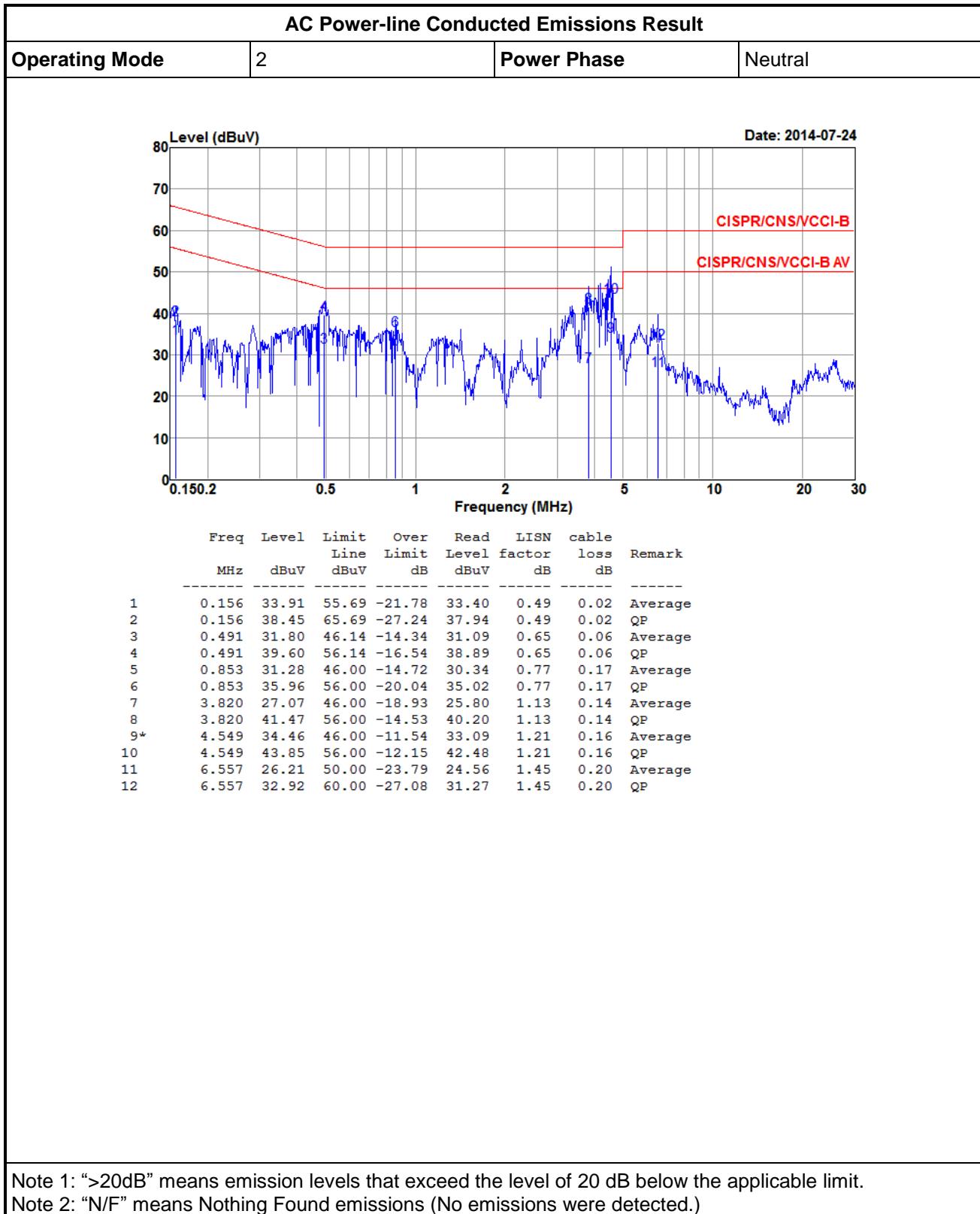
Mode 1: Internal antenna with adapter mode





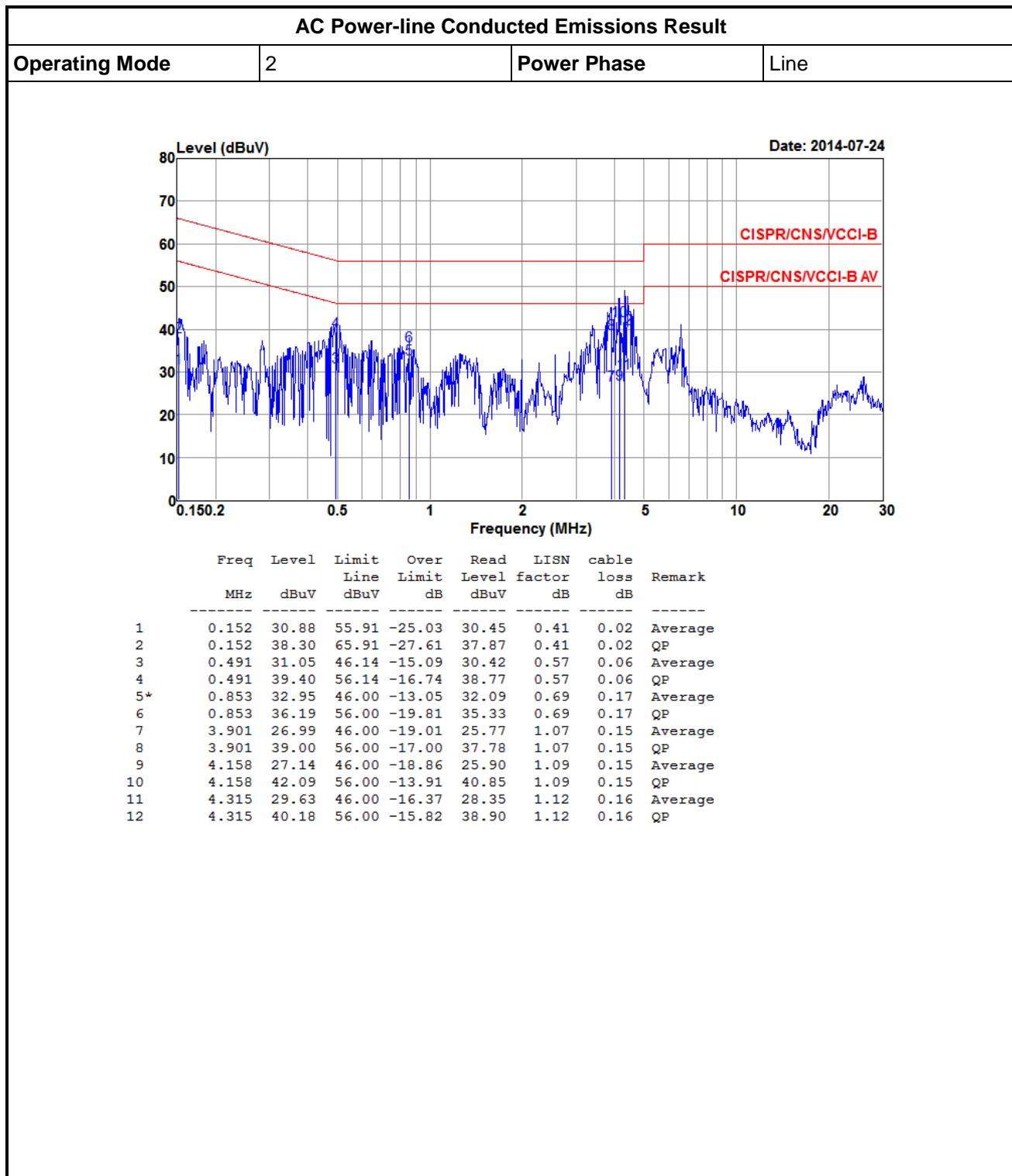


Mode 2: Internal antenna with POE mode



Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.

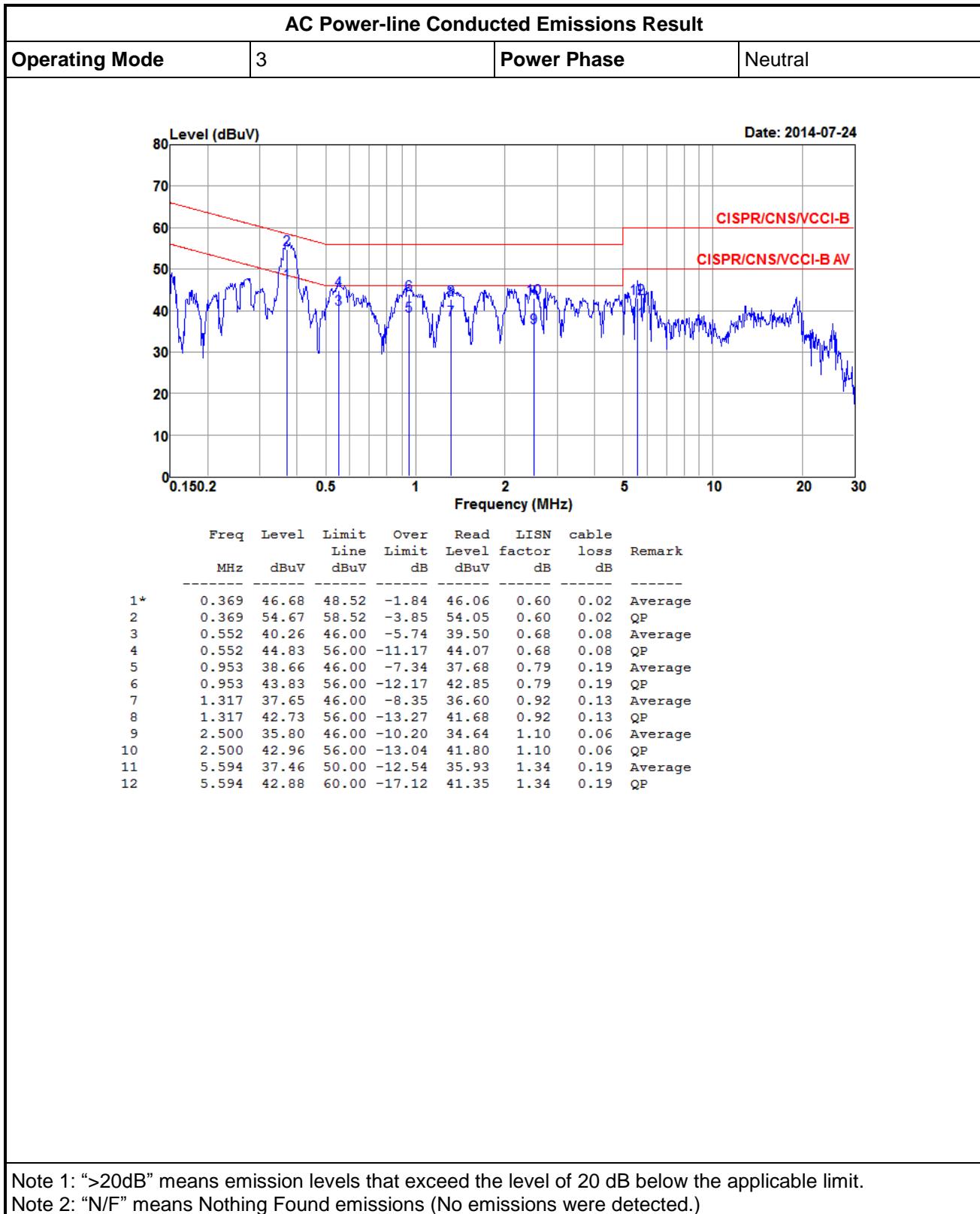
Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

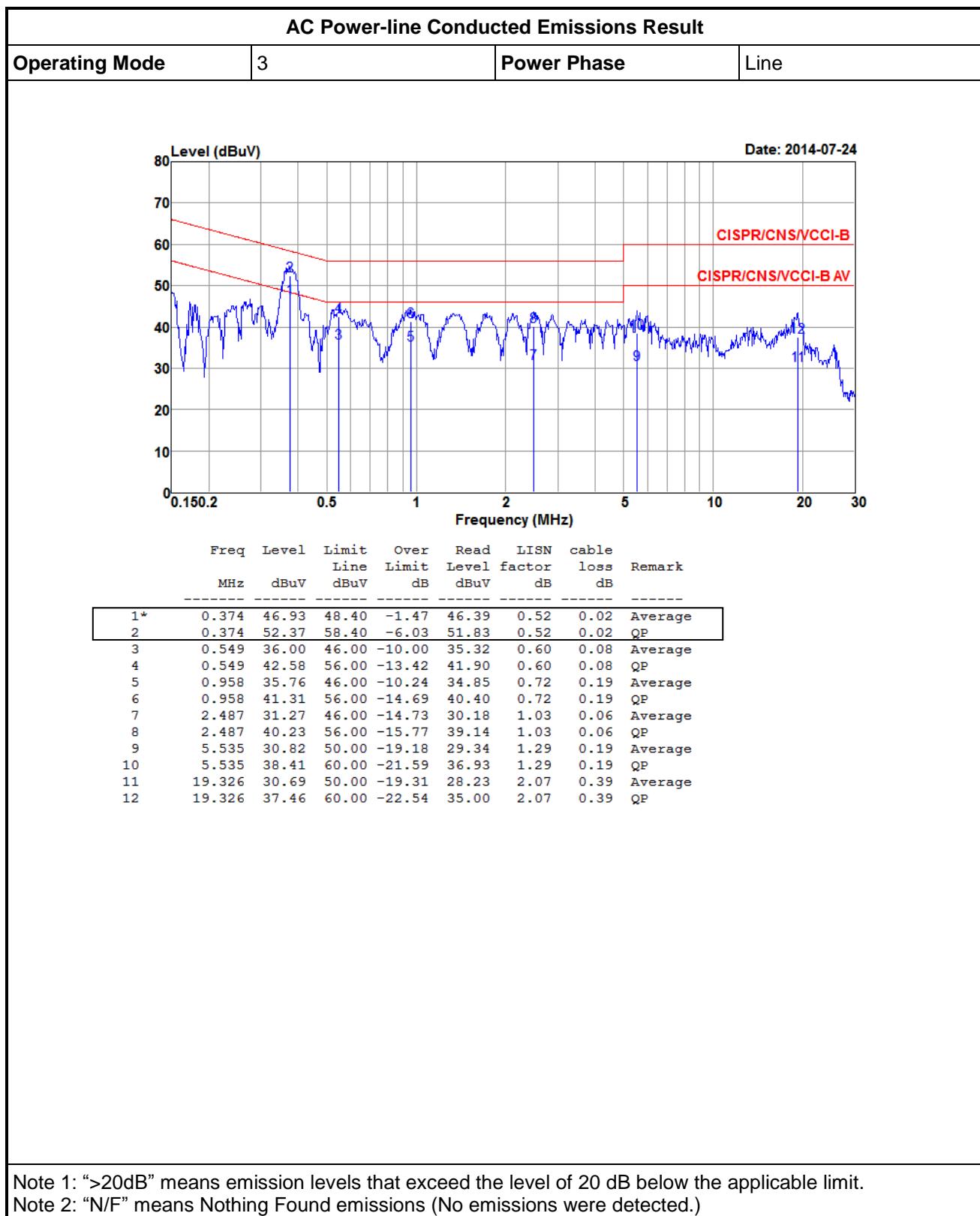


Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)



Mode 3: External antenna with adapter mode

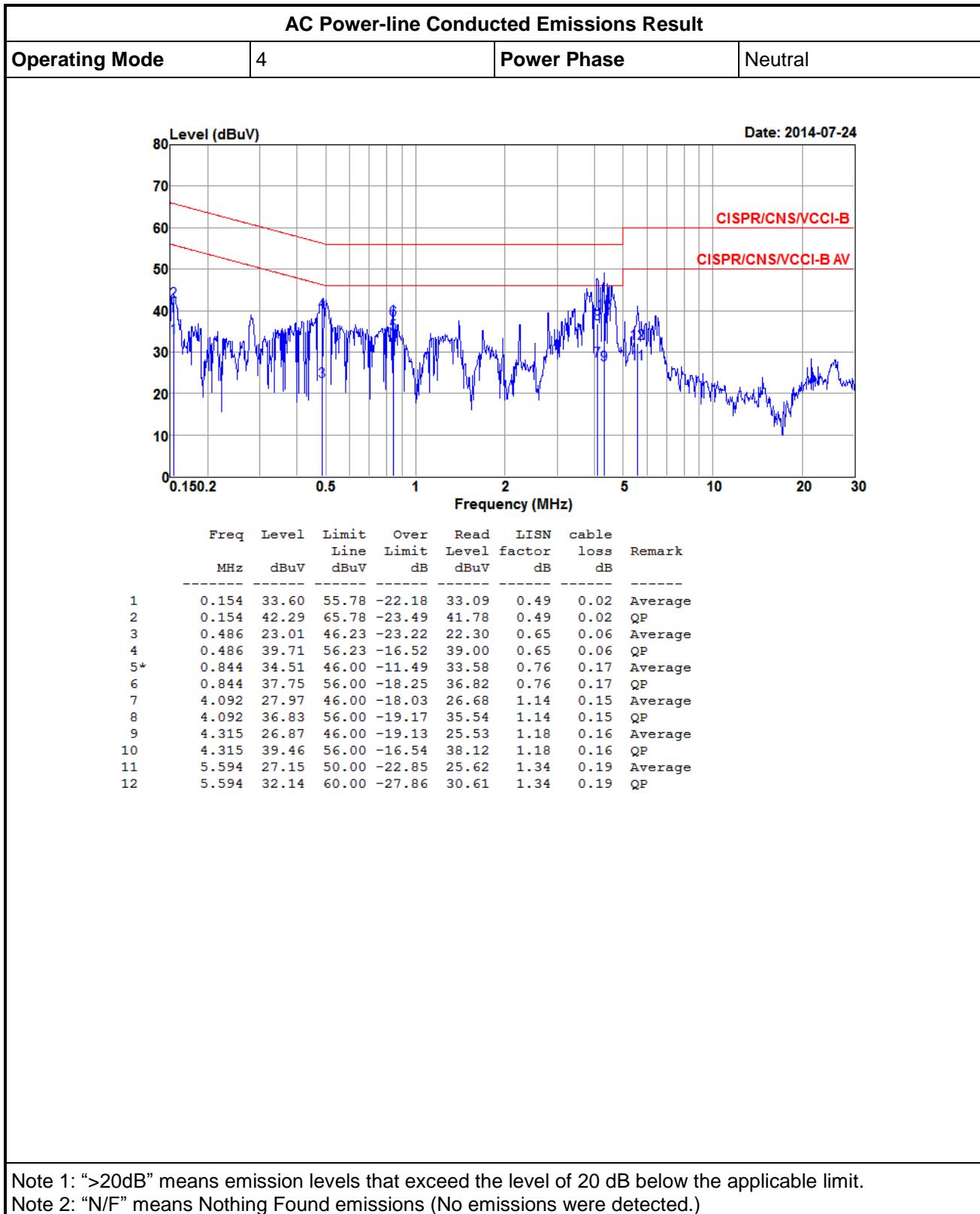


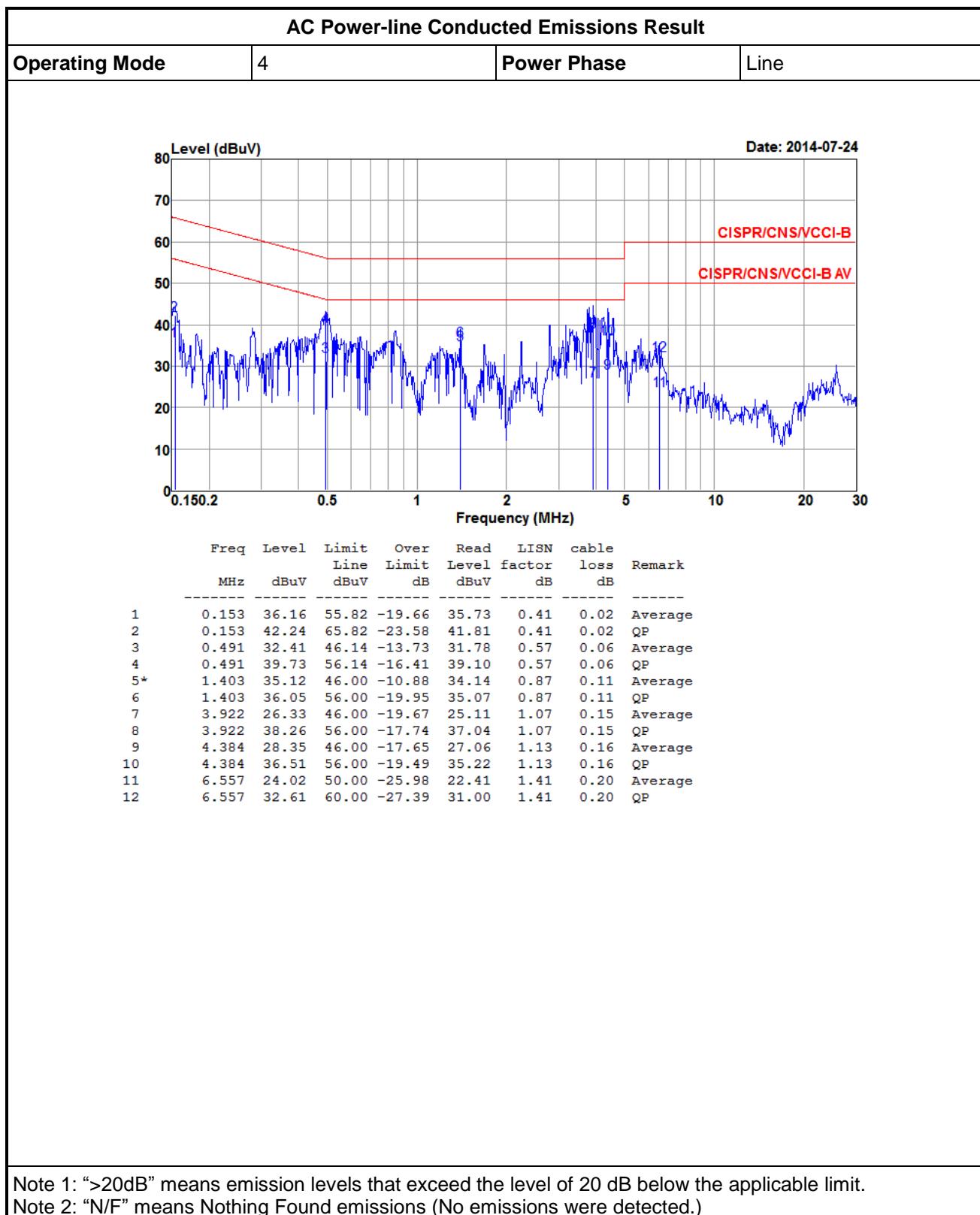


Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)



Mode 4: External antenna with POE mode





3.2 Emission Bandwidth

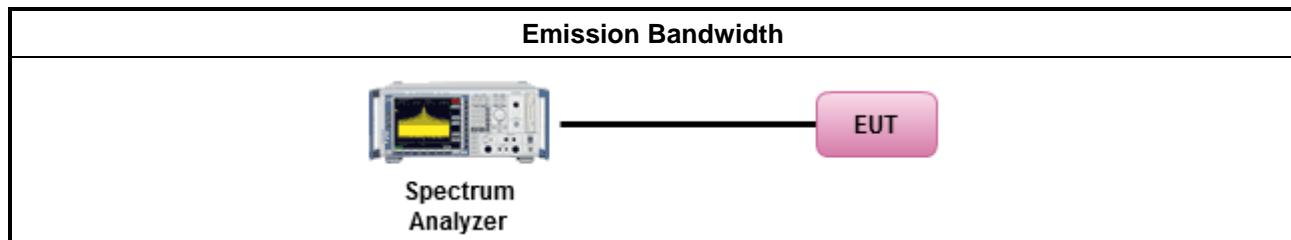
3.2.1 Measuring Instruments

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

3.2.2 Test Procedures

| Test Method | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | For the emission bandwidth shall be measured using one of the options below: |
| <input checked="" type="checkbox"/> | Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause C for EBW and clause D for OBW measurement. |
| <input type="checkbox"/> | Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing. |
| <input type="checkbox"/> | Refer as IC RSS-Gen, clause 4.6 for bandwidth testing. |
| <input checked="" type="checkbox"/> | For conducted measurement. |
| <input type="checkbox"/> | The EUT supports single transmit chain and measurements performed on this transmit chain. |
| <input type="checkbox"/> | The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case. |
| <input checked="" type="checkbox"/> | The EUT supports multiple transmit chains using options given below: |
| <input type="checkbox"/> | Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1. |
| <input checked="" type="checkbox"/> | Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains. |

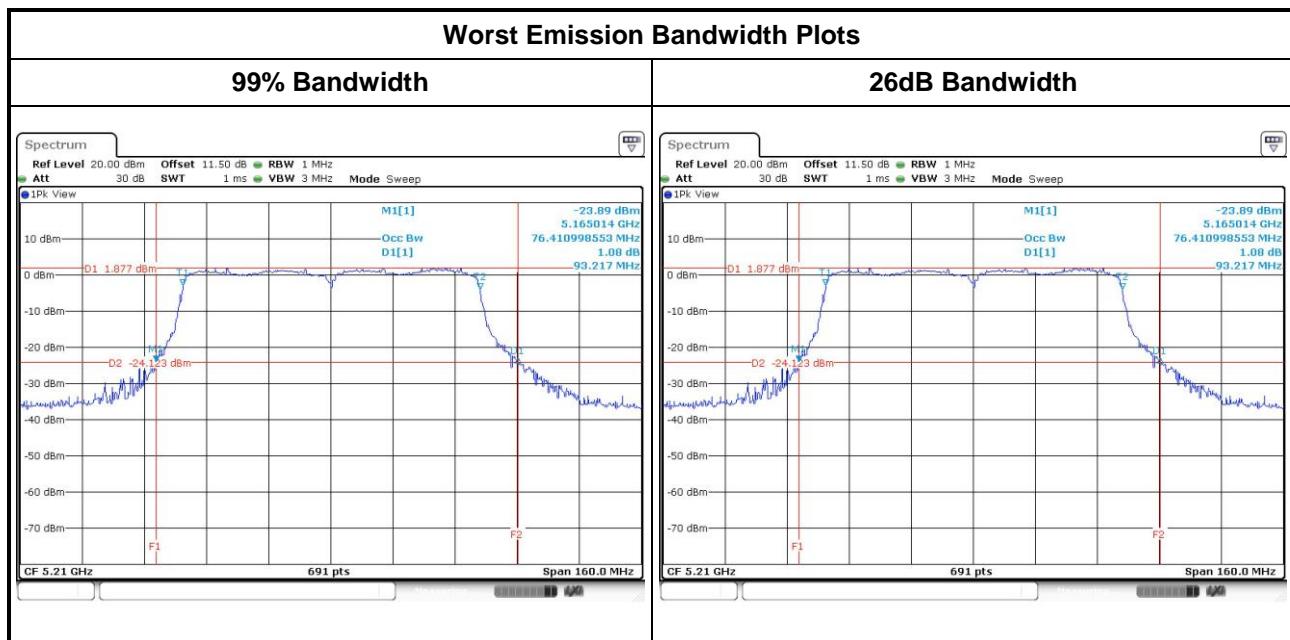
3.2.3 Test Setup



3.2.4 Test Result of Emission Bandwidth

Mode 1: Internal antenna with adapter mode

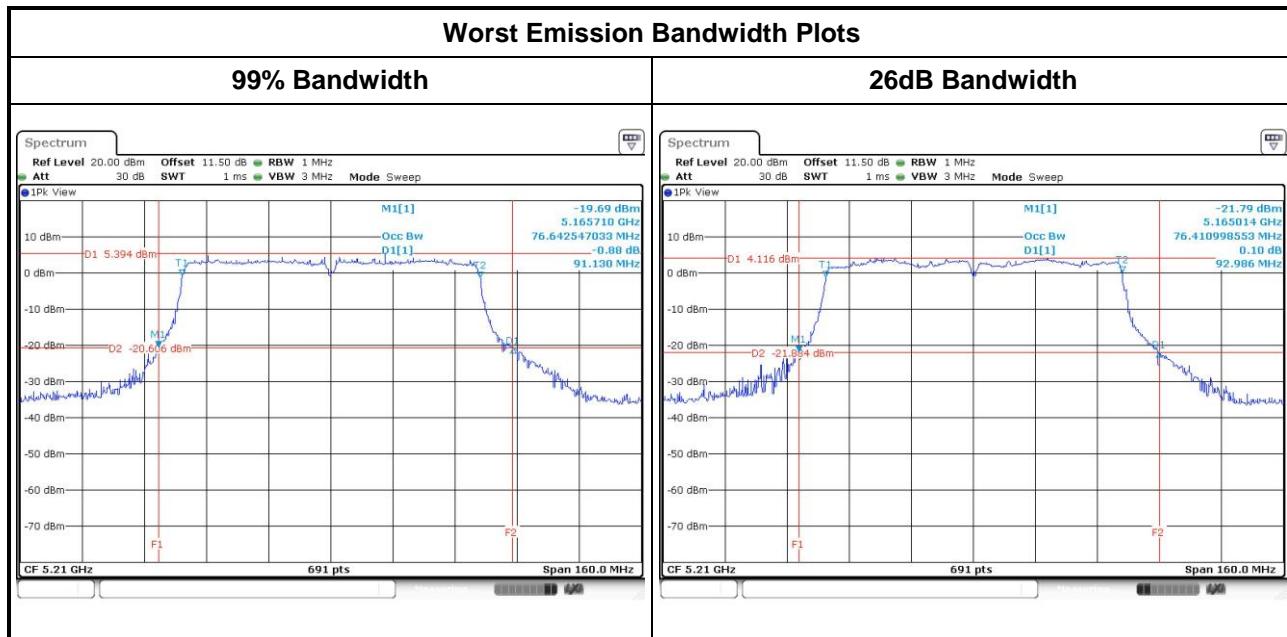
| UNII Emission Bandwidth Result (5150-5250MHz band) | | | | | | | | | | |
|--|-----------------|-------------|--------------------------|--------------|--------------|--------------|----------------|--------------|--------------|--------------|
| Condition | | | Emission Bandwidth (MHz) | | | | | | | |
| Modulation Mode | N _{TX} | Freq. (MHz) | 99% Bandwidth | | | | 26dB Bandwidth | | | |
| | | | Chain-Port 1 | Chain-Port 2 | Chain-Port 3 | Chain-Port 4 | Chain-Port 1 | Chain-Port 2 | Chain-Port 3 | Chain-Port 4 |
| 11a | 2 | 5180 | 17.19 | 16.79 | -- | -- | 23.36 | 22.67 | -- | -- |
| 11a | 2 | 5200 | 17.13 | 16.85 | -- | -- | 26.03 | 22.61 | -- | -- |
| 11a | 2 | 5240 | 17.19 | 16.96 | -- | -- | 25.22 | 24.64 | -- | -- |
| VHT20 | 2 | 5180 | 18.29 | 18.06 | -- | -- | 24.41 | 24.12 | -- | -- |
| VHT20 | 2 | 5200 | 18.18 | 18.18 | -- | -- | 30.03 | 24.93 | -- | -- |
| VHT20 | 2 | 5240 | 18.29 | 18.18 | -- | -- | 29.68 | 31.01 | -- | -- |
| VHT40 | 2 | 5190 | 37.63 | 37.28 | -- | -- | 47.19 | 47.54 | -- | -- |
| VHT40 | 2 | 5230 | 37.51 | 37.28 | -- | -- | 48.23 | 46.38 | -- | -- |
| VHT80 | 2 | 5210 | 76.41 | 76.41 | -- | -- | 93.22 | 92.29 | -- | -- |
| Result | | | Complied | | | | | | | |





Mode 2: External antenna with adapter mode

| UNII Emission Bandwidth Result (5150-5250MHz band) | | | | | | | | | | |
|--|-----------------|-------------|--------------------------|--------------|--------------|--------------|----------------|--------------|--------------|--------------|
| Condition | | | Emission Bandwidth (MHz) | | | | | | | |
| Modulation Mode | N _{TX} | Freq. (MHz) | 99% Bandwidth | | | | 26dB Bandwidth | | | |
| | | | Chain-Port 1 | Chain-Port 2 | Chain-Port 3 | Chain-Port 4 | Chain-Port 1 | Chain-Port 2 | Chain-Port 3 | Chain-Port 4 |
| 11a | 2 | 5180 | 16.90 | 16.61 | -- | -- | 22.78 | 21.22 | -- | -- |
| 11a | 2 | 5200 | 16.85 | 16.85 | -- | -- | 23.19 | 24.58 | -- | -- |
| 11a | 2 | 5240 | 16.96 | 16.85 | -- | -- | 24.23 | 23.94 | -- | -- |
| VHT20 | 2 | 5180 | 17.83 | 17.89 | -- | -- | 22.67 | 22.90 | -- | -- |
| VHT20 | 2 | 5200 | 18.12 | 18.00 | -- | -- | 23.94 | 24.58 | -- | -- |
| VHT20 | 2 | 5240 | 18.06 | 17.89 | -- | -- | 23.42 | 23.42 | -- | -- |
| VHT40 | 2 | 5190 | 37.05 | 37.05 | -- | -- | 45.68 | 45.57 | -- | -- |
| VHT40 | 2 | 5230 | 36.93 | 37.05 | -- | -- | 45.57 | 44.41 | -- | -- |
| VHT80 | 2 | 5210 | 76.41 | 76.64 | -- | -- | 92.99 | 91.13 | -- | -- |
| Result | | | Complied | | | | | | | |





3.3 RF Output Power

3.3.1 RF Output Power Limit

Maximum Conducted Output Power Limit

The maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

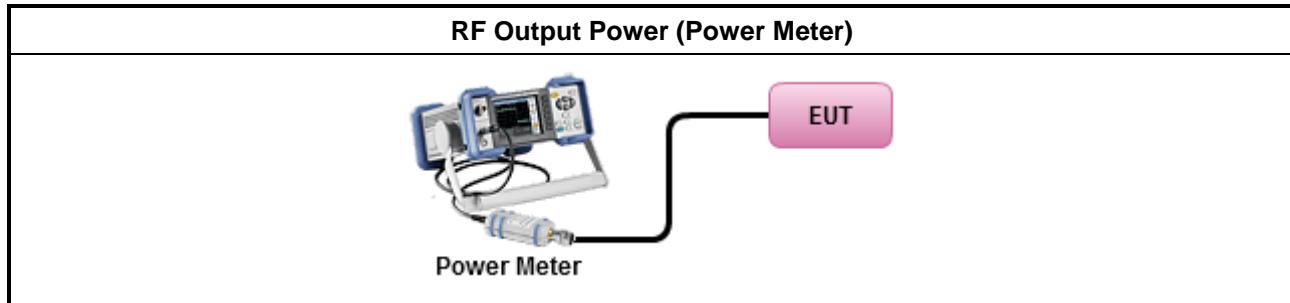
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

| Test Method | |
|--|--|
| <input checked="" type="checkbox"/> Maximum Conducted Output Power | <input type="checkbox"/> Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-1 (spectral trace averaging). <input type="checkbox"/> Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-1 Alt. (RMS detection with slow sweep speed) <input type="checkbox"/> Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-2 (spectral trace averaging). <input type="checkbox"/> Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, 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 <input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method PM-G (using a gated RF average power meter). |
| <input checked="" type="checkbox"/> For conducted measurement. | <input type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain. <input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case. <input checked="" type="checkbox"/> The EUT supports multiple transmit chains using options given below: 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. <input type="checkbox"/> If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$ |

3.3.4 Test Setup



3.3.5 Directional Gain for Power Measurement

Mode 1: Internal antenna with adapter mode

| Directional Gain (DG) Result | | | | | |
|------------------------------|----------|----------|----------|------|-----------------|
| Transmit Chains No. | | 1 | 2 | - | - |
| Maximum G_{ANT} (dBi) | | 5.40 | 4.08 | - | - |
| Modulation Mode | DG (dBi) | N_{TX} | N_{SS} | STBC | Array Gain (dB) |
| 11a,6-54Mbps | 5.4 | 2 | 1 | - | - |
| HT20,M0-15 | 5.4 | 2 | 1 | - | - |
| HT40,M0-15 | 5.4 | 2 | 1 | - | - |
| VHT20,M0-8 | 5.4 | 2 | 1 | - | - |
| VHT40,M0-9 | 5.4 | 2 | 1 | - | - |
| VHT80,M0-9 | 5.4. | 2 | 1 | | - |

Note: Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain

Mode 2: External antenna with adapter mode

| Directional Gain (DG) Result | | | | | |
|------------------------------|----------|----------|----------|------|-----------------|
| Transmit Chains No. | | 1 | 2 | - | - |
| Maximum G_{ANT} (dBi) | | 3.18 | 3.18 | - | - |
| Modulation Mode | DG (dBi) | N_{TX} | N_{SS} | STBC | Array Gain (dB) |
| 11a,6-54Mbps | 3.18 | 2 | 1 | - | - |
| HT20,M0-15 | 3.18 | 2 | 1 | - | - |
| HT40,M0-15 | 3.18 | 2 | 1 | - | - |
| VHT20,M0-8 | 3.18 | 2 | 1 | - | - |
| VHT40,M0-9 | 3.18 | 2 | 1 | - | - |
| VHT80,M0-9 | 3.18 | 2 | 1 | | - |



3.3.6 Test Result of Maximum Conducted Output Power

Mode 1: Internal antenna with adapter mode

| Maximum Conducted (Average) Output Power (5150-5250MHz band) | | | | | | | | | | | | |
|--|-----------------|-------------|-----------------------|--------------|--------------|--------------|-----------|-------------|----------|------------|------------|--|
| Condition | | | RF Output Power (dBm) | | | | | | | | | |
| Modulation Mode | N _{TX} | Freq. (MHz) | Chain Port 1 | Chain Port 2 | Chain Port 3 | Chain Port 4 | Sum Chain | Power Limit | DG (dBi) | EIRP Power | EIRP Limit | |
| 11a | 2 | 5180 | 19.14 | 18.94 | -- | -- | 22.05 | 30.00 | 5.4 | 27.45 | 36.00 | |
| 11a | 2 | 5200 | 23.94 | 23.55 | -- | -- | 26.76 | 30.00 | 5.4 | 32.16 | 36.00 | |
| 11a | 2 | 5240 | 24.32 | 23.93 | -- | -- | 27.14 | 30.00 | 5.4 | 32.54 | 36.00 | |
| HT20 | 2 | 5180 | 19.04 | 18.56 | -- | -- | 21.82 | 30.00 | 5.4 | 27.22 | 36.00 | |
| HT20 | 2 | 5200 | 23.89 | 23.54 | -- | -- | 26.73 | 30.00 | 5.4 | 32.13 | 36.00 | |
| HT20 | 2 | 5240 | 24.68 | 24.31 | -- | -- | 27.51 | 30.00 | 5.4 | 32.91 | 36.00 | |
| HT40 | 2 | 5190 | 13.42 | 13.14 | -- | -- | 16.29 | 30.00 | 5.4 | 21.69 | 36.00 | |
| HT40 | 2 | 5230 | 20.85 | 20.46 | -- | -- | 23.67 | 30.00 | 5.4 | 29.07 | 36.00 | |
| VHT20 | 2 | 5180 | 19.11 | 18.64 | -- | -- | 21.89 | 30.00 | 5.4 | 27.29 | 36.00 | |
| VHT20 | 2 | 5200 | 24.02 | 23.61 | -- | -- | 26.83 | 30.00 | 5.4 | 32.23 | 36.00 | |
| VHT20 | 2 | 5240 | 24.71 | 24.42 | -- | -- | 27.58 | 30.00 | 5.4 | 32.98 | 36.00 | |
| VHT40 | 2 | 5190 | 13.55 | 13.26 | -- | -- | 16.42 | 30.00 | 5.4 | 21.82 | 36.00 | |
| VHT40 | 2 | 5230 | 20.96 | 20.59 | -- | -- | 23.79 | 30.00 | 5.4 | 29.19 | 36.00 | |
| VHT80 | 2 | 5210 | 11.36 | 11.22 | -- | -- | 14.30 | 30.00 | 5.4 | 19.70 | 36.00 | |
| Result | | | Complied | | | | | | | | | |



Mode 2: External antenna with adapter mode

| Maximum Conducted (Average) Output Power (5150-5250MHz band) | | | | | | | | | | | |
|--|-----------------|-------------|-----------------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|
| Condition | | | RF Output Power (dBm) | | | | | | | | |
| Modulation Mode | N _{TX} | Freq. (MHz) | Chain Port 1 | Chain Port 2 | Chain Port 3 | Chain Port 4 | Sum Chain | Power Limit | DG (dBi) | EIRP Power | EIRP Limit |
| 11a | 2 | 5180 | 19.68 | 20.35 | -- | -- | 23.04 | 30.00 | 3.18 | 26.22 | 36.00 |
| 11a | 2 | 5200 | 24.82 | 25.44 | -- | -- | 28.15 | 30.00 | 3.18 | 31.33 | 36.00 |
| 11a | 2 | 5240 | 24.48 | 25.01 | -- | -- | 27.76 | 30.00 | 3.18 | 30.94 | 36.00 |
| HT20 | 2 | 5180 | 19.42 | 20.31 | -- | -- | 22.90 | 30.00 | 3.18 | 26.08 | 36.00 |
| HT20 | 2 | 5200 | 24.35 | 24.96 | -- | -- | 27.68 | 30.00 | 3.18 | 30.86 | 36.00 |
| HT20 | 2 | 5240 | 22.26 | 23.15 | -- | -- | 25.74 | 30.00 | 3.18 | 28.92 | 36.00 |
| HT40 | 2 | 5190 | 13.75 | 14.52 | -- | -- | 17.16 | 30.00 | 3.18 | 20.34 | 36.00 |
| HT40 | 2 | 5230 | 21.86 | 22.31 | -- | -- | 25.10 | 30.00 | 3.18 | 28.28 | 36.00 |
| VHT20 | 2 | 5180 | 19.51 | 20.43 | -- | -- | 23.00 | 30.00 | 3.18 | 26.18 | 36.00 |
| VHT20 | 2 | 5200 | 24.47 | 25.04 | -- | -- | 27.77 | 30.00 | 3.18 | 30.95 | 36.00 |
| VHT20 | 2 | 5240 | 22.38 | 23.26 | -- | -- | 25.85 | 30.00 | 3.18 | 29.03 | 36.00 |
| VHT40 | 2 | 5190 | 13.86 | 14.63 | -- | -- | 17.27 | 30.00 | 3.18 | 20.45 | 36.00 |
| VHT40 | 2 | 5230 | 21.98 | 22.43 | -- | -- | 25.22 | 30.00 | 3.18 | 28.40 | 36.00 |
| VHT80 | 2 | 5210 | 12.56 | 13.35 | -- | -- | 15.98 | 30.00 | 3.18 | 19.16 | 36.00 |
| Result | | | Complied | | | | | | | | |



3.4 Peak Power Spectral Density

3.4.1 Peak Power Spectral Density Limit

Peak Power Spectral Density Limit

The maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band

3.4.2 Measuring Instruments

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

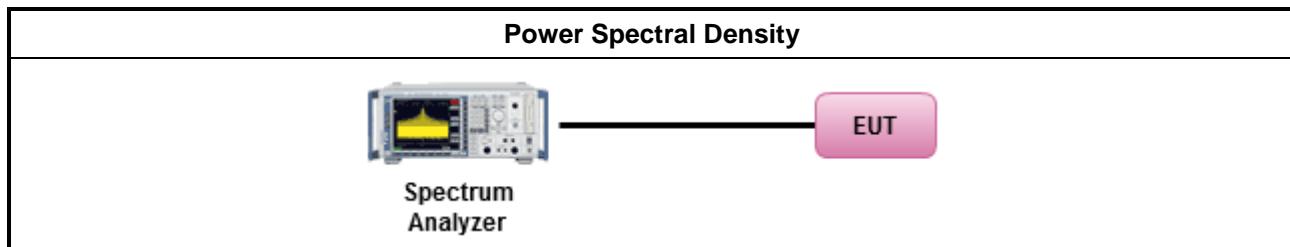
3.4.3 Test Procedures

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 General UNII Test Procedures New Rules v01, F5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth
 - Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-1 (spectral trace averaging).
 - Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)
 - Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-2 (spectral trace averaging).
 - Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
- For conducted measurement.
 - The EUT supports single transmit chain and measurements performed on this transmit chain.
 - The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
 - 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 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.
 - Option 2: 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:
$$\text{PPSD}_{\text{total}} = \text{PPSD}_1 + \text{PPSD}_2 + \dots + \text{PPSD}_n$$
(calculated in linear unit [mW] and transfer to log unit [dBm])
$$\text{EIRP}_{\text{total}} = \text{PPSD}_{\text{total}} + \text{DG}$$
 - Each individually PPSD plots refer as test report clause 3.3.5 with each individually PPSD plots.



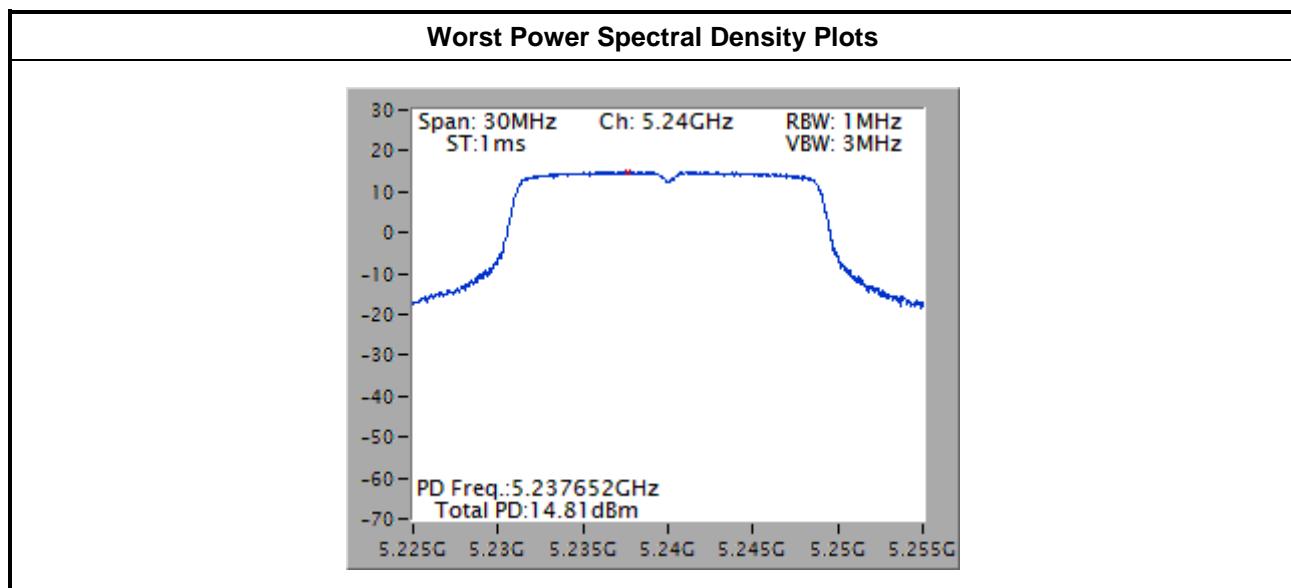
3.4.4 Test Setup



3.4.5 Test Result of Peak Power Spectral Density

Mode 1: Internal antenna with adapter mode

| Peak Power Spectral Density Result (5150-5250MHz band) | | | | | | | |
|--|-----------------|-------------|---------------------------------------|-----------|----------|----------|------------|
| Condition | | | Peak Power Spectral Density (dBm/MHz) | | | | |
| Modulation Mode | N _{TX} | Freq. (MHz) | Sum Chain | PSD Limit | DG (dBi) | EIRP PSD | EIRP Limit |
| 11a | 2 | 5180 | 9.75 | 15.22 | 7.78 | 17.53 | 23 |
| 11a | 2 | 5200 | 14.17 | 15.22 | 7.78 | 21.95 | 23 |
| 11a | 2 | 5240 | 14.74 | 15.22 | 7.78 | 22.52 | 23 |
| VHT20 | 2 | 5180 | 8.92 | 15.22 | 7.78 | 16.70 | 23 |
| VHT20 | 2 | 5200 | 14.00 | 15.22 | 7.78 | 21.78 | 23 |
| VHT20 | 2 | 5240 | 14.81 | 15.22 | 7.78 | 22.59 | 23 |
| VHT40 | 2 | 5190 | -0.36 | 15.22 | 7.78 | 7.42 | 23 |
| VHT40 | 2 | 5230 | 7.61 | 15.22 | 7.78 | 15.39 | 23 |
| VHT80 | 2 | 5210 | -5.58 | 15.22 | 7.78 | 2.20 | 23 |
| Result | | | Complied | | | | |



Note:

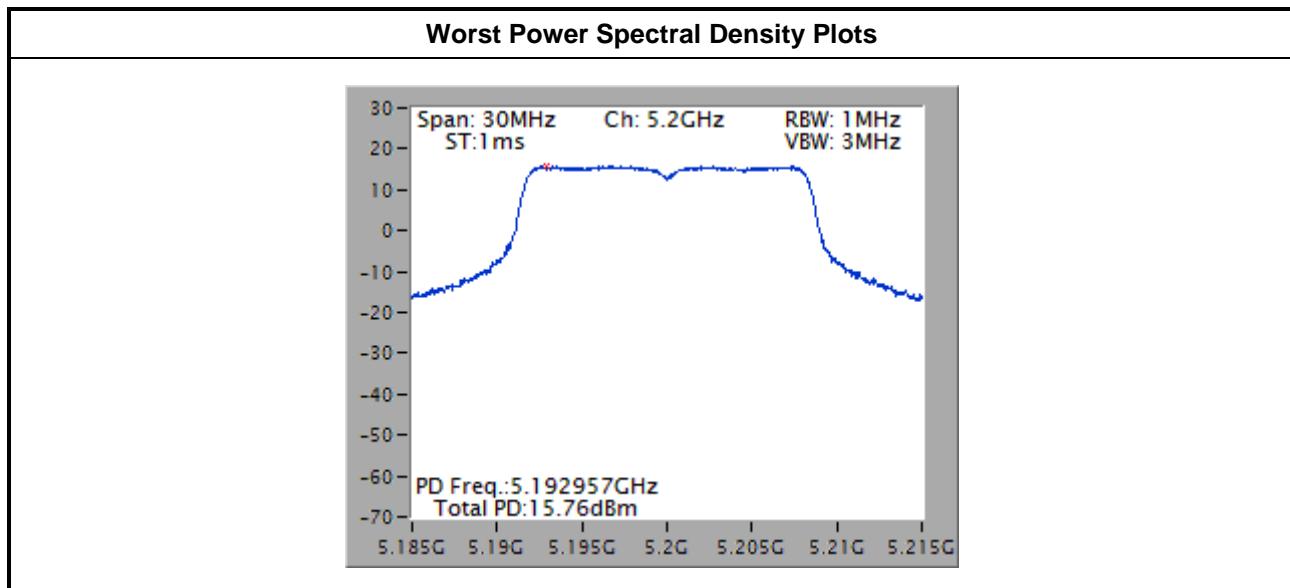
1. Peak Power Spectral Density w/o Duty Factor.
2. Test results are bin-by-bin summing measured value of each TX port.

$$\text{Directional gain} = 10 * \log((10^{5.40/20} + 10^{4.08/20})^2 / 2) = 7.78 \text{ dBi} > 6 \text{ dBi}$$

$$\text{Limit shall be reduced to } 17 \text{ dBm} - (7.78 \text{ dBi} - 6 \text{ dBi}) = 15.22 \text{ dBm}$$

Mode 2: External antenna with adapter mode

| Peak Power Spectral Density Result (5150-5250MHz band) | | | | | | | |
|--|-----------------|-------------|---------------------------------------|-----------|----------|----------|------------|
| Condition | | | Peak Power Spectral Density (dBm/MHz) | | | | |
| Modulation Mode | N _{TX} | Freq. (MHz) | Sum Chain | PSD Limit | DG (dBi) | EIRP PSD | EIRP Limit |
| 11a | 2 | 5180 | 10.55 | 16.81 | 6.19 | 16.74 | 23 |
| 11a | 2 | 5200 | 15.76 | 16.81 | 6.19 | 21.95 | 23 |
| 11a | 2 | 5240 | 15.33 | 16.81 | 6.19 | 21.52 | 23 |
| VHT20 | 2 | 5180 | 10.28 | 16.81 | 6.19 | 16.47 | 23 |
| VHT20 | 2 | 5200 | 15.09 | 16.81 | 6.19 | 21.28 | 23 |
| VHT20 | 2 | 5240 | 12.94 | 16.81 | 6.19 | 19.13 | 23 |
| VHT40 | 2 | 5190 | 1.51 | 16.81 | 6.19 | 7.70 | 23 |
| VHT40 | 2 | 5230 | 9.38 | 16.81 | 6.19 | 15.57 | 23 |
| VHT80 | 2 | 5210 | -3.41 | 16.81 | 6.19 | 2.78 | 23 |
| Result | | | Complied | | | | |



Note:

1. Peak Power Spectral Density w/o Duty Factor.
2. Test results are bin-by-bin summing measured value of each TX port.
 Directional gain = $3.18 + 10 \log(2/1) = 6.19 \text{ dBi} > 6 \text{ dBi}$.
 Limit shall be reduced to $17 \text{ dBm} - (6.19 \text{ dBi} - 6 \text{ dBi}) = 16.81 \text{ dBm}$



3.5 Transmitter Radiated Unwanted Emissions and Band Edge

3.5.1 Transmitter Radiated Unwanted Emissions and Band Edge 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 |

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.

| Un-restricted band emissions above 1GHz Limit | |
|---|---|
| Operating Band | Limit |
| 5.15 - 5.25 GHz | e.i.r.p. -27 dBm [68.2 dBuV/m@3m] |
| 5.25 - 5.35 GHz | e.i.r.p. -27 dBm [68.2 dBuV/m@3m] |
| 5.47 - 5.725 GHz | e.i.r.p. -27 dBm [68.2 dBuV/m@3m] |
| 5.725 - 5.825 GHz | 5.715 5.725 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] 5.825 5.835 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] Other un-restricted band: e.i.r.p. -27 dBm [68.2 dBuV/m@3m] |

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

3.5.2 Measuring Instruments

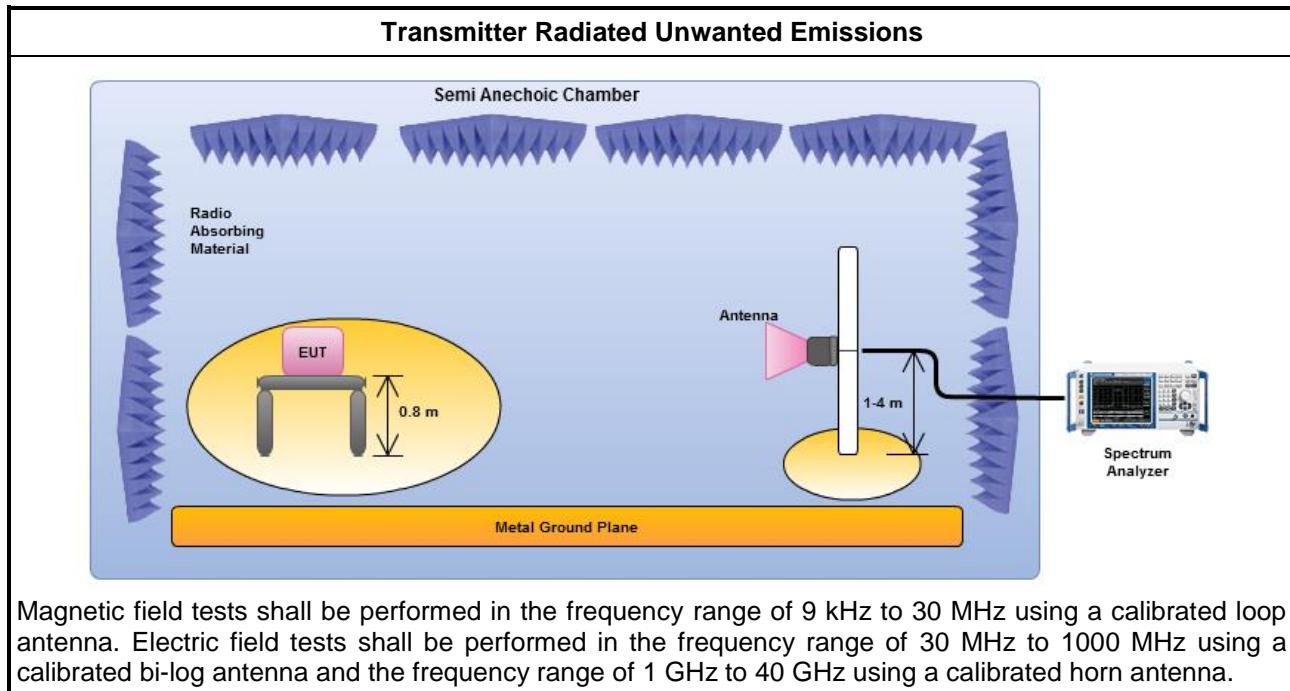
Refer a test equipment and calibration data table in this test report.



3.5.3 Test Procedures

| Test Method |
|--|
| <input checked="" type="checkbox"/> 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). |
| <input checked="" type="checkbox"/> For the transmitter unwanted emissions shall be measured using following options below: |
| <input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause G)2) for unwanted emissions into non-restricted bands. |
| <input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause G)1) for unwanted emissions into restricted bands. |
| <input type="checkbox"/> Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, G)6) Method AD (Trace Averaging). |
| <input type="checkbox"/> Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, G)6) Method VB (Reduced VBW). |
| <input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). $VBW \geq 1/T$, where T is pulse time. |
| <input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions. |
| <input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause G)5) measurement procedure peak limit. |
| <input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit. |
| <input checked="" type="checkbox"/> For radiated measurement. |
| <input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz. |
| <input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz. |
| <input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.6 for radiated emissions from above 1 GHz. |
| <input type="checkbox"/> For conducted and cabinet radiation measurement, refer as FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, clause G)3). |
| <input type="checkbox"/> For conducted unwanted emissions into non-restricted bands (relative emission limits). Devices with multiple transmit chains: Refer as FCC KDB 662911, when testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding 10 log(N) if the measurements are made relative to the in-band emissions on the individual outputs. |
| <input type="checkbox"/> For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB |
| <input type="checkbox"/> For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred. |

3.5.4 Test Setup



Note: Test distance is 3m.

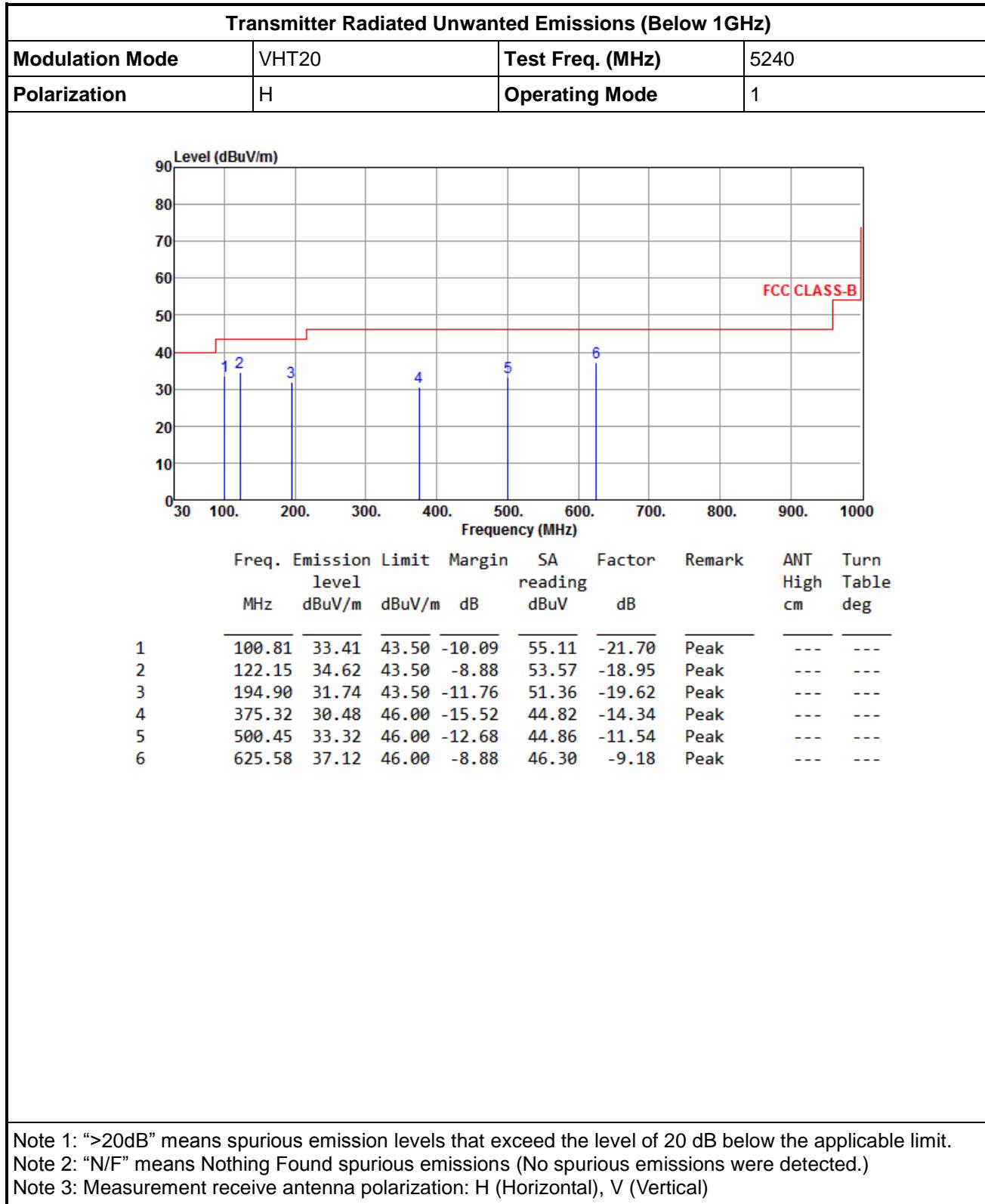
3.5.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

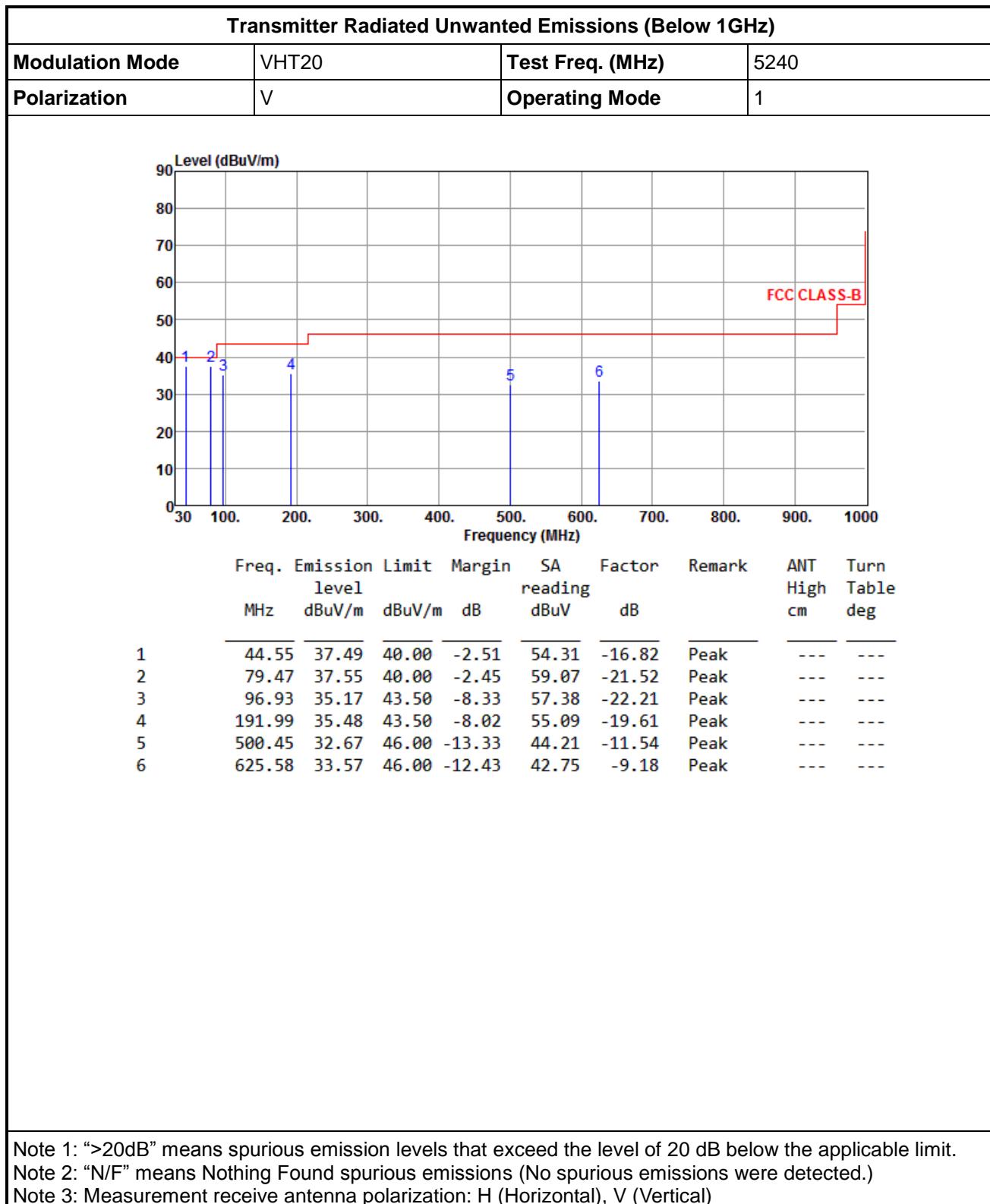
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.



3.5.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

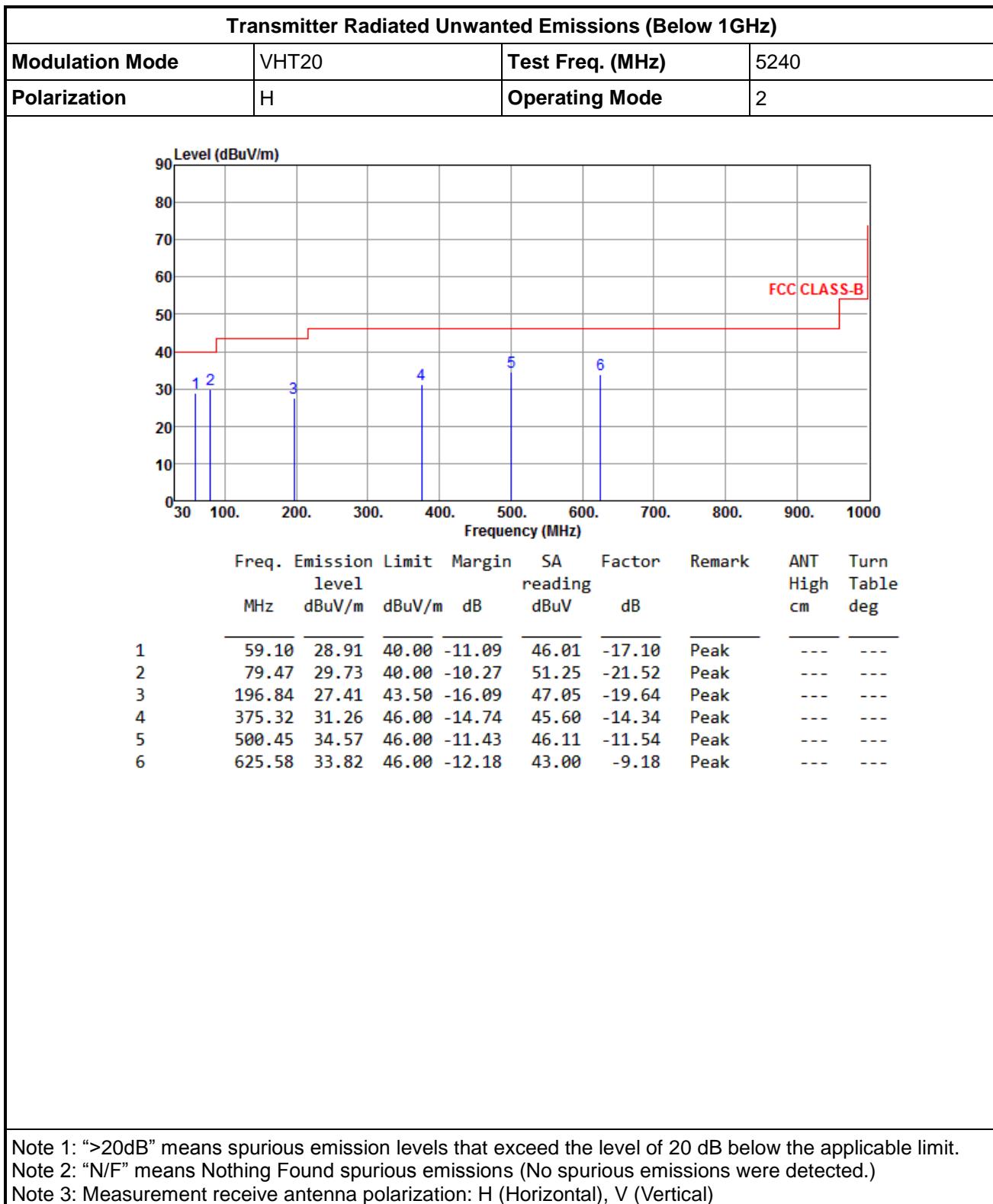
Mode 1: Internal antenna with adapter mode







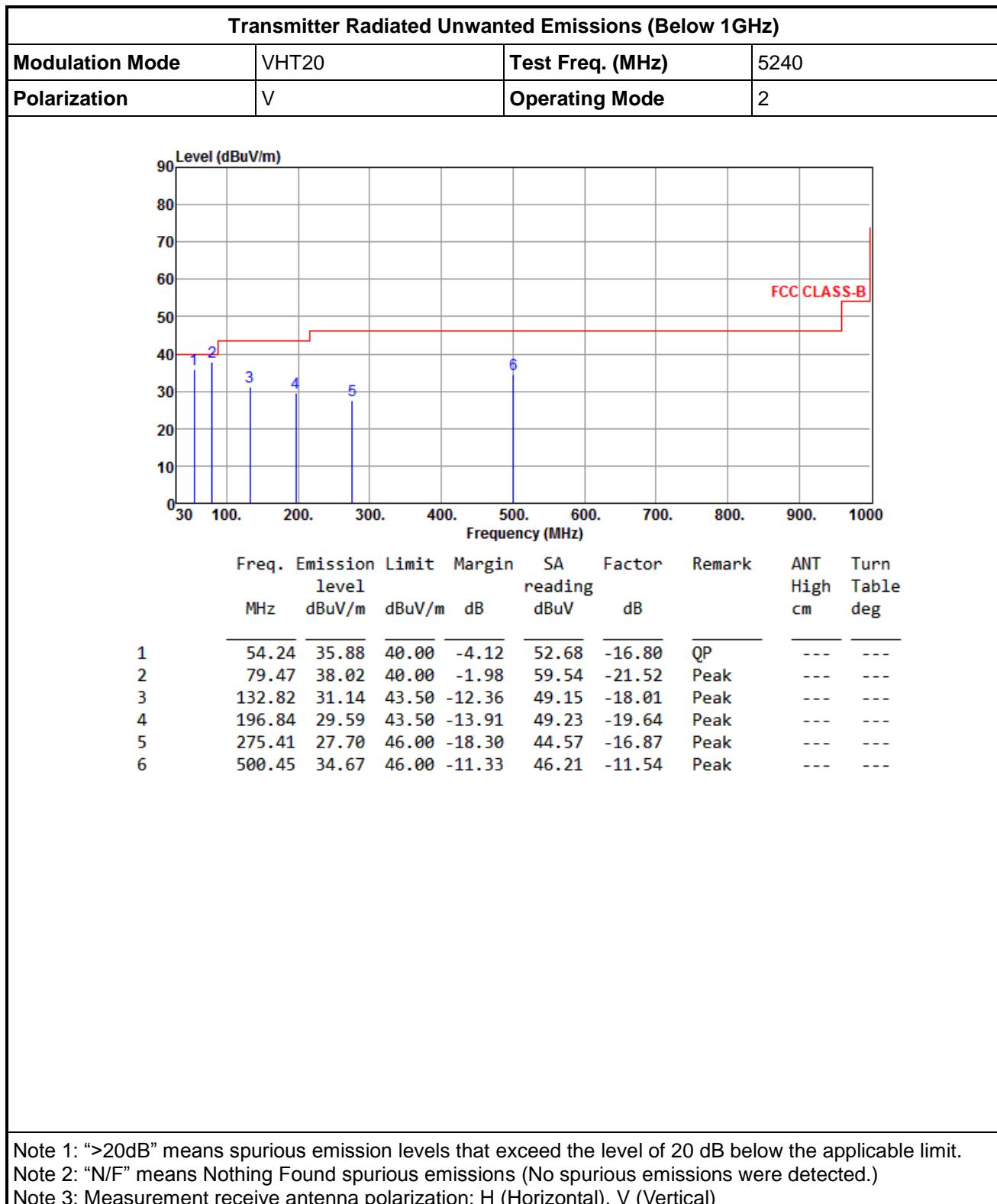
Mode 2: Internal antenna with POE mode



Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

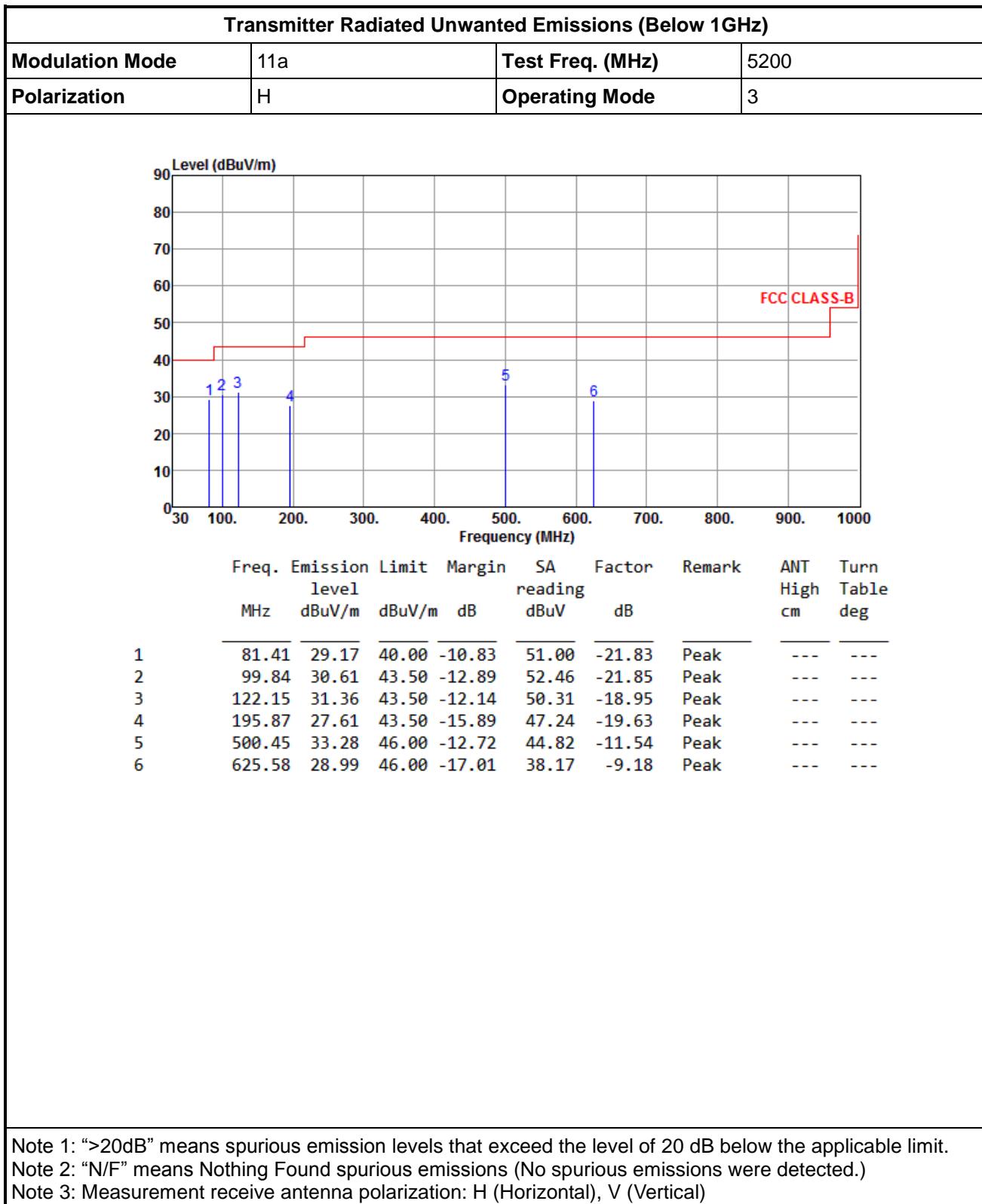
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

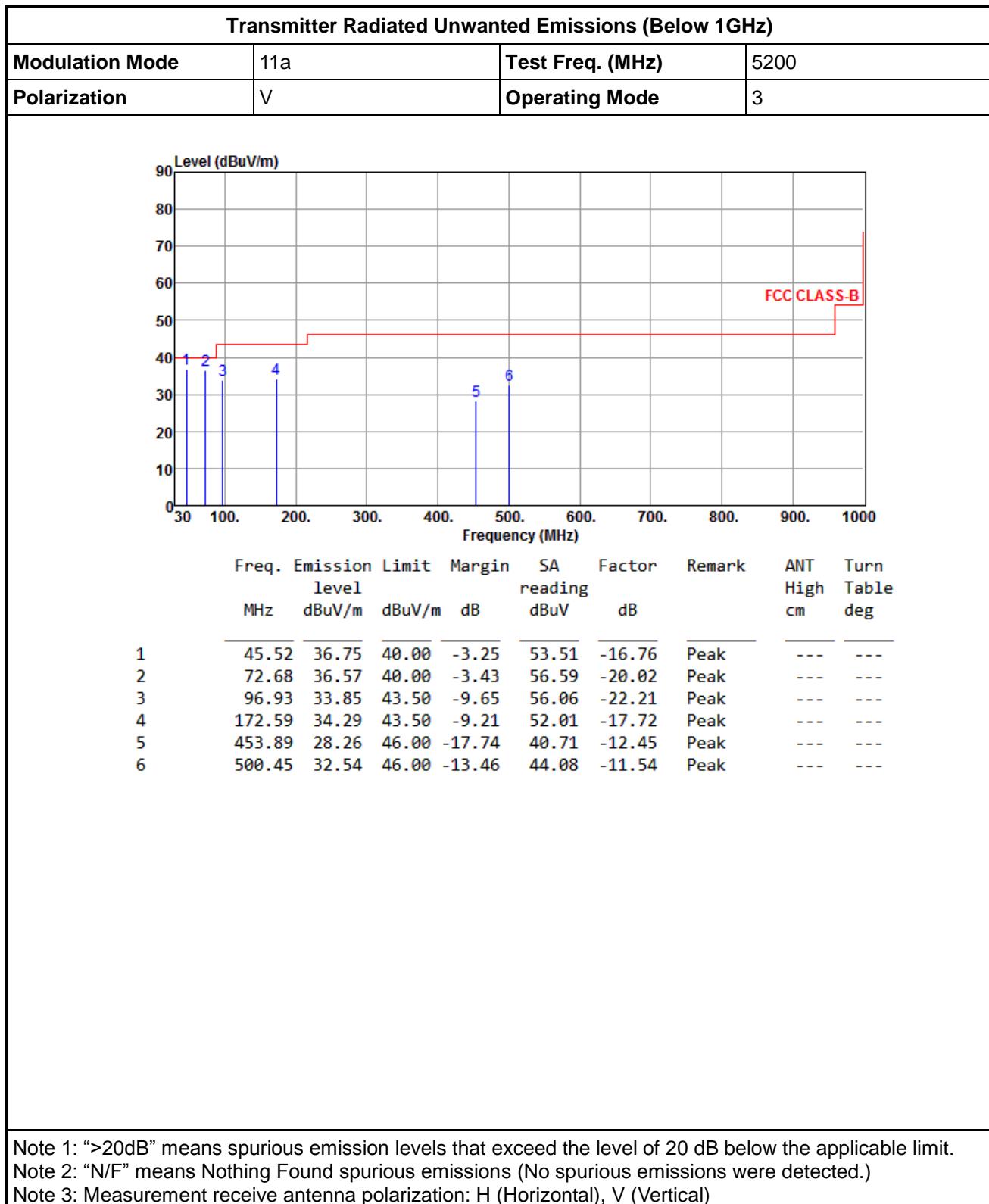
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)





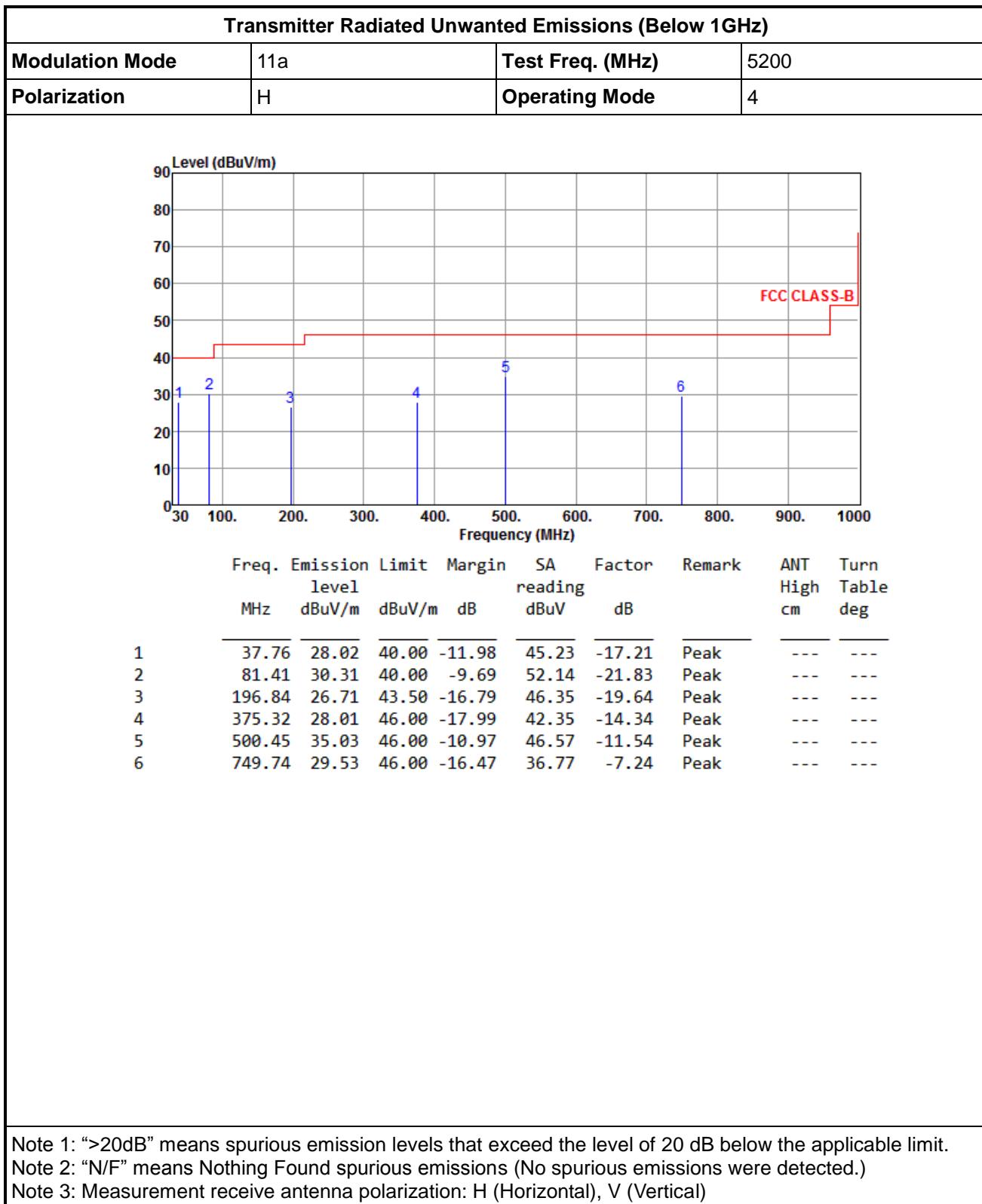
Mode 3: External antenna with adapter mode

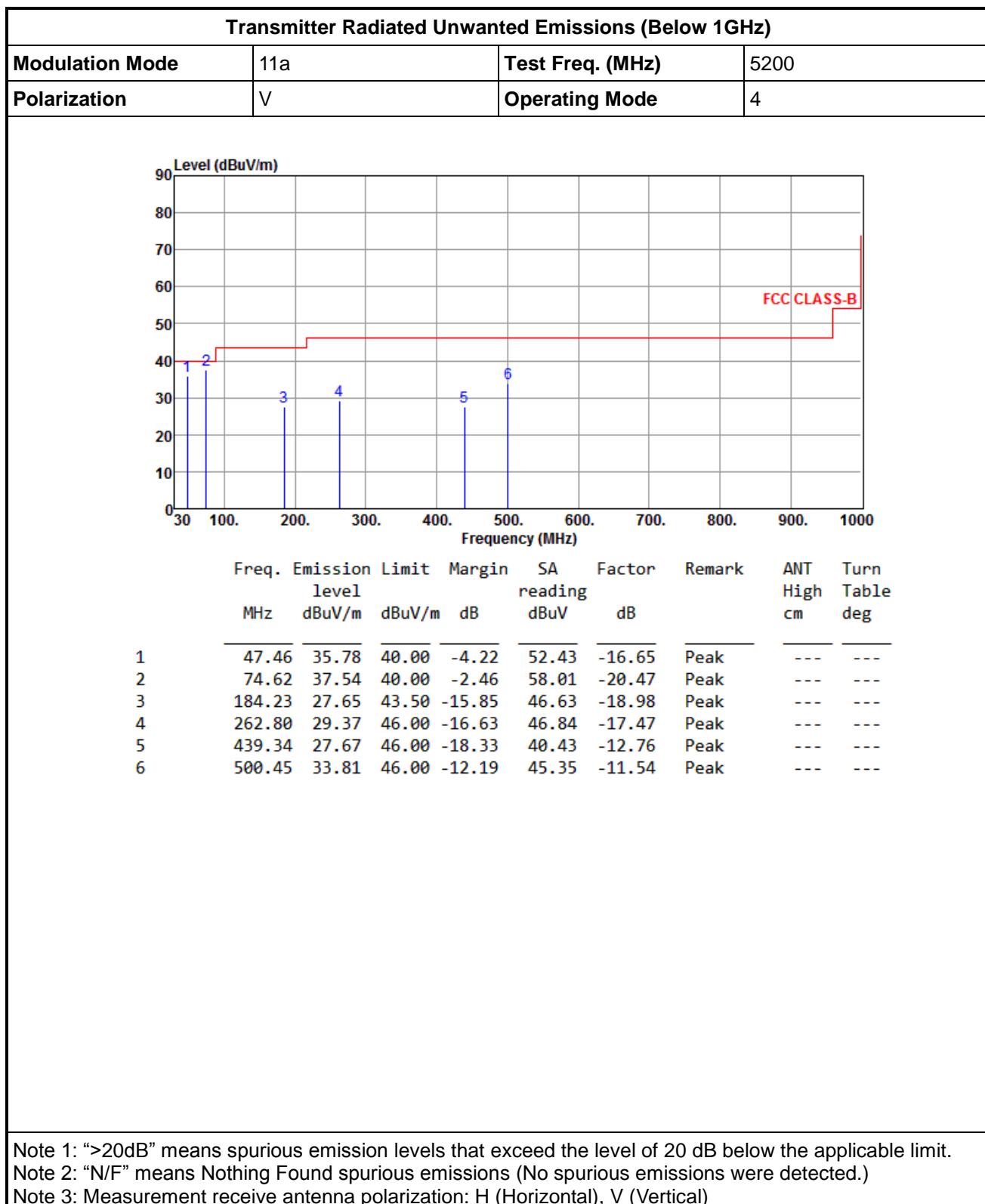






Mode 4: External antenna with POE mode

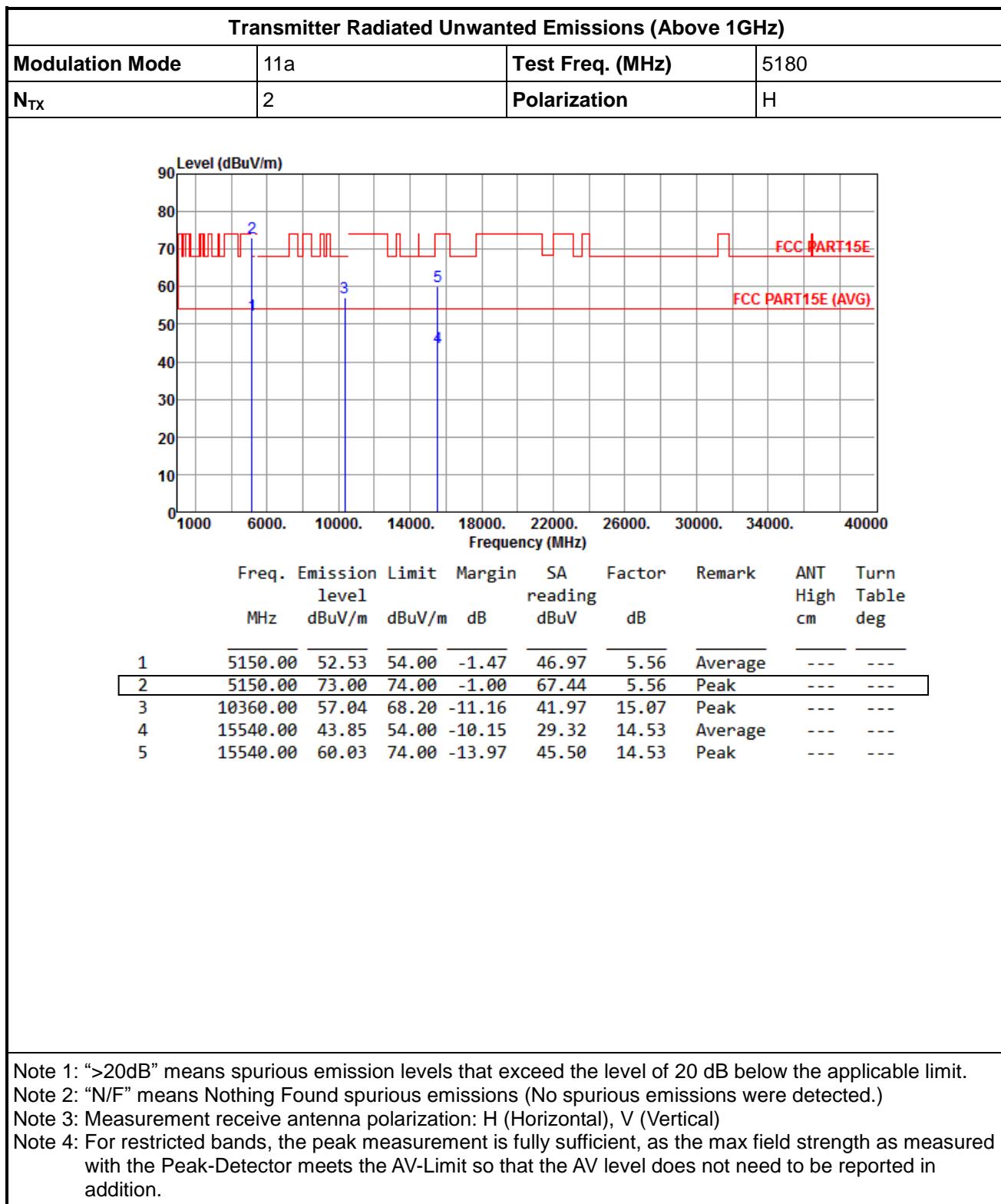


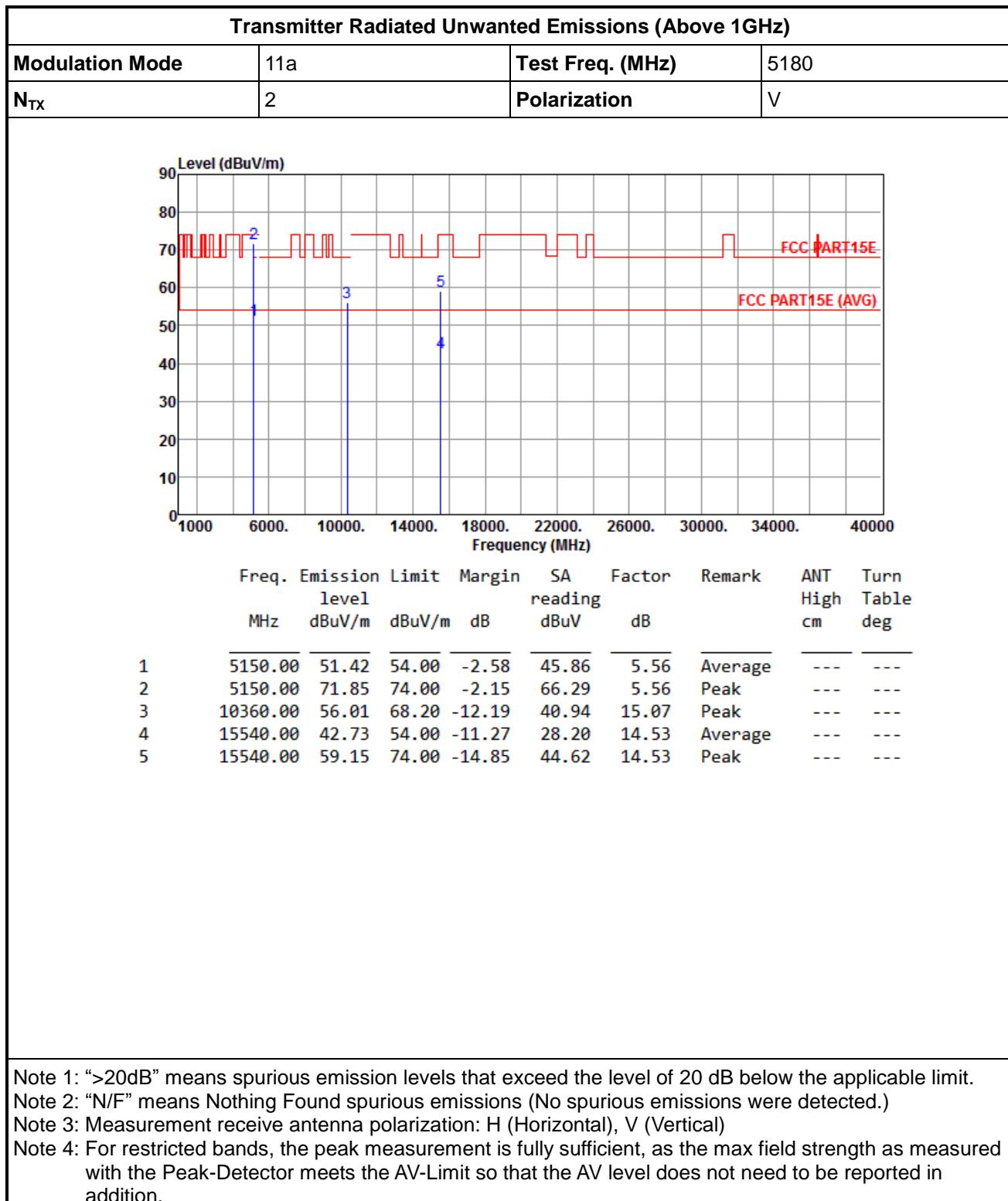


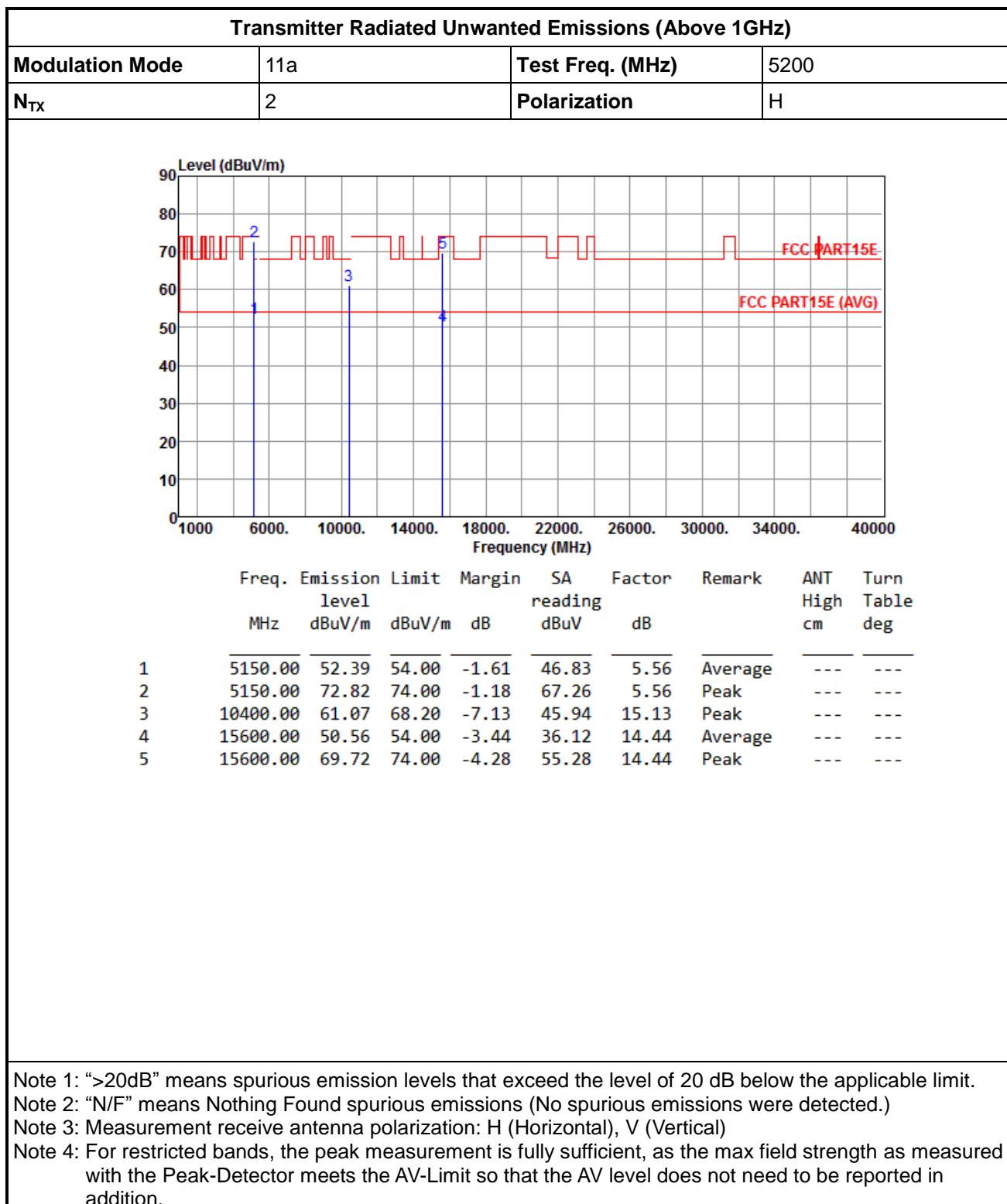


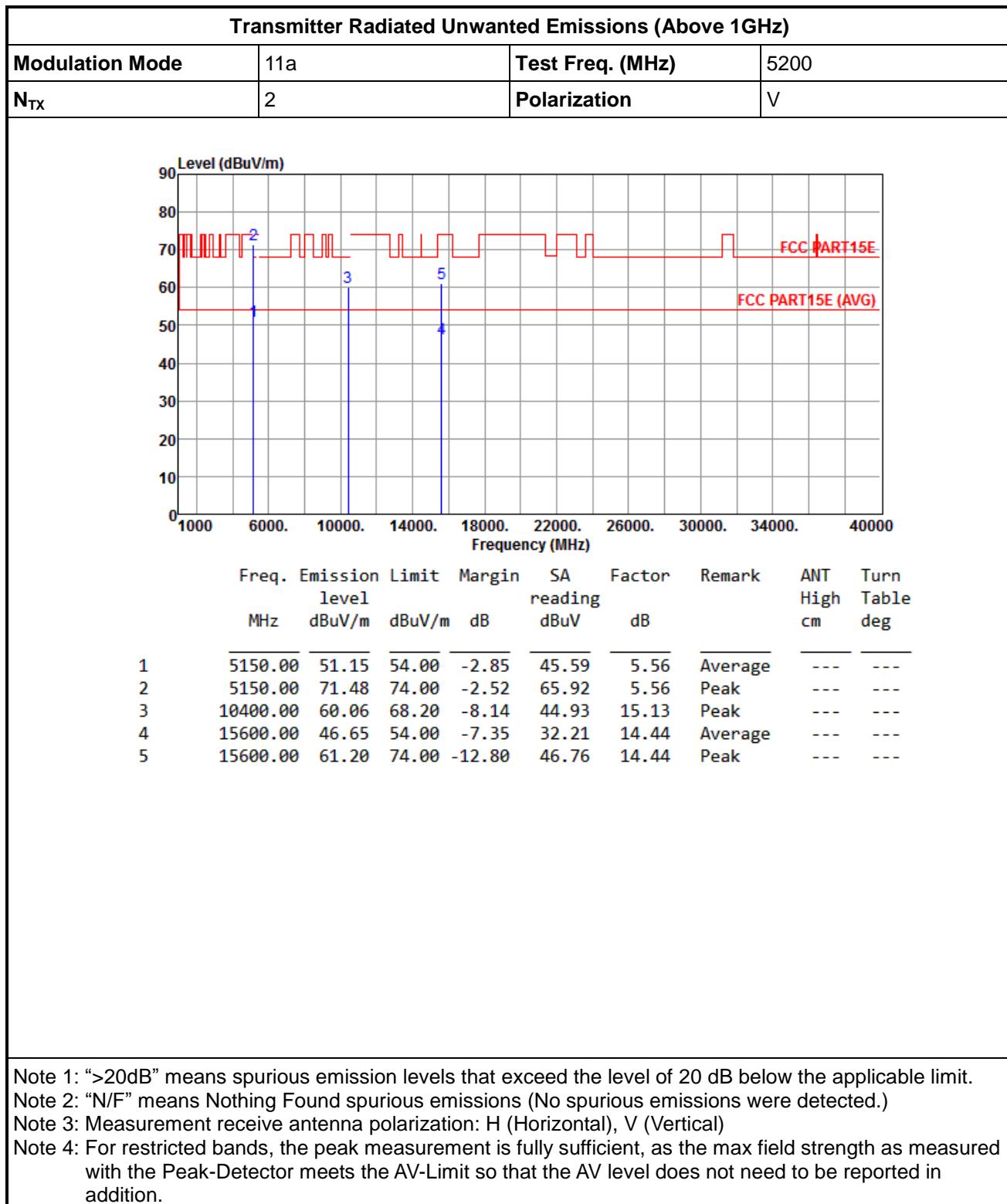
3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)

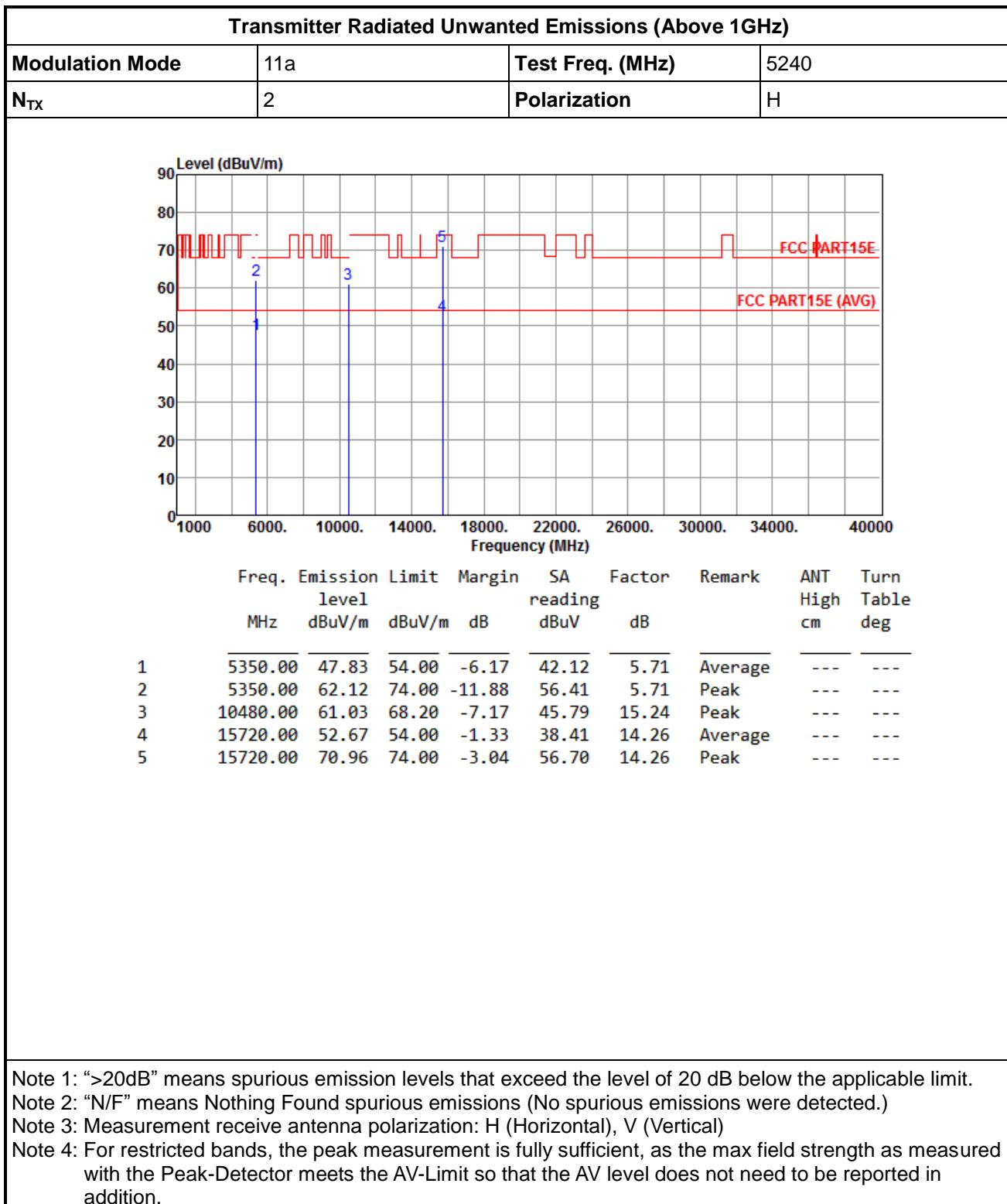
Mode 1: Internal antenna with adapter mode

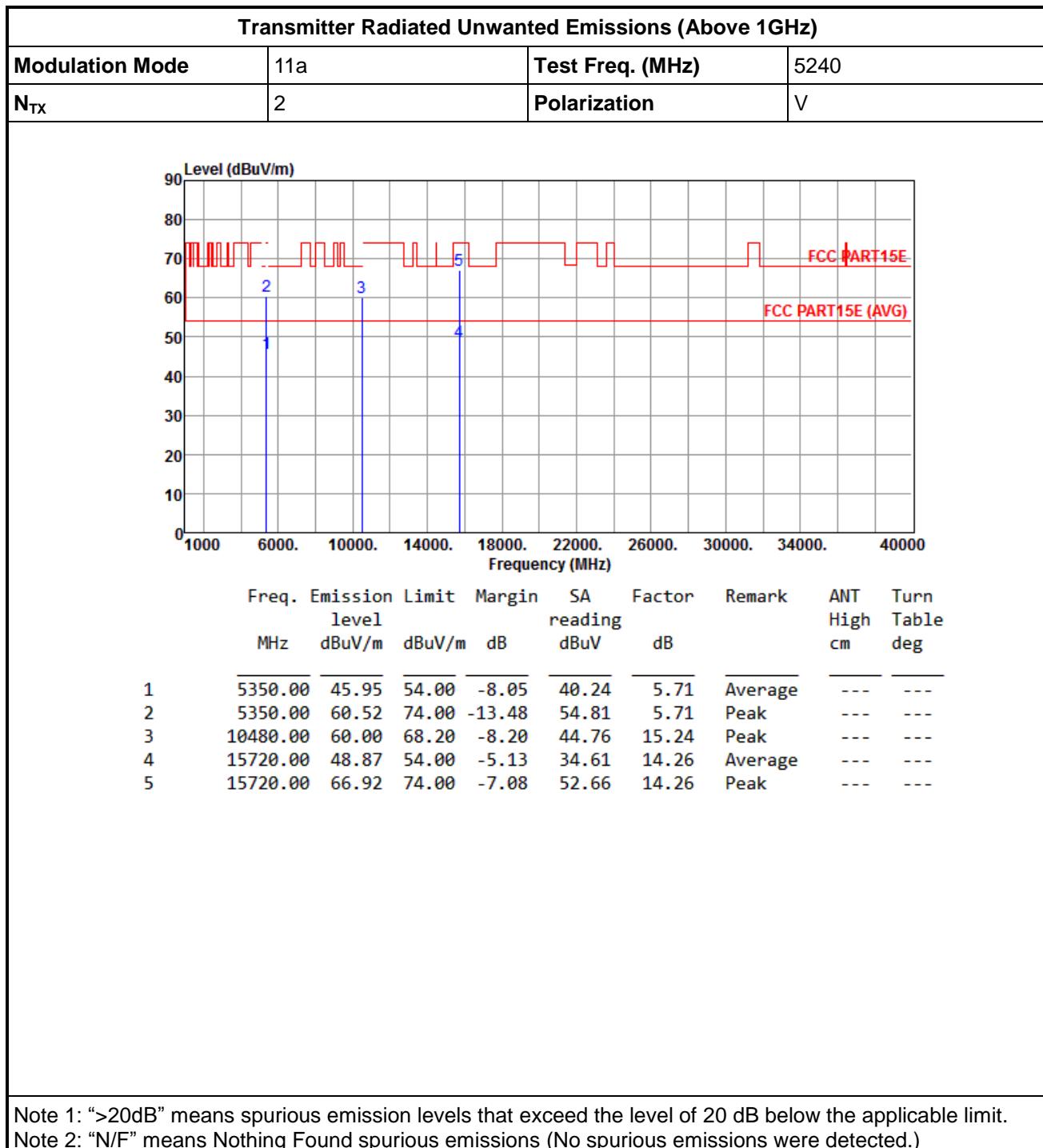


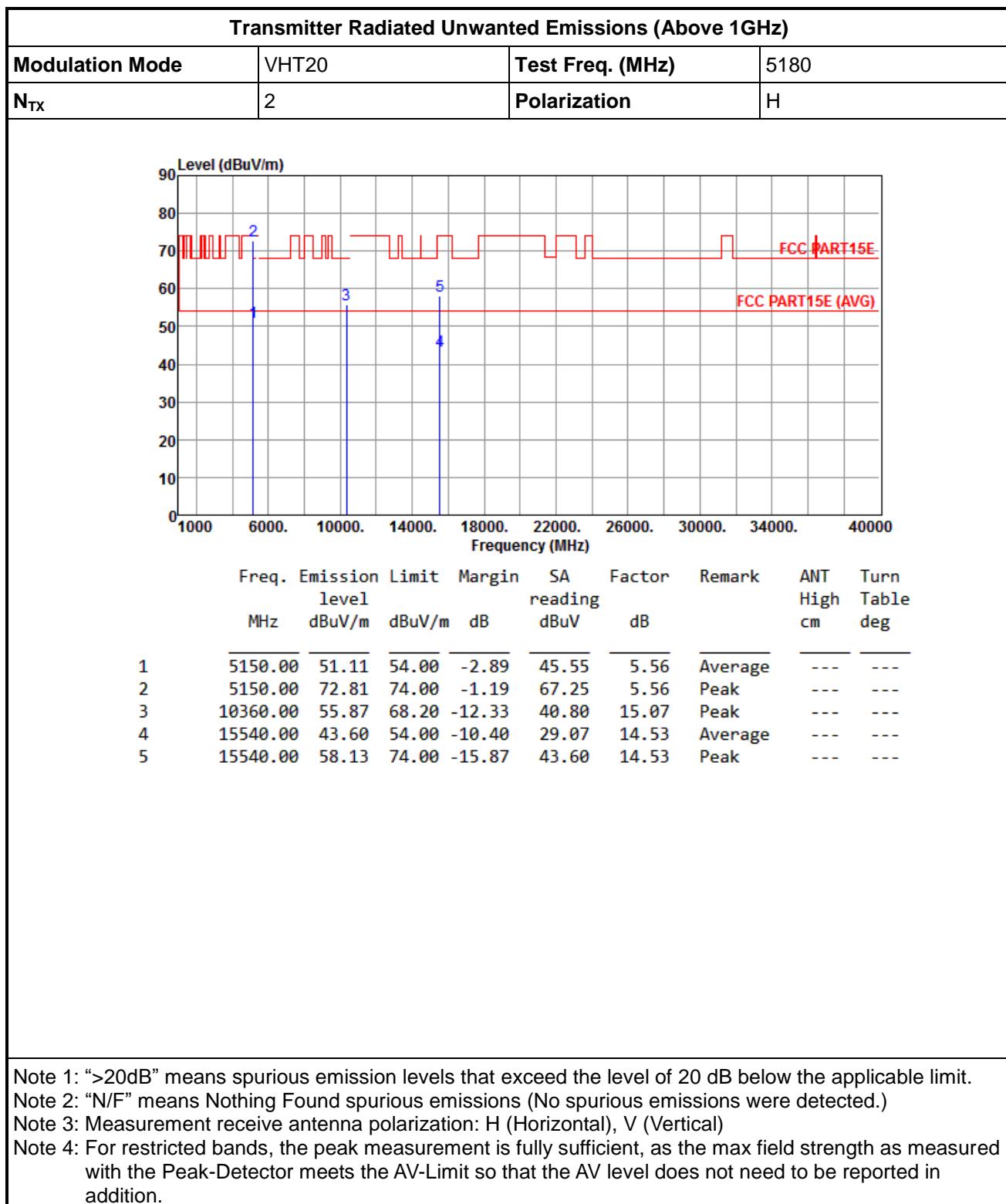


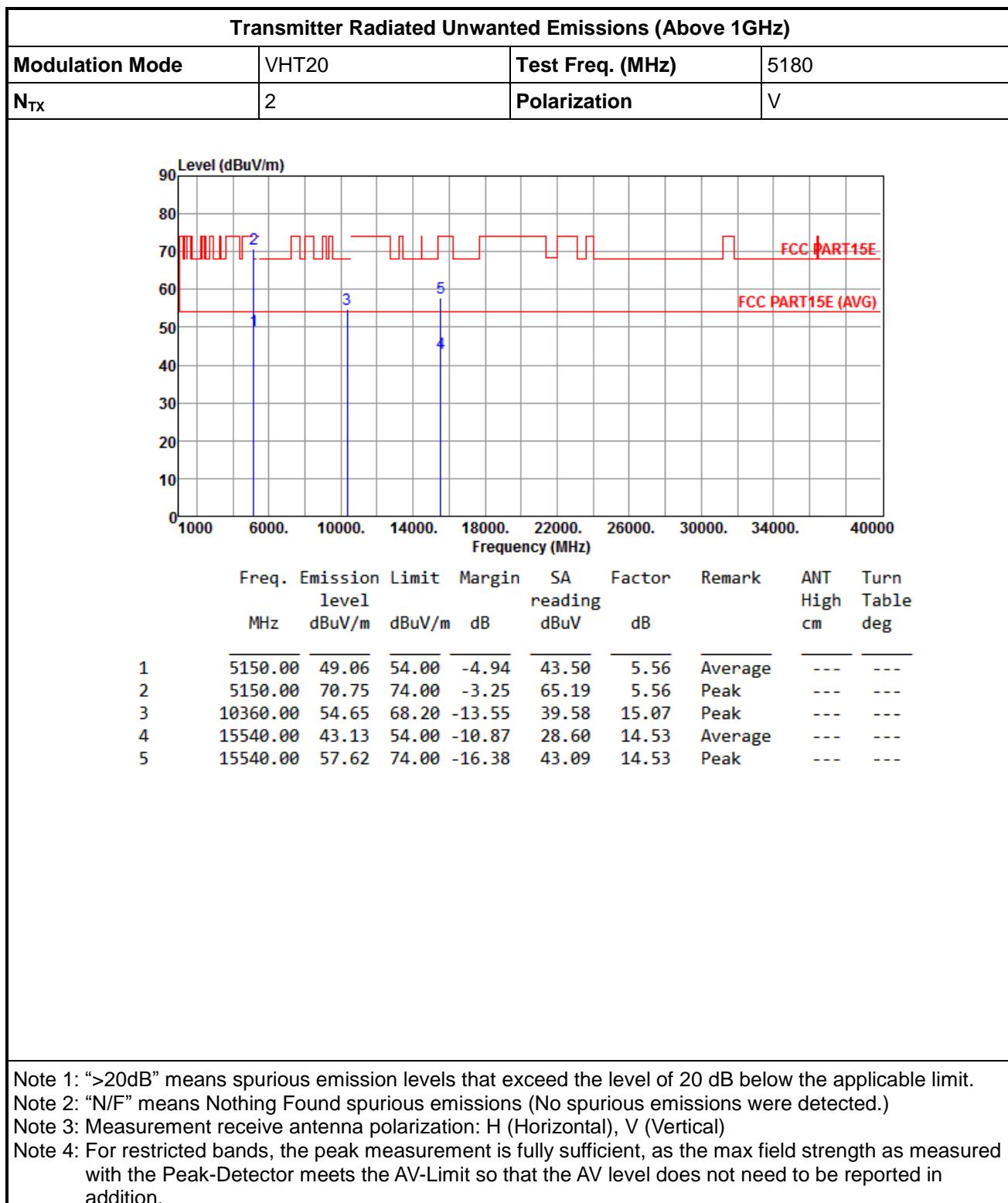


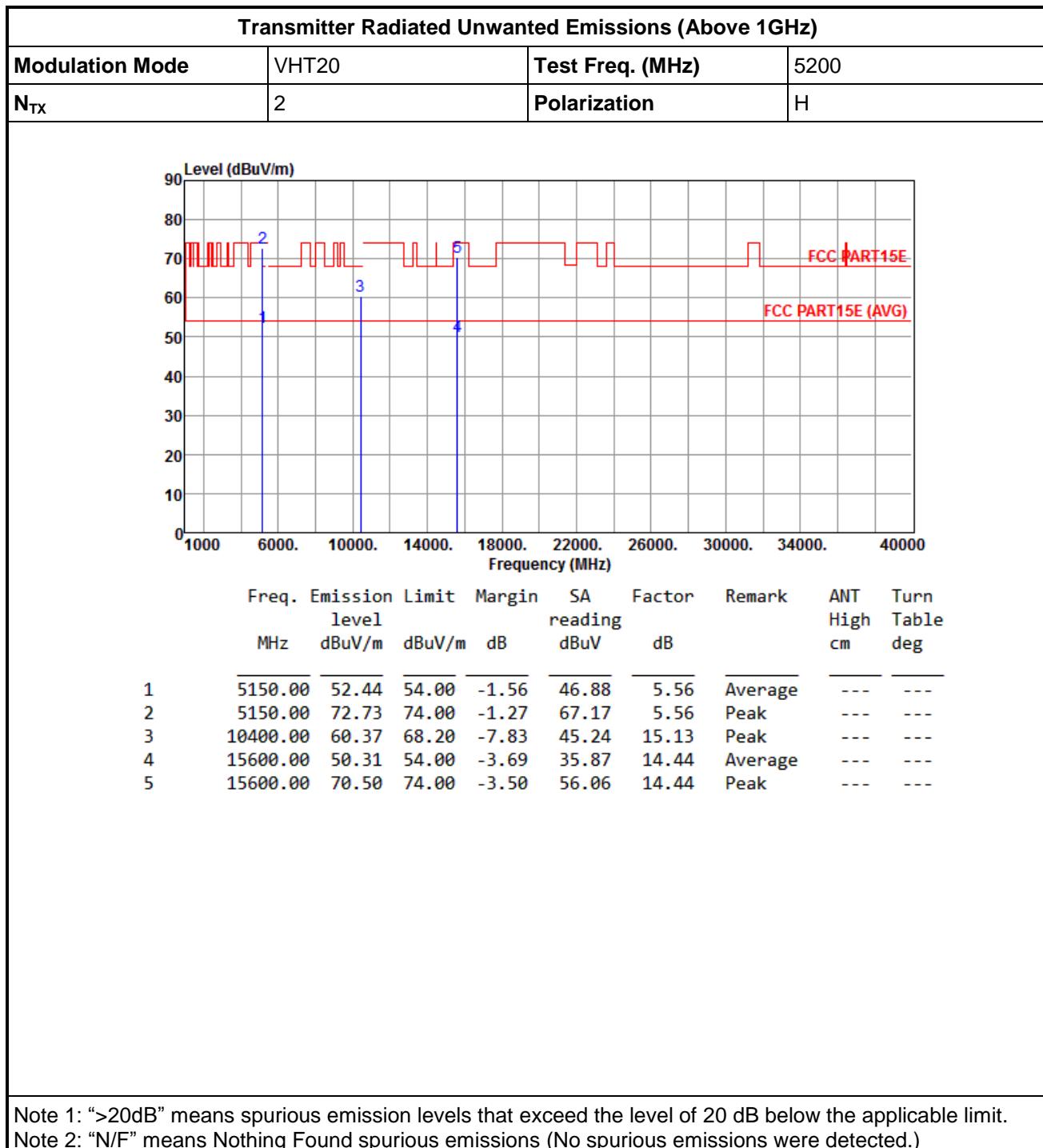


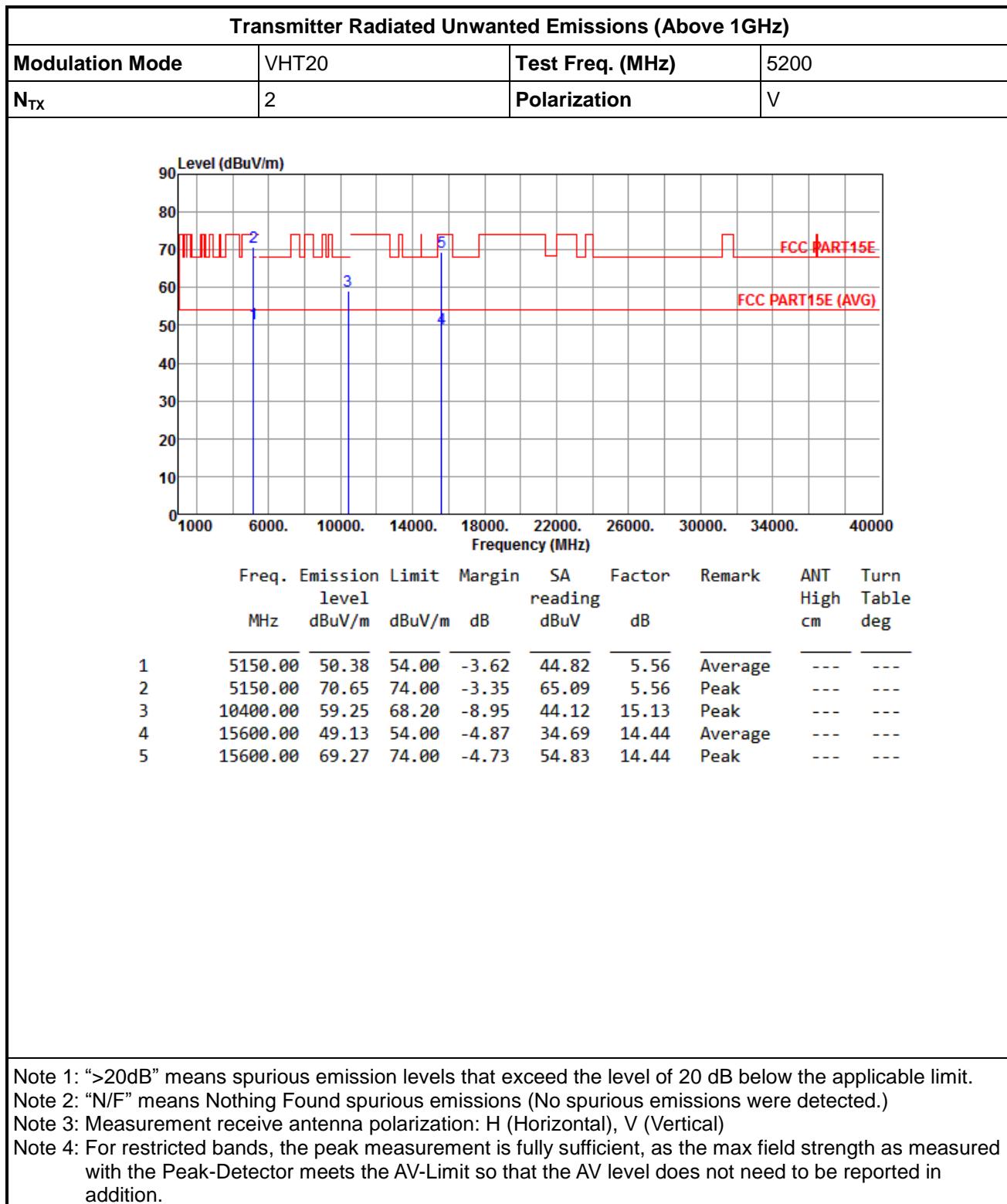










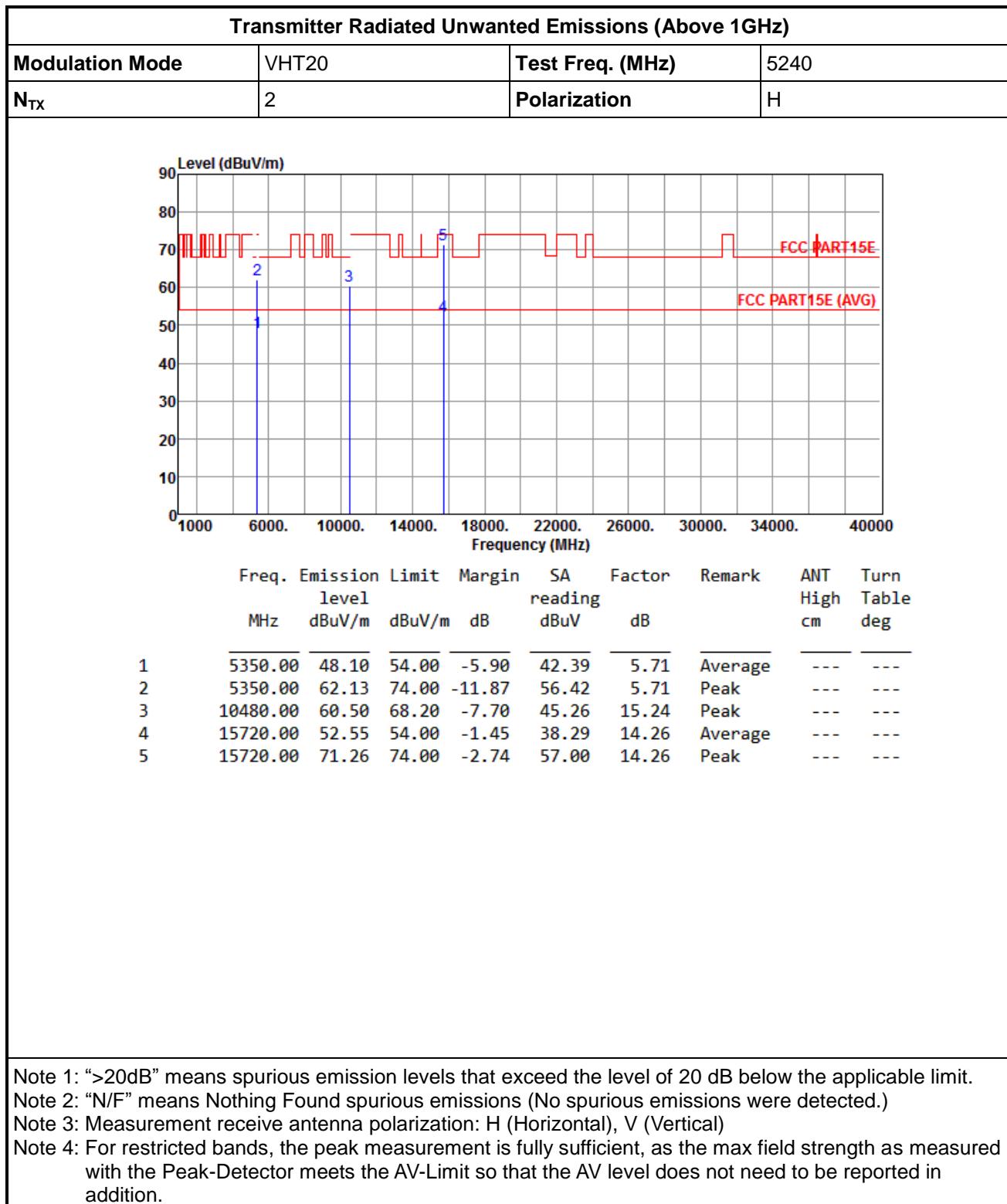


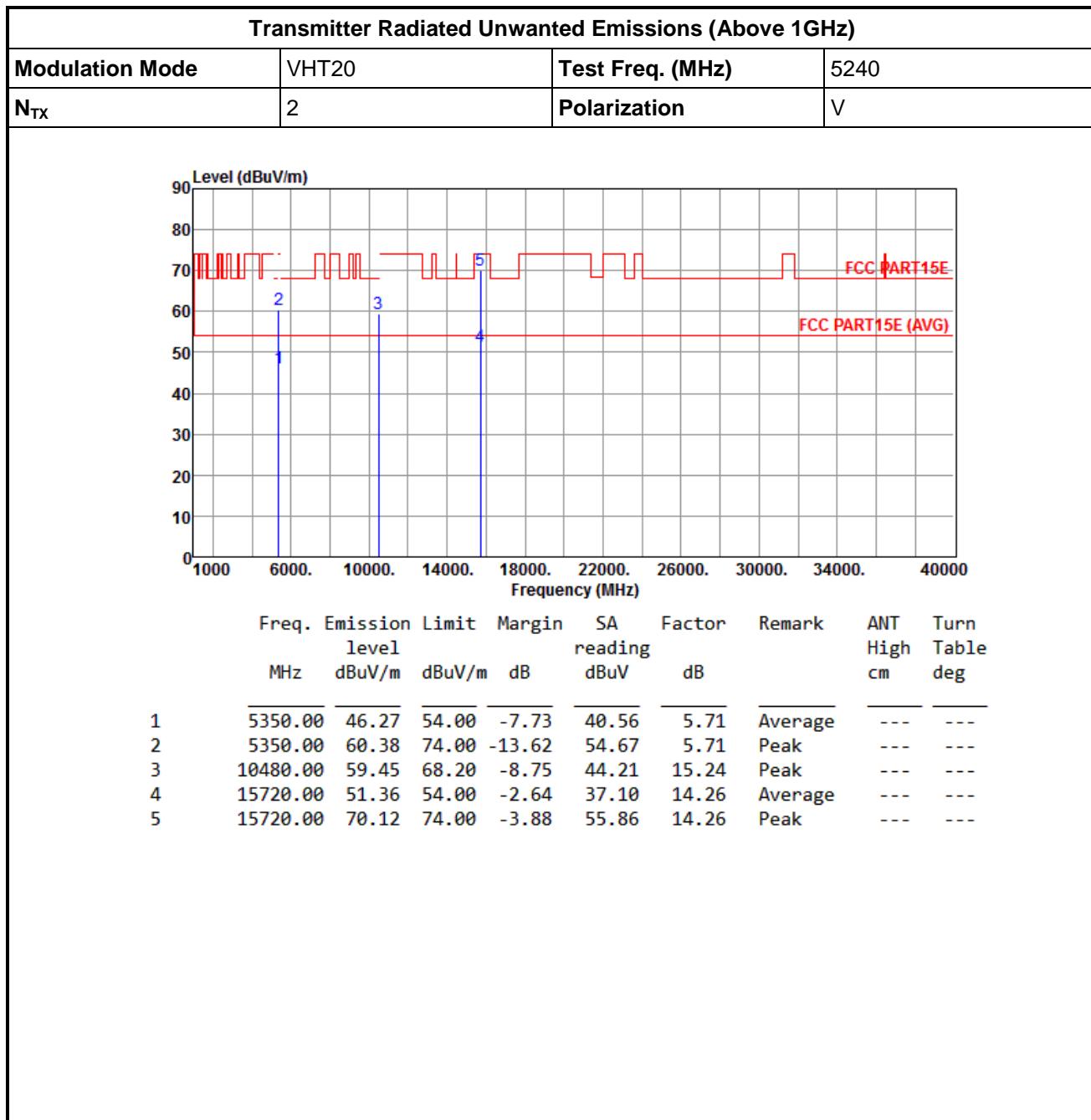
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.



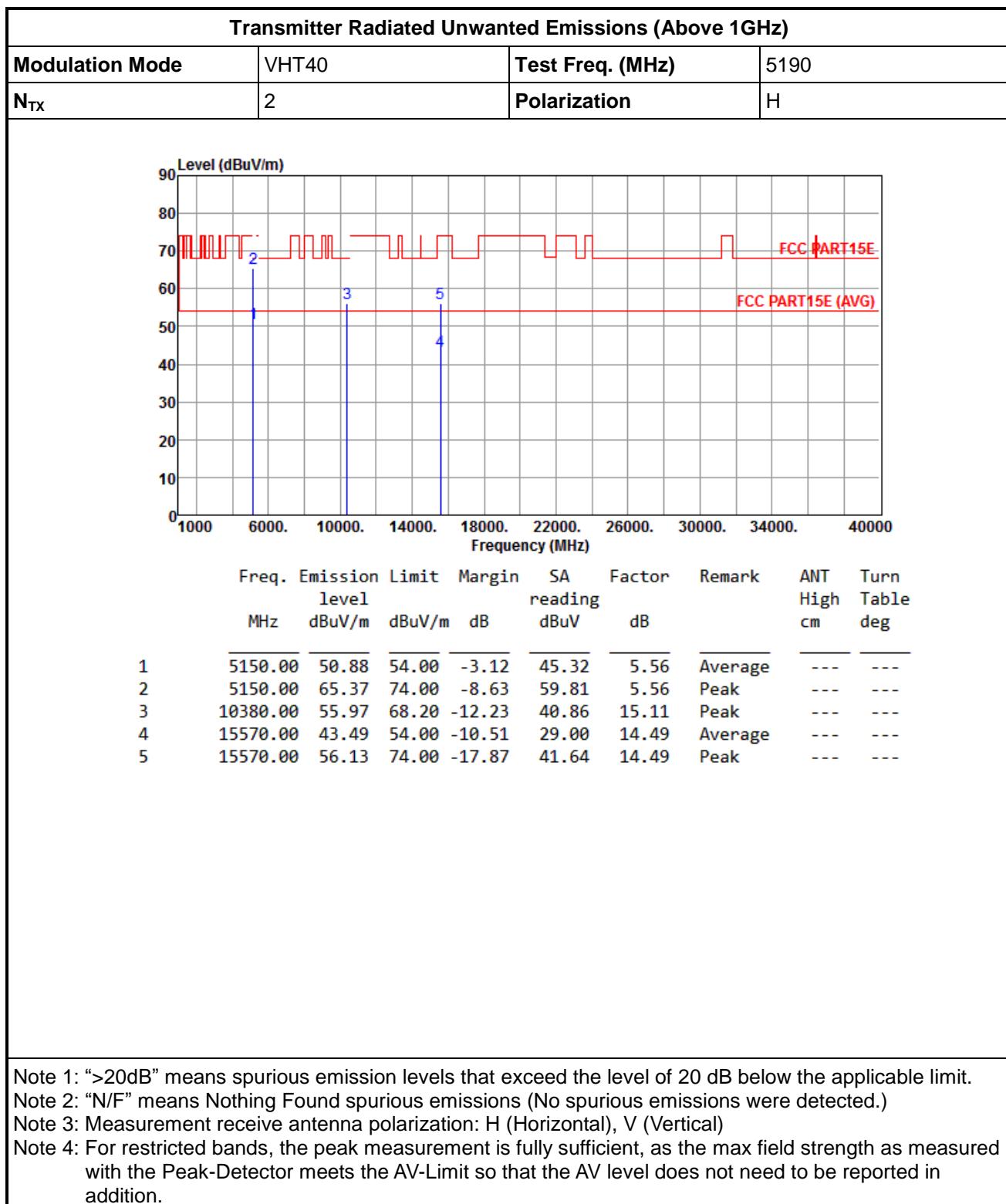


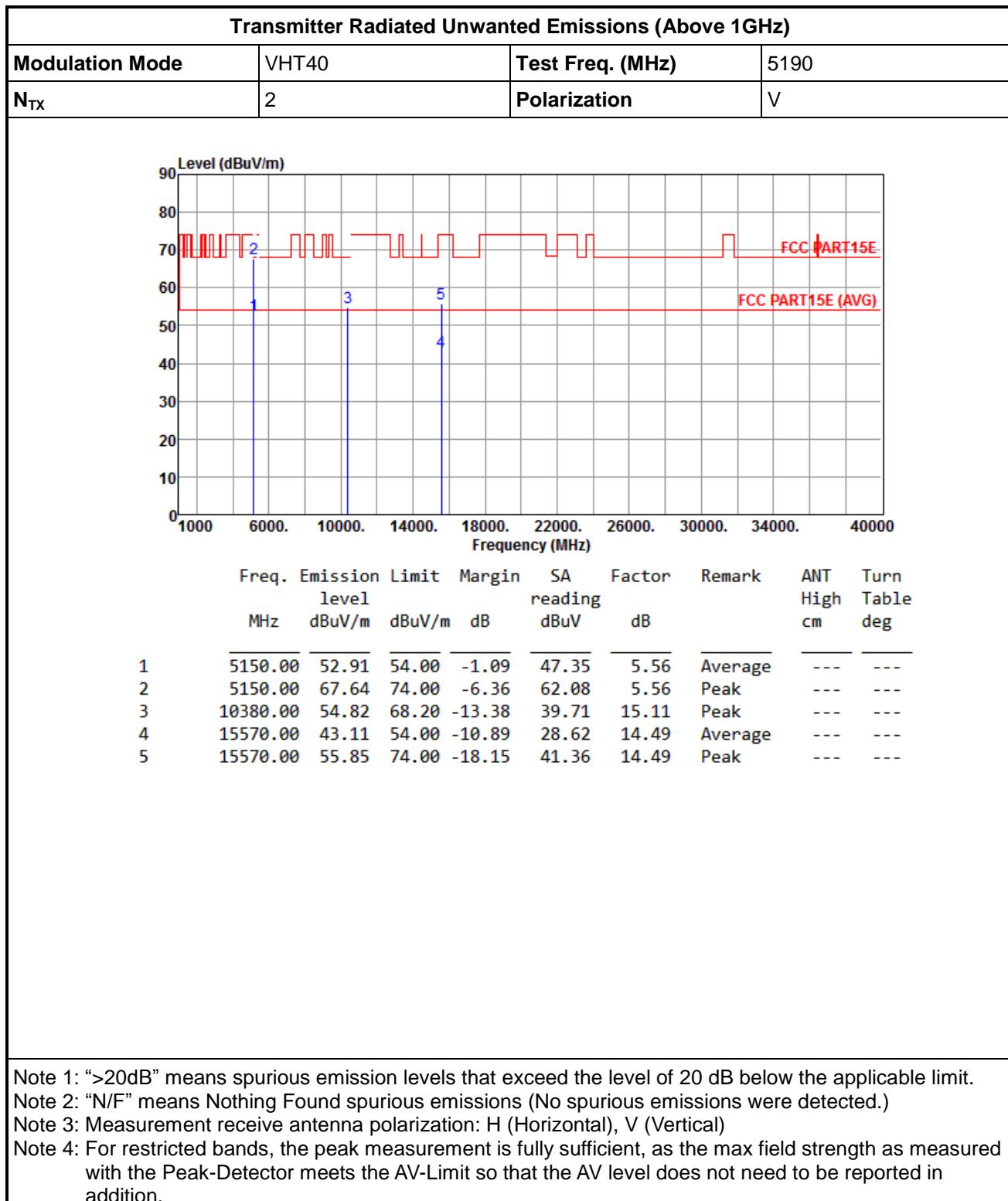
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

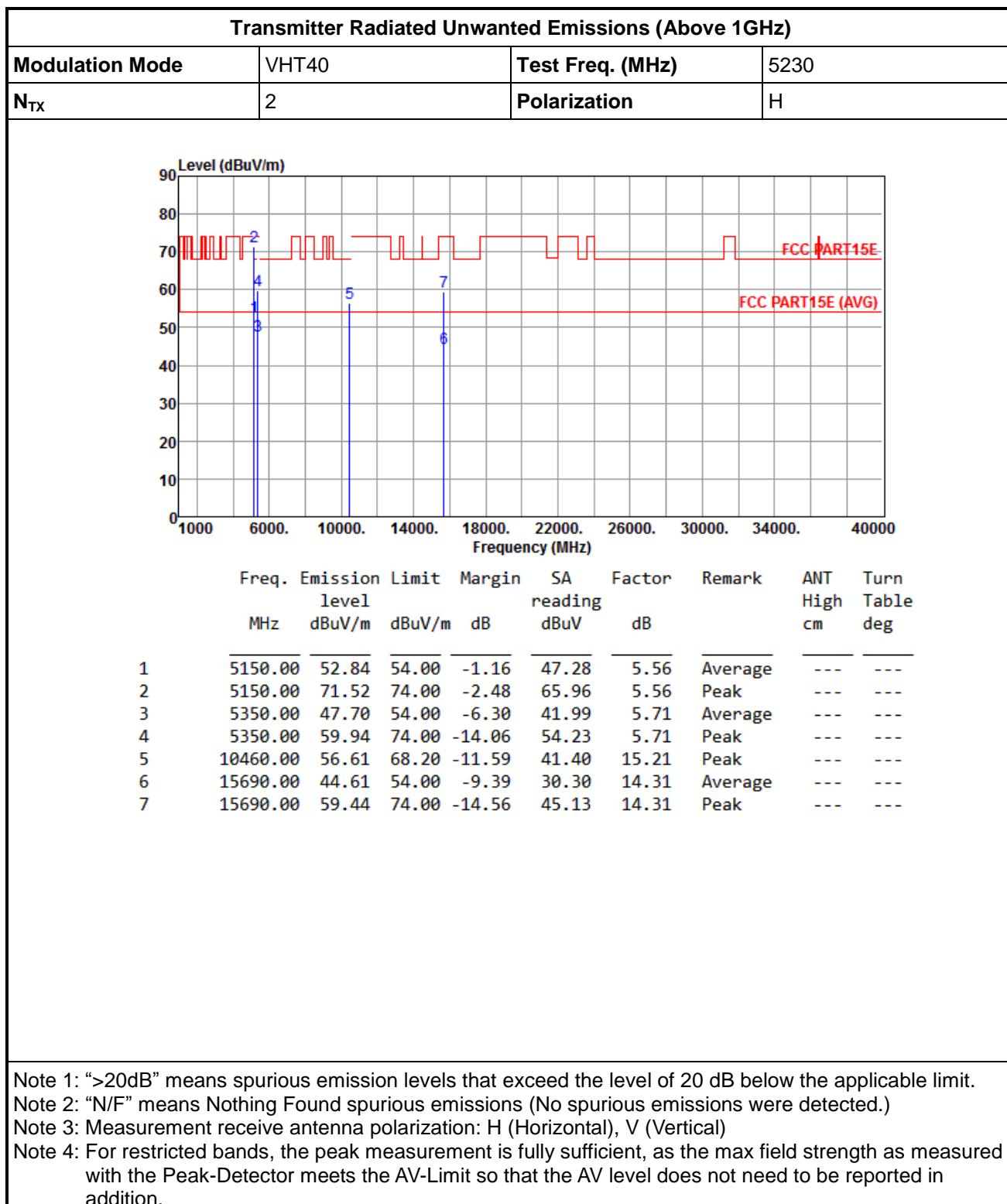
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

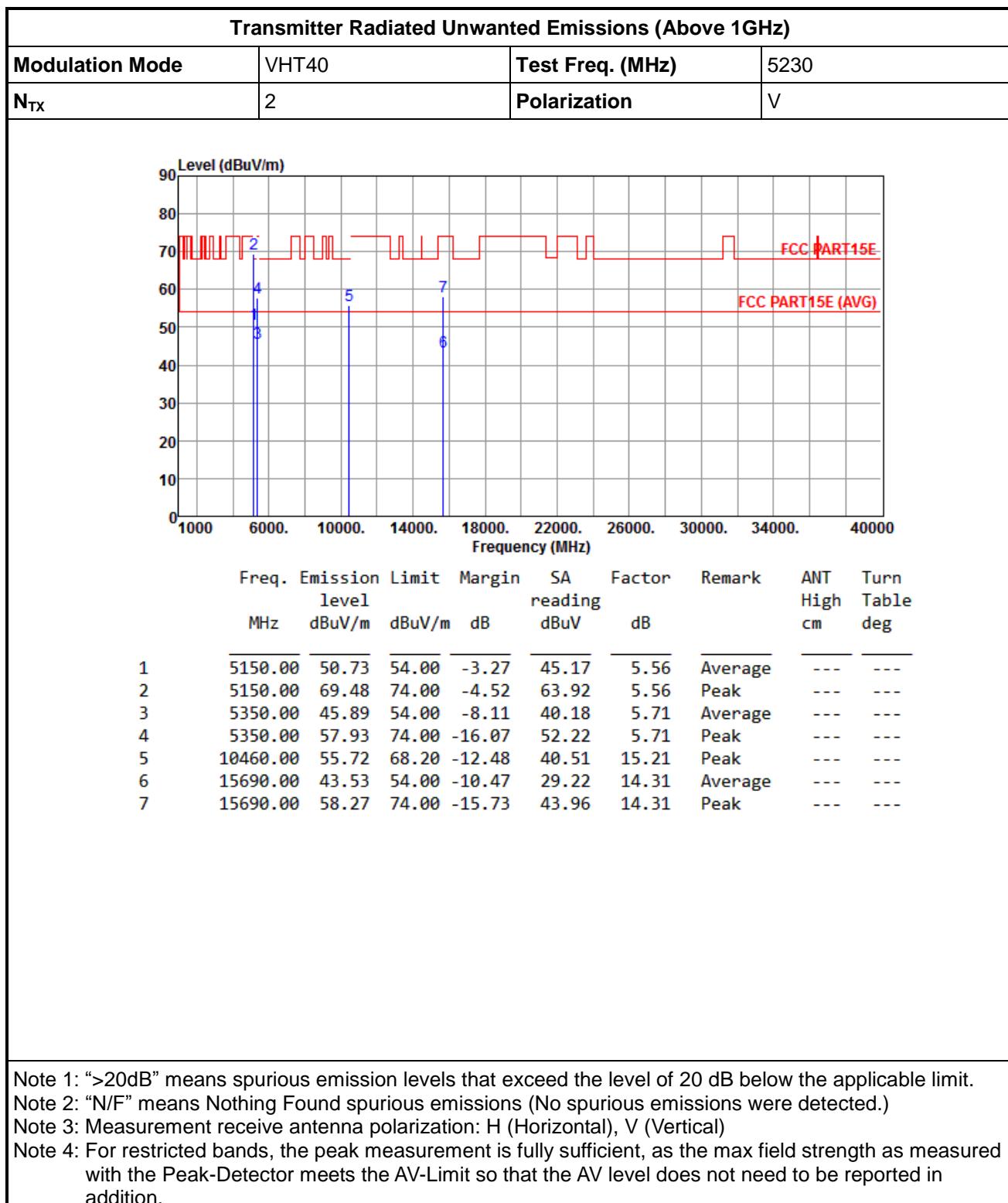
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.





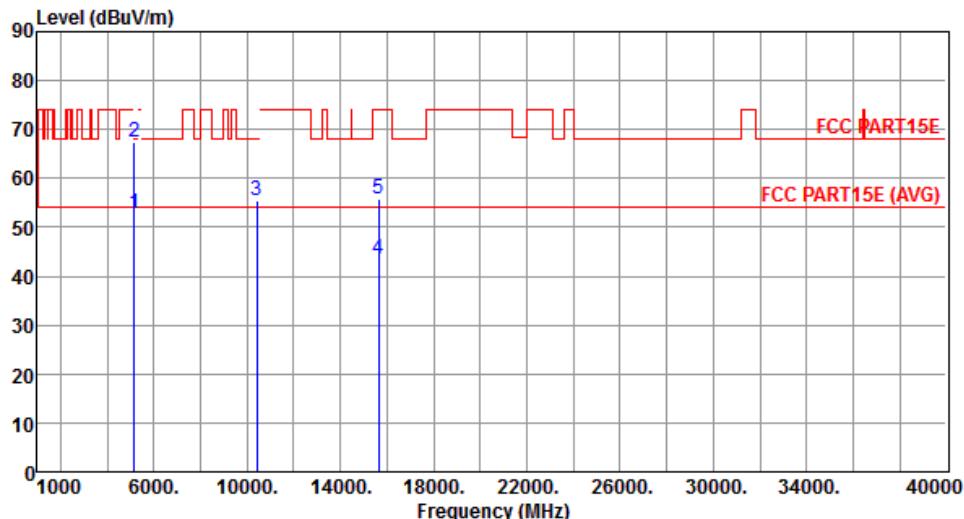






Transmitter Radiated Unwanted Emissions (Above 1GHz)

| | | | |
|-----------------|-------|------------------|------|
| Modulation Mode | VHT80 | Test Freq. (MHz) | 5210 |
| N _{TX} | 2 | Polarization | H |



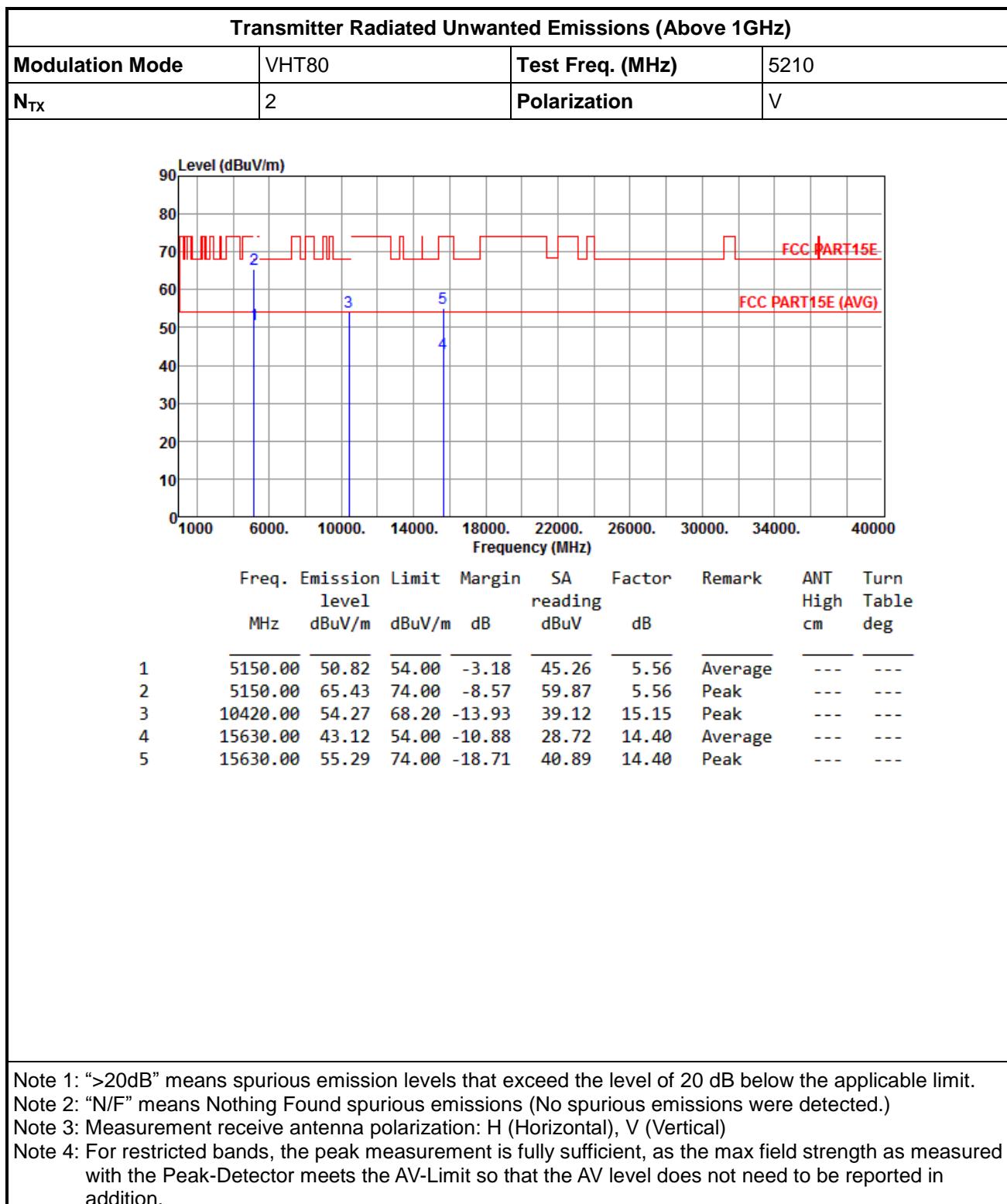
| | Freq. MHz | Emission level dBuV/m | Limit dBuV/m | Margin dB | SA reading dBuV | Factor dB | Remark | ANT High cm | Turn Table deg |
|---|--------------|-----------------------------|-----------------|--------------|-----------------------|--------------|---------|-------------------|----------------------|
| 1 | 5150.00 | 52.89 | 54.00 | -1.11 | 47.33 | 5.56 | Average | --- | --- |
| 2 | 5150.00 | 67.47 | 74.00 | -6.53 | 61.91 | 5.56 | Peak | --- | --- |
| 3 | 10420.00 | 55.45 | 68.20 | -12.75 | 40.30 | 15.15 | Peak | --- | --- |
| 4 | 15630.00 | 43.60 | 54.00 | -10.40 | 29.20 | 14.40 | Average | --- | --- |
| 5 | 15630.00 | 55.63 | 74.00 | -18.37 | 41.23 | 14.40 | Peak | --- | --- |

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

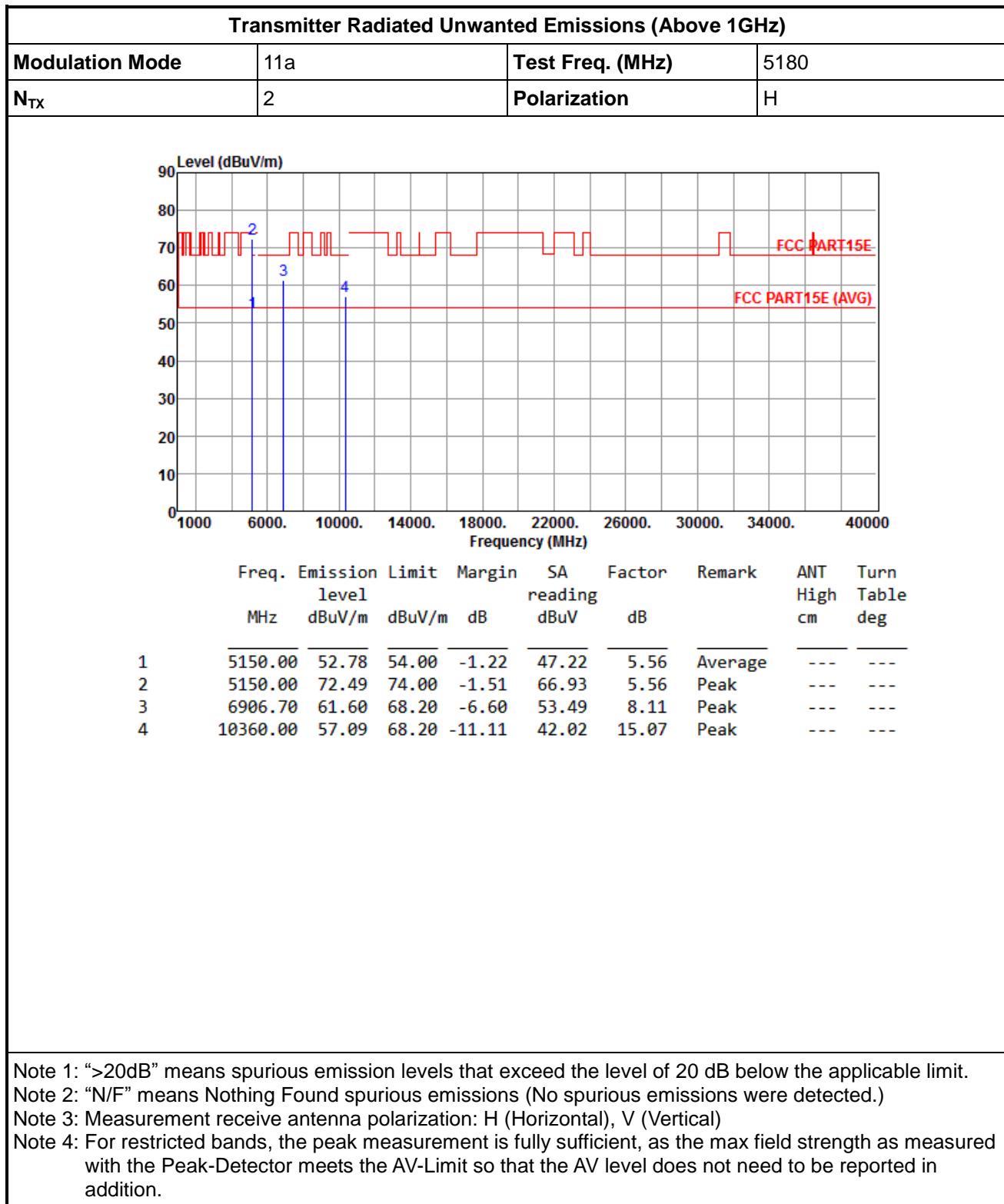
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.





Mode 3: External antenna with adapter mode

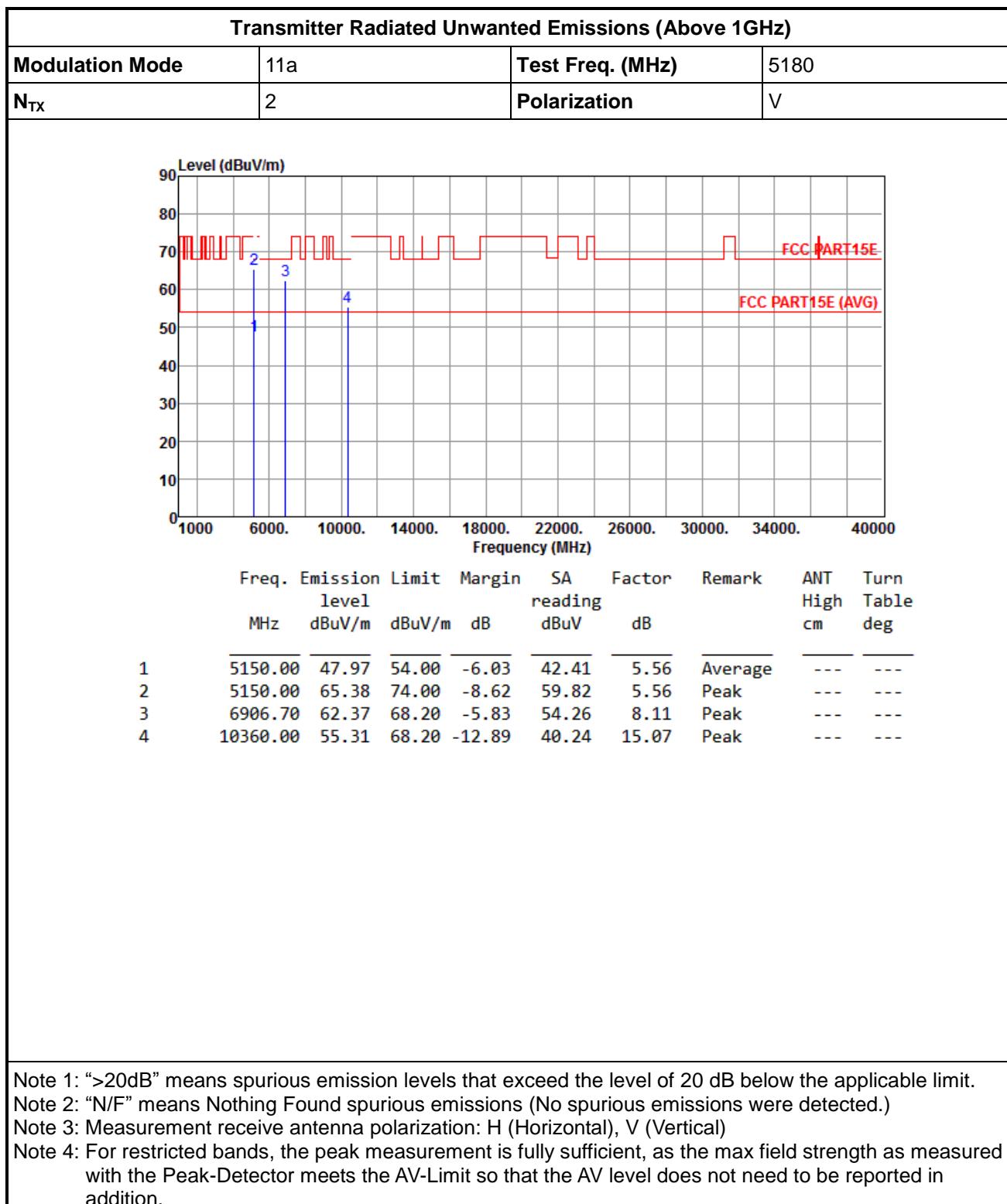


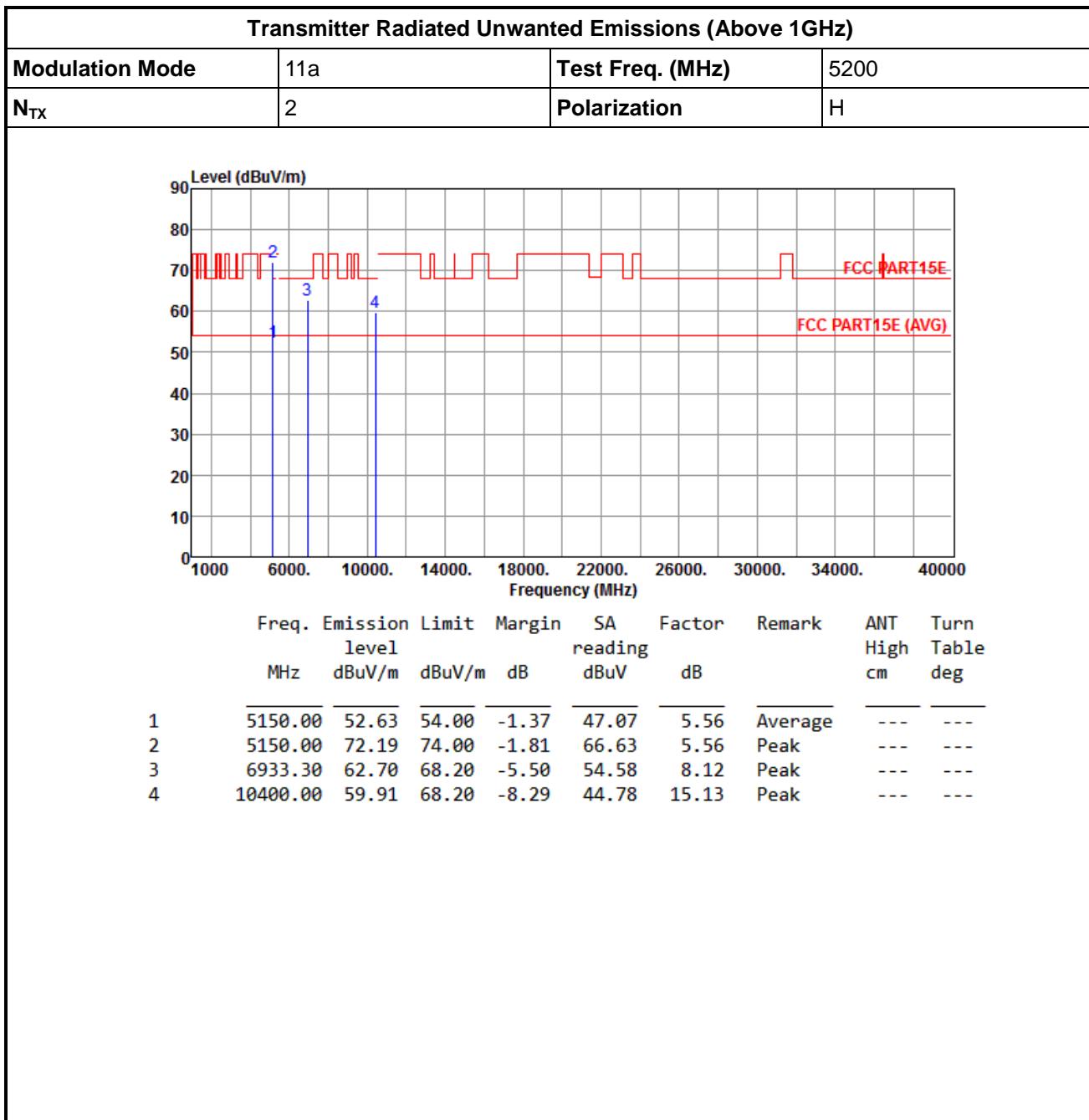
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.



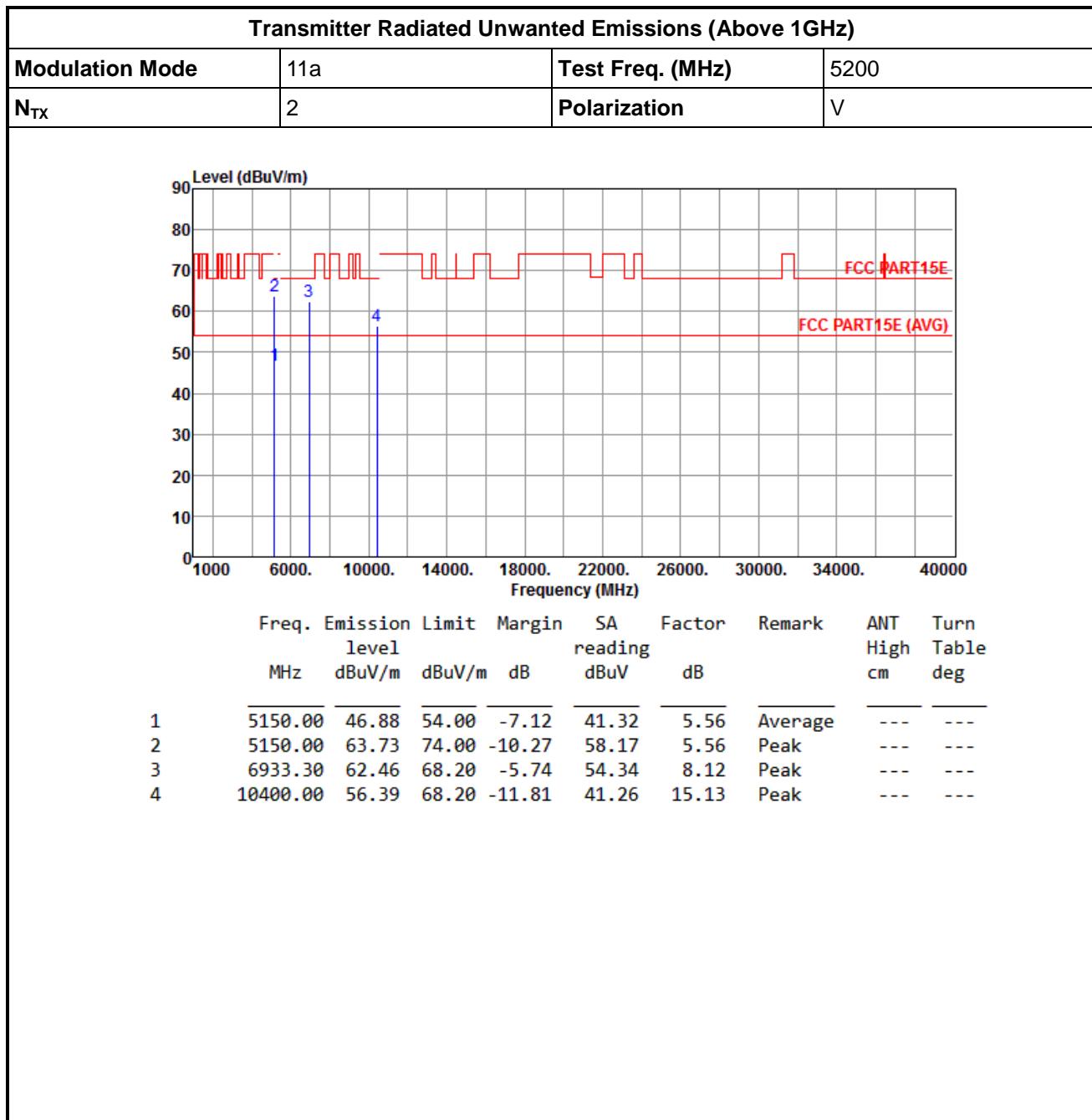


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

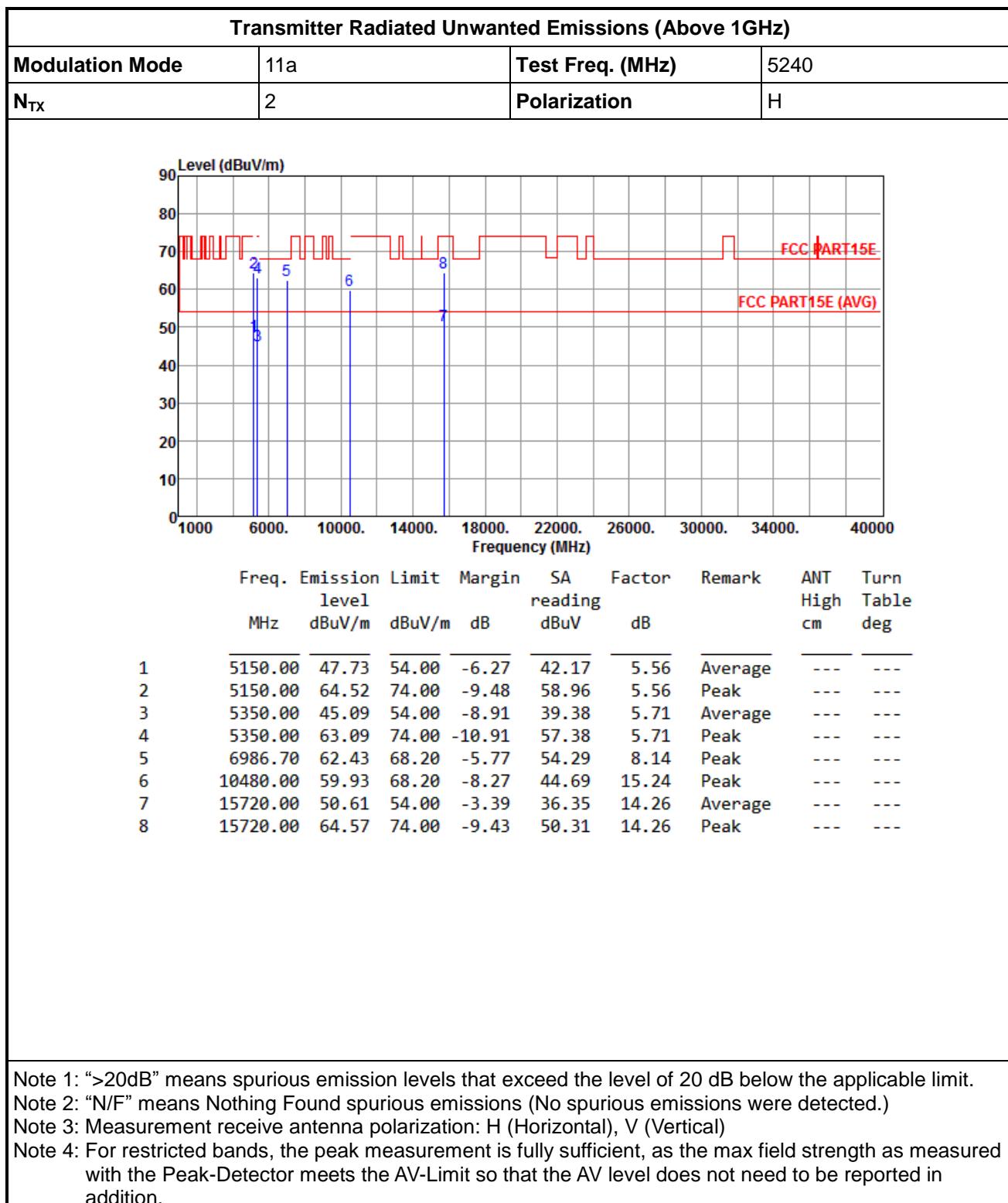


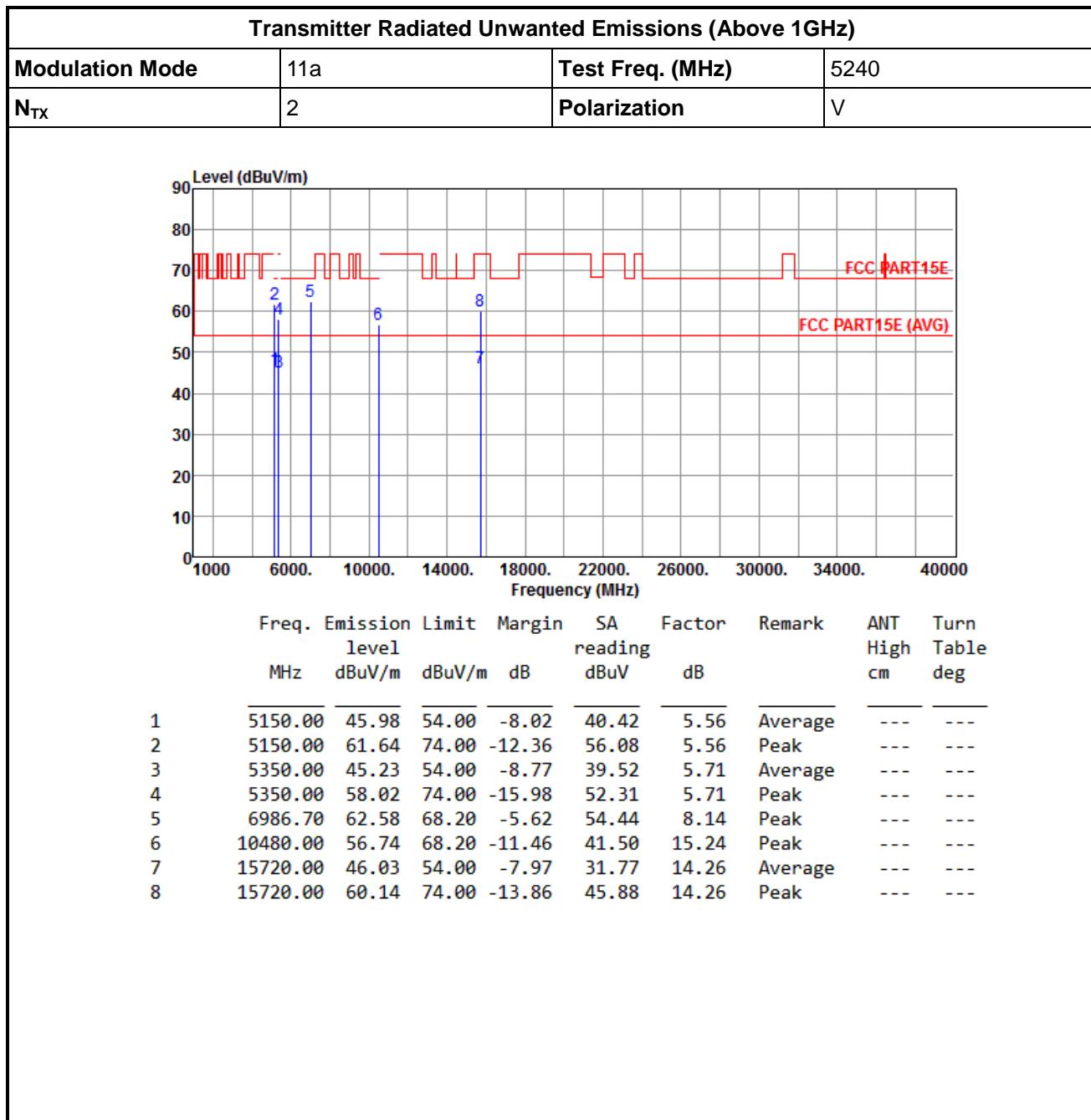
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.



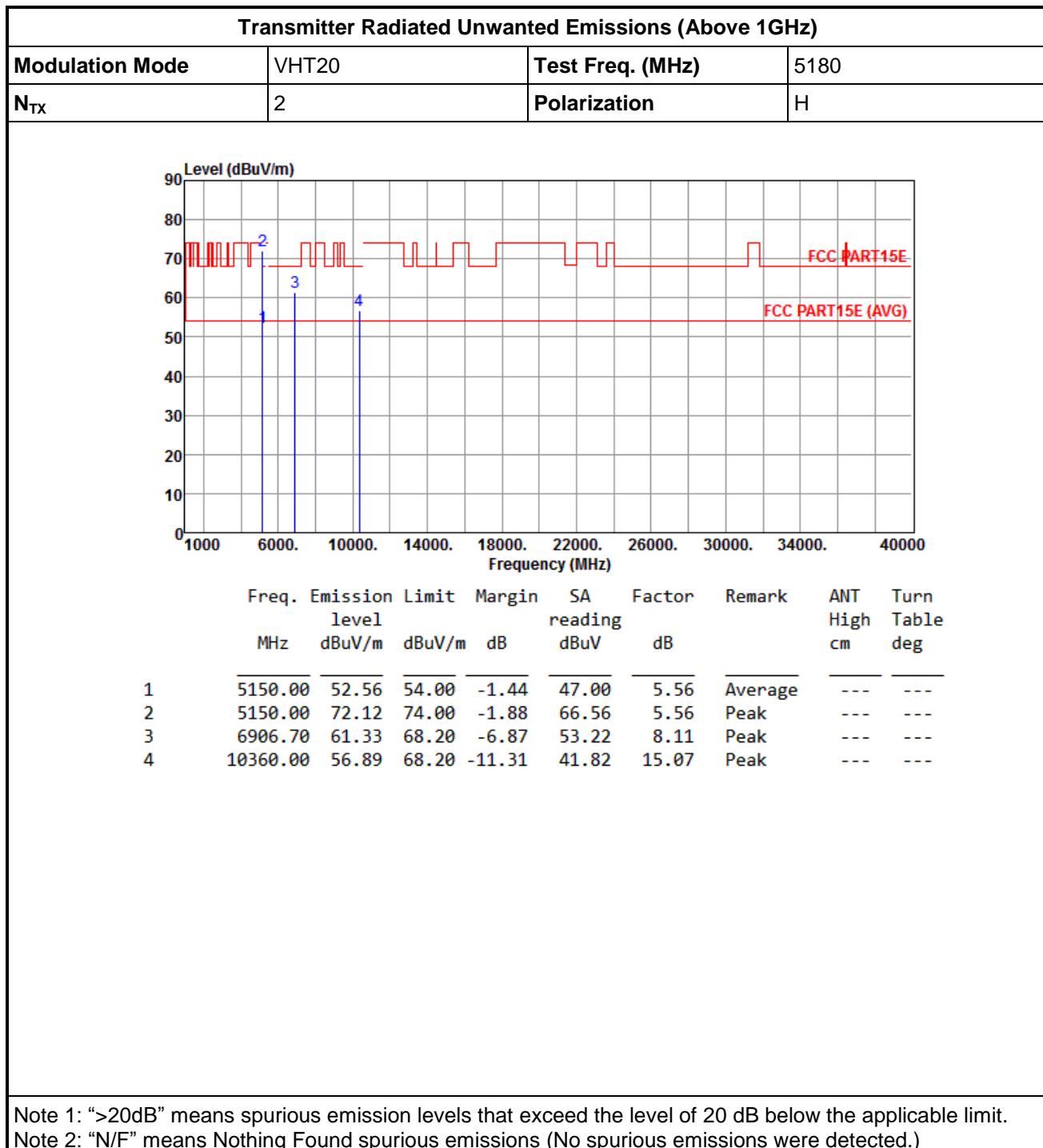


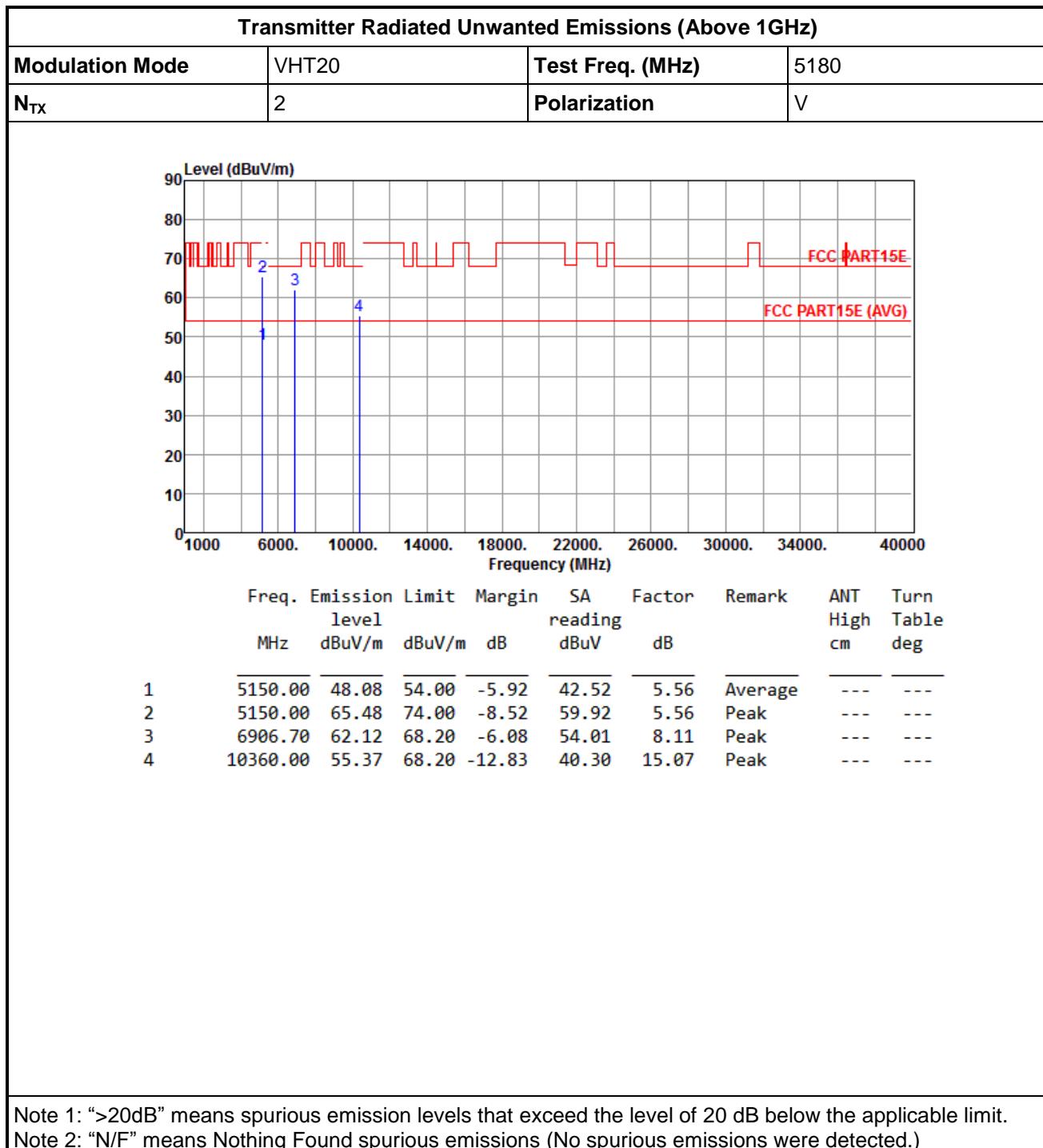
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

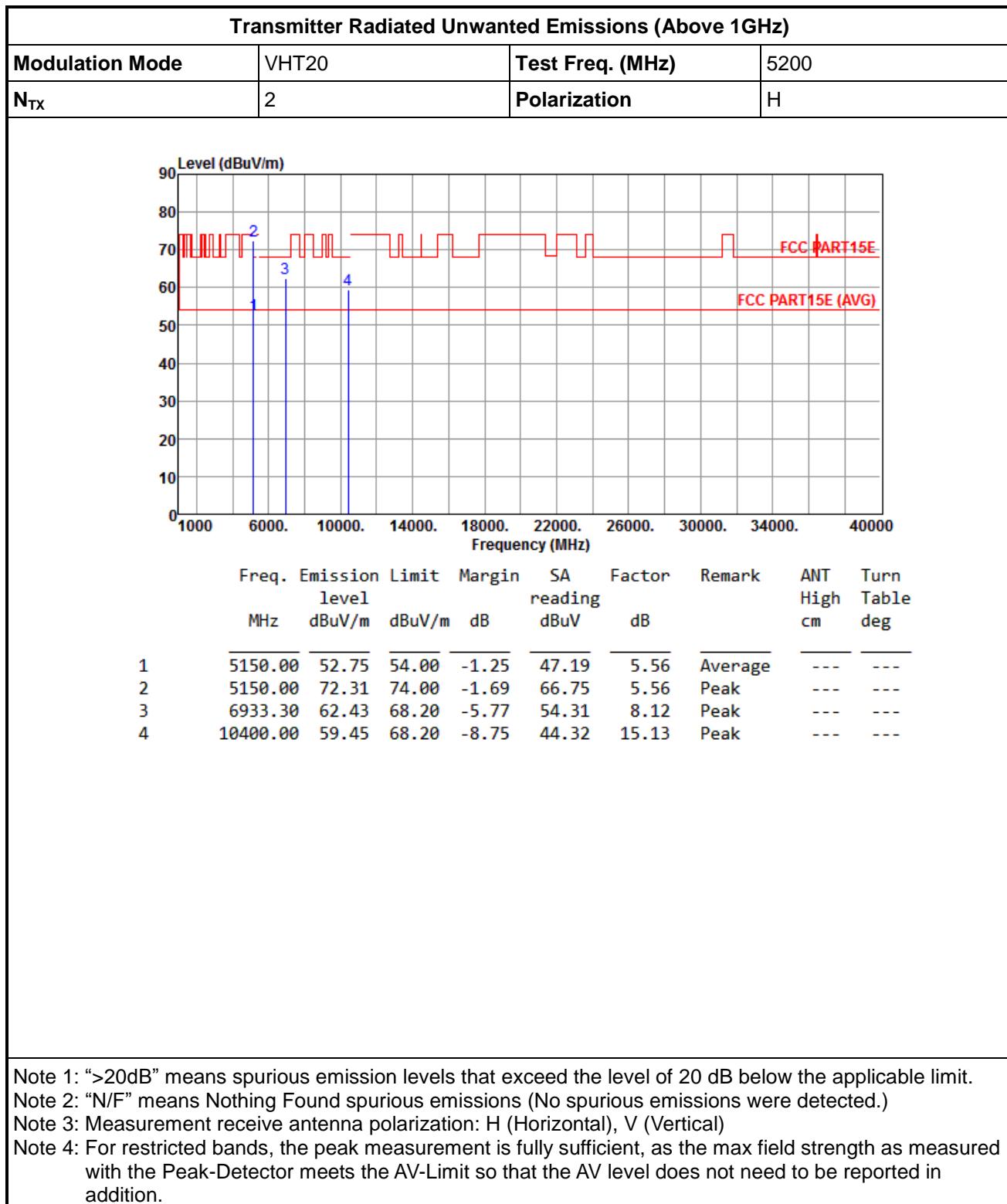
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

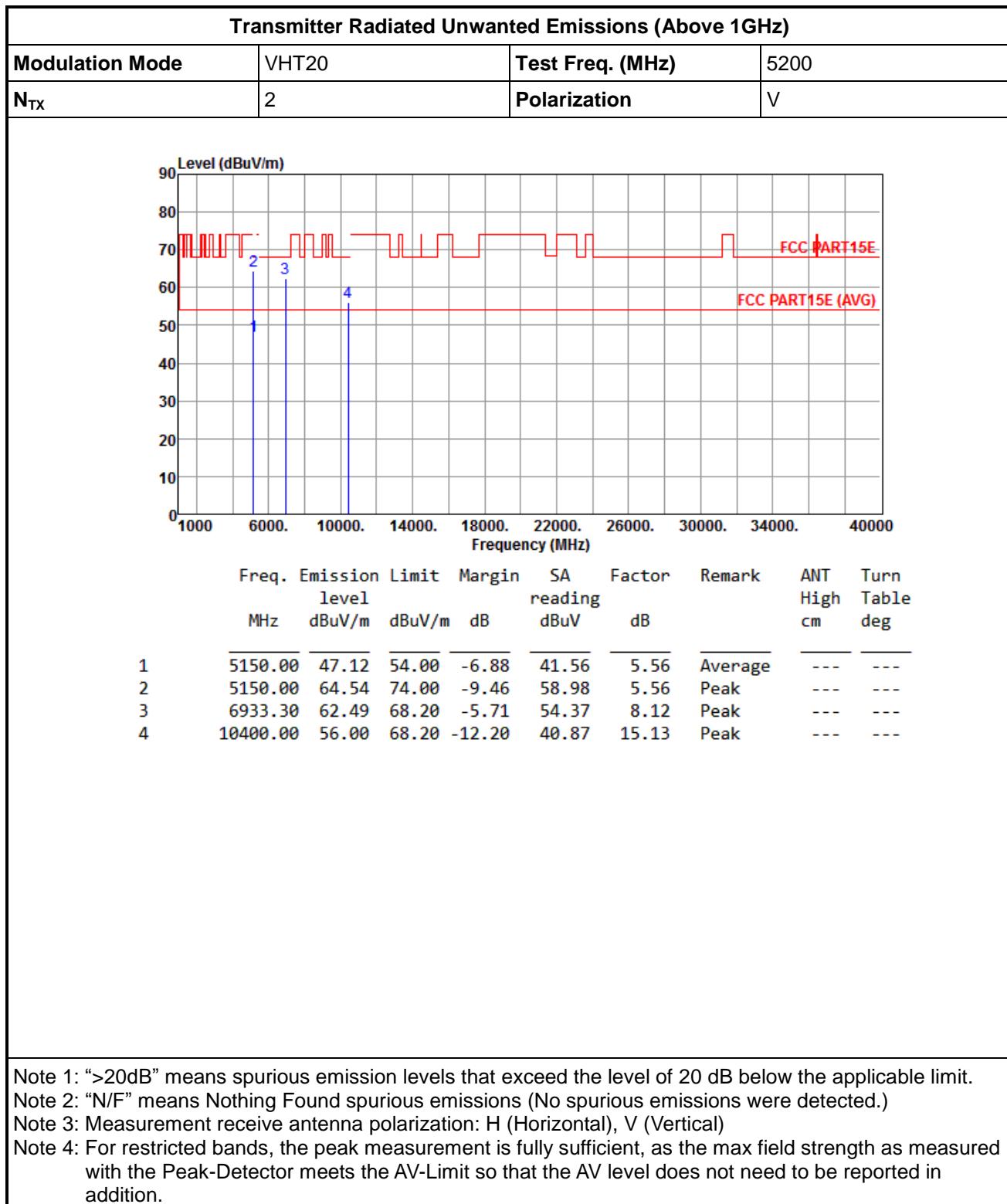
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

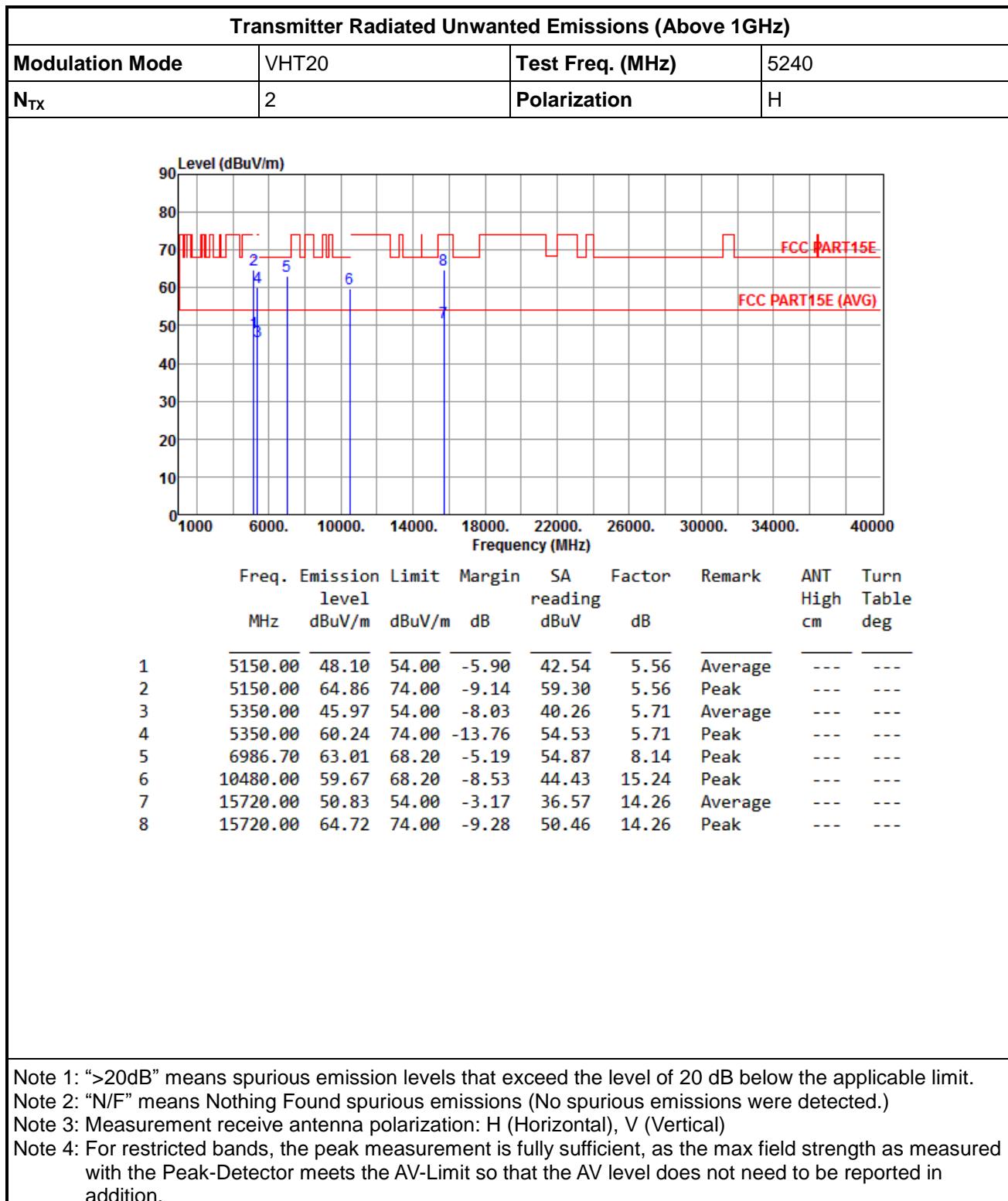
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

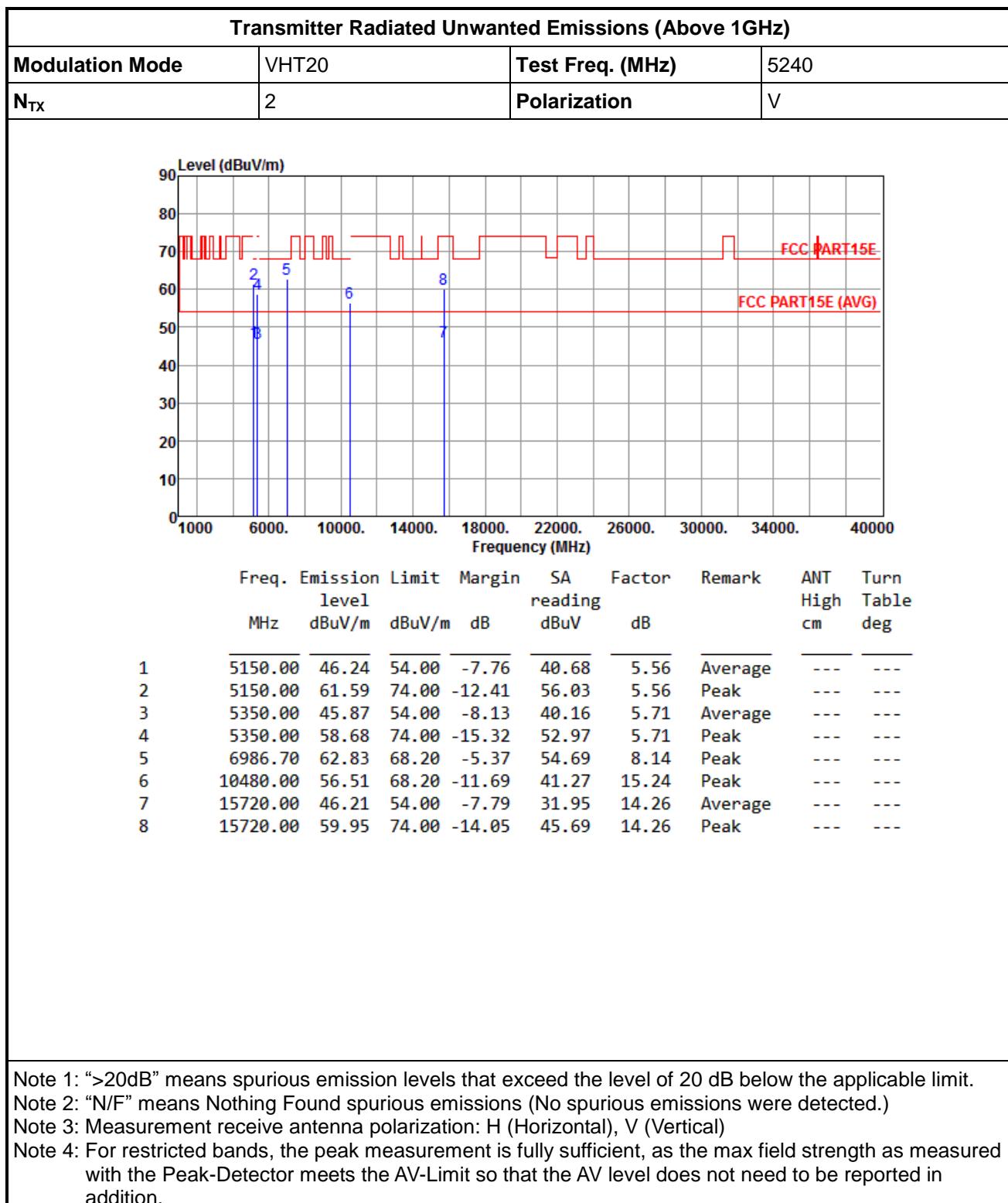


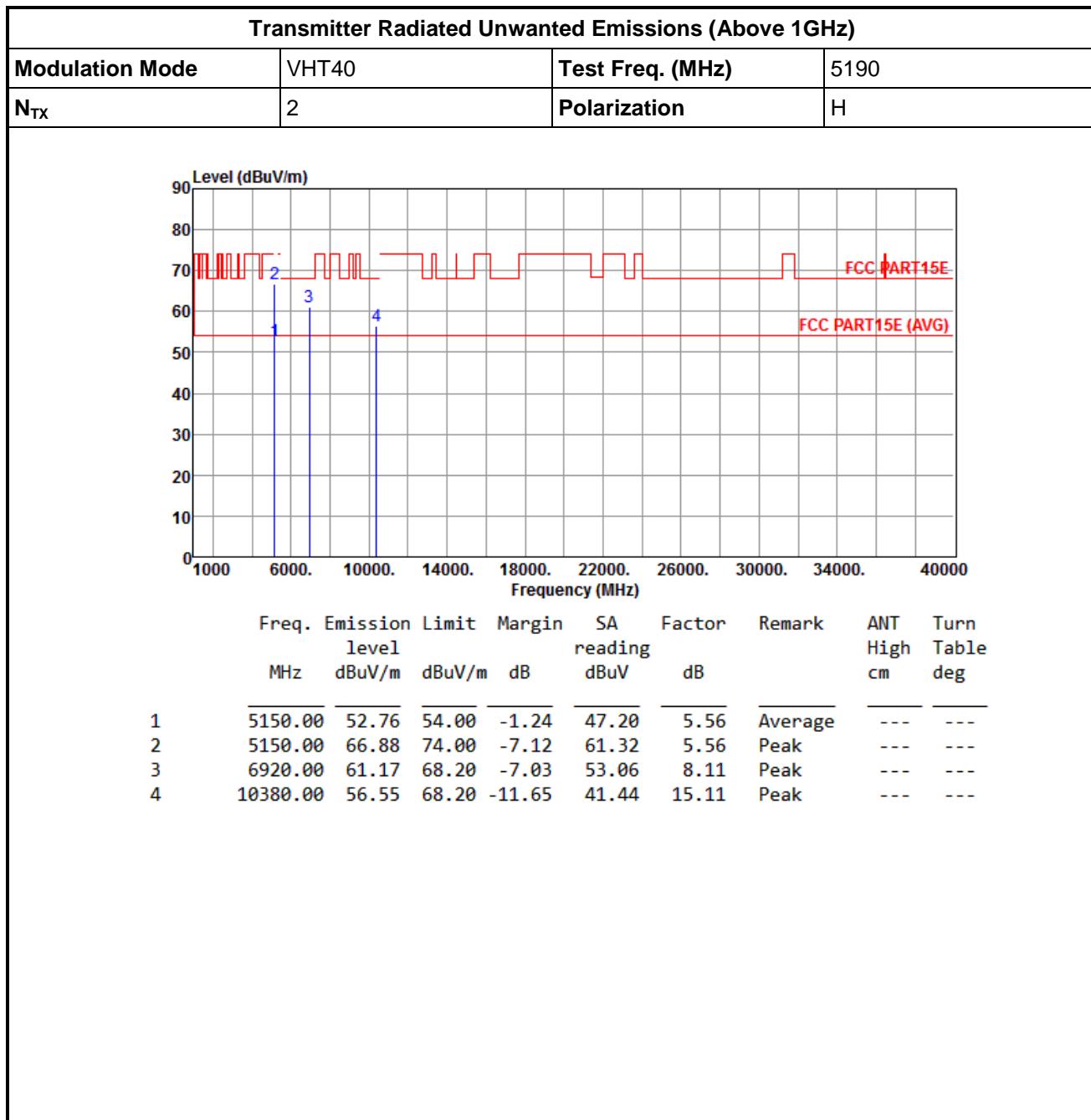










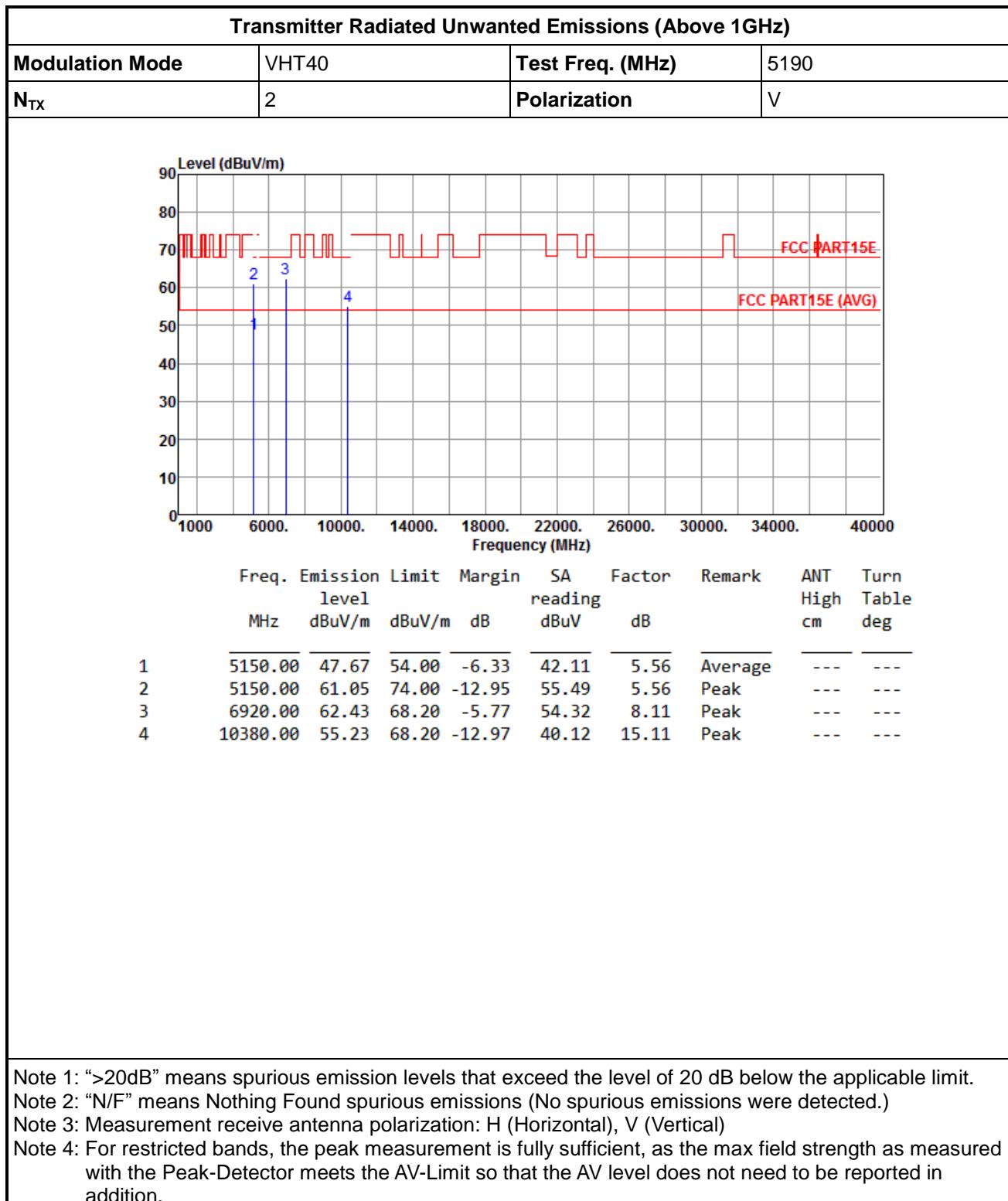


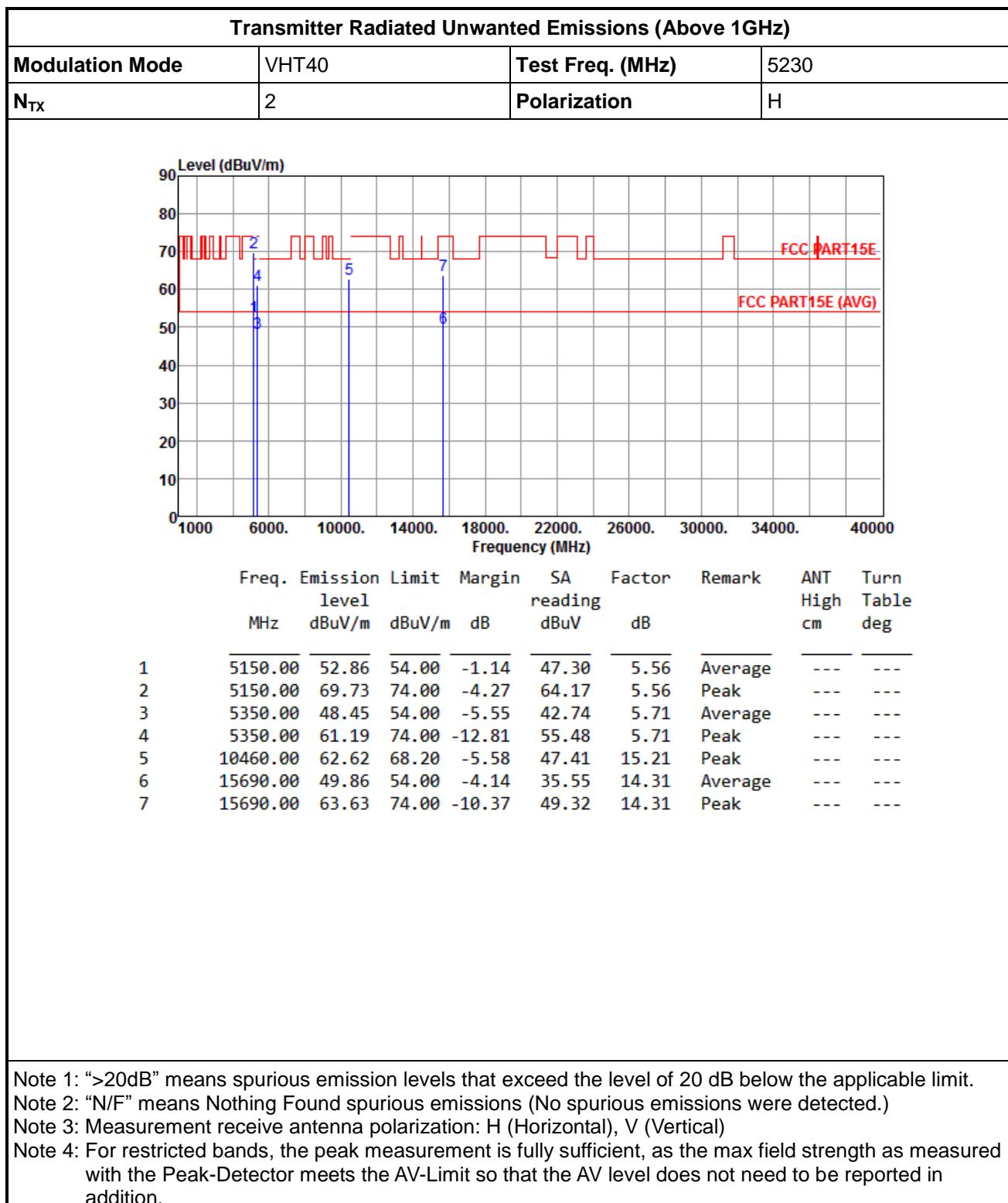
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

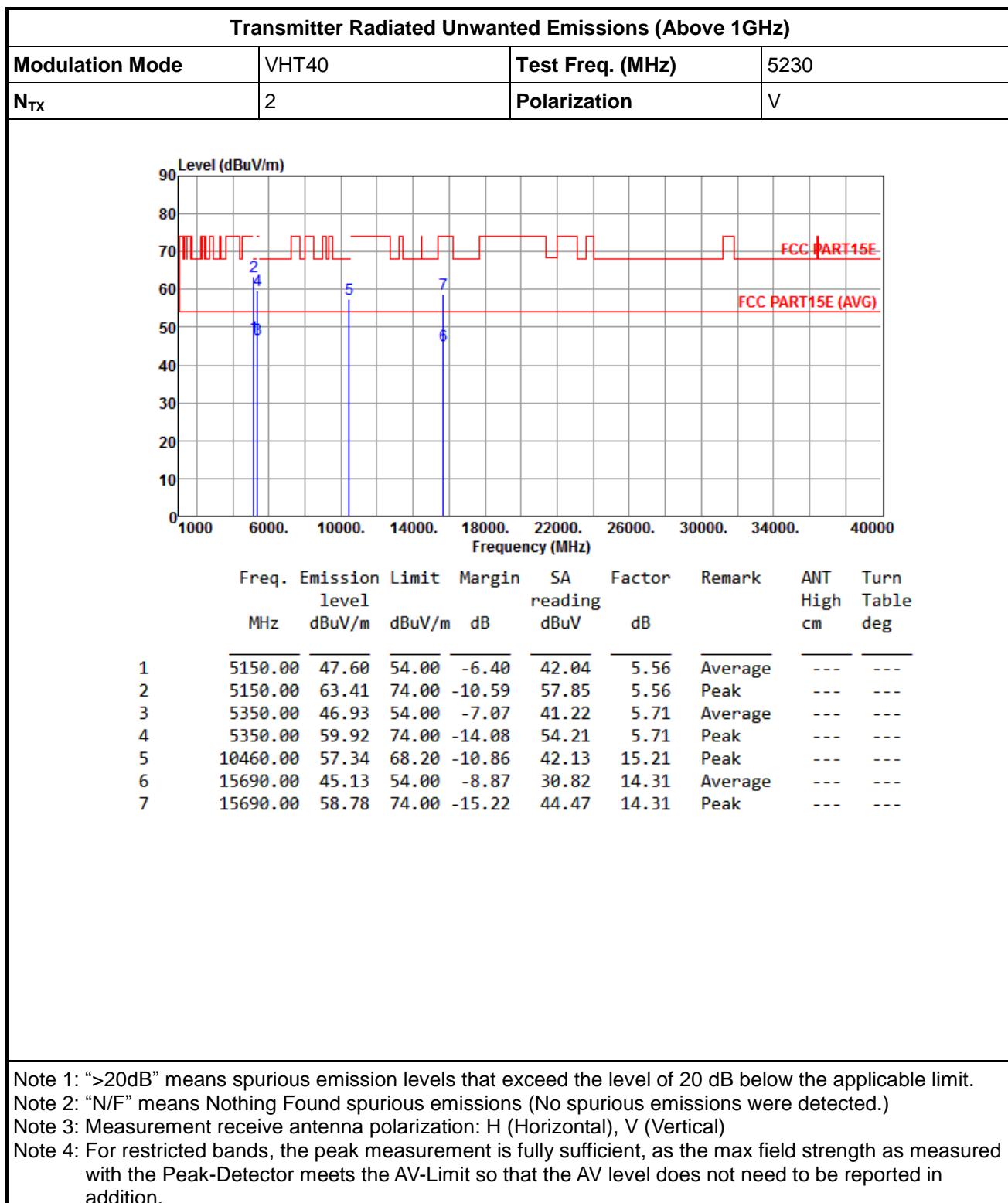
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

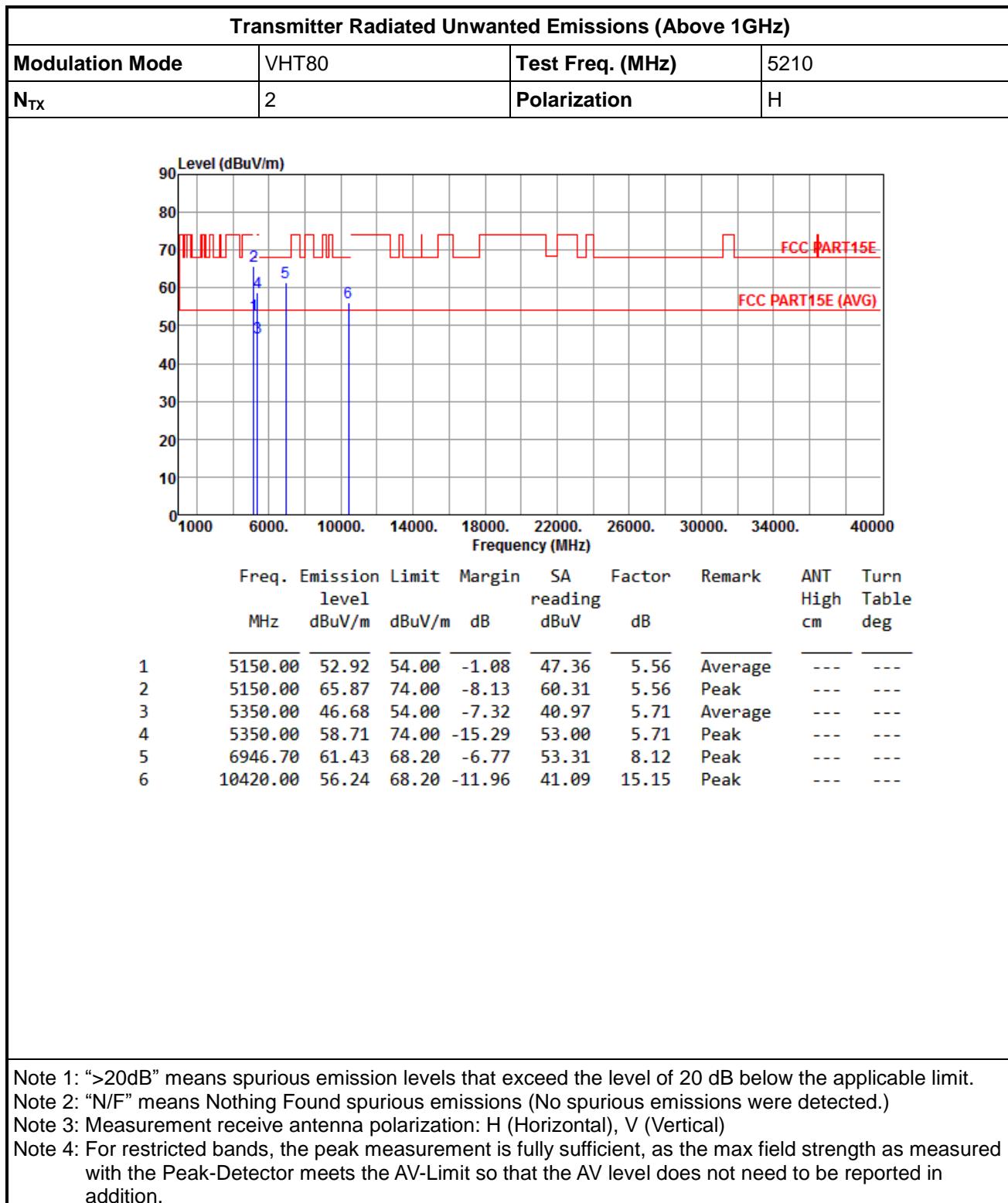
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

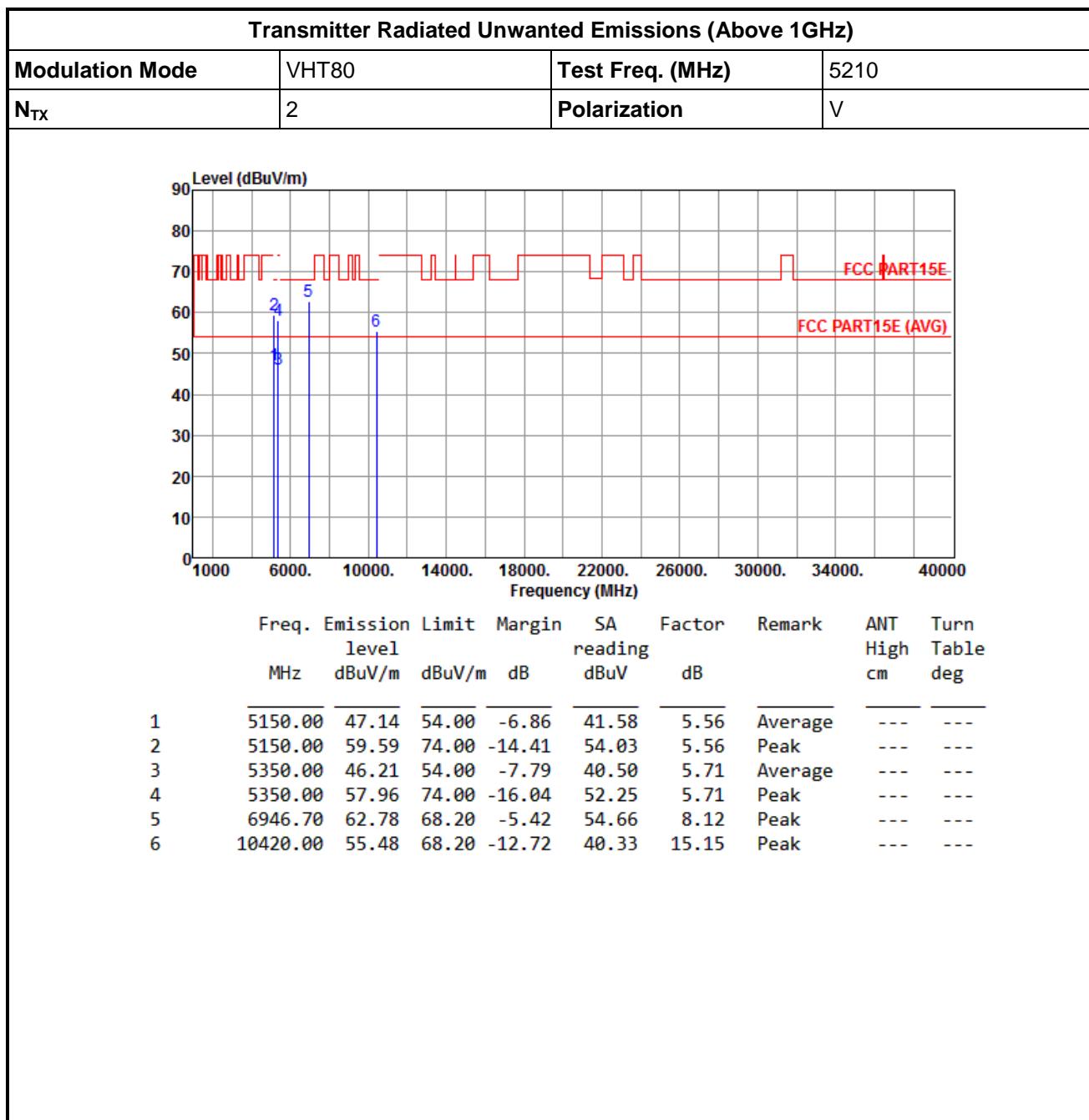
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.











Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

3.6 Frequency Stability

3.6.1 Frequency Stability Limit

| Frequency Stability Limit | |
|-------------------------------------|--|
| UNII Devices | |
| <input checked="" type="checkbox"/> | In-band emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual. |
| LE-LAN Devices | |
| <input checked="" type="checkbox"/> | N/A |
| IEEE Std. 802.11n-2009 | |
| <input checked="" type="checkbox"/> | The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band and ± 25 ppm maximum for the 2.4 GHz band. |

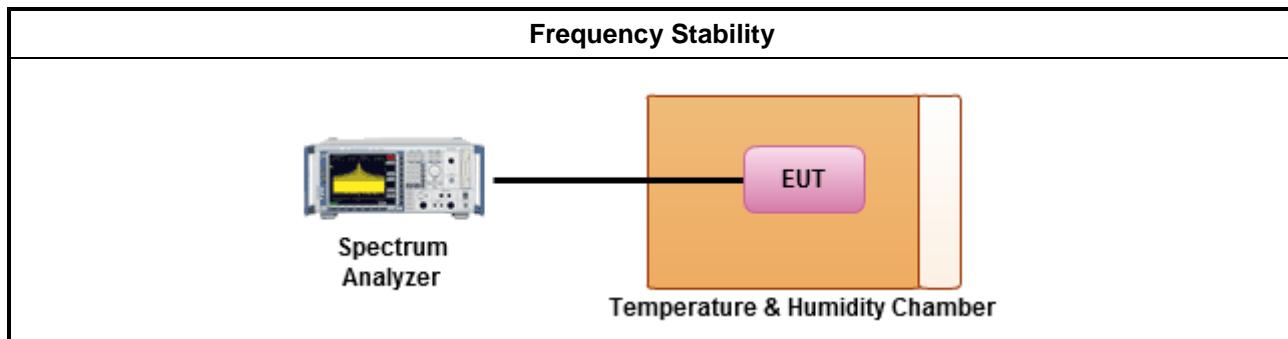
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

| Test Method | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.8 for frequency stability tests |
| <input checked="" type="checkbox"/> | Frequency stability with respect to ambient temperature |
| <input checked="" type="checkbox"/> | Frequency stability when varying supply voltage |
| <input checked="" type="checkbox"/> | For conducted measurement. |
| <input checked="" type="checkbox"/> | For conducted measurements on devices with multiple transmit chains: Measurements need only to be performed on one of the active transmit chains (antenna outputs) |
| <input type="checkbox"/> | For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level. |

3.6.4 Test Setup





3.6.5 Test Result of Frequency Stability

Mode 1: Internal antenna with adapter mode

| Frequency Stability Result | | | |
|----------------------------|-------------|---------------------------|---------------------------|
| Mode | | Frequency Stability (ppm) | |
| Condition | Freq. (MHz) | Test Frequency (MHz) | Frequency Stability (ppm) |
| T _{20°C} Vmax | 5200 | 5200.00453 | 0.8712 |
| T _{20°C} Vmin | 5200 | 5200.02378 | 4.5731 |
| T _{50°C} Vnom | 5200 | 5200.03273 | 6.2942 |
| T _{40°C} Vnom | 5200 | 5199.99687 | -0.6019 |
| T _{30°C} Vnom | 5200 | 5200.01435 | 2.7596 |
| T _{20°C} Vnom | 5200 | 5200.01265 | 2.4327 |
| T _{10°C} Vnom | 5200 | 5200.00740 | 1.4231 |
| T _{0°C} Vnom | 5200 | 5200.00785 | 1.5096 |
| T _{-10°C} Vnom | 5200 | 5200.00925 | 1.7788 |
| T _{-20°C} Vnom | 5200 | 5199.99132 | -1.6692 |
| T _{-30°C} Vnom | 5200 | 5200.01378 | 2.6500 |
| Limit (ppm) | | 20 | |
| Result | | Complied | |

Note 1: Measure at 85 % [Vmin] and 115 % [Vmax] of the nominal voltage [Vnom].
Note 2: The nominal voltage refer test report clause 1.1.6 for EUT operational condition.



Mode 2: External antenna with adapter mode

| Frequency Stability Result | | | |
|----------------------------|-------------|---------------------------|---------------------------|
| Mode | | Frequency Stability (ppm) | |
| Condition | Freq. (MHz) | Test Frequency (MHz) | Frequency Stability (ppm) |
| T _{20°C} Vmax | 5200 | 5200.00807 | 1.5519 |
| T _{20°C} Vmin | 5200 | 5200.02515 | 4.8365 |
| T _{50°C} Vnom | 5200 | 5200.03665 | 7.0481 |
| T _{40°C} Vnom | 5200 | 5199.99564 | -0.8385 |
| T _{30°C} Vnom | 5200 | 5200.01642 | 3.1577 |
| T _{20°C} Vnom | 5200 | 5200.01664 | 3.2000 |
| T _{10°C} Vnom | 5200 | 5200.01263 | 2.4288 |
| T _{0°C} Vnom | 5200 | 5200.00840 | 1.6154 |
| T _{-10°C} Vnom | 5200 | 5200.00935 | 1.7981 |
| T _{-20°C} Vnom | 5200 | 5199.98981 | -1.9596 |
| T _{-30°C} Vnom | 5200 | 5200.01330 | 2.5577 |
| Limit (ppm) | | 20 | |
| Result | | Complied | |

Note 1: Measure at 85 % [Vmin] and 115 % [Vmax] of the nominal voltage [Vnom].
Note 2: The nominal voltage refer test report clause 1.1.6 for EUT operational condition.



4 Test Equipment and Calibration Data

| Test Item | Radiated Emissions | | | | |
|----------------------|----------------------------|-------------|------------------|------------------|-------------------|
| Test Site | 966 chamber1 / (03CH01-WS) | | | | |
| Instrument | Manufacturer | Model No. | Serial No. | Calibration Date | Calibration Until |
| Spectrum Analyzer | R&S | FSV40 | 101498 | Jan. 25, 2014 | Jan. 24, 2015 |
| Receiver | R&S | ESR3 | 101658 | Jan. 10, 2014 | Jan. 09, 2015 |
| Bilog Antenna | SCHWARZBECK | VULB9168 | VULB9168-522 | Jan. 02, 2014 | Jan. 01, 2015 |
| Horn Antenna 1G-18G | SCHWARZBECK | BBHA 9120 D | BBHA 9120 D 1096 | Feb. 13, 2014 | Feb. 12, 2015 |
| Horn Antenna 18G-40G | SCHWARZBECK | BBHA 9170 | BBHA 9170517 | Dec. 27, 2013 | Dec. 26, 2014 |
| Preamplifier | Burgeon | BPA-530 | SN:100219 | Nov. 28, 2013 | Nov. 27, 2014 |
| Preamplifier | Agilent | 83017A | MY39501308 | Dec. 16, 2013 | Dec. 15, 2014 |
| Preamplifier | WM | TF-130N-R1 | 923365 | Oct. 23, 2013 | Oct. 22, 2014 |
| RF Cable | HUBER+SUHNER | SUCOFLEX104 | MY16014/4 | Dec. 16, 2013 | Dec. 15, 2014 |
| RF Cable | HUBER+SUHNER | SUCOFLEX104 | MY16019/4 | Dec. 16, 2013 | Dec. 15, 2014 |
| RF Cable | HUBER+SUHNER | SUCOFLEX104 | MY16139/4 | Dec. 16, 2013 | Dec. 15, 2014 |
| LF cable 3M | Woken | CFD400NL-LW | CFD400NL-001 | Dec. 16, 2013 | Dec. 15, 2014 |
| LF cable 10M | Woken | CFD400NL-LW | CFD400NL-002 | Dec. 16, 2013 | Dec. 15, 2014 |

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

| | | | | | |
|---|-----|---------|--------|---------------|---------------|
| Loop Antenna | R&S | HFH2-Z2 | 100330 | Nov. 15, 2012 | Nov. 14, 2014 |
| Note: Calibration Interval of instruments listed above is two year. | | | | | |

| Test Item | Conducted Emission | | | | |
|--------------------------------|-------------------------------|------------------|---------------|------------------|-------------------|
| Test Site | Conduction room 1 / (CO01-WS) | | | | |
| Instrument | Manufacturer | Model No. | Serial No. | Calibration Date | Calibration Until |
| EMC Receiver | R&S | ESCS 30 | 100169 | Oct. 15, 2013 | Oct. 14, 2014 |
| LISN | SCHWARZBECK | Schwarzbeck 8127 | 8127-667 | Nov. 23, 2013 | Nov. 22, 2014 |
| LISN (Support Unit) | SCHWARZBECK | Schwarzbeck 8127 | 8127-666 | Dec. 04, 2013 | Dec. 03, 2014 |
| RF Cable-CON | Woken | CFD200-NL | CFD200-NL-001 | Apr. 23, 2014 | Apr. 22, 2015 |
| 50 ohm terminal (Support Unit) | NA | 50 | 04 | Apr. 18, 2014 | Apr. 17, 2015 |

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



| Test Item | RF Conducted | | | | |
|----------------------------|--------------|------------------|-------------|------------------|-------------------|
| Test Site | TH01-HY | | | | |
| Instrument | Manufacturer | Model No. | Serial No. | Calibration Date | Calibration Until |
| Spectrum Analyzer | R&S | FSV 40 | 101063 | Feb. 17, 2014 | Feb. 16, 2015 |
| Temp. and Humidity Chamber | Giant Force | GTH-225-20-SP-SD | MAA1112-007 | Nov. 21, 2013 | Nov. 20, 2014 |
| Signal Generator | R&S | SMB100A | 175727 | Jan. 07, 2014 | Jan. 06, 2015 |
| Power Sensor | Anritsu | MA2411B | 1207366 | Oct. 24, 2013 | Oct. 23, 2014 |
| Power Meter | Anritsu | ML2495A | 1241002 | Oct. 24, 2013 | Oct. 23, 2014 |
| DC Power Source | G.W. | GPS-3030DD | GEN865896 | Nov. 21, 2013 | Nov. 20, 2014 |
| AC Power Source | G.W | APS-9102 | EL920581 | Jul. 15, 2014 | Jul. 14, 2015 |

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