



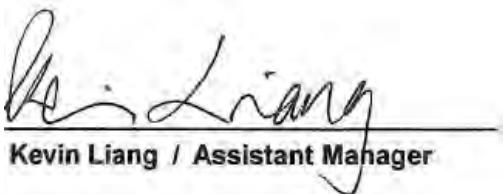
# FCC Test Report

**Equipment** : 802.11abgn, USB Dongle  
**Brand Name** : SparkLAN  
**Model No.** : WUBR-508N  
**FCC ID** : RYK-WUBR508N-D  
**Standard** : 47 CFR FCC Part 15.407  
**Operating Band** : 5150 MHz – 5250 MHz  
5725 MHz – 5850 MHz  
**FCC Classification** : NII  
**Applicant** : SparkLAN Communications, Inc.  
**Manufacturer** : 8F., No. 257, Sec. 2, Tiding Blvd., Neihu District,  
Taipei City 11493, Taiwan  
**Function** :  Outdoor AP;  Indoor AP;  
 Fixed P2P AP  Portable Client

The product sample received on Aug. 13, 2015 and completely tested on Oct. 02, 2015. We, SPORTON, 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 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:

  
\_\_\_\_\_  
Kevin Liang / Assistant Manager





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### APPENDIX A. TEST PHOTOS

### APPENDIX B. PHOTOGRAPHS OF EUT



## Summary of Test Result

| Conformance Test Specifications |                  |  |          |
|---------------------------------|------------------|--|----------|
| Report Clause                   | Ref. Std. Clause | Description                                      | Result   |
| 1.1.2                           | 15.203           | Antenna Requirement                              | Complied |
| 3.1                             | 15.207           | AC Power-line Conducted Emissions                | Complied |
| 3.2                             | 15.407(a)        | Emission Bandwidth                               | Complied |
| 3.3                             | 15.407(a)        | RF Output Power (Maximum Conducted Output Power) | Complied |
| 3.4                             | 15.407(a)        | Peak Power Spectral Density                      | Complied |
| 3.5                             | 15.407(b)        | Transmitter Bandedge Emissions                   | Complied |
| 3.6                             | 15.407(b)        | Transmitter Unwanted Emissions                   | Complied |
| 3.7                             | 15.407(g)        | Frequency Stability                              | Complied |



## Revision History



## 1 General Description

### 1.1 Information

#### 1.1.1 RF General Information

| RF General Information (5150-5250MHz band) |                  |                 |                |                                    |                       |
|--|------------------|-----------------|----------------|------------------------------------|-----------------------|
| Frequency Range (MHz)                      | IEEE Std. 802.11 | Ch. Freq. (MHz) | Channel Number | Transmit Chains (N <sub>TX</sub> ) | RF Output Power (dBm) |
| 5150-5250                                  | a                | 5180-5240       | 36-48 [4]      | 1                                  | 13.00                 |
| 5150-5250                                  | n (HT20)         | 5180-5240       | 36-48 [4]      | 2                                  | 12.35                 |
| 5150-5250                                  | n (HT40)         | 5190-5230       | 38-46 [2]      | 2                                  | 15.40                 |

Note 1: RF output power specifies that Maximum Conducted Output Power.  
Note 2: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

| RF General Information (5725-5850MHz band) |                  |                 |                |                                    |                       |
|--|------------------|-----------------|----------------|------------------------------------|-----------------------|
| Frequency Range (MHz)                      | IEEE Std. 802.11 | Ch. Freq. (MHz) | Channel Number | Transmit Chains (N <sub>TX</sub> ) | RF Output Power (dBm) |
| 5725-5850                                  | a                | 5745-5825       | 149-165 [5]    | 1                                  | 10.46                 |
| 5725-5850                                  | n (HT20)         | 5745-5825       | 149-165 [5]    | 2                                  | 16.68                 |
| 5725-5850                                  | n (HT40)         | 5755-5795       | 151-159 [2]    | 2                                  | 14.12                 |

Note 1: RF output power specifies that Maximum Conducted Output Power.  
Note 2: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.



### 1.1.2 Antenna Information

| Antenna Category                    |   |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Integral antenna (antenna permanently attached)   |
| <input type="checkbox"/>            | Temporary RF connector provided   |
| <input checked="" type="checkbox"/> | No temporary RF connector provided<br>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. |

| Antenna General Information  |           |           |            |
|--|-----------|-----------|------------|
| No.  | Ant. Cat. | Ant. Type | Gain (dBi) |
| 1  | Integral  | Printed   | 6.64       |
| 2  | Integral  | Printed   | 6.64       |
| Remark:  |           |           |            |
| 1. In modulation mode 11a, this EUT supports diversity. EUT was pre-tested Antenna Port 1 and Antenna Port 2 for single chain, and the worst case was Antenna Port 1. Therefore only the test data (Port 1) was recorded in this report.<br>2. In modulation mode 11n, this EUT only supports 2TX. |           |           |            |

### 1.1.3 Type of EUT

| Identify EUT                        |   |
|-------------------------------------|---|
| EUT Serial Number                   | N/A   |
| Presentation of Equipment           | <input checked="" type="checkbox"/> Production ; <input 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)<br>Combined Equipment - Brand Name / Model No.: ... |
| <input type="checkbox"/>            | Plug-in radio (EUT intended for a variety of host systems)<br>Host System - Brand Name / Model No.: ...                           |
| <input type="checkbox"/>            | Other:  |



### 1.1.4 Test Signal Duty Cycle

| Operated Mode for Worst Duty Cycle  |                 |                                       |
|---|-----------------|---------------------------------------|
| Test Signal Duty Cycle (x)  | N <sub>TX</sub> | Power Duty Factor [dB] – (10 log 1/x) |
| <input type="checkbox"/> Operated normally mode for worst duty cycle        |                 |                                       |
| <input checked="" type="checkbox"/> Operated test mode for worst duty cycle |                 |                                       |
| <input checked="" type="checkbox"/> 100.00% - IEEE 802.11a                  | 1               | 0.00                                  |
| <input checked="" type="checkbox"/> 100.00% - IEEE 802.11n (HT20)           | 2               | 0.00                                  |
| <input checked="" type="checkbox"/> 100.00% - IEEE 802.11n (HT40)           | 2               | 0.00                                  |

### 1.1.5 EUT Operational Condition

|                   |   |   |  |
|-------------------|---|---|--|
| Supply Voltage    | <input type="checkbox"/> AC mains           | <input checked="" type="checkbox"/> DC          |  |
| Type of DC Source | <input type="checkbox"/> Internal DC supply | <input checked="" type="checkbox"/> From system | <input type="checkbox"/> External DC adapter |



## 1.2 Support Equipment

| Support Equipment - RF Conducted |            |            |            |        |
|----------------------------------|------------|------------|------------|--------|
| No.                              | Equipment  | Brand Name | Model Name | FCC ID |
| 1                                | Notebook   | DELL       | E5540      | DoC    |
| 2                                | AC adaptor | DELL       | HA65NM130  | DoC    |

| Support Equipment - AC Conduction and Radiated Emission |            |                               |            |        |
|---|------------|-------------------------------|------------|--------|
| No.   | Equipment  | Brand Name                    | Model Name | FCC ID |
| 1   | Notebook   | DELL                          | E5540      | DoC    |
| 2   | AC adaptor | DELL                          | LA65NS2-01 | DoC    |
| 3   | USB Cable  | -                             | -          | -      |
|   |            | 0.1 meter, non-shielded cable |            |        |

## 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 C63.10-2013
- FCC KDB 789033 D02 v01r02
- FCC-14-30A1-UNII
- FCC KDB 662911 D01 v02r01



## 1.4 Testing Location Information

| Testing Location                    |               |   |                      |
|-------------------------------------|---------------|---|----------------------|
| <input checked="" type="checkbox"/> | HWA YA        | ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. |                      |
|                                     | TEL :         | 886-3-327-3456  | FAX : 886-3-327-0973 |
| Test Condition                      | Test Site No. | Test Engineer   | Test Environment     |
| AC Conduction                       | CO04-HY       | Anthony   | 23°C / 58%           |
| RF Conducted                        | TH01-HY       | Candy   | 21.5°C / 63%         |
| Radiated Emission                   | 03CH03-HY     | Daniel  | 23.3°C / 58%         |

## 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   |         |
| AC power-line conducted emissions  | ±2.3 dB       |         |
| Emission bandwidth, 26dB bandwidth | ±0.5%         |         |
| RF output power, conducted         | ±0.1 dB       |         |
| Power density, conducted           | ±0.5 dB       |         |
| Unwanted emissions, conducted      | 9 – 150 kHz   | ±0.4 dB |
|                                    | 0.15 – 30 MHz | ±0.4 dB |
|                                    | 30 – 1000 MHz | ±0.6 dB |
|                                    | 1 – 18 GHz    | ±0.5 dB |
|                                    | 18 – 40 GHz   | ±0.5 dB |
|                                    | 40 – 200 GHz  | N/A     |
| All emissions, radiated            | 9 – 150 kHz   | ±2.5 dB |
|                                    | 0.15 – 30 MHz | ±2.3 dB |
|                                    | 30 – 1000 MHz | ±2.6 dB |
|                                    | 1 – 18 GHz    | ±3.6 dB |
|                                    | 18 – 40 GHz   | ±3.8 dB |
|                                    | 40 – 200 GHz  | N/A     |
| Temperature                        |               | ±0.8 °C |
| Humidity                           |               | ±5 %    |
| DC and low frequency voltages      |               | ±0.9%   |
| Time                               |               | ±1.4 %  |
| Duty Cycle                         |               | ±0.5 %  |



## 2 Test Configuration of EUT

### 2.1 The Worst Case Modulation Configuration

| Worst Modulation Used for Conformance Testing |                                    |                 |                       |
|---|------------------------------------|-----------------|-----------------------|
| Modulation Mode                               | Transmit Chains (N <sub>TX</sub> ) | Data Rate / MCS | Worst Data Rate / MCS |
| 11a   | 1                                  | 6-54Mbps        | 6 Mbps                |
| HT20  | 2                                  | MCS 0-15        | MCS 0                 |
| HT40  | 2                                  | MCS 0-15        | MCS 0                 |

### 2.2 The Worst Case Power Setting Parameter

| The Worst Case Power Setting Parameter (5150-5250MHz band) |                    |                      |       |       |            |       |
|--|--------------------|----------------------|-------|-------|------------|-------|
| Test Software Version                                      | RT5x7x QA_V1.0.5.9 |                      |       |       |            |       |
| Modulation Mode  | N <sub>TX</sub>    | Test Frequency (MHz) |       |       |            |       |
|  |                    | NCB: 20MHz           |       |       | NCB: 40MHz |       |
|  |                    | 5180                 | 5200  | 5240  | 5190       | 5230  |
| 11a  | 1                  | 0F                   | 10    | 11    | -          | -     |
| HT20   | 2                  | 06,07                | 09,09 | 0A,0A | -          | -     |
| HT40   | 2                  | -                    | -     | -     | 10,0F      | 10,0D |

| The Worst Case Power Setting Parameter (5725-5850MHz band) |                    |                      |       |       |            |       |
|--|--------------------|----------------------|-------|-------|------------|-------|
| Test Software Version                                      | RT5x7x QA_V1.0.5.9 |                      |       |       |            |       |
| Modulation Mode  | N <sub>TX</sub>    | Test Frequency (MHz) |       |       |            |       |
|  |                    | NCB: 20MHz           |       |       | NCB: 40MHz |       |
|  |                    | 5745                 | 5785  | 5825  | 5755       | 5795  |
| 11a  | 1                  | 11                   | 12    | 10    | -          | -     |
| HT20   | 2                  | 19,19                | 17,15 | 17,14 | -          | -     |
| HT40   | 2                  | -                    | -     | -     | 18,14      | 18,16 |



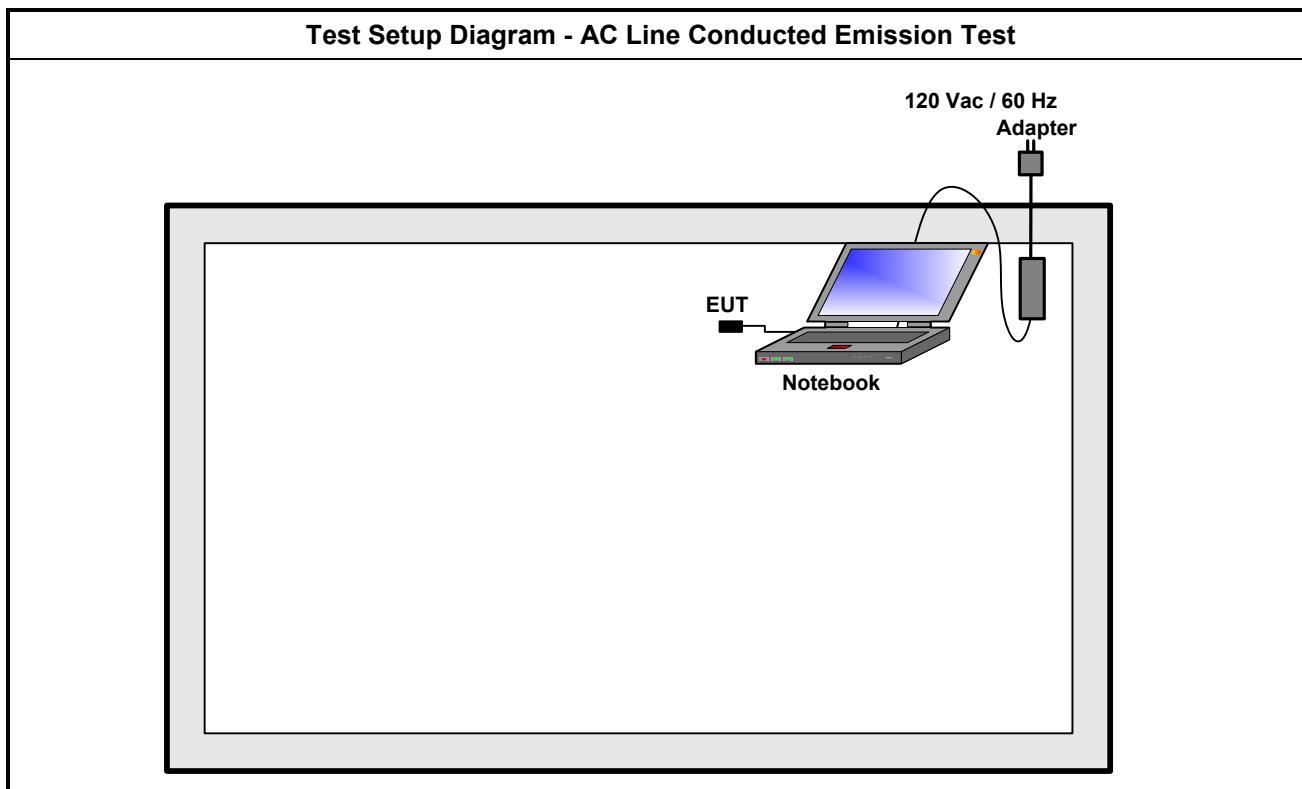
## 2.3 The Worst Case Measurement Configuration

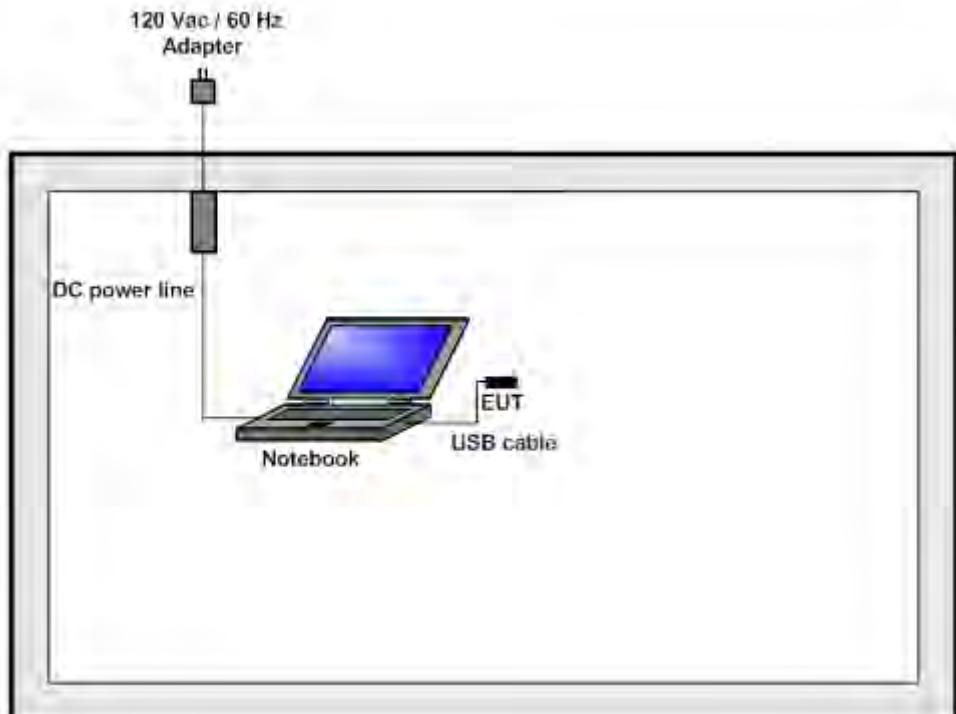
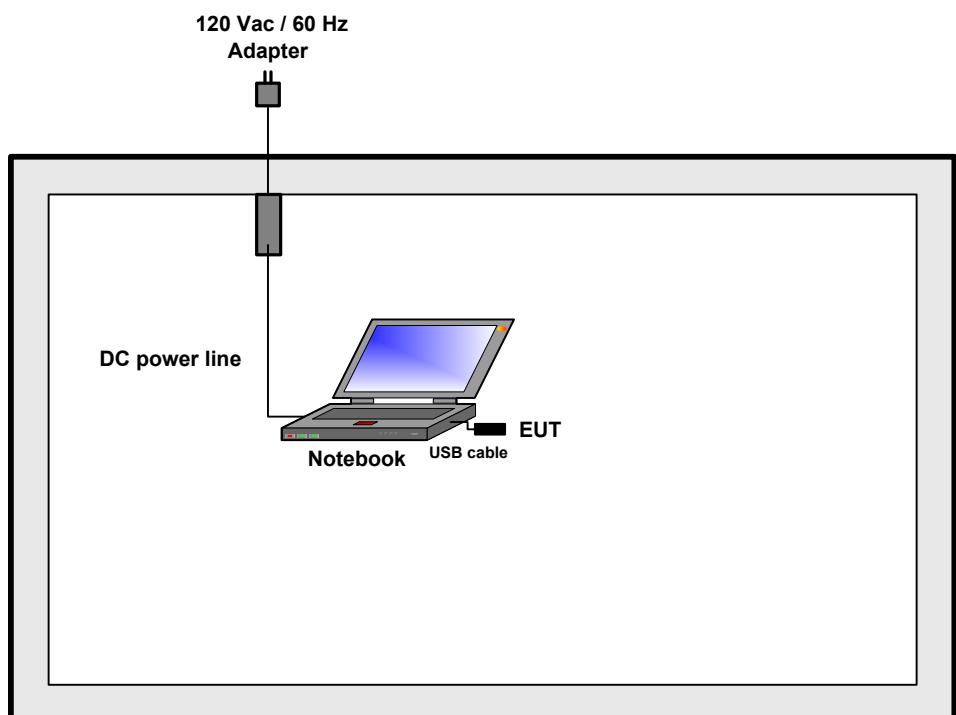
| The Worst Case Mode for Following Conformance Tests |   |
|---|---|
| <b>Tests Item</b>                                   | AC power-line conducted emissions   |
| <b>Condition</b>                                    | AC power-line conducted measurement for line and neutral<br>Test Voltage: 120Vac / 60Hz |
| <b>Operating Mode</b>                               | Operating Mode Description  |
| 1   | EUT with Notebook and transmit  |

| The Worst Case Mode for Following Conformance Tests |  |
|---|--|
| <b>Tests Item</b>                                   | RF Output Power, Peak Power Spectral Density, Emission Bandwidth, Peak Excursion, Transmitter Conducted Unwanted Emissions<br>Transmitter Conducted Bandedge Emissions |
| <b>Test Condition</b>                               | Conducted measurement at transmit chains   |
| <b>Modulation Mode</b>                              | 11a, HT20, HT40  |

| The Worst Case Mode for Following Conformance Tests |   |         |         |         |  |  |  |
|---|---|---------|---------|---------|--|--|--|
| <b>Tests Item</b>                                   | Transmitter Radiated Unwanted Emissions<br>Transmitter Radiated Bandedge Emissions  |         |         |         |  |  |  |
| <b>Test Condition</b>                               | Radiated measurement<br>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.   |         |         |         |  |  |  |
| <b>User Position</b>                                | <input type="checkbox"/> EUT will be placed in fixed position.<br><input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions.<br>EUT shall be performed three orthogonal planes.<br><input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed three orthogonal planes. |         |         |         |  |  |  |
| <b>Operating Mode</b>                               | Operating Mode Description  |         |         |         |  |  |  |
| <b>Radiated Emissions</b>                           | EUT with Notebook and transmit  |         |         |         |  |  |  |
| <b>Modulation Mode</b>                              | 11a, HT20, HT40   |         |         |         |  |  |  |
| <b>Orthogonal Planes of EUT</b>                     | <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 |         |         |  |  |  |
|   |   |         |         |         |  |  |  |
| <b>Worst Planes of EUT</b>                          | V   |         |         |         |  |  |  |

## 2.4 Test Setup Diagram



**Test Setup Diagram - Radiated Below 1GHz Test****Test Setup Diagram - Radiated Above 1GHz Test**

### 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.

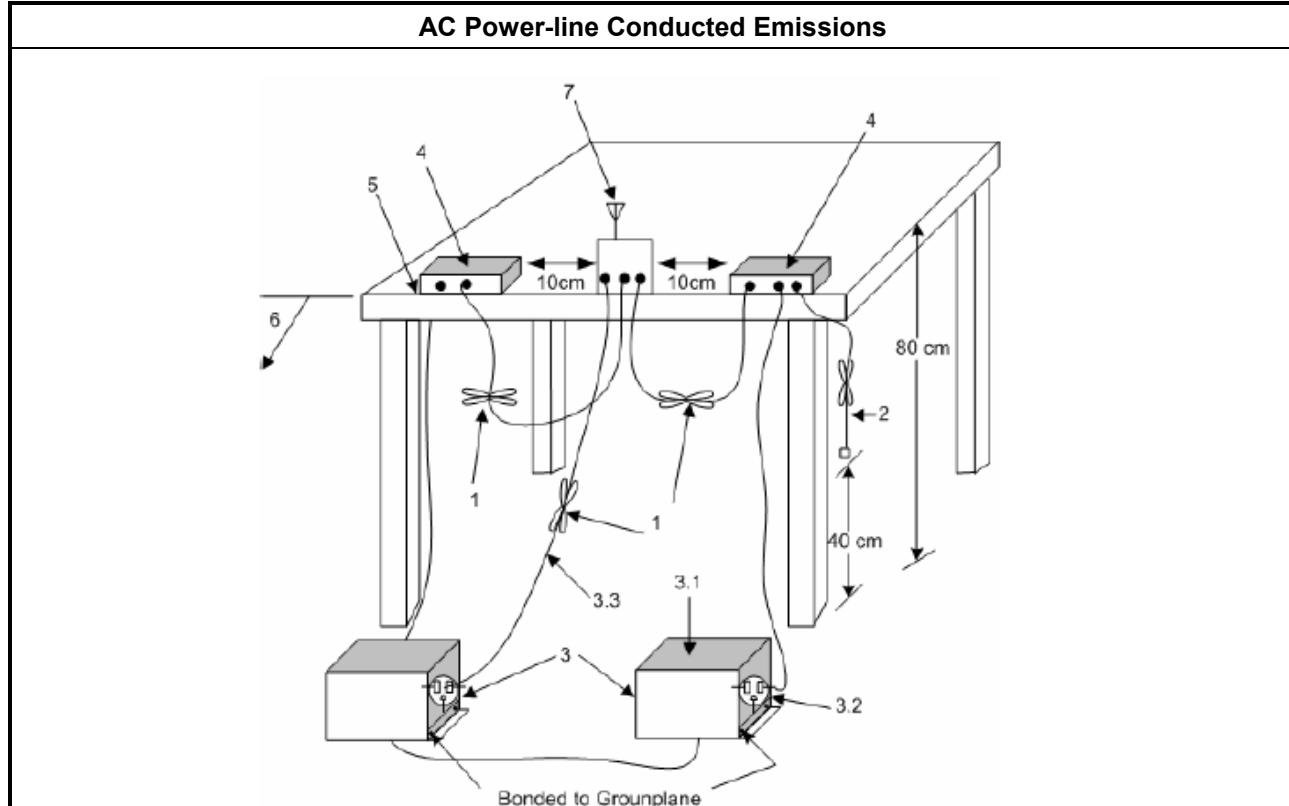
##### 3.1.2 Measuring Instruments

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 C63.10-2013, 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

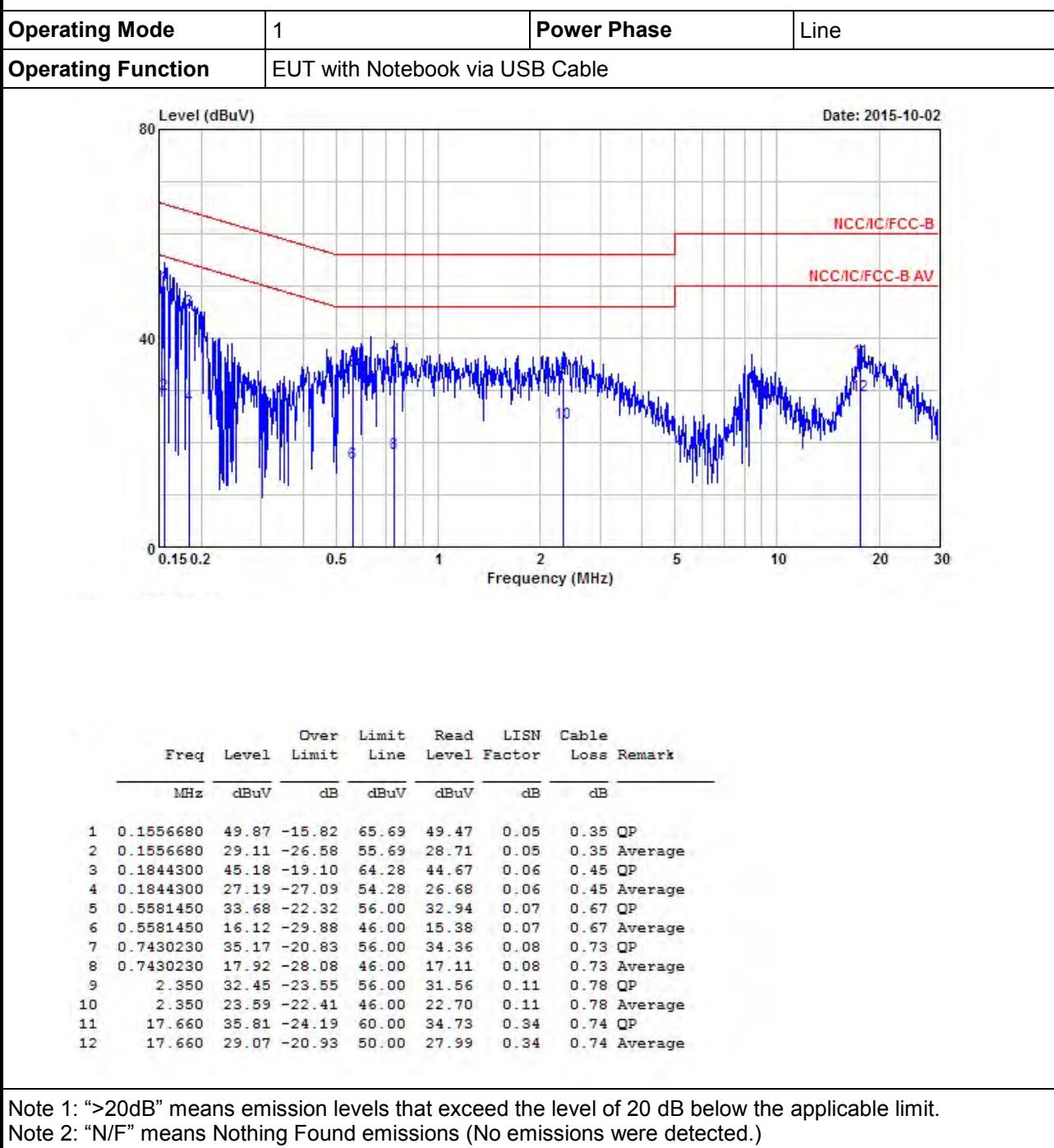
| AC Power-line Conducted Emissions Result |                                 |             |         |           |      |       |              |
|--|---------------------------------|-------------|---------|-----------|------|-------|--------------|
| Operating Mode                           | 1                               | Power Phase | Neutral |           |      |       |              |
| Operating Function                       | EUT with Notebook via USB Cable |             |         |           |      |       |              |
| Date: 2015-10-02                         |                                 |             |         |           |      |       |              |
| Level (dBuV)                             | 80                              | 40          | 0       | 0.15 0.2  | 0.5  | 1     | 2 5 10 20 30 |
| Frequency (MHz)                          |                                 |             |         |           |      |       |              |
| Freq                                     | Level                           | Over Limit  | Limit   | Read Line | LISN | Cable | Remark       |
| MHz                                      | dBuV                            | dB          | dBuV    | dBuV      | dB   | dB    |              |
| 1 0.150000                               | 52.58                           | -13.42      | 66.00   | 52.17     | 0.07 | 0.34  | QP           |
| 2 0.150000                               | 31.35                           | -24.65      | 56.00   | 30.94     | 0.07 | 0.34  | Average      |
| 3 0.1758420                              | 45.98                           | -18.70      | 64.68   | 45.49     | 0.07 | 0.42  | QP           |
| 4 0.1758420                              | 24.18                           | -30.50      | 54.68   | 23.69     | 0.07 | 0.42  | Average      |
| 5 0.6043130                              | 35.51                           | -20.49      | 56.00   | 34.74     | 0.08 | 0.69  | QP           |
| 6 0.6043130                              | 19.89                           | -26.11      | 46.00   | 19.12     | 0.08 | 0.69  | Average      |
| 7 0.7469700                              | 33.51                           | -22.49      | 56.00   | 32.69     | 0.08 | 0.74  | QP           |
| 8 0.7469700                              | 17.02                           | -28.98      | 46.00   | 16.20     | 0.08 | 0.74  | Average      |
| 9 1.940                                  | 30.33                           | -25.67      | 56.00   | 29.43     | 0.10 | 0.80  | QP           |
| 10 1.940                                 | 20.27                           | -25.73      | 46.00   | 19.37     | 0.10 | 0.80  | Average      |
| 11 17.660                                | 34.81                           | -25.19      | 60.00   | 33.70     | 0.37 | 0.74  | QP           |
| 12 17.660                                | 28.87                           | -21.13      | 50.00   | 27.76     | 0.37 | 0.74  | Average      |

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.)



## AC Power-line Conducted Emissions Result





## 3.2 Emission Bandwidth

### 3.2.1 Emission Bandwidth Limit

| Emission Bandwidth Limit            |   |
|-------------------------------------|---|
| <b>UNII Devices</b>                 |   |
| <input checked="" type="checkbox"/> | For the 5.15-5.25 GHz band, N/A   |
| <input type="checkbox"/>            | For the 5.25-5.35 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.  |
| <input type="checkbox"/>            | 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. |
| <input checked="" type="checkbox"/> | For the 5.725-5.85 GHz band, 6 dB emission bandwidth $\geq$ 500kHz.   |

### 3.2.2 Measuring Instruments

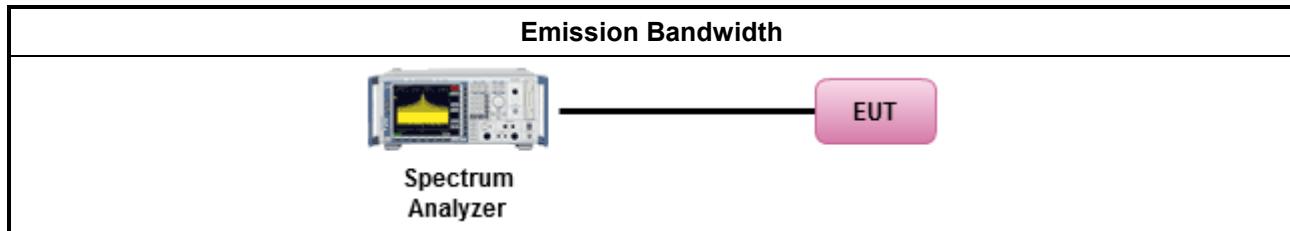
Refer a test equipment and calibration data table in this test report.

### 3.2.3 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 v01r02, 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 6.6 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 2.   |
| <input checked="" 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 2.              |
|                                     | <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. |



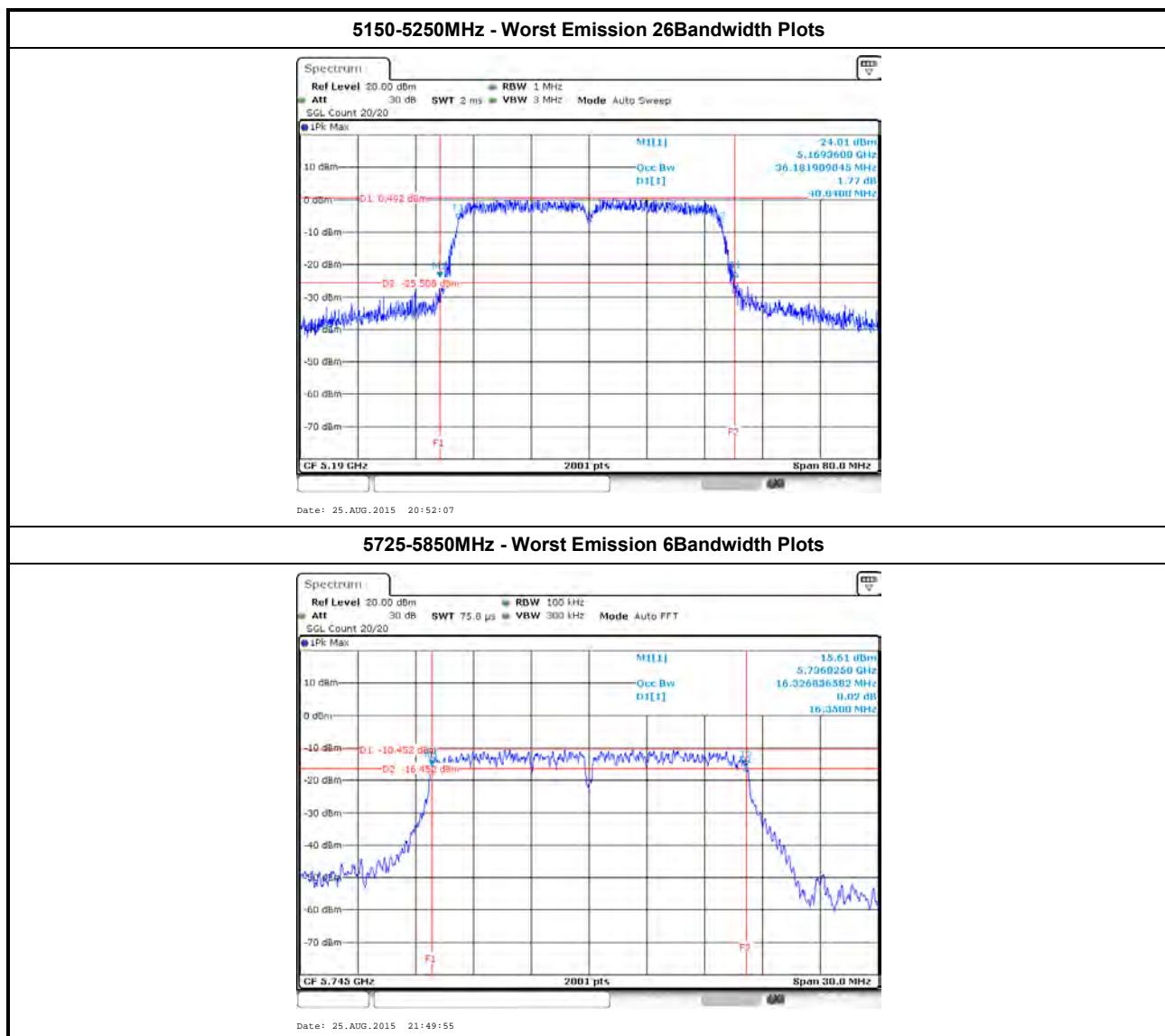
### 3.2.4 Test Setup



### 3.2.5 Test Result of Emission Bandwidth

| UNII Emission Bandwidth Result (5150-5250MHz band) |                 |             |                          |              |                |              |
|--|-----------------|-------------|--------------------------|--------------|----------------|--------------|
| Condition  |                 |             | Emission Bandwidth (MHz) |              |                |              |
| Modulation Mode                                    | N <sub>TX</sub> | Freq. (MHz) | 99% Bandwidth            |              | 26dB Bandwidth |              |
|  |                 |             | Chain Port 1             | Chain Port 2 | Chain Port 1   | Chain Port 2 |
| 11a  | 1               | 5180        | 16.41                    | -            | 18.57          | -            |
| 11a  | 1               | 5200        | 16.44                    | -            | 19.00          | -            |
| 11a  | 1               | 5240        | 16.44                    | -            | 18.70          | -            |
| HT20   | 2               | 5180        | 17.34                    | 17.51        | 19.25          | 19.45        |
| HT20   | 2               | 5200        | 17.36                    | 17.34        | 19.12          | 19.45        |
| HT20   | 2               | 5240        | 17.44                    | 17.51        | 19.65          | 19.47        |
| HT40   | 2               | 5190        | 36.10                    | 36.18        | 40.72          | 40.84        |
| HT40   | 2               | 5230        | 36.18                    | 36.10        | 40.60          | 40.68        |
| Result   |                 |             | Complied                 |              |                |              |

| UNII Emission Bandwidth Result (5725-5850MHz band) |                 |             |                          |              |               |              |
|--|-----------------|-------------|--------------------------|--------------|---------------|--------------|
| Condition  |                 |             | Emission Bandwidth (MHz) |              |               |              |
| Modulation Mode                                    | N <sub>TX</sub> | Freq. (MHz) | 99% Bandwidth            |              | 6dB Bandwidth |              |
|  |                 |             | Chain Port 1             | Chain Port 2 | Chain Port 1  | Chain Port 2 |
| 11a  | 1               | 5745        | 16.32                    | -            | 16.35         | -            |
| 11a  | 1               | 5785        | 16.37                    | -            | 16.44         | -            |
| 11a  | 1               | 5825        | 16.32                    | -            | 16.35         | -            |
| HT20   | 2               | 5745        | 17.46                    | 17.48        | 17.55         | 17.58        |
| HT20   | 2               | 5785        | 17.43                    | 17.40        | 17.35         | 17.05        |
| HT20   | 2               | 5825        | 17.43                    | 17.46        | 17.53         | 17.55        |
| HT40   | 2               | 5755        | 35.90                    | 35.90        | 36.32         | 36.36        |
| HT40   | 2               | 5795        | 35.86                    | 35.82        | 36.32         | 36.32        |
| Limit  |                 |             | -                        |              | ≥ 500 kHz     |              |
| Result   |                 |             | Complied                 |              |               |              |





### 3.3 RF Output Power

#### 3.3.1 RF Output Power Limit

| Maximum Conducted Output Power Limit   |  |
|--|--|
| <b>UNII Devices</b>  |  |
| <input checked="" type="checkbox"/> For the 5.15-5.25 GHz band:  |  |
| <input type="checkbox"/> Outdoor AP: the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W. If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ . e.i.r.p. at any elevation angle above 30 degrees $\leq 125$ mW [21dBm]                         |  |
| <input type="checkbox"/> Indoor AP: the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W. If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$   |  |
| <input type="checkbox"/> 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 $P_{Out} = 30 - (G_{TX} - 23)$ .  |  |
| <input checked="" type="checkbox"/> Mobile or Portable Client: the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 250 mW. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$ .   |  |
| <input type="checkbox"/> 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 $P_{Out} = 24 - (G_{TX} - 6)$ .  |  |
| <input type="checkbox"/> 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 $P_{Out} = 24 - (G_{TX} - 6)$ . |  |
| <input checked="" type="checkbox"/> For the 5.725-5.85 GHz band:   |  |
| <input checked="" type="checkbox"/> Point-to-multipoint systems (P2M): the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W. If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ .  |  |
| <input type="checkbox"/> Point-to-point systems (P2P): the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W.  |  |
| $P_{Out}$ = maximum conducted output power in dBm,<br>$G_{TX}$ = the maximum transmitting antenna directional gain in dBi.   |  |

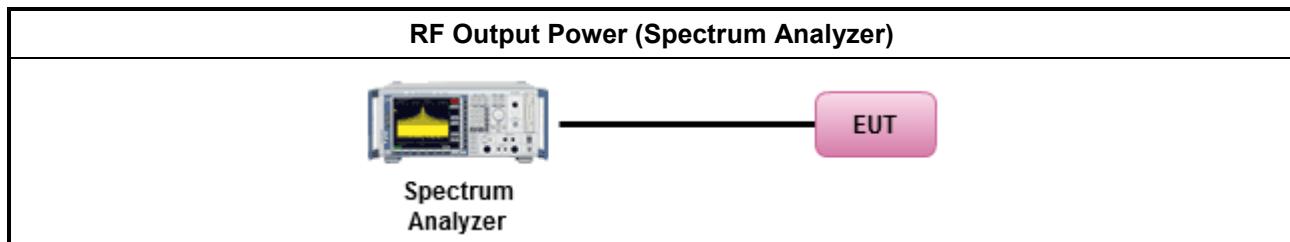
#### 3.3.2 Measuring Instruments

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 |  |
|  | [duty cycle $\geq$ 98% or external video / power trigger]  |
| <input checked="" type="checkbox"/>                                | Refer as FCC KDB 789033 D02 v01r02, clause E Method SA-1 (spectral trace averaging).   |
| <input type="checkbox"/>   | Refer as FCC KDB 789033 D02 v01r02, clause E Method SA-1 Alt.<br>(RMS detection with slow sweep speed)   |
|  | duty cycle $<$ 98% and average over on/off periods with duty factor  |
| <input type="checkbox"/>   | Refer as FCC KDB 789033 D02 v01r02, clause E Method SA-2 (spectral trace averaging).   |
| <input type="checkbox"/>   | Refer as FCC KDB 789033 D02 v01r02, clause E Method SA-2 Alt.<br>(RMS detection with slow sweep speed)   |
|  | Wideband RF power meter and average over on/off periods with duty factor   |
| <input type="checkbox"/>   | Refer as FCC KDB 789033 D02 v01r02, clause E Method PM (using an 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 checked="" 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:<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. |
| <input type="checkbox"/>   | If multiple transmit chains, EIRP calculation could be following as methods:<br>$P_{total} = P_1 + P_2 + \dots + P_n$<br>(calculated in linear unit [mW] and transfer to log unit [dBm])<br>$EIRP_{total} = P_{total} + DG$  |

### 3.3.4 Test Setup





### 3.3.5 Directional Gain for Power Measurement

| Directional Gain (DG) Result |          |          |                 |      |                 |
|------------------------------|----------|----------|-----------------|------|-----------------|
| Transmit Chains No.          |          | 1        | 2               | -    | -               |
| Maximum $G_{ANT}$ (dBi)      |          | 6.64     | 6.64            | -    | -               |
| Modulation Mode              | DG (dBi) | $N_{TX}$ | $N_{SS}$ (Min.) | STBC | Array Gain (dB) |
| 11a                          | 6.64     | 1        | 1               | -    | 0.00            |
| HT20,M0-15                   | 9.65     | 2        | 1               | -    | 3.01            |
| HT40,M0-15                   | 9.65     | 2        | 1               | -    | 3.01            |

Note 1: For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows:  
Any transmit signals are correlated, Directional Gain =  $G_{ANT} + 10 \log(N_{TX})$   
All transmit signals are completely uncorrelated, Directional Gain =  $G_{ANT}$

Note 2: For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows:  
Any transmit signals are correlated, Directional Gain =  $10 \log[(10^{G1/20} + \dots + 10^{GN/20})^2 / N_{TX}]$   
All transmit signals are completely uncorrelated, Directional Gain =  $10 \log[(10^{G1/10} + \dots + 10^{GN/10}) / N_{TX}]$

Note 3: For Spatial Multiplexing, Directional Gain (DG) =  $G_{ANT} + 10 \log(N_{TX}/N_{SS})$ ,  
where  $N_{SS}$  = the number of independent spatial streams data.

Note 4: For CDD transmissions, directional gain is calculated as power measurements:  
Directional Gain (DG) =  $G_{ANT} + \text{Array Gain}$ , where Array Gain is as follows:  
Array Gain = 0 dB (i.e., no array gain) for  $N_{TX} \leq 4$ ;  
Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq 40$  MHz for any  $N_{TX}$ ;

Note 5: Array Gain =  $10 \log(N_{TX})$



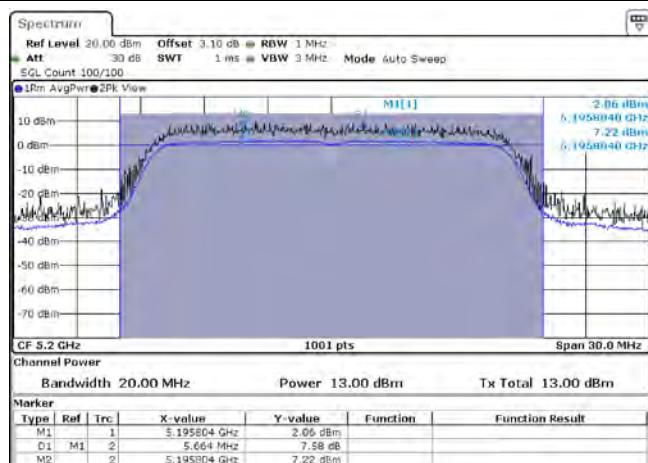
## 3.3.6 Test Result of Maximum Conducted Output Power

| Maximum Conducted Output Power (5150-5250MHz band) |                 |                |                       |                 |           |                       |             |
|--|-----------------|----------------|-----------------------|-----------------|-----------|-----------------------|-------------|
| Modulation Mode                                    | N <sub>TX</sub> | Freq.<br>(MHz) | Output Power<br>(dBm) |                 |           | Antenna Gain<br>(dBi) | Power Limit |
|  |                 |                | Chain<br>Port 1       | Chain<br>Port 2 | Sum Chain |                       |             |
| 11a  | 1               | 5180           | 12.71                 | -               | 12.71     | 6.64                  | 23.36       |
| 11a  | 1               | 5200           | 13.00                 | -               | 13.00     | 6.64                  | 23.36       |
| 11a  | 1               | 5240           | 12.66                 | -               | 12.66     | 6.64                  | 23.36       |
| HT20   | 2               | 5180           | 8.46                  | 9.54            | 12.04     | 9.65                  | 20.35       |
| HT20   | 2               | 5200           | 8.71                  | 9.89            | 12.35     | 9.65                  | 20.35       |
| HT20   | 2               | 5240           | 8.32                  | 9.94            | 12.22     | 9.65                  | 20.35       |
| HT40   | 2               | 5190           | 12.34                 | 12.43           | 15.40     | 9.65                  | 20.35       |
| HT40   | 2               | 5230           | 11.52                 | 11.33           | 14.44     | 9.65                  | 20.35       |
| Result   |                 | Complied       |                       |                 |           |                       |             |

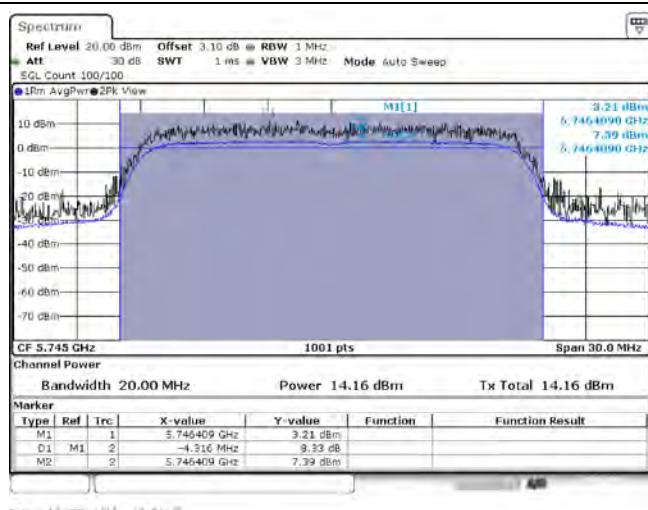
| Maximum Conducted Output Power (5725-5850MHz band) |                 |                |                       |                 |           |                       |             |
|--|-----------------|----------------|-----------------------|-----------------|-----------|-----------------------|-------------|
| Modulation Mode                                    | N <sub>TX</sub> | Freq.<br>(MHz) | Output Power<br>(dBm) |                 |           | Antenna Gain<br>(dBi) | Power Limit |
|  |                 |                | Chain<br>Port 1       | Chain<br>Port 2 | Sum Chain |                       |             |
| 11a  | 1               | 5745           | 10.45                 | -               | 10.45     | 6.64                  | 29.36       |
| 11a  | 1               | 5785           | 10.46                 | -               | 10.46     | 6.64                  | 29.36       |
| 11a  | 1               | 5825           | 8.64                  | -               | 8.64      | 6.64                  | 29.36       |
| HT20   | 2               | 5745           | 13.12                 | 14.16           | 16.68     | 9.65                  | 26.35       |
| HT20   | 2               | 5785           | 11.01                 | 10.88           | 13.96     | 9.65                  | 26.35       |
| HT20   | 2               | 5825           | 10.57                 | 10.07           | 13.34     | 9.65                  | 26.35       |
| HT40   | 2               | 5755           | 11.64                 | 10.51           | 14.12     | 9.65                  | 26.35       |
| HT40   | 2               | 5795           | 11.26                 | 10.53           | 13.92     | 9.65                  | 26.35       |
| Result   |                 | Complied       |                       |                 |           |                       |             |



## 5150-5250MHz - Worst RF Output Power Plots



## 5725-5850MHz - Worst RF Output Power Plots





## 3.4 Peak Power Spectral Density

### 3.4.1 Peak Power Spectral Density Limit

| Peak Power Spectral Density Limit  |  |
|--|--|
| <b>UNII Devices</b>  |  |
| <input checked="" type="checkbox"/> For the 5.15-5.25 GHz band:  |  |
| <input type="checkbox"/> Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .  |  |
| <input type="checkbox"/> Indoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .   |  |
| <input type="checkbox"/> Point-to-point AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 23$ dBi, then $P_{Out} = 17 - (G_{TX} - 23)$ .   |  |
| <input checked="" type="checkbox"/> Mobile or Portable Client: the peak power spectral density (PPSD) $\leq 11$ dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 11 - (G_{TX} - 6)$ .  |  |
| <input type="checkbox"/> For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) $\leq 11$ dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 11 - (G_{TX} - 6)$ .  |  |
| <input type="checkbox"/> For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) $\leq 11$ dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 11 - (G_{TX} - 6)$ .   |  |
| <input checked="" type="checkbox"/> For the 5.725-5.85 GHz band:   |  |
| <input checked="" type="checkbox"/> Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) $\leq 30$ dBm/500kHz. If $G_{TX} > 6$ dBi, then $PPSD = 30 - (G_{TX} - 6)$ .   |  |
| <input type="checkbox"/> Point-to-point systems (P2P): the peak power spectral density (PPSD) $\leq 30$ dBm/500kHz.  |  |
| <b>PPSD</b> = peak power spectral density that the 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<br><b>G<sub>TX</sub></b> = the maximum transmitting antenna directional gain in dBi. |  |

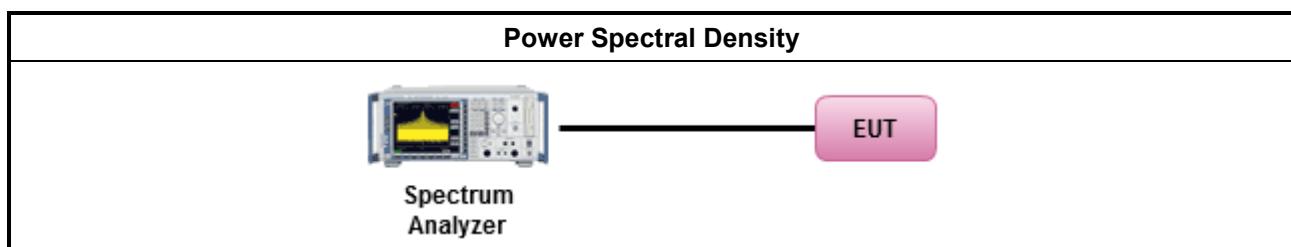
### 3.4.2 Measuring Instruments

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

### 3.4.3 Test Procedures

| Test Method  |  |
|--|--|
| <input checked="" type="checkbox"/> 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:            |  |
| <input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, 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 $\geq$ 98% or external video / power trigger]  |  |
| <input type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, clause E Method SA-1 (spectral trace averaging).  |  |
| <input type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)   |  |
| duty cycle $<$ 98% and average over on/off periods with duty factor  |  |
| <input type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, clause E Method SA-2 (spectral trace averaging).  |  |
| <input type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)   |  |
| <input checked="" type="checkbox"/> For conducted measurement.   |  |
| <input type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.   |  |
| <input checked="" 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 checked="" type="checkbox"/> 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.   |  |
| <input type="checkbox"/> 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. |  |
| <input type="checkbox"/> If multiple transmit chains, EIRP PPSD calculation could be following as methods:<br>$PPSD_{total} = PPSD_1 + PPSD_2 + \dots + PPSD_n$<br>(calculated in linear unit [mW] and transfer to log unit [dBm])<br>$EIRP_{total} = PPSD_{total} + DG$   |  |
| <input type="checkbox"/> Each individually PPSD plots refer as test report clause 3.3.5 with each individually PPSD plots.   |  |

### 3.4.4 Test Setup





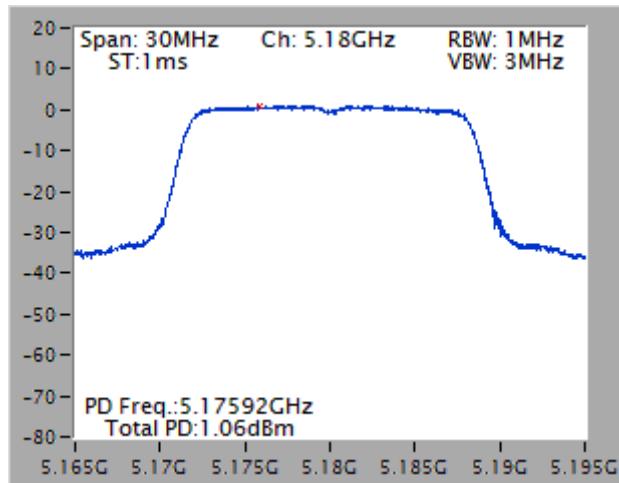
### 3.4.5 Test Result of Peak Power Spectral Density

| Peak Power Spectral Density Result (5150-5250MHz band) |                 |             |                                   |           |              |
|--|-----------------|-------------|-----------------------------------|-----------|--------------|
| Modulation Mode  | N <sub>TX</sub> | Freq. (MHz) | Peak Power Spectral Density (dBm) | PSD Limit | PSD-DG (dBi) |
| 11a  | 1               | 5180        | 1.06                              | 10.36     | 6.64         |
| 11a  | 1               | 5200        | 0.20                              | 10.36     | 6.64         |
| 11a  | 1               | 5240        | -0.39                             | 10.36     | 6.64         |
| HT20   | 2               | 5180        | -3.33                             | 7.35      | 9.65         |
| HT20   | 2               | 5200        | -3.28                             | 7.35      | 9.65         |
| HT20   | 2               | 5240        | -2.56                             | 7.35      | 9.65         |
| HT40   | 2               | 5190        | -2.42                             | 7.35      | 9.65         |
| HT40   | 2               | 5230        | -2.49                             | 7.35      | 9.65         |
| Result   |                 | Complied    |                                   |           |              |

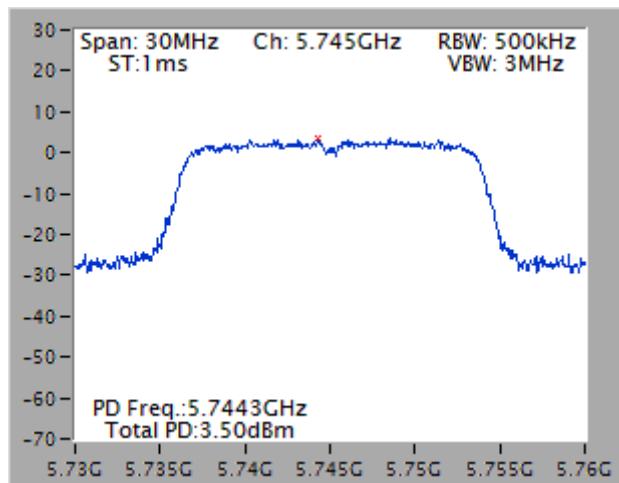
| Peak Power Spectral Density Result (5725-5850MHz band) |                 |             |                                   |                    |              |
|--|-----------------|-------------|-----------------------------------|--------------------|--------------|
| Modulation Mode  | N <sub>TX</sub> | Freq. (MHz) | Peak Power Spectral Density (dBm) | PSD Limit (500kHz) | PSD-DG (dBi) |
| 11a  | 1               | 5745        | 0.27                              | 29.36              | 6.64         |
| 11a  | 1               | 5785        | 0.80                              | 29.36              | 6.64         |
| 11a  | 1               | 5825        | -1.82                             | 29.36              | 6.64         |
| HT20   | 2               | 5745        | 3.50                              | 26.35              | 9.65         |
| HT20   | 2               | 5785        | 3.26                              | 26.35              | 9.65         |
| HT20   | 2               | 5825        | 1.92                              | 26.35              | 9.65         |
| HT40   | 2               | 5755        | -1.26                             | 26.35              | 9.65         |
| HT40   | 2               | 5795        | -0.69                             | 26.35              | 9.65         |
| Result   |                 | Complied    |                                   |                    |              |



## 5150-5250MHz - Worst Power Spectral Density Plots

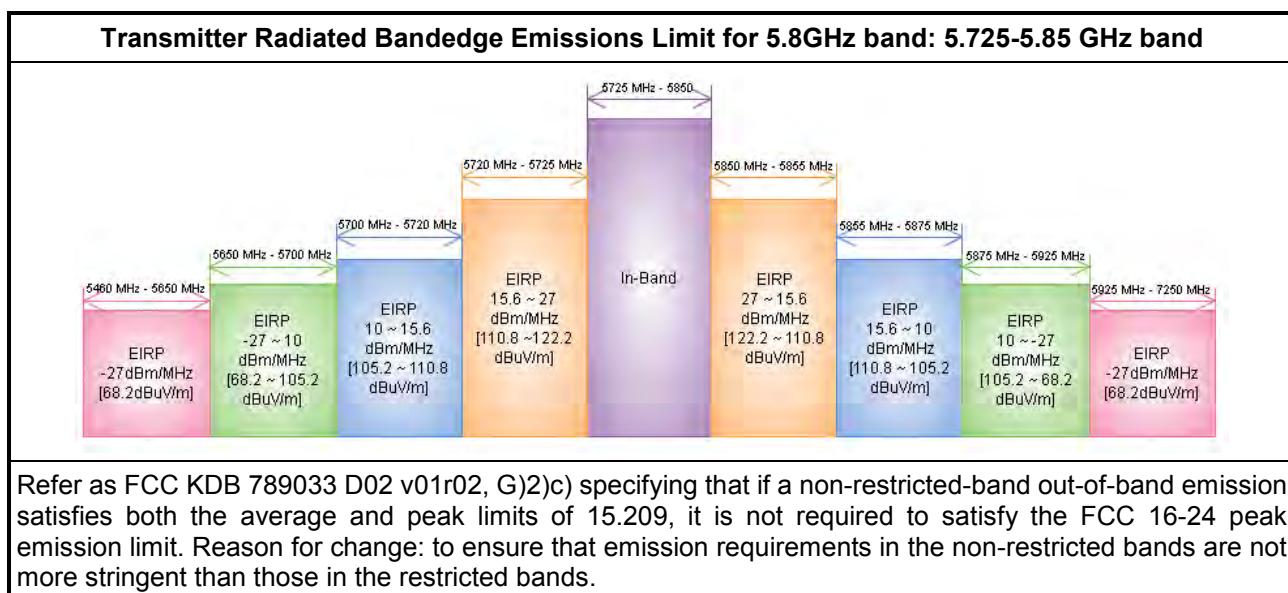
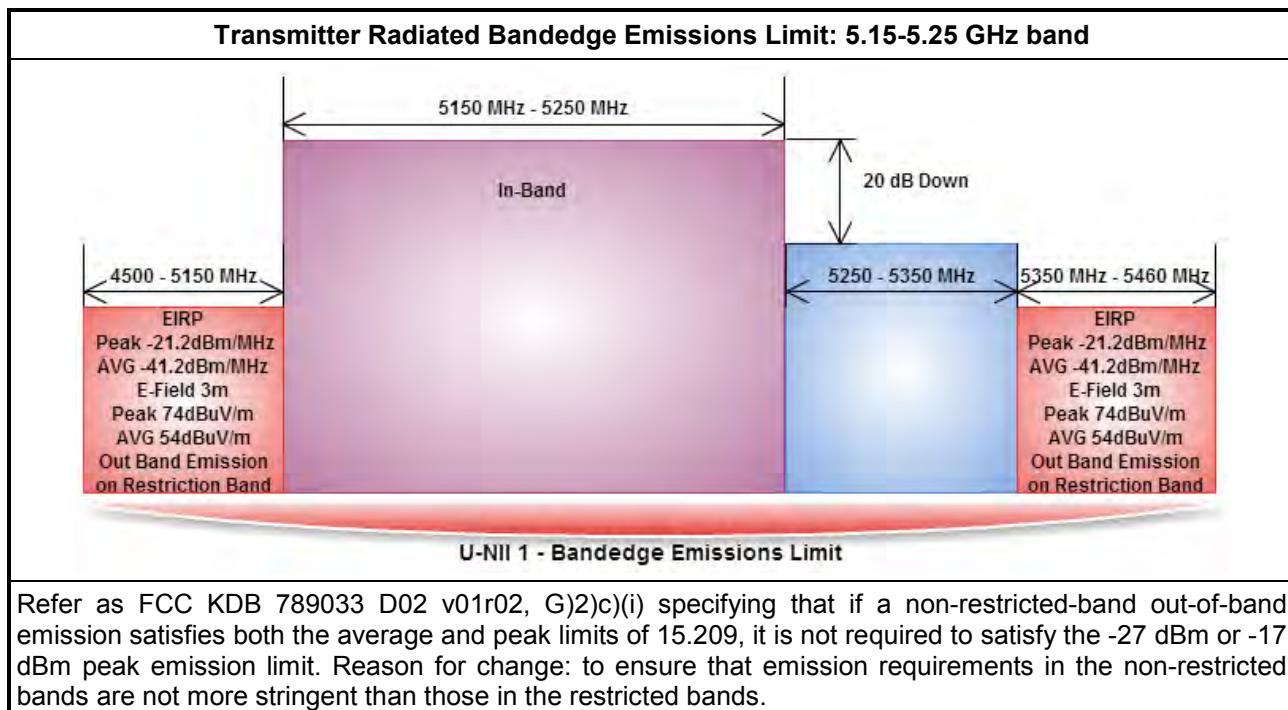


## 5725-5850MHz - Worst Power Spectral Density Plots



## 3.5 Transmitter Bandedge Emissions

### 3.5.1 Transmitter Radiated Bandedge Emissions Limit



### 3.5.2 Measuring Instruments

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

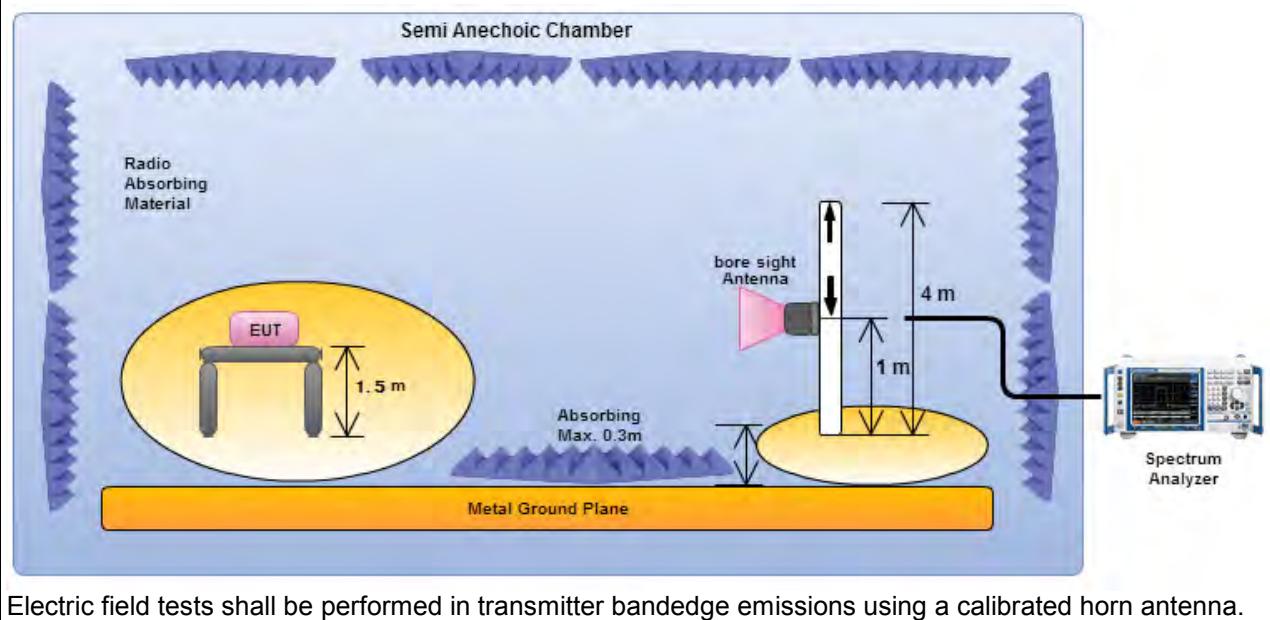


### 3.5.3 Test Procedures

| Test Method   |
|---|
| <input checked="" type="checkbox"/> The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].   |
| <input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.10 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.  |
| <input type="checkbox"/> If EUT operate in adjacent contiguous bands, bandedge testing performed at the lowest frequency channel at lower-band and highest frequency channel at higher-band. Transmitter in-band emissions will consist of adjacent contiguous bands (e.g., IEEE 802.11ac VHT160 The lowest frequency channel at lower-band and highest frequency channel at higher-band in-band emissions will consist of two adjacent contiguous bands.) <ul style="list-style-type: none"><li><input type="checkbox"/> Operating in 5.15-5.25 GHz band (lower-band) and 5.25-5.35 GHz band (higher-band).</li><li><input type="checkbox"/> Operating in 5.47-5.725 GHz band (lower-band) and 5.725-5.85 GHz band (higher-band).</li></ul>  |
| <input type="checkbox"/> If EUT operate in individual non-contiguous bands, bandedge testing performed at the lowest frequency channel and highest frequency channel within lower-band and higher-band. (e.g., (e.g., IEEE 802.11ac VHT160) <ul style="list-style-type: none"><li><input type="checkbox"/> Operating in 5.25-5.35 GHz band (lower-band) and 5.47-5.725 GHz band (higher-band).</li><li><input type="checkbox"/> Operating in 5.15-5.25 GHz band (lower-band) and 5.725-5.85 GHz band (higher-band).</li></ul>   |
| <input checked="" type="checkbox"/> For the transmitter unwanted emissions shall be measured using following options below: <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, clause G)2) for unwanted emissions into non-restricted bands.</li><li><input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, clause G)1) for unwanted emissions into restricted bands.<ul style="list-style-type: none"><li><input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, G)6) Method AD (Trace Averaging).</li><li><input type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, G)6) Method VB (Reduced VBW).</li><li><input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). <math>VBW \geq 1/T</math>, where T is pulse time.</li><li><input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.</li><li><input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, clause G)5) measurement procedure peak limit.</li><li><input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.</li></ul></li></ul> |
| <input checked="" type="checkbox"/> For the transmitter bandedge emissions shall be measured using following options below: <ul style="list-style-type: none"><li><input type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, clause G)3)d) for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).</li><li><input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.10 for band-edge testing.</li><li><input type="checkbox"/> Refer as ANSI C63.10, clause 6.10.6.2 for marker-delta method for band-edge measurements.</li></ul>   |
| <input checked="" type="checkbox"/> For radiated measurement, refer as ANSI C63.10, clause 6.6. Test distance is 3m.  |
| <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. 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). Measurements in the bandedge are typically made at a closer distance 3m, because the instrumentation noise floor is typically close to the radiated emission limit.   |

### 3.5.4 Test Setup

#### Transmitter Radiated Bandedge Emissions



Electric field tests shall be performed in transmitter bandedge emissions using a calibrated horn antenna.

**3.5.5 Transmitter Radiated Bandedge Emissions (with Antenna)**

| U-NII 5150-5250MHz Transmitter Radiated Bandedge (with Antenna) |                 |             |                      |                |                   |                   |                |                   |                   |      |
|---|-----------------|-------------|----------------------|----------------|-------------------|-------------------|----------------|-------------------|-------------------|------|
| Modulation Mode   | N <sub>TX</sub> | Freq. (MHz) | Measure Distance (m) | Freq. (MHz) PK | Level (dBuV/m) PK | Limit (dBuV/m) PK | Freq. (MHz) AV | Level (dBuV/m) AV | Limit (dBuV/m) AV | Pol. |
| 11a   | 1               | 5180        | 3                    | 5148.80        | 59.17             | 74                | 5127.40        | 45.40             | 54                | H    |
| 11a   | 1               | 5240        | 3                    | 5123.40        | 58.77             | 74                | 5112.60        | 45.27             | 54                | H    |
| HT20  | 2               | 5180        | 3                    | 5117.60        | 58.04             | 74                | 5128.40        | 44.94             | 54                | H    |
| HT20  | 2               | 5240        | 3                    | 5398.20        | 58.23             | 74                | 5121.60        | 44.85             | 54                | H    |
| HT40  | 2               | 5190        | 3                    | 5147.30        | 58.64             | 74                | 5149.94        | 45.80             | 54                | H    |
| HT40  | 2               | 5230        | 3                    | 5133.60        | 58.96             | 74                | 5124.60        | 44.99             | 54                | H    |

Note 1: Measurement worst emissions of receive antenna polarization.

| U-NII 5725-5850MHz Transmitter Radiated Bandedge (with Antenna) |                 |             |                      |                |                   |                   |                |                   |                   |      |
|---|-----------------|-------------|----------------------|----------------|-------------------|-------------------|----------------|-------------------|-------------------|------|
| Modulation Mode   | N <sub>TX</sub> | Freq. (MHz) | Measure Distance (m) | Freq. (MHz) PK | Level (dBuV/m) PK | Limit (dBuV/m) PK | Freq. (MHz) AV | Level (dBuV/m) AV | Limit (dBuV/m) AV | Pol. |
| 11a   | 1               | 5745        | 3                    | 5650           | 58.09             | 68.2              | 5650           | 45.31             | 68.2              | H    |
| 11a   | 1               | 5785        | 3                    | 5650           | 58.72             | 68.2              | 5650           | 45.63             | 68.2              | H    |
| 11a   | 1               | 5825        | 3                    | 5893.54        | 59.31             | 91.44             | 5876.95        | 45.89             | 103.75            | H    |
| HT20  | 2               | 5745        | 3                    | 5650           | 56.7              | 68.2              | 5650           | 45.36             | 68.2              | H    |
| HT20  | 2               | 5785        | 3                    | 5650           | 57.05             | 68.2              | 5650           | 45.18             | 68.2              | H    |
| HT20  | 2               | 5825        | 3                    | 5907.19        | 58.88             | 81.34             | 5877.58        | 45.59             | 103.28            | H    |
| HT40  | 2               | 5755        | 3                    | 5650           | 58.22             | 68.2              | 5650           | 45.32             | 68.2              | H    |
| HT40  | 2               | 5795        | 3                    | 5904.7         | 59.4              | 83.18             | 5897.5         | 45.76             | 88.51             | H    |

Note 1: Measurement worst emissions of receive antenna polarization.



## 3.6 Transmitter Unwanted Emissions

### 3.6.1 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                    |

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 - 5.85 GHz                              | 5.650-5700 GHz: e.i.r.p. -27 ~ 10 dBm [68.2 ~ 105.2 dBuV/m@3m]<br>5.700-5720 GHz: e.i.r.p. 10 ~ 15.6 dBm [105.2 ~ 110.8 dBuV/m@3m]<br>5.720-5725 GHz: e.i.r.p. 15.6 ~ 27 dBm [110.8 ~ 122.2 dBuV/m@3m]<br>5.850-5.855 GHz: e.i.r.p. 27 ~ 15.6 dBm [122.2 ~ 110.8 dBuV/m@3m]<br>5.855-5.875 GHz: e.i.r.p. 15.6 ~ 10 dBm [110.8 ~ 105.2 dBuV/m@3m]<br>5.875-5.925 GHz: e.i.r.p. 10 ~ -27 dBm [105.2 ~ 68.2 dBuV/m@3m]<br>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).



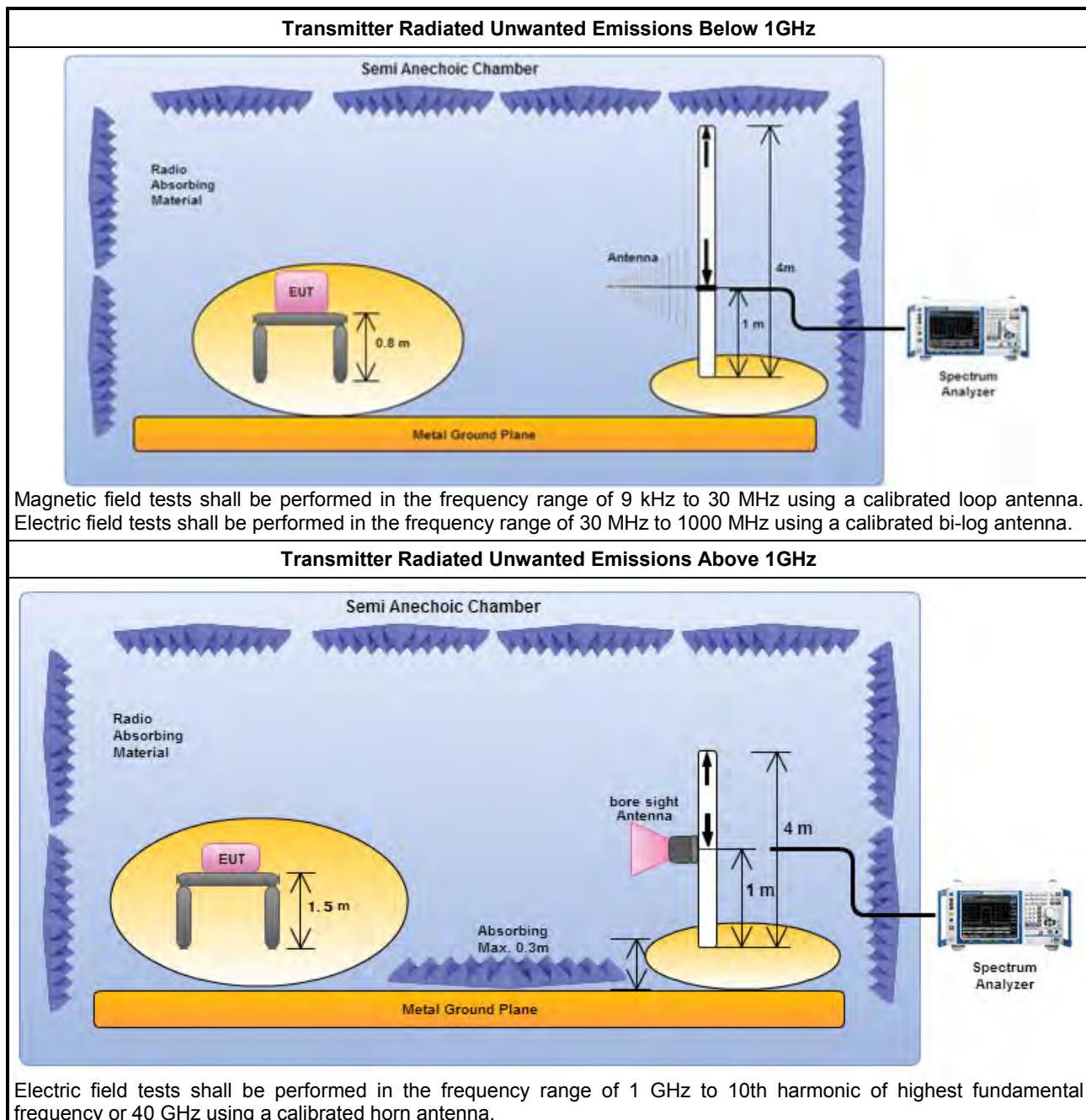
### 3.6.2 Measuring Instruments

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

### 3.6.3 Test Procedures

| Test Method  |
|--|
| <input checked="" type="checkbox"/> 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"/> The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].  |
| <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 v01r02, clause G)2) for unwanted emissions into non-restricted bands.  |
| <input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, clause G)1) for unwanted emissions into restricted bands.  |
| <input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, G)6) Method AD (Trace Averaging).  |
| <input type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, G)6) Method VB (Reduced VBW).   |
| <input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). $VBW \geq 1/T$ , where T is pulse time.   |
| <input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.   |
| <input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01r02, clause G)5) measurement procedure peak limit.  |
| <input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.2 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 below 30 MHz and test distance is 3m.  |
| <input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.   |
| <input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz. For 1 GHz to 5 GHz, test distance is 3m; For 5 GHz to 40 GHz, test distance is 3m.   |
| <input checked="" type="checkbox"/> The any unwanted emissions level shall not exceed the fundamental emission level.  |
| <input checked="" type="checkbox"/> All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.   |

### 3.6.4 Test Setup

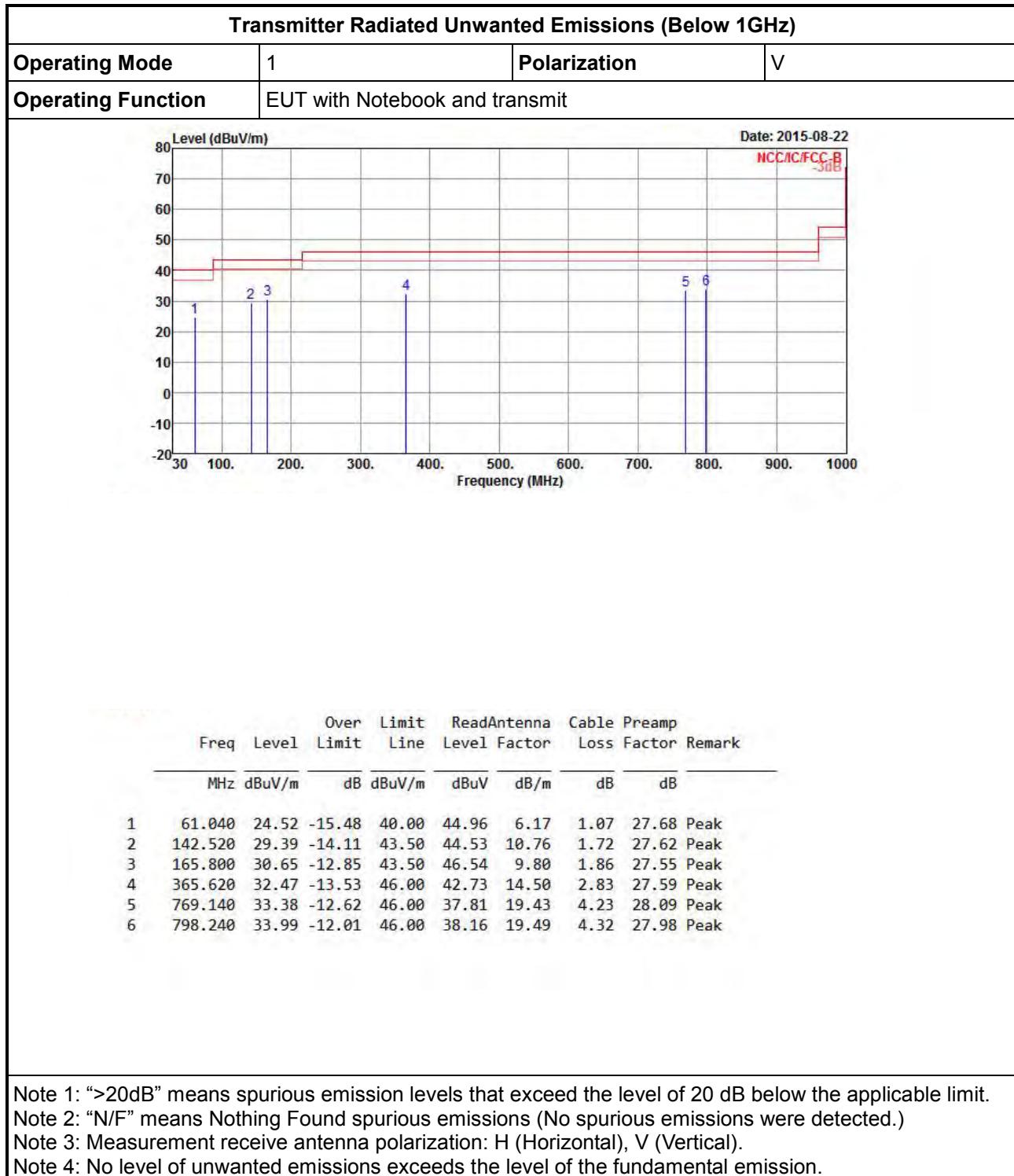


### 3.6.5 Transmitter Radiated Unwanted Emissions-with Antenna (Below 30MHz)

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

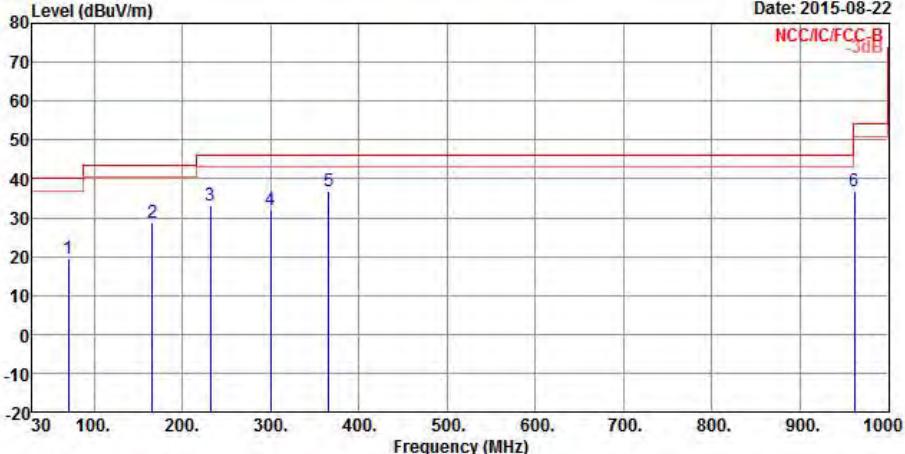


## 3.6.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)





## Transmitter Radiated Unwanted Emissions (Below 1GHz)

| Operating Mode  | 1                              | Polarization | H  |         |            |        |         |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
|---|--------------------------------|--------------|--|---------|------------|--------|---------|-------|--------|--|--|-------|-------|------|---------|-------|--------|------|--|-----|--------|----|--------|------|------|----|---|--------|-------|--------|-------|-------|------|------|---|---------|-------|--------|-------|-------|------|------|---|---------|-------|--------|-------|-------|-------|------|---|---------|-------|--------|-------|-------|-------|------|---|---------|-------|-------|-------|-------|-------|------|---|---------|-------|--------|-------|-------|-------|------|------|
| Operating Function  | EUT with Notebook and transmit |              |  |         |            |        |         |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
|   |                                |              | Date: 2015-08-22<br>NCC/C/IC/FCC-B -30dB |         |            |        |         |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
| <table><thead><tr><th></th><th>Freq</th><th>Over Limit</th><th>Read</th><th>Antenna</th><th>Cable</th><th>Preamp</th><th></th></tr><tr><th></th><th>Level</th><th>Limit</th><th>Line</th><th>Antenna</th><th>Level</th><th>Factor</th><th>Loss</th></tr><tr><th></th><th>MHz</th><th>dBuV/m</th><th>dB</th><th>dBuV/m</th><th>dBuV</th><th>dB/m</th><th>dB</th></tr></thead><tbody><tr><td>1</td><td>70.740</td><td>19.57</td><td>-20.43</td><td>40.00</td><td>39.91</td><td>6.22</td><td>1.14</td></tr><tr><td>2</td><td>165.800</td><td>28.84</td><td>-14.66</td><td>43.50</td><td>44.73</td><td>9.80</td><td>1.86</td></tr><tr><td>3</td><td>231.760</td><td>33.26</td><td>-12.74</td><td>46.00</td><td>48.31</td><td>10.03</td><td>2.23</td></tr><tr><td>4</td><td>299.660</td><td>32.06</td><td>-13.94</td><td>46.00</td><td>43.74</td><td>12.85</td><td>2.51</td></tr><tr><td>5</td><td>365.620</td><td>36.92</td><td>-9.08</td><td>46.00</td><td>47.18</td><td>14.50</td><td>2.83</td></tr><tr><td>6</td><td>961.200</td><td>36.92</td><td>-17.08</td><td>54.00</td><td>39.00</td><td>20.60</td><td>4.76</td></tr></tbody></table> |                                |              |  | Freq    | Over Limit | Read   | Antenna | Cable | Preamp |  |  | Level | Limit | Line | Antenna | Level | Factor | Loss |  | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | 1 | 70.740 | 19.57 | -20.43 | 40.00 | 39.91 | 6.22 | 1.14 | 2 | 165.800 | 28.84 | -14.66 | 43.50 | 44.73 | 9.80 | 1.86 | 3 | 231.760 | 33.26 | -12.74 | 46.00 | 48.31 | 10.03 | 2.23 | 4 | 299.660 | 32.06 | -13.94 | 46.00 | 43.74 | 12.85 | 2.51 | 5 | 365.620 | 36.92 | -9.08 | 46.00 | 47.18 | 14.50 | 2.83 | 6 | 961.200 | 36.92 | -17.08 | 54.00 | 39.00 | 20.60 | 4.76 | Peak |
|   | Freq                           | Over Limit   | Read                                     | Antenna | Cable      | Preamp |         |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
|   | Level                          | Limit        | Line                                     | Antenna | Level      | Factor | Loss    |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
|   | MHz                            | dBuV/m       | dB                                       | dBuV/m  | dBuV       | dB/m   | dB      |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
| 1   | 70.740                         | 19.57        | -20.43                                   | 40.00   | 39.91      | 6.22   | 1.14    |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
| 2   | 165.800                        | 28.84        | -14.66                                   | 43.50   | 44.73      | 9.80   | 1.86    |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
| 3   | 231.760                        | 33.26        | -12.74                                   | 46.00   | 48.31      | 10.03  | 2.23    |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
| 4   | 299.660                        | 32.06        | -13.94                                   | 46.00   | 43.74      | 12.85  | 2.51    |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
| 5   | 365.620                        | 36.92        | -9.08                                    | 46.00   | 47.18      | 14.50  | 2.83    |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |
| 6   | 961.200                        | 36.92        | -17.08                                   | 54.00   | 39.00      | 20.60  | 4.76    |       |        |  |  |       |       |      |         |       |        |      |  |     |        |    |        |      |      |    |   |        |       |        |       |       |      |      |   |         |       |        |       |       |      |      |   |         |       |        |       |       |       |      |   |         |       |        |       |       |       |      |   |         |       |       |       |       |       |      |   |         |       |        |       |       |       |      |      |

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

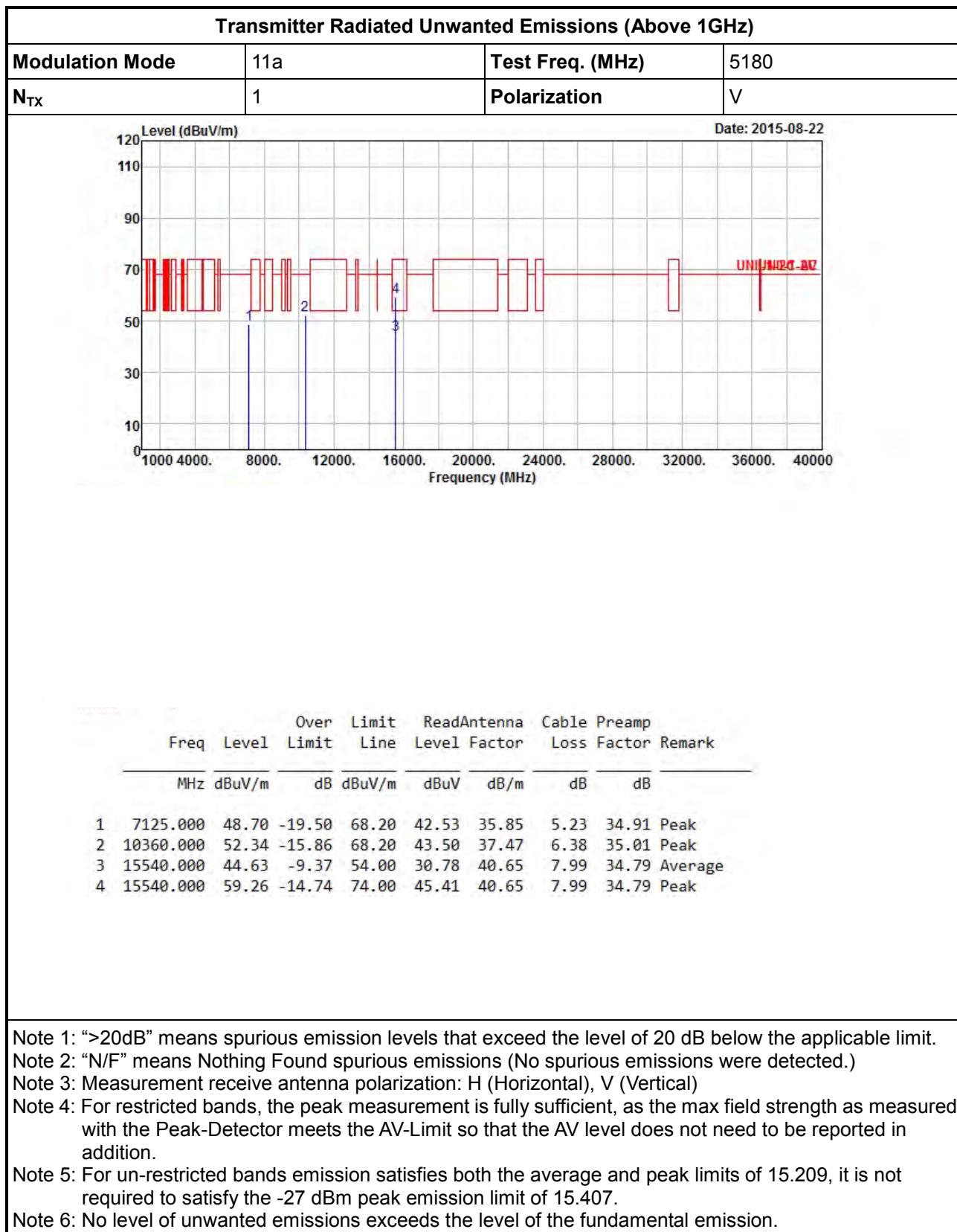
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

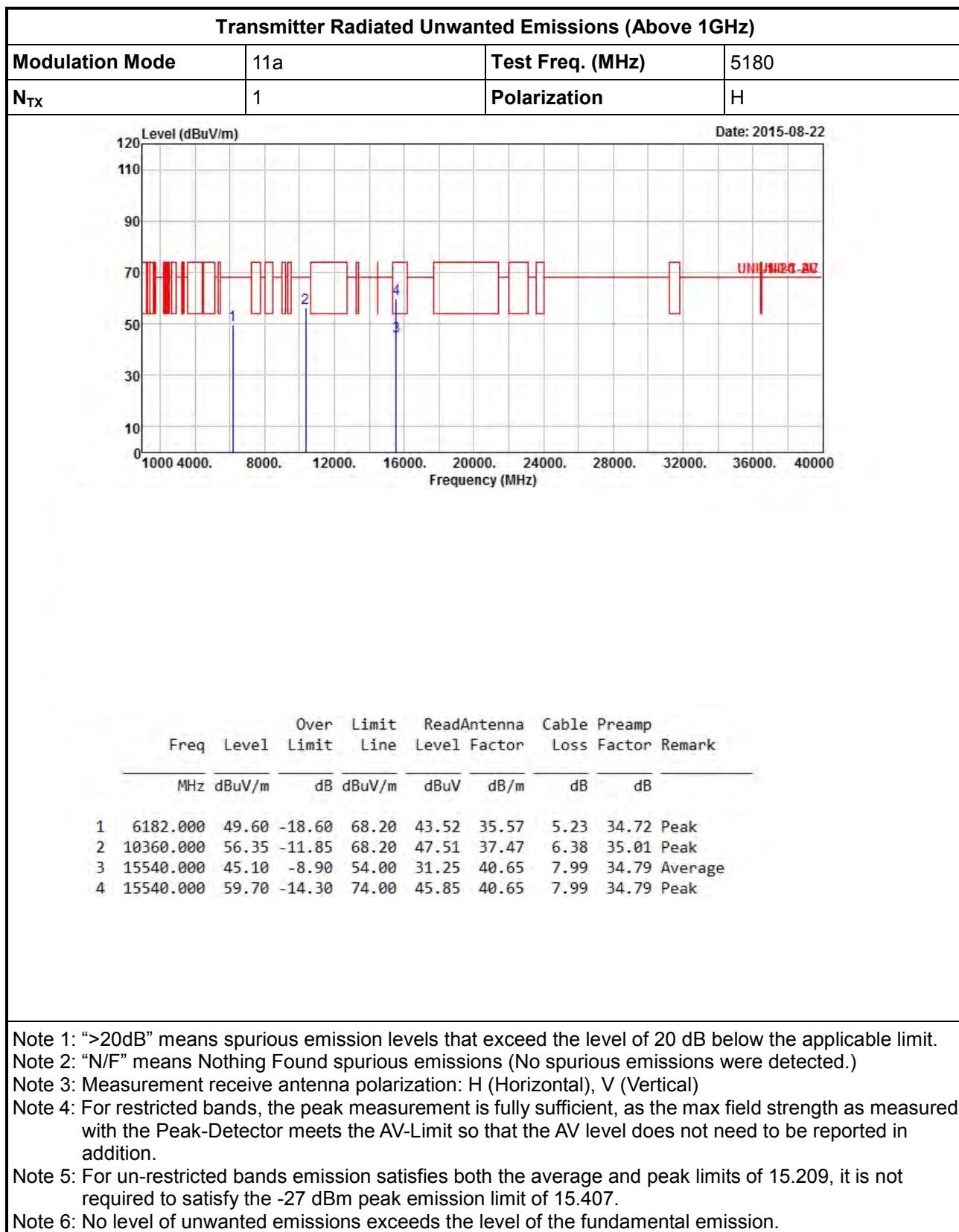
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).

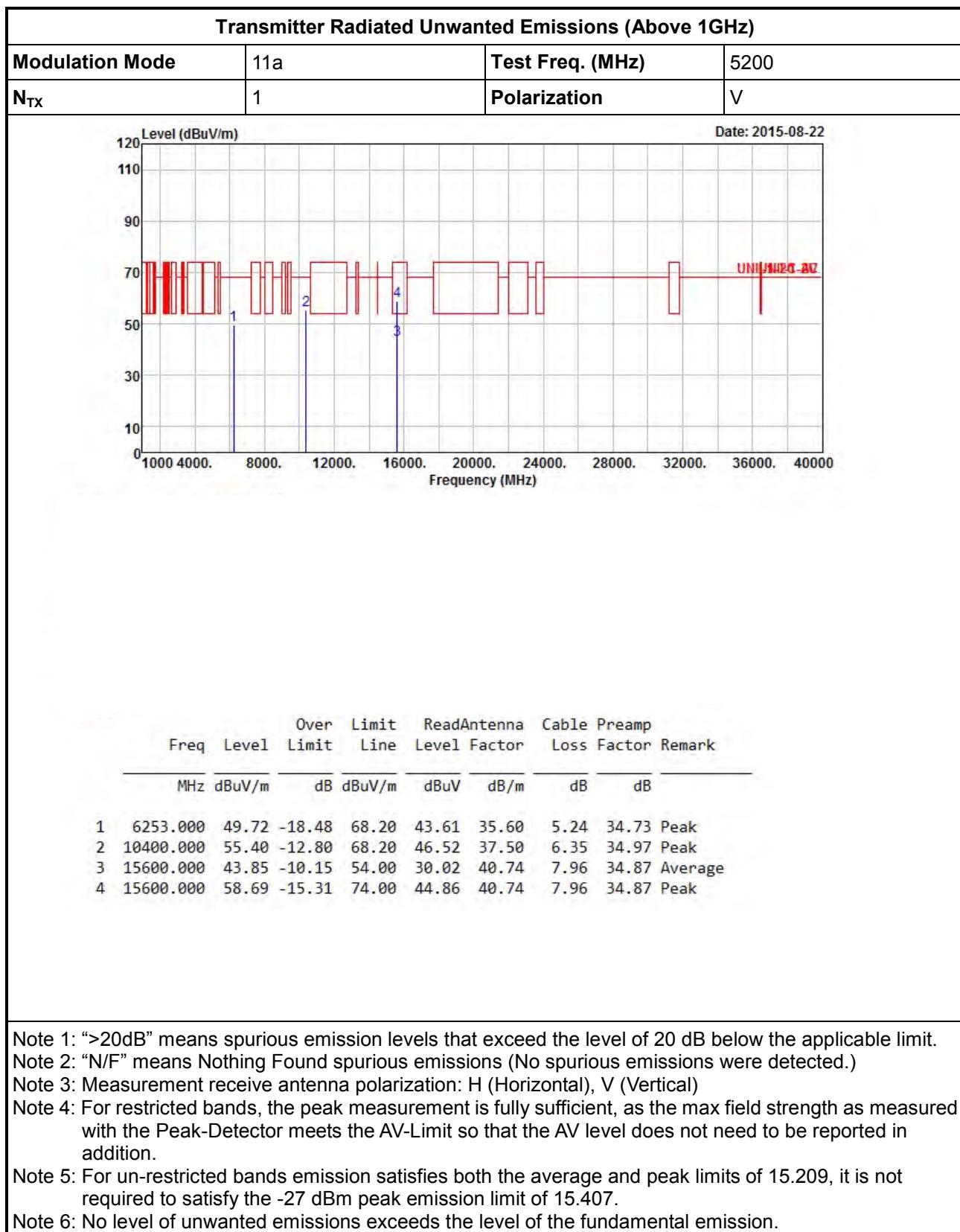
Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.

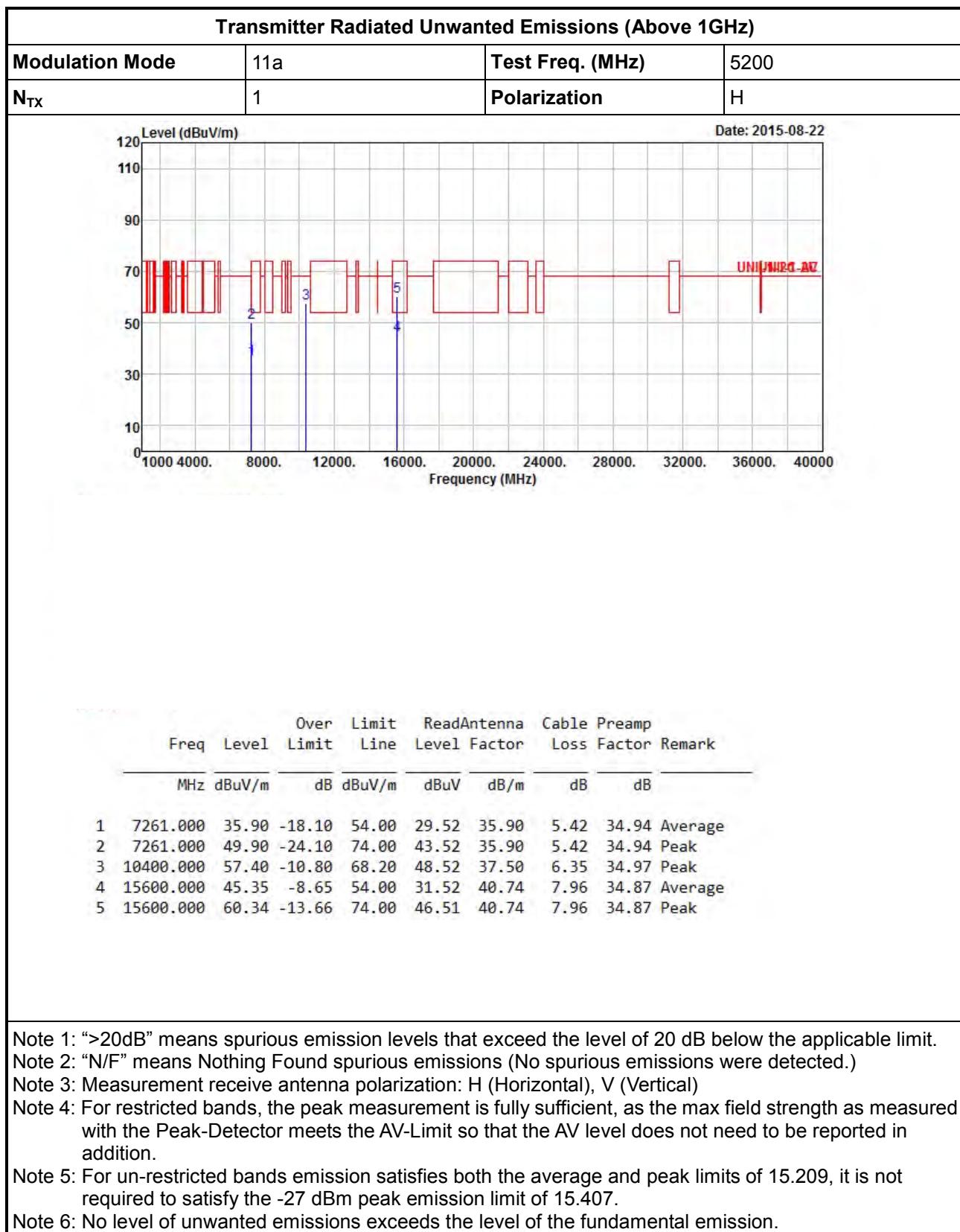


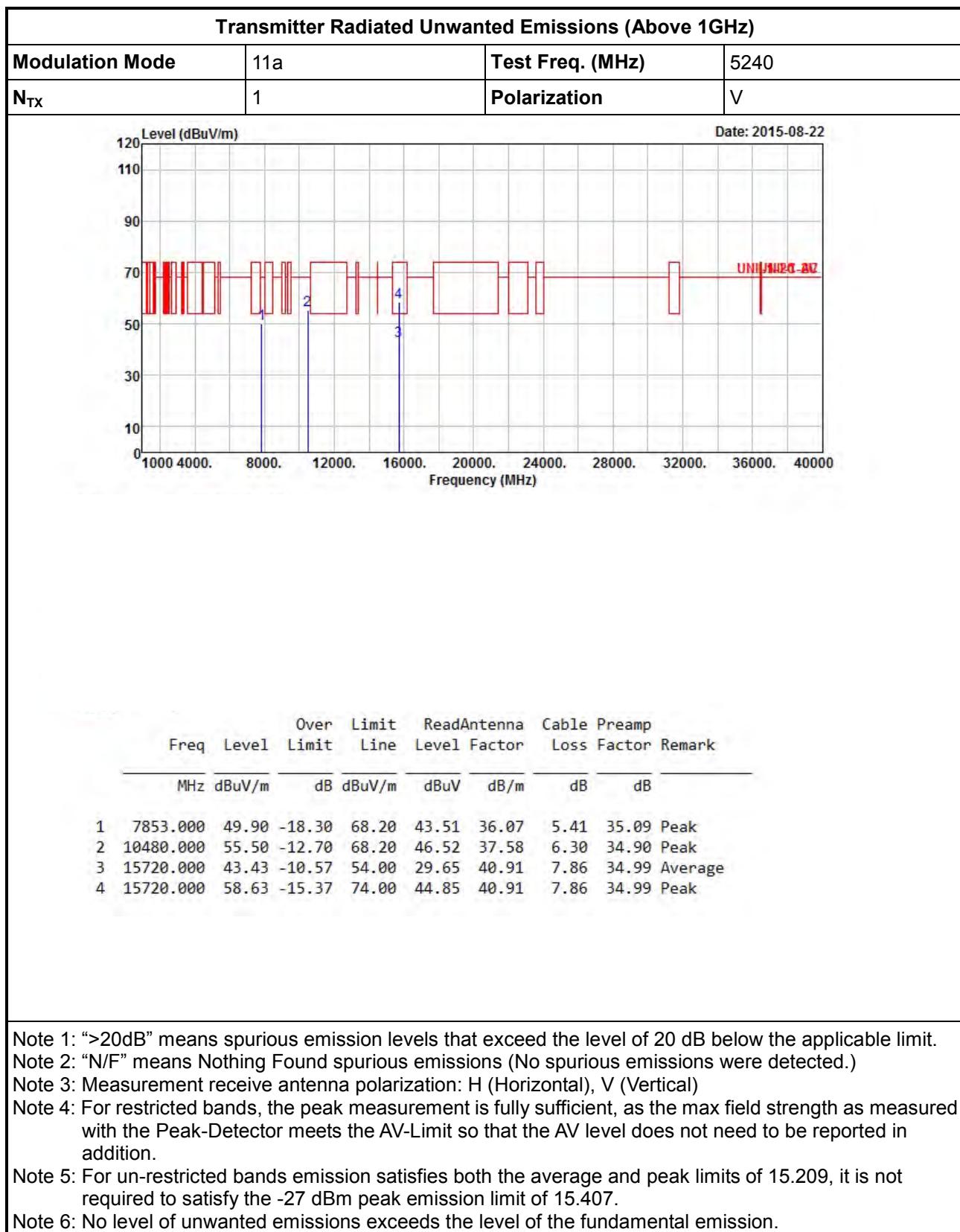
## 3.6.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 5150-5250MHz

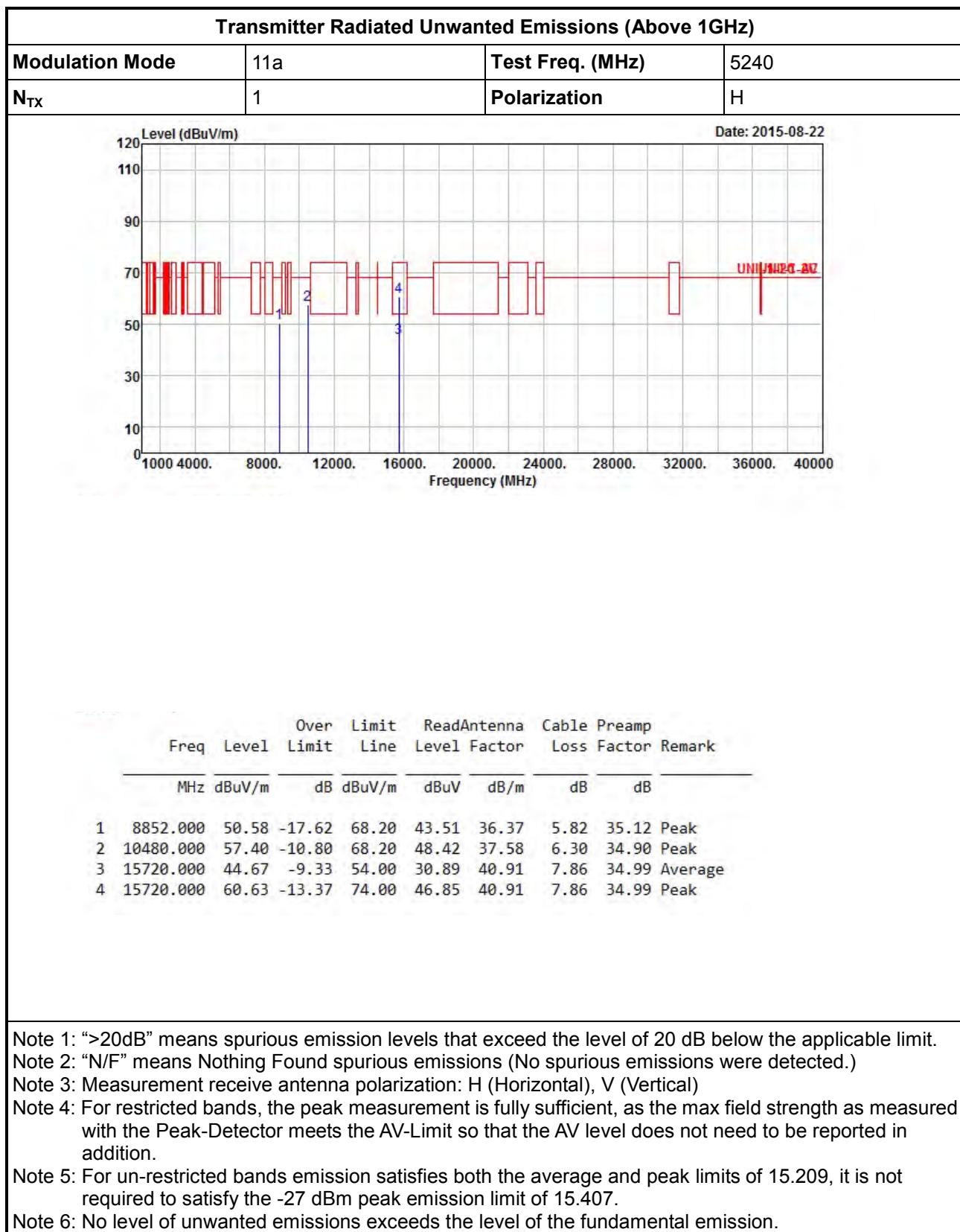


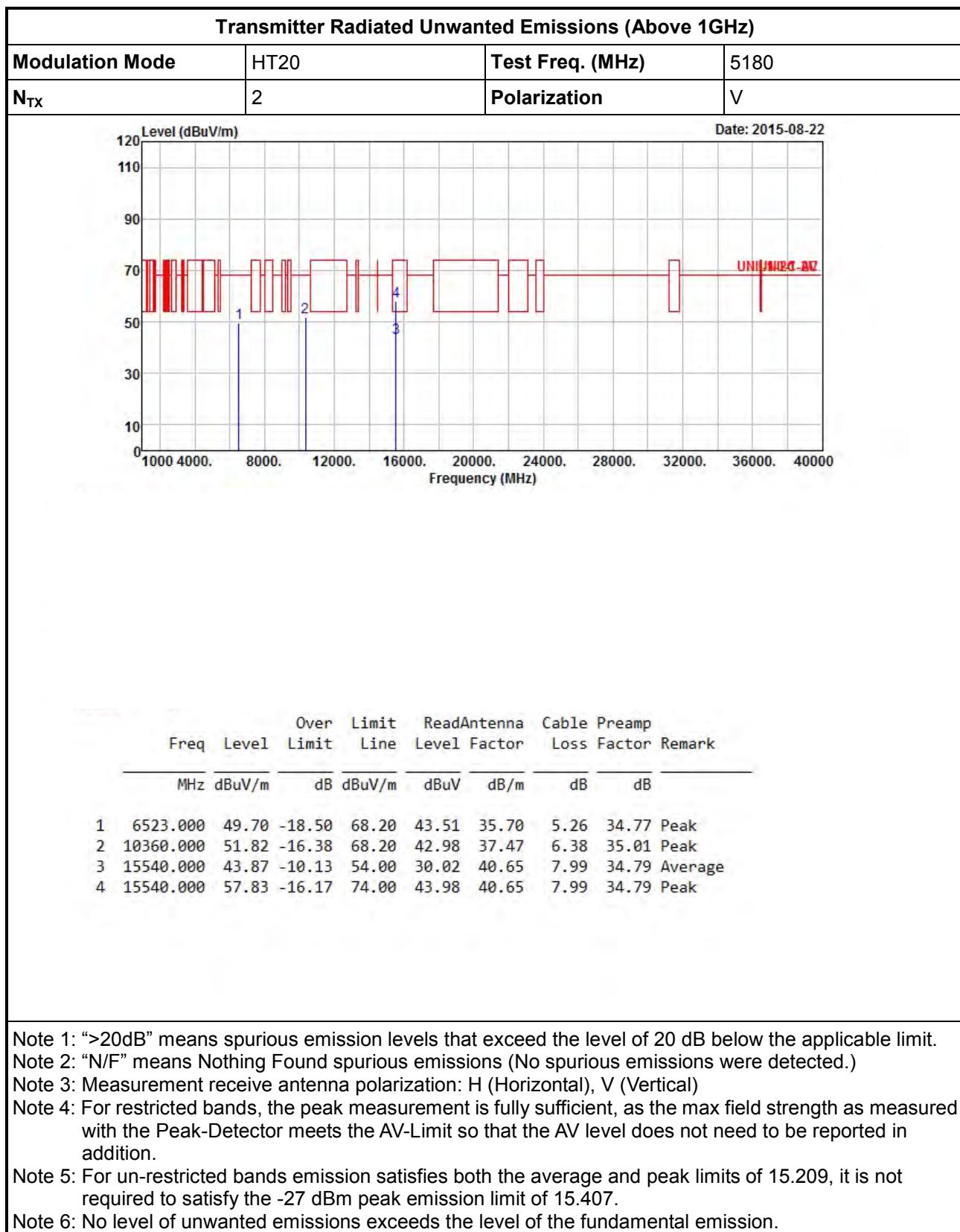


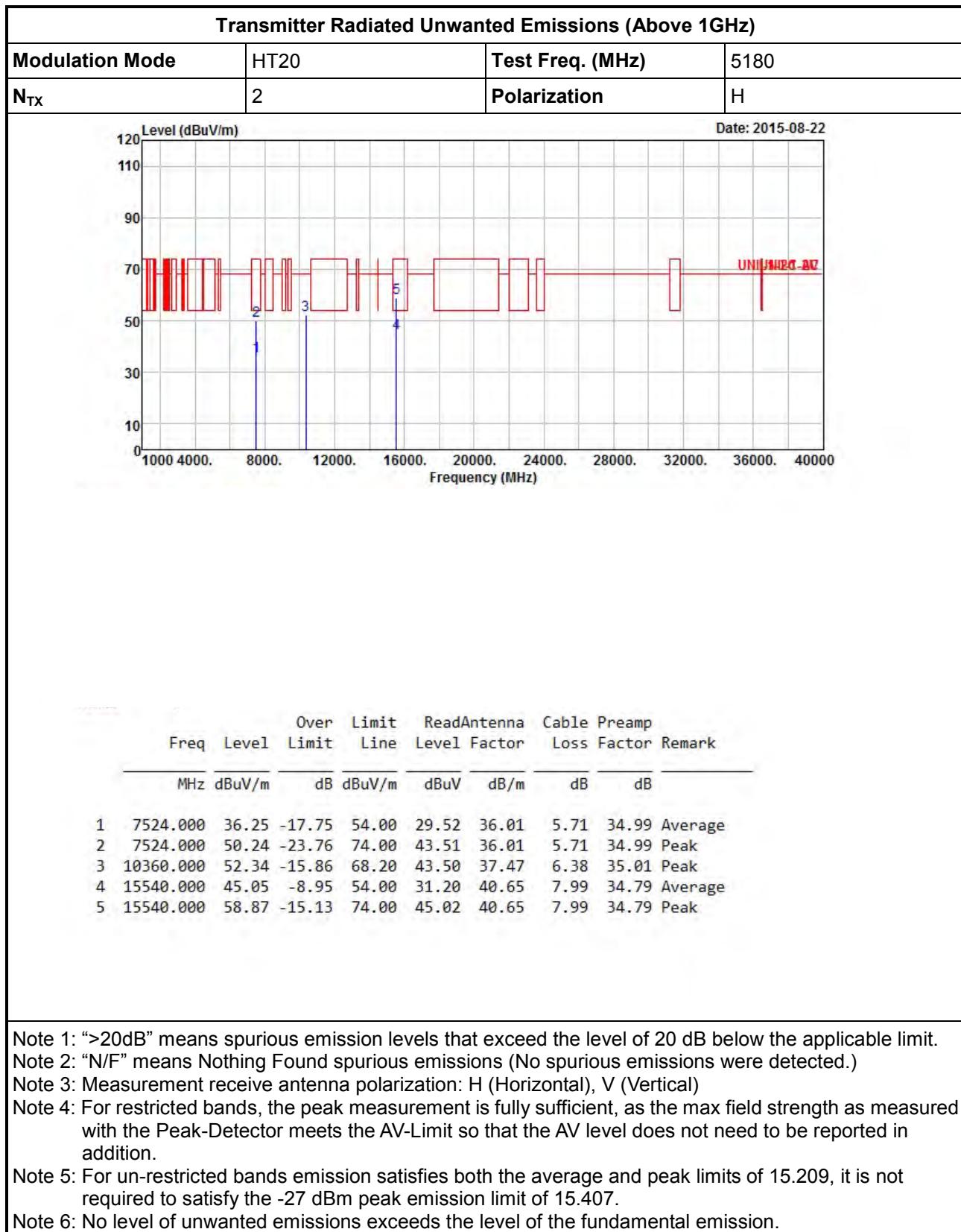












Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

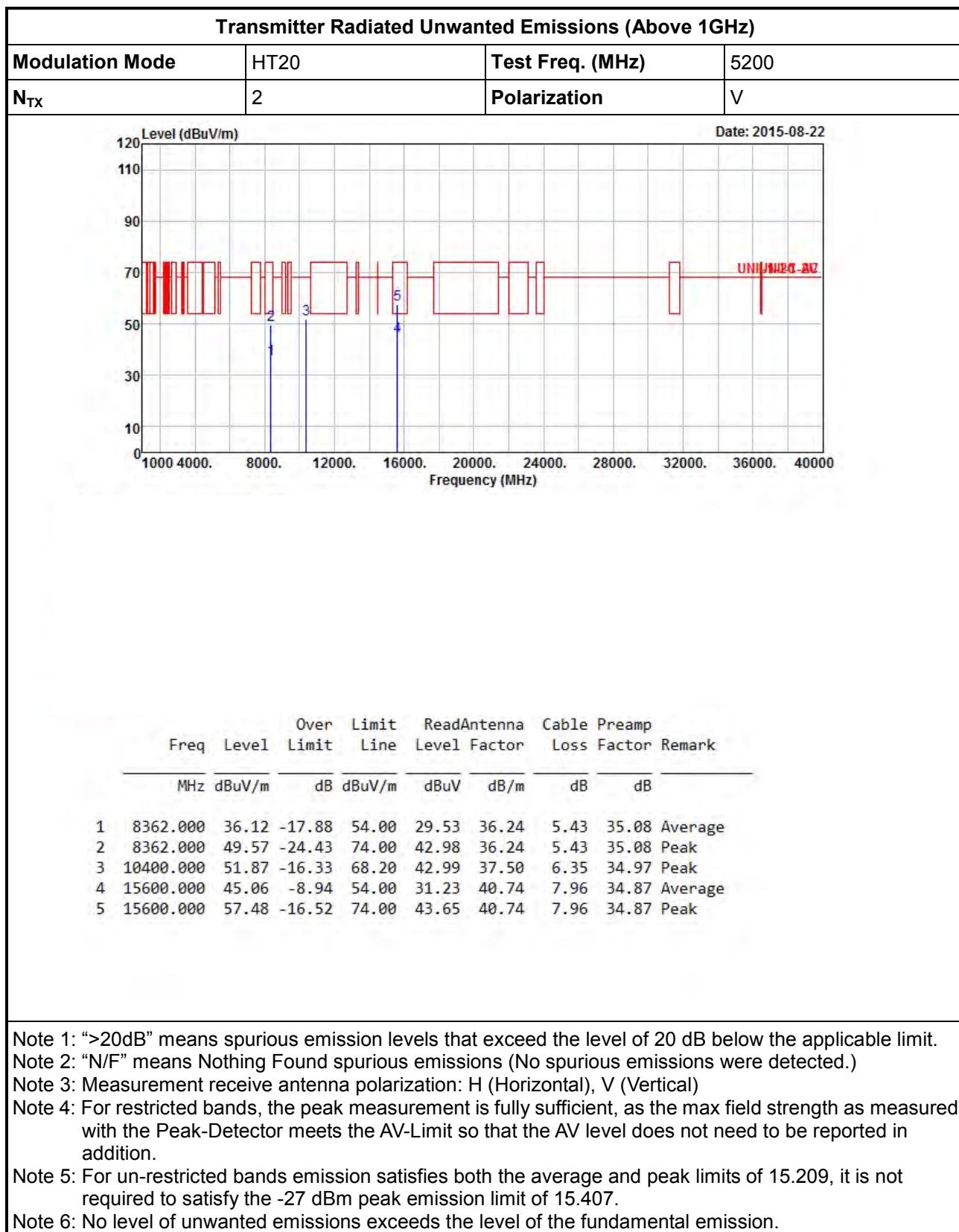
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

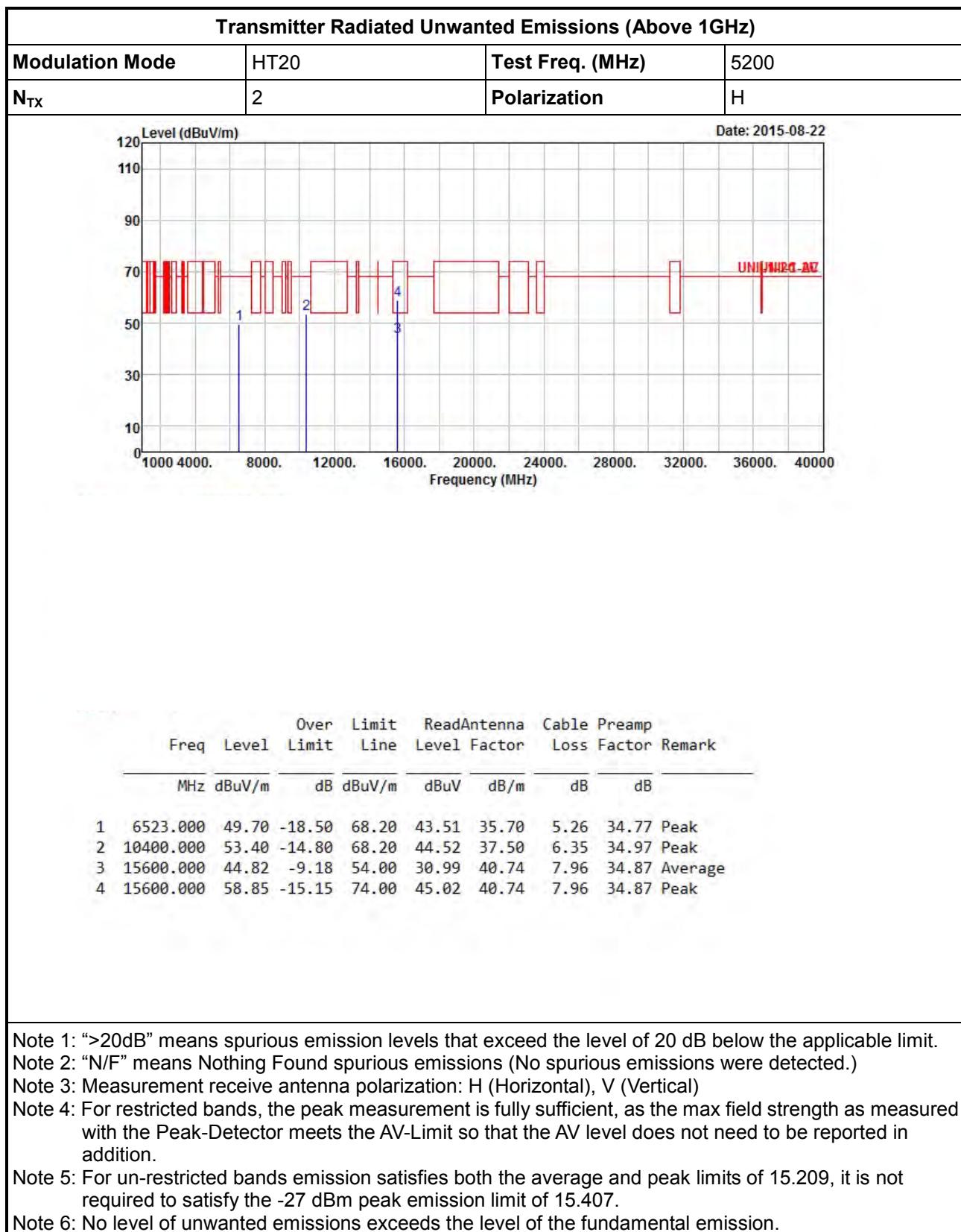
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

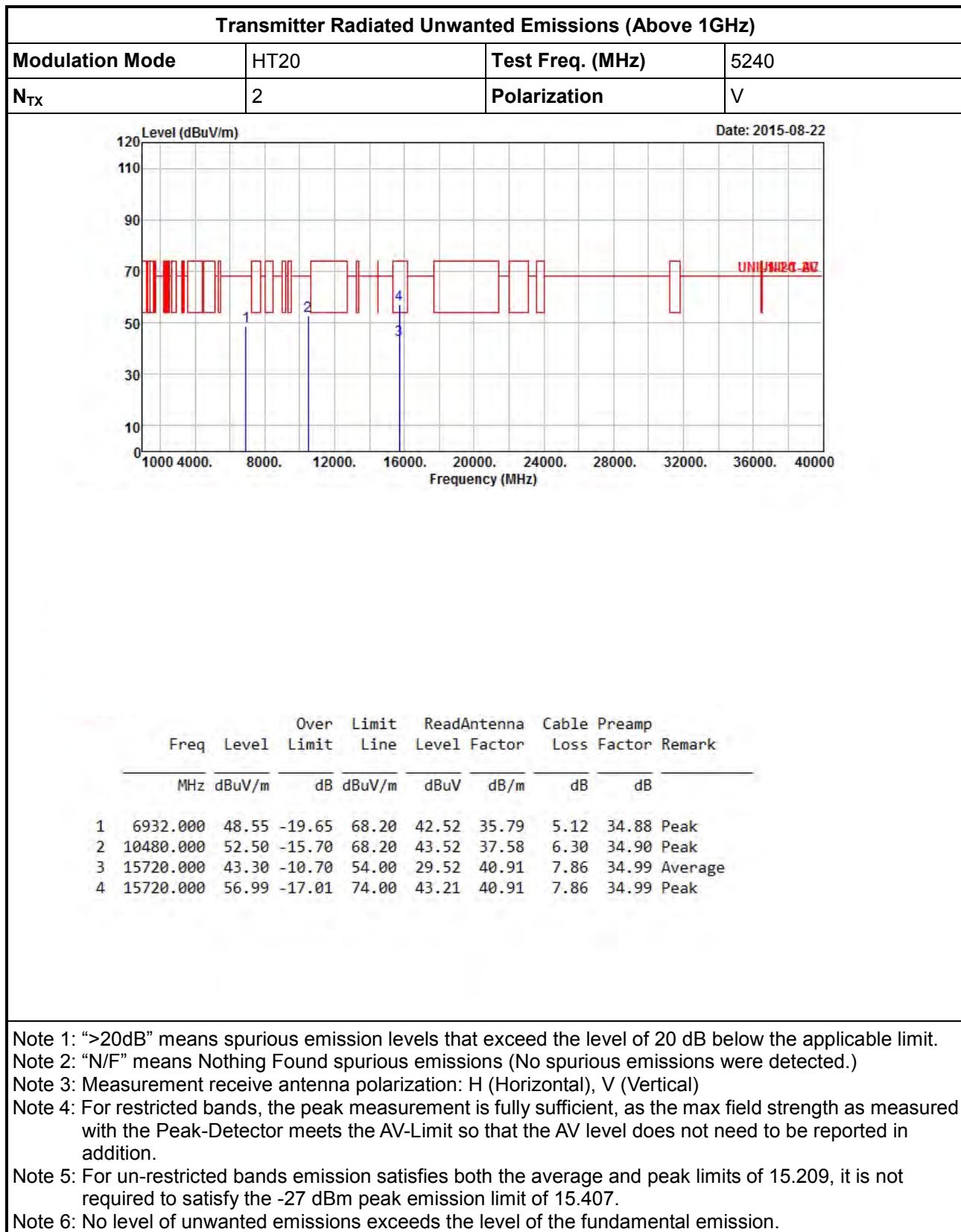
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

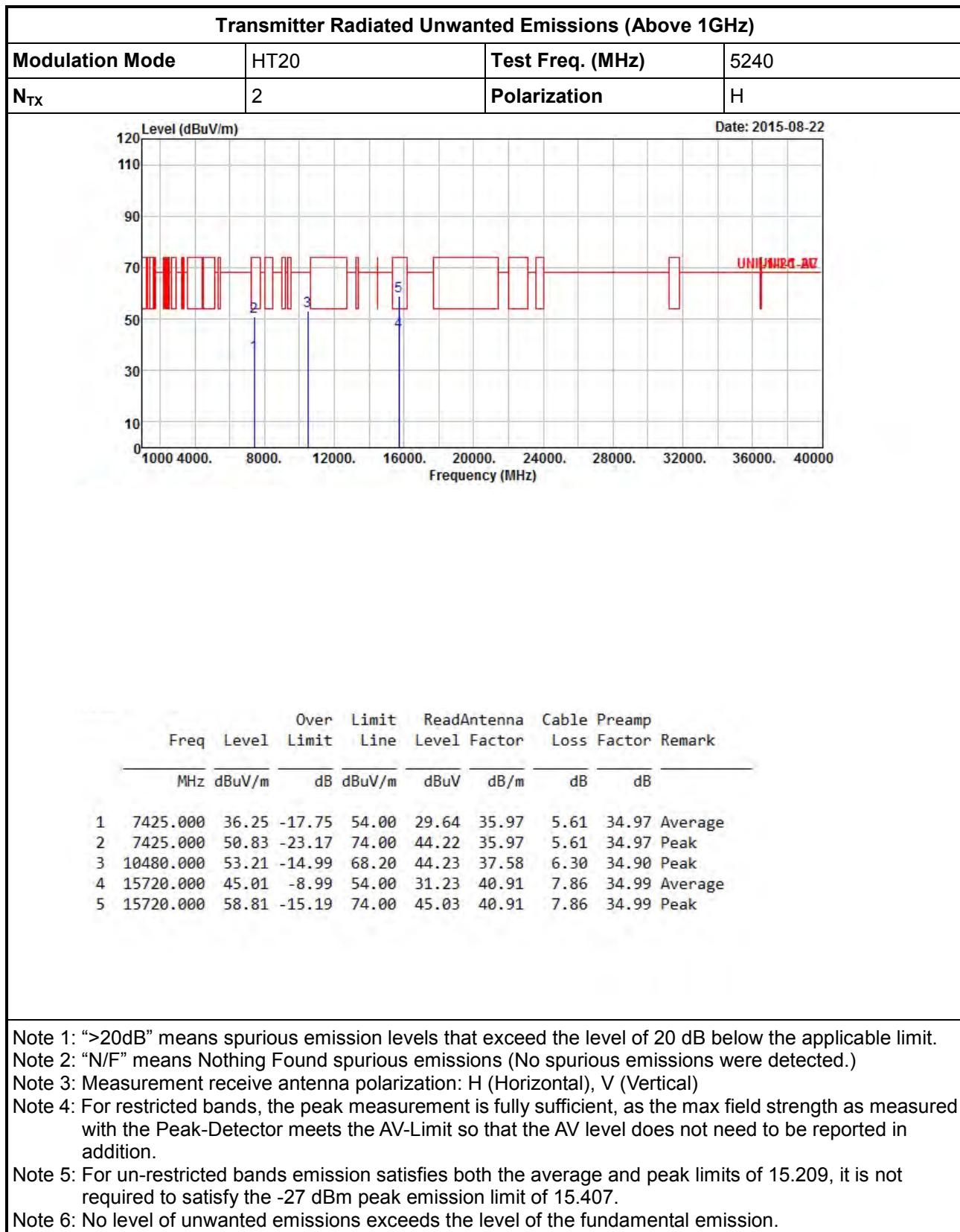
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

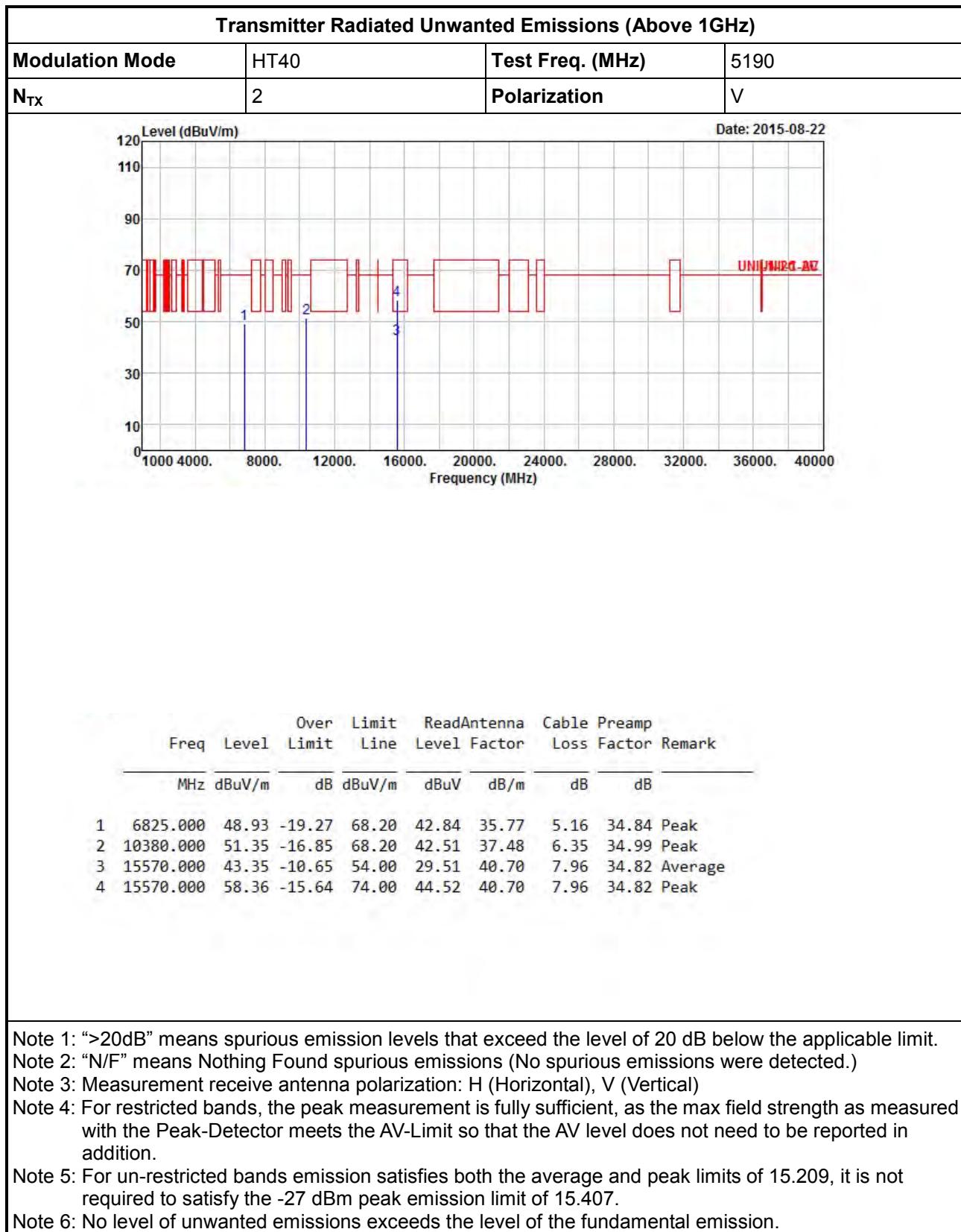
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

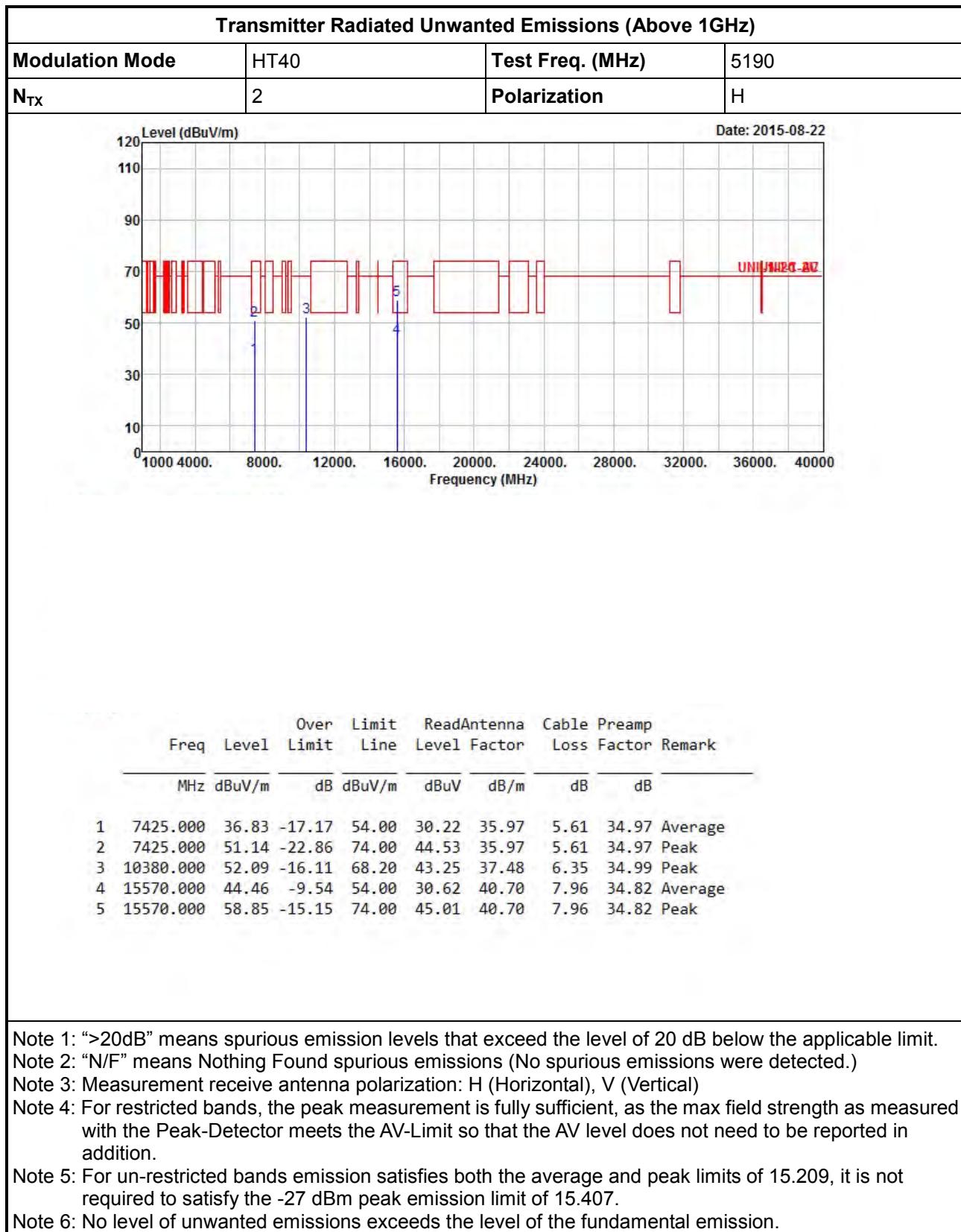


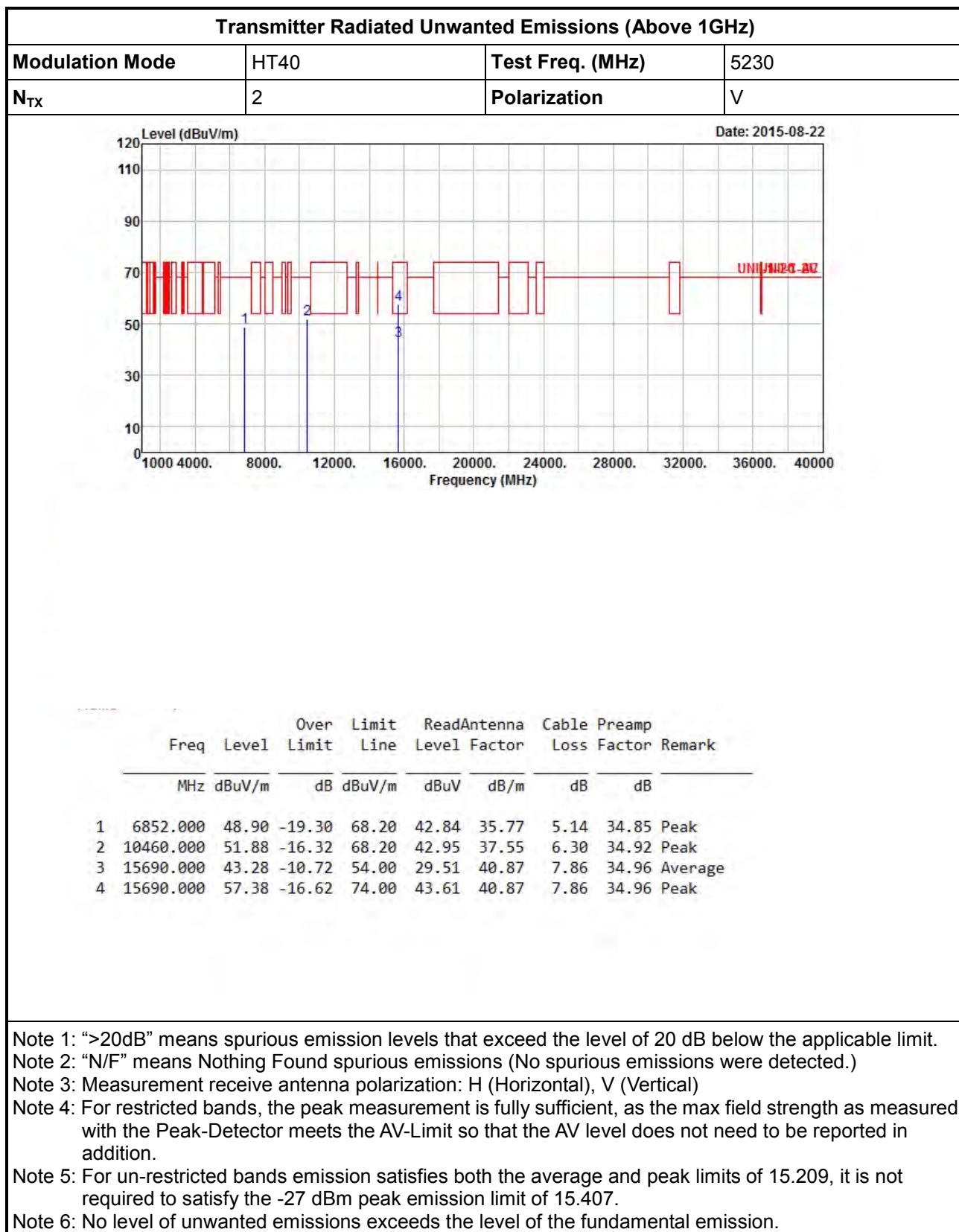


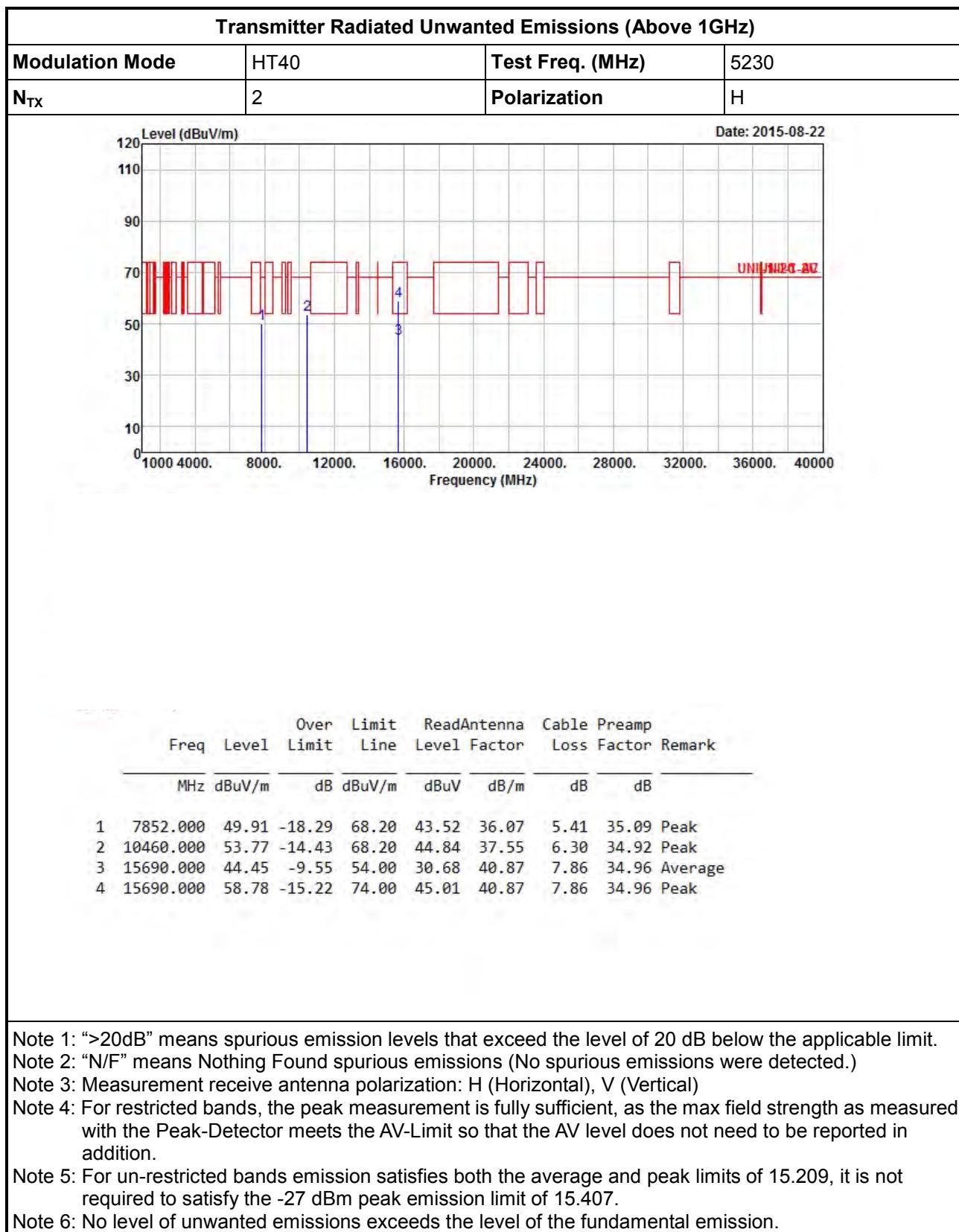














### 3.6.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 5725-5850MHz

**Transmitter Radiated Unwanted Emissions (Above 1GHz)**

|                 |     |                  |      |
|-----------------|-----|------------------|------|
| Modulation Mode | 11a | Test Freq. (MHz) | 5745 |
| N <sub>TX</sub> | 1   | Polarization     | V    |

Date: 2015-08-22

Frequency (MHz)

| Freq | Level      | Over  | Limit  | Read    | Antenna | Cable  | Preamp |       |         |
|------|------------|-------|--------|---------|---------|--------|--------|-------|---------|
|      |            | Line  | Level  | Antenna | Loss    | Factor | Remark |       |         |
| MHz  | dBuV/m     | dB    | dBuV/m | dBuV    | dB/m    | dB     | dB     |       |         |
| 1    | 7523.0000  | 36.98 | -17.02 | 54.00   | 30.25   | 36.01  | 5.71   | 34.99 | Average |
| 2    | 7523.0000  | 50.25 | -23.75 | 74.00   | 43.52   | 36.01  | 5.71   | 34.99 | Peak    |
| 3    | 11490.0000 | 39.08 | -14.92 | 54.00   | 28.96   | 38.20  | 6.36   | 34.44 | Average |
| 4    | 11490.0000 | 53.63 | -20.37 | 74.00   | 43.51   | 38.20  | 6.36   | 34.44 | Peak    |
| 5    | 17235.0000 | 60.26 | -7.94  | 68.20   | 43.51   | 41.59  | 8.96   | 33.80 | 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)

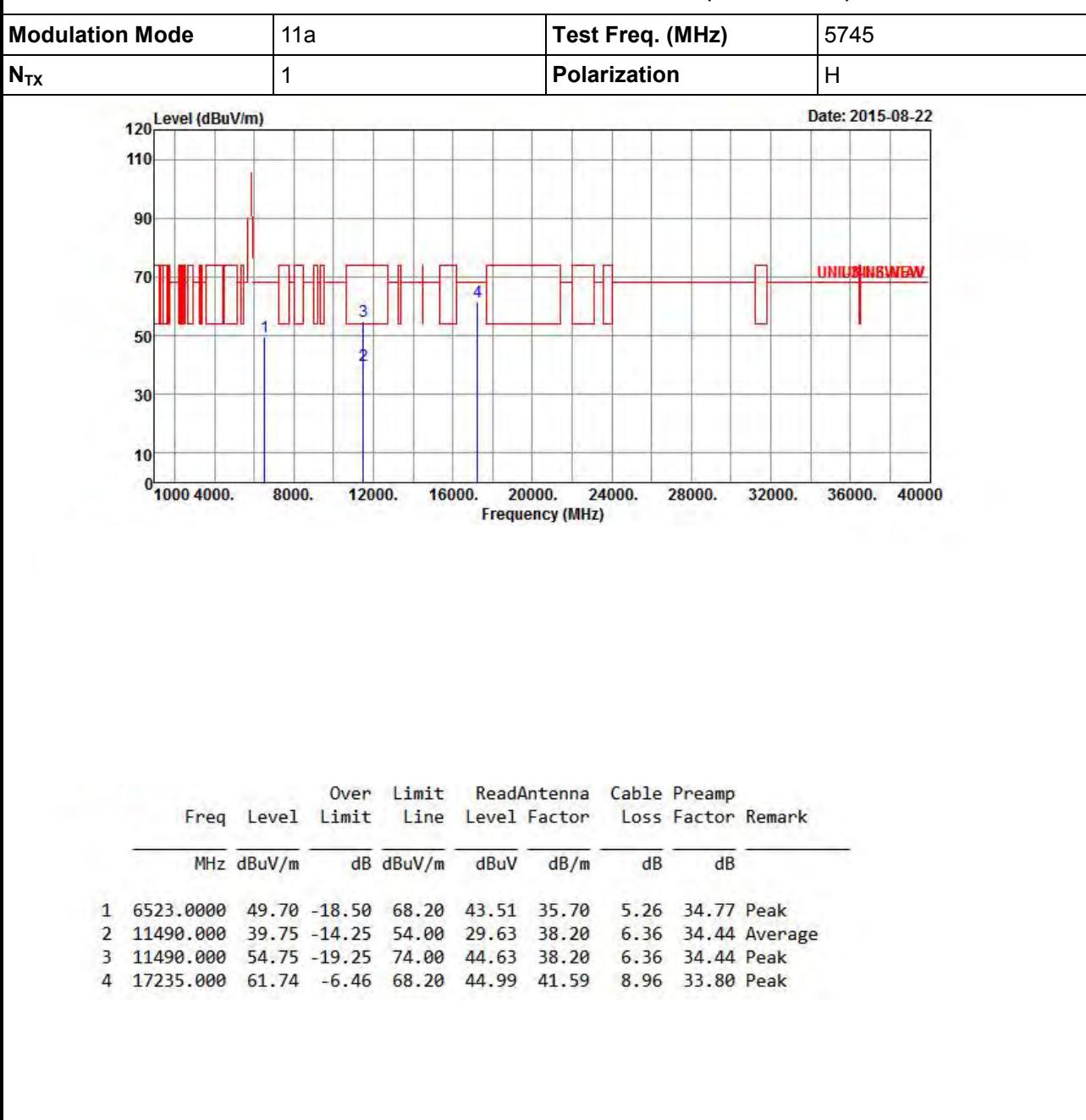
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.



## Transmitter Radiated Unwanted Emissions (Above 1GHz)



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

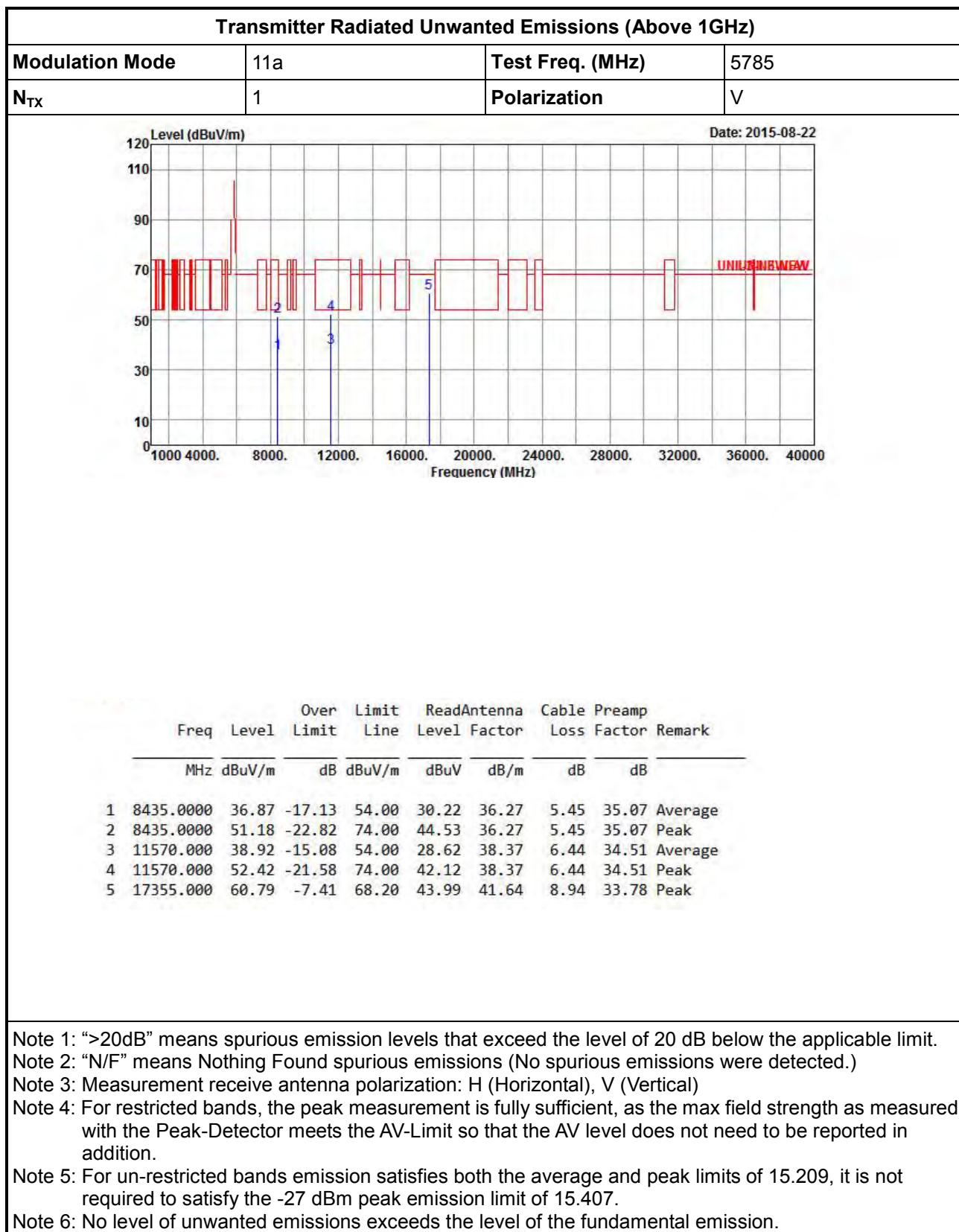
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

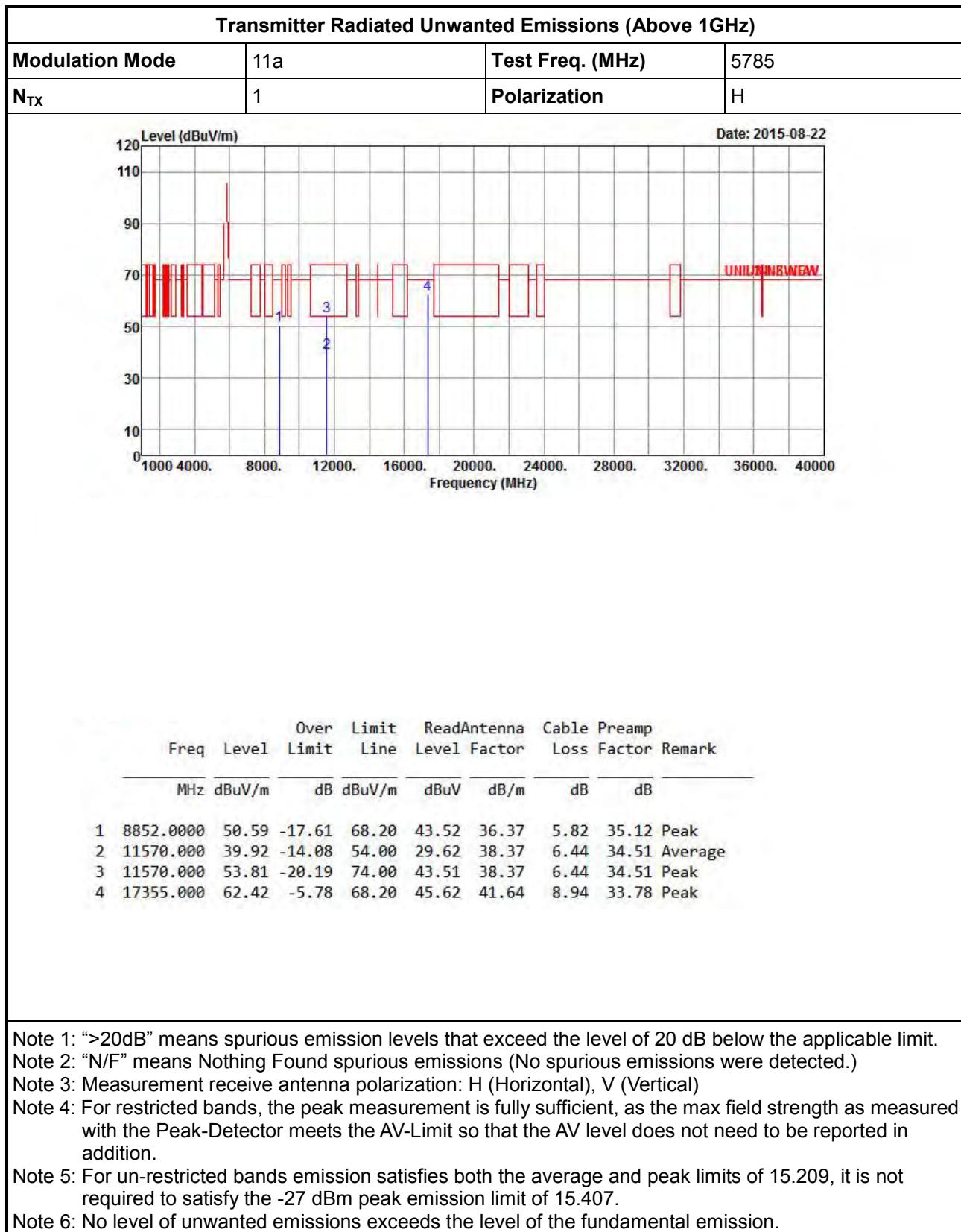
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

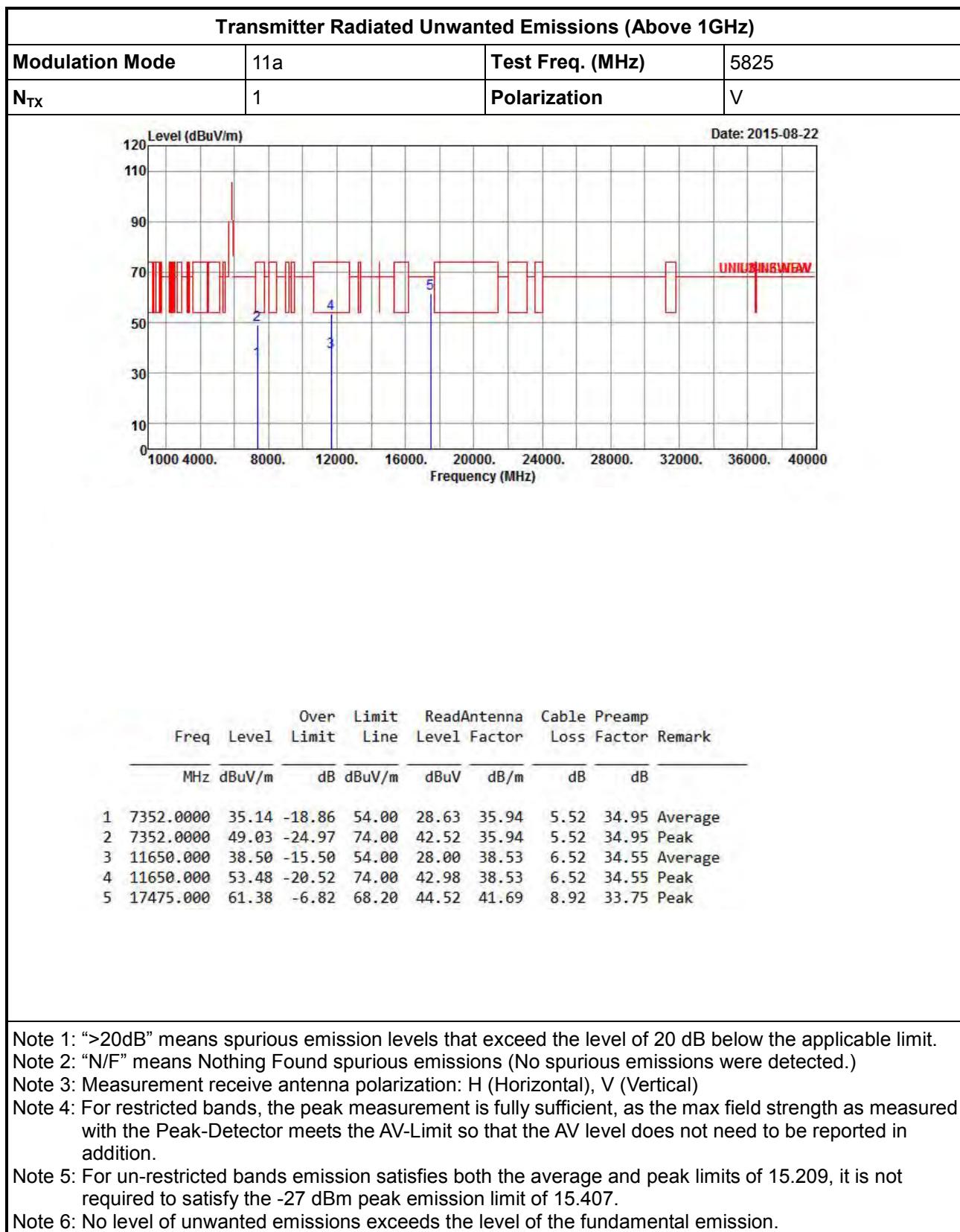
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

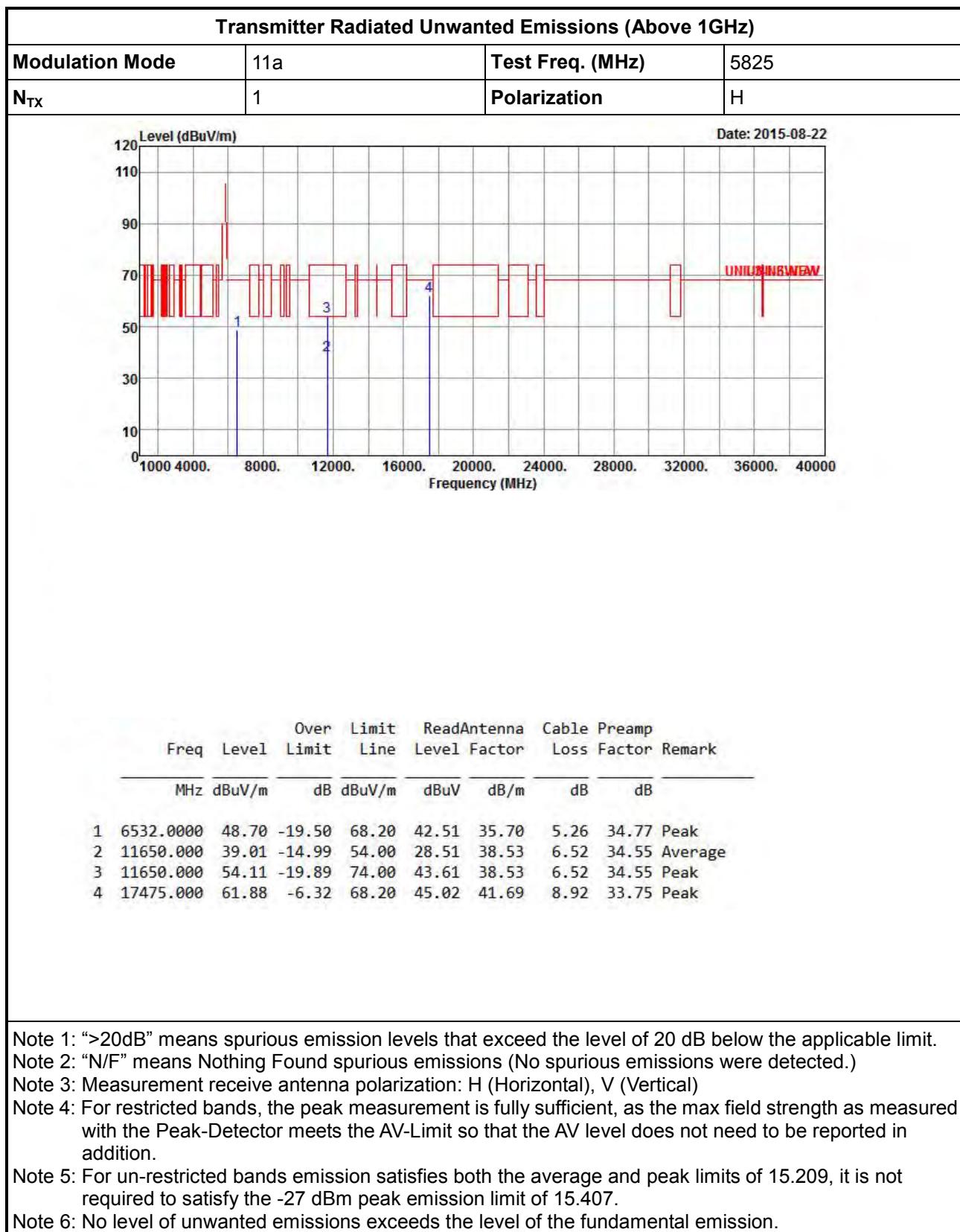
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

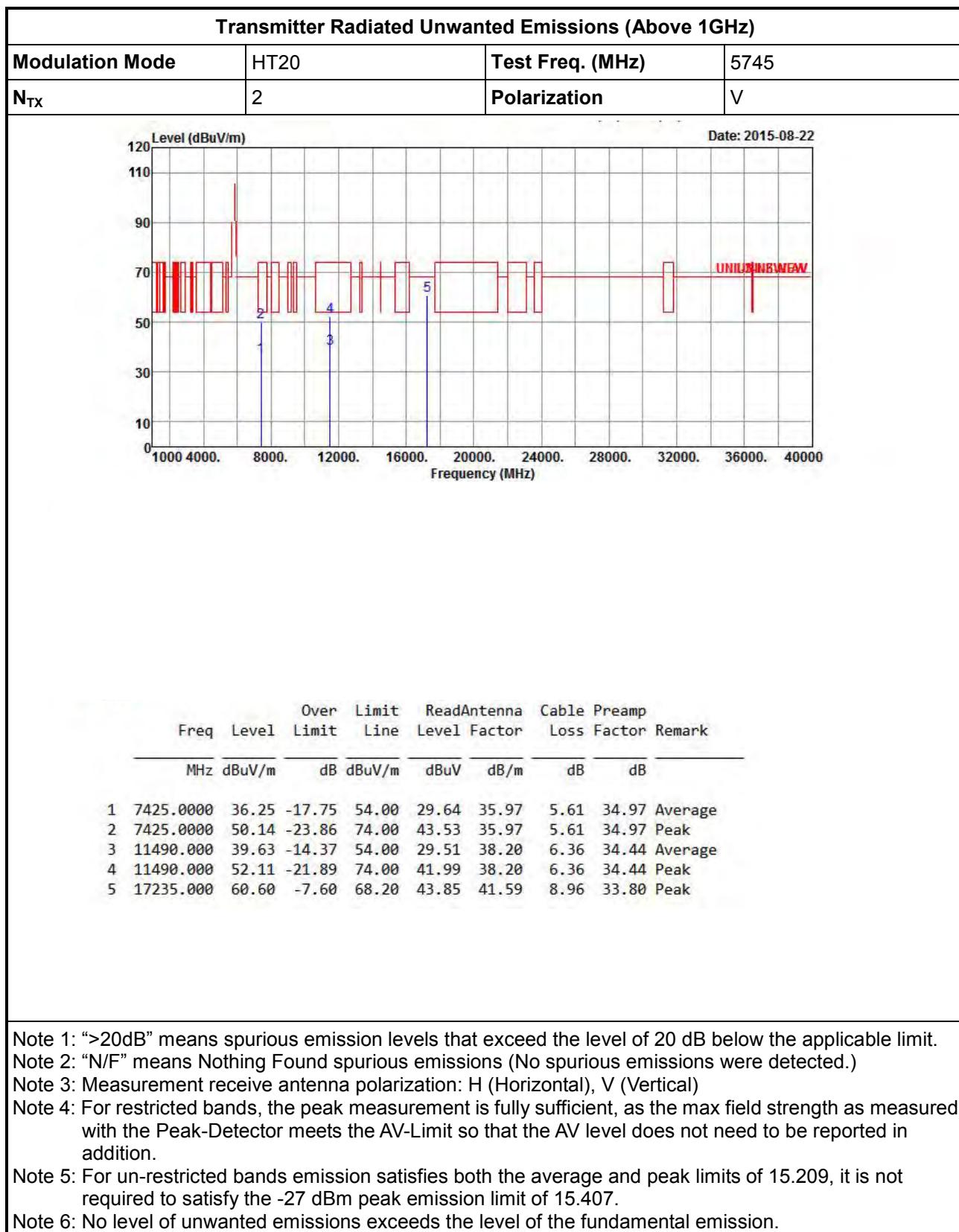
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

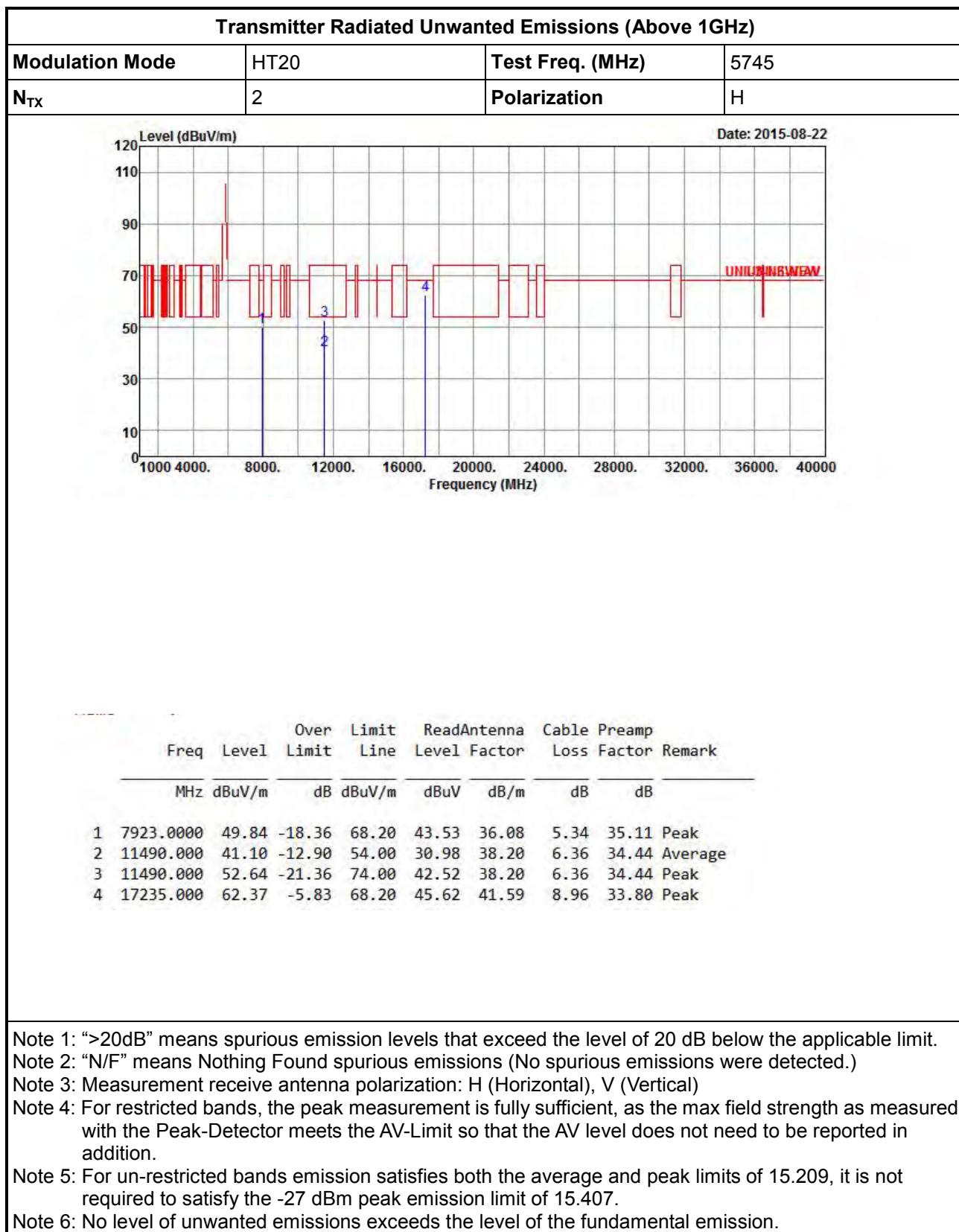


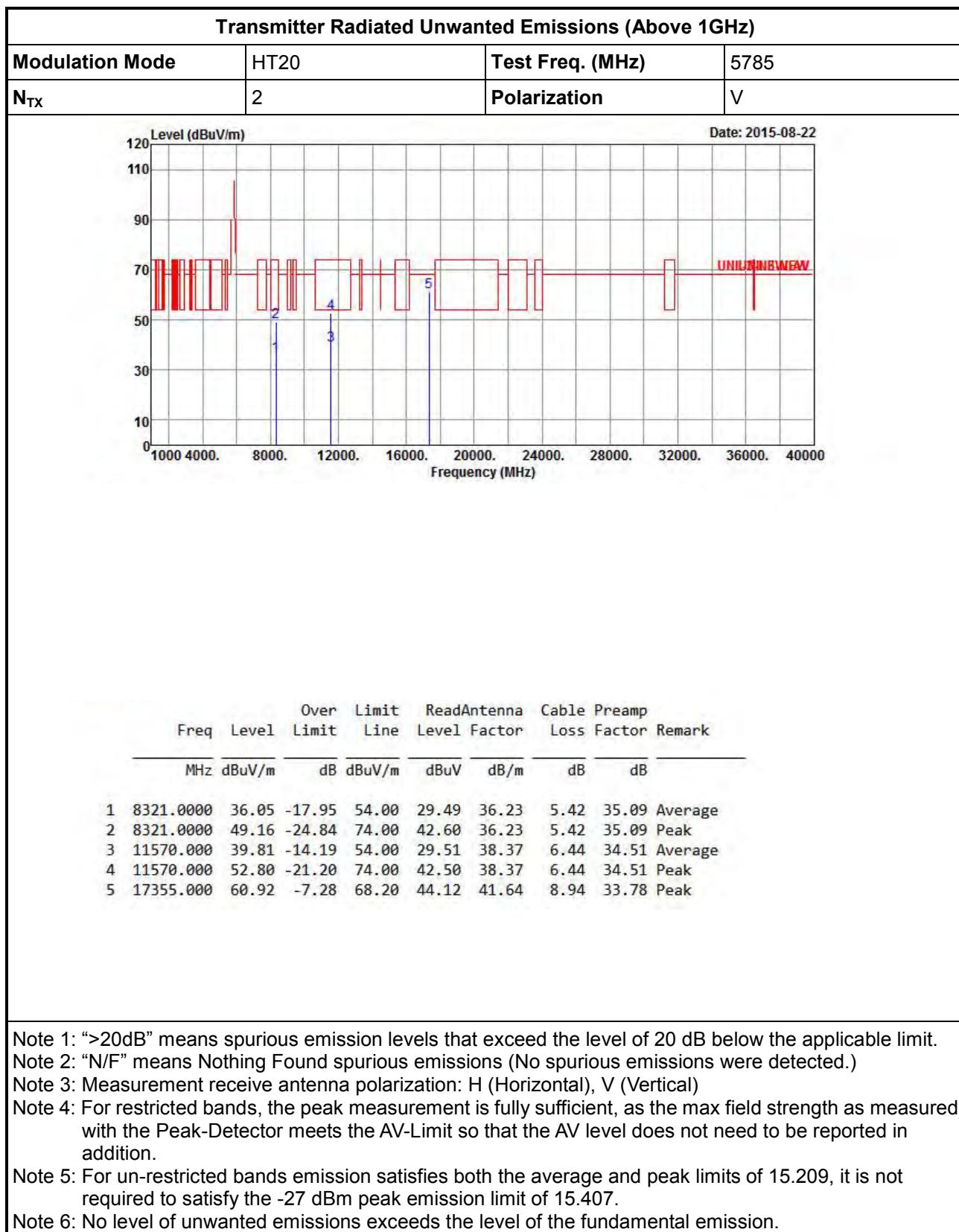


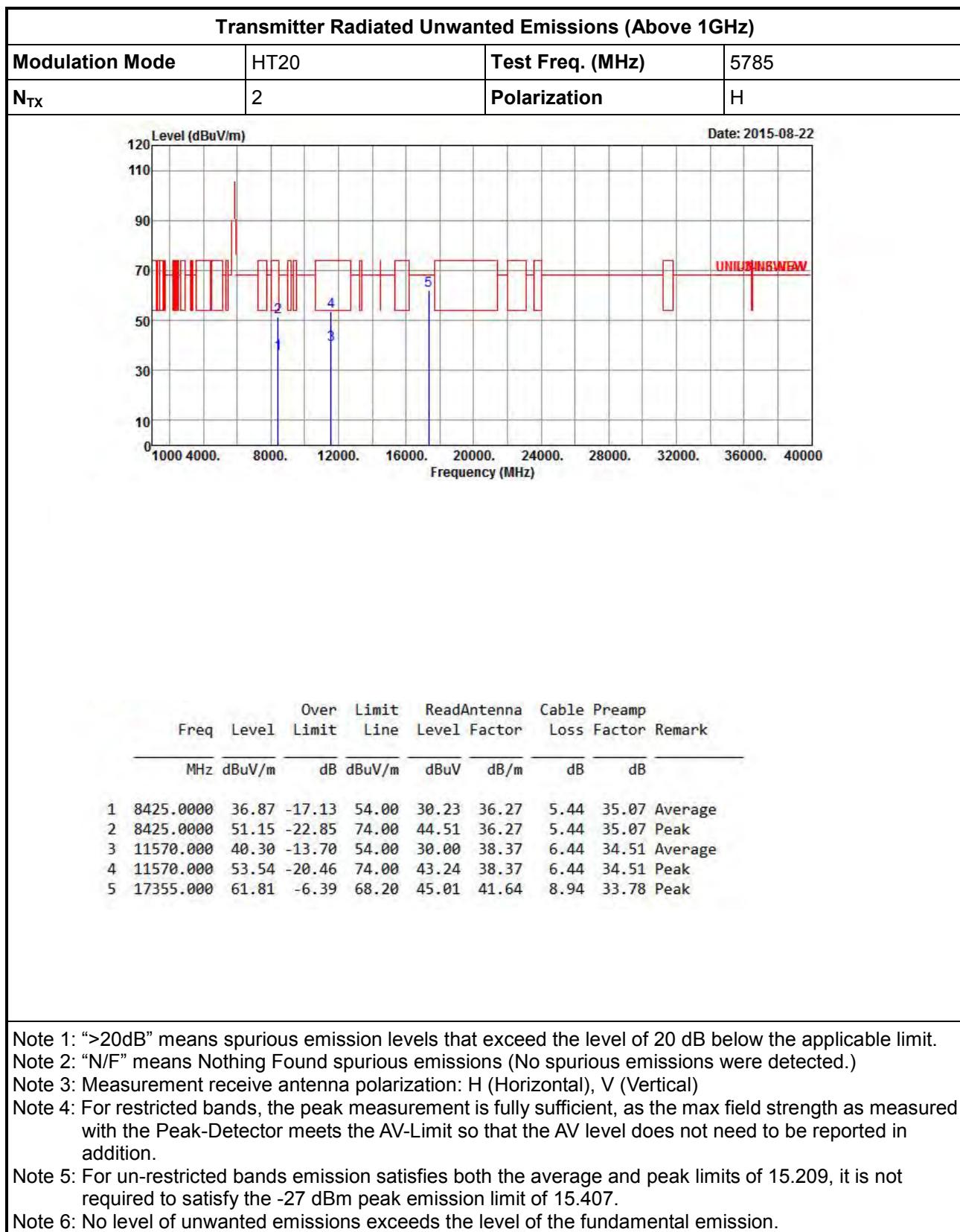


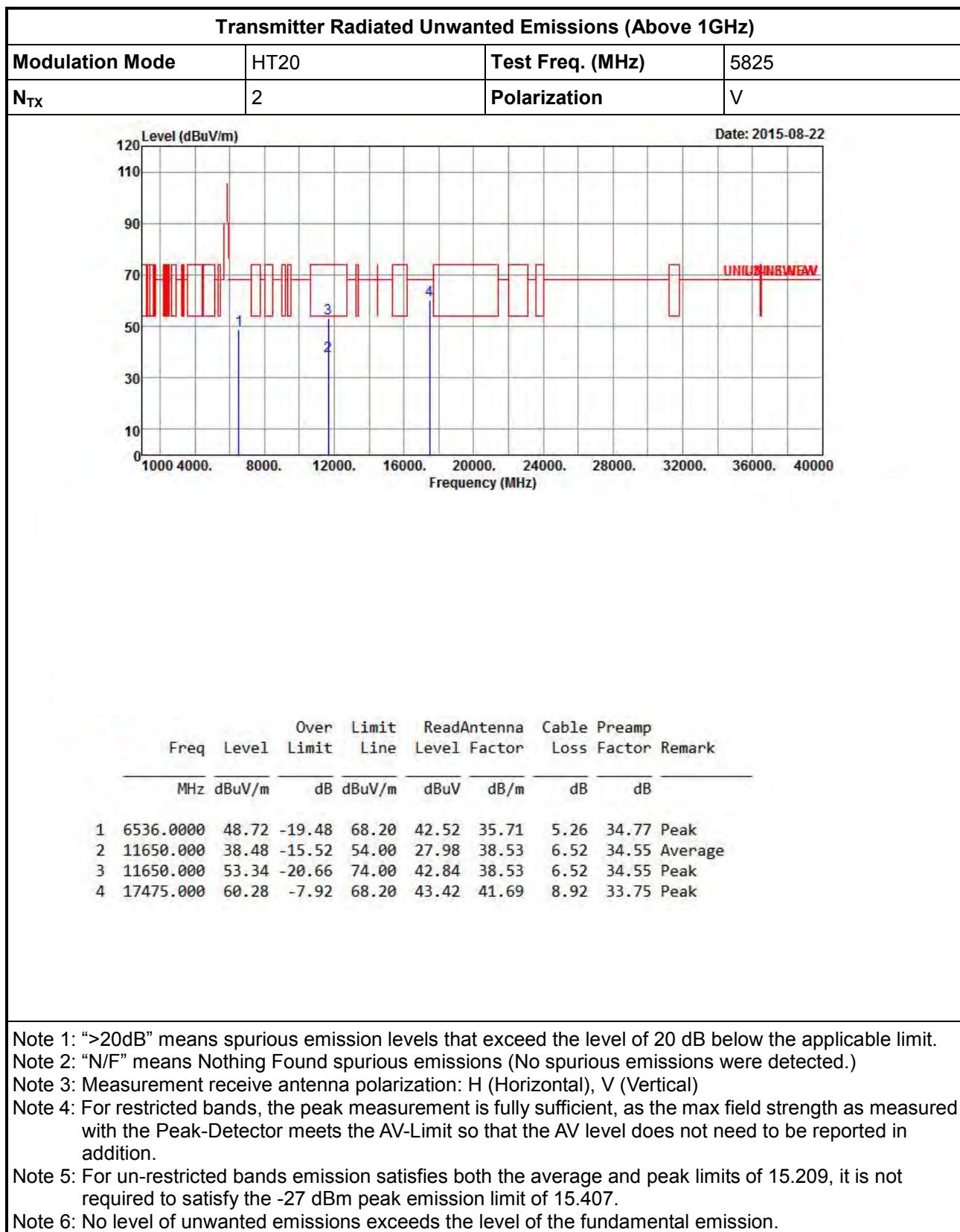


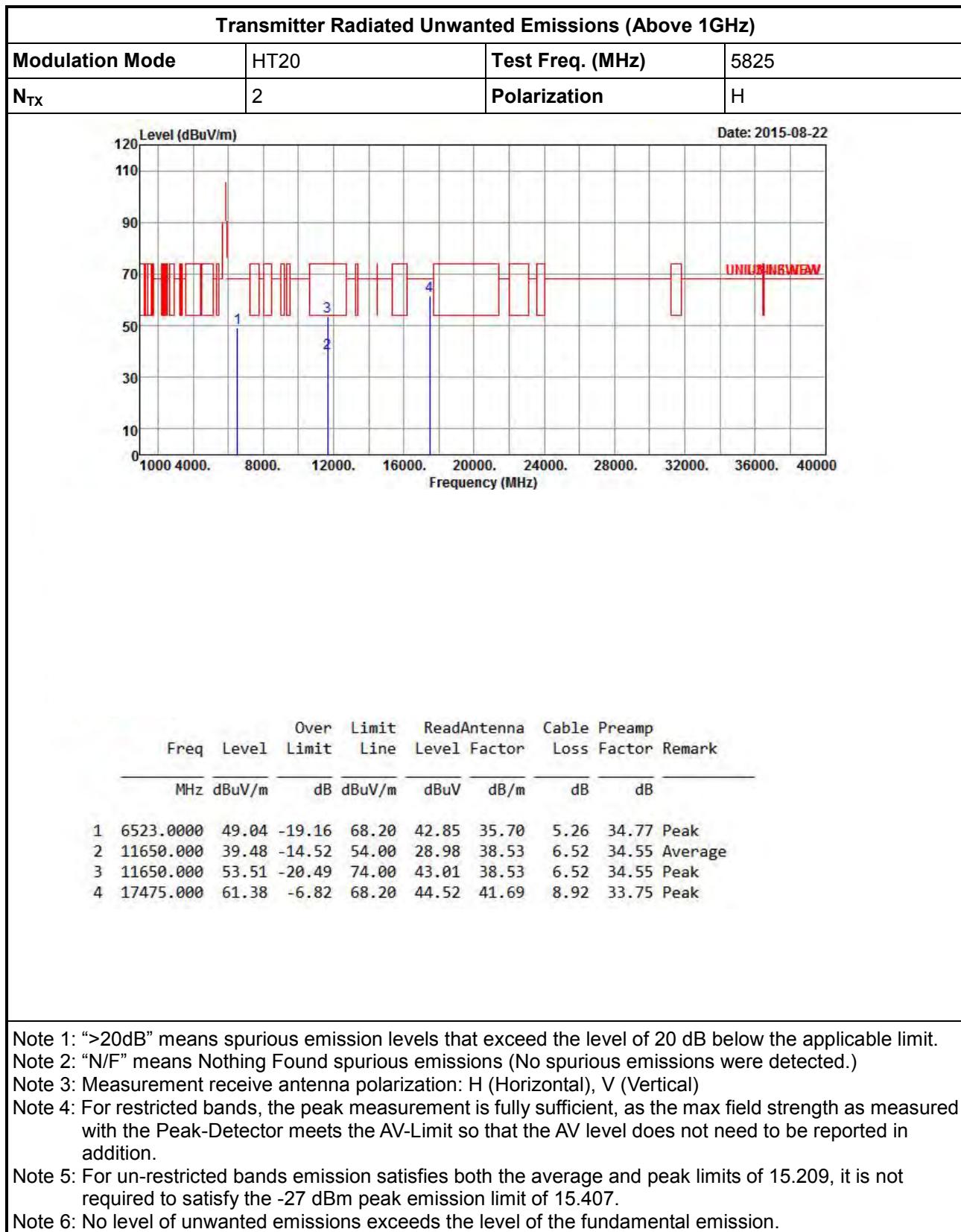


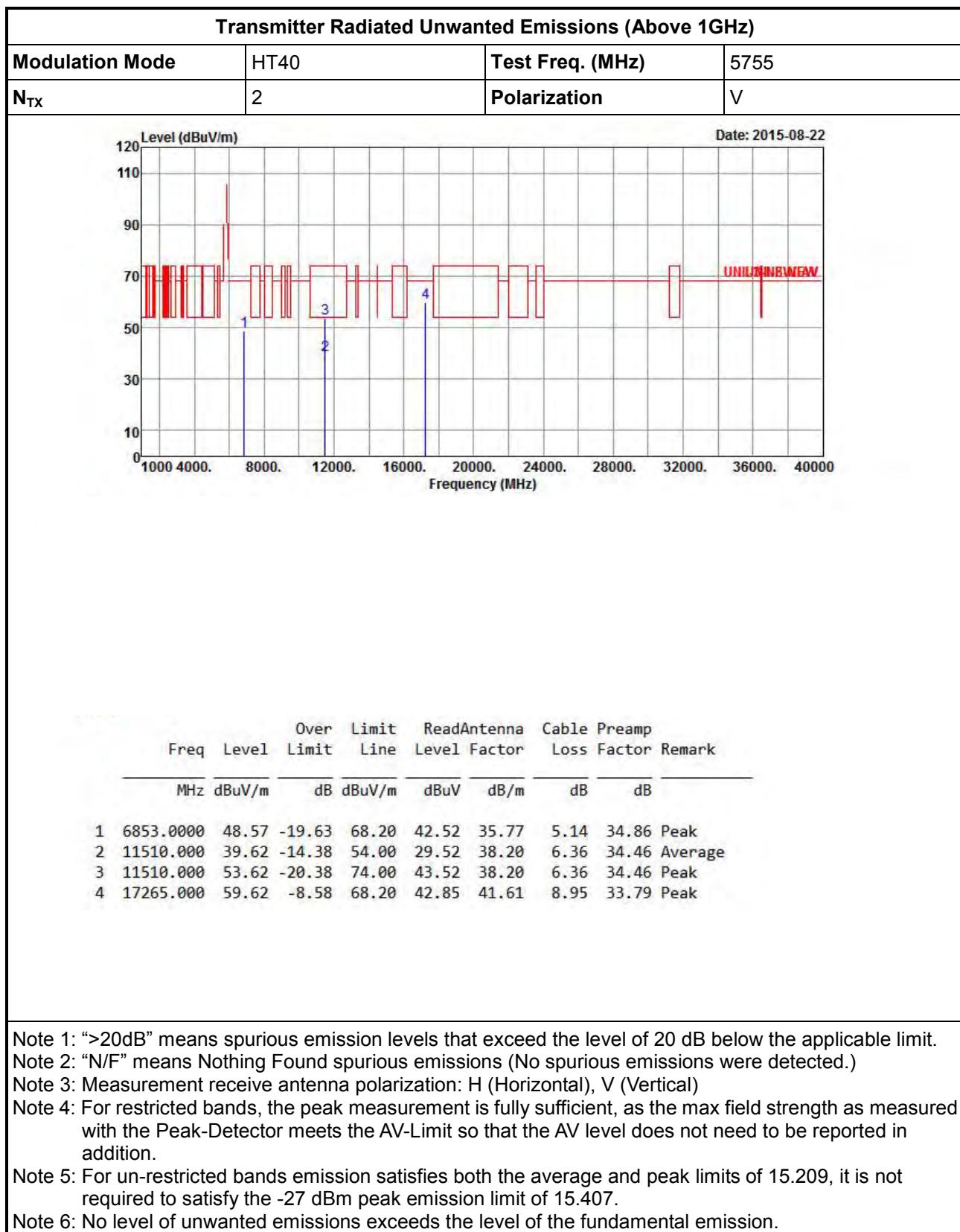


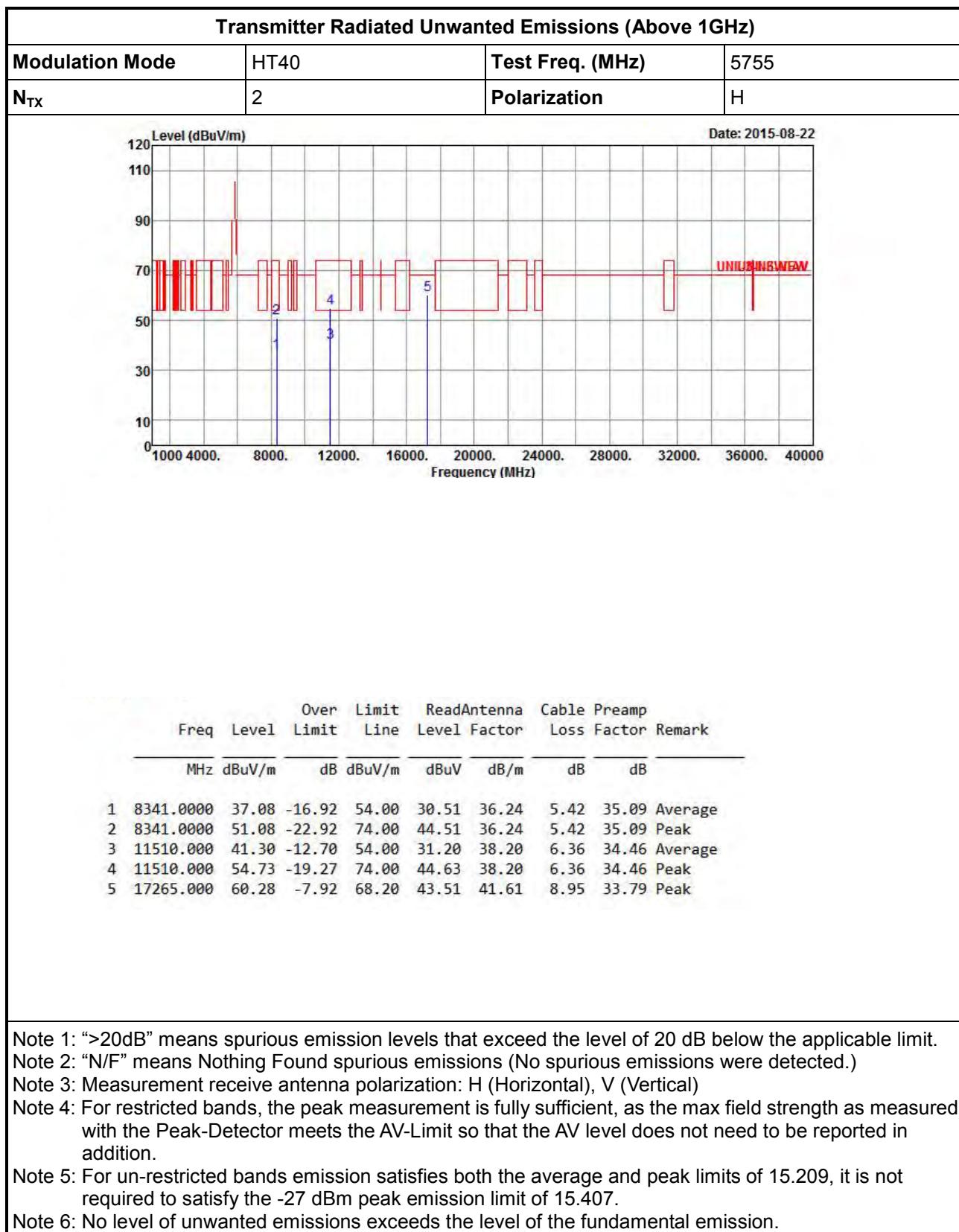


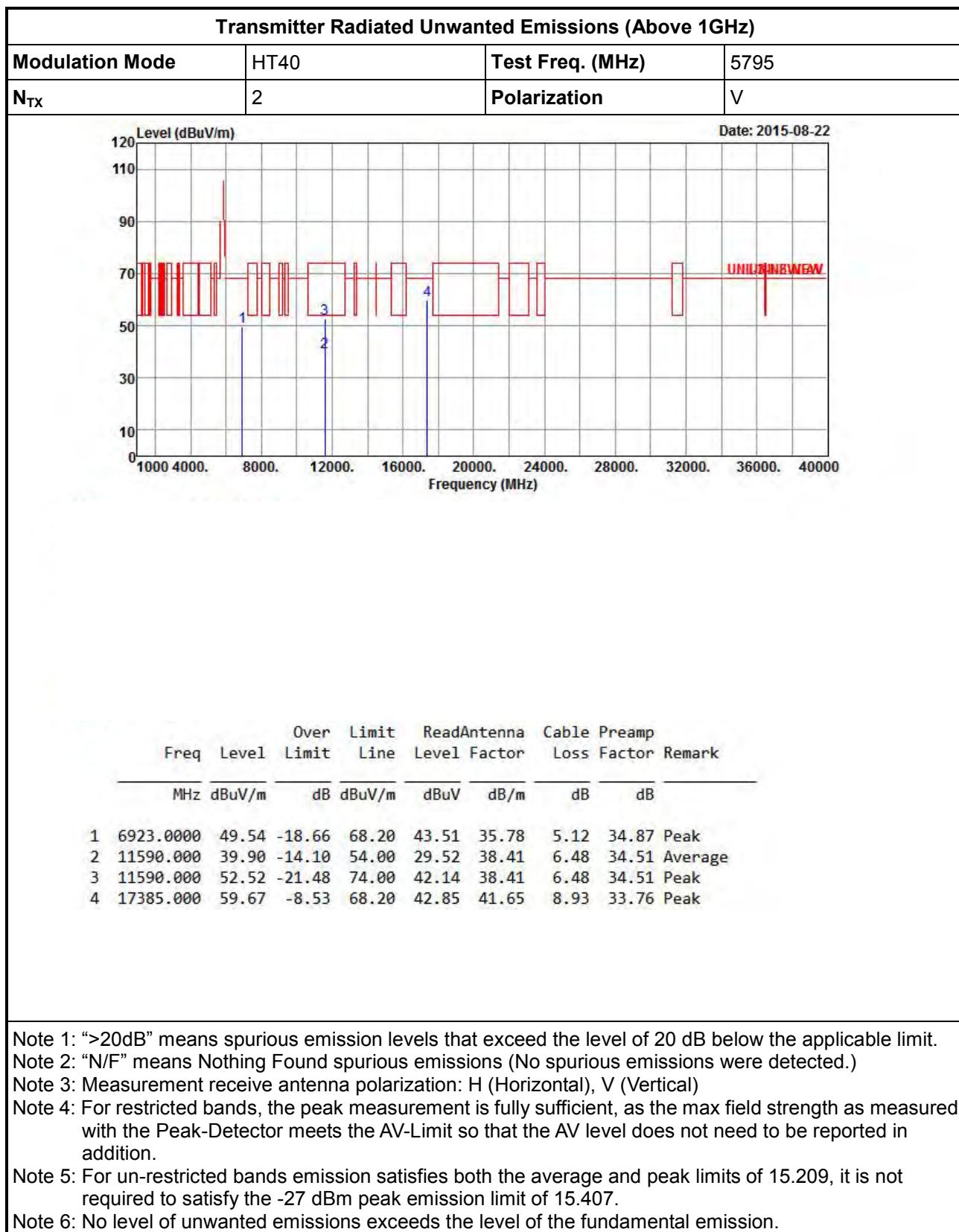














**Transmitter Radiated Unwanted Emissions (Above 1GHz)**

|                 |      |                  |      |
|-----------------|------|------------------|------|
| Modulation Mode | HT40 | Test Freq. (MHz) | 5795 |
| N <sub>TX</sub> | 2    | Polarization     | H    |

Date: 2015-08-22

Frequency (MHz)

| Freq        | Level  | Over   | Limit  | Read  | Antenna | Cable | Preamp        |
|-------------|--------|--------|--------|-------|---------|-------|---------------|
|             |        | Limit  | Line   | Level | Factor  | Loss  | Factor        |
| MHz         | dBuV/m | dB     | dBuV/m | dBuV  | dB/m    | dB    | dB            |
| 1 6523.000  | 48.70  | -19.50 | 68.20  | 42.51 | 35.70   | 5.26  | 34.77 Peak    |
| 2 11590.000 | 40.59  | -13.41 | 54.00  | 30.21 | 38.41   | 6.48  | 34.51 Average |
| 3 11590.000 | 53.90  | -20.10 | 74.00  | 43.52 | 38.41   | 6.48  | 34.51 Peak    |
| 4 17385.000 | 60.44  | -7.76  | 68.20  | 43.62 | 41.65   | 8.93  | 33.76 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.

Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

## 3.7 Frequency Stability

### 3.7.1 Frequency Stability Limit

| Frequency Stability Limit   |  |
|---|--|
| <b>UNII Devices</b>   |  |
| <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. |  |
| <b>IEEE Std. 802.11n-2009</b>   |  |
| <input checked="" type="checkbox"/> The transmitter center frequency tolerance shall be $\pm 20$ ppm maximum for the 5 GHz band.  |  |

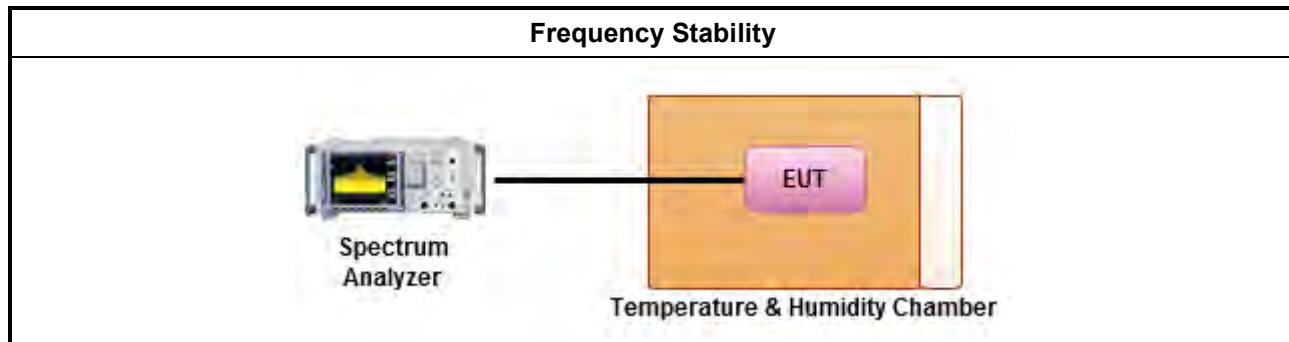
### 3.7.2 Measuring Instruments

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

### 3.7.3 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:<br>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.                              |

### 3.7.4 Test Setup





### 3.7.5 Test Result of Frequency Stability

| Frequency Stability Result |             |                           |          |          |          |
|----------------------------|-------------|---------------------------|----------|----------|----------|
| Mode                       |             | Frequency Stability (ppm) |          |          |          |
| Condition                  | Freq. (MHz) | 0 min                     | 2 min    | 5 min    | 10 min   |
| T <sub>20°C</sub> Vmax     | 5200        | -13.0385                  | -12.8077 | -12.6923 | -12.3462 |
| T <sub>20°C</sub> Vmin     | 5200        | -12.8846                  | -12.2308 | -12.1154 | -11.8846 |
| T <sub>50°C</sub> Vnom     | 5200        | 16.3846                   | 16.7308  | 17.0769  | 17.4231  |
| T <sub>40°C</sub> Vnom     | 5200        | 4.6154                    | 4.9615   | 5.1923   | 5.4231   |
| T <sub>30°C</sub> Vnom     | 5200        | -4.7308                   | -4.6154  | -4.3846  | -4.0385  |
| T <sub>20°C</sub> Vnom     | 5200        | -12.9231                  | -12.8077 | -12.8077 | -12.5769 |
| T <sub>10°C</sub> Vnom     | 5200        | -12.3462                  | -12.2308 | -11.8846 | -11.6538 |
| T <sub>0°C</sub> Vnom      | 5200        | -12.9231                  | -12.8077 | -12.4615 | -12.0000 |
| T <sub>-10°C</sub> Vnom    | 5200        | -12.1154                  | -12.0000 | -11.7692 | -11.5385 |
| T <sub>-20°C</sub> Vnom    | 5200        | -10.0385                  | -9.9231  | -9.9231  | -9.6923  |
| 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 1.1.5 for EUT operational condition.



## 4 Test Equipment and Calibration Data

### AC Conducted

| Instrument   | Manufacturer                   | Model No. | Serial No.     | Characteristics | Calibration Date | Calibration Due Date |
|--------------|--------------------------------|-----------|----------------|-----------------|------------------|----------------------|
| EMC Receiver | R&S                            | ESCS 30   | 100174         | 9kHz ~ 2.75GHz  | Apr. 15. 2015    | Apr. 14. 2016        |
| LISN         | SCHWARZBECK<br>MESS-ELEKTRONIK | NSLK 8127 | 8127-477       | 9kHz ~ 30MHz    | JAN. 22, 2015    | JAN. 21, 2016        |
| RF Cable-CON | HUBER+SUHNER                   | RG213/U   | 07611832020001 | 9kHz ~ 30MHz    | Oct. 31, 2014    | Oct. 30, 2015        |
| EMI Filter   | LINDGREN                       | LRE-2030  | 2651           | < 450 Hz        | NCR              | NCR                  |

### RF Conducted

| Instrument                 | Manufacturer | Model No.        | Serial No.  | Characteristics | Calibration Date | Calibration Due Date |
|----------------------------|--------------|------------------|-------------|-----------------|------------------|----------------------|
| Spectrum Analyzer          | R&S          | FSV 40           | 101500      | 9KHz~40GHz      | May. 06, 2015    | May. 05, 2016        |
| Temp. and Humidity Chamber | Giant Force  | GTH-225-20-SP-SD | MAA1112-007 | -20 ~ 100°C     | Apr. 07, 2015    | Apr. 06, 2016        |
| Signal Generator           | R&S          | SMR40            | 100116      | 10MHz ~ 40GHz   | Jul. 28, 2015    | Jul. 27, 2016        |
| DC Power Source            | G.W.         | GPC-6030D        | C671845     | DC 1V ~ 60V     | Jul. 22, 2015    | Jul. 21, 2016        |
| 4 Port switch              | CEI          | P4R-720120       | TH01        | 1GHz~26.5GHz    | Jul. 01, 2015    | Jun. 30, 2016        |

### Radiation Emissions

| Instrument               | Manufacturer         | Model No.   | Serial No.  | Characteristics    | Calibration Date | Calibration Due Date |
|--------------------------|----------------------|-------------|-------------|--------------------|------------------|----------------------|
| Spectrum Analyzer        | R&S                  | FSP40       | 100593      | 9kHz ~ 40GHz       | Oct. 02, 2014    | Oct. 01, 2015        |
| 3m Semi Anechoic Chamber | SIDT FRANKONIA       | SAC-3M      | 03CH02-HY   | 30MHz ~ 1GHz<br>3m | May 03, 2015     | May 02, 2016         |
| Amplifier                | Agilent              | 8447D       | 2944A11149  | 100kHz ~ 1.3GHz    | Jul. 24, 2015    | Jul. 23, 2016        |
| Amplifier                | Agilent              | 8449B       | 3008A02602  | 1GHz ~ 26.5GHz     | Oct. 20, 2014    | Oct. 19, 2015        |
| Horn Antenna             | ETS-LINDGREN         | 3117        | 00091920    | 1GHz ~ 18GHz       | Nov. 28, 2014    | Nov. 27, 2015        |
| Horn Antenna             | SCHWARZBECK          | BBHA9170    | BBHA9170154 | 18GHz ~ 40GHz      | Jan. 27, 2015    | Jan. 26, 2016        |
| RF Cable-R03m            | Jye Bao              | RG142       | CB021       | 9kHz ~ 1GHz        | Nov. 08, 2014    | Nov. 07, 2015        |
| RF Cable-high            | SUHNER               | SUCOFLEX106 | MY17173/4   | 1GHz ~ 40GHz       | Mar. 04, 2015    | Mar. 03, 2016        |
| Bilog Antenna            | SCHAFFNER            | CBL61128    | 2723        | 30MHz ~ 2GHz       | Sep 20, 2014     | Sep 19, 2015         |
| Turn Table               | Chaintek Instruments | 3000        | MF7802058   | 0~ 360 degree      | N/A              | N/A                  |
| Antenna Mast             | MF                   | MF7802      | MF780208205 | 1 ~ 4 m            | N/A              | N/A                  |
| Amplifier                | EMC INSTRUMENTS      | EMC184045B  | 980192      | 18GHz ~ 40GHz      | Aug. 25.2014     | Aug. 24.2016         |
| Loop Antenna             | R&S                  | HFH2-Z2     | 100330      | 9 kHz~30 MHz       | Nov. 10, 2014    | Nov. 09, 2016        |