



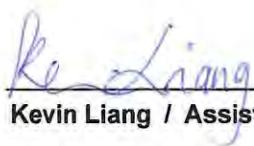
# FCC Test Report

**Equipment** : IP Camera  
**Model No.** : ALLie Home  
**FCC ID** : 2AFCRAH720  
**Standard** : 47 CFR FCC Part 15.407  
**Operating Band** : 5150 MHz – 5250 MHz  
5250 MHz – 5350 MHz  
5470 MHz – 5725 MHz  
5725 MHz – 5850 MHz  
**FCC Classification** : UNII  
**Applicant** : IC Real Tech  
3050 North Andrews Avenue Extension, Pompano Beach, Florida, United States 33064.  
**Manufacturer** : Hi-P Electronics Pte Ltd  
12 Ang Mo Kio Street 64, #03=02, UE BizHub Central Blk A, Singapore 569088.  
**Function** :  Outdoor AP;  Indoor AP;  
 Fixed P2P AP  Mobile or Portable Client

The product sample received on Aug. 18, 2015 and completely tested on Sep. 07, 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	19.36
5150-5250	n (HT20)	5180-5240	36-48 [4]	1	17.37
5150-5250	n (HT40)	5190-5230	38-46 [2]	1	17.80
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	1	17.41
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	1	17.79
5150-5250	ac (VHT80)	5210	48 [1]	1	13.20

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.  
Note 3: 802.11ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.

RF General Information (5250-5350MHz band)					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N <sub>TX</sub> )	RF Output Power (dBm)
5250-5350	a	5260-5320	52-64 [4]	1	17.62
5250-5350	n (HT20)	5260-5320	52-64 [4]	1	17.50
5250-5350	n (HT40)	5270-5310	54-62 [2]	1	17.83
5250-5350	ac (VHT20)	5260-5320	52-64 [4]	1	17.68
5250-5350	ac (VHT40)	5270-5310	54-62 [2]	1	17.82
5250-5350	ac (VHT80)	5290	58 [1]	1	13.49

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.  
Note 3: 802.11ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.



RF General Information (5470-5725MHz band)					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N <sub>TX</sub> )	RF Output Power (dBm)
5470-5725	a	5500-5700	100-140 [8]	1	19.59
5470-5725	n (HT20)	5500-5700	100-140 [8]	1	19.64
5470-5725	n (HT40)	5510-5670	102-134 [3]	1	19.61
5470-5725	ac (VHT20)	5500-5700	100-140 [8]	1	19.88
5470-5725	ac (VHT40)	5510-5670	102-134 [3]	1	19.13
5470-5725	ac (VHT80)	5530	106 [1]	1	13.71

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.

Note 3: 802.11ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM 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	18.49
5725-5850	n (HT20)	5745-5825	149-165 [5]	1	19.14
5725-5850	n (HT40)	5755-5795	151-159 [2]	1	17.31
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	1	18.90
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	1	18.10
5725-5850	ac (VHT80)	5775	155 [1]	1	12.63

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.

Note 3: 802.11ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.



### 1.1.2 Antenna Information

Antenna Category	
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input checked="" type="checkbox"/>	Temporary RF connector provided
<input type="checkbox"/>	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.

Antenna General Information		
Ant. Cat.	Ant. Type	Gain (dBi)
Integral	PIFA	1.50

### 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) Combined Equipment - Brand Name / Model No.: ...
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: ...
<input type="checkbox"/>	Other:



### 1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
Test Signal Duty Cycle (x)	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"/> 97.28% - IEEE 802.11a	0.12
<input checked="" type="checkbox"/> 96.38% - IEEE 802.11n (HT20)	0.16
<input checked="" type="checkbox"/> 92.95% - IEEE 802.11n (HT40)	0.32
<input checked="" type="checkbox"/> 94.66% - IEEE 802.11ac (VHT20)	0.24
<input checked="" type="checkbox"/> 90.24% - IEEE 802.11ac (VHT40)	0.45
<input checked="" type="checkbox"/> 83.35% - IEEE 802.11ac (VHT80)	0.79

### 1.1.5 EUT Operational Condition

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



## 1.2 Accessories and Support Equipment

Accessories Information				
AC Adapter	Brand Name	Ten Pao	Model Name	S012BEU0900100
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 9 Vdc, 1000 mA		
	Power Cord	3 meter, non-shielded cable, w/o ferrite core		
USB Cable	Brand Name	YuanLing Technology (HK) Limited	Model Name	YL008-065
	Signal Line	0.9 meter, with braid shielded cable, w/o ferrite core		

Reminder: Regarding to more detail and other information, please refer to user manual.

### Support Equipment - RF Conducted

No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5540	DoC
2	Adapter	DELL	HA65NM130	DoC

### Support Equipment - AC Conduction

No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5530	DoC
2	Adapter	DELL	LA65NS2-01	DoC

### Support Equipment - Radiated Emission

No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5530	DoC
2	Adapter	DELL	LA65NS2-01	DoC

## 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 v01
- ◆ FCC KDB 644545 D03 v01
- ◆ FCC-14-30A1-UNII



## 1.4 Testing Location Information

Testing Location			
	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	Zeus	21°C / 57%
RF Conducted	TH06-HY	Leo	24.6°C / 64%
Radiated Emission	03CH03-HY	Hsiao	24.2°C / 63%

## 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 ( $N_{TX}$ )	Data Rate / MCS	Worst Data Rate / MCS
11a	1	6-54Mbps	6 Mbps
HT20	1	MCS 0-7	MCS 0
HT40	1	MCS 0-7	MCS 0
VHT20	1	MCS 0-8	MCS 0
VHT40	1	MCS 0-9	MCS 0
VHT80	1	MCS 0-9	MCS 0

### 2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (5150-5250MHz band)							
Test Software Version	DOS Command						
Modulation Mode	$N_{TX}$	Test Frequency (MHz)					
		NCB: 20MHz		NCB: 40MHz		NCB: 80MHz	
		5180	5200	5240	5190	5230	5210
11a	1	20	20	20	-	-	-
HT20	1	19	20	20	-	-	-
HT40	1	-	-	-	13	20	-
VHT20	1	19	20	20	-	-	-
VHT40	1	-	-	-	13	20	-
VHT80	1	-	-	-	-	-	13

The Worst Case Power Setting Parameter (5250-5350MHz band)							
Test Software Version	DOS Command						
Modulation Mode	$N_{TX}$	Test Frequency (MHz)					
		NCB: 20MHz		NCB: 40MHz		NCB: 80MHz	
		5260	5300	5320	5270	5310	5290
11a	1	20	20	20	-	-	-
HT20	1	20	20	17	-	-	-
HT40	1	-	-	-	20	13	-
VHT20	1	20	20	17	-	-	-
VHT40	1	-	-	-	20	13	-
VHT80	1	-	-	-	-	-	13



The Worst Case Power Setting Parameter (5470-5725MHz band)								
Test Software Version	DOS Command							
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)						
		NCB: 20MHz			NCB: 40MHz			NCB: 80MHz
		5500	5580	5700	5510	5550	5670	5530
11a	1	16	20	14	-	-	-	-
HT20	1	16	20	13	-	-	-	-
HT40	1	-	-	-	13	19	16	-
VHT20	1	16	20	13	-	-	-	-
VHT40	1	-	-	-	13	19	16	-
VHT80	1	-	-	-	-	-	-	13

The Worst Case Power Setting Parameter (5725-5850MHz band)								
Test Software Version	DOS Command							
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)						
		NCB: 20MHz			NCB: 40MHz		NCB: 80MHz	
		5745	5785	5825	5755	5795	5775	
11a	1	14	20	15	-	-	-	-
HT20	1	14	21	16	-	-	-	-
HT40	1	-	-	-	12	17	-	-
VHT20	1	15	21	16	-	-	-	-
VHT40	1	-	-	-	13	18	-	-
VHT80	1	-	-	-	-	-	-	13



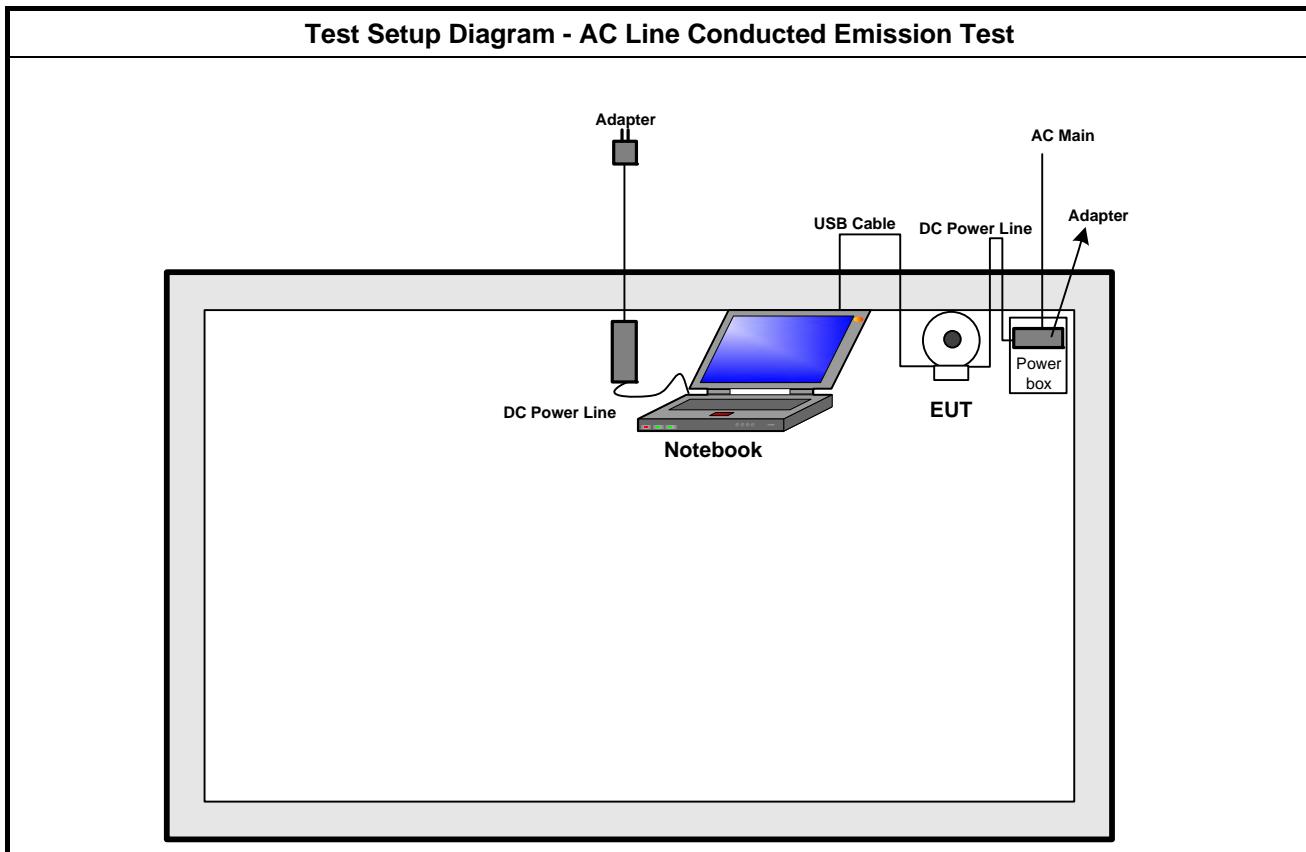
## 2.3 The Worst Case Measurement Configuration

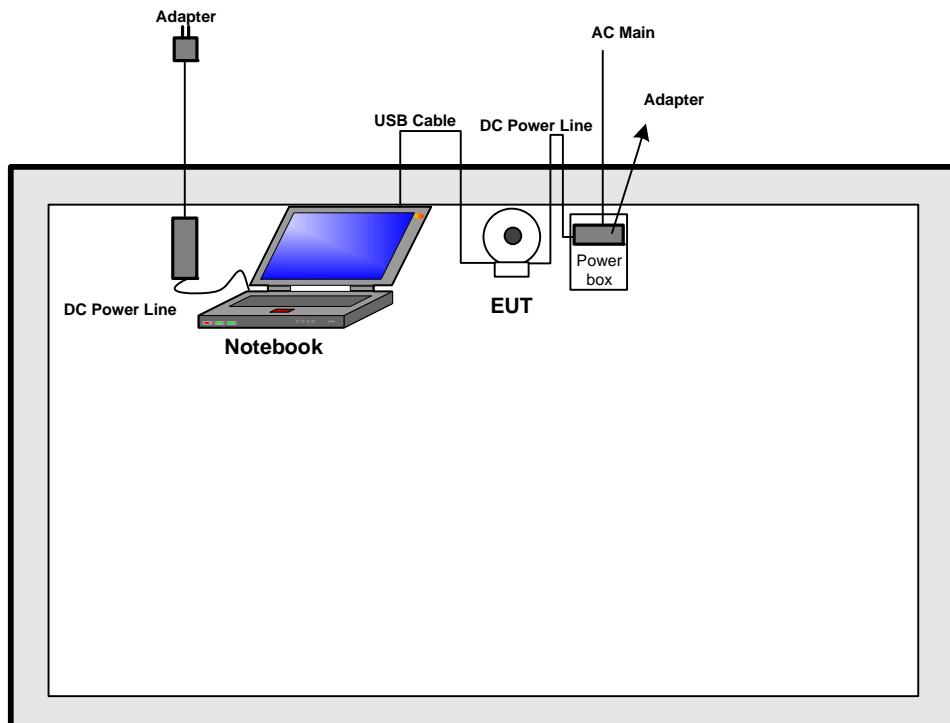
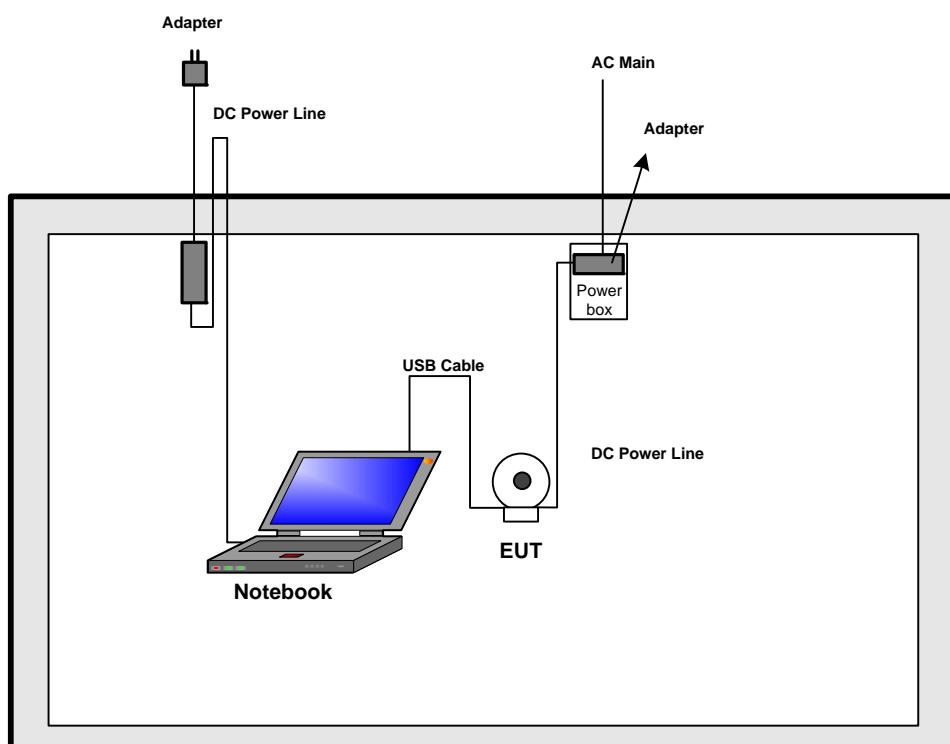
The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	AC power-line conducted emissions
<b>Condition</b>	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
<b>Operating Mode</b>	Operating Mode Description
1	Adapter mode and transmit

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 Transmitter Conducted Bandedge Emissions
<b>Test Condition</b>	Conducted measurement at transmit chains
<b>Modulation Mode</b>	11a, HT20, HT40, VHT20, VHT40, VHT80

The Worst Case Mode for Following Conformance Tests							
<b>Tests Item</b>	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions						
<b>Test Condition</b>	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.						
<b>User Position</b>	<input checked="" type="checkbox"/> EUT will be placed in fixed position. <input type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. <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>	1. Adapter mode and transmit						
<b>Modulation Mode</b>	11a, HT20, HT40, VHT20, VHT40, VHT80						
<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.

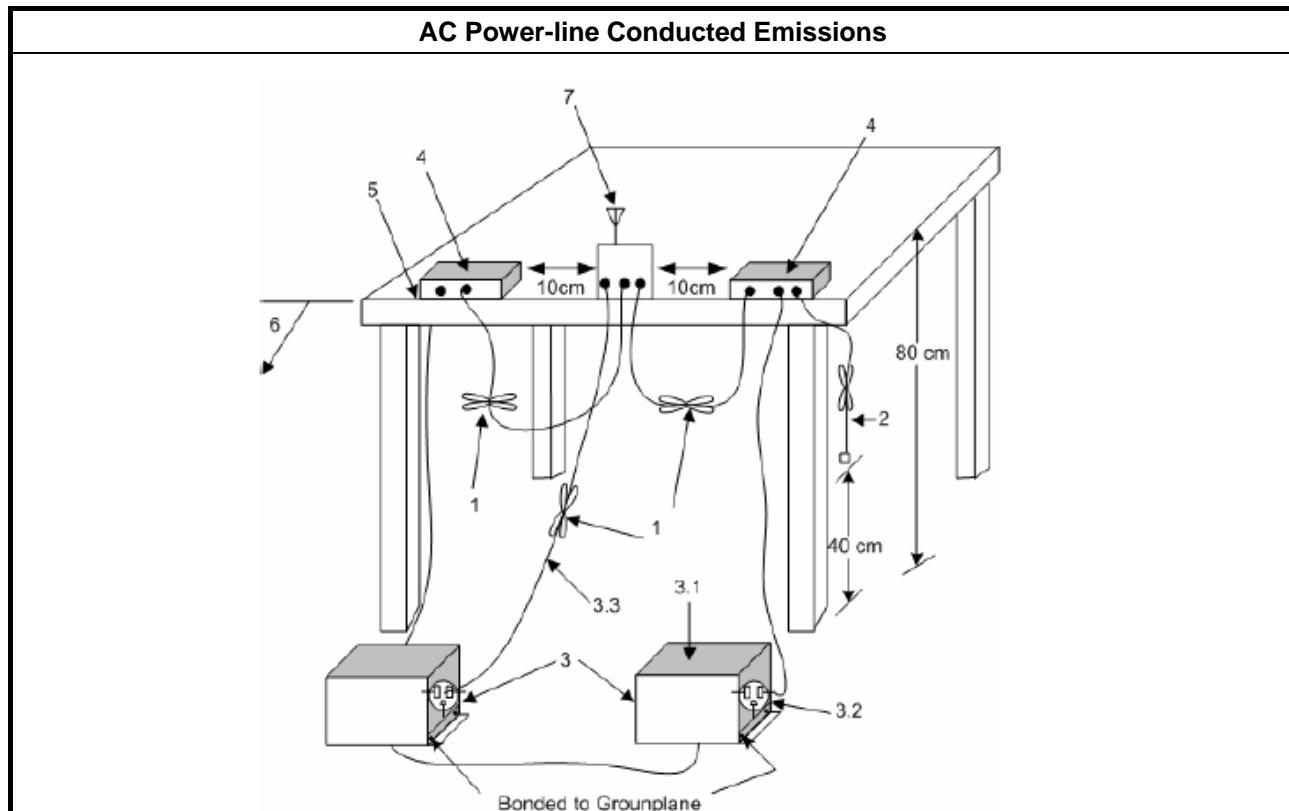
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

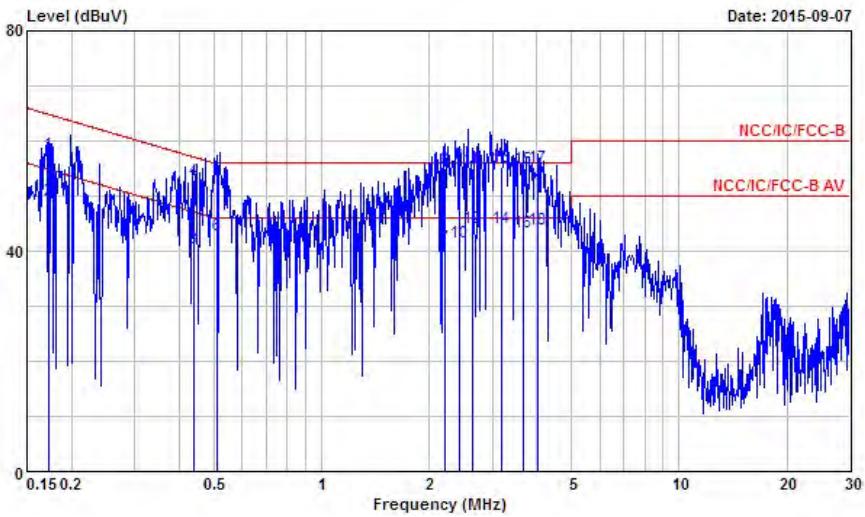
Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

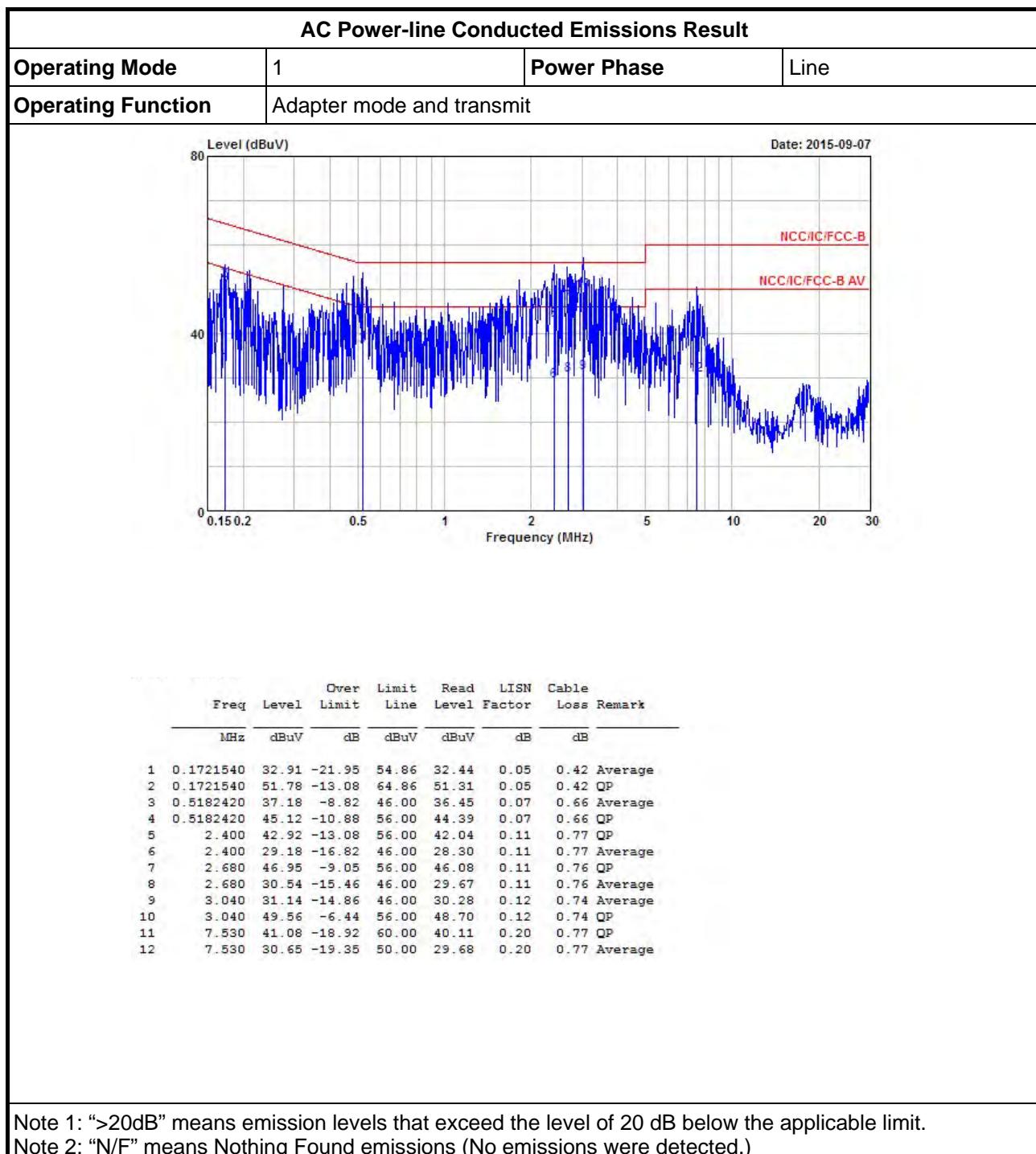
##### 3.1.4 Test Setup





## 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	Adapter mode and transmit																																																																																																																																																																						
							Date: 2015-09-07																																																																																																																																																																
<table><thead><tr><th>Freq</th><th>Over Level</th><th>Limit</th><th>Read Line</th><th>LISN</th><th>Cable Factor</th><th>Loss</th><th>Remark</th></tr><tr><th>MHz</th><th>dBuV</th><th>dB</th><th>dBuV</th><th>dBuV</th><th>dB</th><th>dB</th><th></th></tr></thead><tbody><tr><td>1</td><td>0.1721540</td><td>57.66</td><td>-7.20</td><td>64.86</td><td>57.17</td><td>0.07</td><td>0.42 QP</td></tr><tr><td>2</td><td>0.1721540</td><td>49.11</td><td>-5.75</td><td>54.86</td><td>48.62</td><td>0.07</td><td>0.42 Average</td></tr><tr><td>3</td><td>0.4374210</td><td>40.47</td><td>-6.64</td><td>47.11</td><td>39.78</td><td>0.07</td><td>0.62 Average</td></tr><tr><td>4</td><td>0.4374210</td><td>52.79</td><td>-4.32</td><td>57.11</td><td>52.10</td><td>0.07</td><td>0.62 QP</td></tr><tr><td>5</td><td>0.5100690</td><td>53.21</td><td>-2.79</td><td>56.00</td><td>52.48</td><td>0.08</td><td>0.65 QP</td></tr><tr><td>6</td><td>0.5100690</td><td>42.77</td><td>-3.23</td><td>46.00</td><td>42.04</td><td>0.08</td><td>0.65 Average</td></tr><tr><td>7</td><td>2.210</td><td>40.68</td><td>-5.32</td><td>46.00</td><td>39.79</td><td>0.10</td><td>0.79 Average</td></tr><tr><td>8</td><td>2.210</td><td>54.94</td><td>-1.06</td><td>56.00</td><td>54.05</td><td>0.10</td><td>0.79 QP</td></tr><tr><td>9</td><td>2.420</td><td>55.92</td><td>-0.08</td><td>56.00</td><td>55.04</td><td>0.11</td><td>0.77 QP</td></tr><tr><td>10</td><td>2.420</td><td>41.70</td><td>-4.30</td><td>46.00</td><td>40.82</td><td>0.11</td><td>0.77 Average</td></tr><tr><td>11</td><td>2.640</td><td>55.01</td><td>-0.99</td><td>56.00</td><td>54.14</td><td>0.11</td><td>0.76 QP</td></tr><tr><td>12</td><td>2.640</td><td>44.26</td><td>-1.74</td><td>46.00</td><td>43.39</td><td>0.11</td><td>0.76 Average</td></tr><tr><td>13</td><td>3.190</td><td>55.20</td><td>-0.80</td><td>56.00</td><td>54.35</td><td>0.12</td><td>0.73 QP</td></tr><tr><td>14</td><td>3.190</td><td>44.25</td><td>-1.75</td><td>46.00</td><td>43.40</td><td>0.12</td><td>0.73 Average</td></tr><tr><td>15</td><td>3.680</td><td>54.99</td><td>-1.01</td><td>56.00</td><td>54.15</td><td>0.13</td><td>0.71 QP</td></tr><tr><td>16</td><td>3.680</td><td>43.40</td><td>-2.60</td><td>46.00</td><td>42.56</td><td>0.13</td><td>0.71 Average</td></tr><tr><td>17</td><td>4.030</td><td>55.29</td><td>-0.71</td><td>56.00</td><td>54.46</td><td>0.13</td><td>0.70 QP</td></tr><tr><td>18</td><td>4.030</td><td>43.98</td><td>-2.02</td><td>46.00</td><td>43.15</td><td>0.13</td><td>0.70 Average</td></tr></tbody></table>								Freq	Over Level	Limit	Read Line	LISN	Cable Factor	Loss	Remark	MHz	dBuV	dB	dBuV	dBuV	dB	dB		1	0.1721540	57.66	-7.20	64.86	57.17	0.07	0.42 QP	2	0.1721540	49.11	-5.75	54.86	48.62	0.07	0.42 Average	3	0.4374210	40.47	-6.64	47.11	39.78	0.07	0.62 Average	4	0.4374210	52.79	-4.32	57.11	52.10	0.07	0.62 QP	5	0.5100690	53.21	-2.79	56.00	52.48	0.08	0.65 QP	6	0.5100690	42.77	-3.23	46.00	42.04	0.08	0.65 Average	7	2.210	40.68	-5.32	46.00	39.79	0.10	0.79 Average	8	2.210	54.94	-1.06	56.00	54.05	0.10	0.79 QP	9	2.420	55.92	-0.08	56.00	55.04	0.11	0.77 QP	10	2.420	41.70	-4.30	46.00	40.82	0.11	0.77 Average	11	2.640	55.01	-0.99	56.00	54.14	0.11	0.76 QP	12	2.640	44.26	-1.74	46.00	43.39	0.11	0.76 Average	13	3.190	55.20	-0.80	56.00	54.35	0.12	0.73 QP	14	3.190	44.25	-1.75	46.00	43.40	0.12	0.73 Average	15	3.680	54.99	-1.01	56.00	54.15	0.13	0.71 QP	16	3.680	43.40	-2.60	46.00	42.56	0.13	0.71 Average	17	4.030	55.29	-0.71	56.00	54.46	0.13	0.70 QP	18	4.030	43.98	-2.02	46.00	43.15	0.13	0.70 Average
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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.)



## 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 checked="" 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 checked="" 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

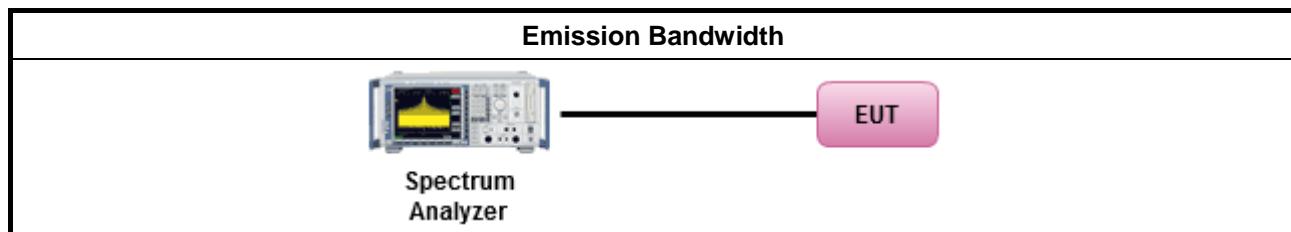
Refer a test equipment and calibration data table in this test report.

### 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 v01, clause C for EBW and clause D for OBW measurement.
	<input type="checkbox"/> Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
	<input type="checkbox"/> Refer as IC RSS-Gen, clause 6.6 for bandwidth testing.
<input checked="" type="checkbox"/>	For conducted measurement.
	<input checked="" type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.
	<input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
	<input type="checkbox"/> The EUT supports multiple transmit chains using options given below:
	<input type="checkbox"/> Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
	<input 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
11a	1	5180	26.16	43.82
11a	1	5200	17.79	35.02
11a	1	5240	18.24	38.27
HT20	1	5180	19.59	36.77
HT20	1	5200	19.49	34.45
HT20	1	5240	19.96	38.07
HT40	1	5190	36.38	41.16
HT40	1	5230	37.78	69.52
VHT20	1	5180	18.69	37.57
VHT20	1	5200	18.21	31.77
VHT20	1	5240	19.44	34.60
VHT40	1	5190	36.02	40.24
VHT40	1	5230	38.50	69.48
VHT80	1	5210	74.76	79.20
Result			Complied	

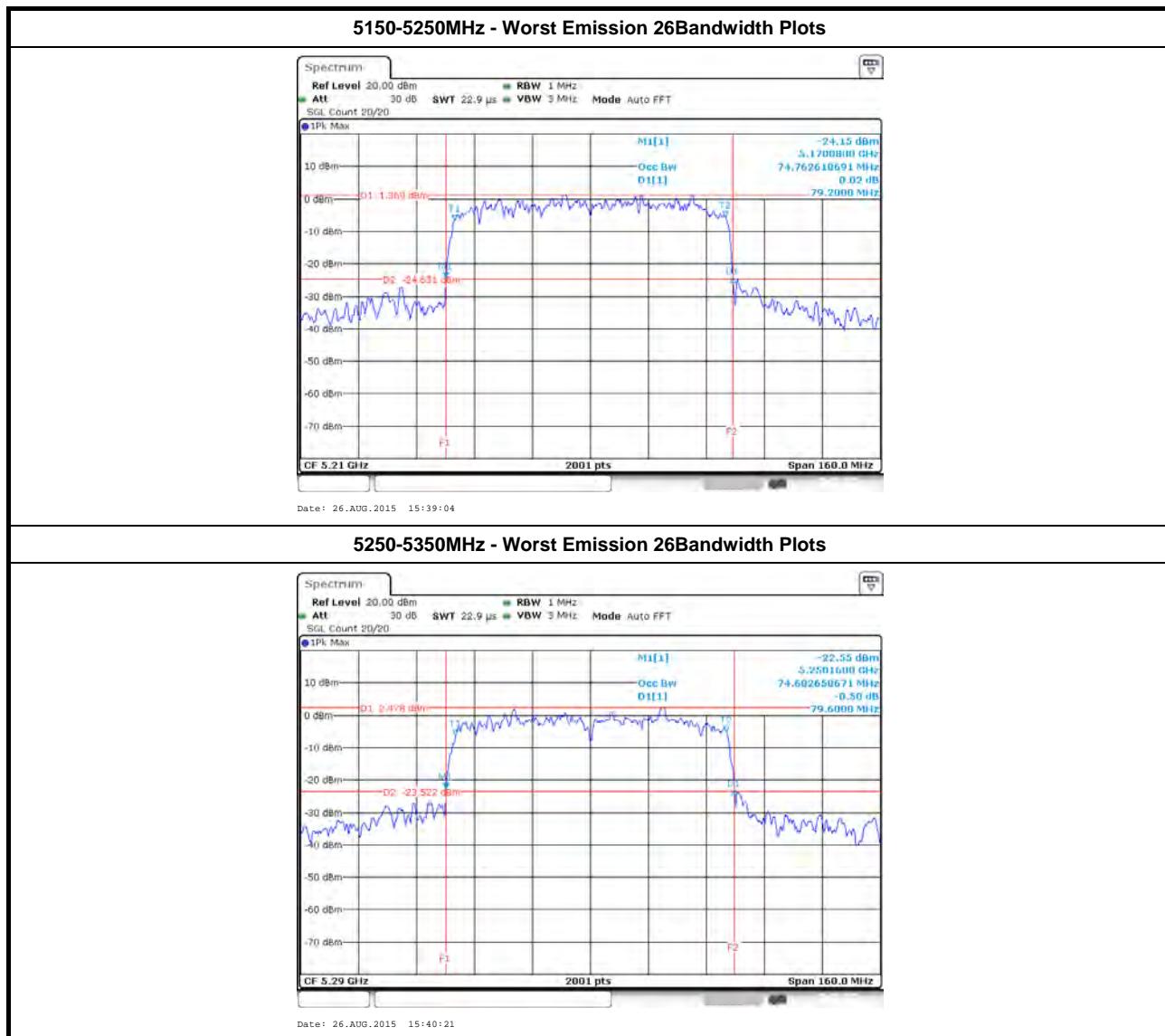


UNII Emission Bandwidth Result (5250-5350MHz band)				
Condition			Emission Bandwidth (MHz)	
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	99% Bandwidth	26dB Bandwidth
11a	1	5260	19.69	34.92
11a	1	5300	18.21	33.95
11a	1	5320	19.06	39.12
HT20	1	5260	19.59	36.52
HT20	1	5300	20.13	40.17
HT20	1	5320	18.21	33.87
HT40	1	5270	38.54	71.80
HT40	1	5310	36.54	43.00
VHT20	1	5260	18.54	34.97
VHT20	1	5300	18.56	31.47
VHT20	1	5320	18.09	32.62
VHT40	1	5270	41.45	75.96
VHT40	1	5310	36.34	43.44
VHT80	1	5290	74.68	79.60
Result			Complied	

UNII Emission Bandwidth Result (5470-5725MHz band)				
Condition			Emission Bandwidth (MHz)	
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	99% Bandwidth	26dB Bandwidth
11a	1	5500	17.31	29.67
11a	1	5580	23.26	37.60
11a	1	5700	17.04	23.47
HT20	1	5500	18.29	33.25
HT20	1	5580	32.10	46.17
HT20	1	5700	12.71	20.65
HT40	1	5510	36.26	40.96
HT40	1	5550	47.45	70.72
HT40	1	5670	37.74	75.20
VHT20	1	5500	18.24	35.75
VHT20	1	5580	32.70	46.40
VHT20	1	5700	17.94	22.67
VHT40	1	5510	36.26	40.28
VHT40	1	5550	48.13	76.28
VHT40	1	5670	37.22	67.04
VHT80	1	5530	74.68	85.20
Result			Complied	

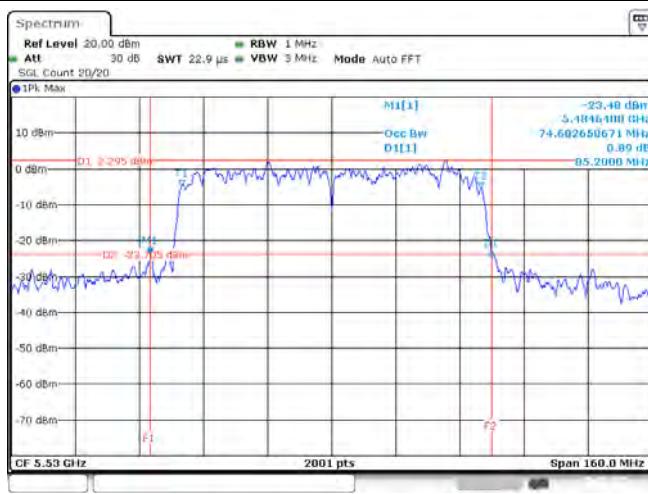


UNII Emission Bandwidth Result (5725-5850MHz band)				
Condition			Emission Bandwidth (MHz)	
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	99% Bandwidth	6dB Bandwidth
11a	1	5745	16.59	16.50
11a	1	5785	19.47	16.48
11a	1	5825	16.53	16.56
HT20	1	5745	17.75	17.59
HT20	1	5785	20.61	17.58
HT20	1	5825	17.72	17.76
HT40	1	5755	36.06	36.32
HT40	1	5795	36.38	35.68
VHT20	1	5745	17.64	17.70
VHT20	1	5785	21.19	17.73
VHT20	1	5825	17.78	17.71
VHT40	1	5755	36.06	35.04
VHT40	1	5795	41.37	35.08
VHT80	1	5775	74.68	68.80
Limit		-	≥ 500 kHz	
Result			Complied	

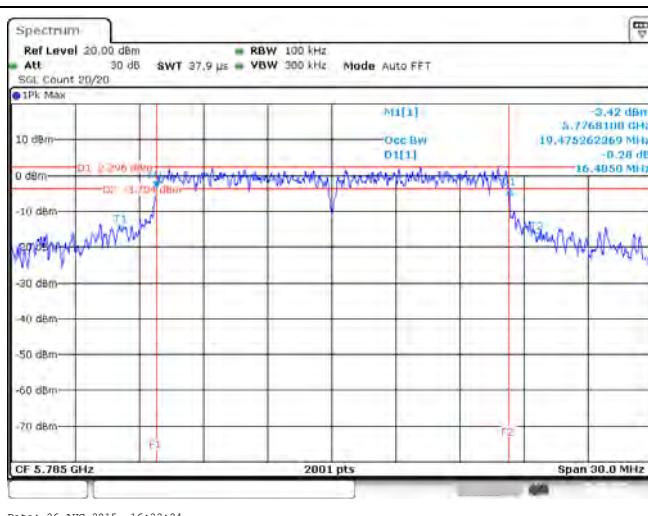




## 5470-5725MHz - Worst Emission 26Bandwidth Plots



## 5725-5850MHz - Worst Emission 6Bandwidth Plots





### 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 checked="" 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 checked="" 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, $G_{TX}$ = the maximum transmitting antenna directional gain in dBi.	

#### 3.3.2 Measuring Instruments

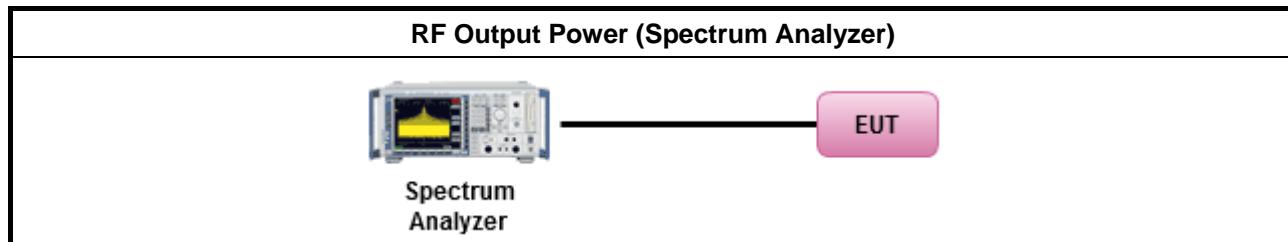
Refer a test equipment and calibration data table in this test report.



### 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 type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause E Method SA-1 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, 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 checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause E Method SA-2 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
Wideband RF power meter and average over on/off periods with duty factor
<input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause E Method PM (using an RF average power meter).
<input checked="" type="checkbox"/> For conducted measurement.
<input checked="" type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
<input type="checkbox"/> The EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
<input type="checkbox"/> If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

### 3.3.4 Test Setup





### 3.3.5 Test Result of Maximum Conducted Output Power

Maximum Conducted Output Power (5150-5250MHz band)					
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Output Power (dBm)	Antenna Gain (dBi)	Power Limit
11a	1	5180	19.36	1.50	24.00
11a	1	5200	17.01	1.50	24.00
11a	1	5240	17.36	1.50	24.00
HT20	1	5180	17.28	1.50	24.00
HT20	1	5200	17.04	1.50	24.00
HT20	1	5240	17.37	1.50	24.00
HT40	1	5190	13.65	1.50	24.00
HT40	1	5230	17.80	1.50	24.00
VHT20	1	5180	17.23	1.50	24.00
VHT20	1	5200	17.41	1.50	24.00
VHT20	1	5240	17.37	1.50	24.00
VHT40	1	5190	13.72	1.50	24.00
VHT40	1	5230	17.79	1.50	24.00
VHT80	1	5210	13.20	1.50	24.00
Result		Complied			

Maximum Conducted Output Power (5250-5350MHz band)					
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Output Power (dBm)	Antenna Gain (dBi)	Power Limit
11a	1	5260	17.42	1.50	24.00
11a	1	5300	17.62	1.50	24.00
11a	1	5320	17.46	1.50	24.00
HT20	1	5260	17.47	1.50	24.00
HT20	1	5300	17.50	1.50	24.00
HT20	1	5320	16.79	1.50	24.00
HT40	1	5270	17.83	1.50	24.00
HT40	1	5310	13.46	1.50	24.00
VHT20	1	5260	17.60	1.50	24.00
VHT20	1	5300	17.68	1.50	24.00
VHT20	1	5320	16.89	1.50	24.00
VHT40	1	5270	17.82	1.50	24.00
VHT40	1	5310	13.40	1.50	24.00
VHT80	1	5290	13.49	1.50	24.00
Result		Complied			



Maximum Conducted Output Power (5470-5725MHz band)					
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Output Power (dBm)	Antenna Gain (dBi)	Power Limit
11a	1	5500	15.84	1.50	24.00
11a	1	5580	19.59	1.50	24.00
11a	1	5700	14.55	1.50	24.00
HT20	1	5500	15.94	1.50	24.00
HT20	1	5580	19.64	1.50	24.00
HT20	1	5700	13.70	1.50	24.00
HT40	1	5510	13.09	1.50	24.00
HT40	1	5550	19.61	1.50	24.00
HT40	1	5670	16.97	1.50	24.00
VHT20	1	5500	15.97	1.50	24.00
VHT20	1	5580	19.88	1.50	24.00
VHT20	1	5700	13.87	1.50	24.00
VHT40	1	5510	12.78	1.50	24.00
VHT40	1	5550	19.13	1.50	24.00
VHT40	1	5670	16.48	1.50	24.00
VHT80	1	5530	13.71	1.50	24.00
Result		Complied			

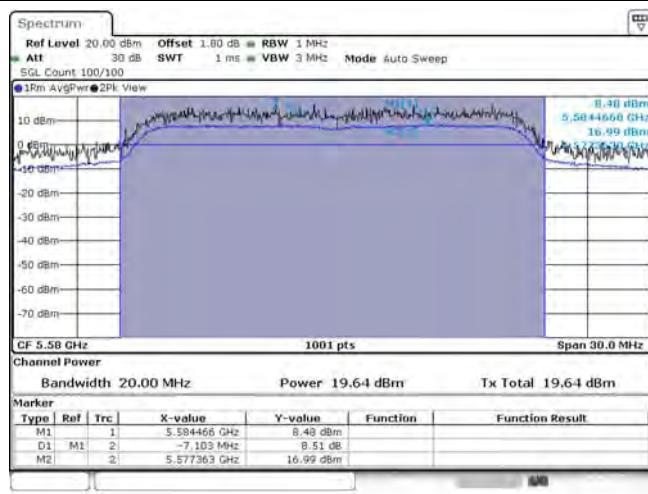
Maximum Conducted Output Power (5725-5850MHz band)					
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Output Power (dBm)	Antenna Gain (dBi)	Power Limit
11a	1	5745	14.74	1.50	30.00
11a	1	5785	18.49	1.50	30.00
11a	1	5825	15.56	1.50	30.00
HT20	1	5745	14.89	1.50	30.00
HT20	1	5785	19.14	1.50	30.00
HT20	1	5825	16.72	1.50	30.00
HT40	1	5755	12.85	1.50	30.00
HT40	1	5795	17.31	1.50	30.00
VHT20	1	5745	15.73	1.50	30.00
VHT20	1	5785	18.90	1.50	30.00
VHT20	1	5825	16.55	1.50	30.00
VHT40	1	5755	13.46	1.50	30.00
VHT40	1	5795	18.10	1.50	30.00
VHT80	1	5775	12.63	1.50	30.00
Result		Complied			



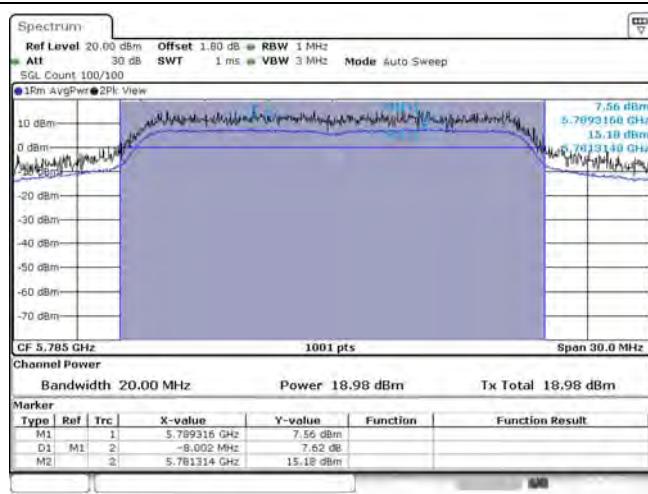
Note 1: RF Output Power Plots w/o Duty Factor



## 5470-5725MHz - Worst RF Output Power Plots



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



Note 1: RF Output Power Plots w/o Duty Factor



## 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 checked="" 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 checked="" 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 he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz <b>G<sub>TX</sub></b> = the maximum transmitting antenna directional gain in dBi.	

### 3.4.2 Measuring Instruments

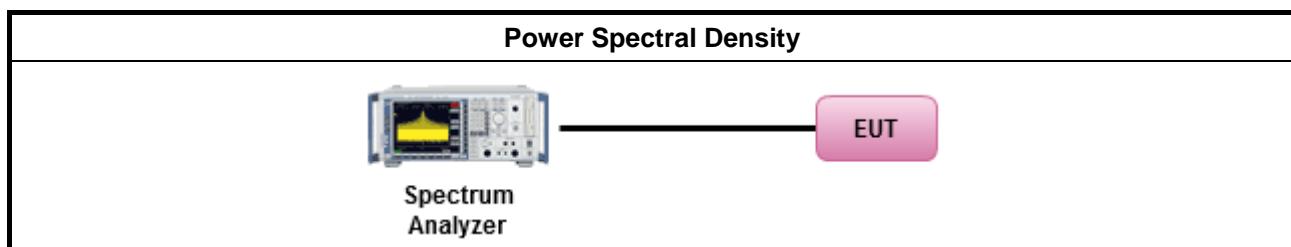
Refer a test equipment and calibration data table in this test report.



### 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 type="checkbox"/> Refer as FCC KDB 789033 D02 v01, 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 v01, clause E Method SA-1 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, 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 checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause E Method SA-2 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
<input checked="" type="checkbox"/> For conducted measurement.
<input checked="" type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
<input type="checkbox"/> The EUT supports multiple transmit chains using options given below:
<input 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: $PPSD_{total} = PPSD_1 + PPSD_2 + \dots + PPSD_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = PPSD_{total} + DG$
<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	Antenna Gain (dBi)
11a	1	5180	8.32	11.00	1.50
11a	1	5200	5.96	11.00	1.50
11a	1	5240	6.48	11.00	1.50
HT20	1	5180	5.96	11.00	1.50
HT20	1	5200	5.73	11.00	1.50
HT20	1	5240	6.06	11.00	1.50
HT40	1	5190	-0.49	11.00	1.50
HT40	1	5230	3.50	11.00	1.50
VHT20	1	5180	5.90	11.00	1.50
VHT20	1	5200	6.18	11.00	1.50
VHT20	1	5240	6.00	11.00	1.50
VHT40	1	5190	-0.44	11.00	1.50
VHT40	1	5230	3.53	11.00	1.50
VHT80	1	5210	-3.62	11.00	1.50
Result		Complied			

Peak Power Spectral Density Result (5250-5350MHz band)					
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Peak Power Spectral Density (dBm)	PSD Limit	Antenna Gain (dBi)
11a	1	5260	6.31	11.00	1.50
11a	1	5300	6.61	11.00	1.50
11a	1	5320	6.34	11.00	1.50
HT20	1	5260	6.12	11.00	1.50
HT20	1	5300	6.24	11.00	1.50
HT20	1	5320	5.50	11.00	1.50
HT40	1	5270	3.73	11.00	1.50
HT40	1	5310	-0.77	11.00	1.50
VHT20	1	5260	6.30	11.00	1.50
VHT20	1	5300	6.40	11.00	1.50
VHT20	1	5320	5.60	11.00	1.50
VHT40	1	5270	3.80	11.00	1.50
VHT40	1	5310	-0.76	11.00	1.50
VHT80	1	5290	-3.52	11.00	1.50
Result		Complied			

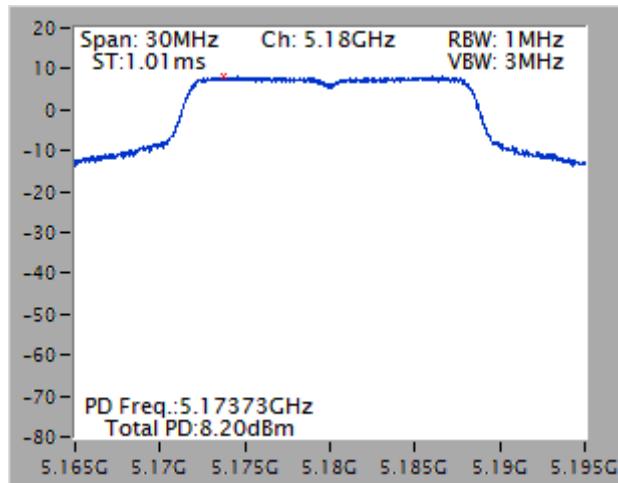


Peak Power Spectral Density Result (5470-5725MHz band)					
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Peak Power Spectral Density (dBm)	PSD Limit	Antenna Gain (dBi)
11a	1	5500	4.85	11.00	1.50
11a	1	5580	8.59	11.00	1.50
11a	1	5700	3.46	11.00	1.50
HT20	1	5500	4.66	11.00	1.50
HT20	1	5580	8.17	11.00	1.50
HT20	1	5700	2.30	11.00	1.50
HT40	1	5510	-1.02	11.00	1.50
HT40	1	5550	5.44	11.00	1.50
HT40	1	5670	2.71	11.00	1.50
VHT20	1	5500	4.50	11.00	1.50
VHT20	1	5580	8.72	11.00	1.50
VHT20	1	5700	2.78	11.00	1.50
VHT40	1	5510	-1.36	11.00	1.50
VHT40	1	5550	5.08	11.00	1.50
VHT40	1	5670	2.48	11.00	1.50
VHT80	1	5530	-2.96	11.00	1.50
Result		Complied			

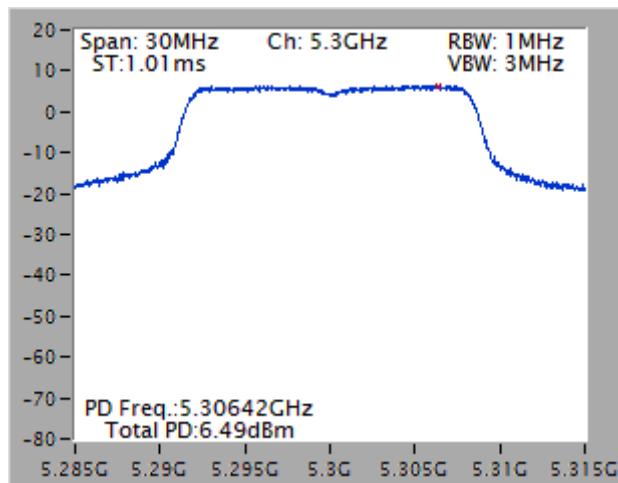
Peak Power Spectral Density Result (5725-5850MHz band)					
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Peak Power Spectral Density (dBm)	PSD Limit (500kHz)	Antenna Gain (dBi)
11a	1	5745	7.13	30.00	1.50
11a	1	5785	11.71	30.00	1.50
11a	1	5825	8.49	30.00	1.50
HT20	1	5745	7.34	30.00	1.50
HT20	1	5785	11.98	30.00	1.50
HT20	1	5825	9.00	30.00	1.50
HT40	1	5755	2.97	30.00	1.50
HT40	1	5795	7.92	30.00	1.50
VHT20	1	5745	7.87	30.00	1.50
VHT20	1	5785	11.57	30.00	1.50
VHT20	1	5825	8.36	30.00	1.50
VHT40	1	5755	2.66	30.00	1.50
VHT40	1	5795	8.61	30.00	1.50
VHT80	1	5775	0.22	30.00	1.50
Result		Complied			



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



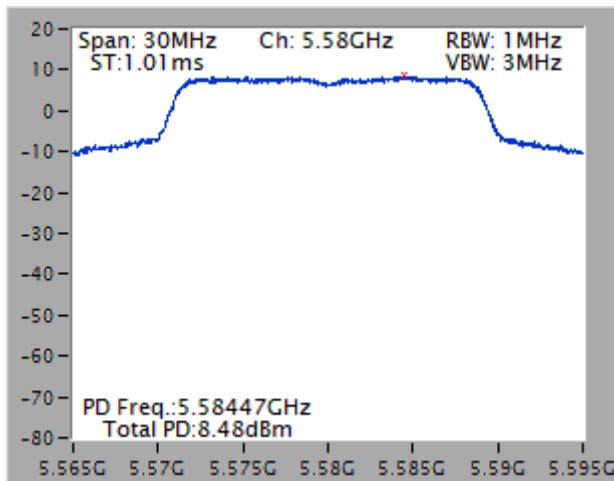
## 5250-5350MHz - Worst Power Spectral Density Plots



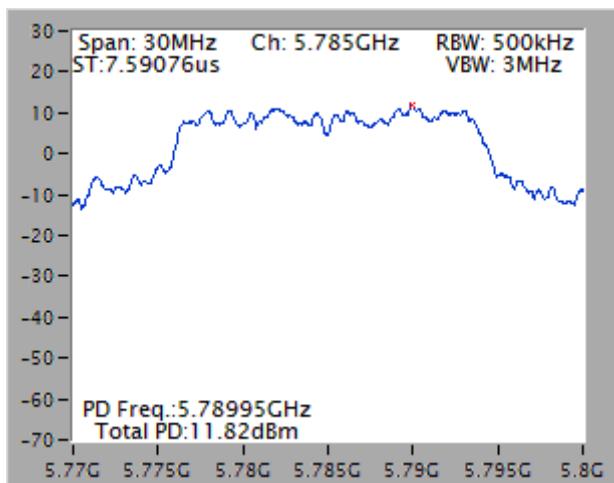
Note 1: Power Density Plots w/o Duty Factor



## 5470-5725MHz - Worst Power Spectral Density Plots



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

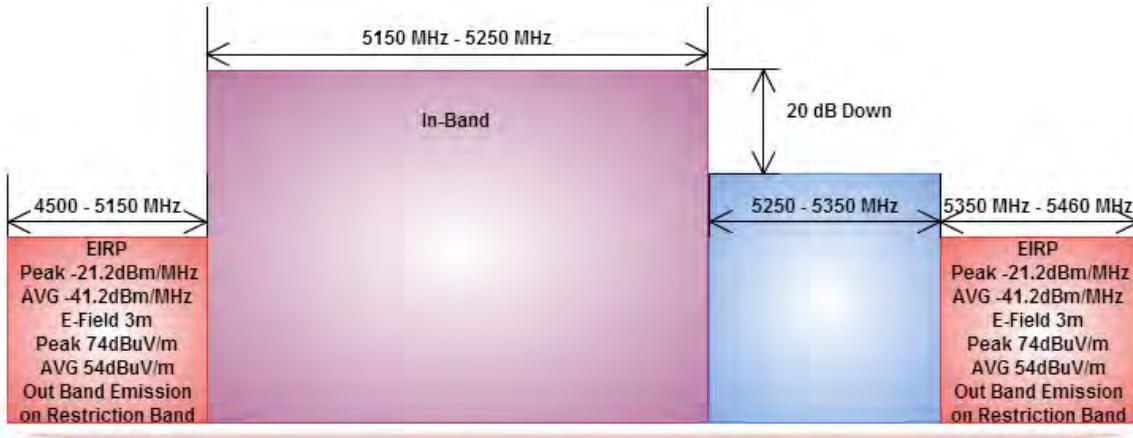


Note 1: Power Density Plots w/o Duty Factor

### 3.5 Transmitter Bandedge Emissions

#### 3.5.1 Transmitter Radiated Bandedge Emissions Limit

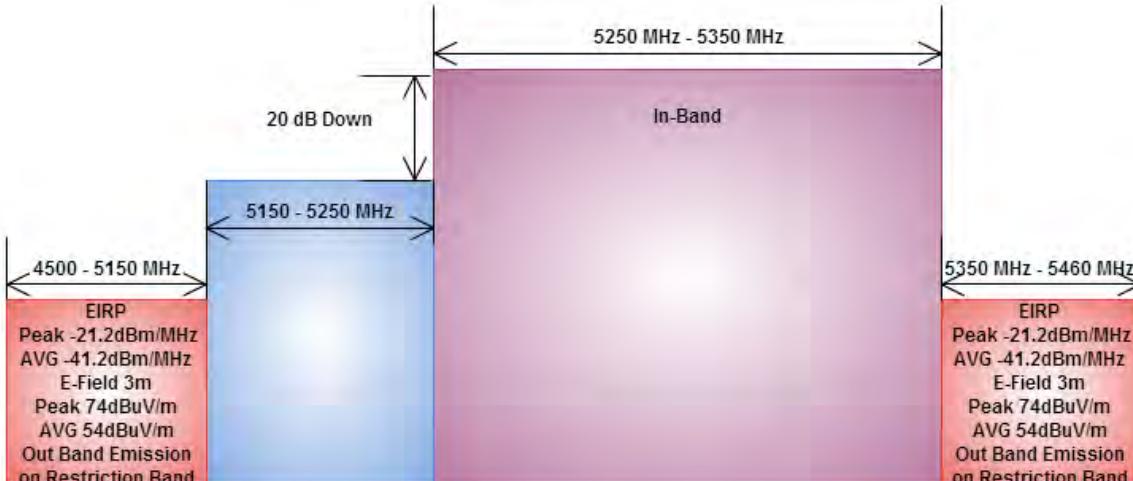
**Transmitter Radiated Bandedge Emissions Limit: 5.15-5.25 GHz band**



**U-NII 1 - Bandedge Emissions Limit**

Refer as FCC KDB 789033 D02 v01, G)2)c)(i) specifying that if a non-restricted-band out-of-band emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm or -17 dBm peak emission limit. Reason for change: to ensure that emission requirements in the non-restricted bands are not more stringent than those in the restricted bands.

**Transmitter Radiated Bandedge Emissions Limit: 5.25-5.35 GHz band**

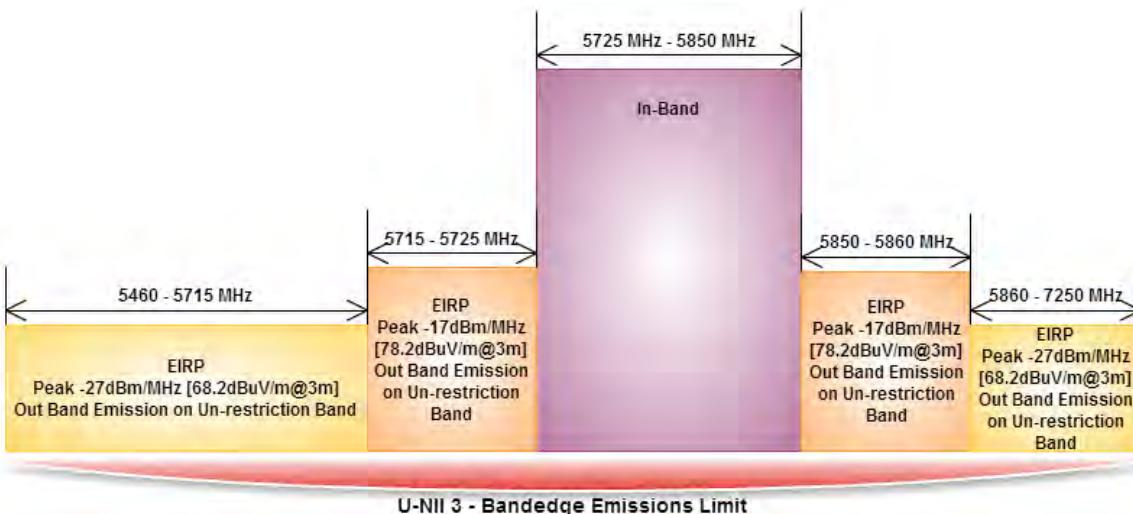


**U-NII 2A - Bandedge Emissions Limit**

Refer as FCC KDB 789033 D02 v01, G)2)c)(i) specifying that if a non-restricted-band out-of-band emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm or -17 dBm peak emission limit. Reason for change: to ensure that emission requirements in the non-restricted bands are not more stringent than those in the restricted bands.

**Transmitter Radiated Bandedge Emissions Limit: 5.47-5.725 GHz band**


Refer as FCC KDB 789033 D02 v01, G)2)c)(i) specifying that if a non-restricted-band out-of-band emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm or -17 dBm peak emission limit. Reason for change: to ensure that emission requirements in the non-restricted bands are not more stringent than those in the restricted bands.

**Transmitter Radiated Bandedge Emissions Limit for 5.8GHz band: 5.725-5.85 GHz band**


Refer as FCC KDB 789033 D02 v01, G)2)c)(i) specifying that if a non-restricted-band out-of-band emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm or -17 dBm peak emission limit. Reason for change: to ensure that emission requirements in the non-restricted bands are not more stringent than those in the restricted bands.

### 3.5.2 Measuring Instruments

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

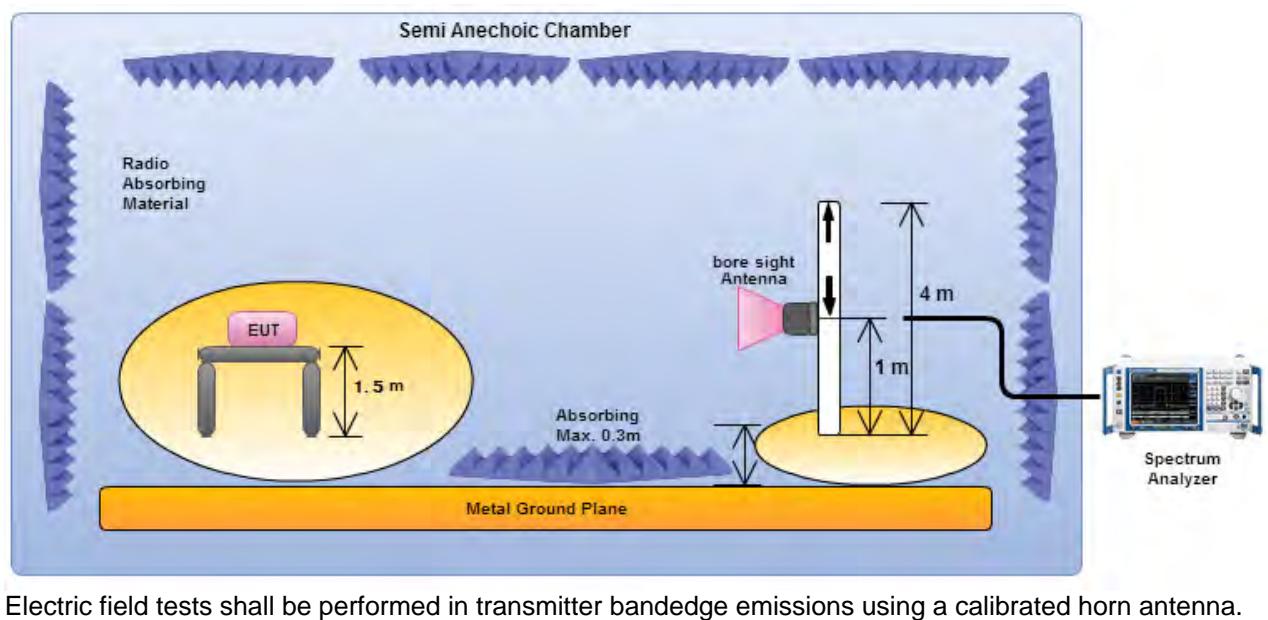


### 3.5.3 Test Procedures

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 checked="" 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.)
<input checked="" type="checkbox"/> Operating in 5.15-5.25 GHz band (lower-band) and 5.25-5.35 GHz band (higher-band).
<input checked="" type="checkbox"/> Operating in 5.47-5.725 GHz band (lower-band) and 5.725-5.85 GHz band (higher-band).
<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)
<input type="checkbox"/> Operating in 5.25-5.35 GHz band (lower-band) and 5.47-5.725 GHz band (higher-band).
<input type="checkbox"/> Operating in 5.15-5.25 GHz band (lower-band) and 5.725-5.85 GHz band (higher-band).
<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 v01, clause H)2) for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause H)1) for unwanted emissions into restricted bands.
<input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, H)6) Method AD (Trace Averaging).
<input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, H)6) Method VB (Reduced VBW).
<input checked="" 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 v01, clause H)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 the transmitter bandedge emissions shall be measured using following options below:
<input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause H)3)d) for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.10 for band-edge testing.
<input type="checkbox"/> Refer as ANSI C63.10, clause 6.10.6.2 for marker-delta method for band-edge measurements.
<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	5149.80	72.36	74	5150.00	51.91	54	H
11a	1	5240	3	5372.40	62.51	74	5394.60	49.27	54	H
HT20	1	5180	3	5149.20	71.30	74	5149.80	52.28	54	H
HT20	1	5240	3	5392.20	62.84	74	5393.40	49.05	54	H
HT40	1	5190	3	5148.18	67.64	74	5149.06	52.88	54	H
HT40	1	5230	3	5396.40	62.24	74	5395.80	48.94	54	H
VHT20	1	5180	3	5149.40	69.92	74	5149.90	52.02	54	H
VHT20	1	5240	3	5395.20	63.31	74	5394.60	49.08	54	H
VHT40	1	5190	3	5148.40	66.86	74	5149.94	52.62	54	H
VHT40	1	5230	3	5388.60	62.57	74	5393.40	49.04	54	H
VHT80	1	5210	3	5146.80	66.42	74	5147.40	52.46	54	H

Note 1: Measurement worst emissions of receive antenna polarization.

U-NII 5250-5350MHz 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	5260	3	5393.40	62.33	74	5382.60	48.83	54	H
11a	1	5320	3	5351.16	68.65	74	5351.02	51.36	54	H
HT20	1	5260	3	5388.00	62.70	74	5396.40	49.18	54	H
HT20	1	5320	3	5350.46	68.75	74	5350.18	52.08	54	H
HT40	1	5270	3	5353.80	62.33	74	5352.00	49.13	54	H
HT40	1	5310	3	5351.02	66.89	74	5351.02	51.88	54	H
VHT20	1	5260	3	5382.00	62.15	74	5394.60	49.28	54	H
VHT20	1	5320	3	5350.60	66.44	74	5350.00	52.02	54	H
VHT40	1	5270	3	5352.60	63.87	74	5350.80	49.20	54	H
VHT40	1	5310	3	5350.84	67.29	74	5350.00	51.89	54	H
VHT80	1	5290	3	5355.00	65.83	74	5350.20	52.63	54	H

Note 1: Measurement worst emissions of receive antenna polarization.



U-NII 5470-5725MHz 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	Pol.
11a	1	5500	3	5465.84	66.45	68.2	H
11a	1	5700	3	5725.16	66.62	68.2	H
HT20	1	5500	3	5467.20	66.73	68.2	H
HT20	1	5700	3	5725.40	66.77	68.2	H
HT40	1	5510	3	5468.20	65.70	68.2	H
HT40	1	5670	3	5725.20	66.83	68.2	H
VHT20	1	5500	3	5469.52	65.43	68.2	H
VHT20	1	5700	3	5725.52	66.96	68.2	H
VHT40	1	5510	3	5467.20	65.70	68.2	H
VHT40	1	5670	3	5726.20	66.79	68.2	H
VHT80	1	5530	3	5466.48	66.69	68.2	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	Pol.
11a	1	5745	3	5723.92	77.16	78.2	H
11a	1	5825	3	5860.99	66.32	68.2	H
HT20	1	5745	3	5724.55	76.61	78.2	H
HT20	1	5825	3	5861.20	66.76	68.2	H
HT40	1	5755	3	5714.22	67.01	68.2	H
HT40	1	5795	3	5860.60	66.45	68.2	H
VHT20	1	5745	3	5723.71	77.19	78.2	H
VHT20	1	5825	3	5861.83	66.08	68.2	H
VHT40	1	5755	3	5712.40	67.03	68.2	H
VHT40	1	5795	3	5861.20	66.34	68.2	H
VHT80	1	5775	3	5714.80	66.30	68.2	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	5.715 5.725 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] 5.85 5.86 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] Other un-restricted band: e.i.r.p. -27 dBm [68.2 dBuV/m@3m]

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

### 3.6.2 Measuring Instruments

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

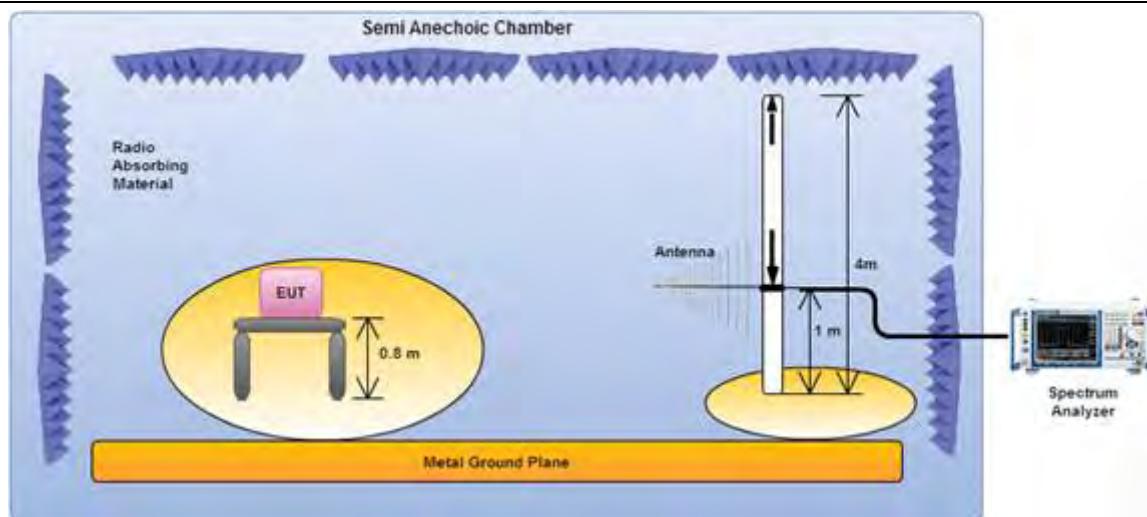


### 3.6.3 Test Procedures

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 v01, clause G2) for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause G1) for unwanted emissions into restricted bands.
<input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, G6) Method AD (Trace Averaging).
<input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, G6) Method VB (Reduced VBW).
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq$ 1/T, where T is pulse time.
<input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause G5) 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.

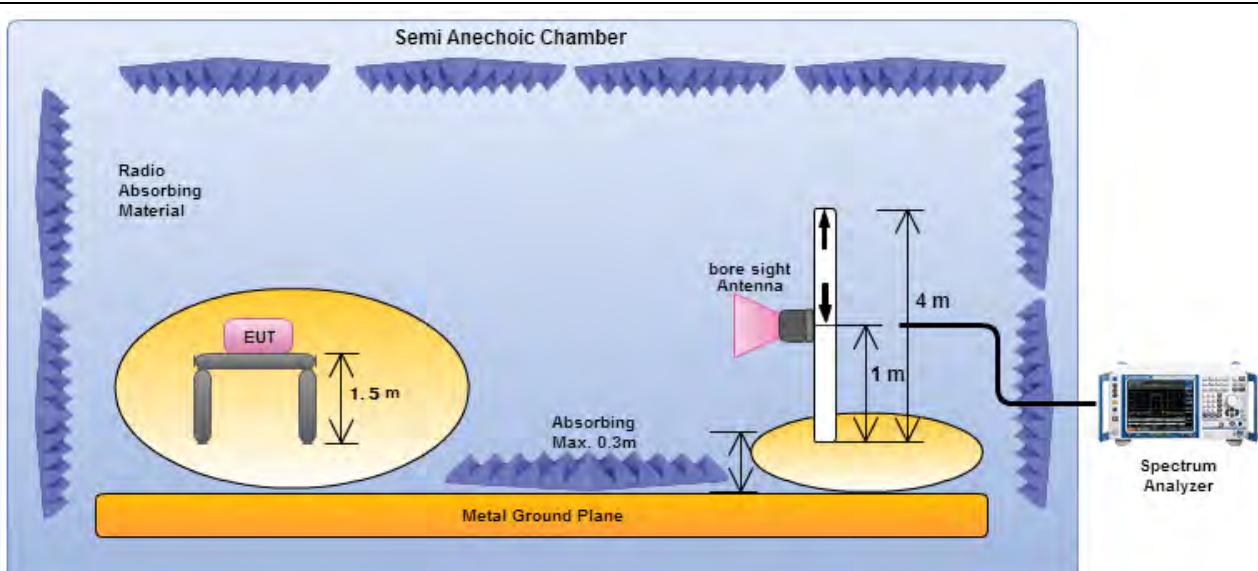
### 3.6.4 Test Setup

#### Transmitter Radiated Unwanted Emissions Below 1GHz



Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna. Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna.

#### Transmitter Radiated Unwanted Emissions Above 1GHz



Electric field tests shall be performed in the frequency range of 1 GHz to 10th harmonic of highest fundamental frequency or 40 GHz using a calibrated horn antenna.

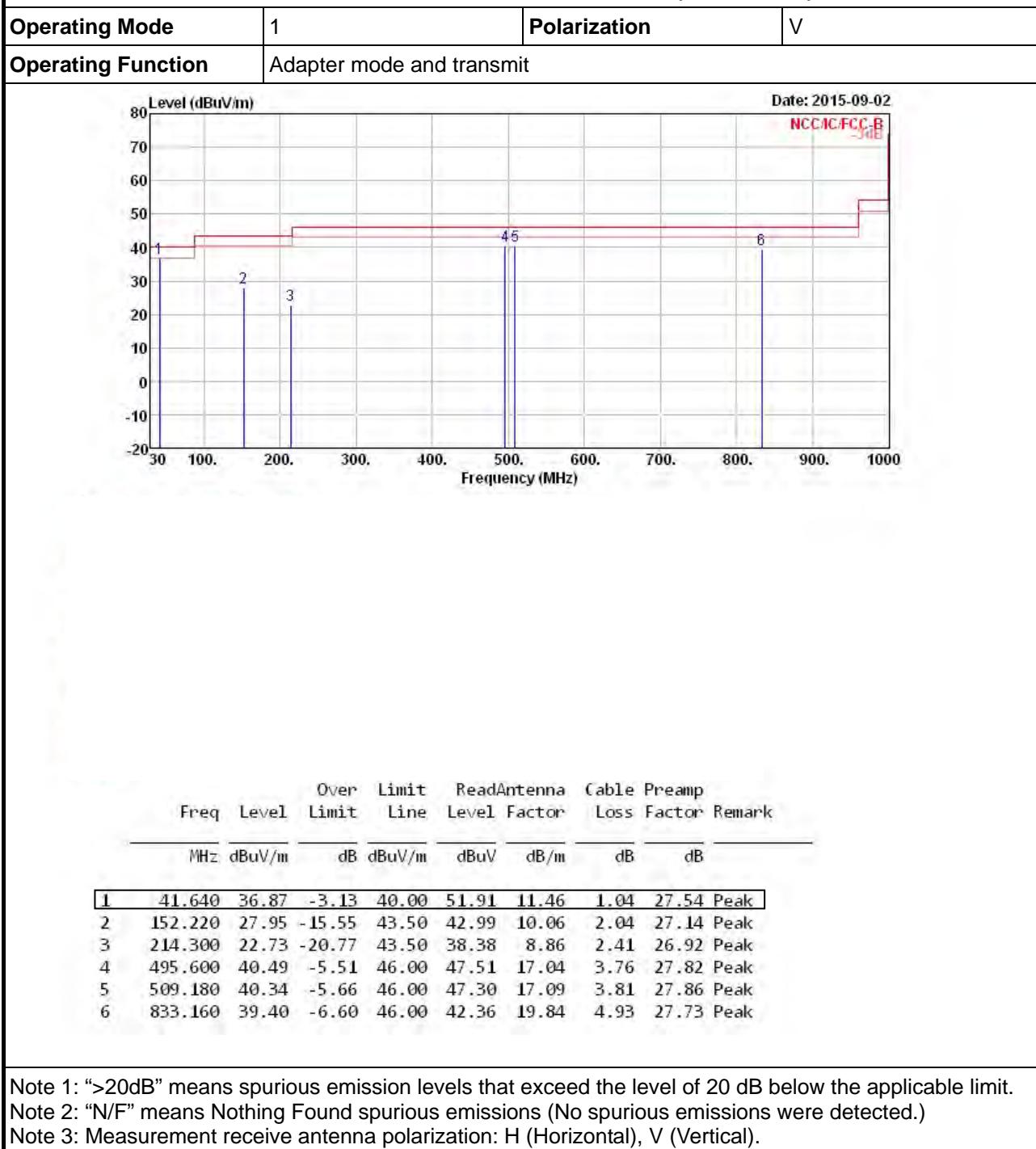
### 3.6.5 Transmitter Radiated Unwanted Emissions-with Antenna (Below 30MHz)

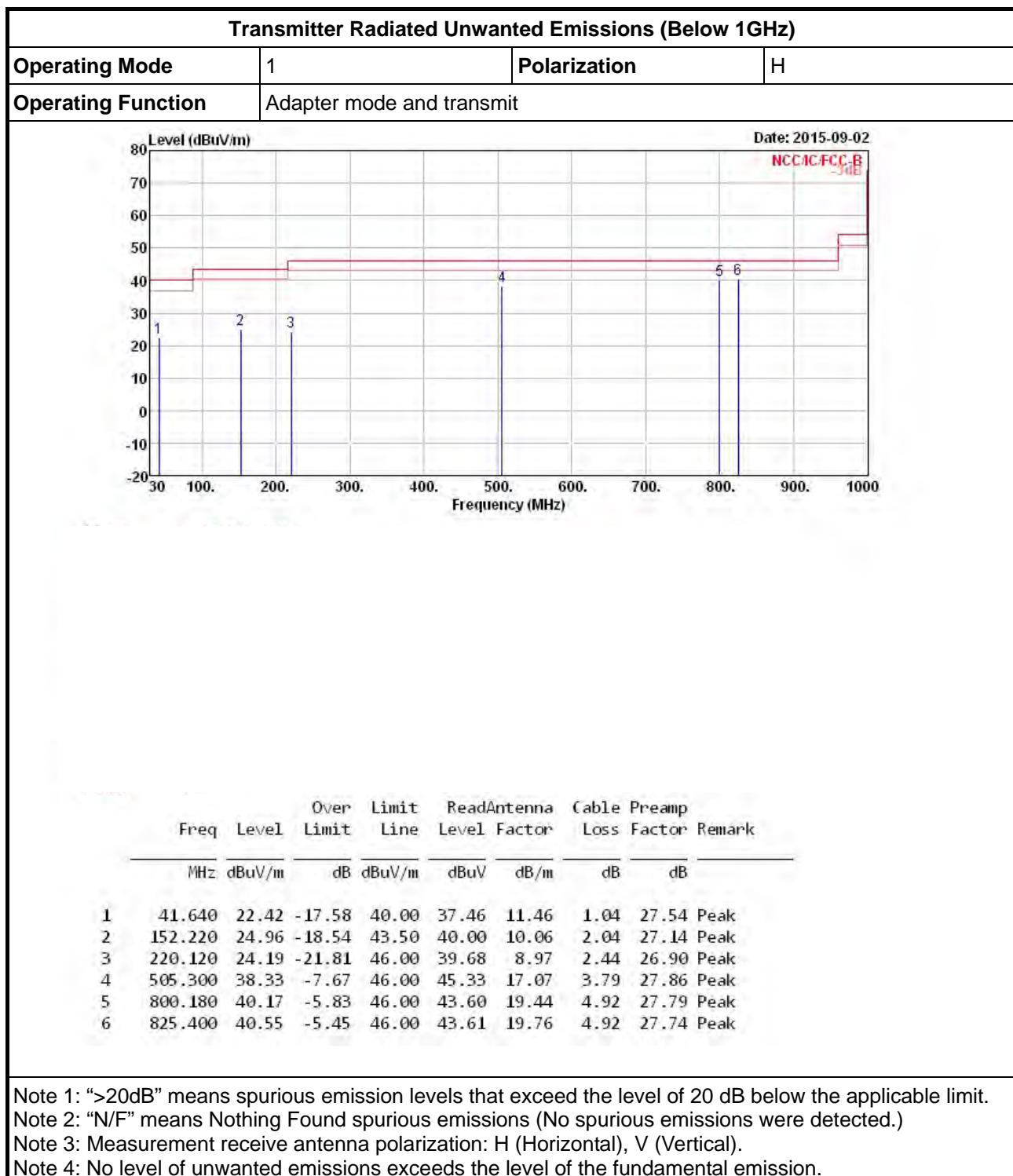
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.



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

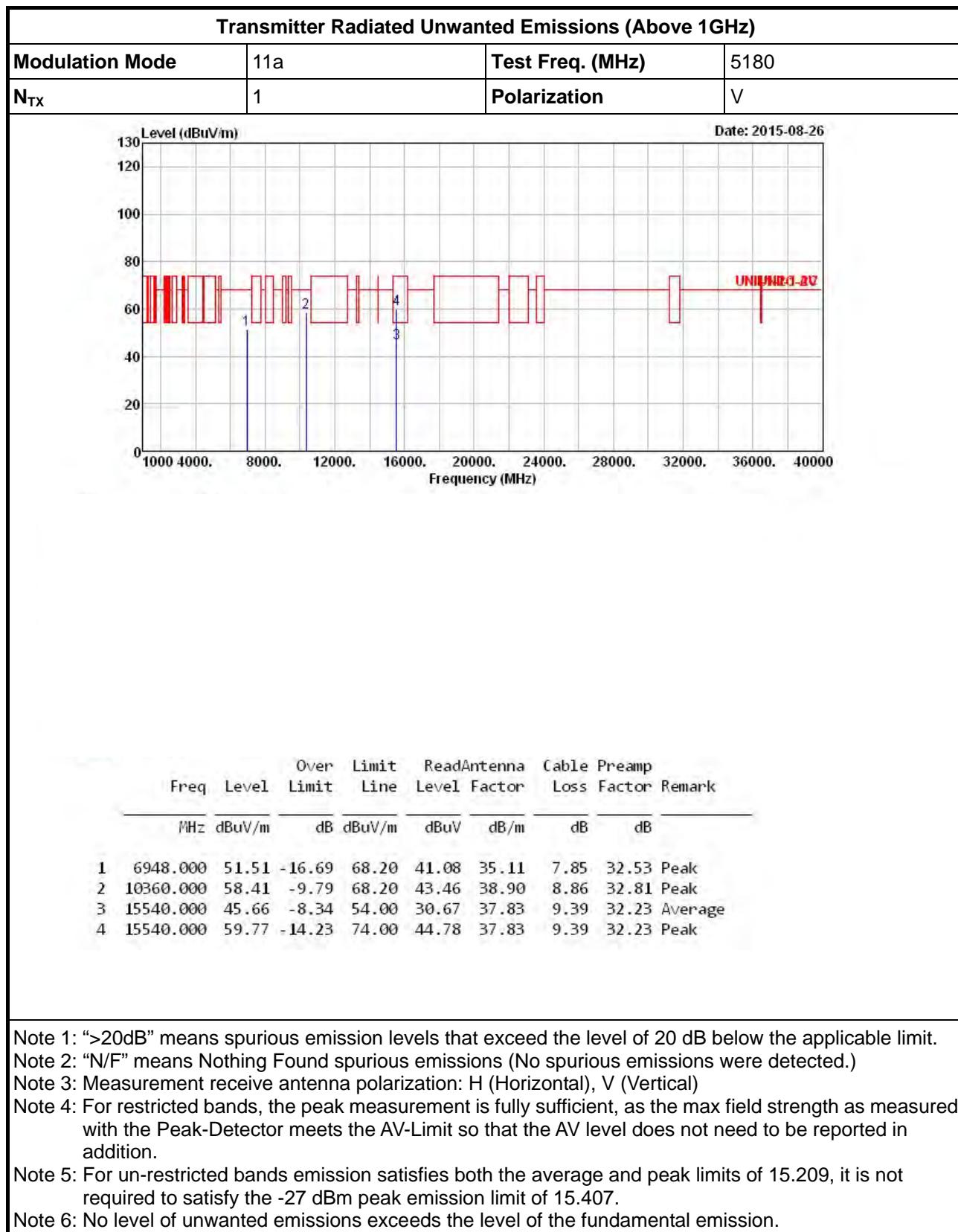
Transmitter Radiated Unwanted Emissions (Below 1GHz)

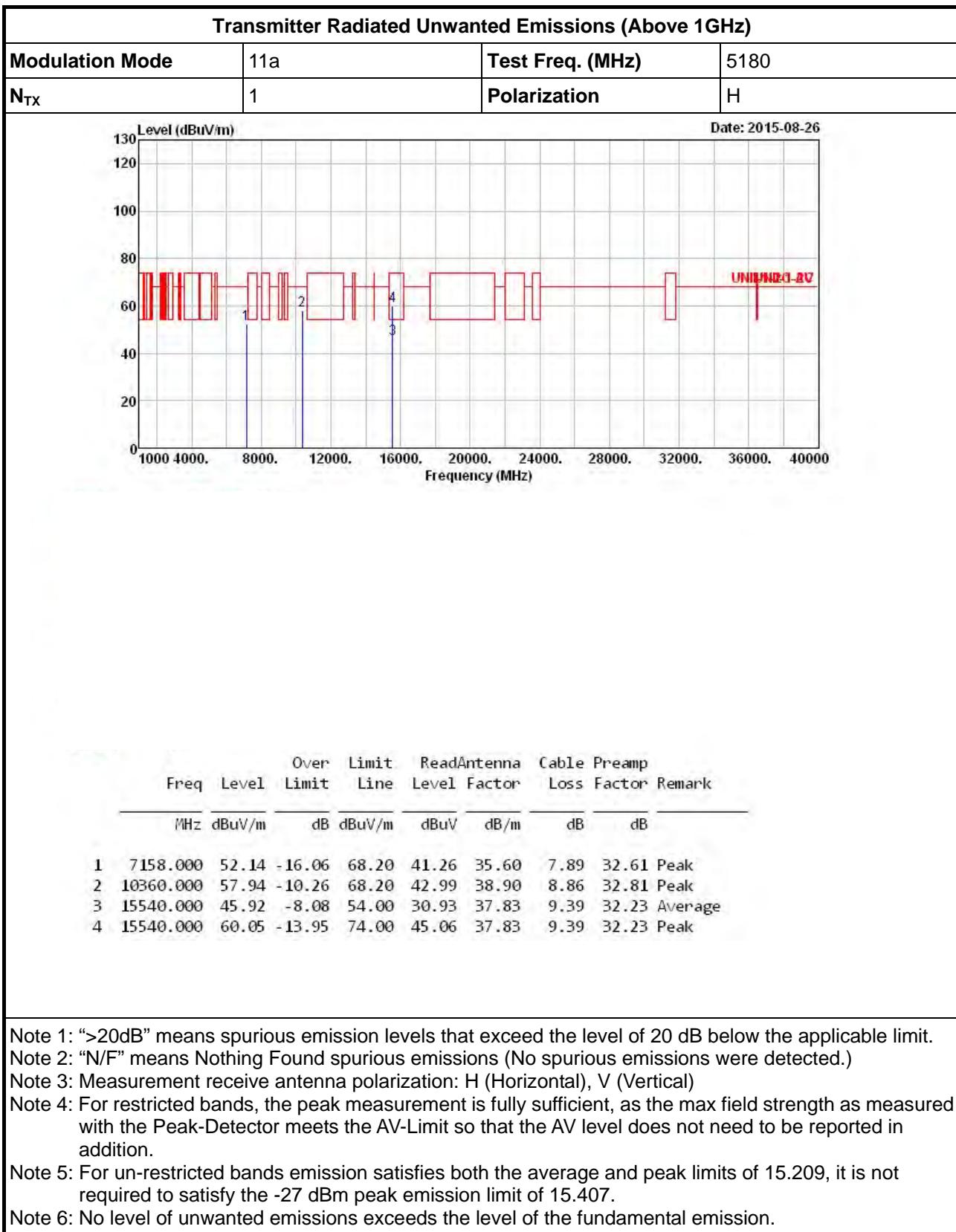


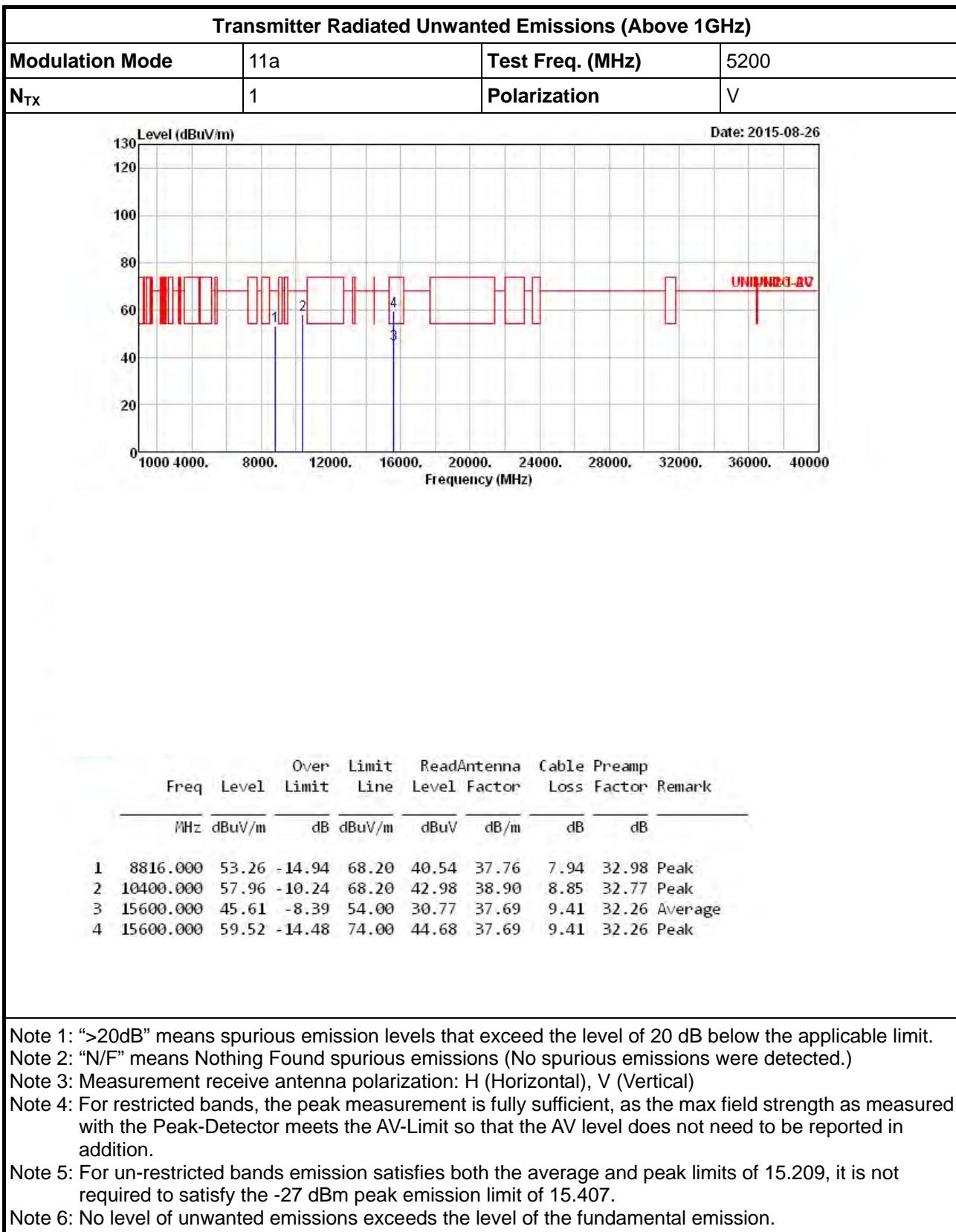


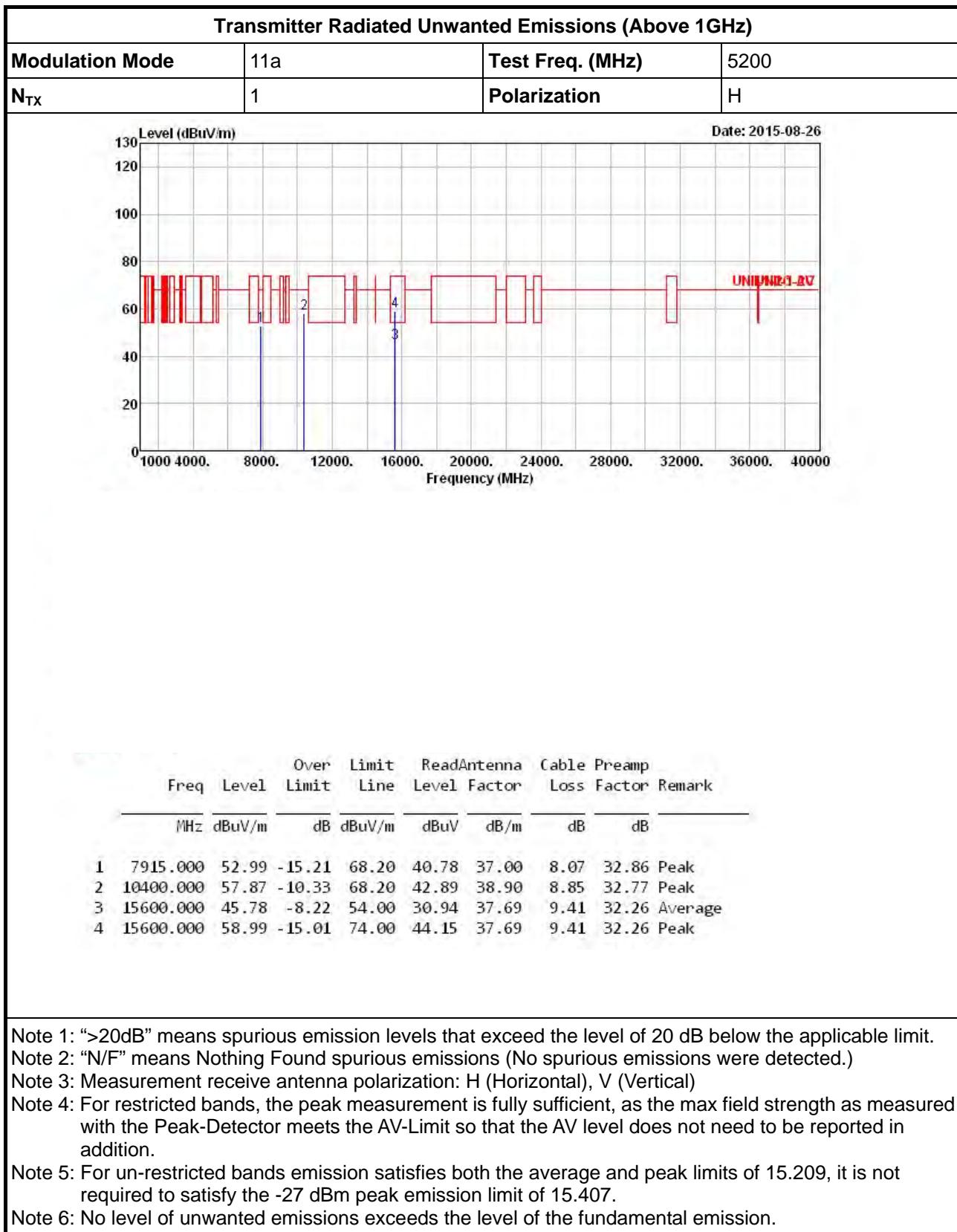


## 3.6.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 5150-5250MHz









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

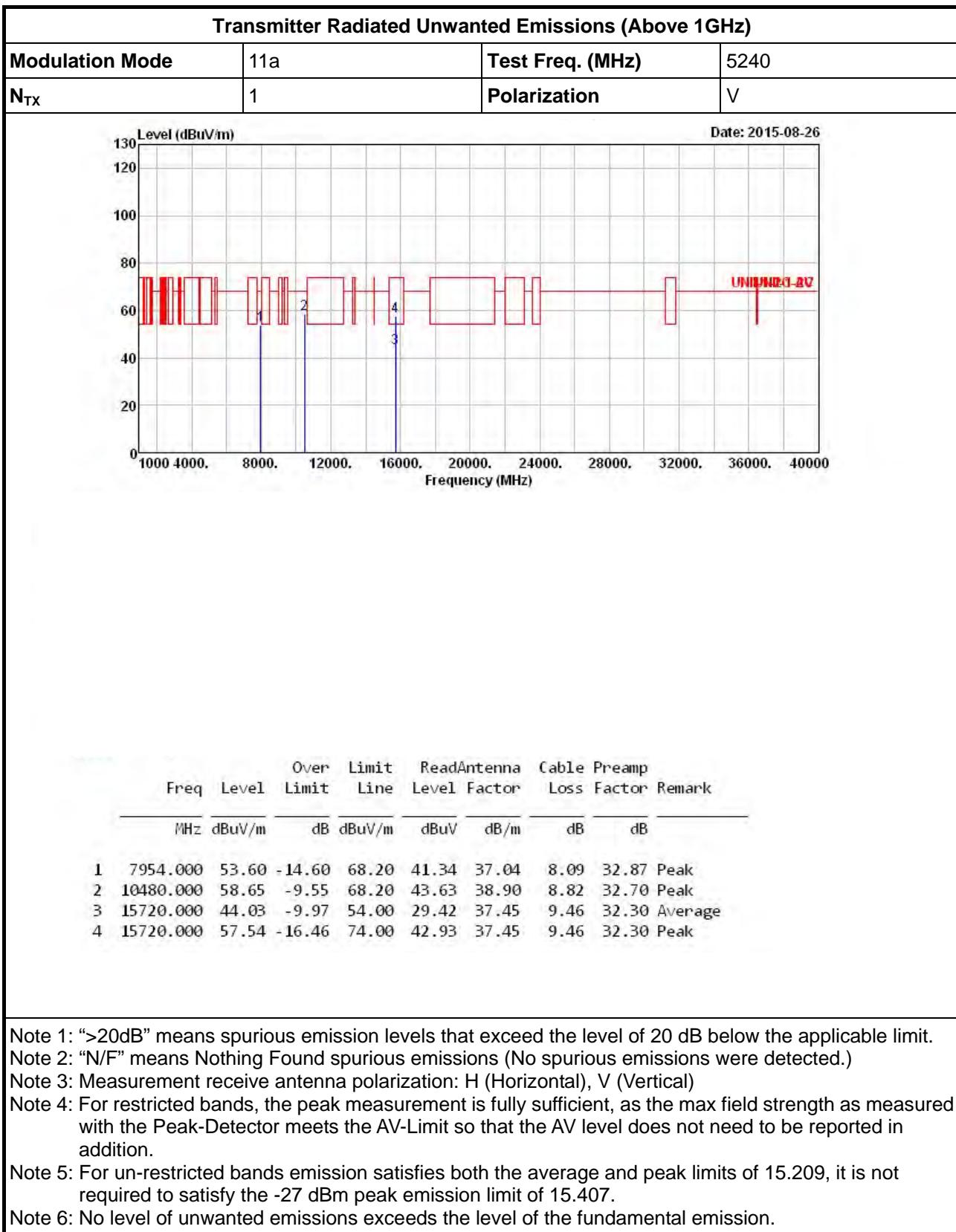
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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.



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

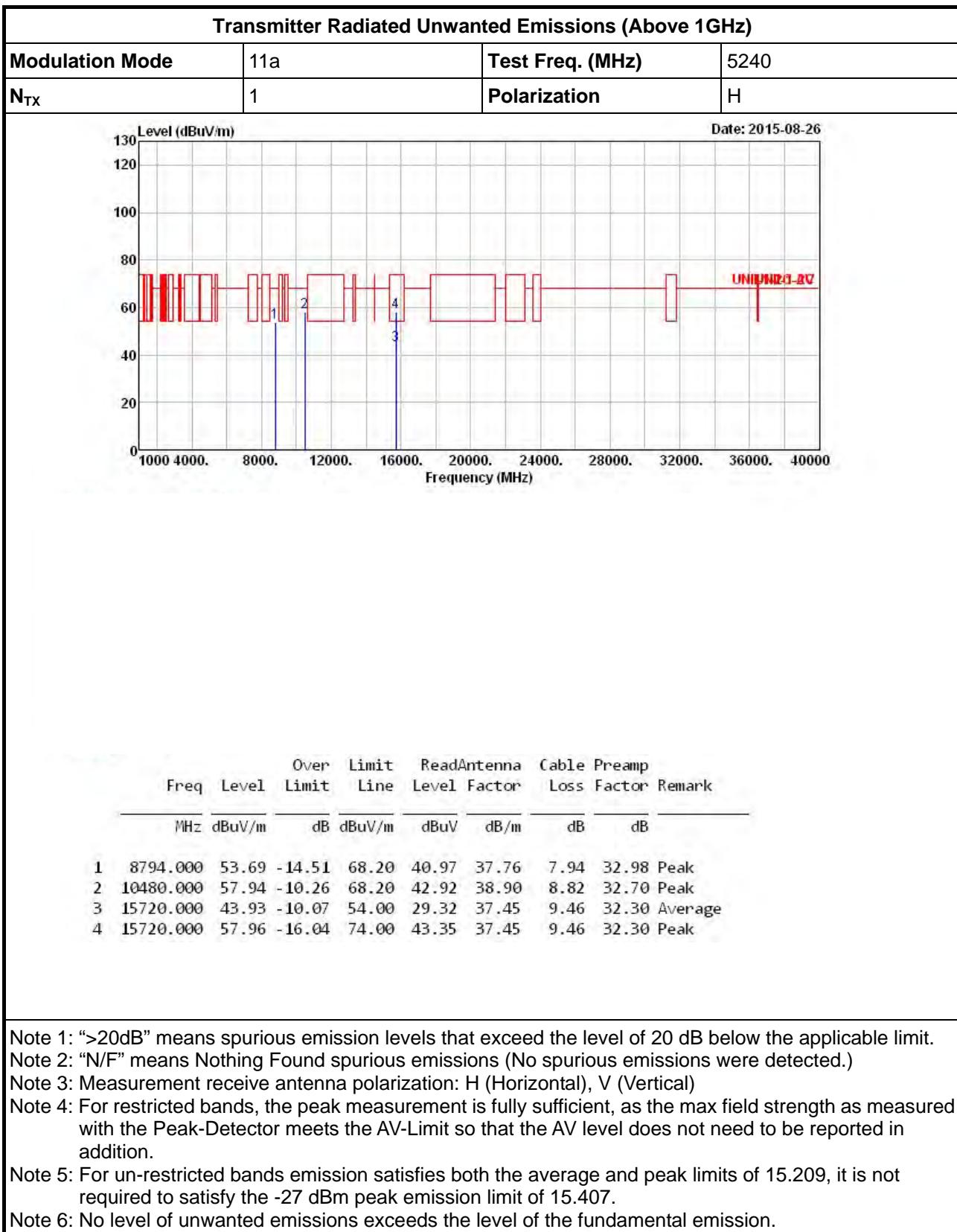
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

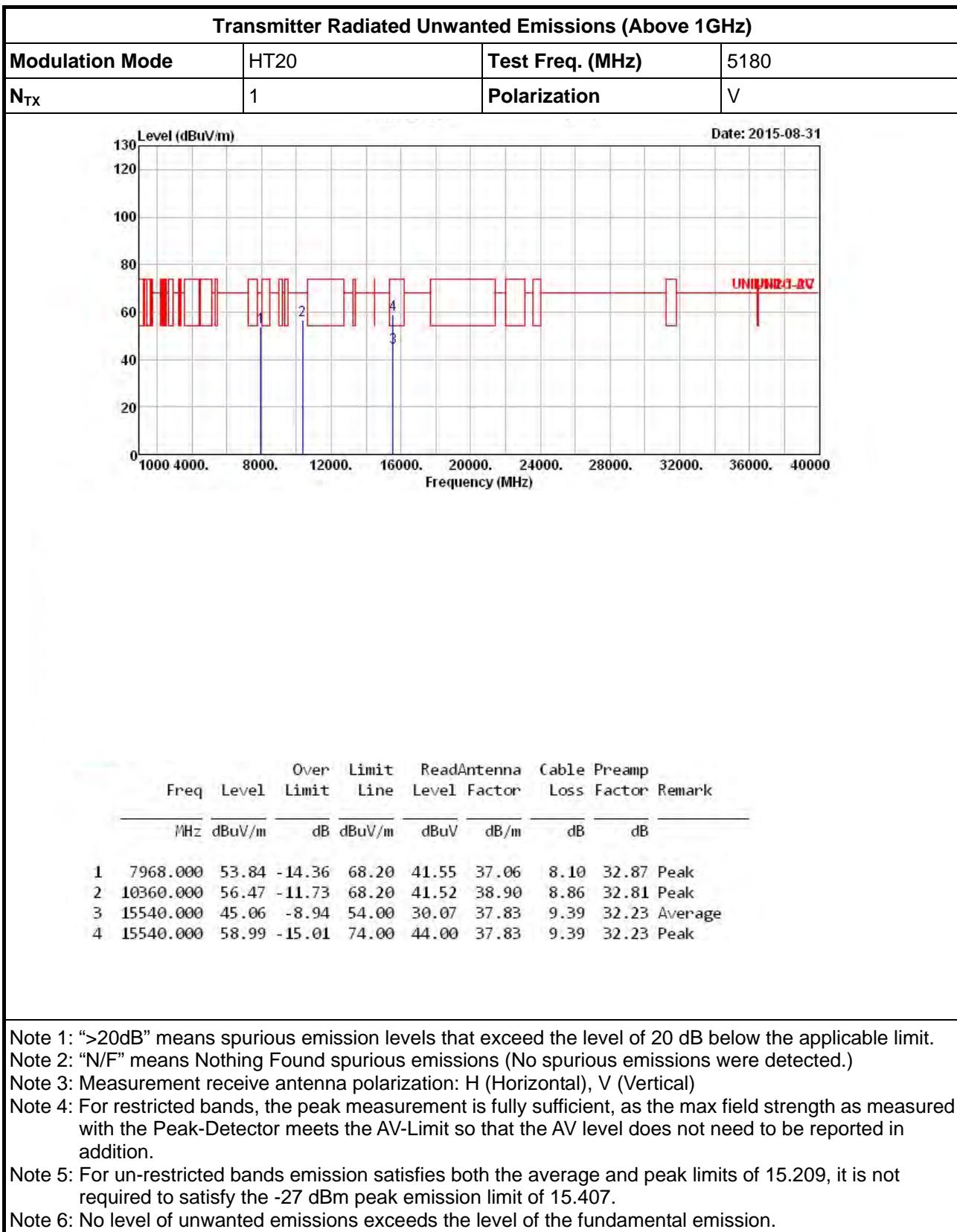
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

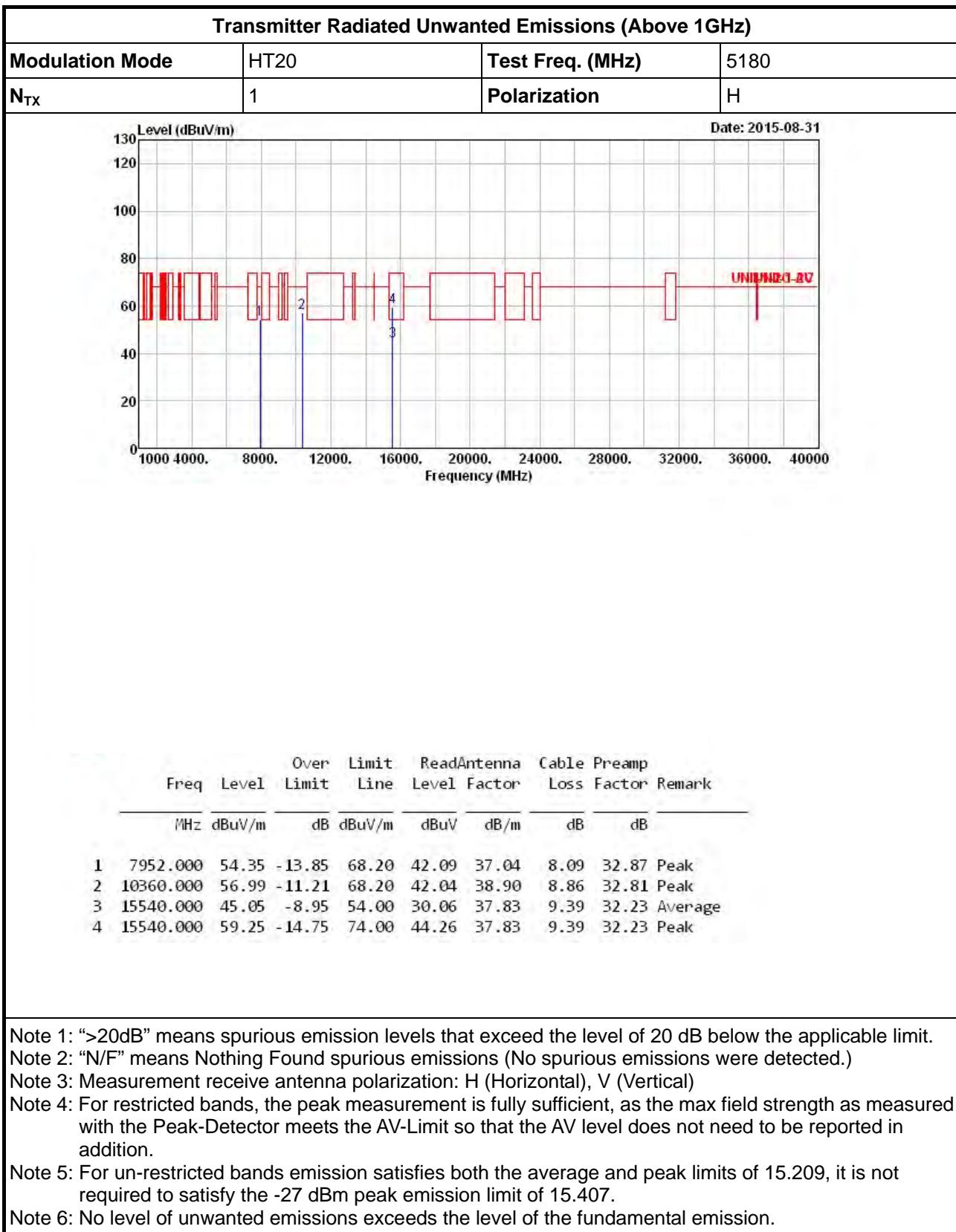
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

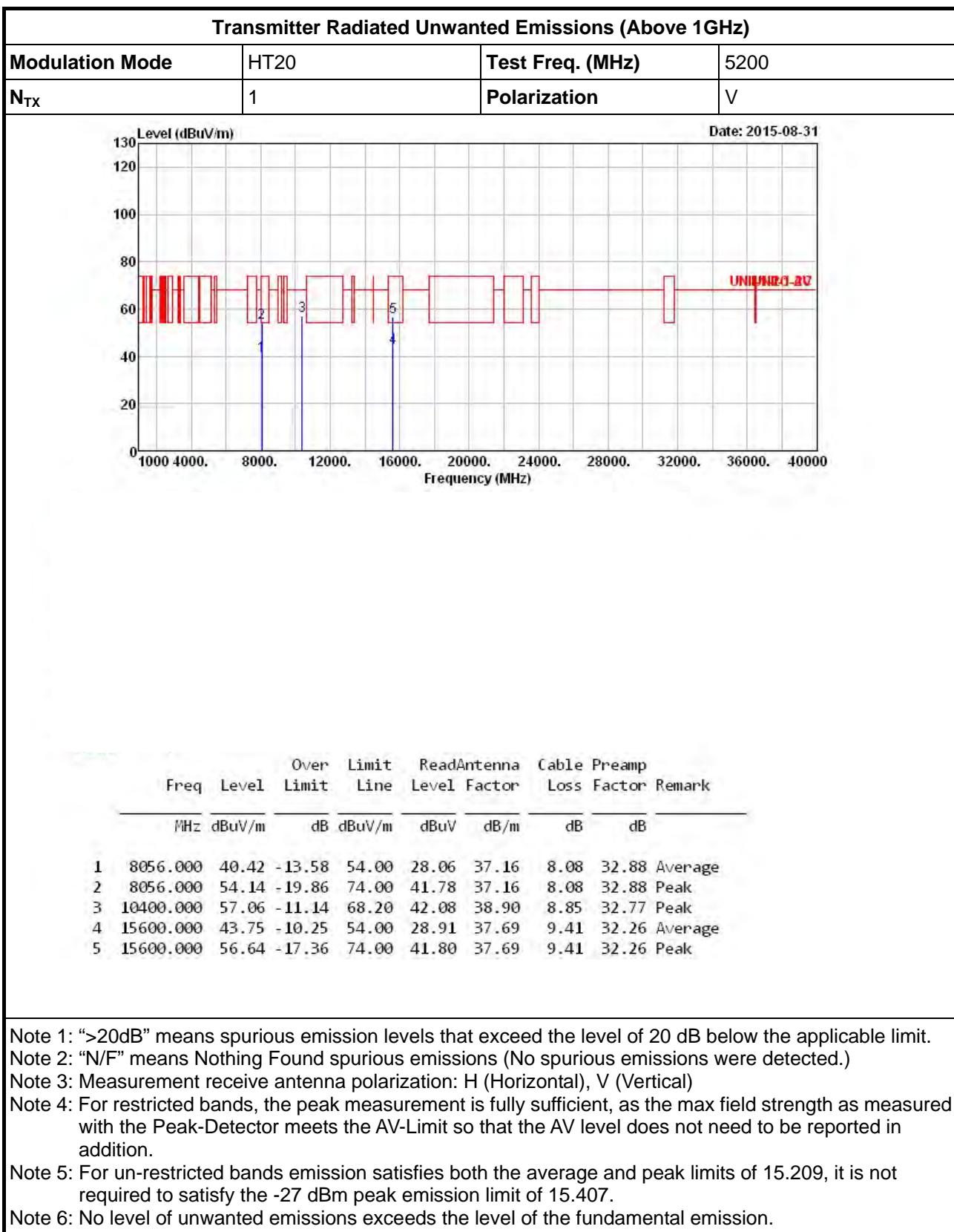
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

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









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

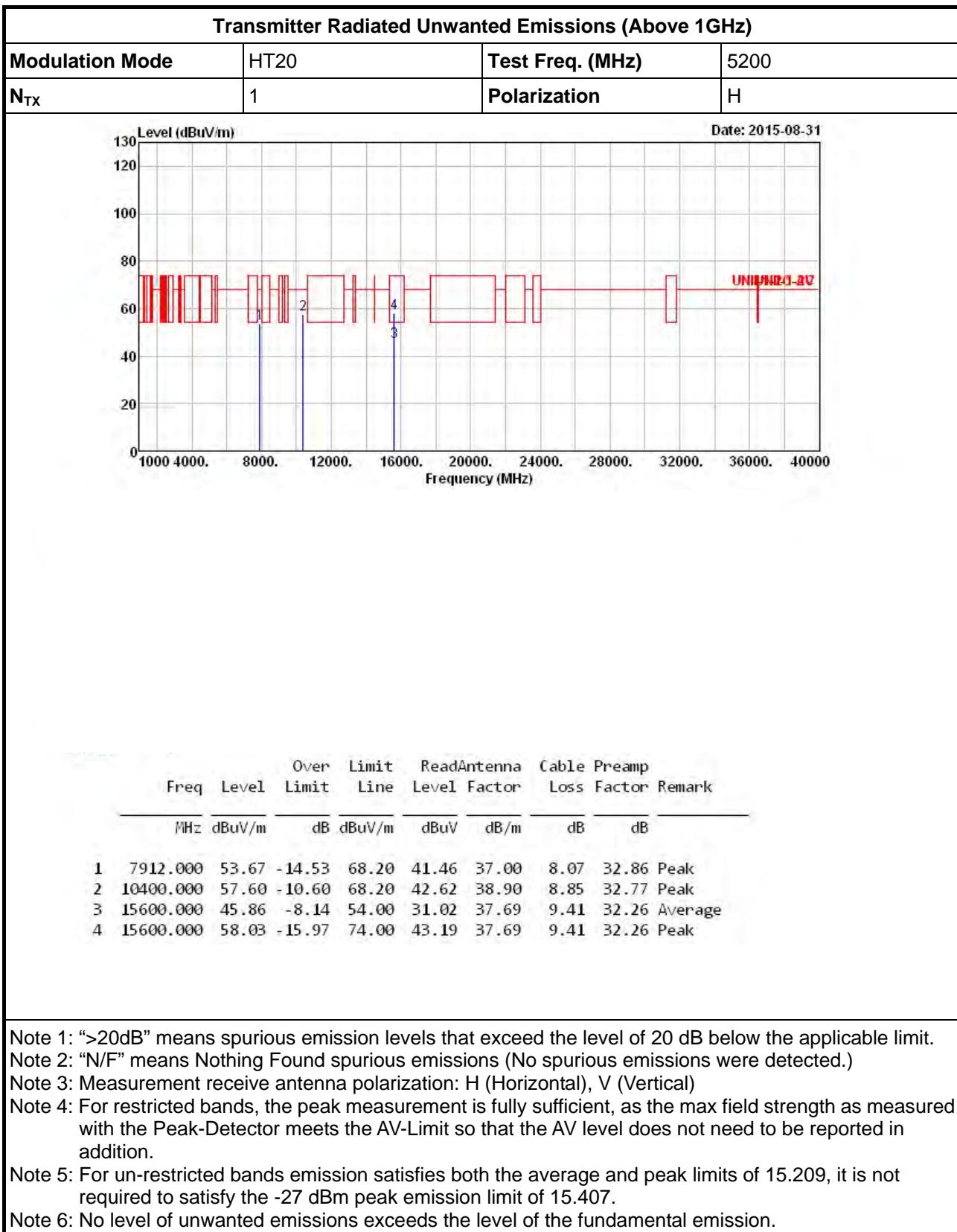
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

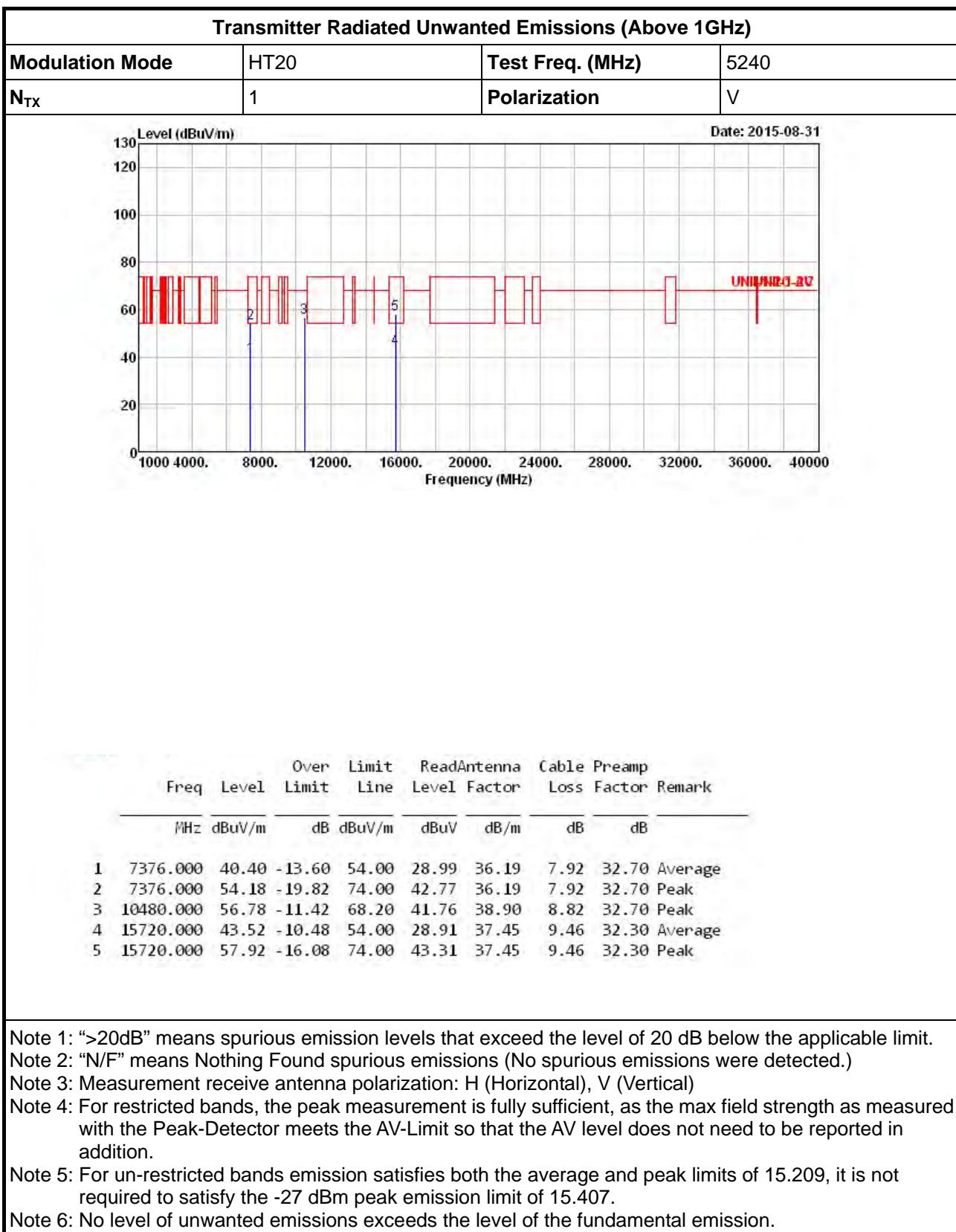
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

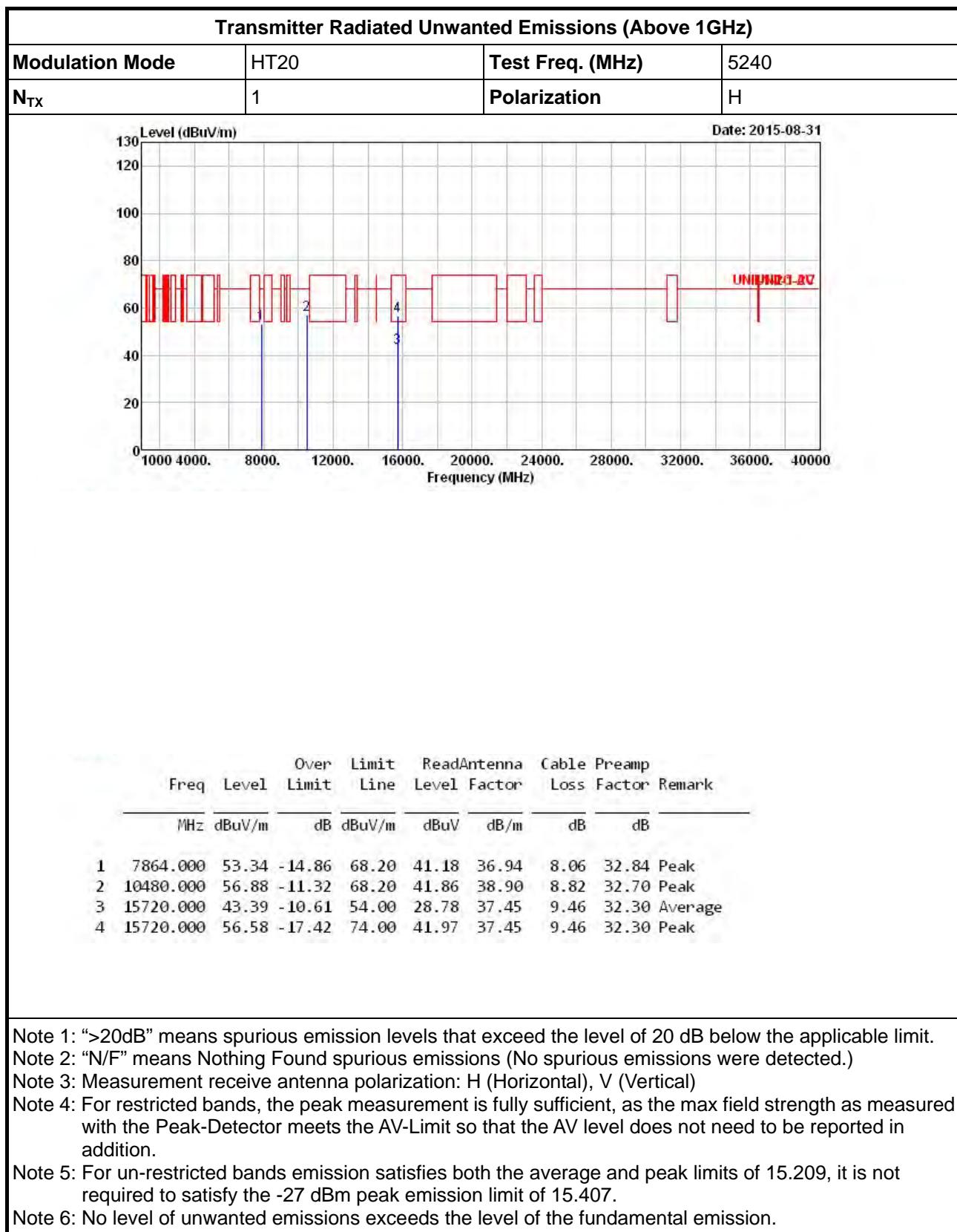
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

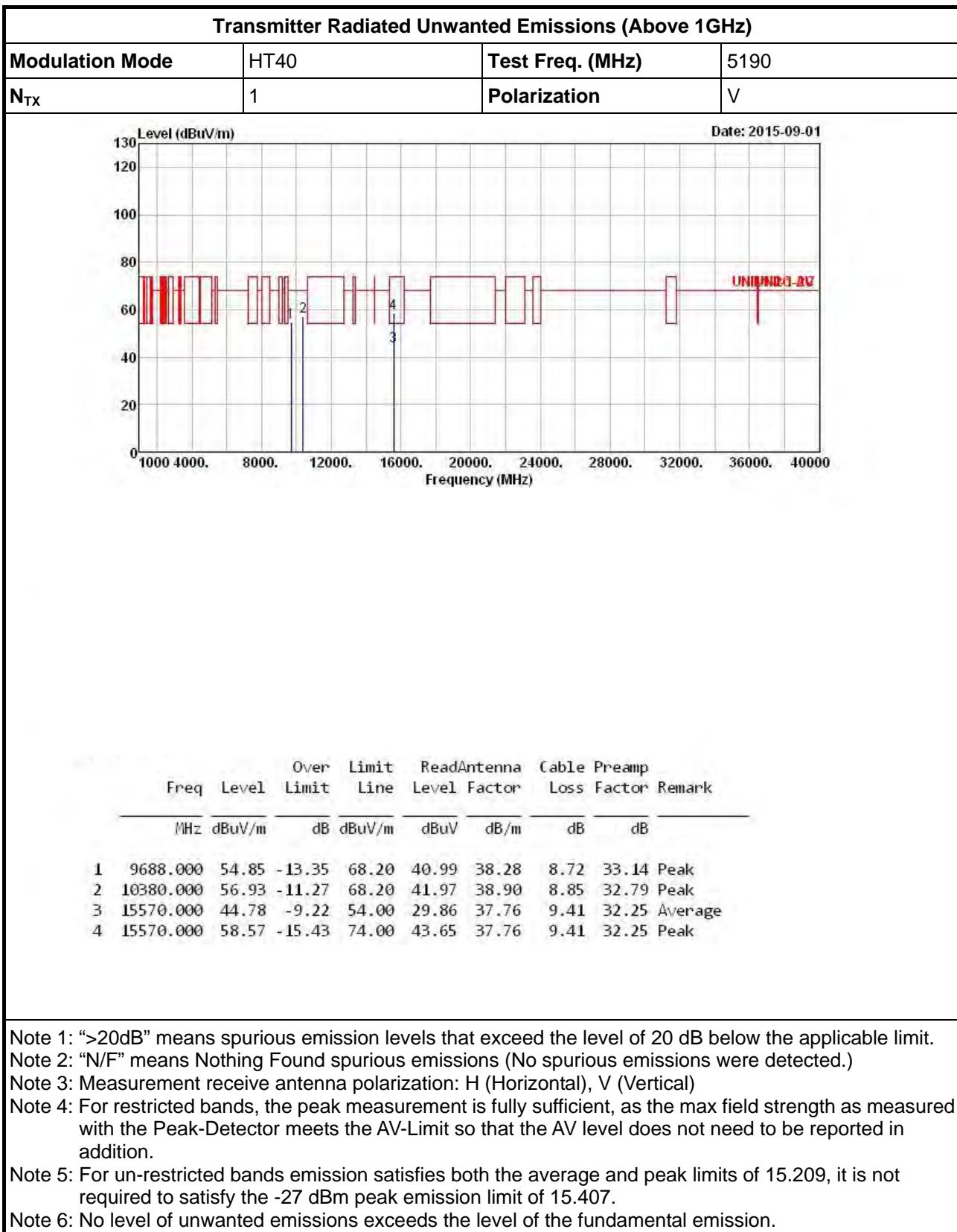
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

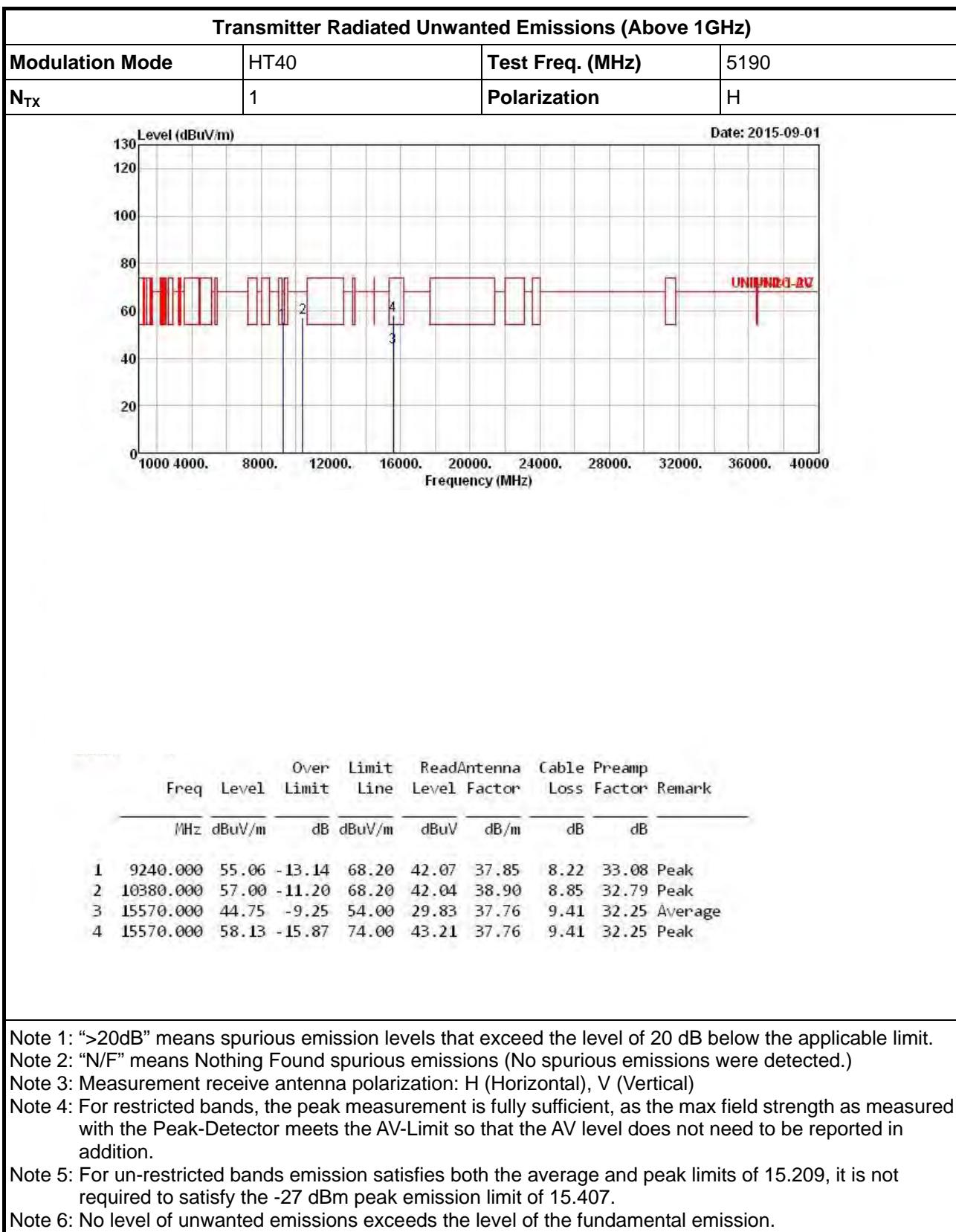
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

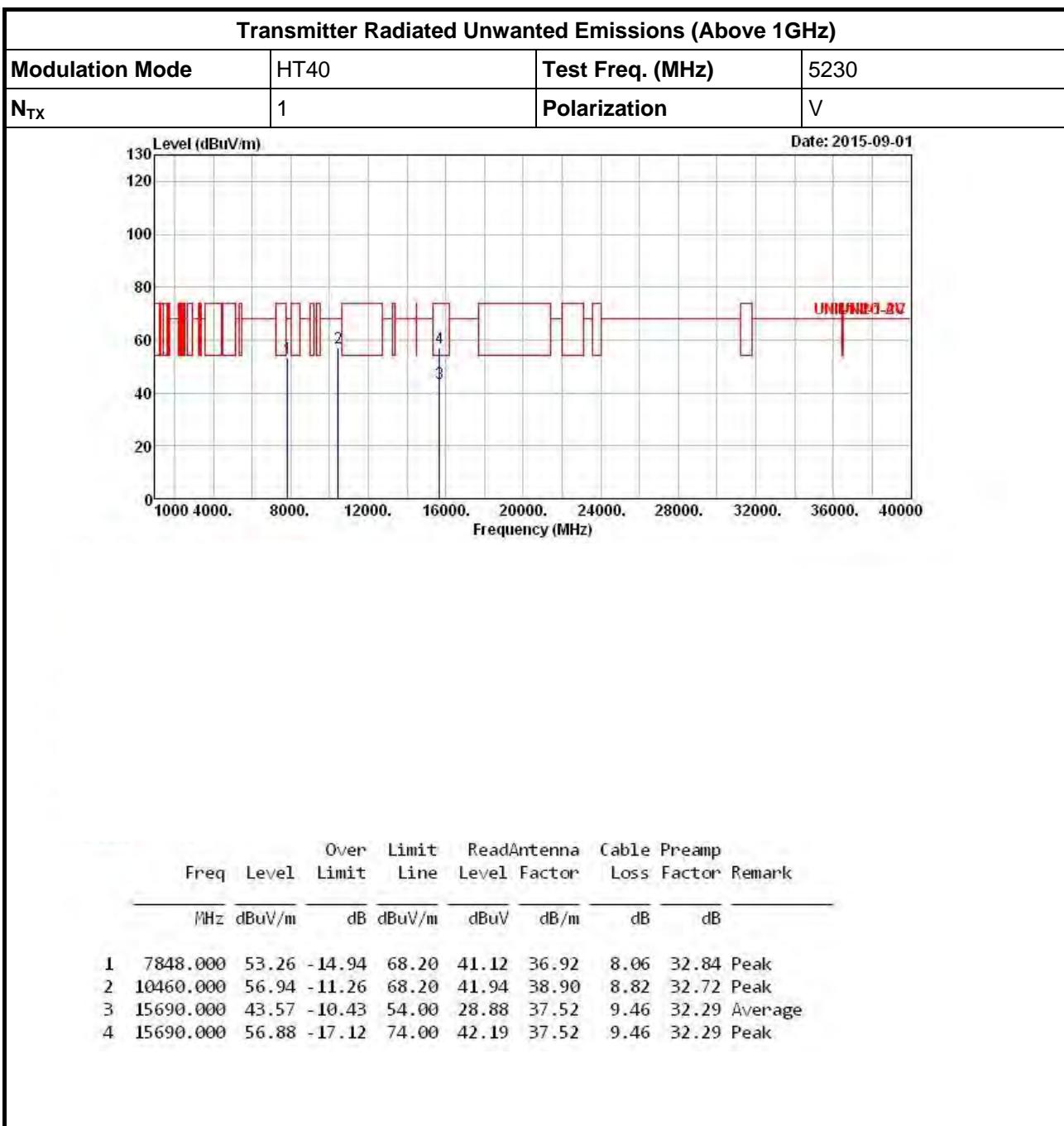












Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

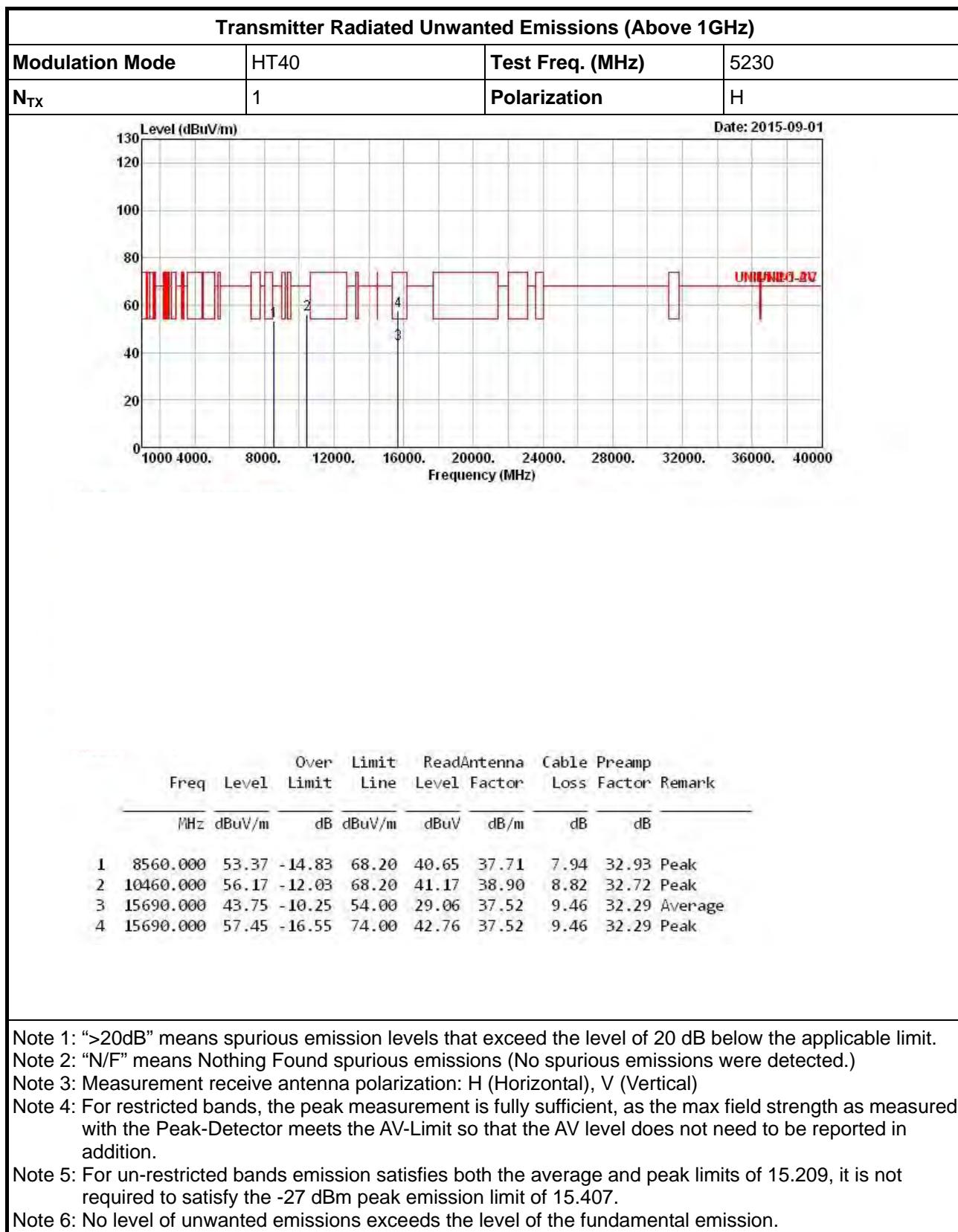
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

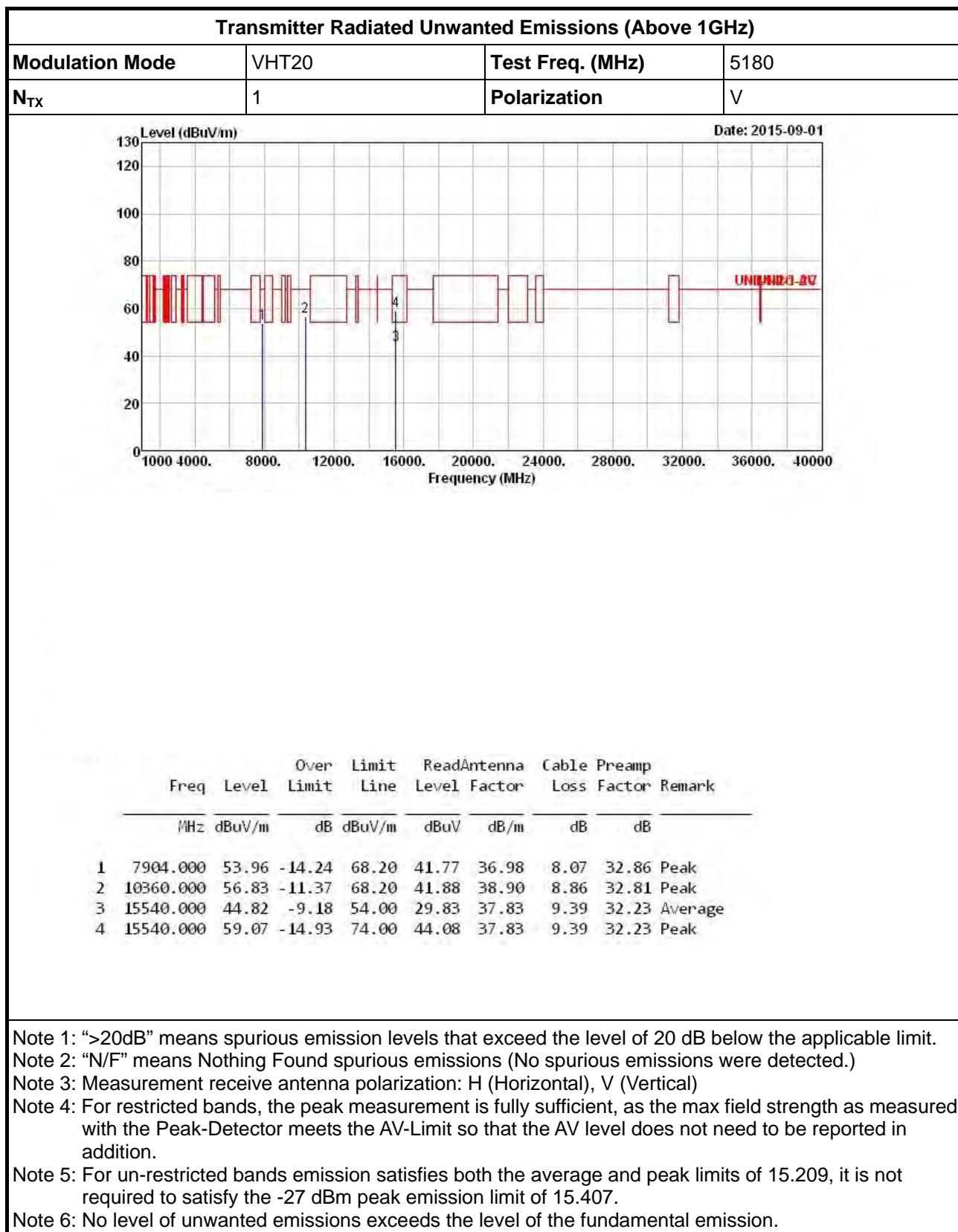
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

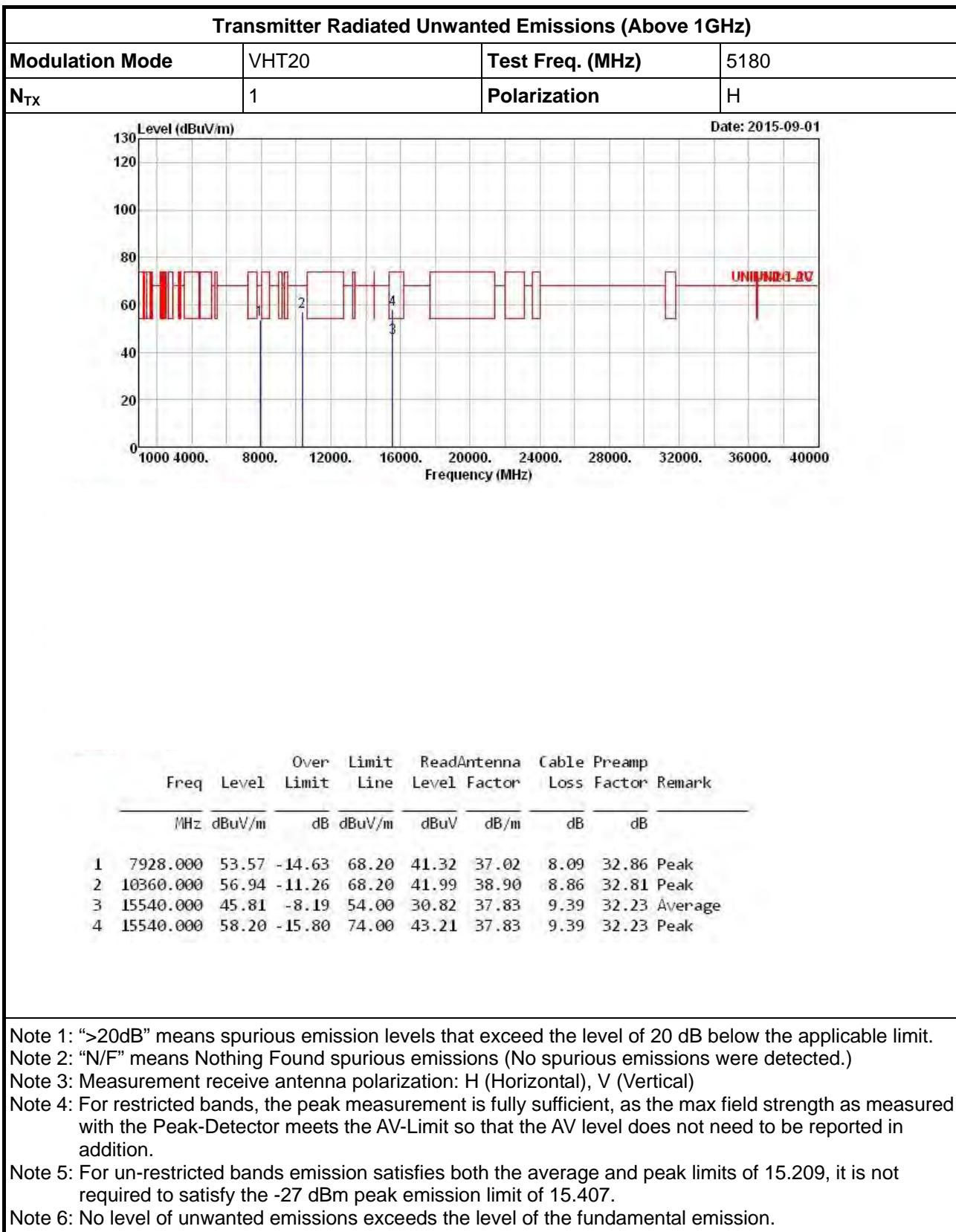
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

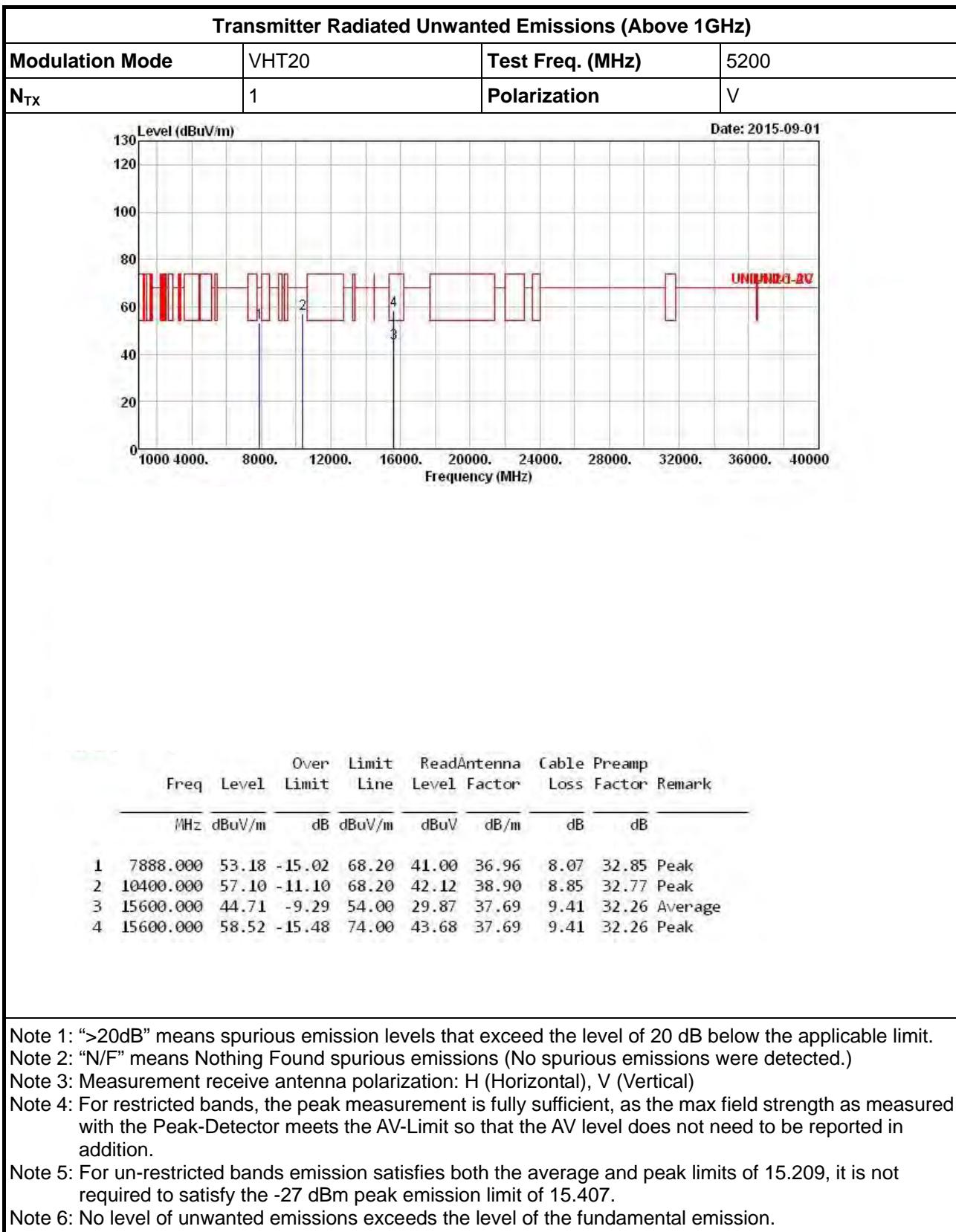
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

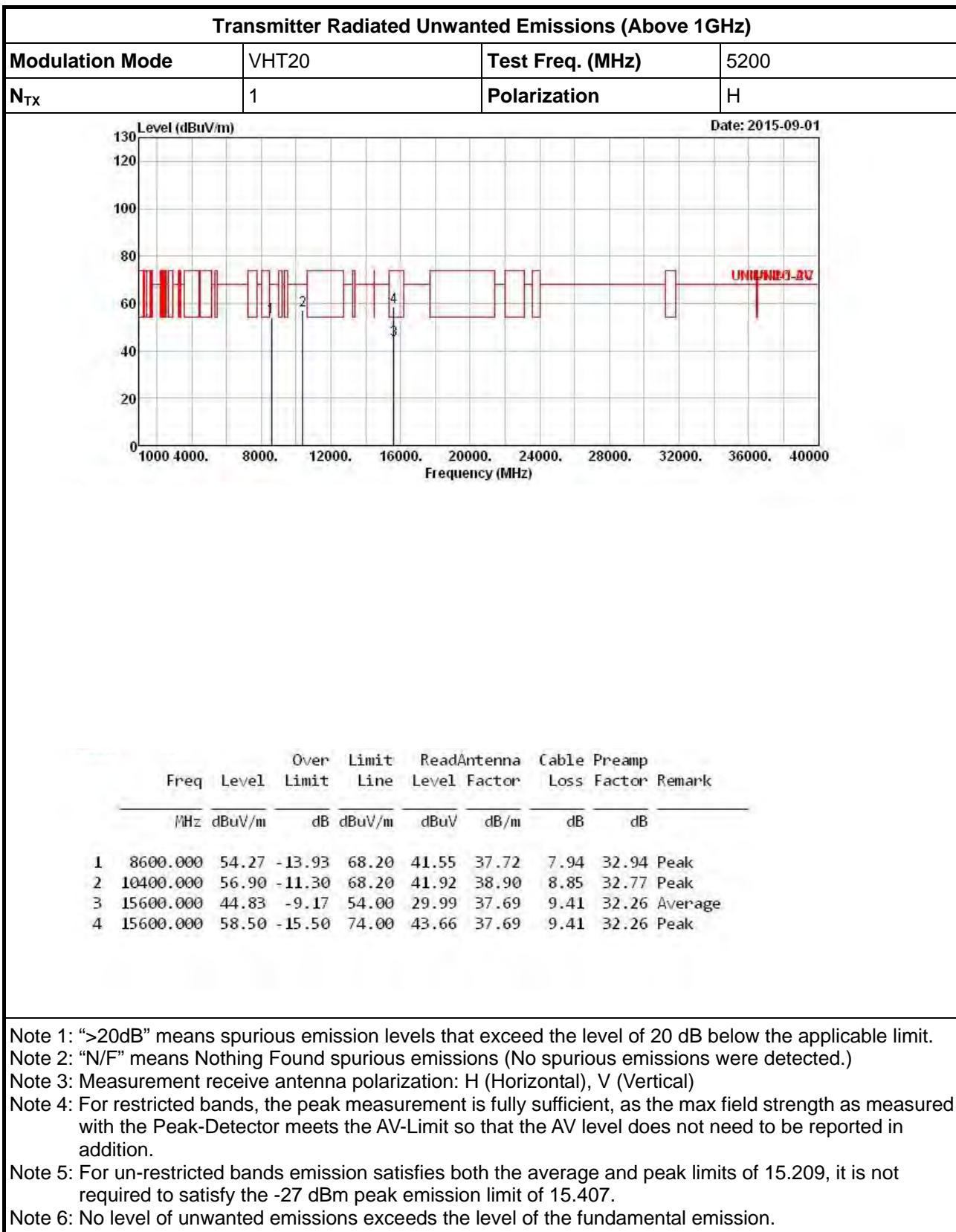
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

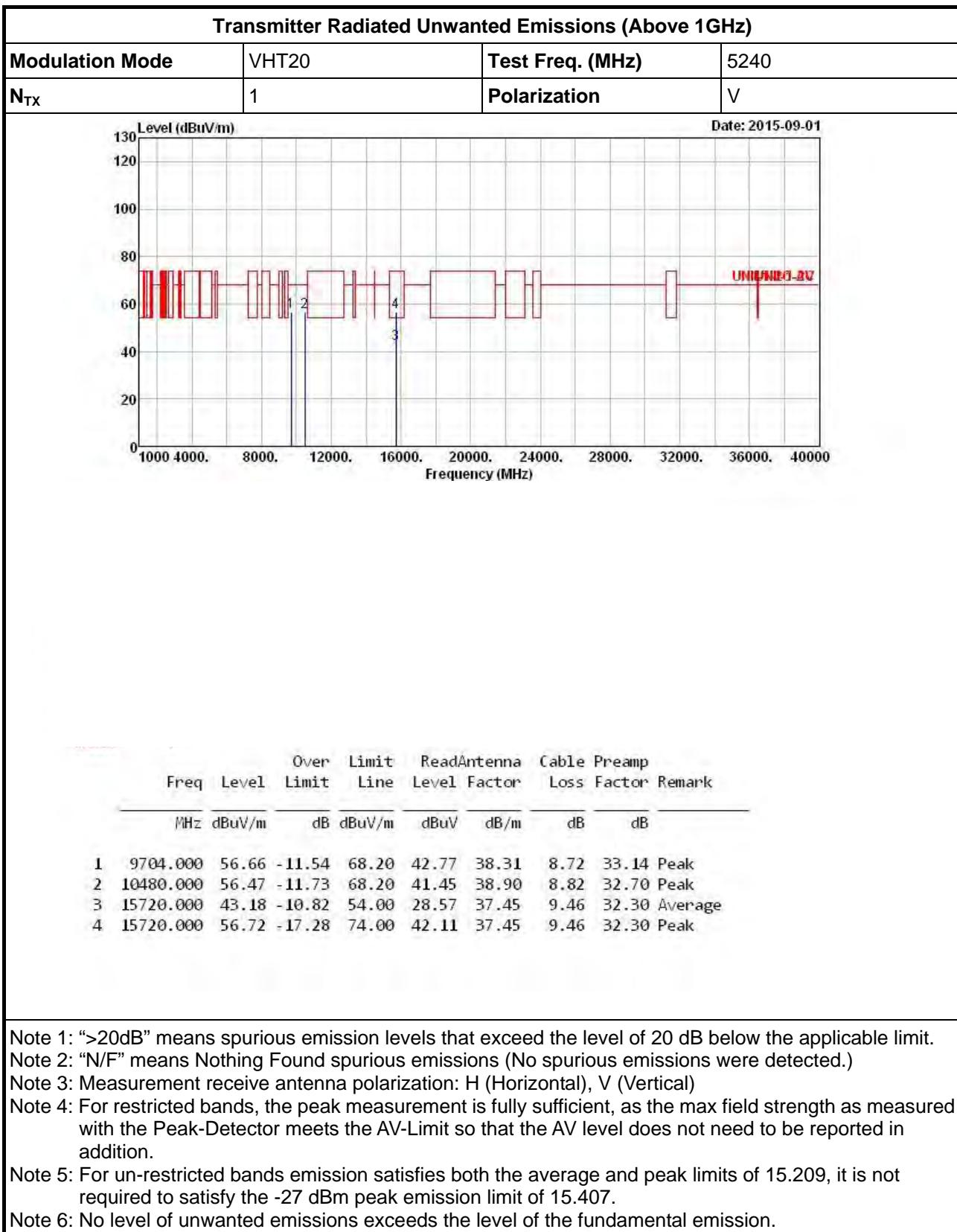


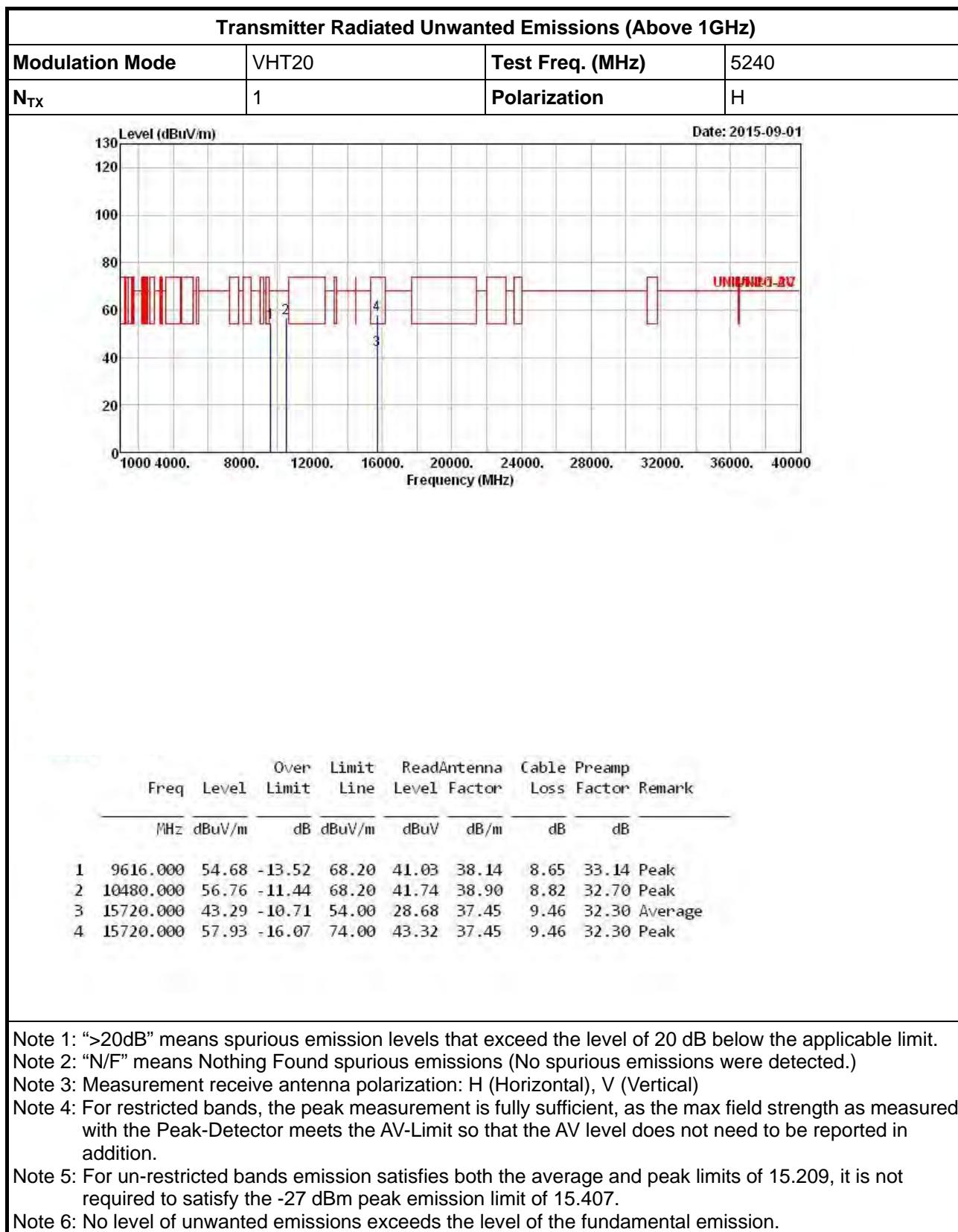


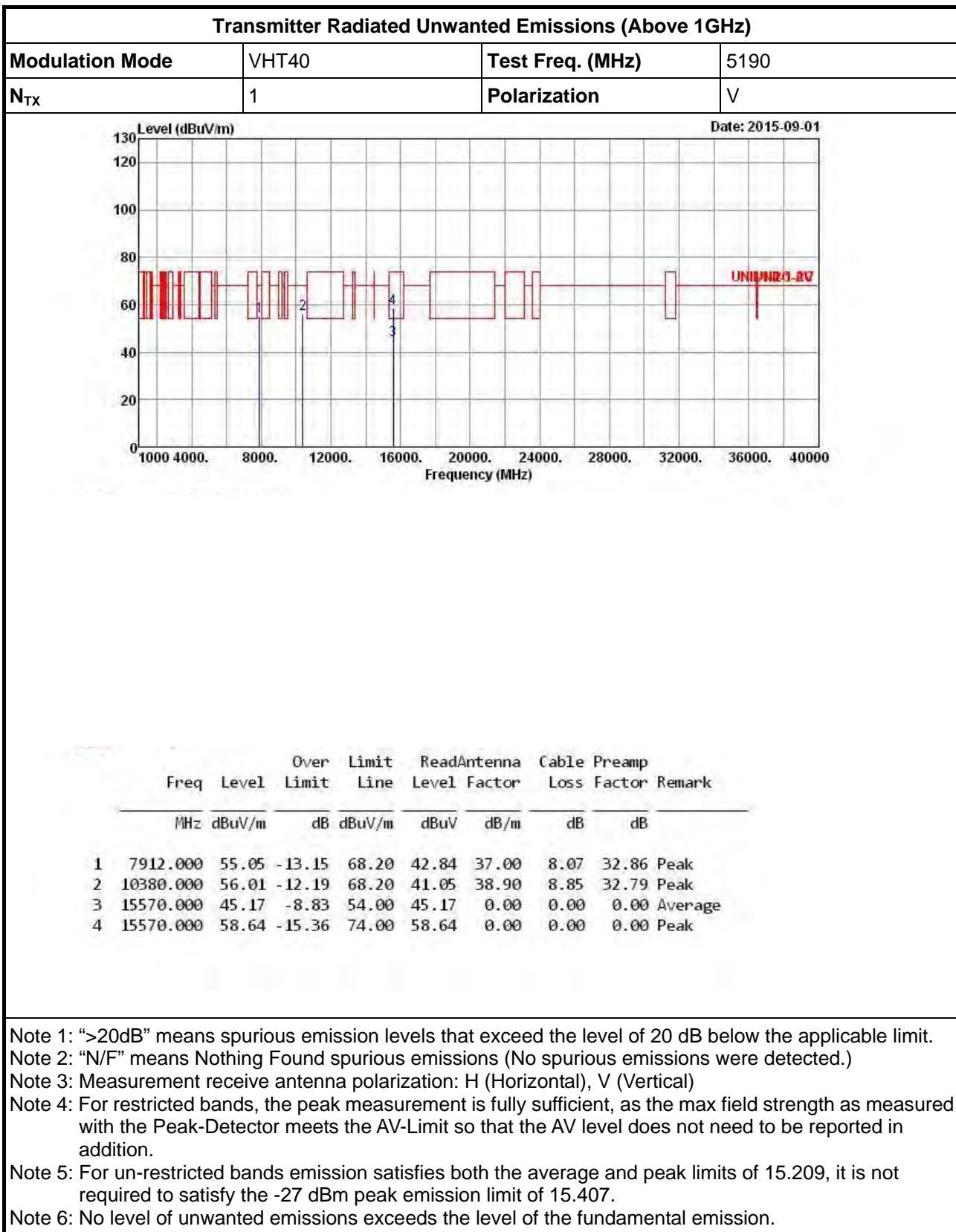


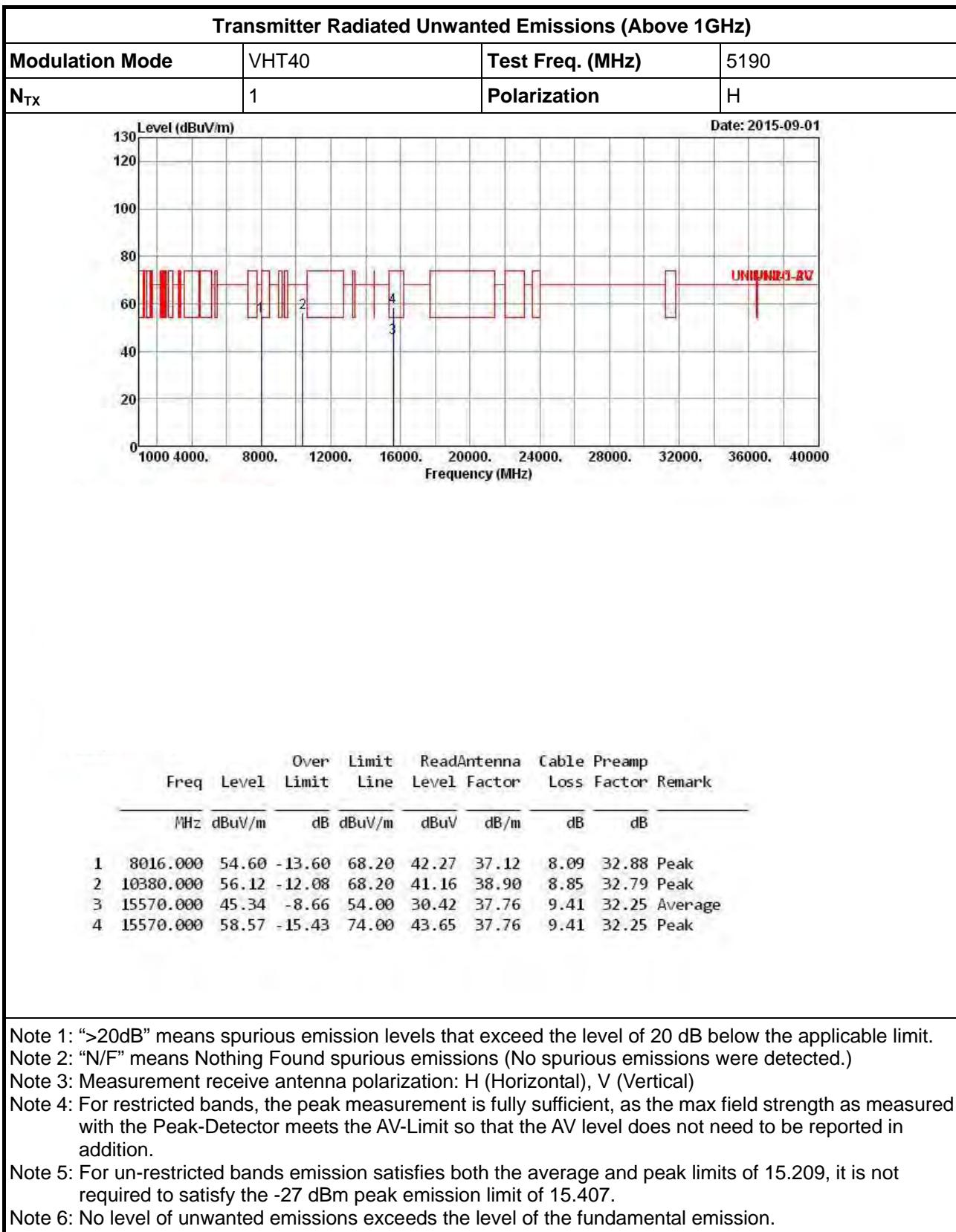


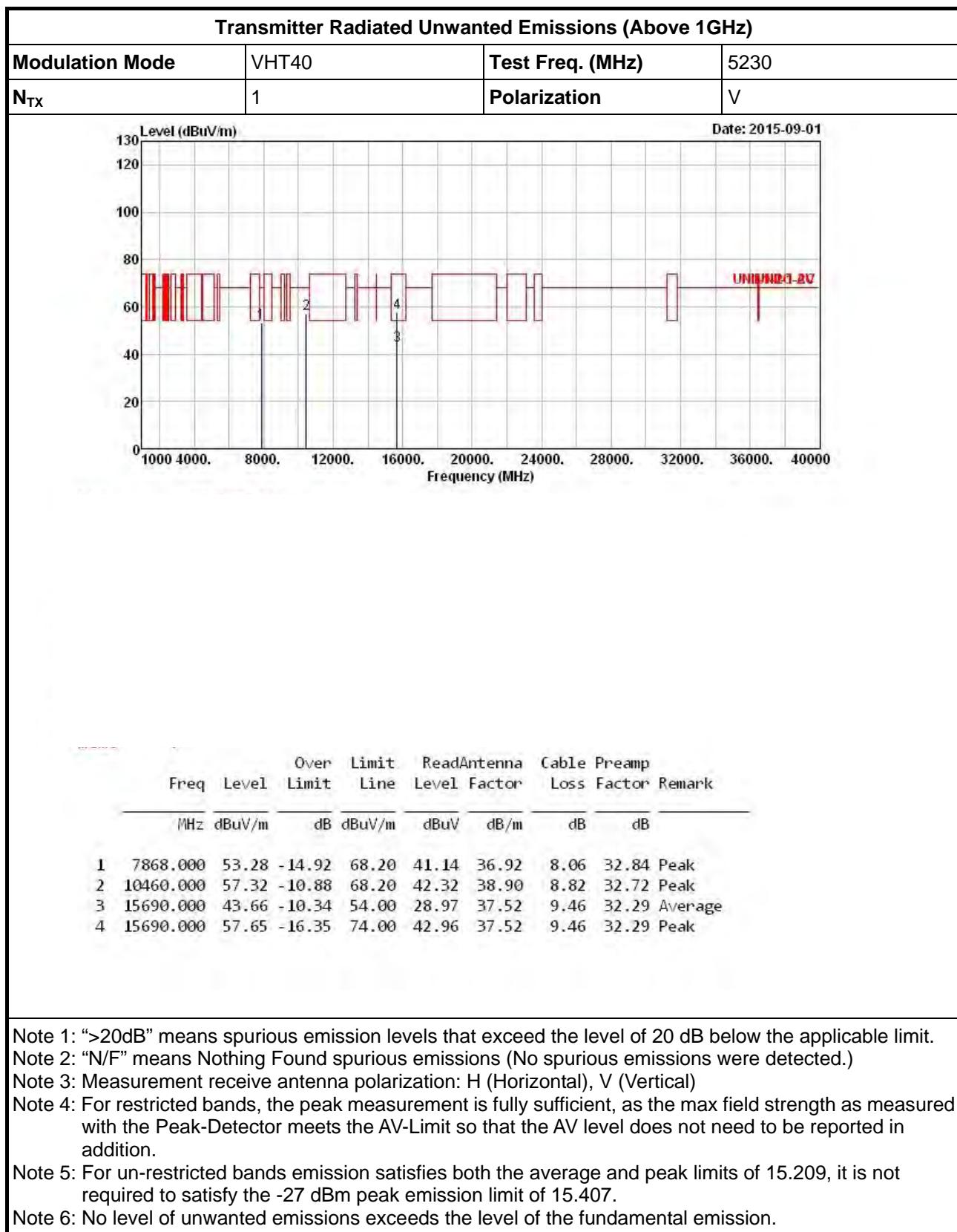


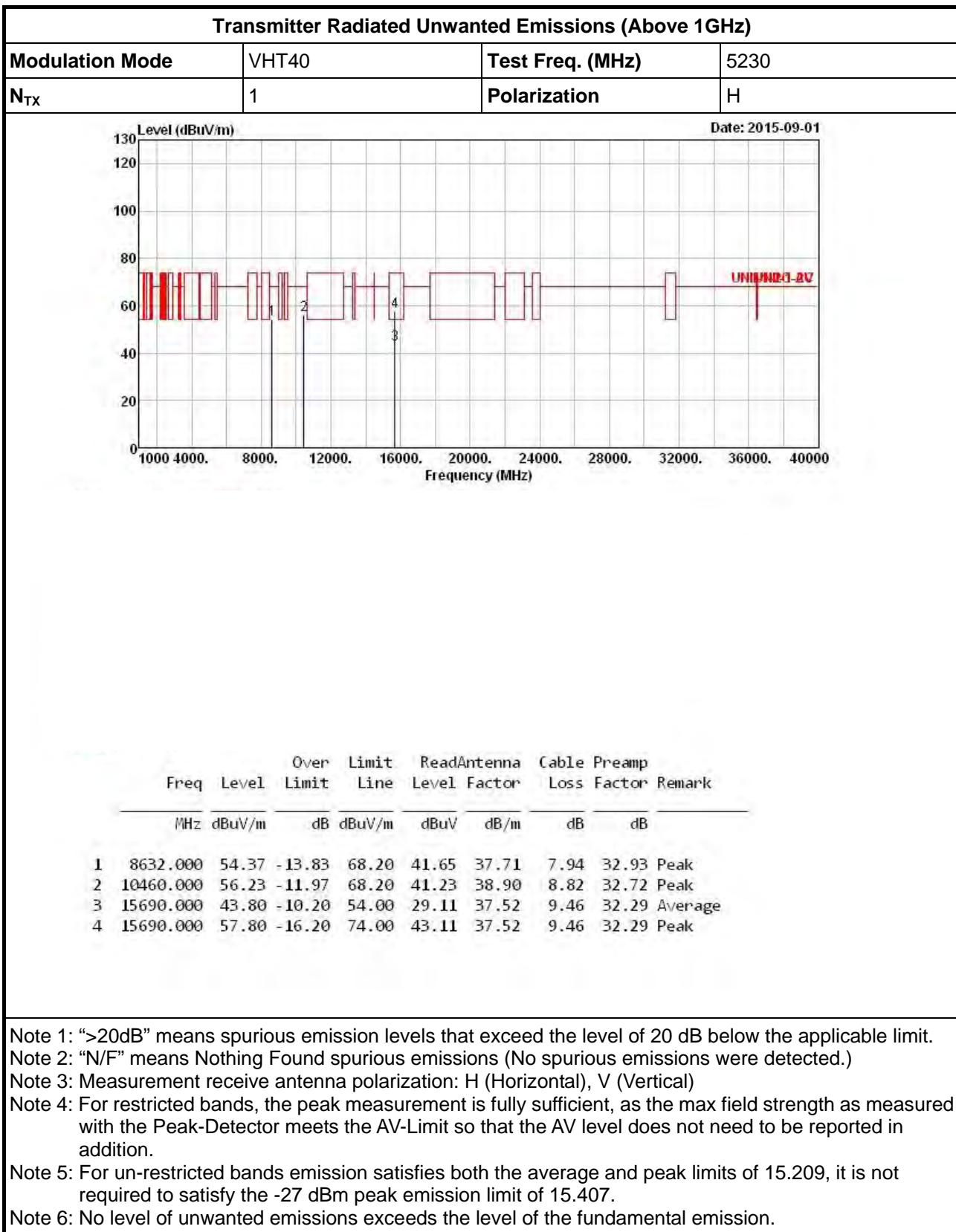


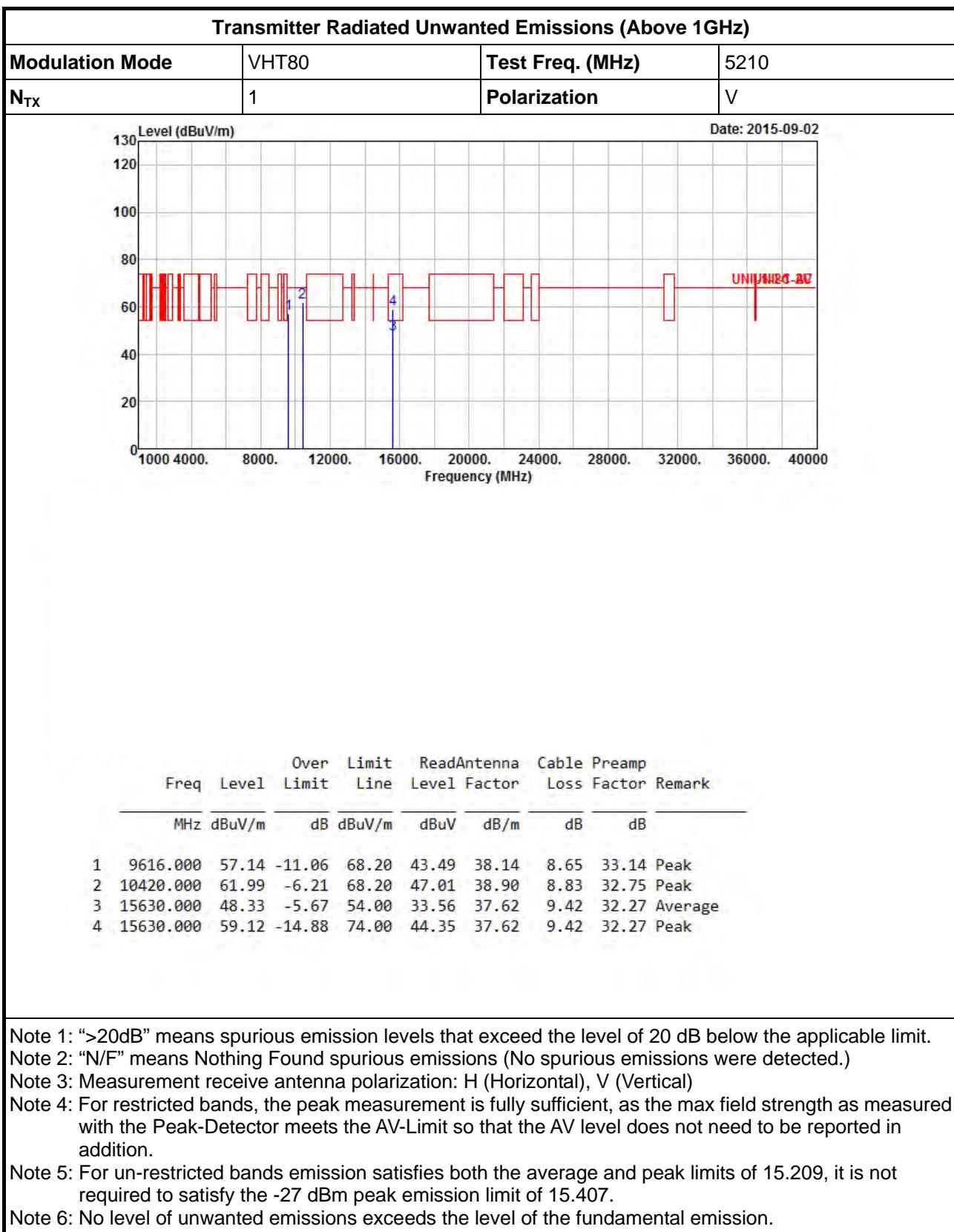


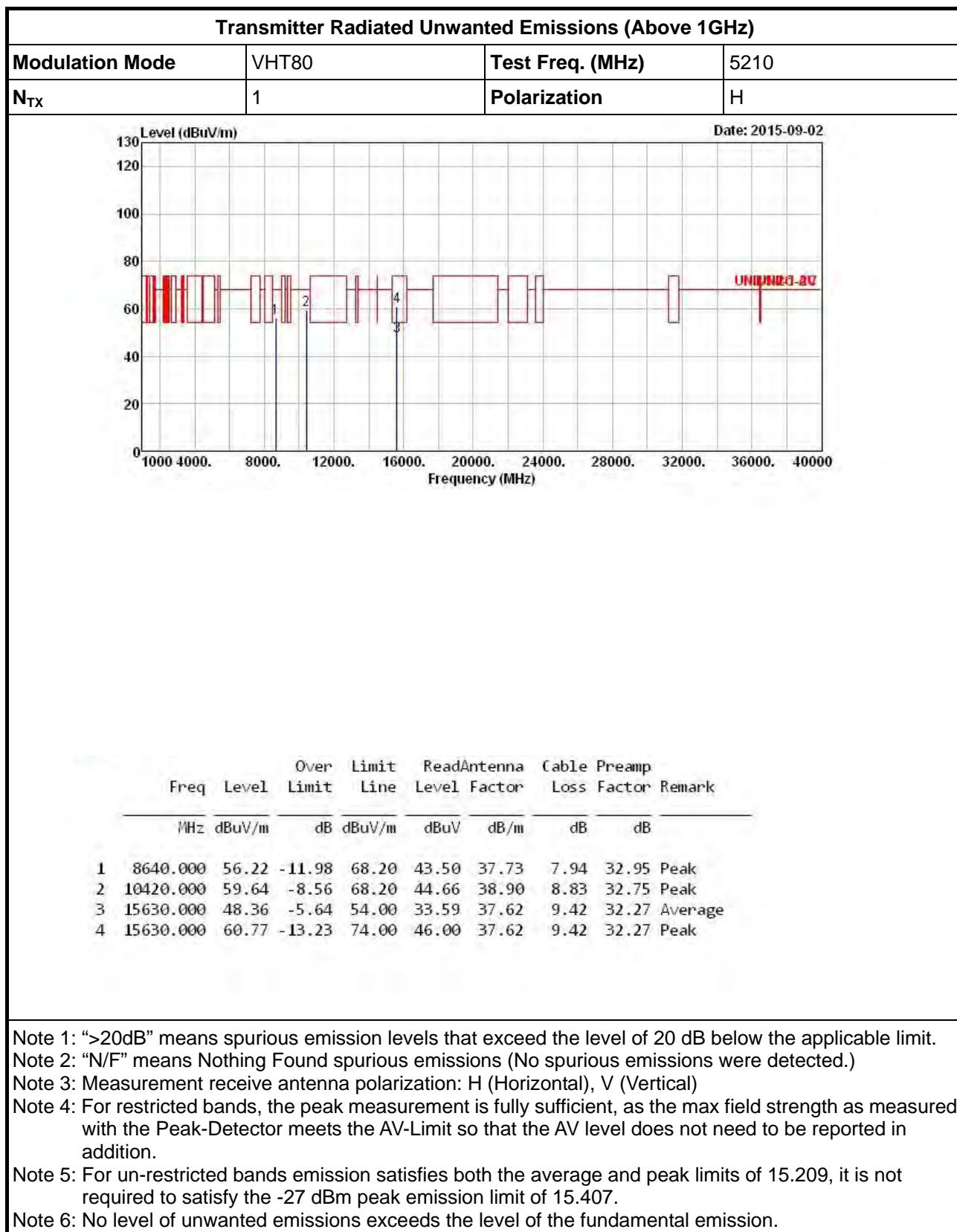






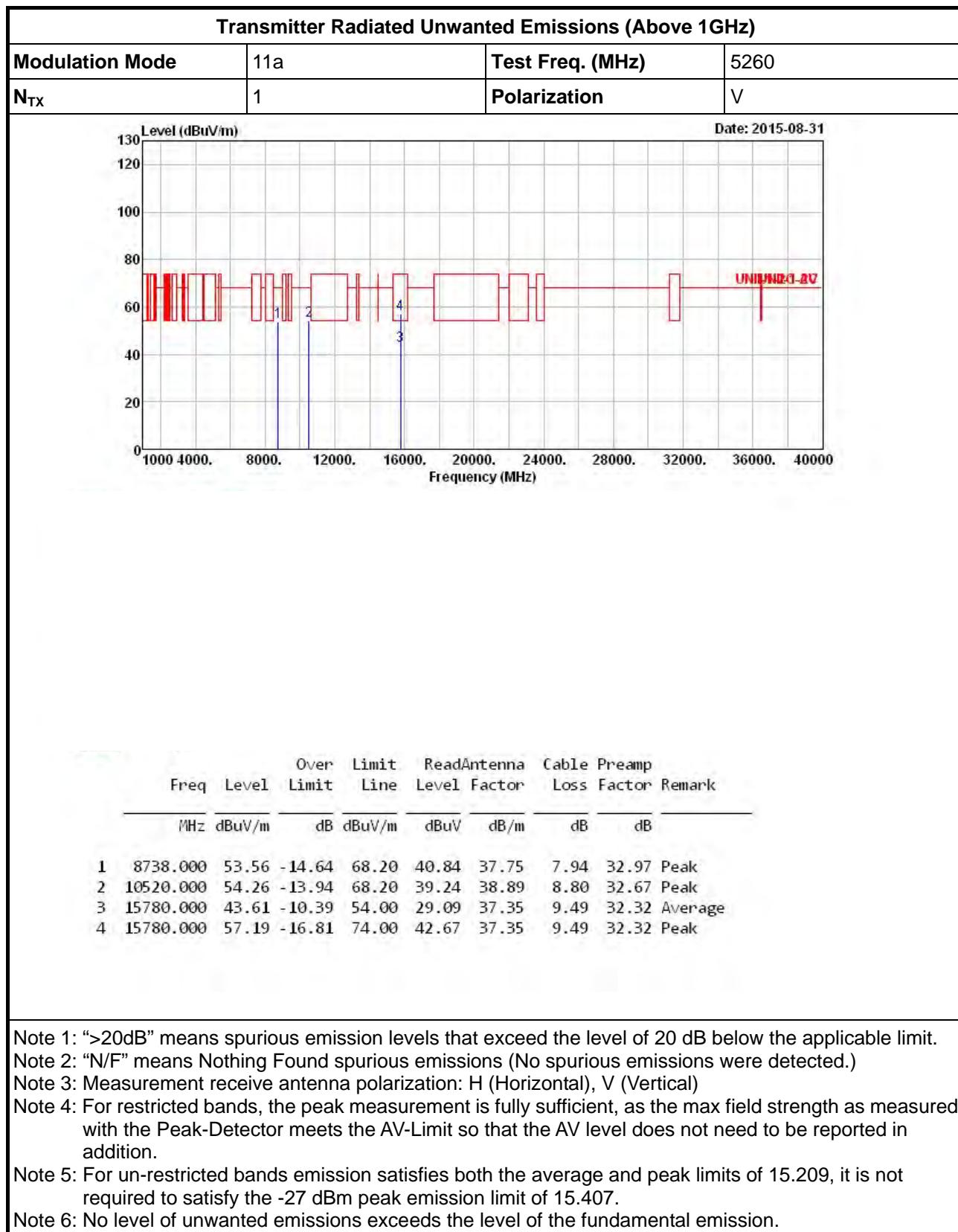


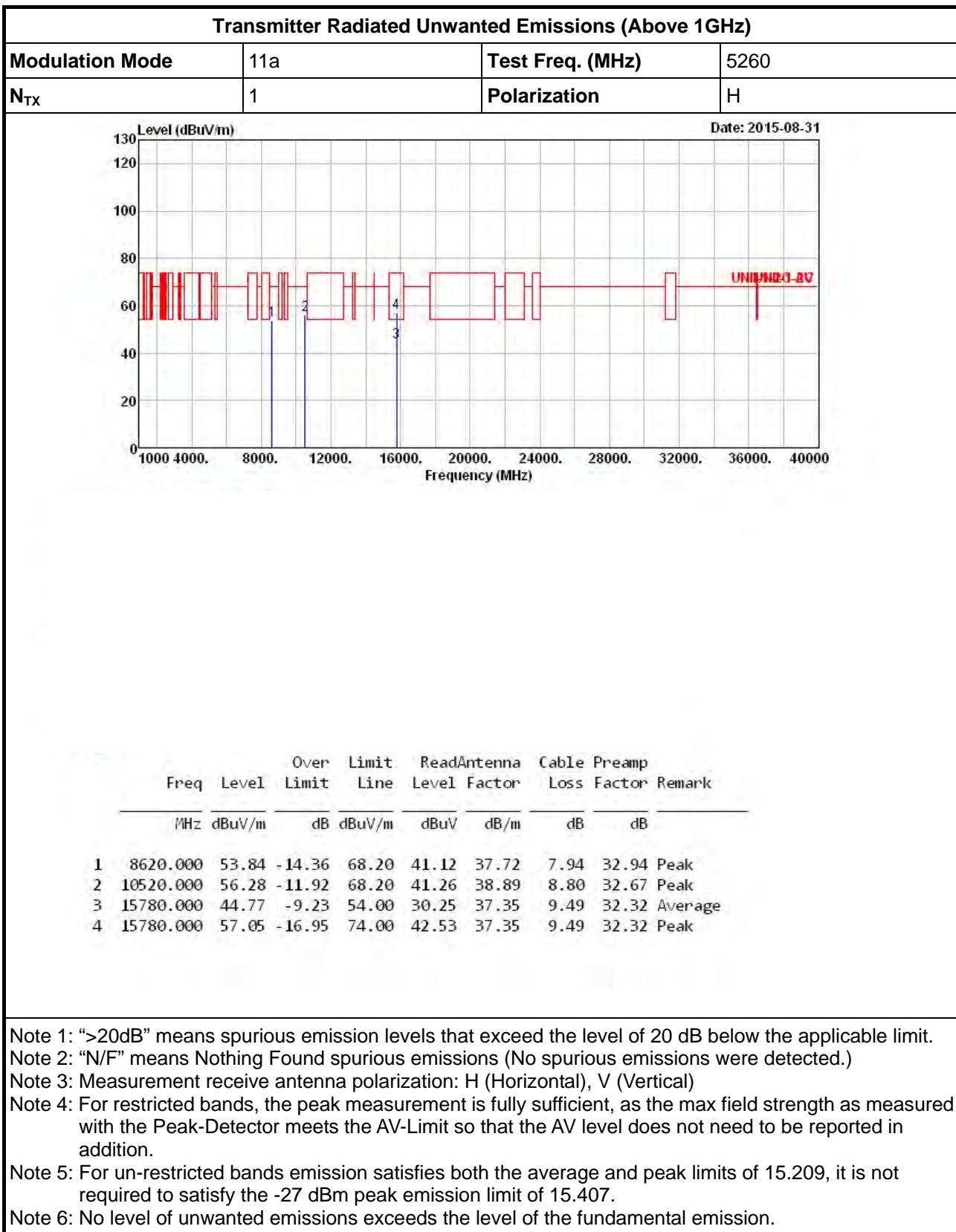


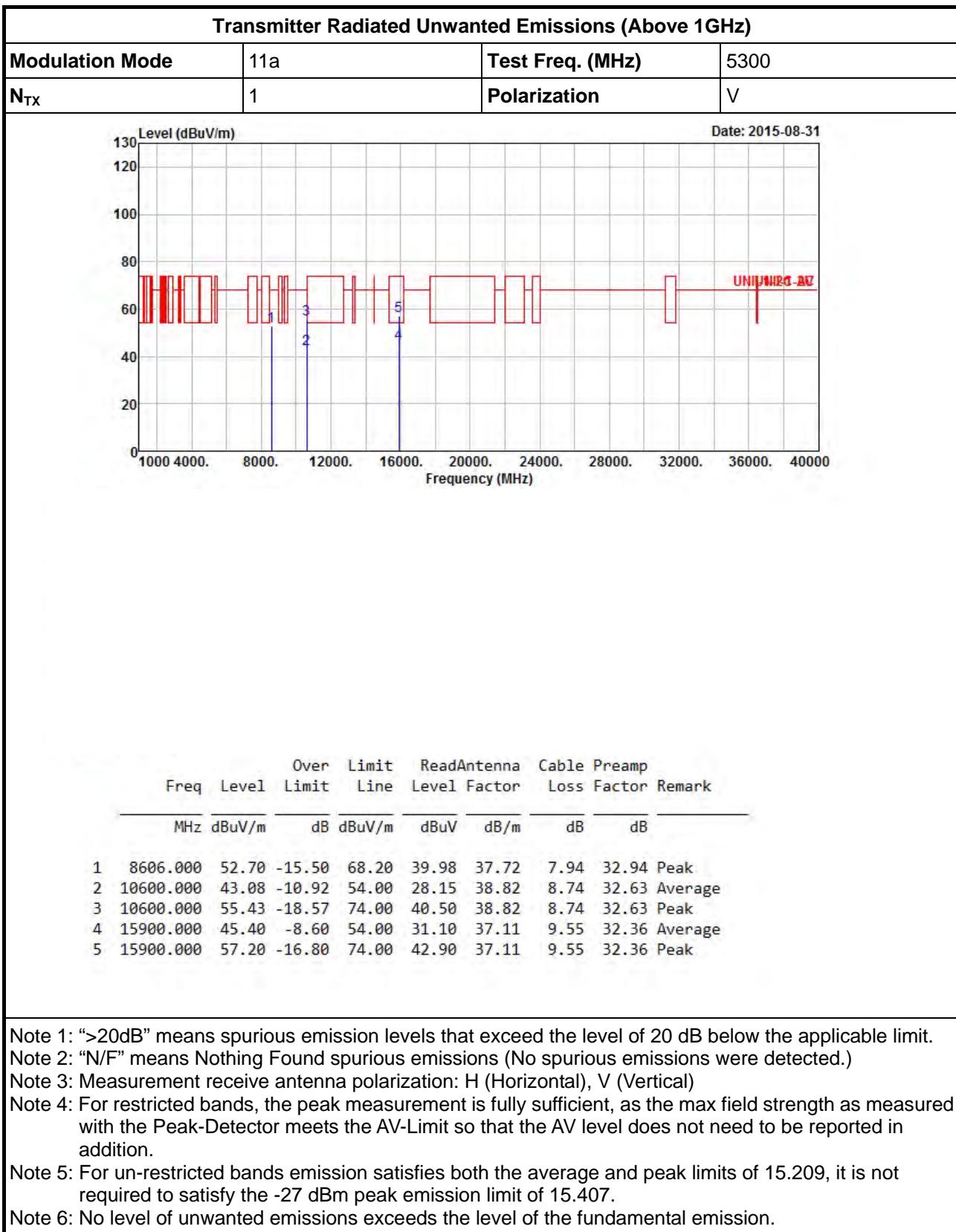


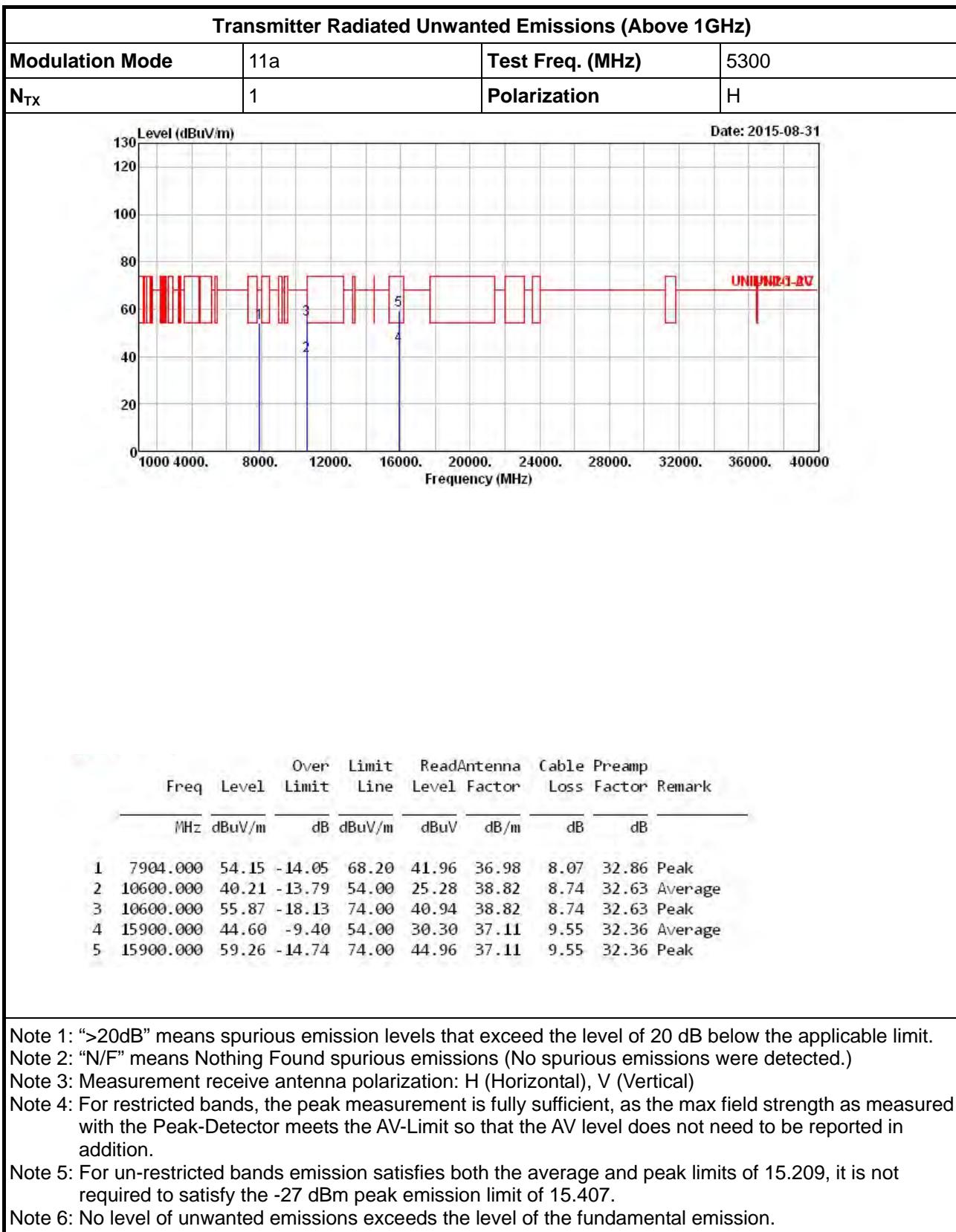


## 3.6.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 5250-5350MHz









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

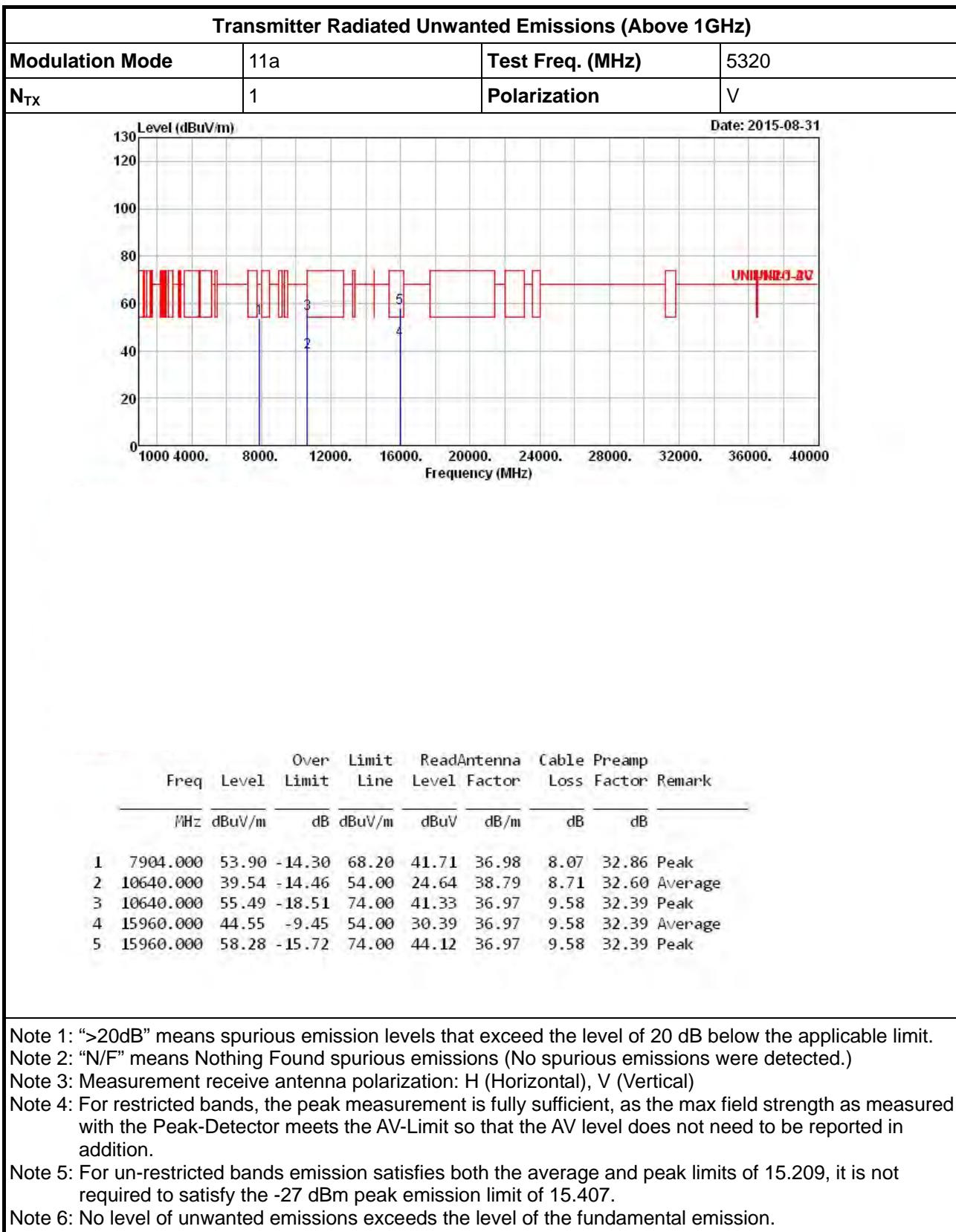
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

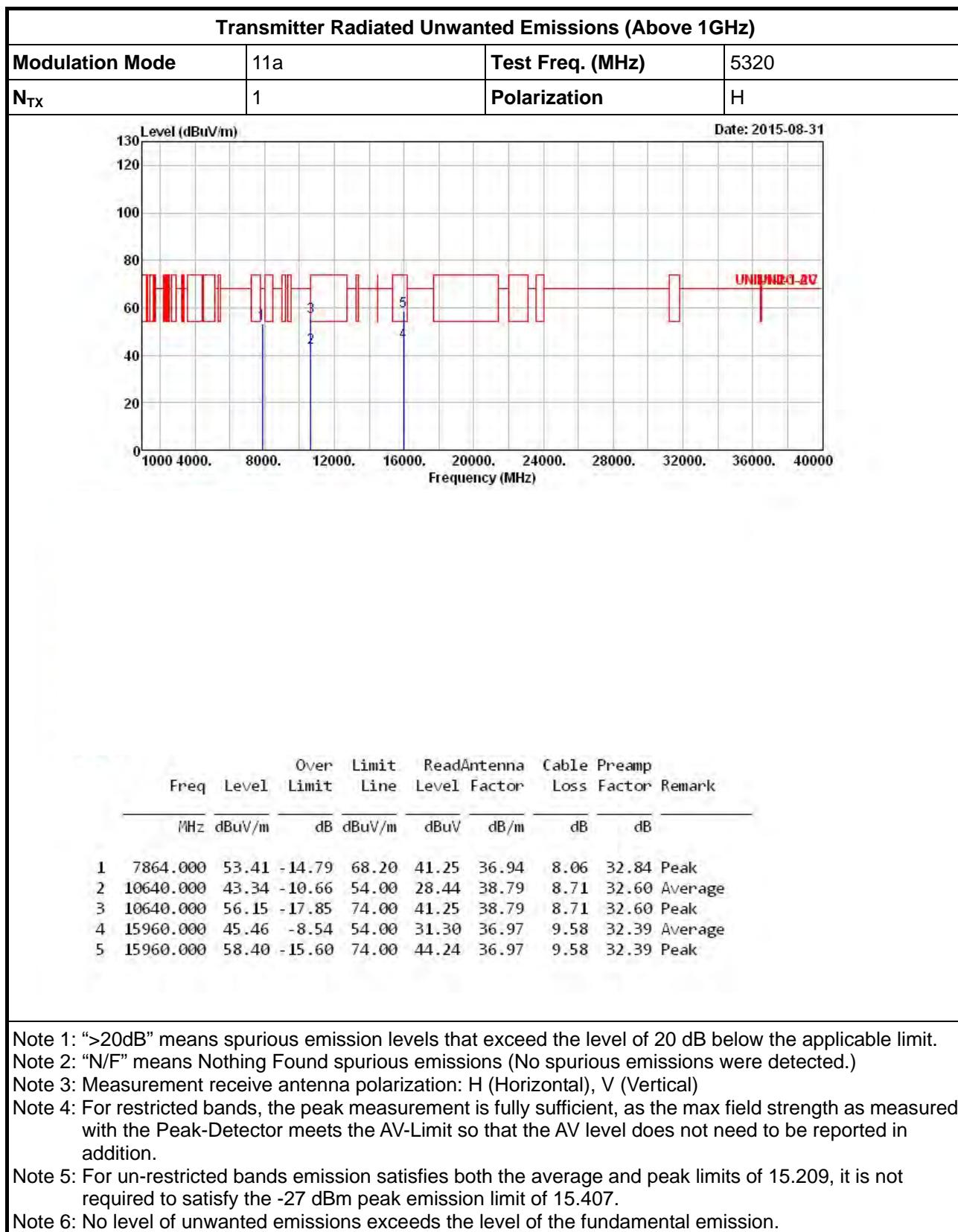
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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.





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

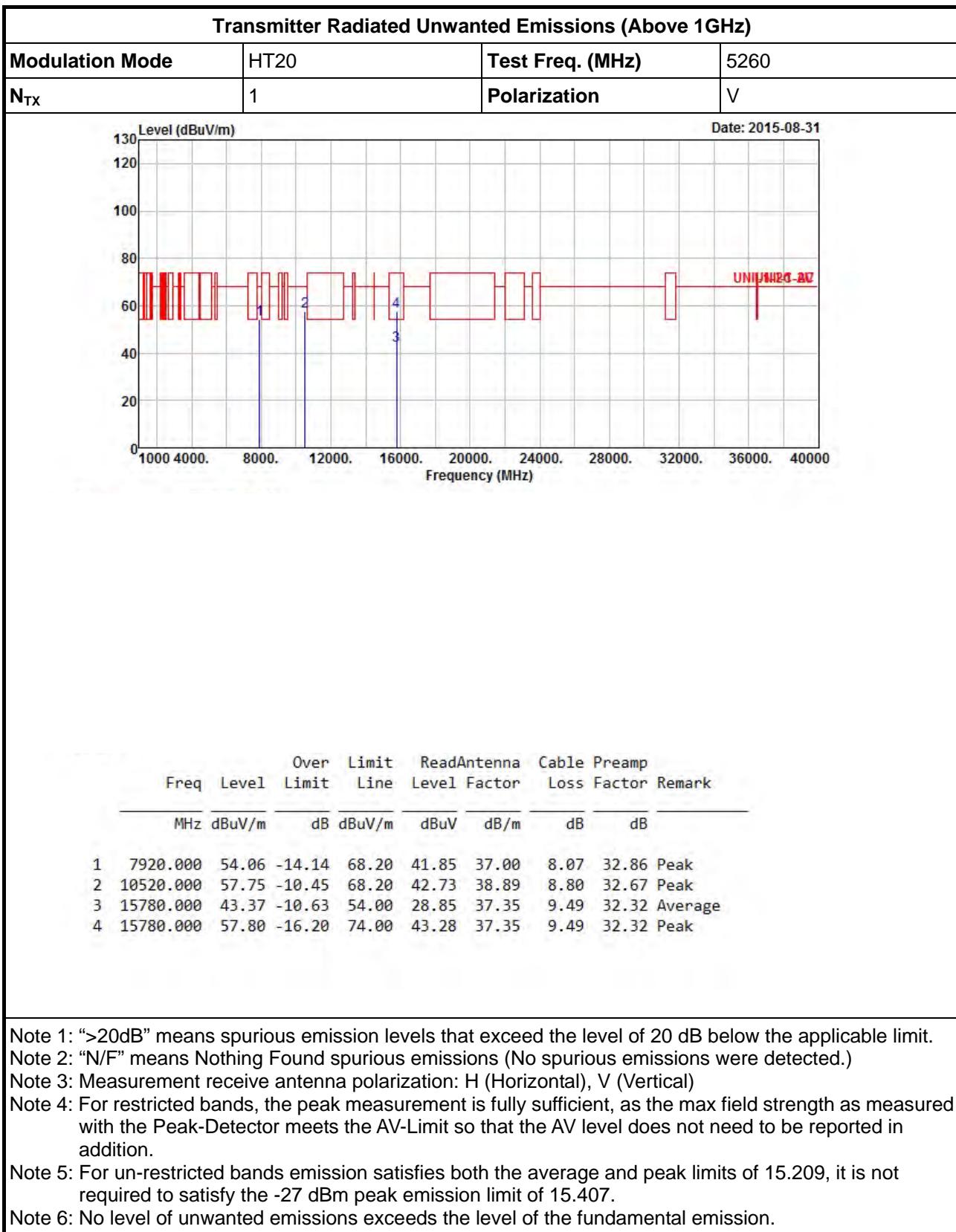
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

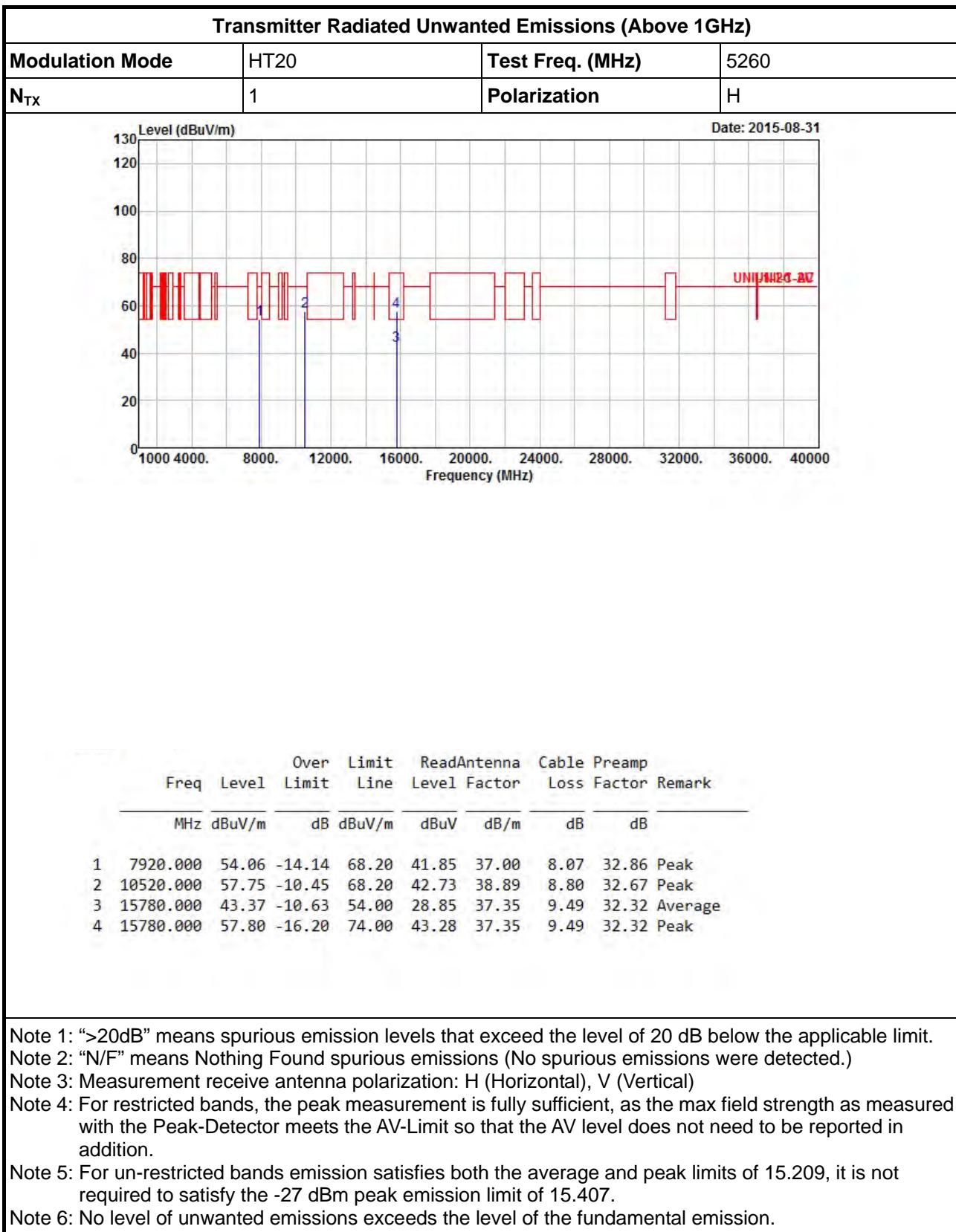
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

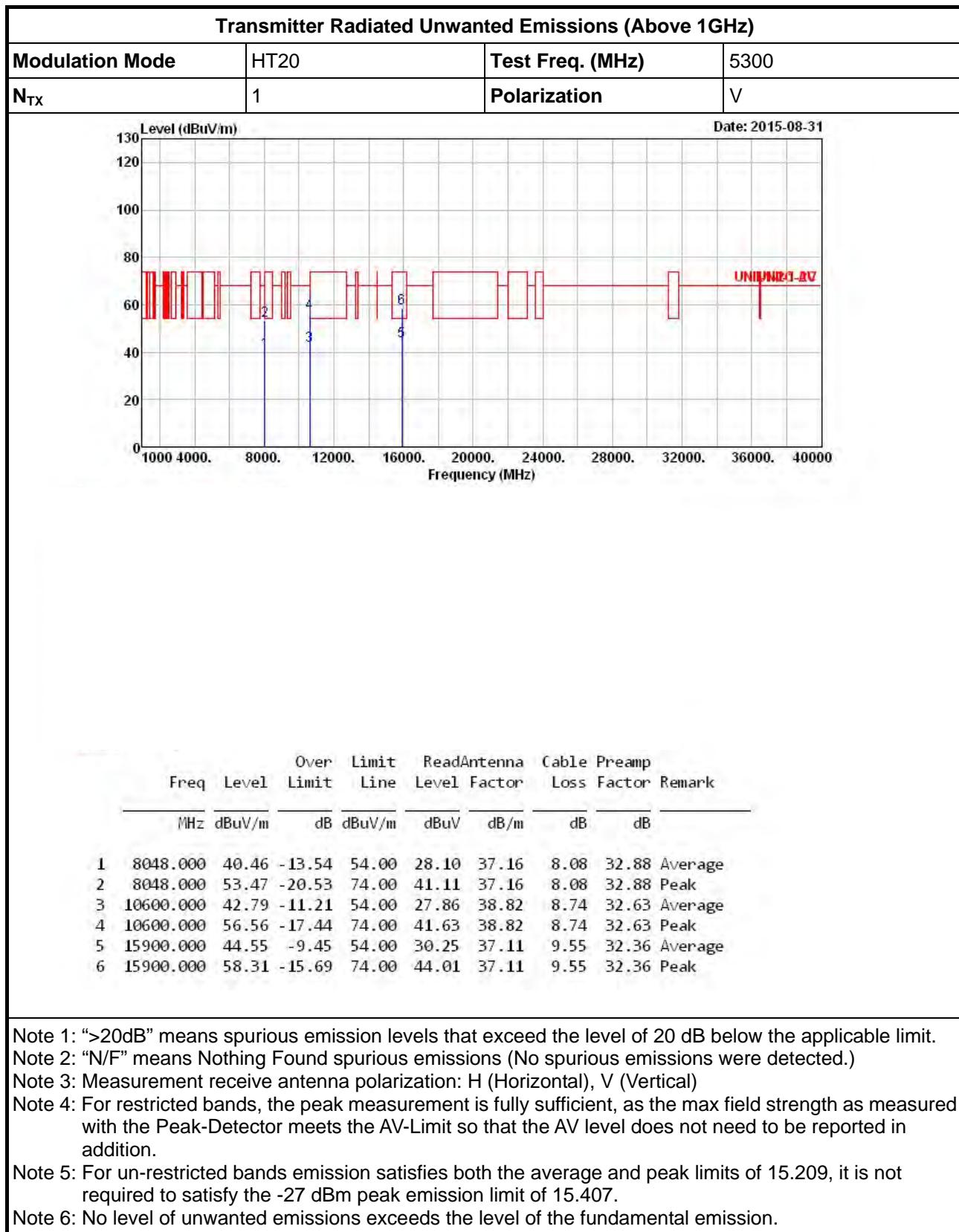
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

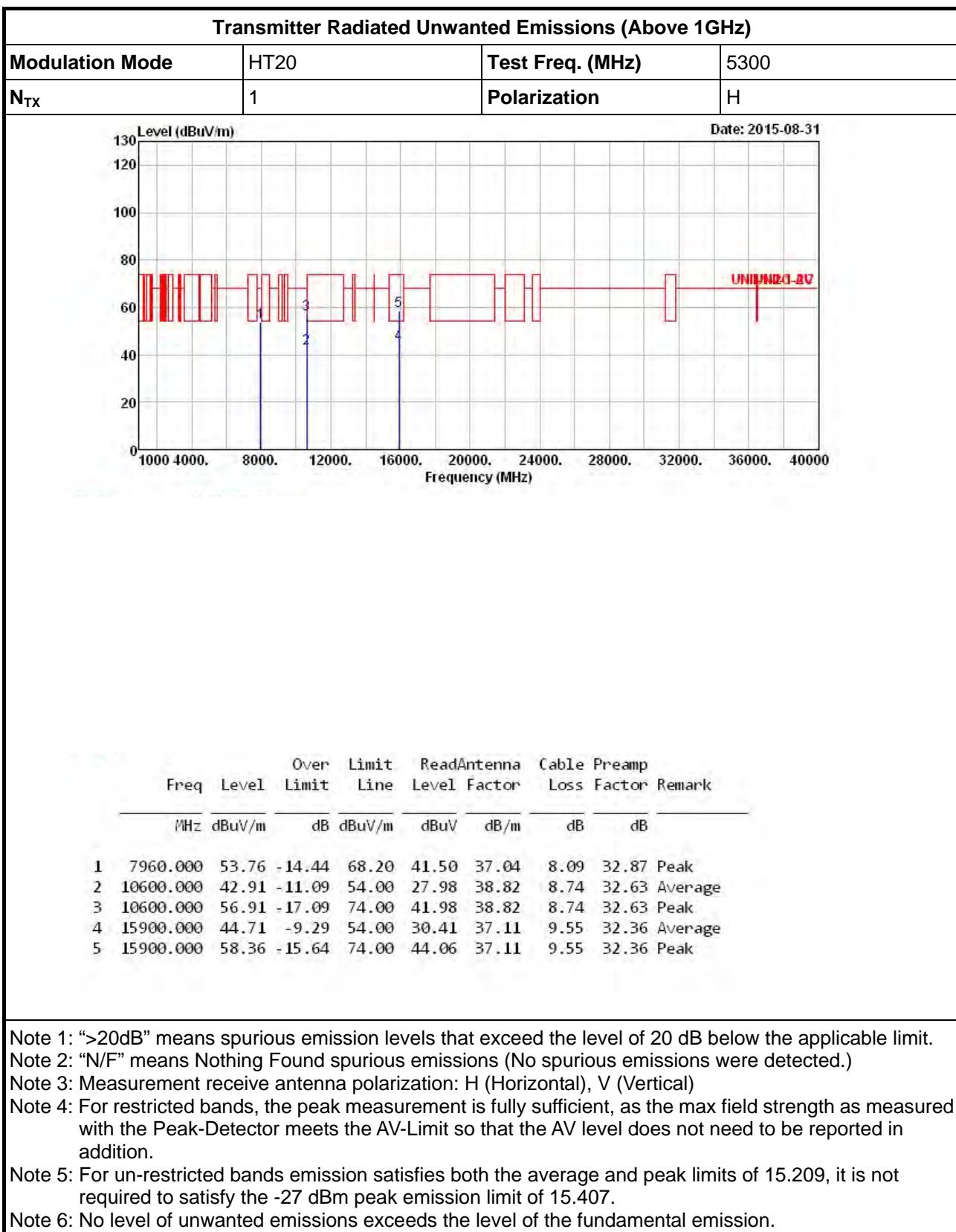
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

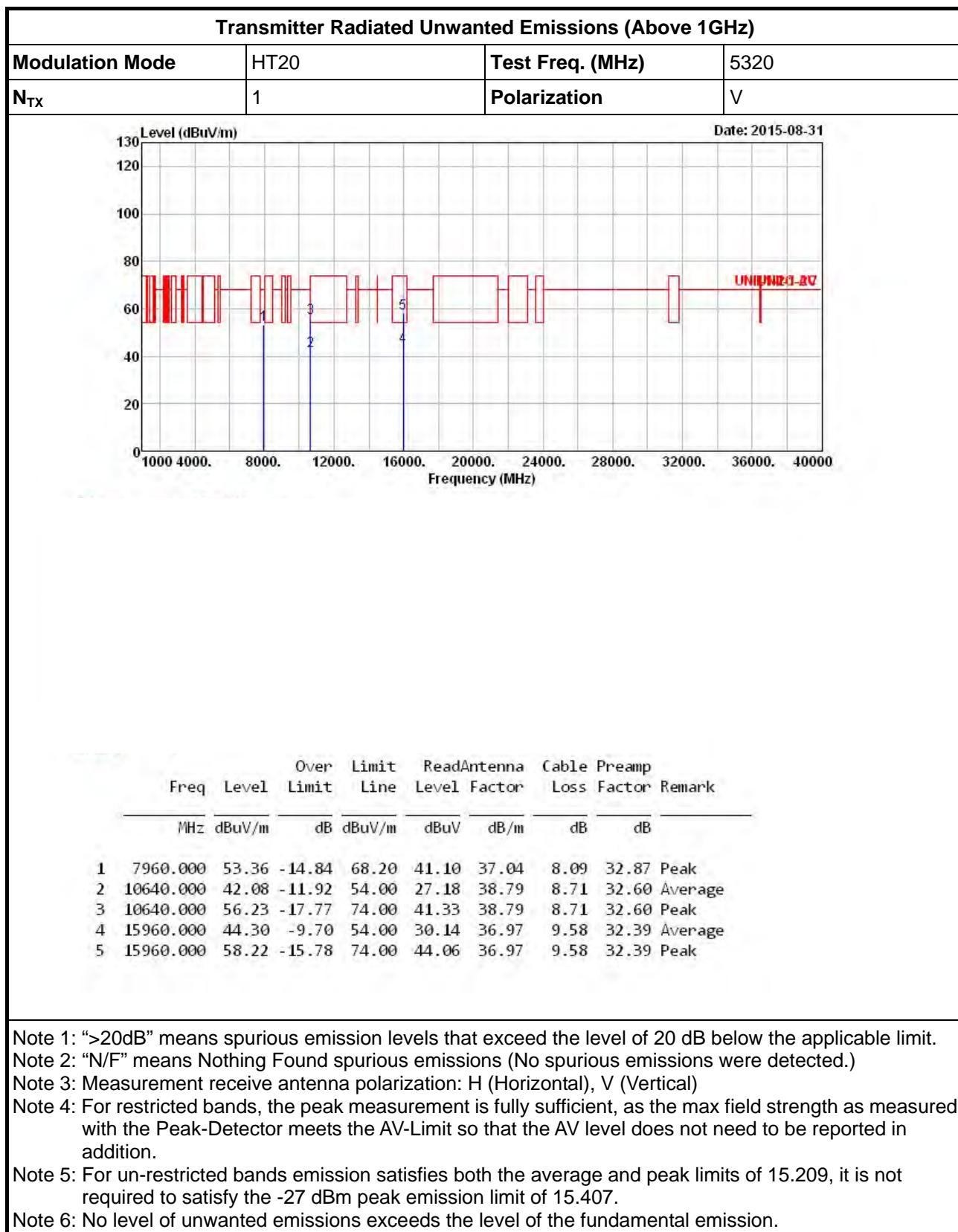
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

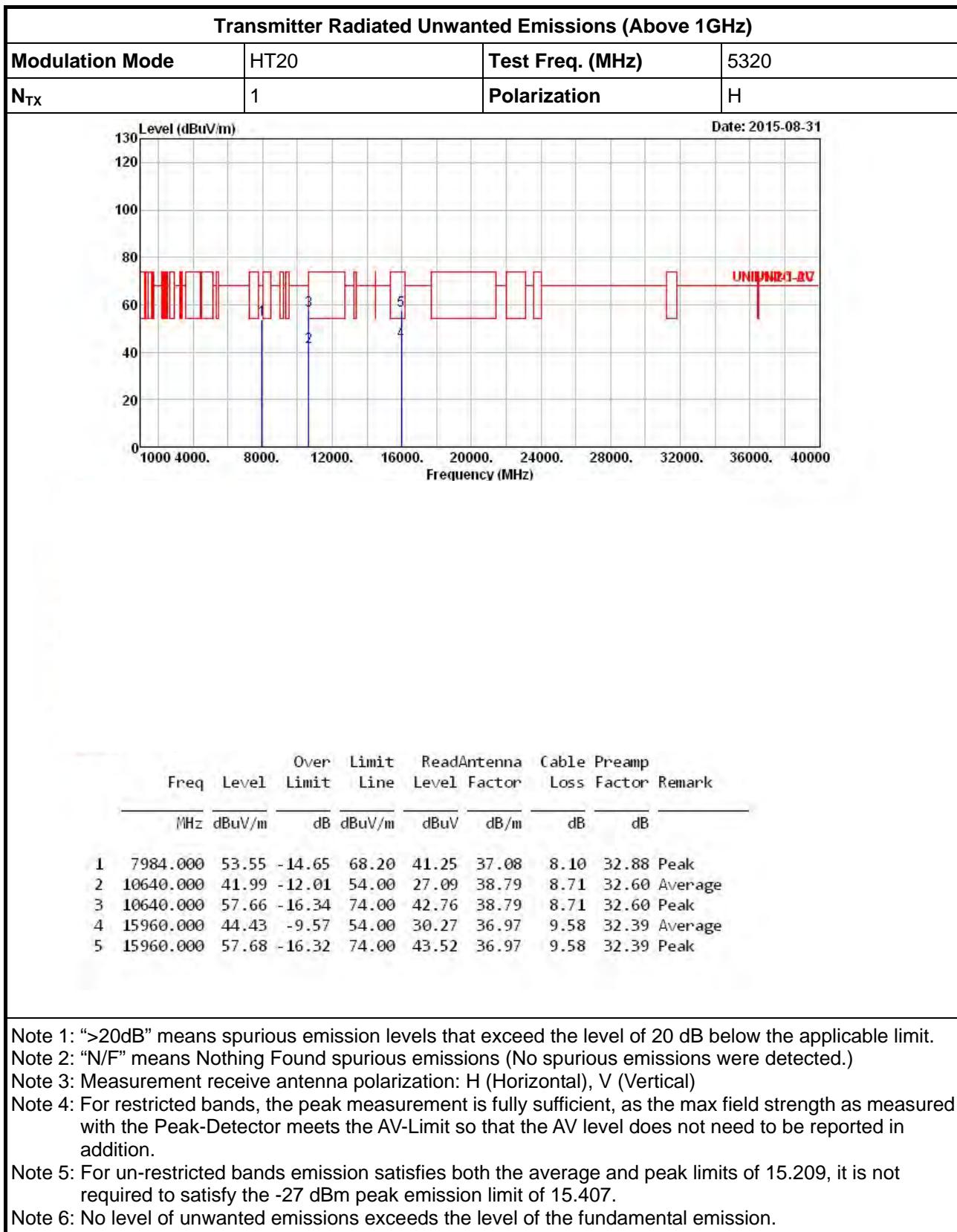


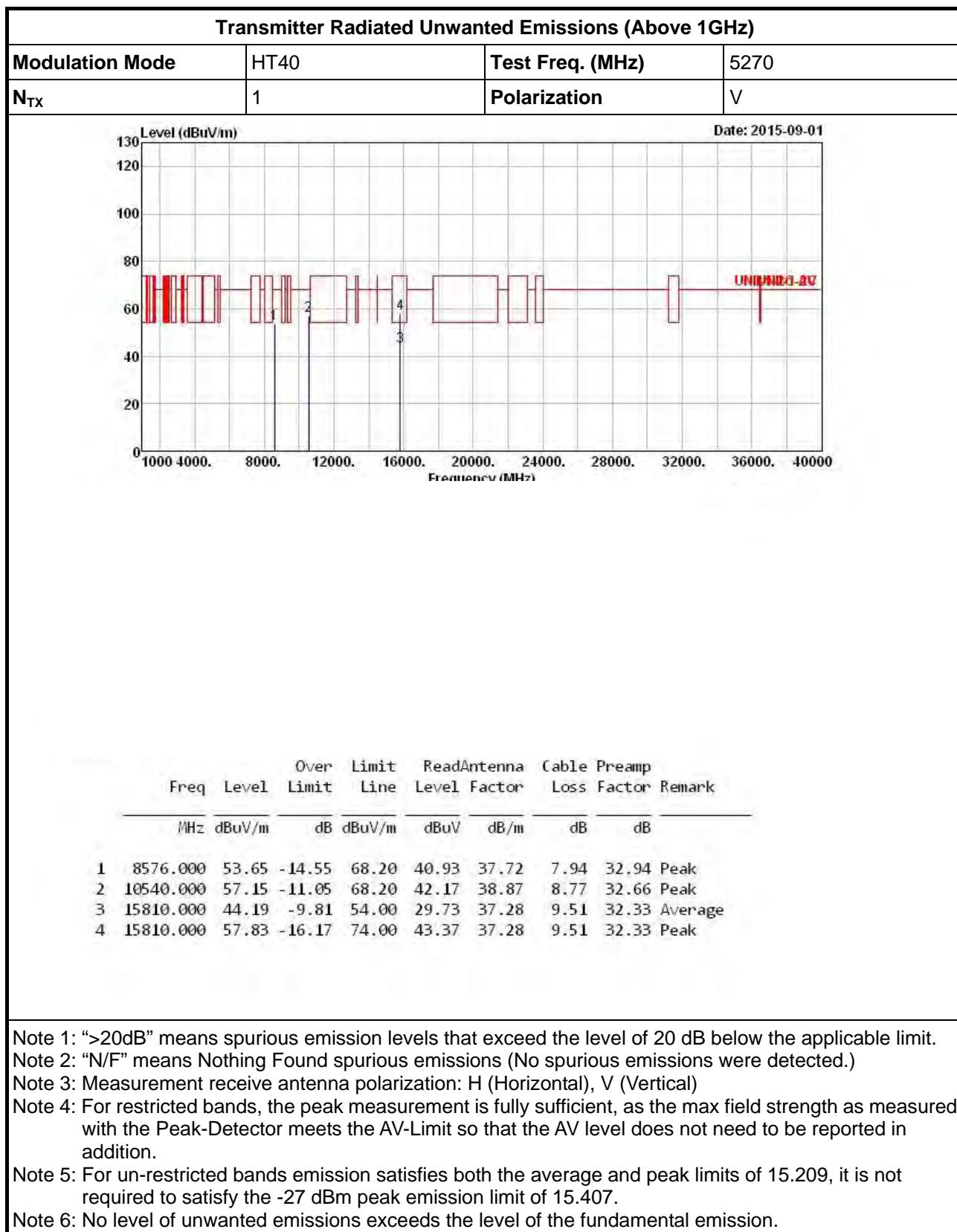


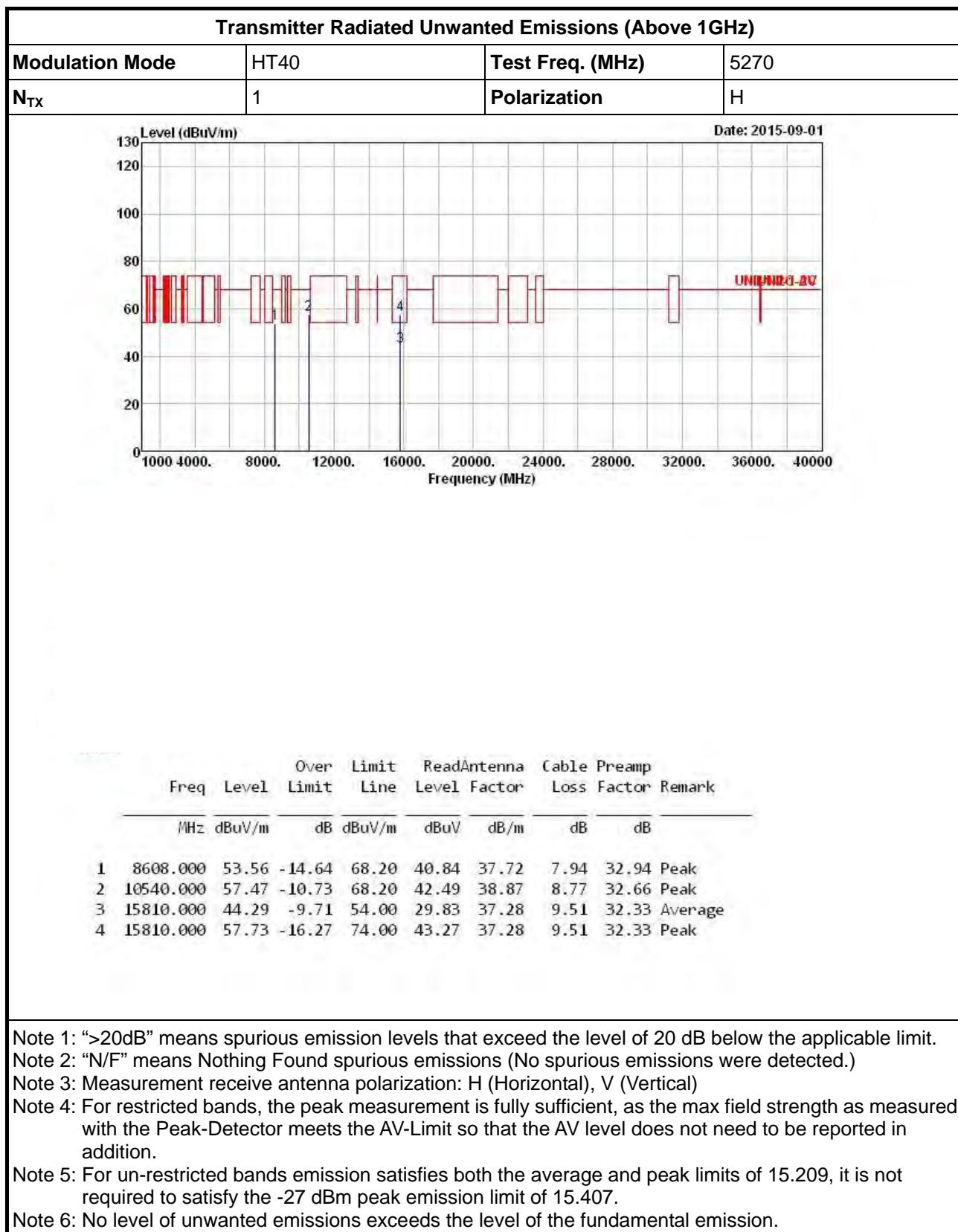


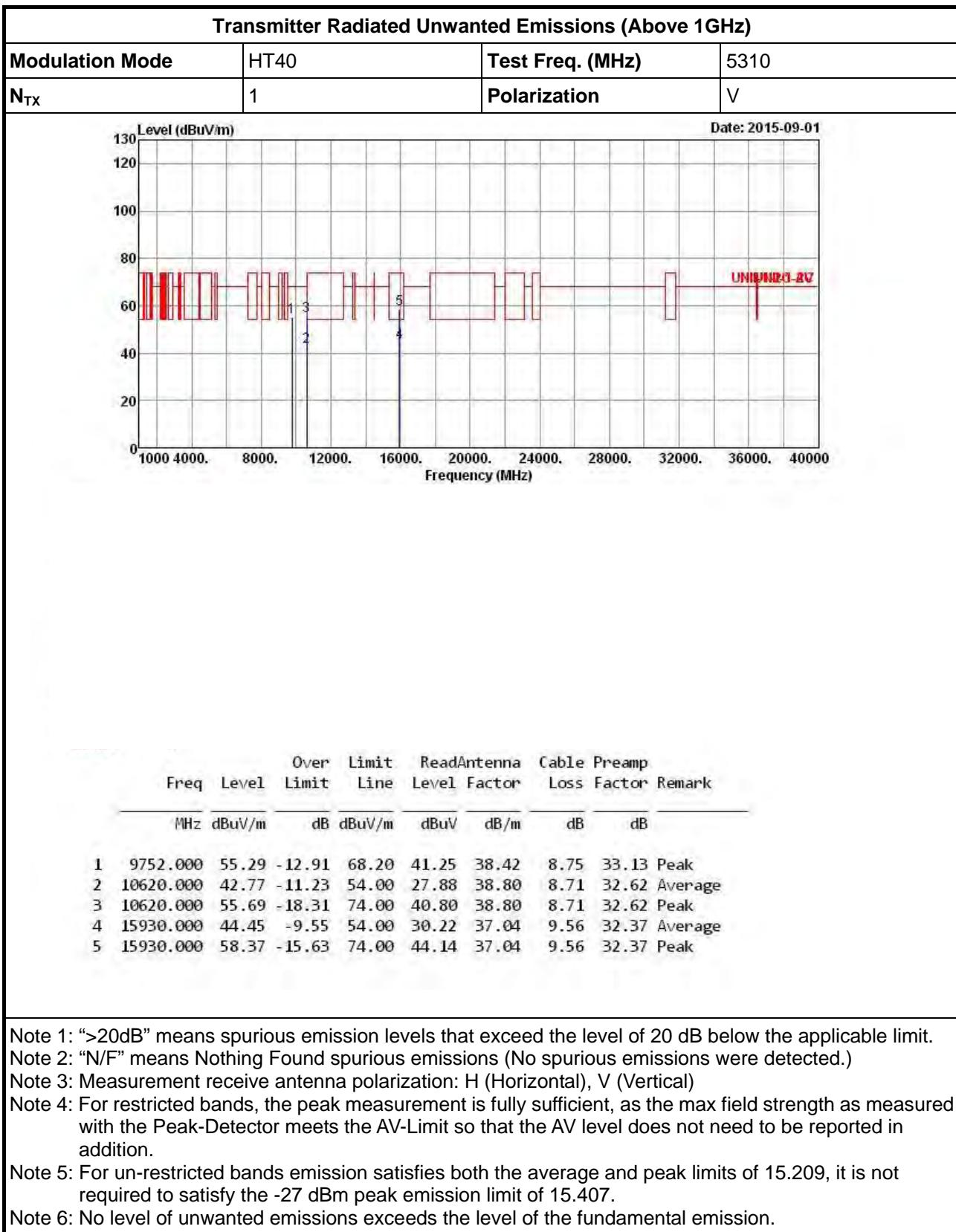












Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

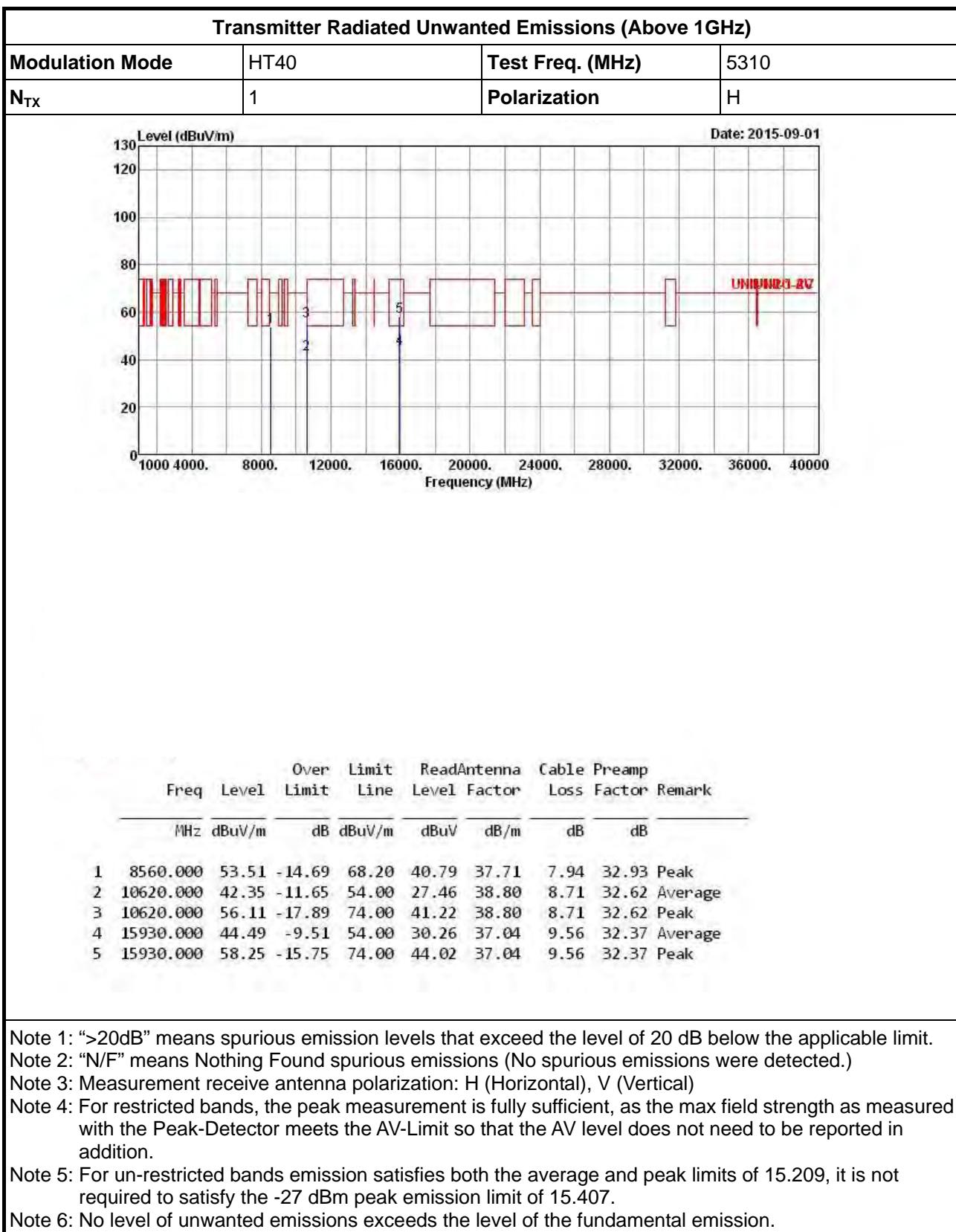
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

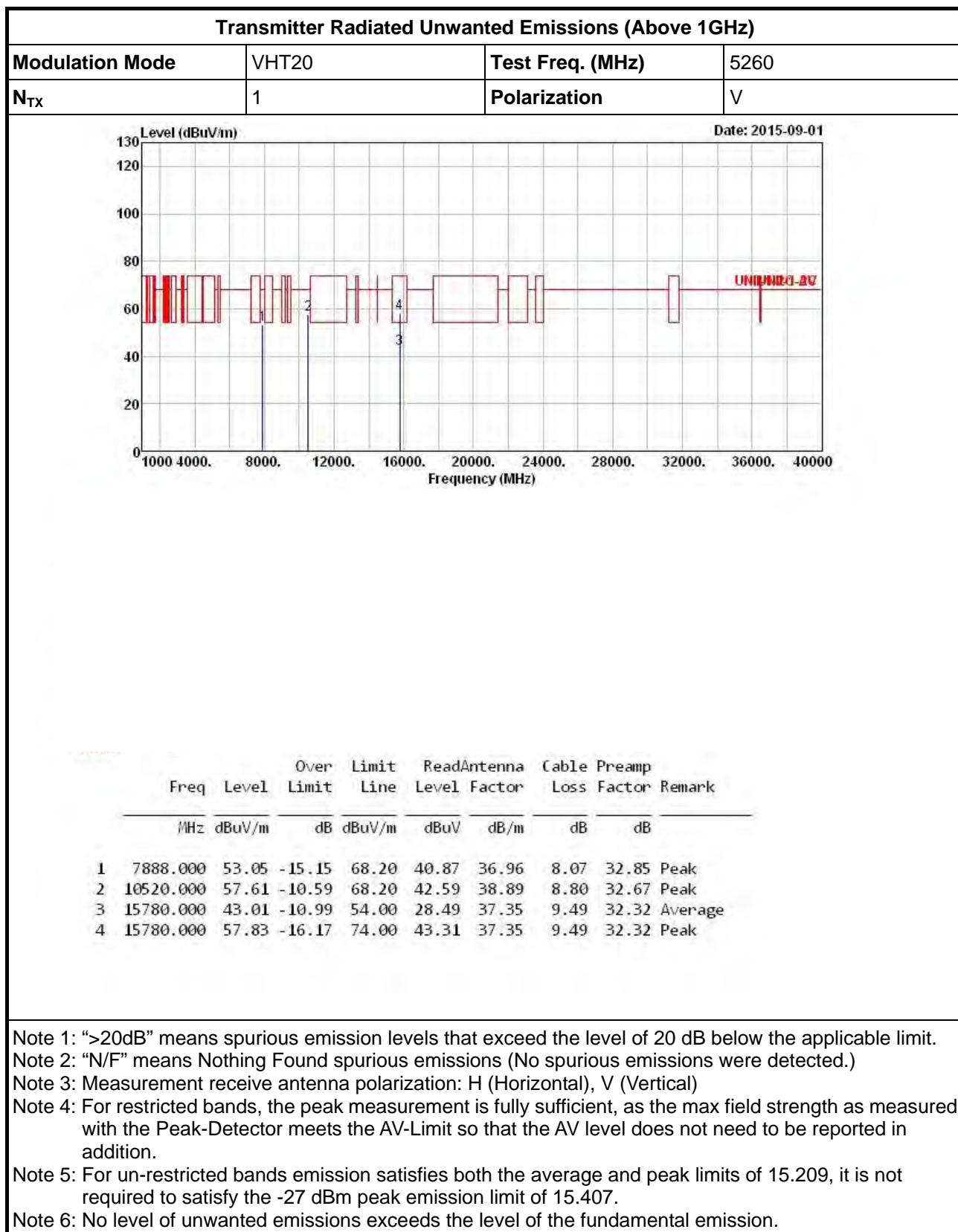
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

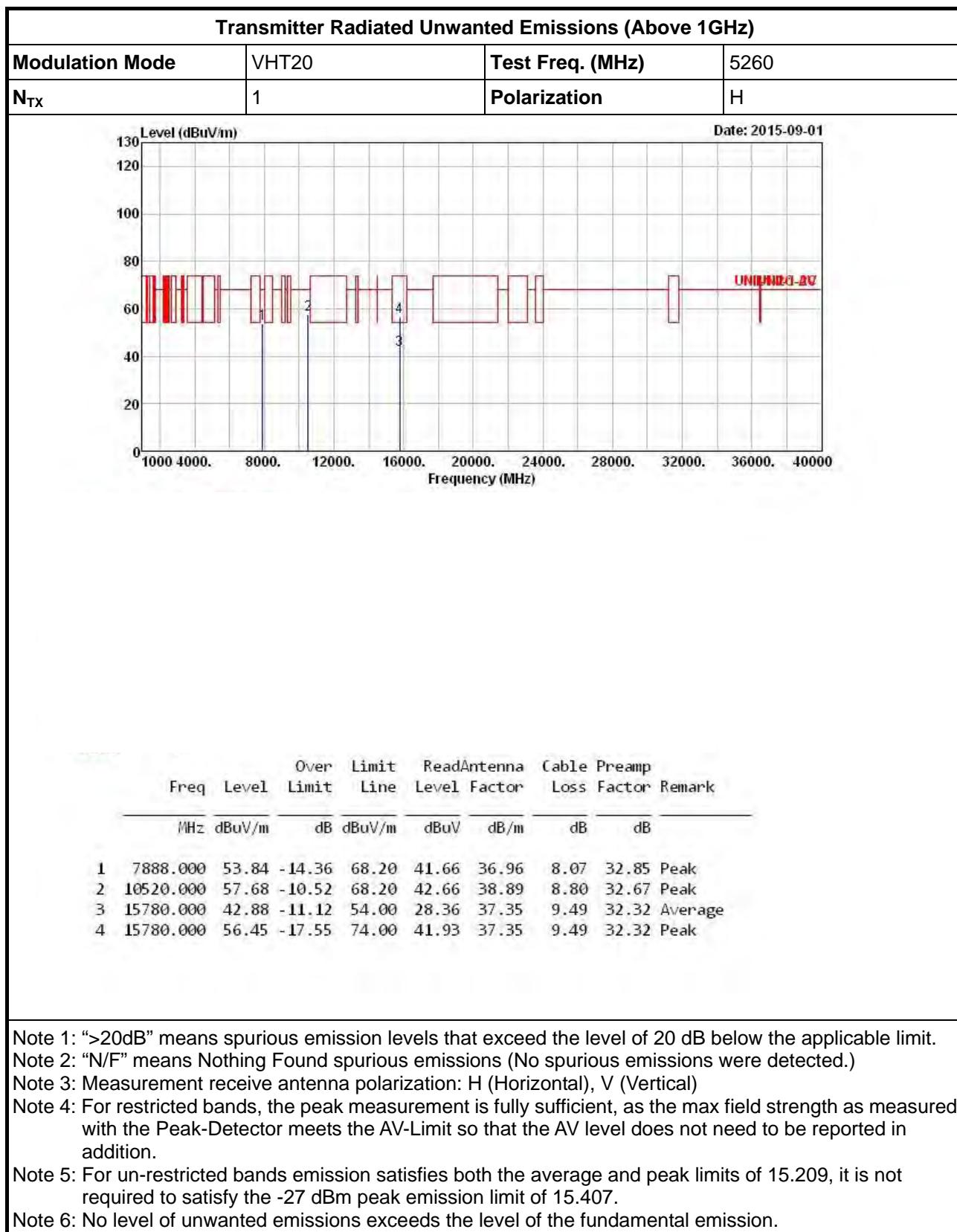
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

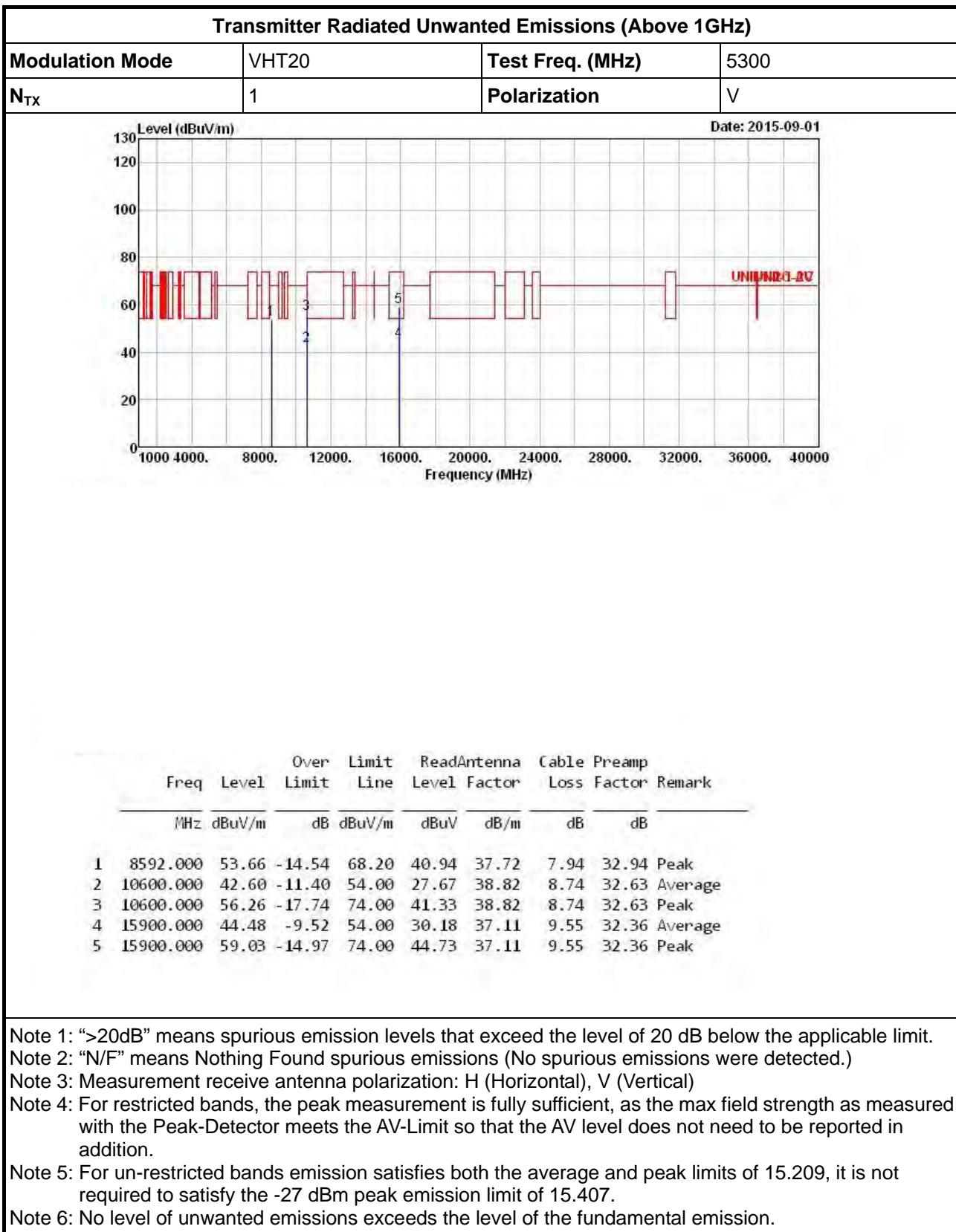
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

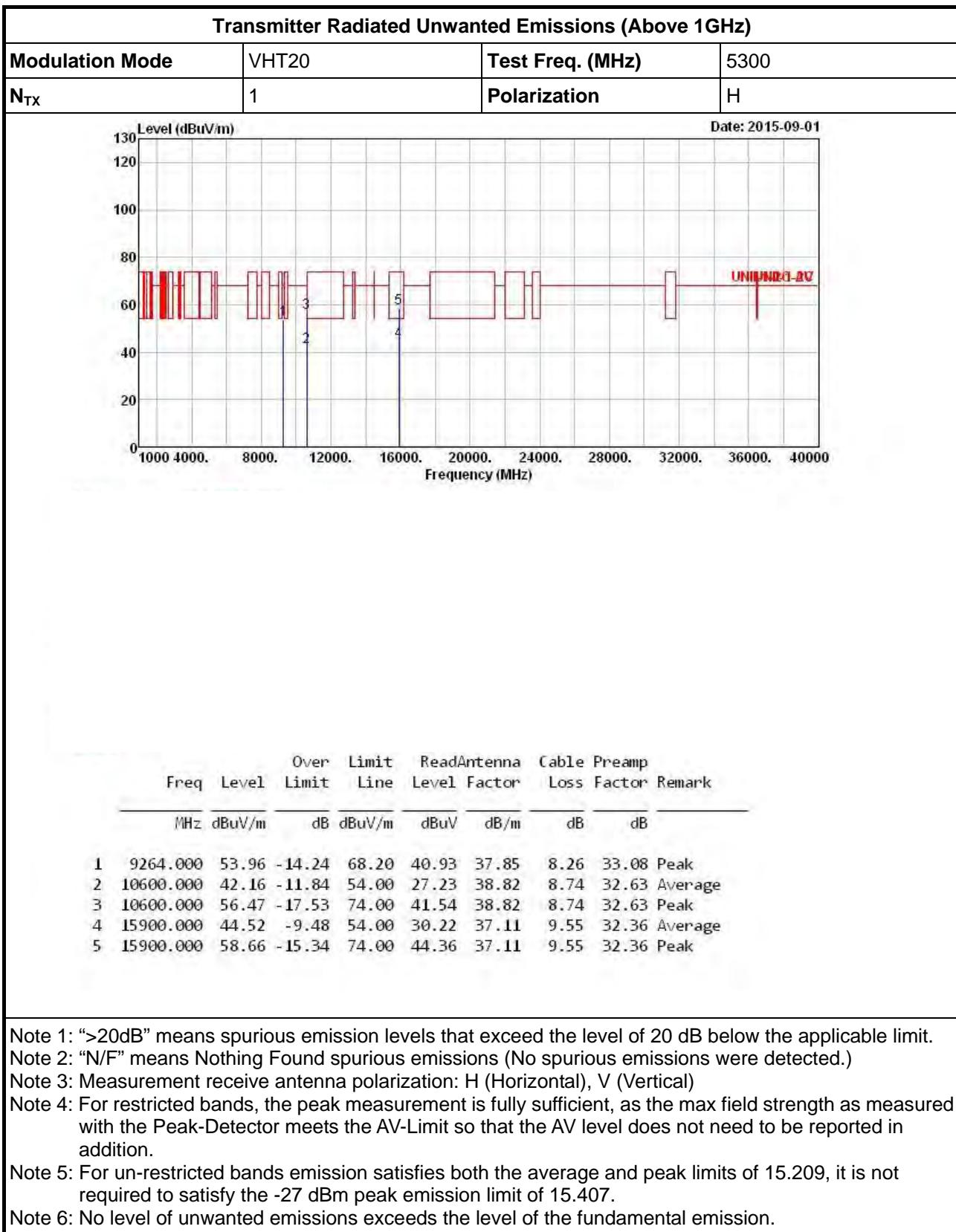
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.







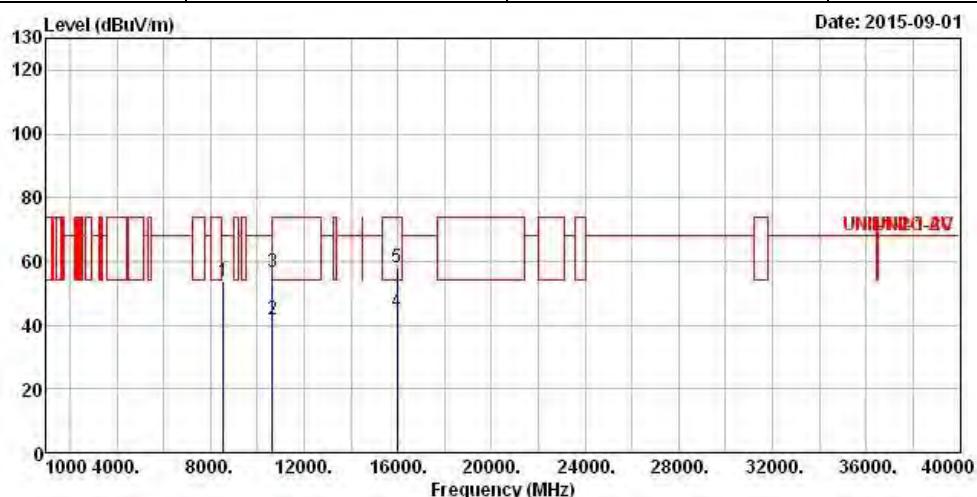






## Transmitter Radiated Unwanted Emissions (Above 1GHz)

<b>Modulation Mode</b>	VHT20	<b>Test Freq. (MHz)</b>	5320
<b>N<sub>TX</sub></b>	1	<b>Polarization</b>	V



Freq	Level	Over Limit	Limit Line	ReadAntenna		Cable Loss	Preamp Factor	Remark
				dB	dBuV/m			
1	8568.000	53.78	-14.42	68.20	41.06	37.71	7.94	32.93 Peak
2	10640.000	41.64	-12.36	54.00	26.74	38.79	8.71	32.60 Average
3	10640.000	56.39	-17.61	74.00	41.49	38.79	8.71	32.60 Peak
4	15960.000	44.22	-9.78	54.00	30.06	36.97	9.58	32.39 Average
5	15960.000	57.95	-16.05	74.00	43.79	36.97	9.58	32.39 Peak

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

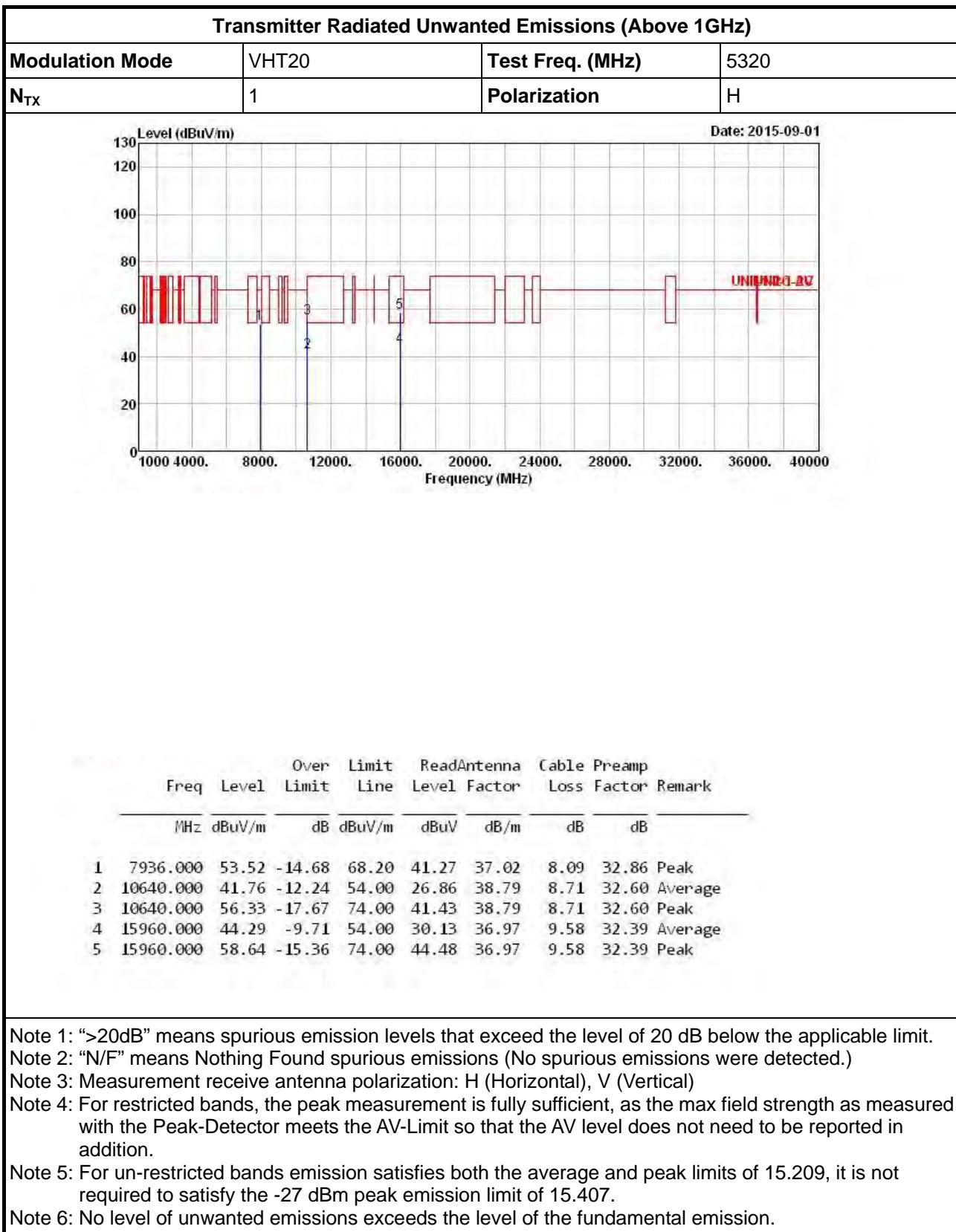
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

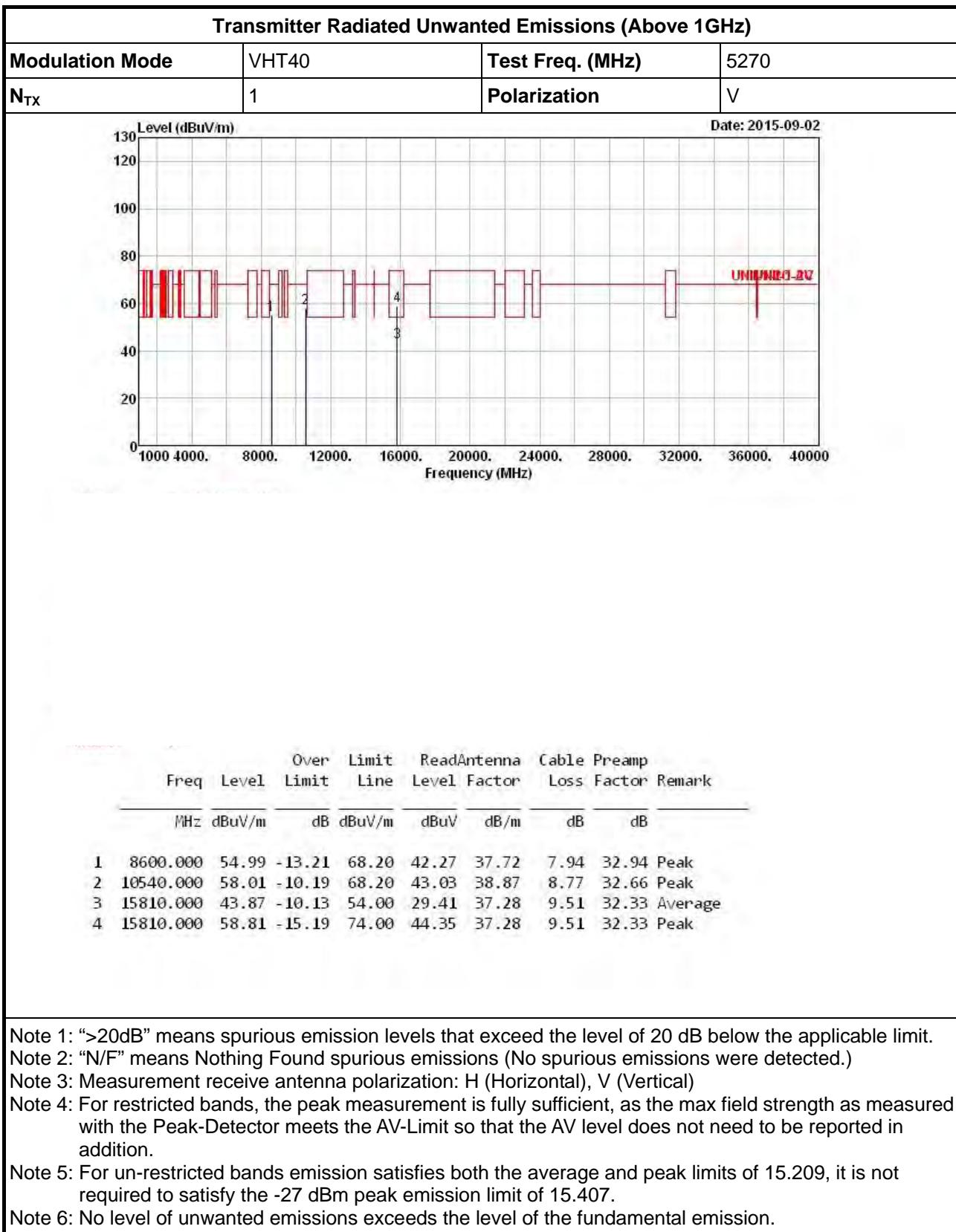
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

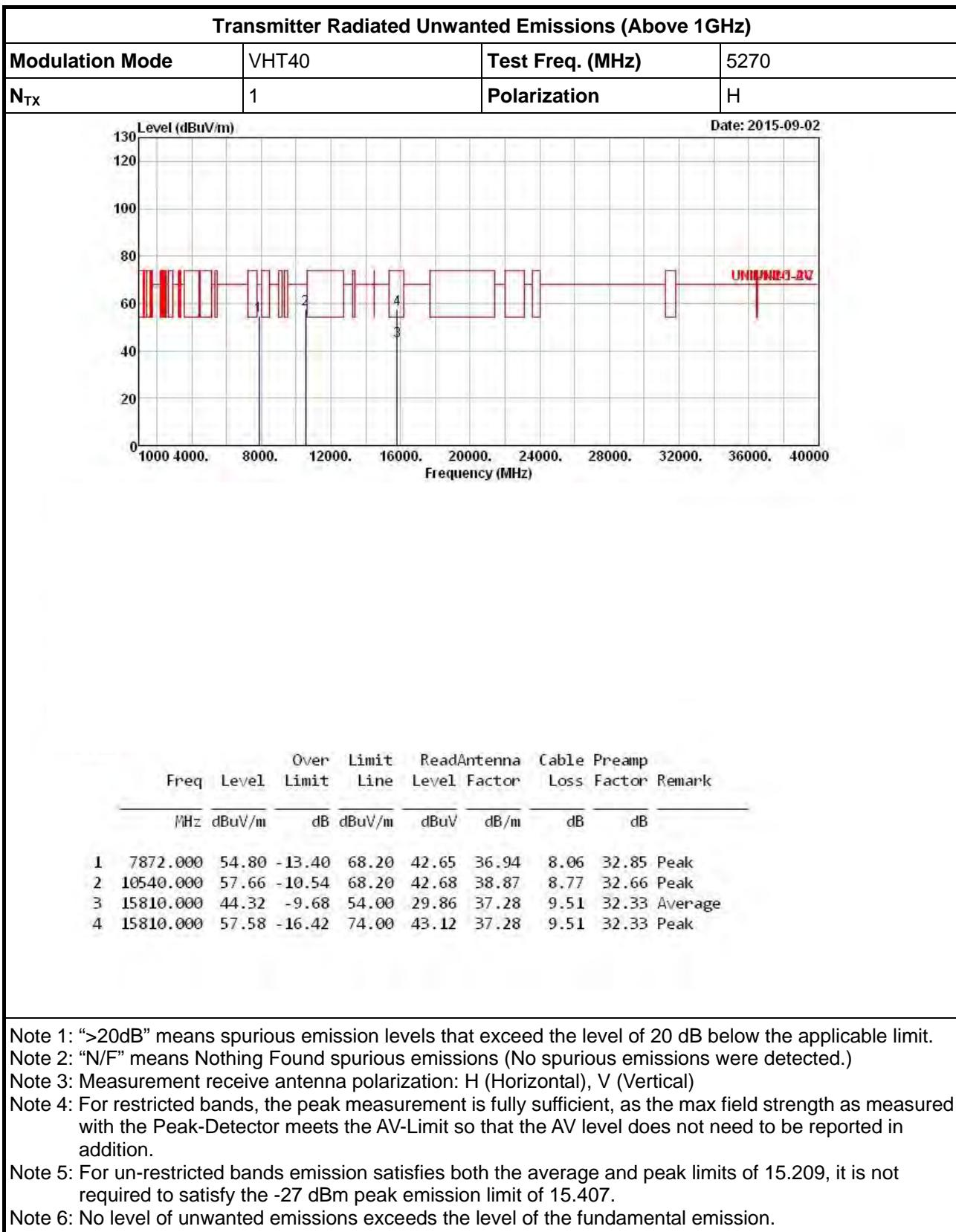
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

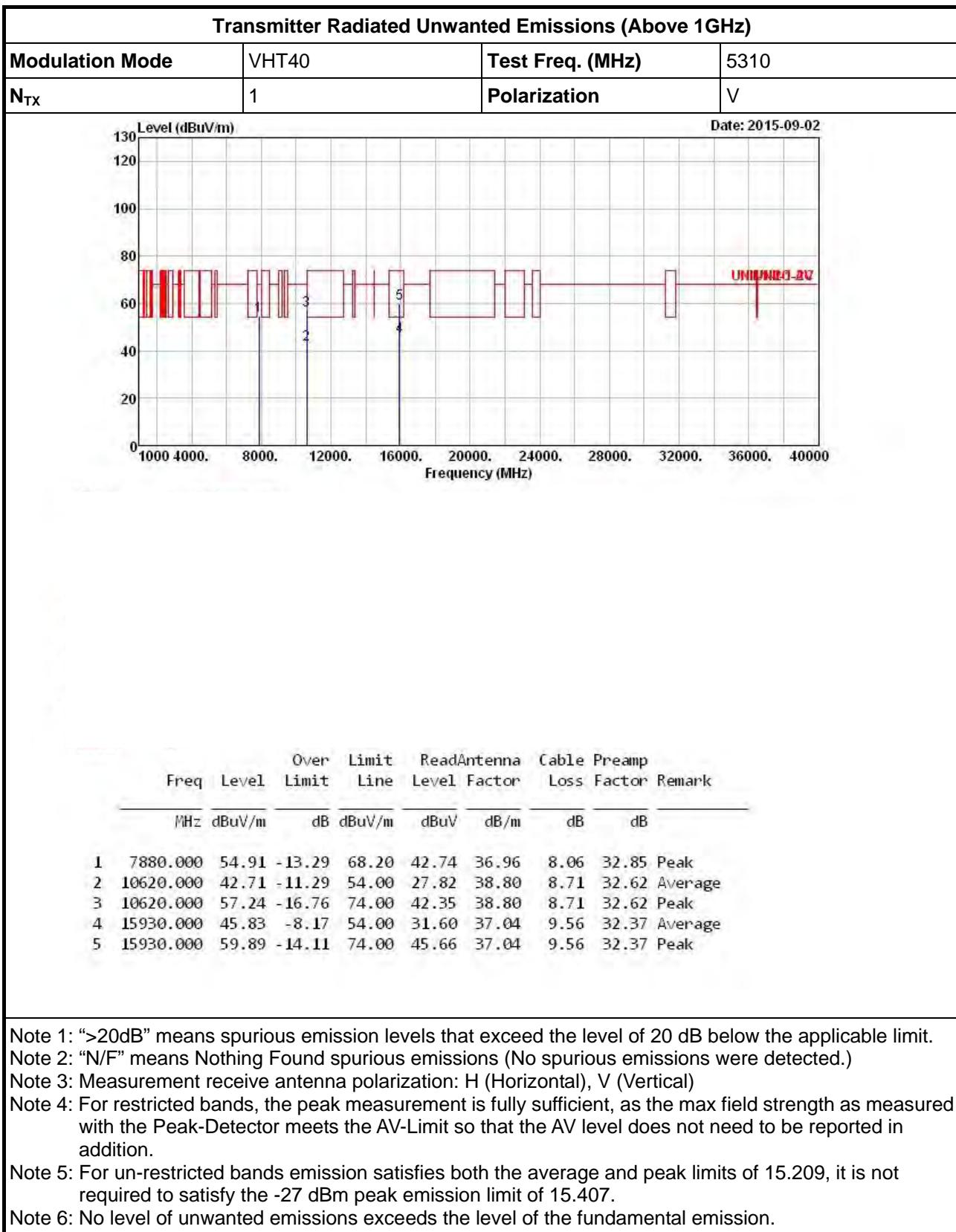
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

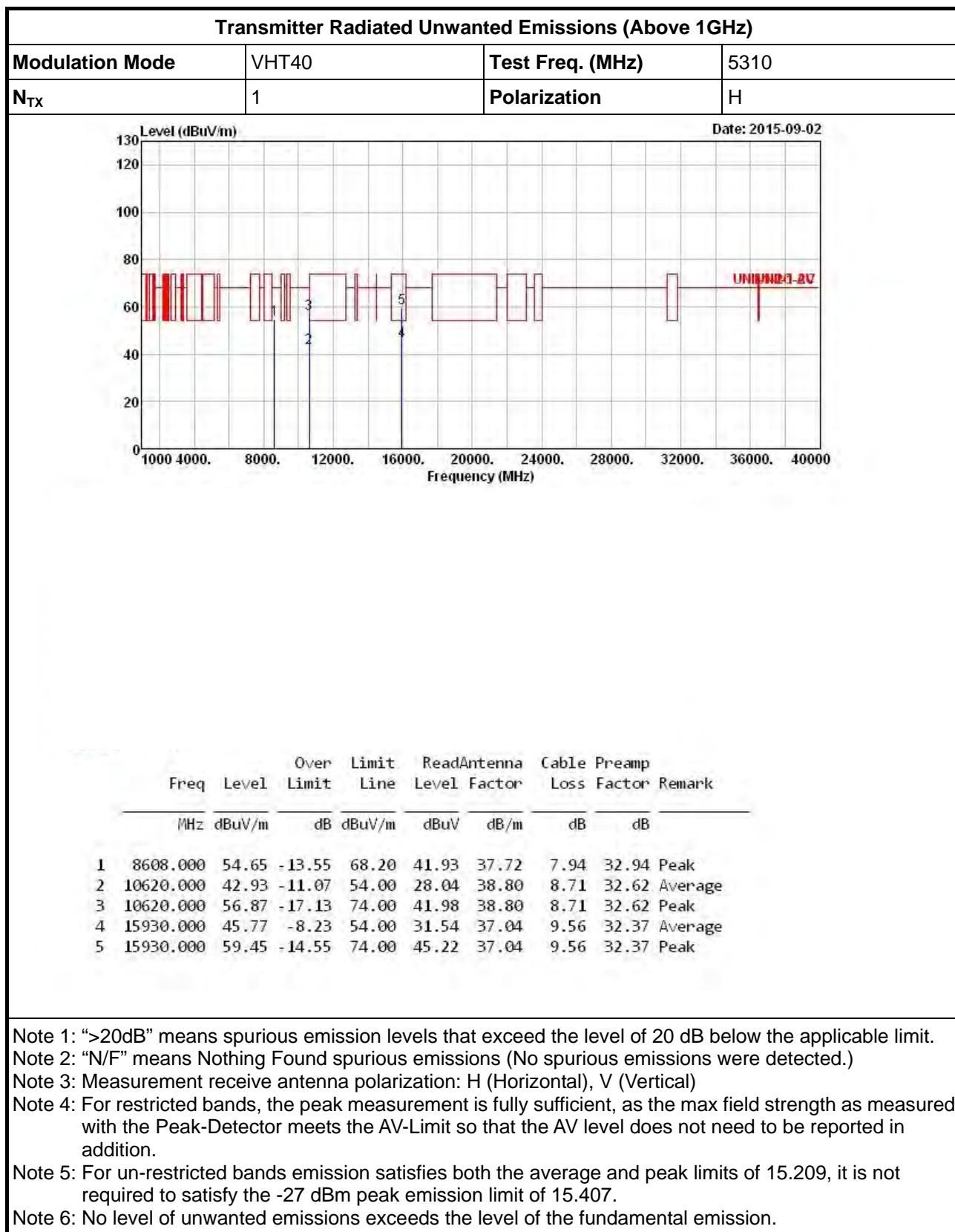
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.











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

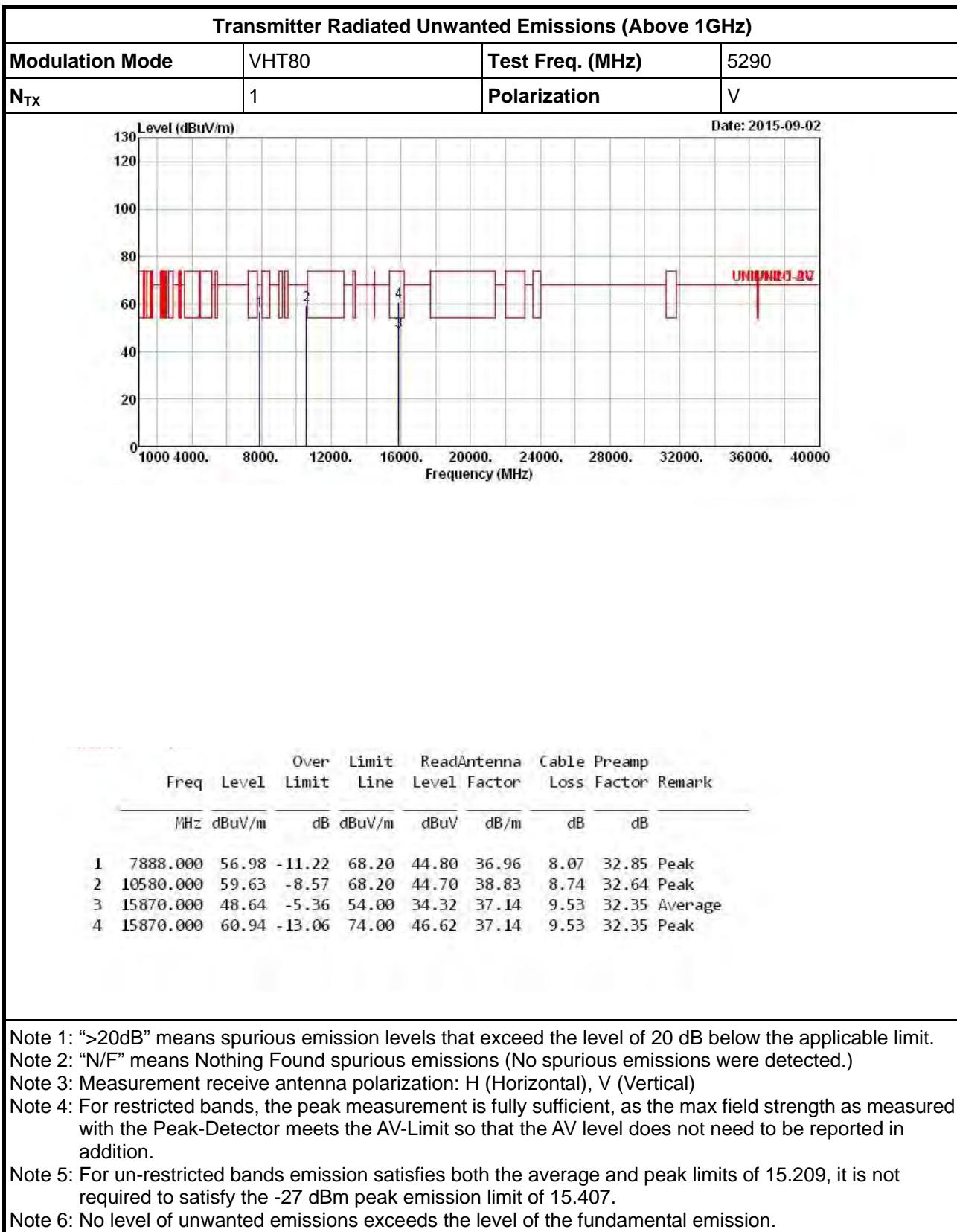
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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.



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

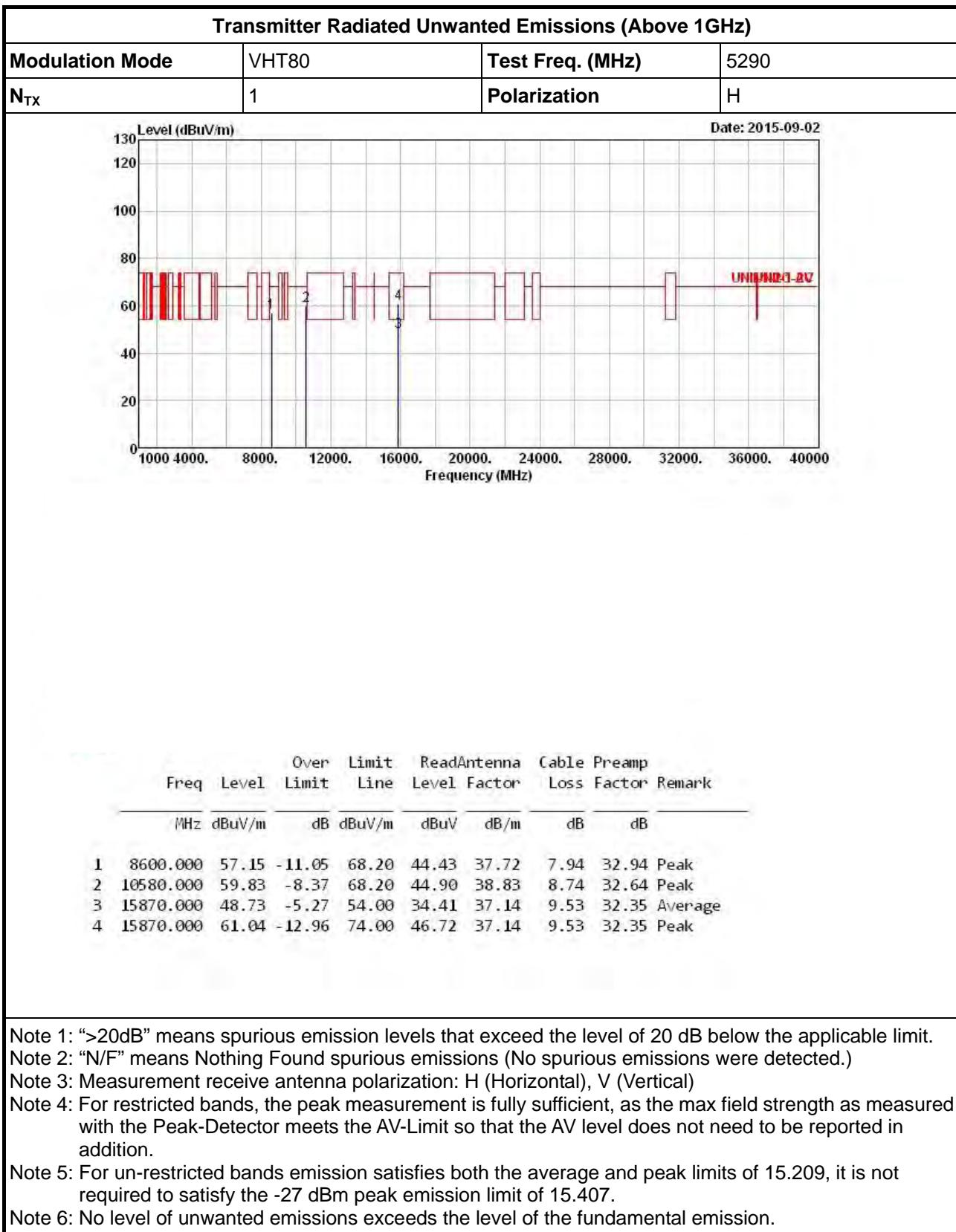
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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.

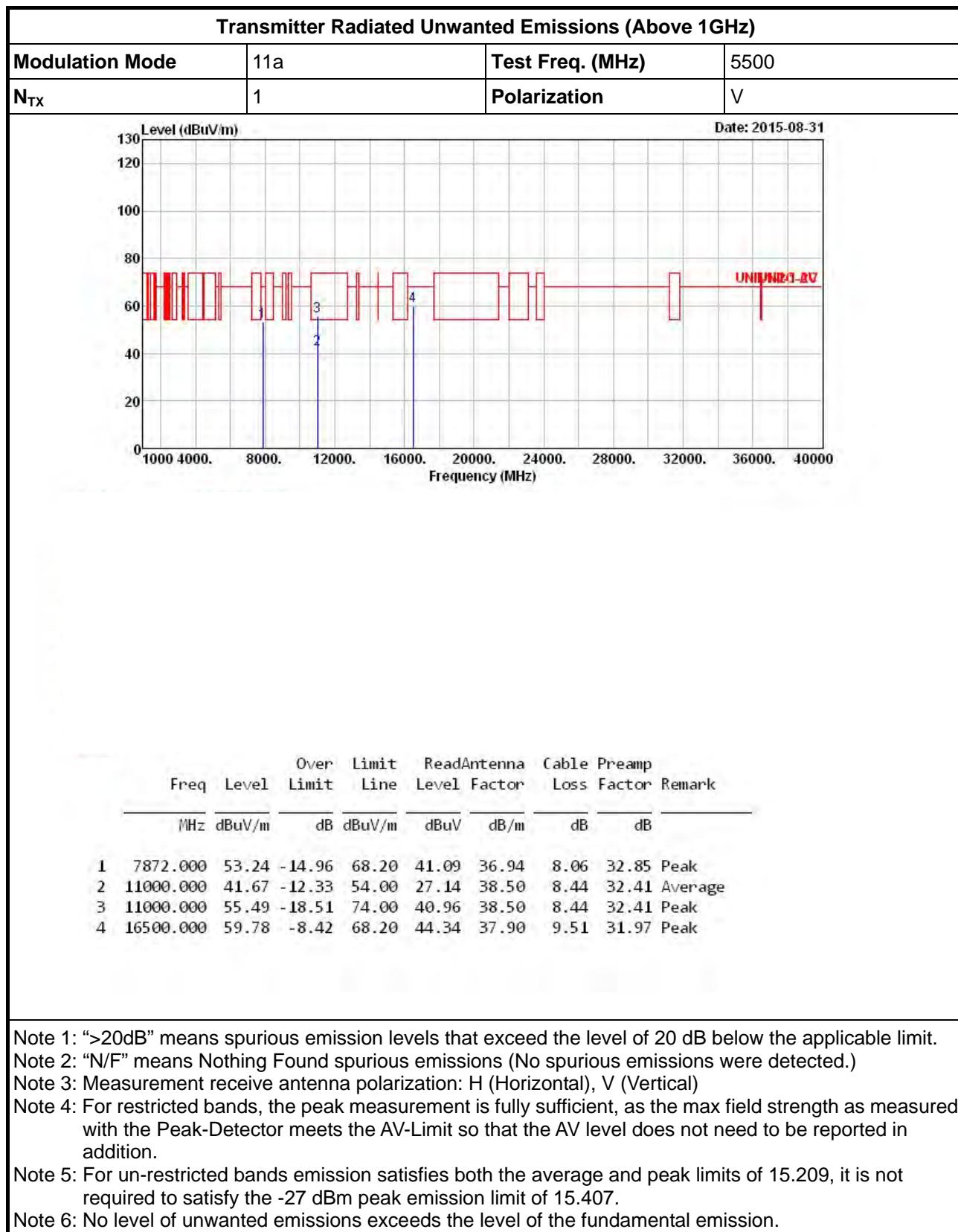
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

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



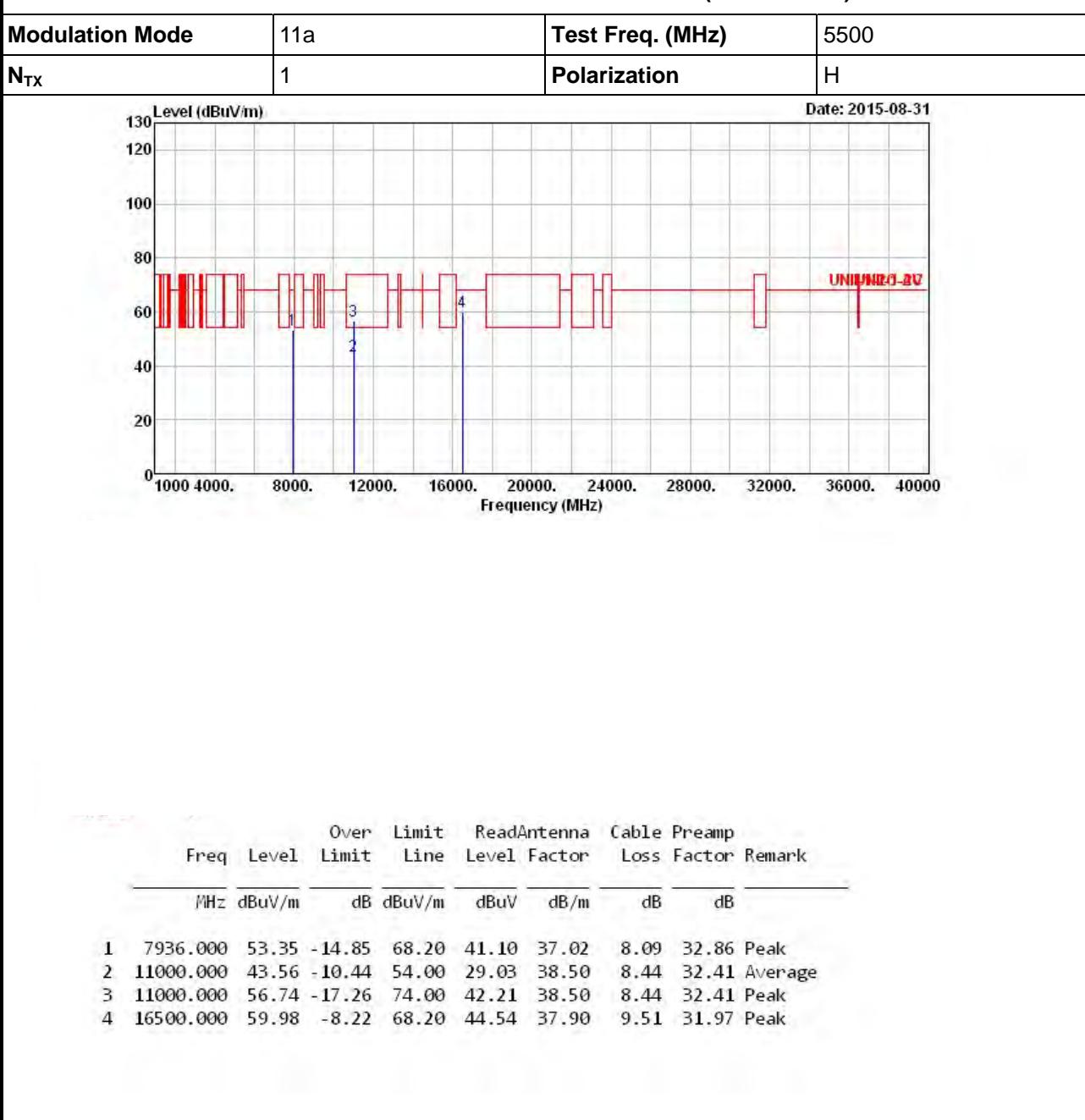


## 3.6.9 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 5470-5725MHz





## Transmitter Radiated Unwanted Emissions (Above 1GHz)



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

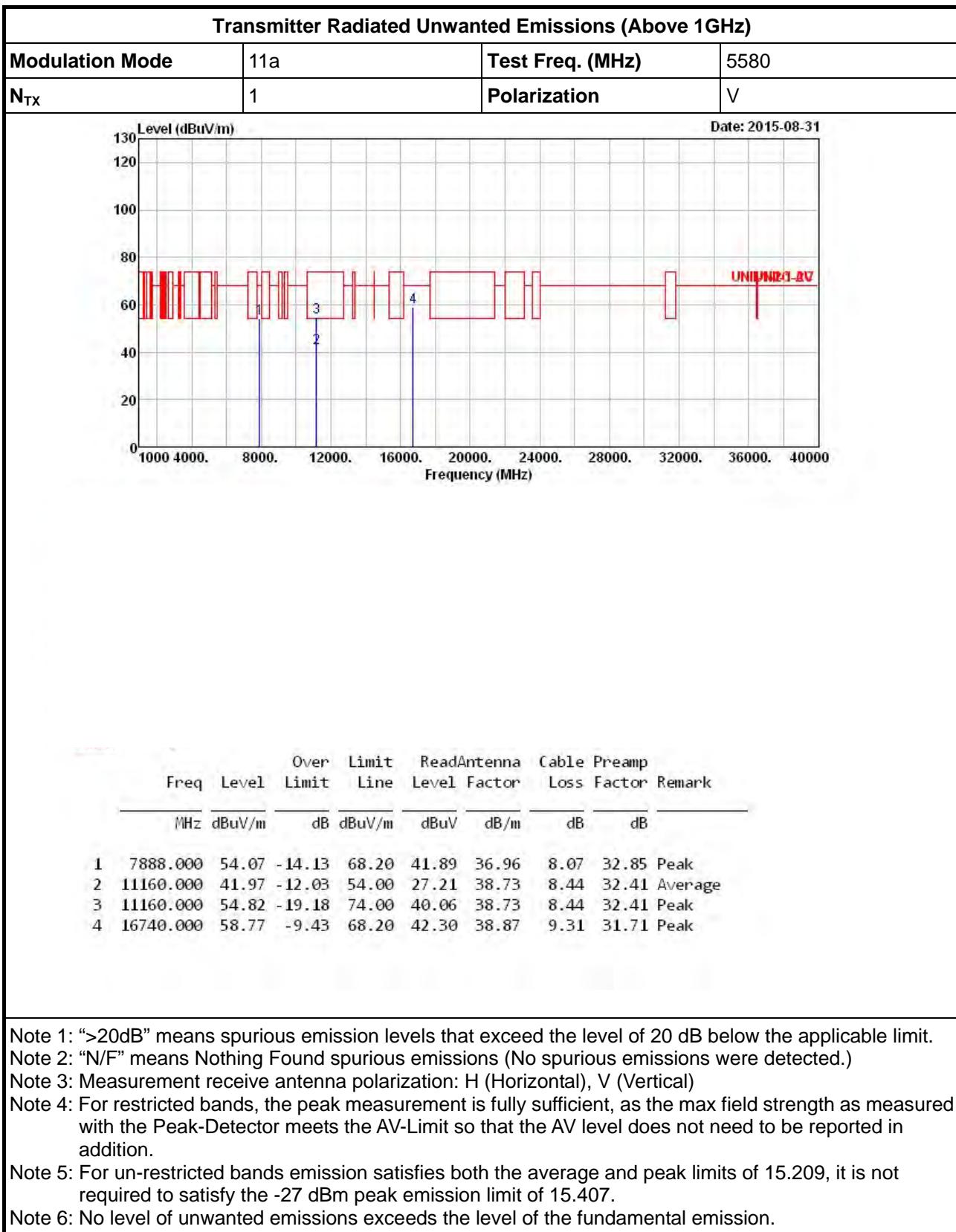
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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.



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

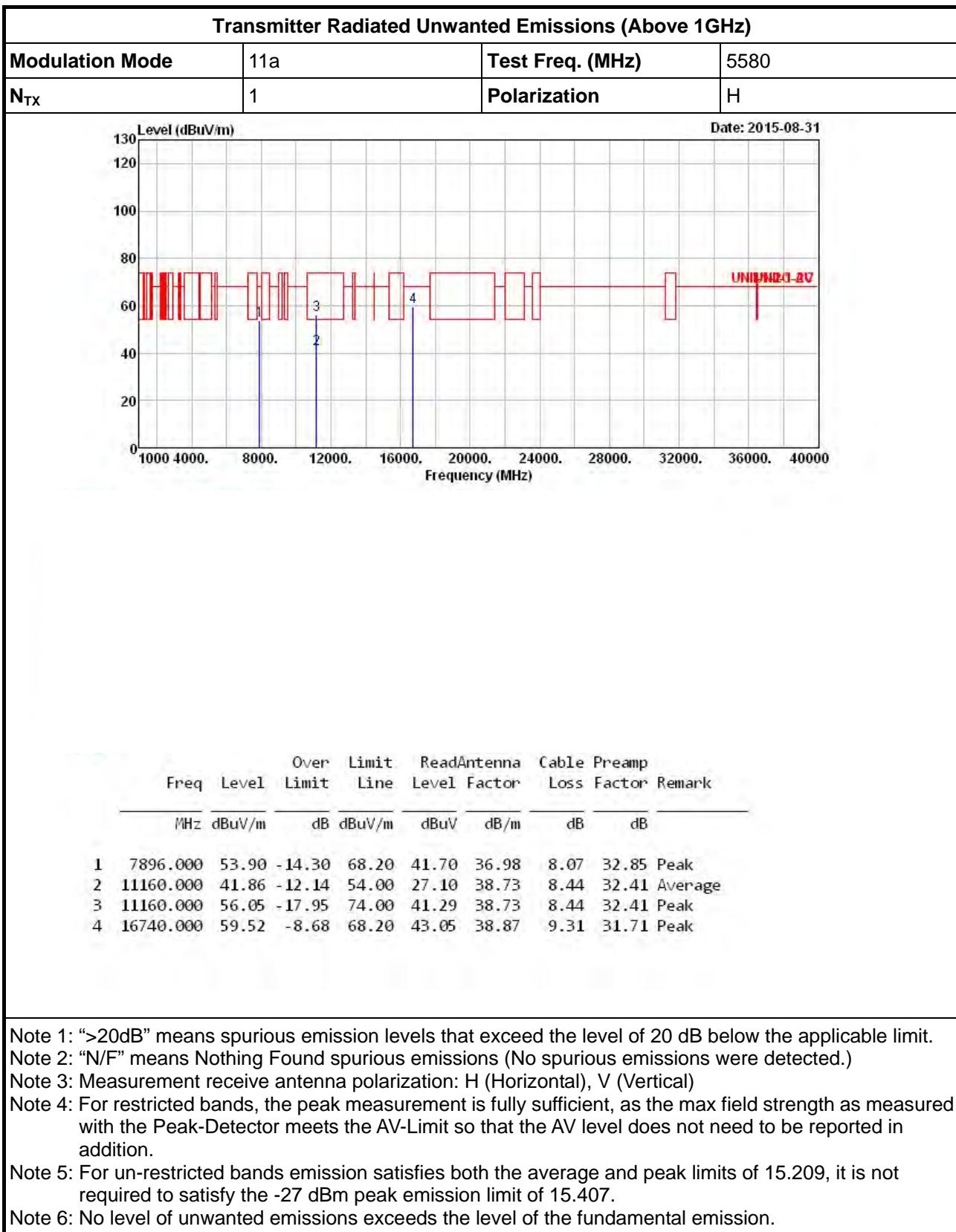
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

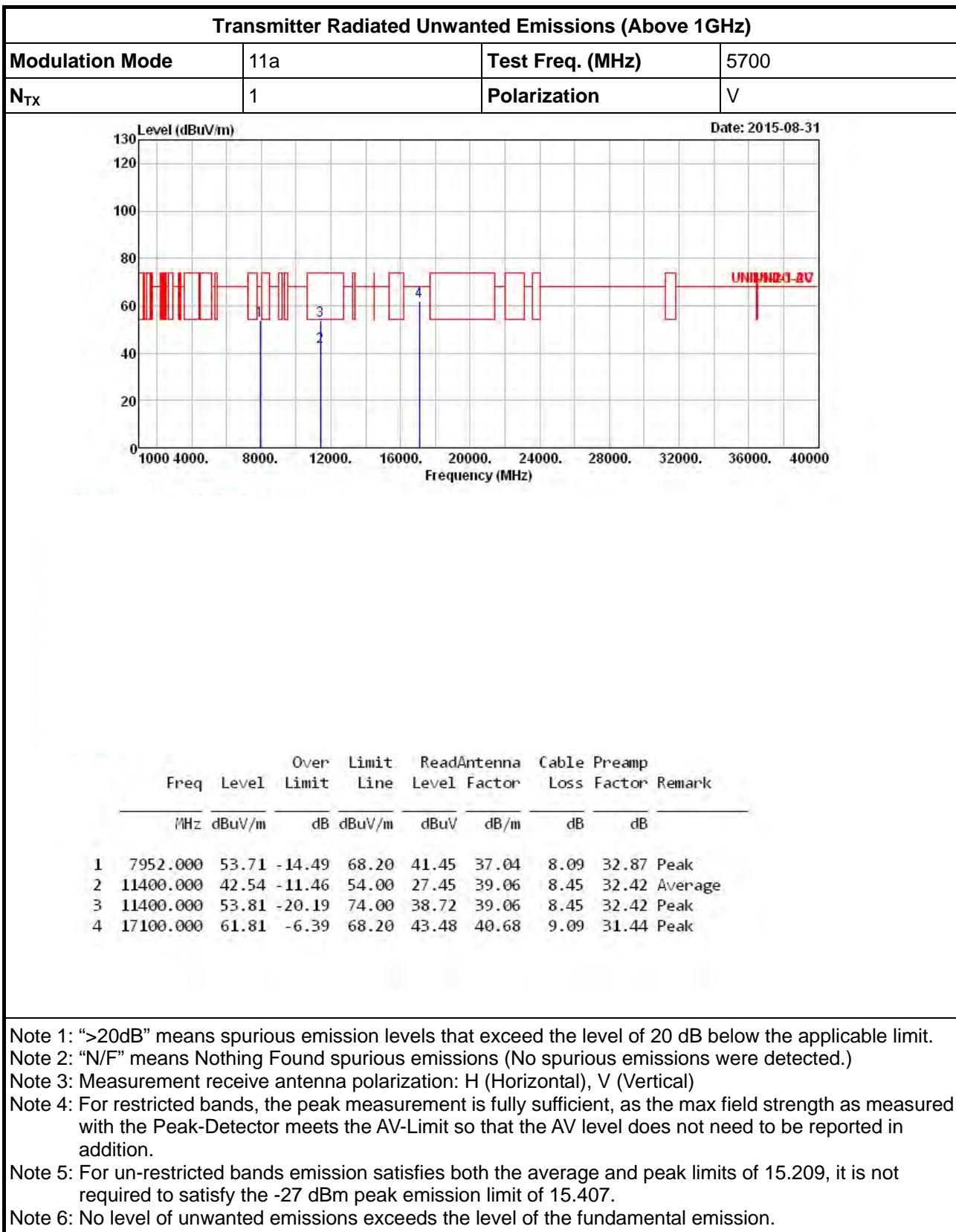
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

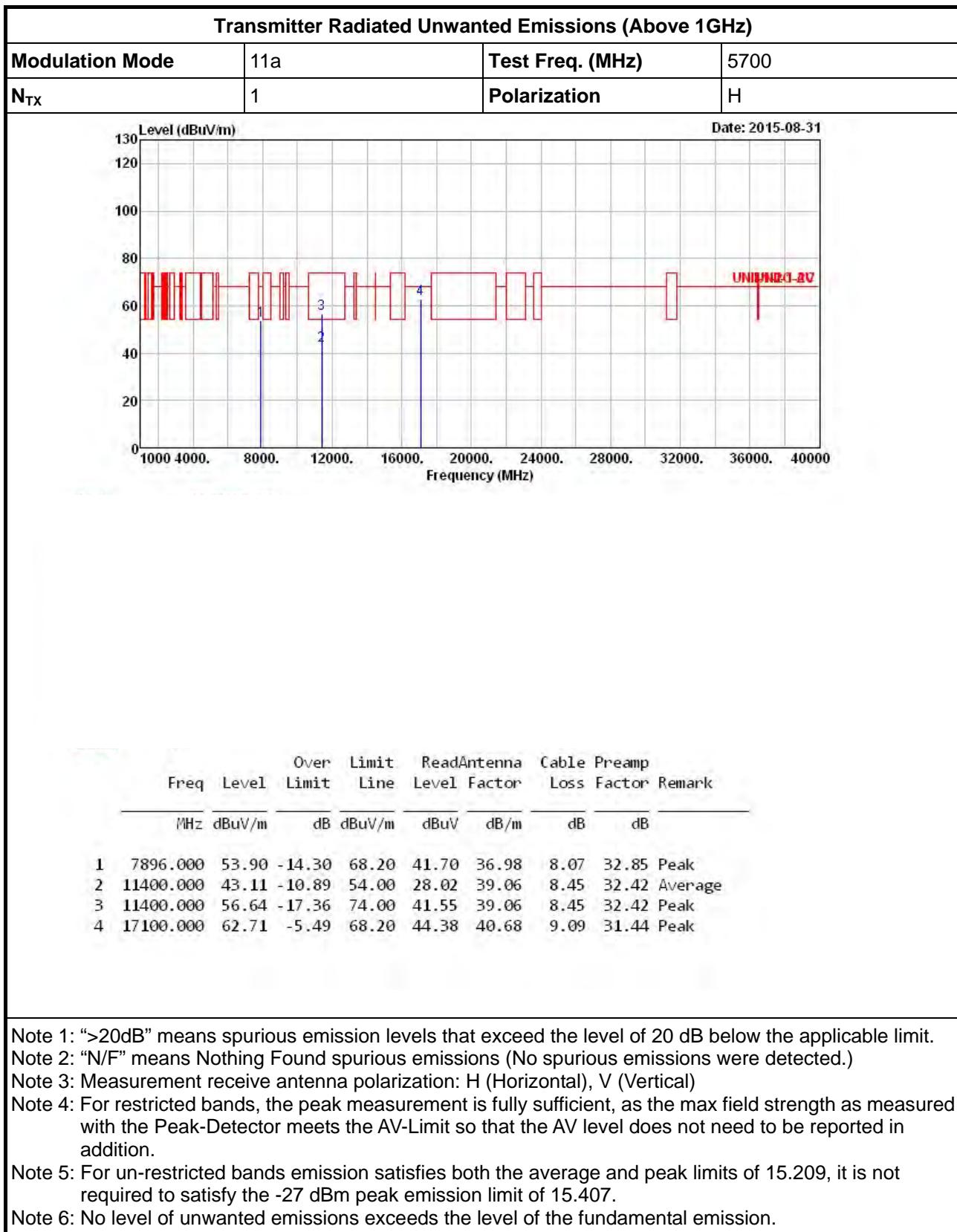
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

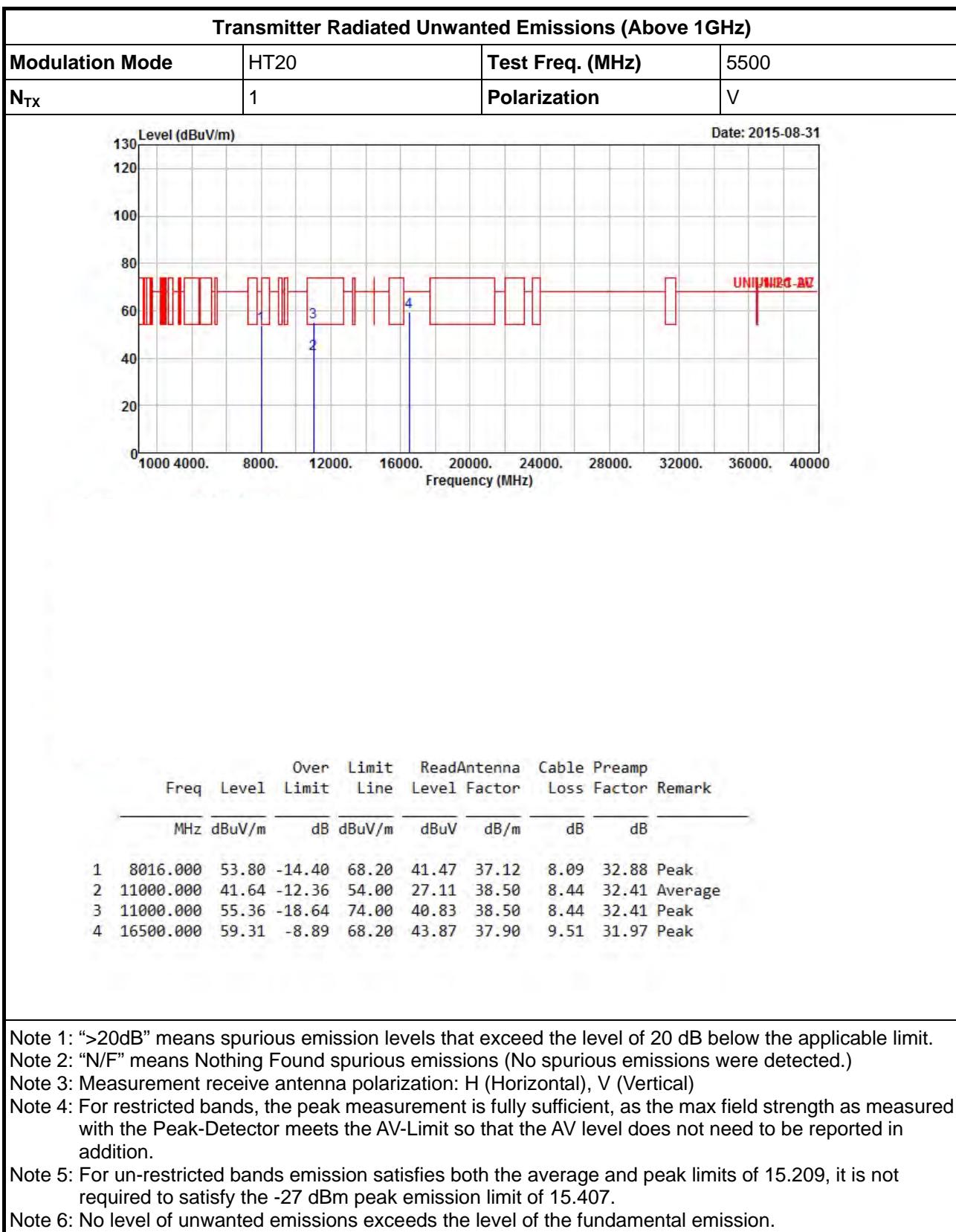
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

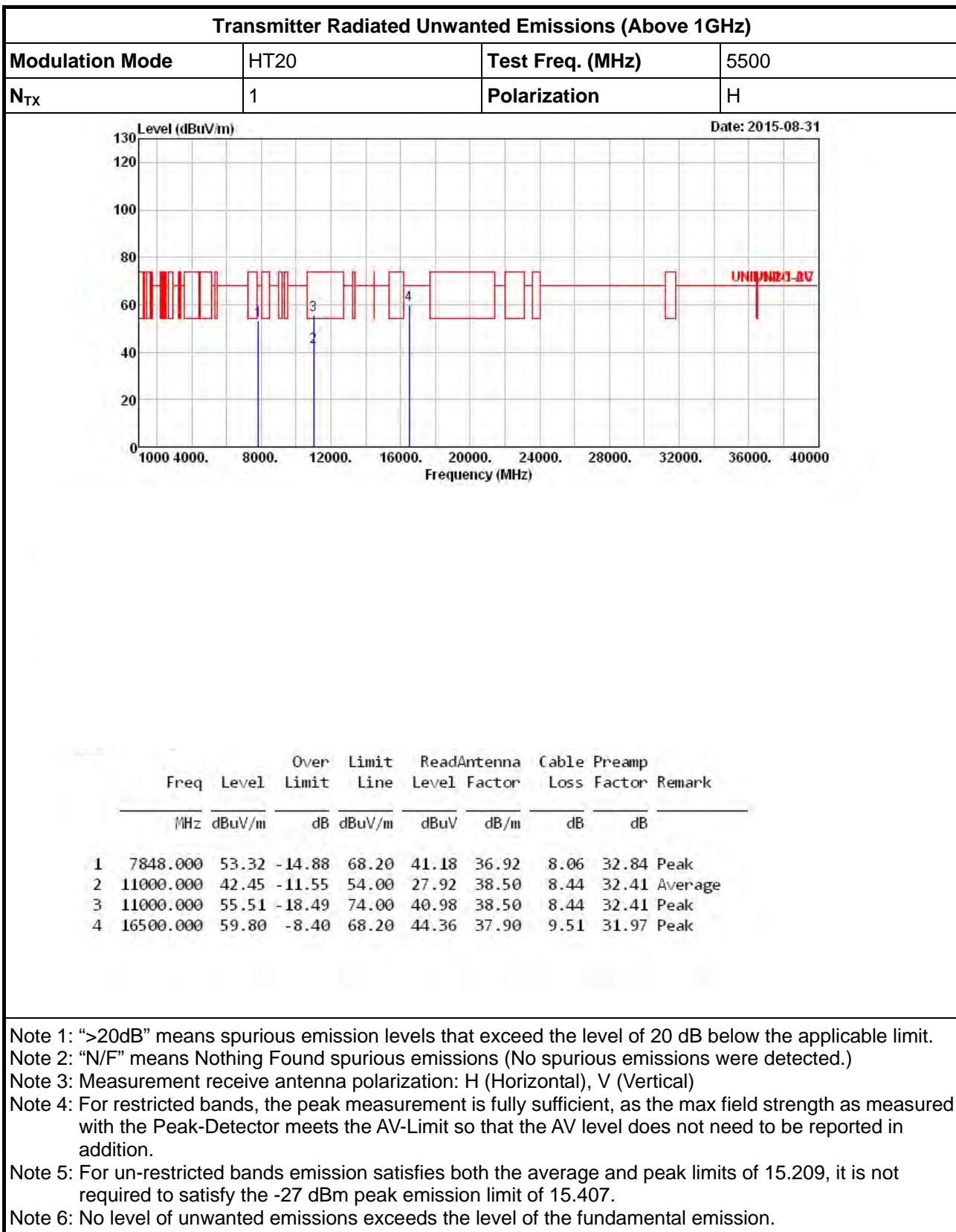
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

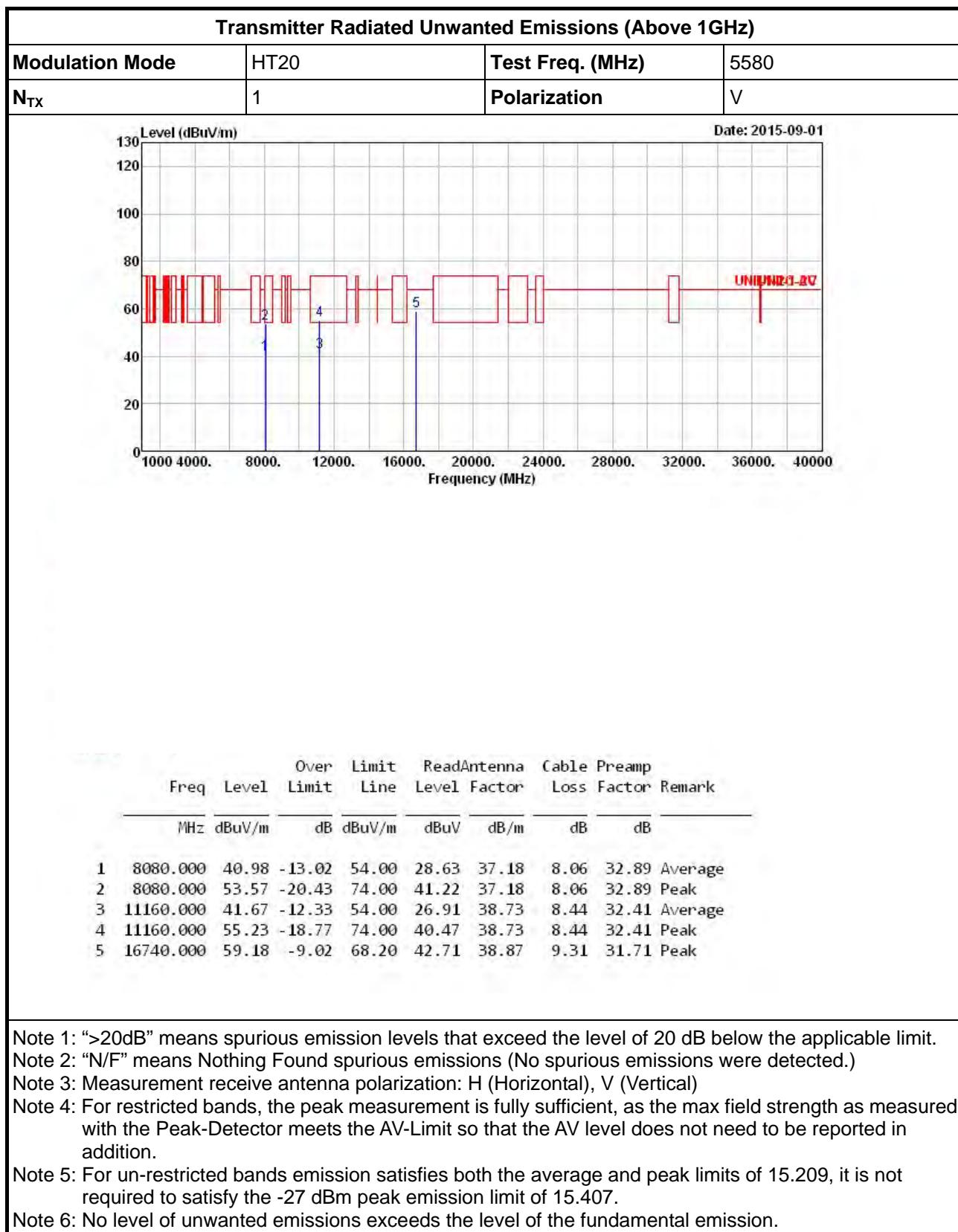


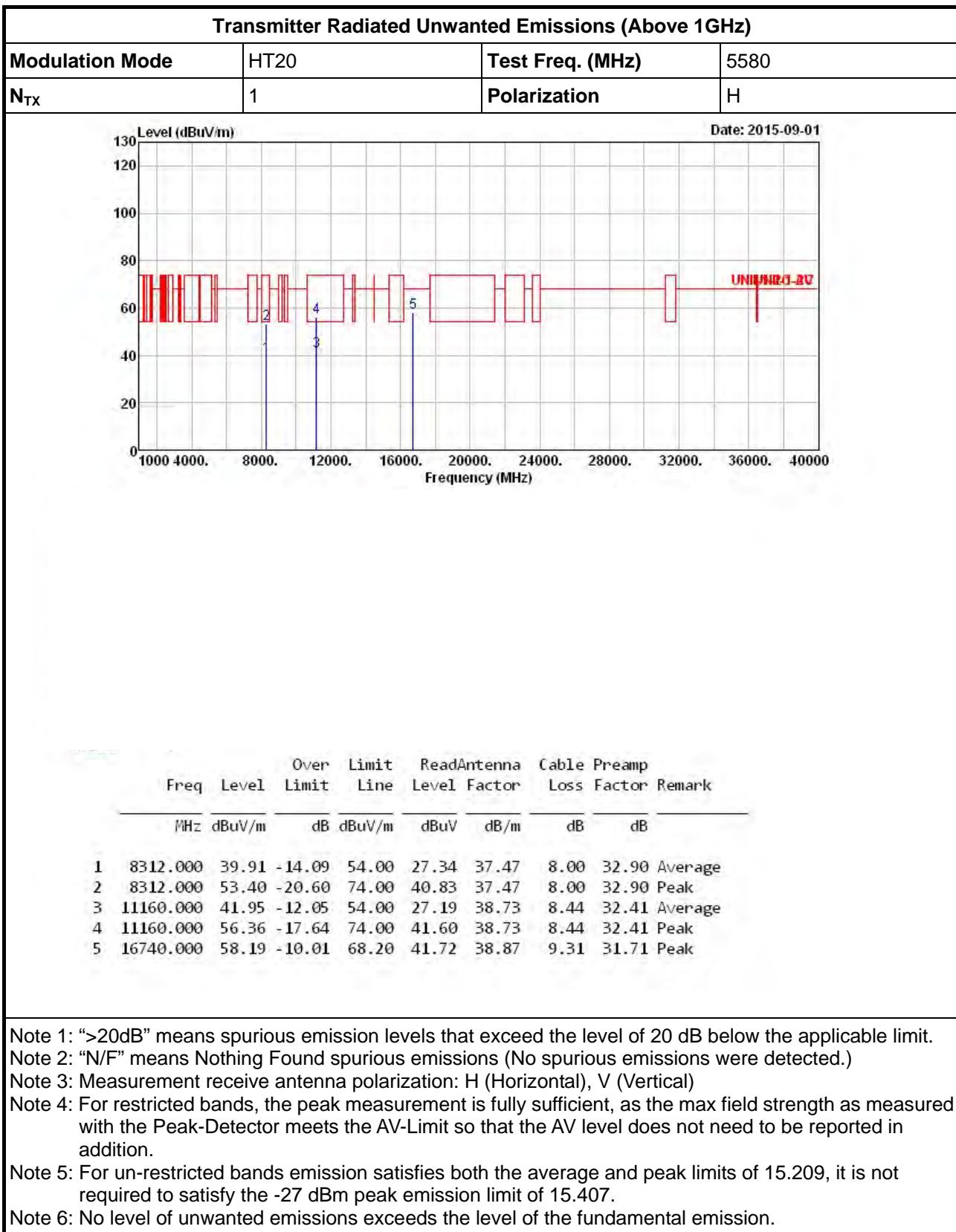


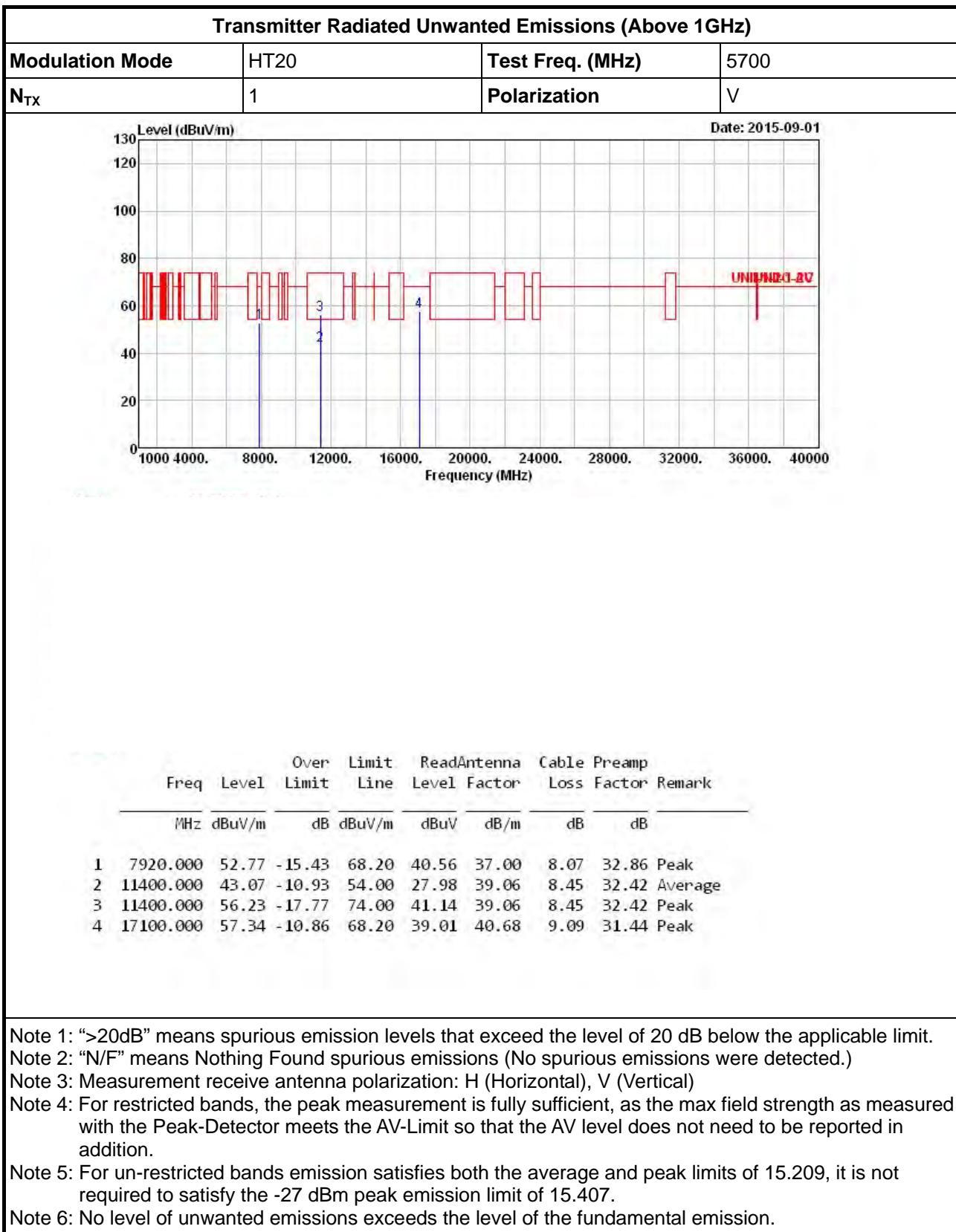


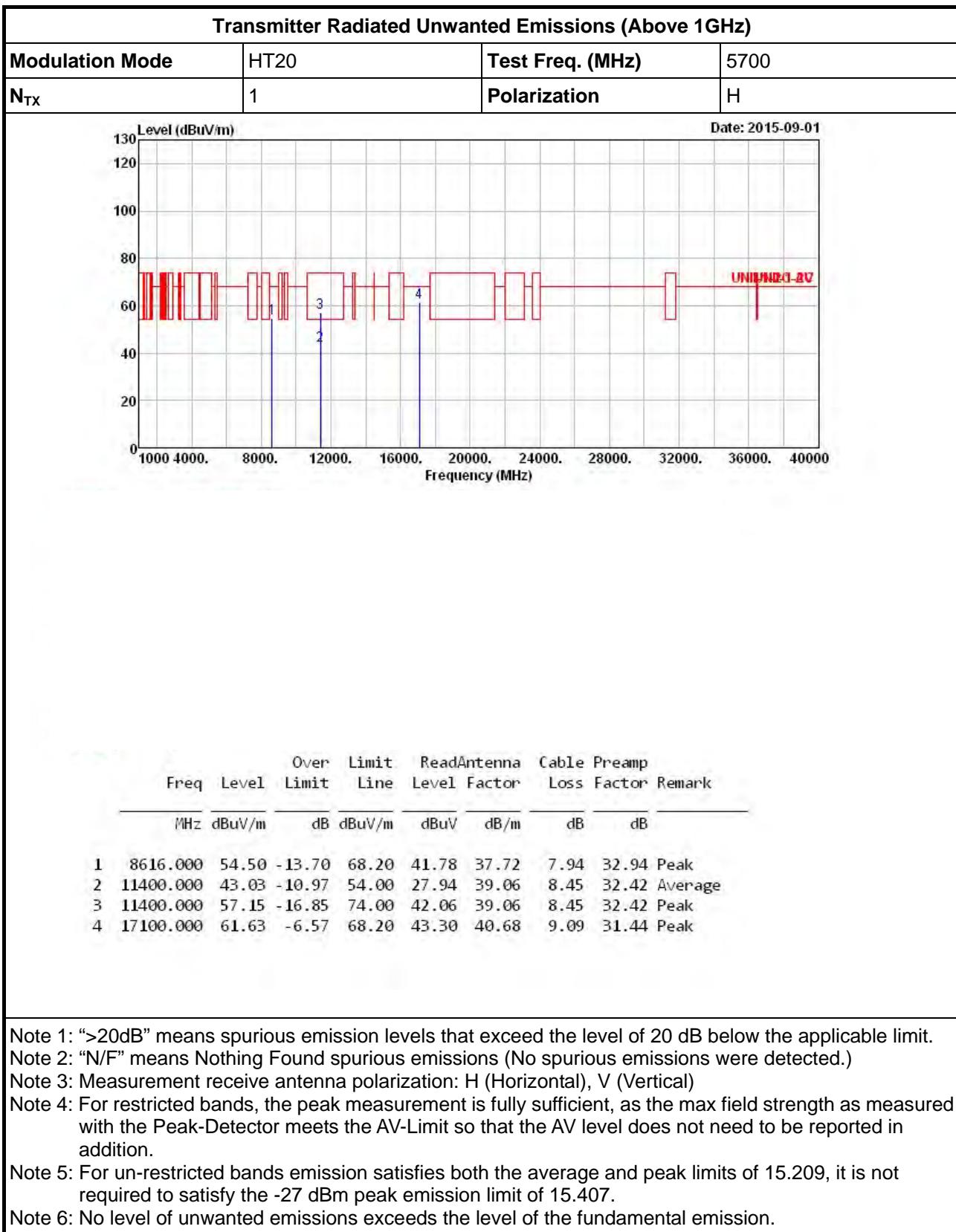


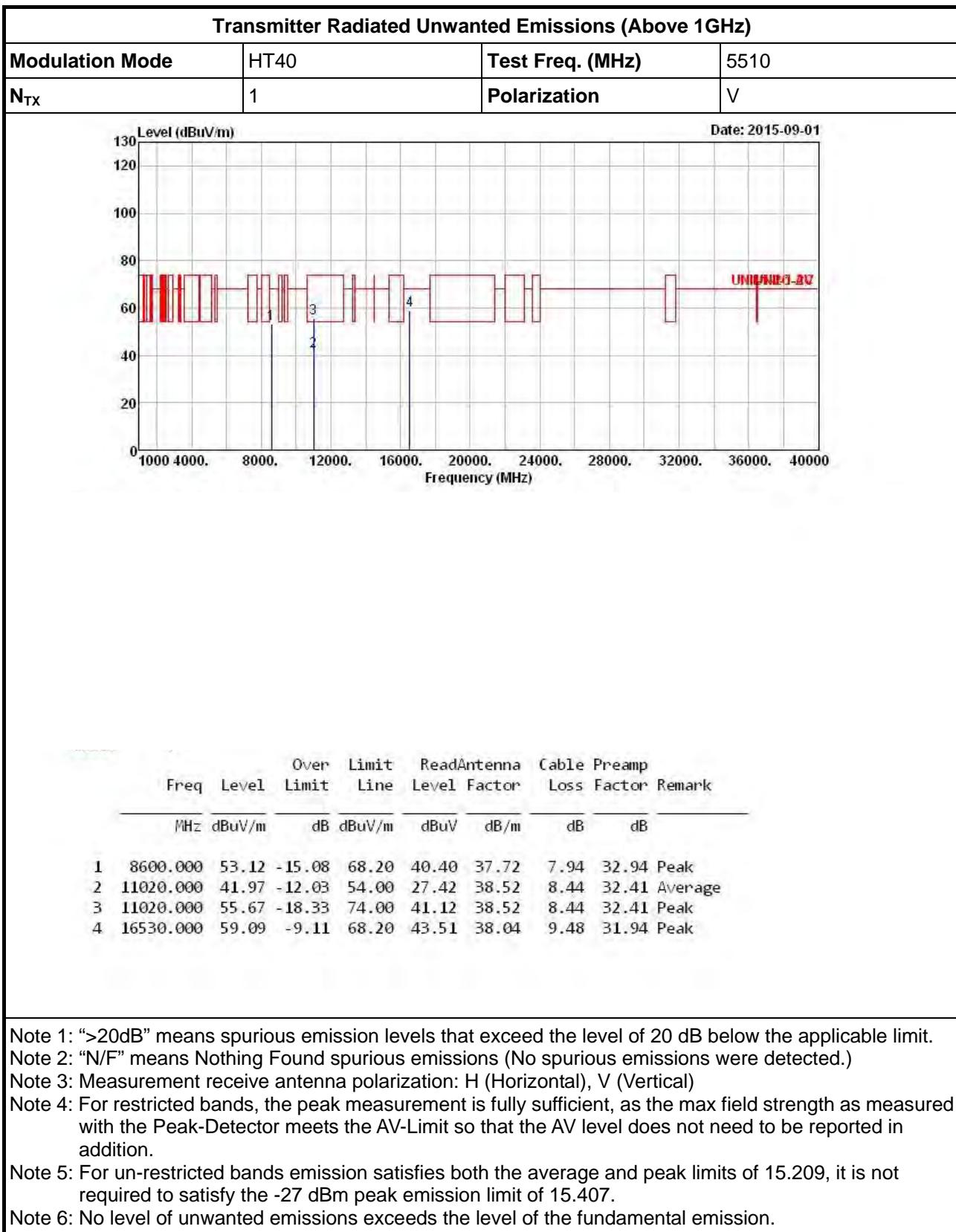


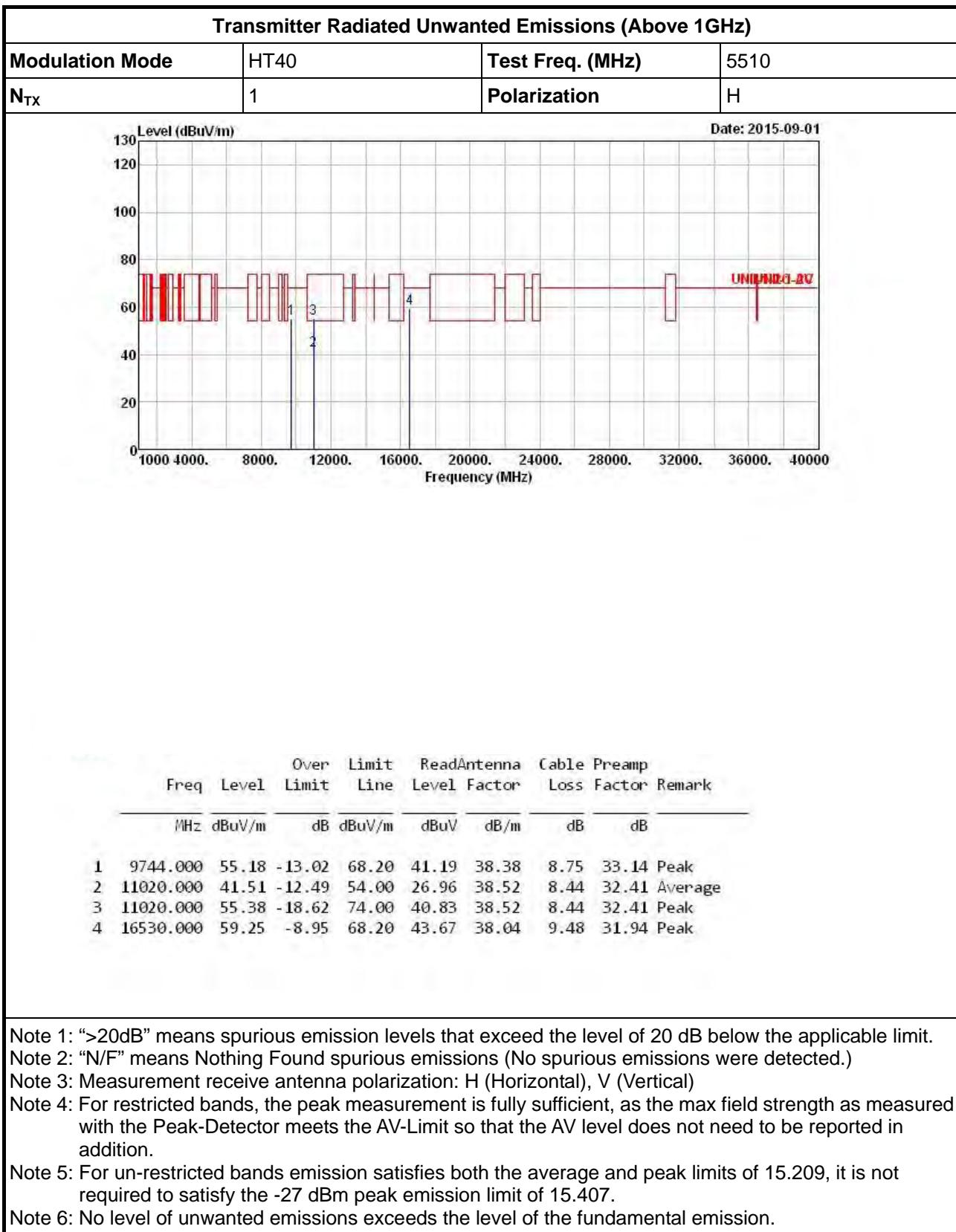












Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

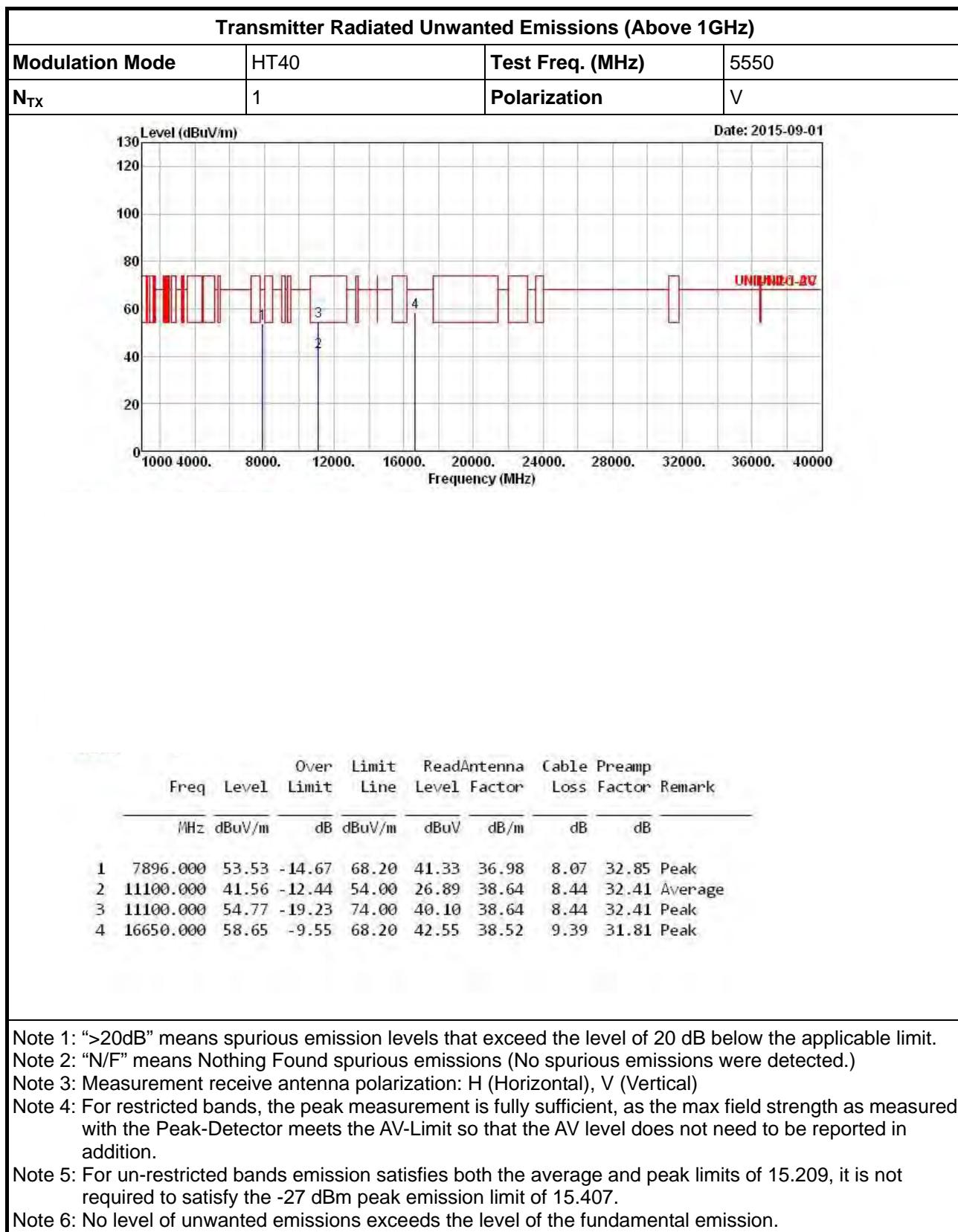
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

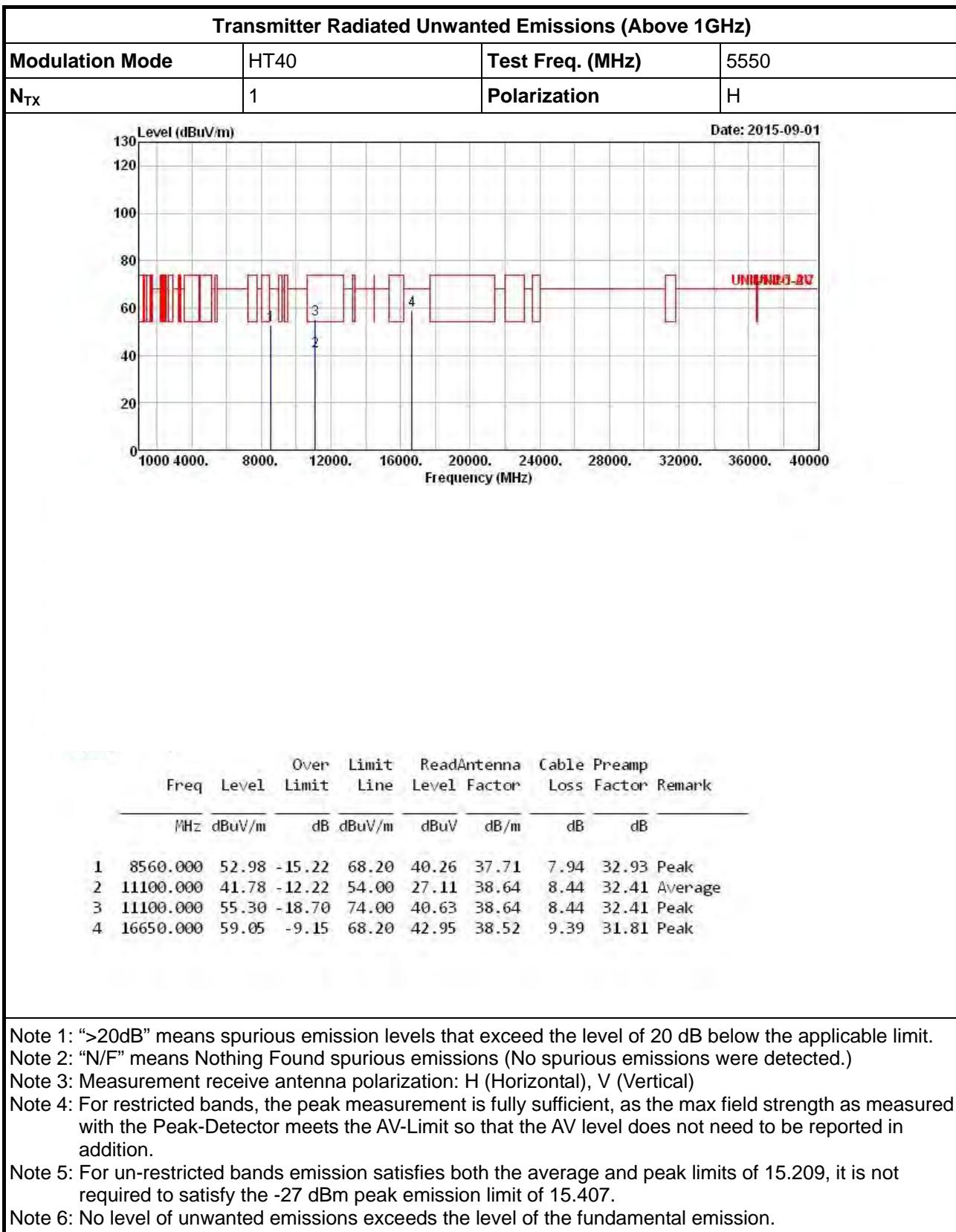
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

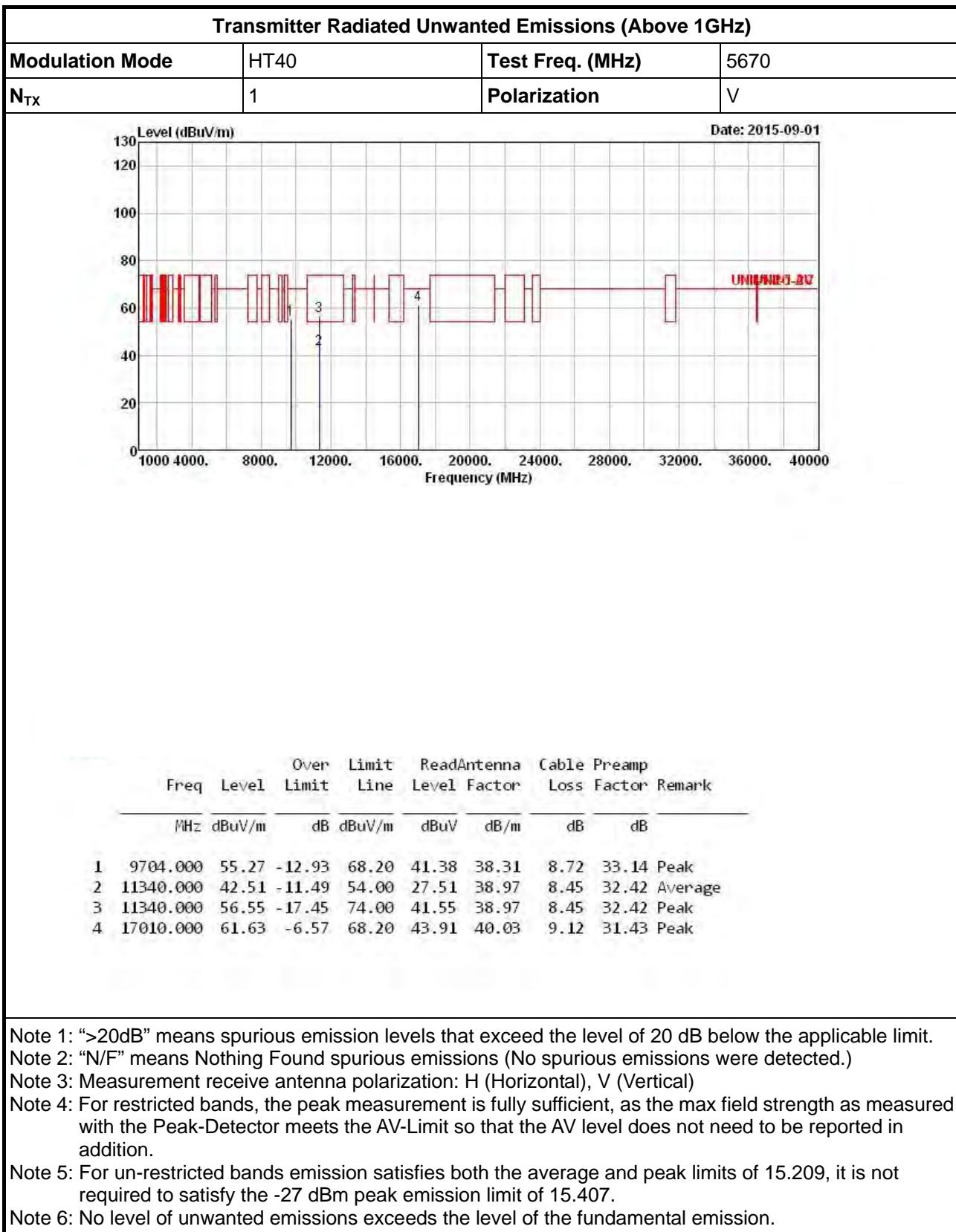
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

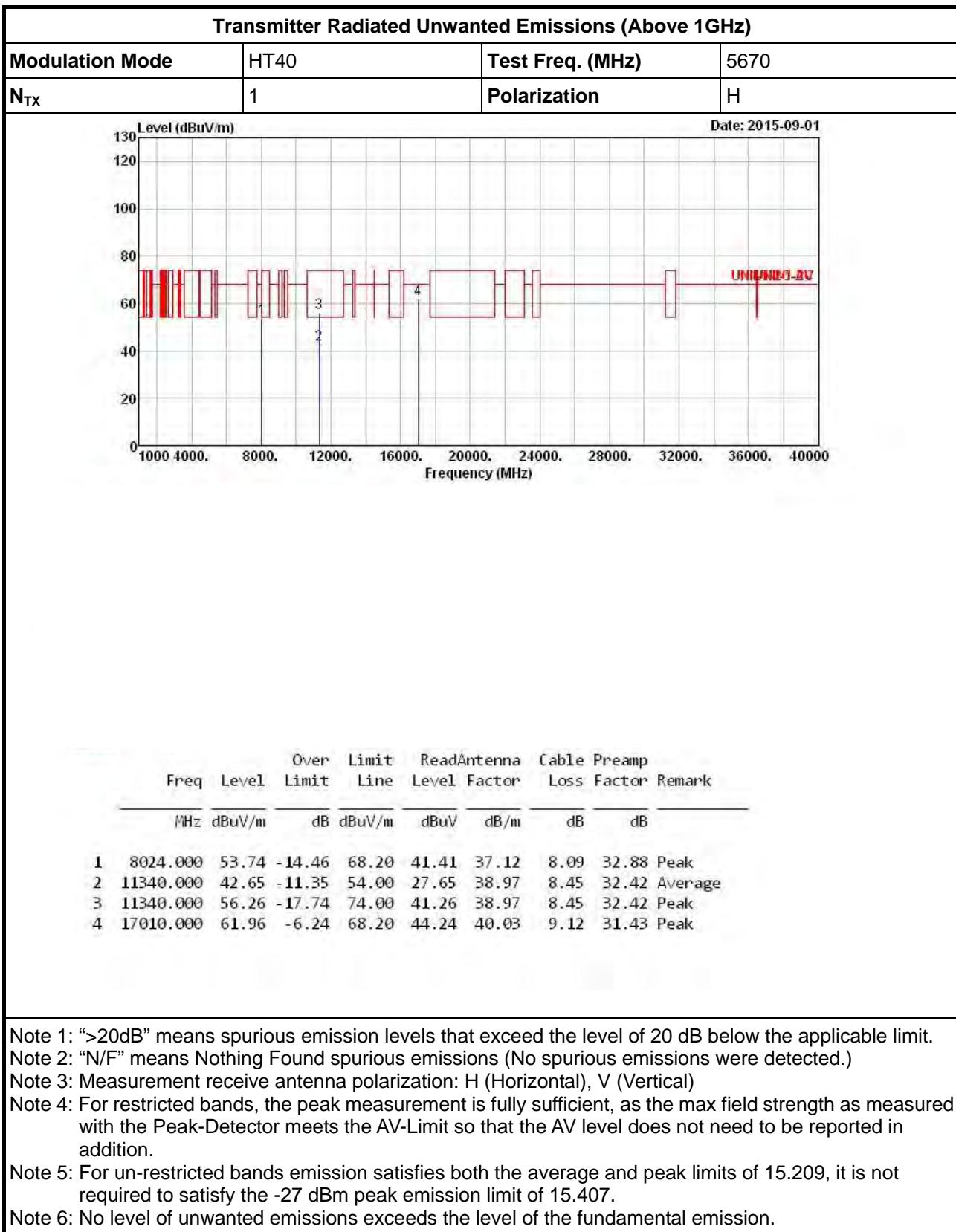
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

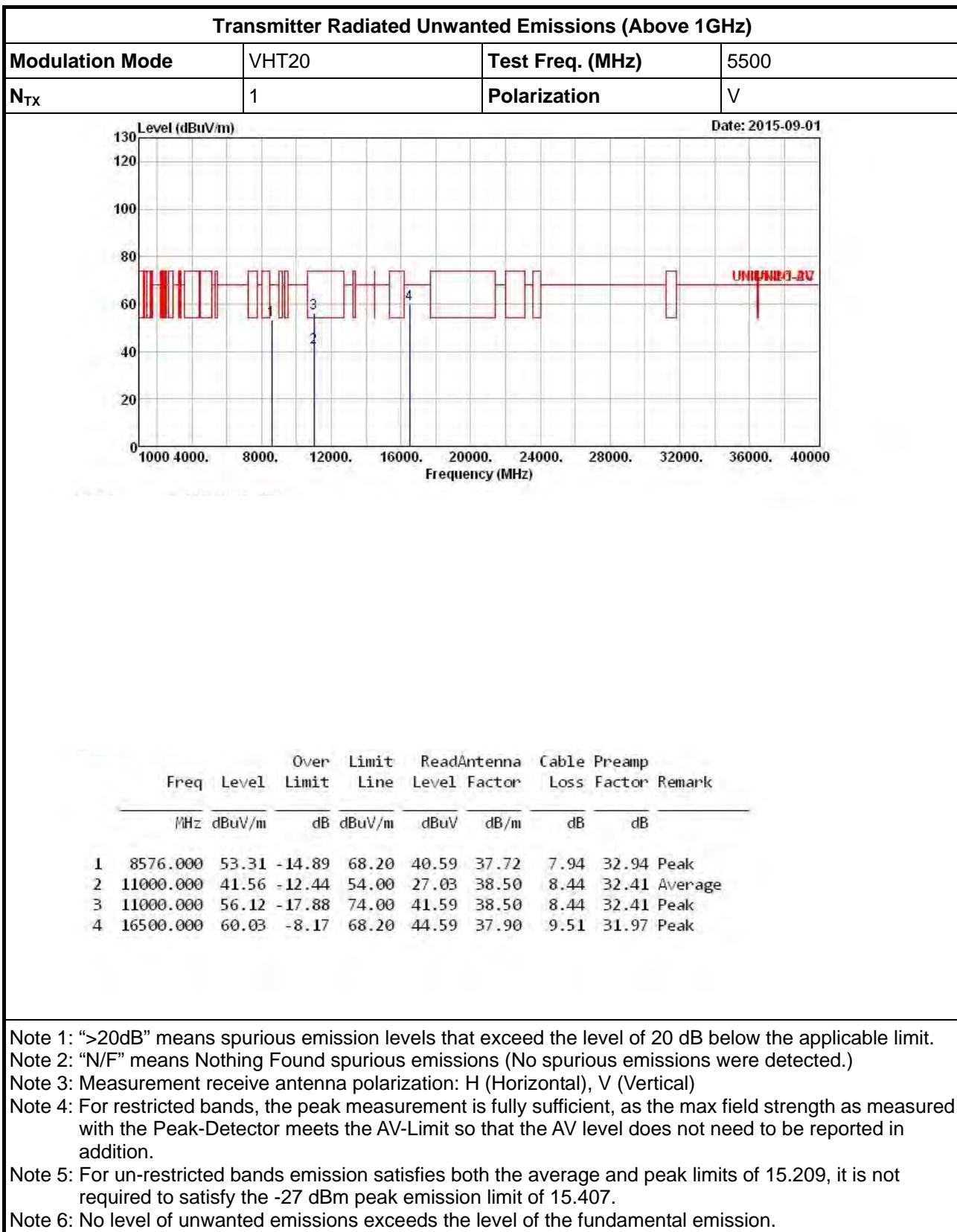
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

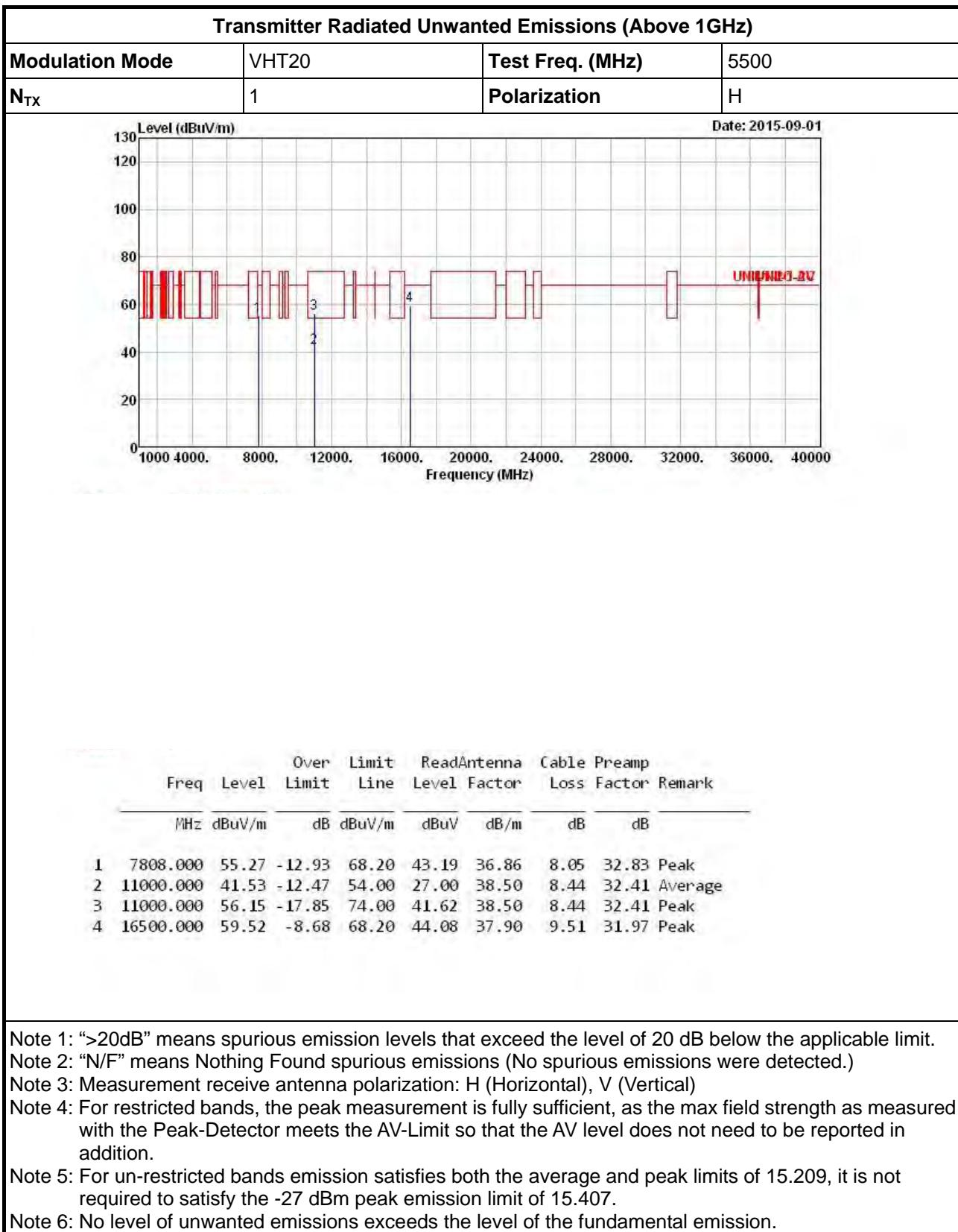


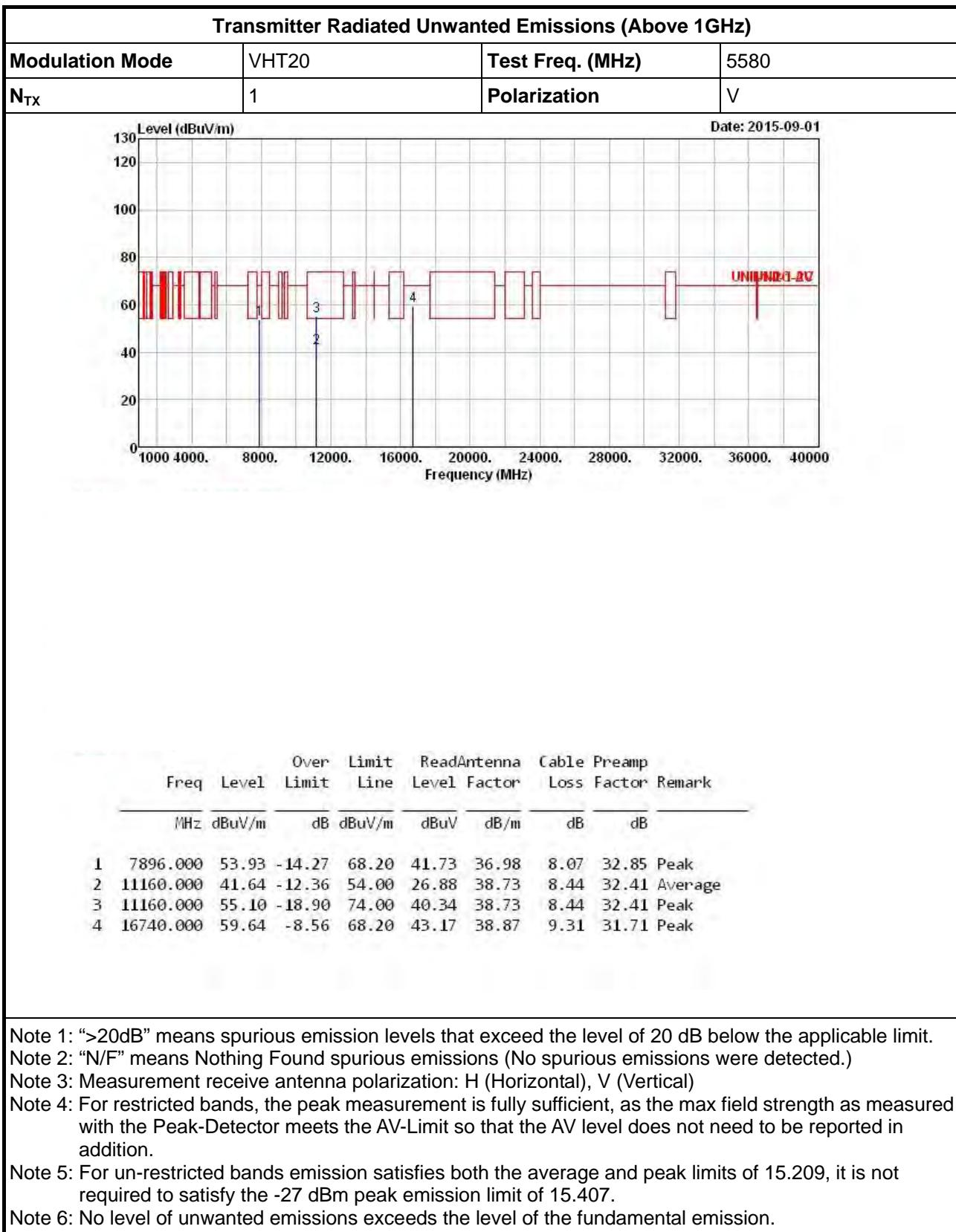


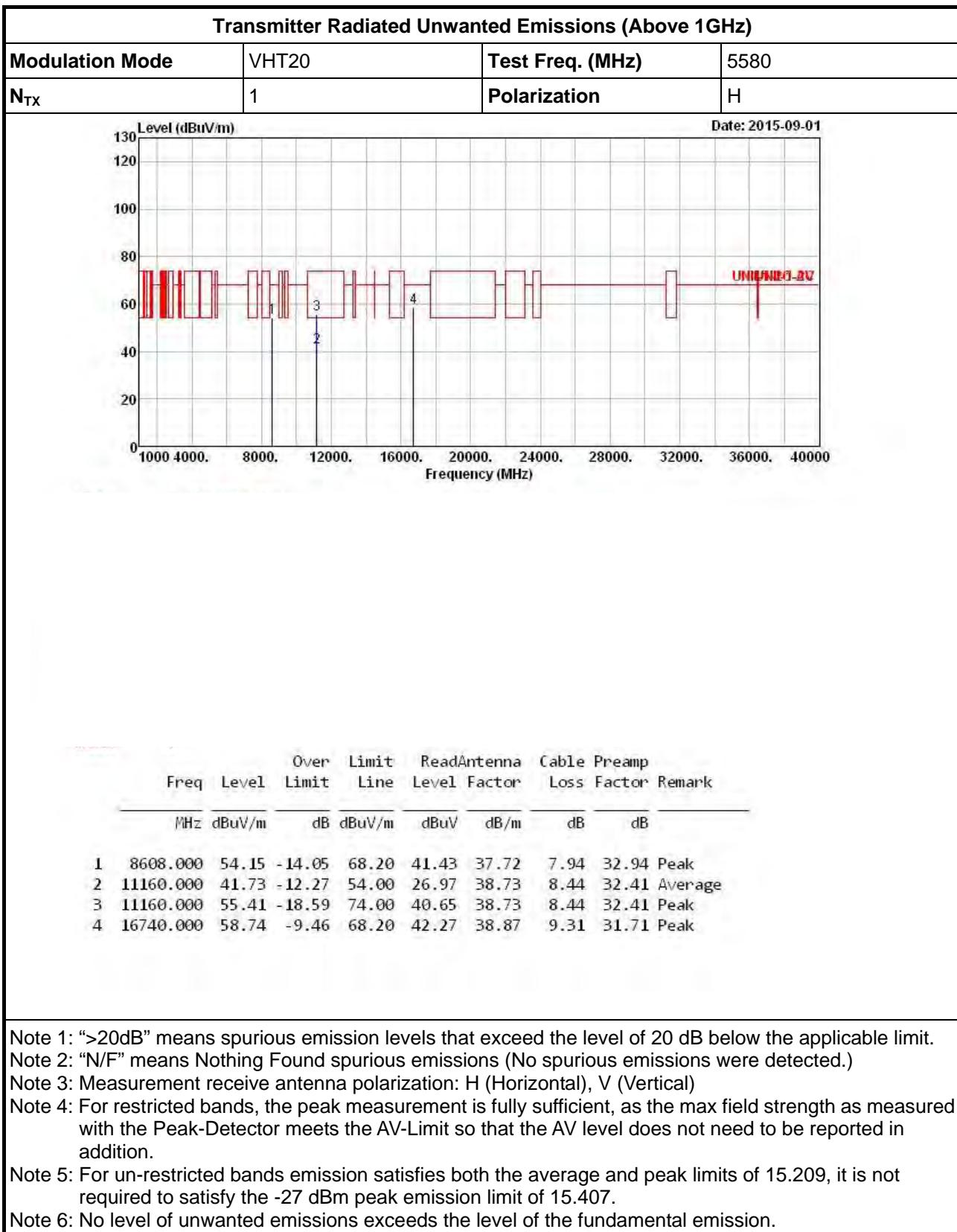


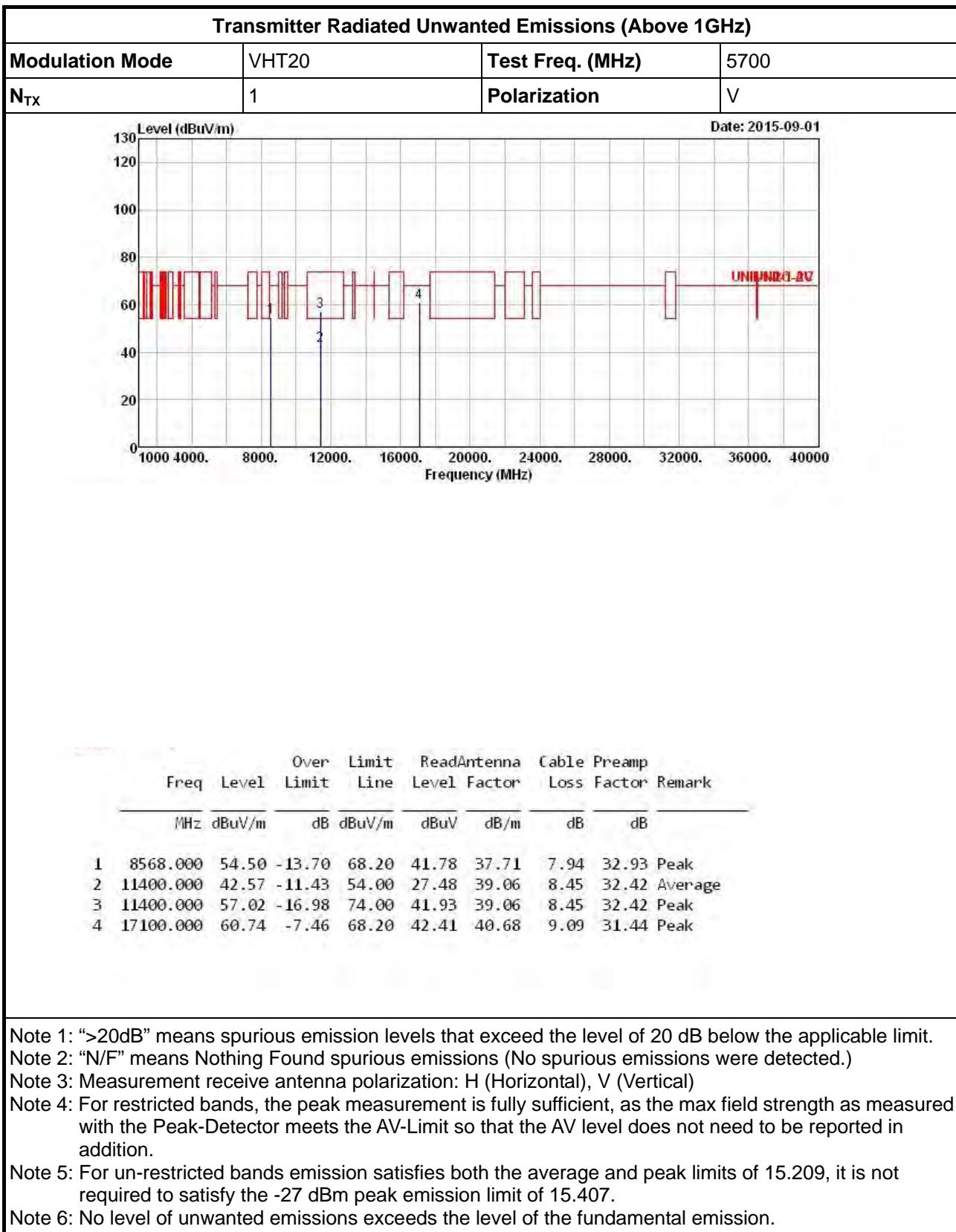


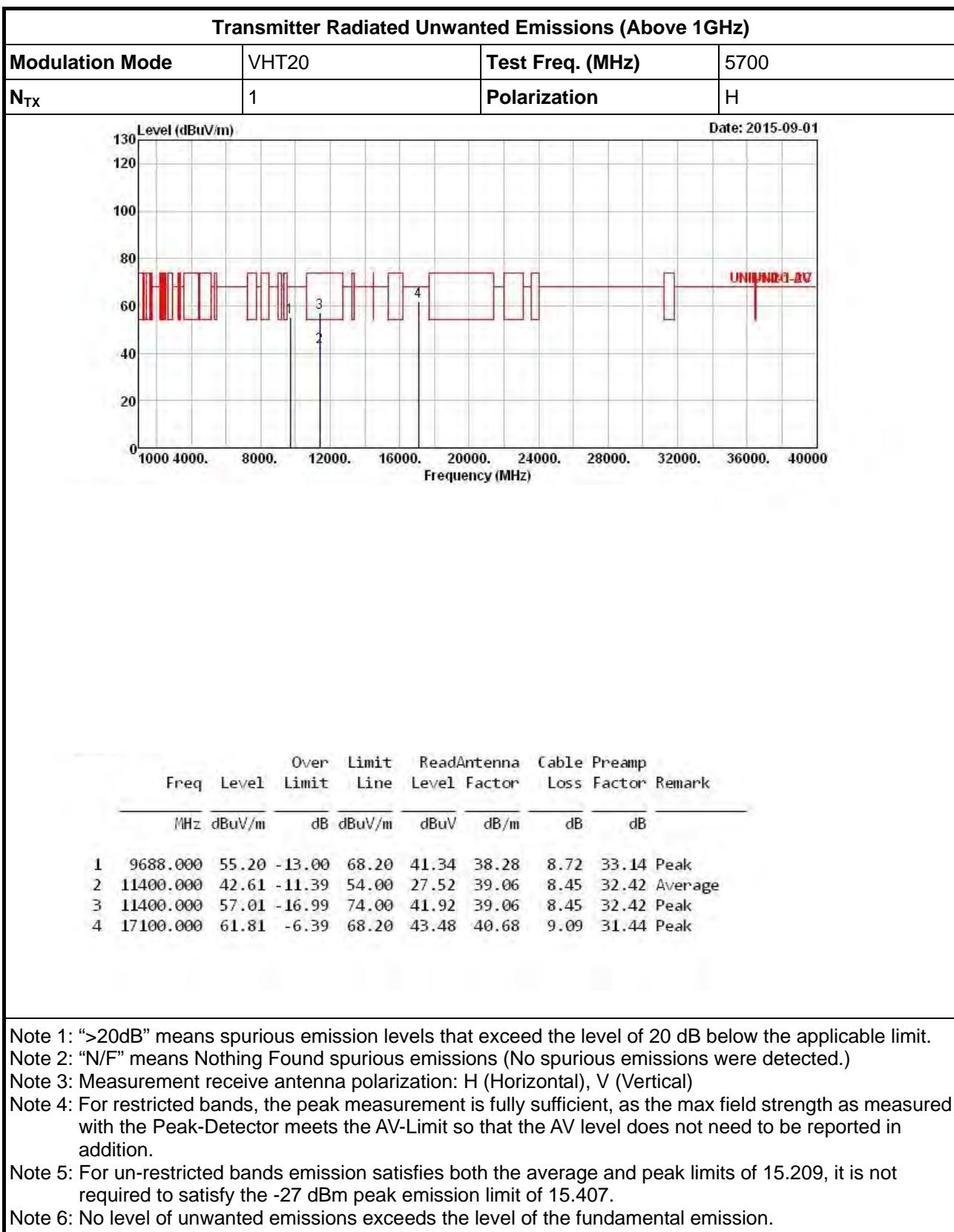


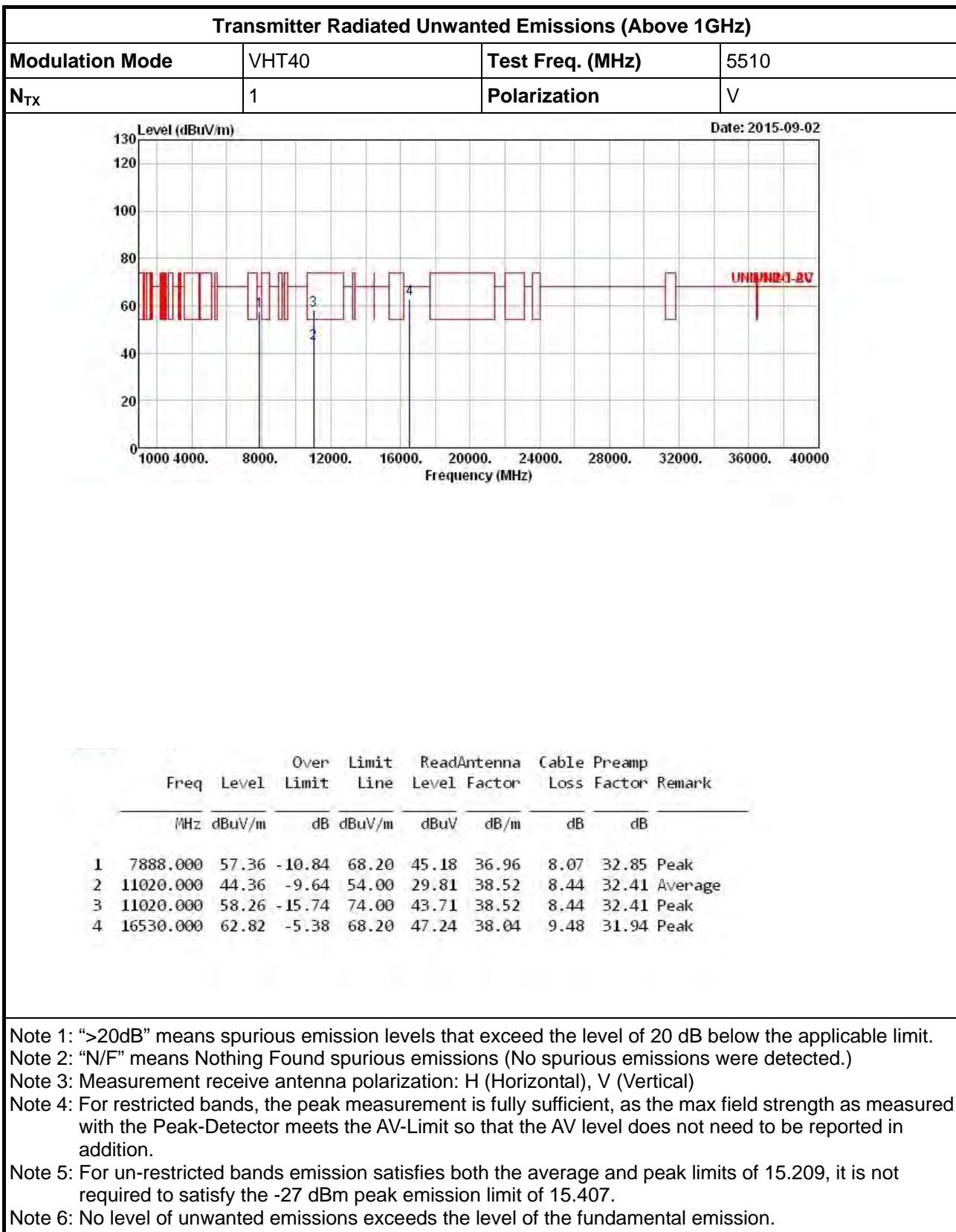


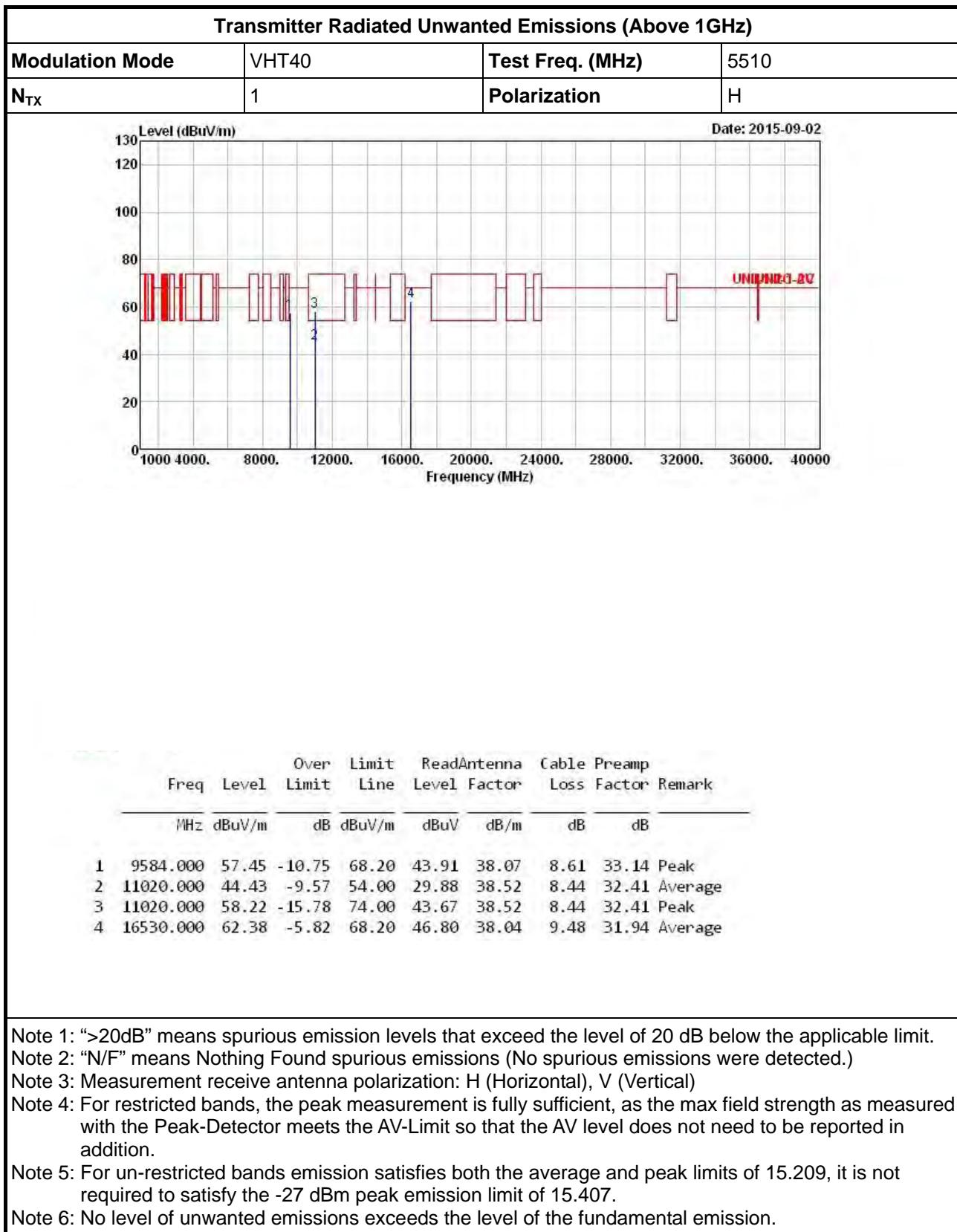


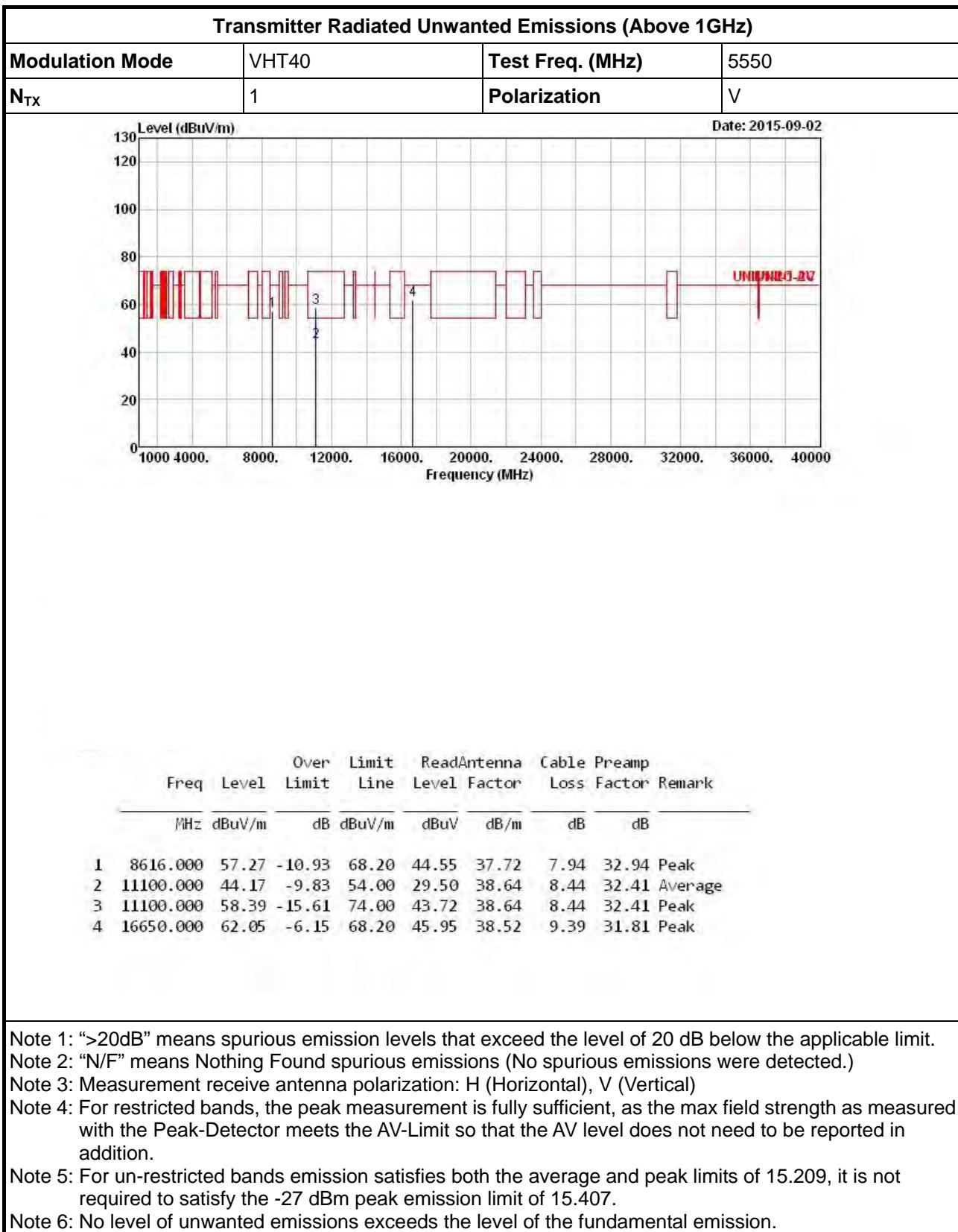












Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

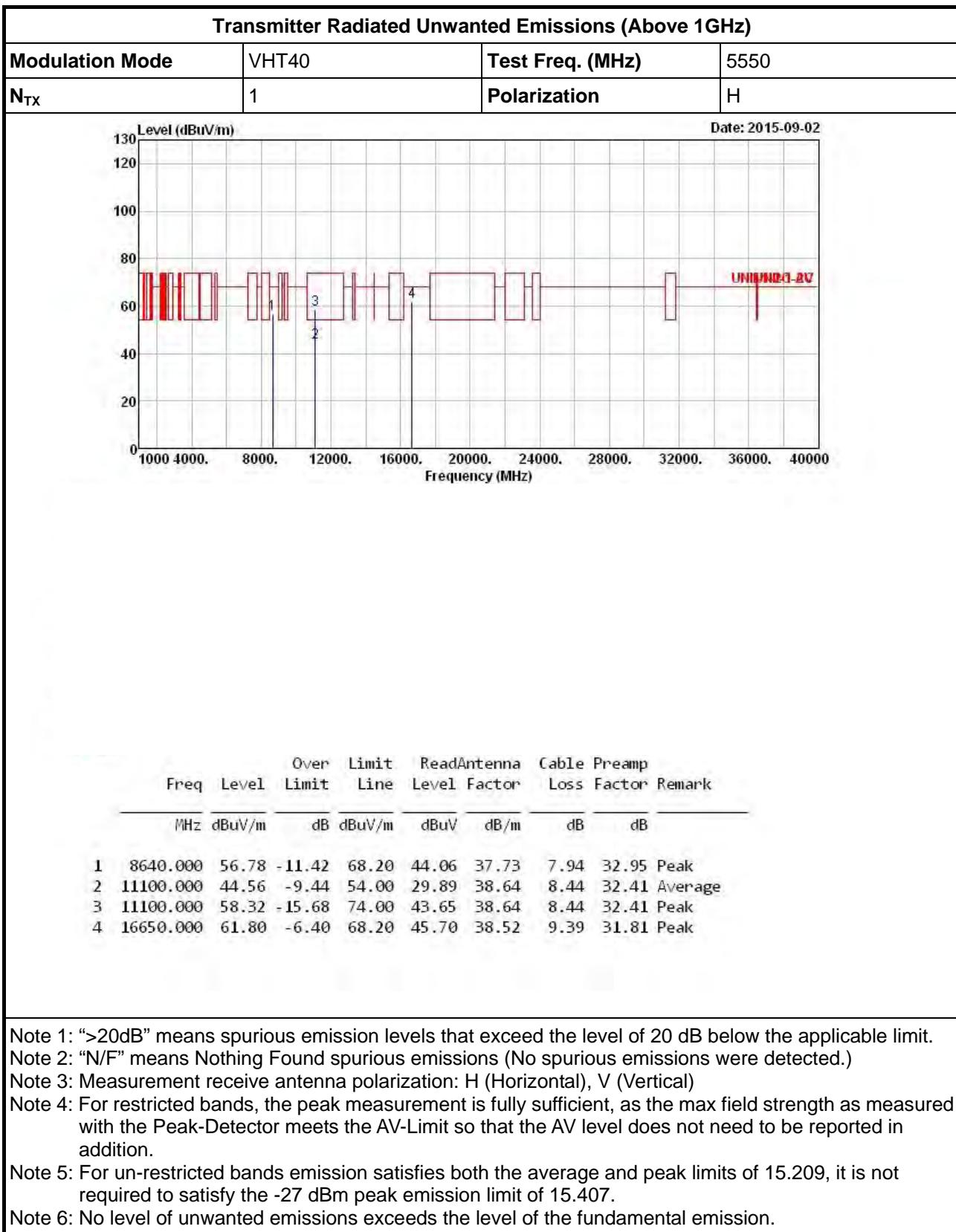
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

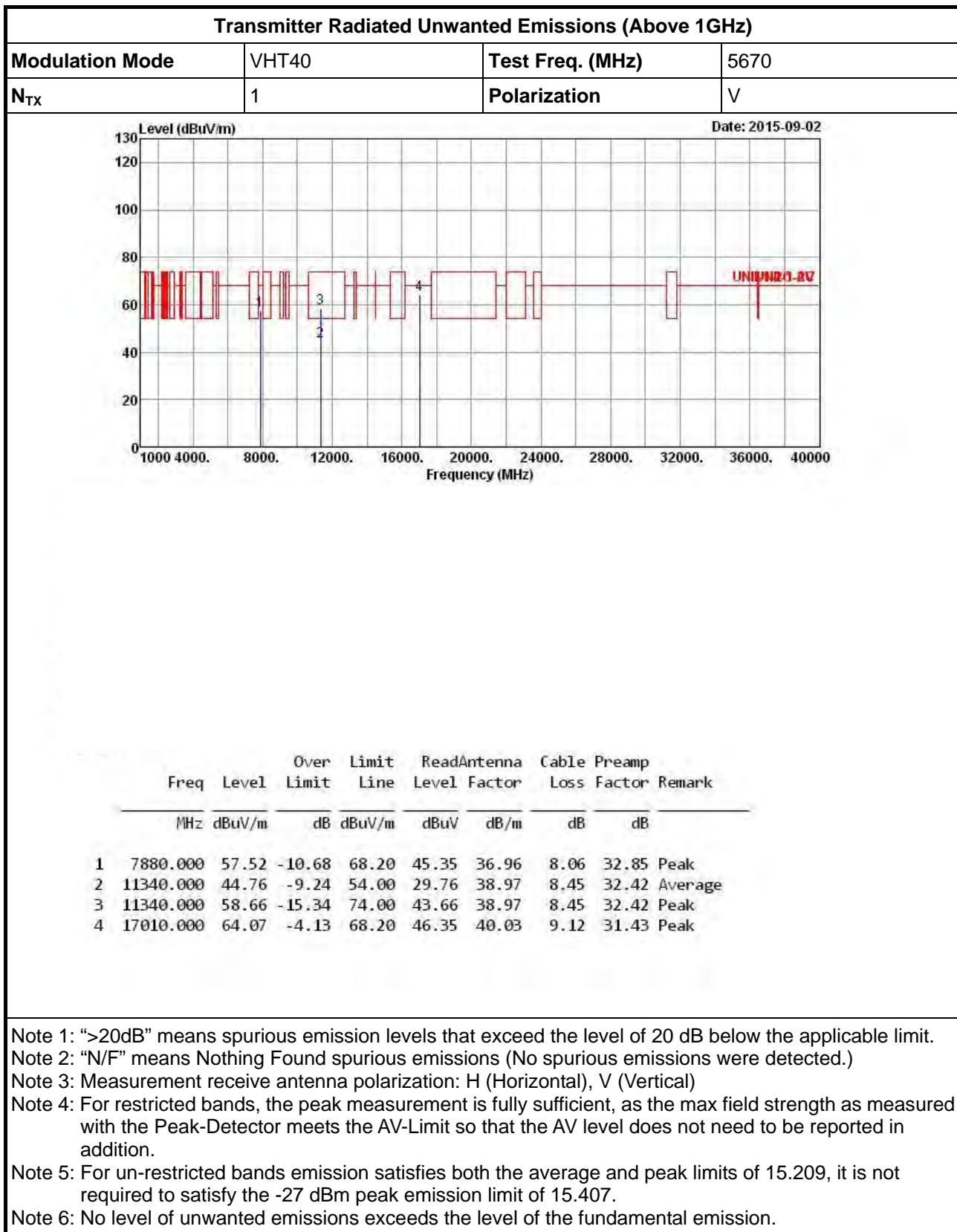
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

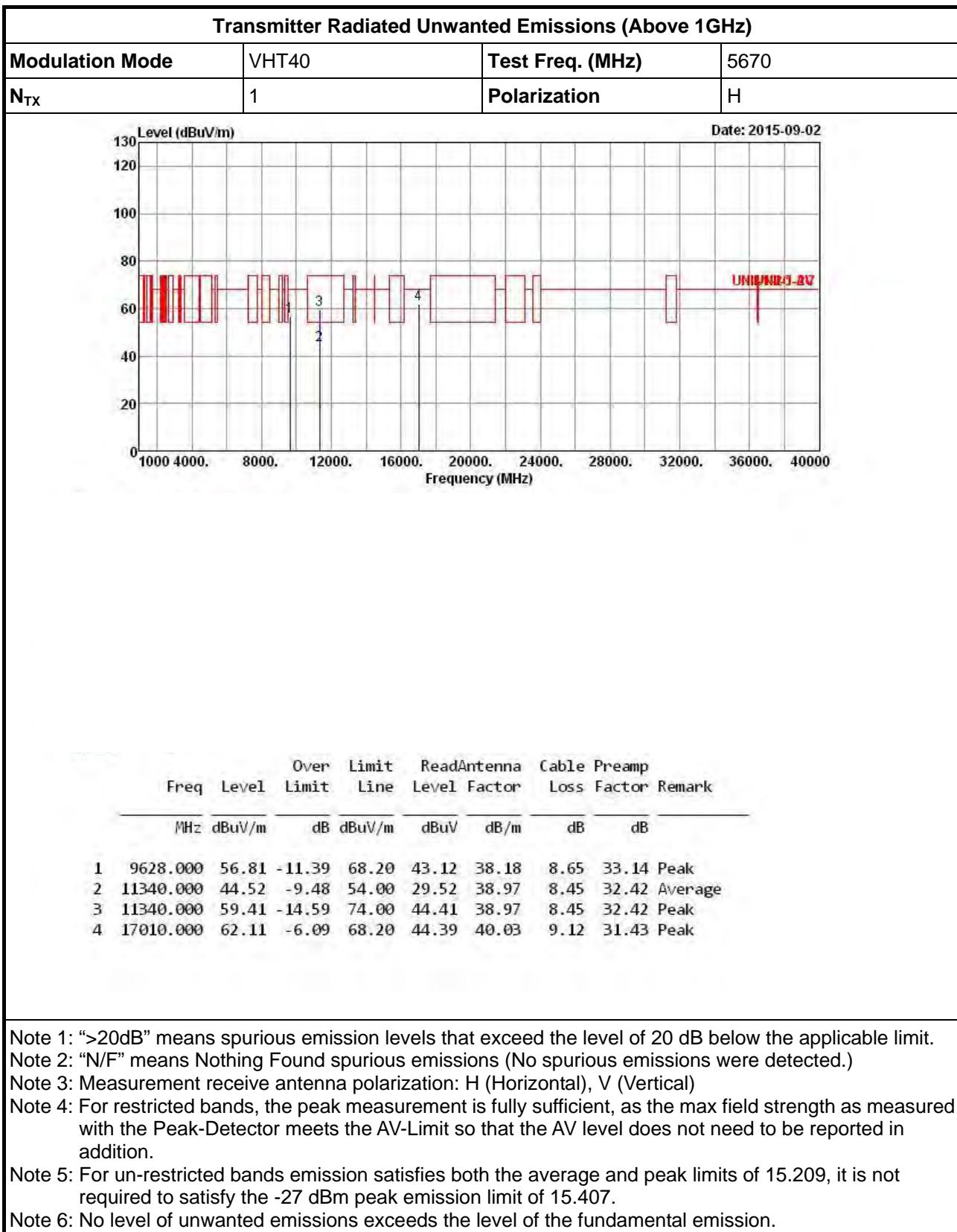
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

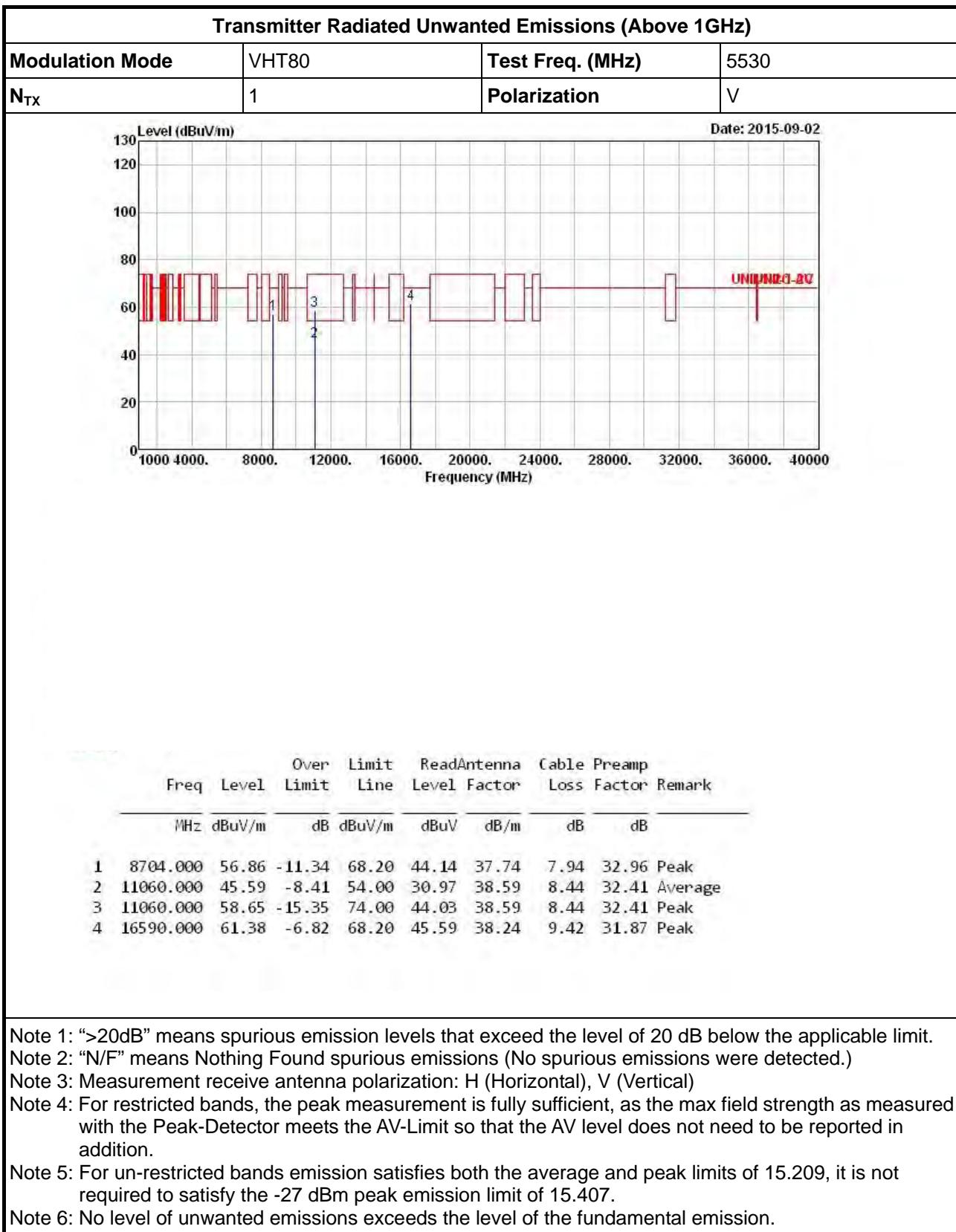
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

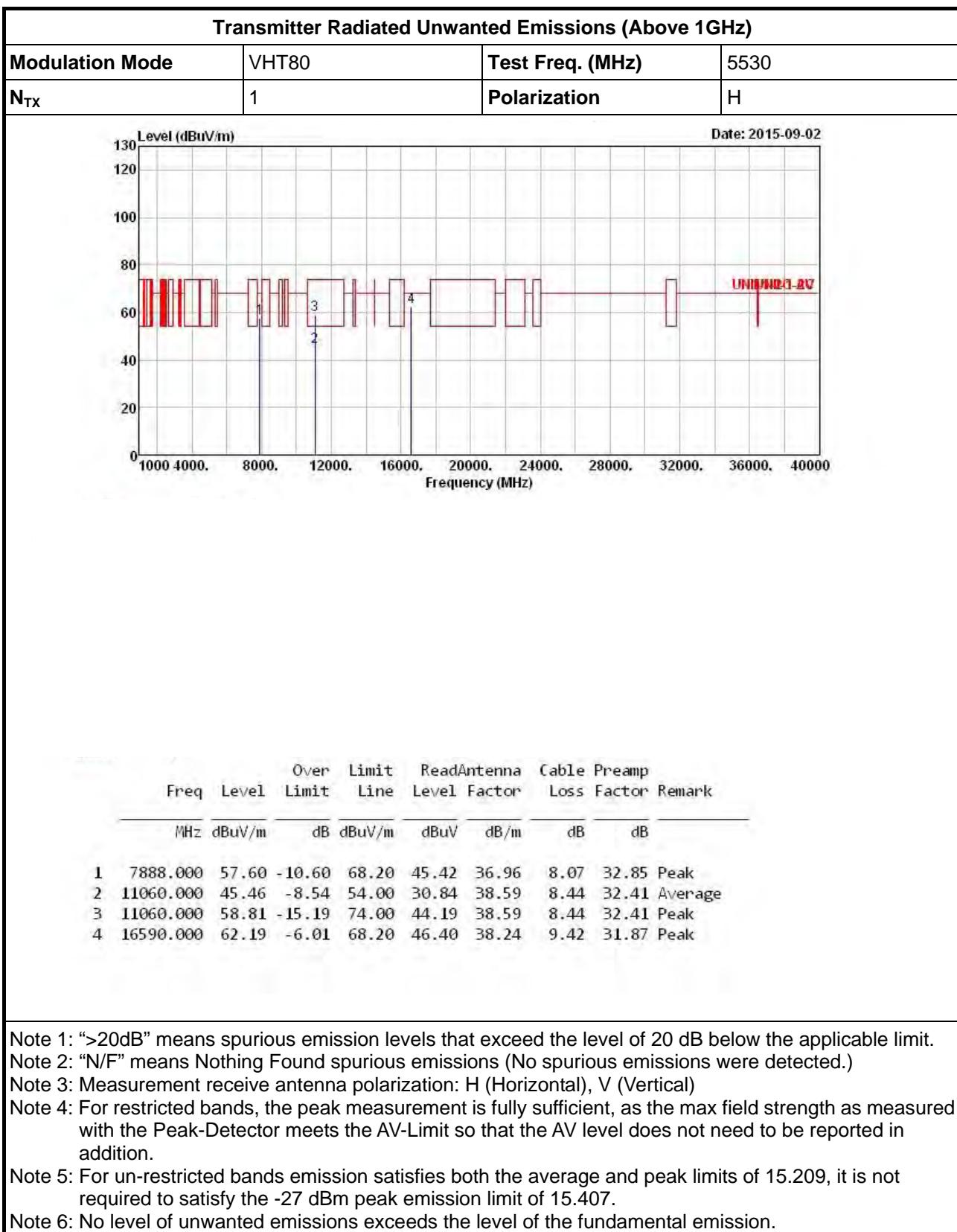
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.





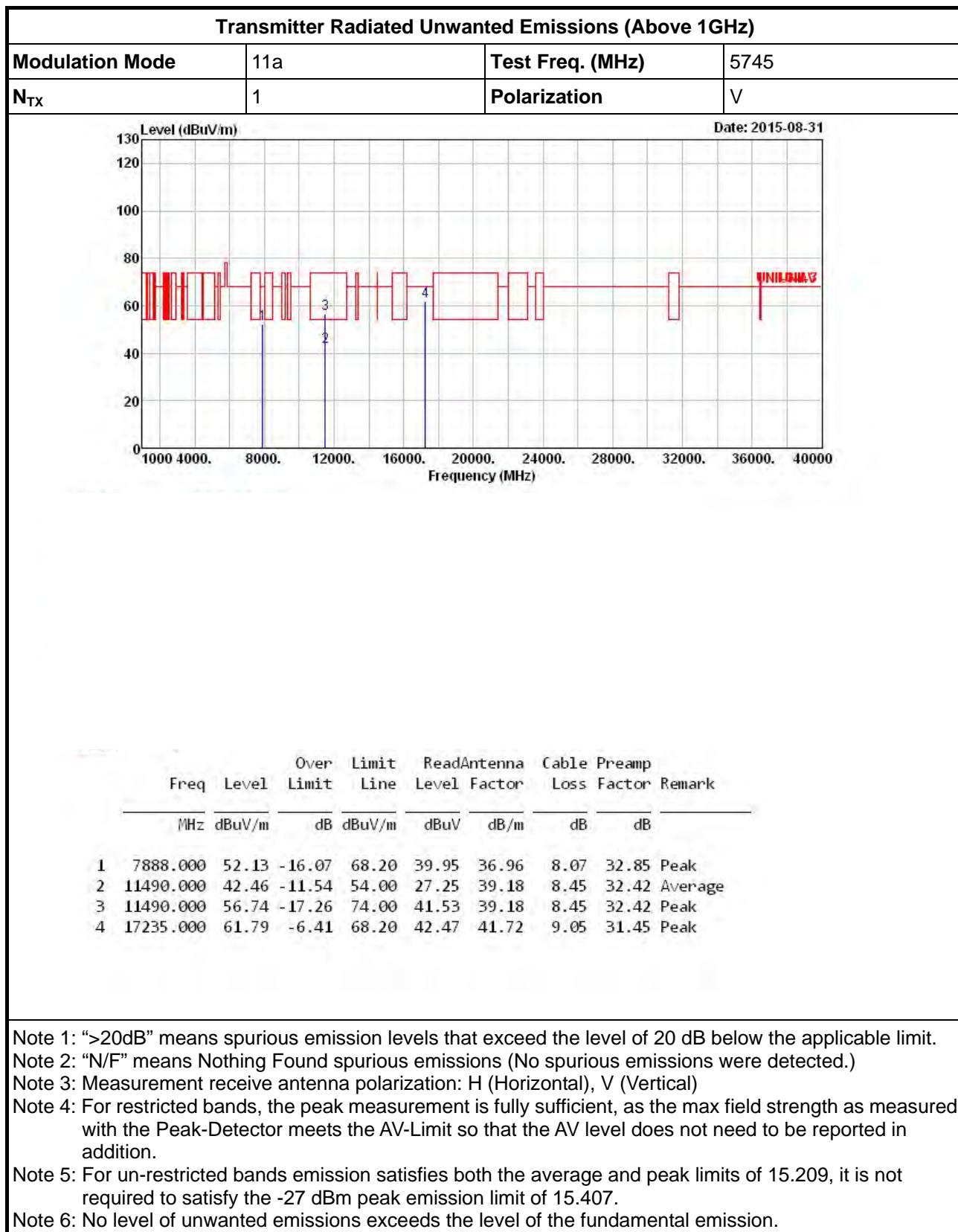








## 3.6.10 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 5725-5850MHz





## Transmitter Radiated Unwanted Emissions (Above 1GHz)

<b>Modulation Mode</b>	11a	<b>Test Freq. (MHz)</b>	5745					
<b>N<sub>TX</sub></b>	1	<b>Polarization</b>	H					
Freq	Level	Over Limit	Limit	Read	Antenna	Cable	Preamp	Remark
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 7600.000	41.55	-12.45	54.00	29.74	36.62	7.97	32.78	Average
2 7600.000	53.24	-20.76	74.00	41.43	36.62	7.97	32.78	Peak
3 11490.000	43.35	-10.65	54.00	28.14	39.18	8.45	32.42	Average
4 11490.000	56.47	-17.53	74.00	41.26	39.18	8.45	32.42	Peak
5 17235.000	62.64	-5.56	68.20	43.32	41.72	9.05	31.45	Peak

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

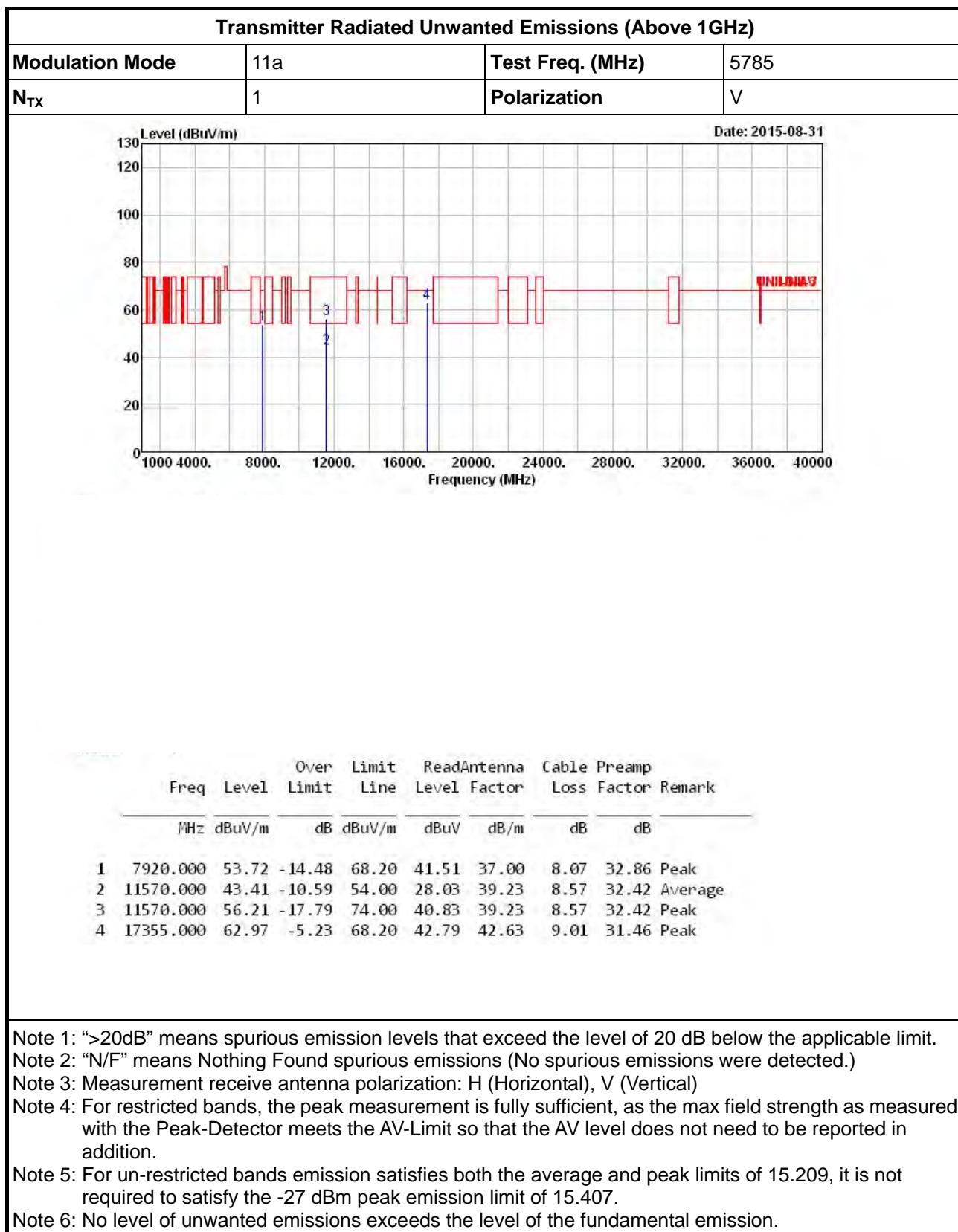
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

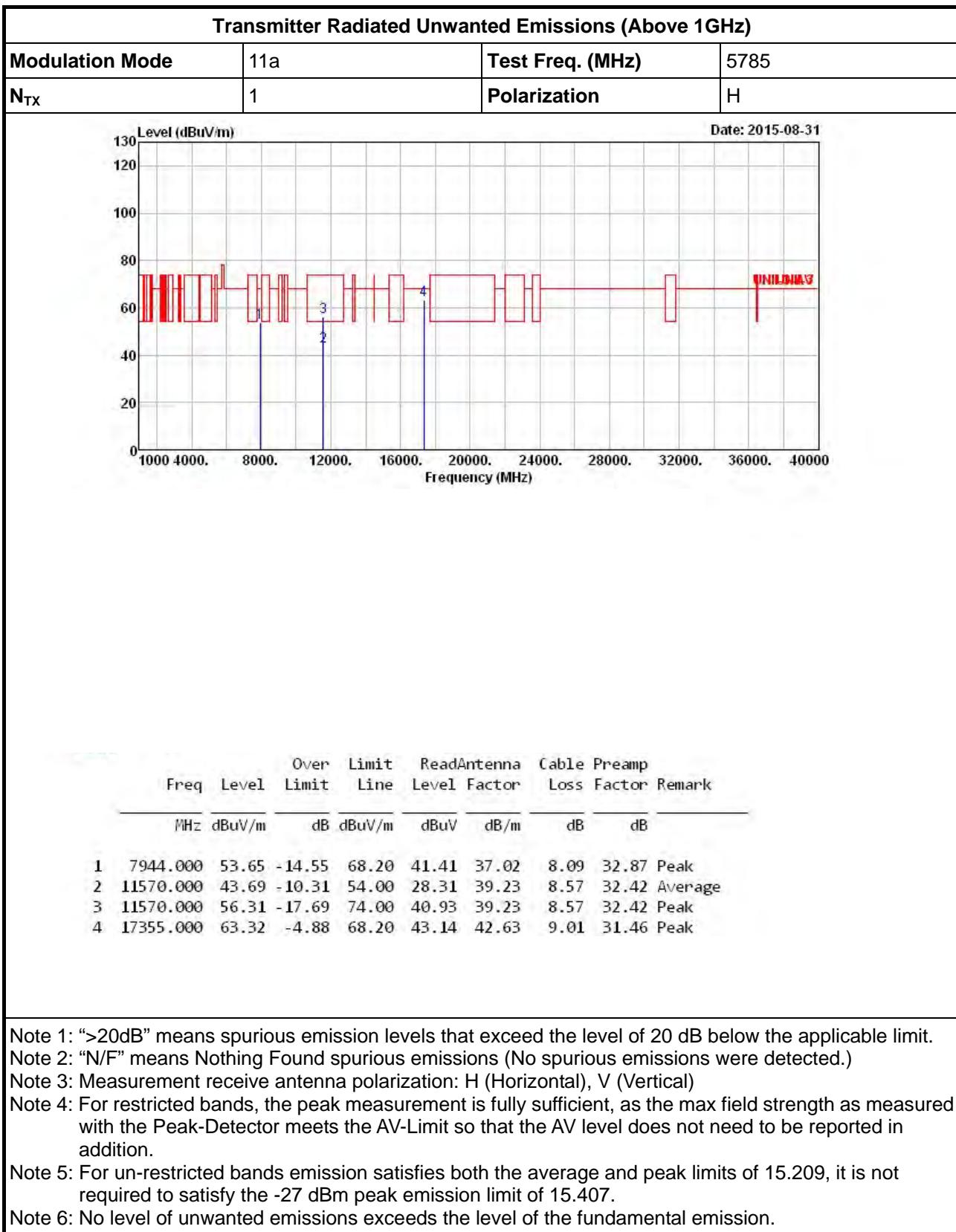
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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.





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

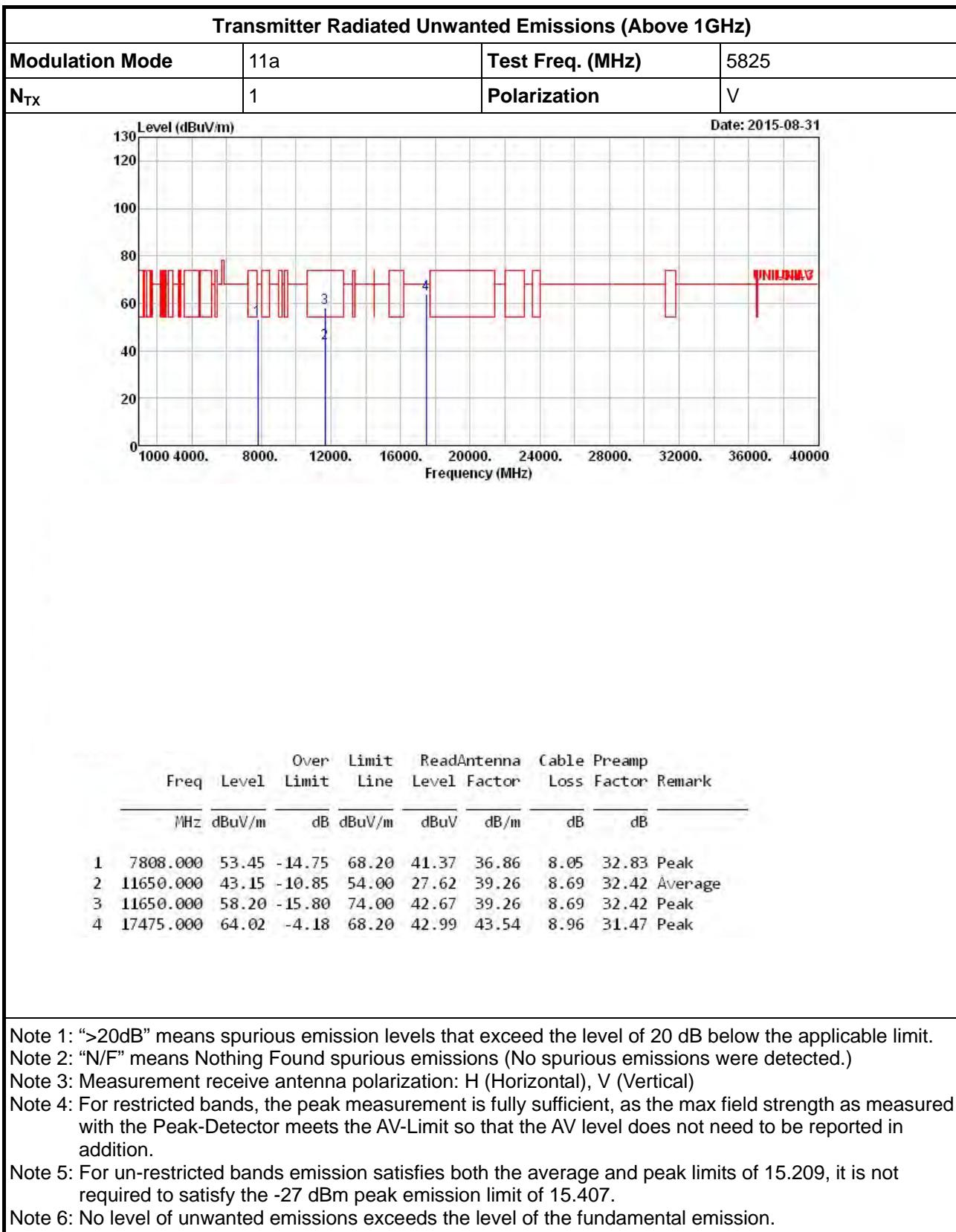
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

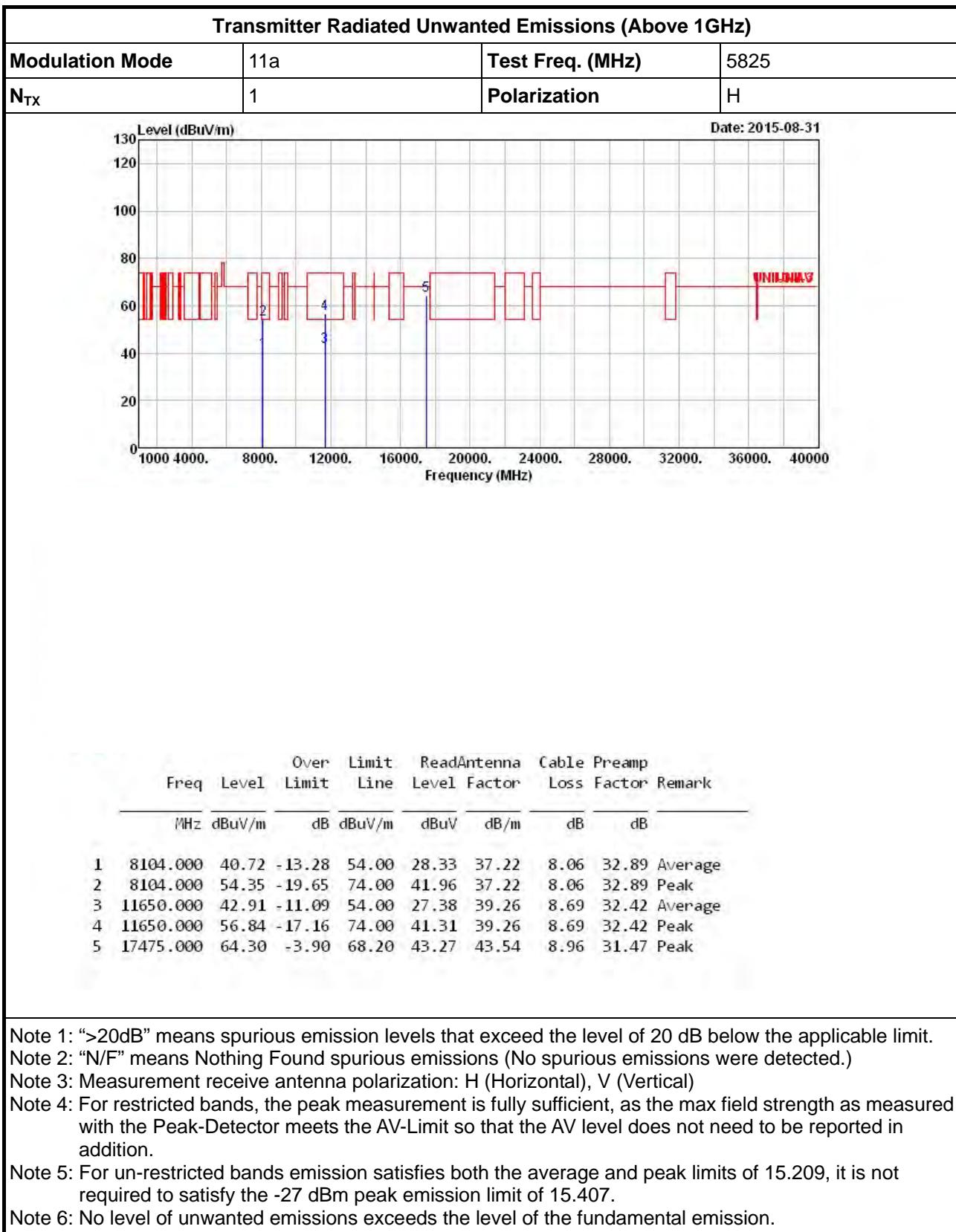
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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.





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

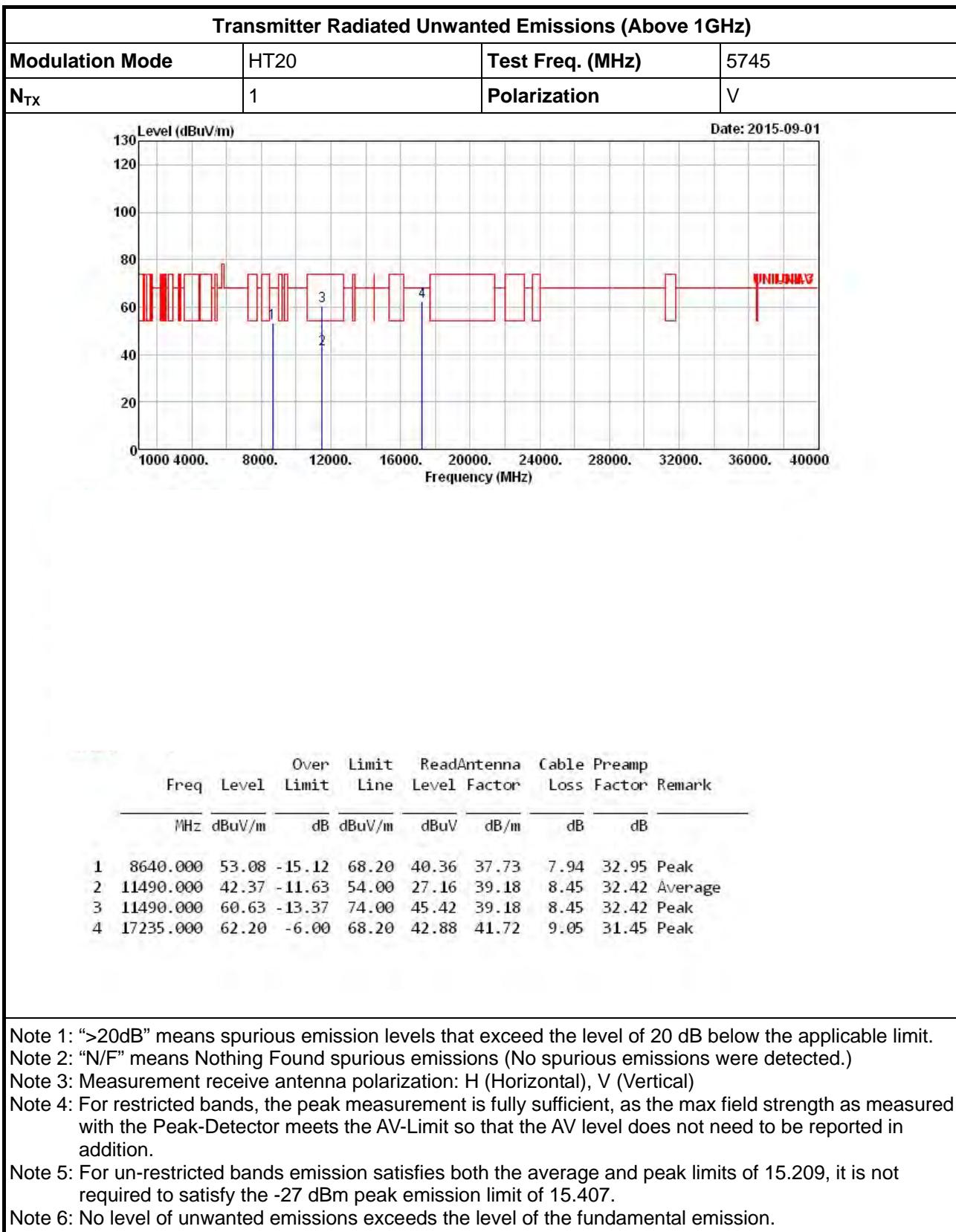
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

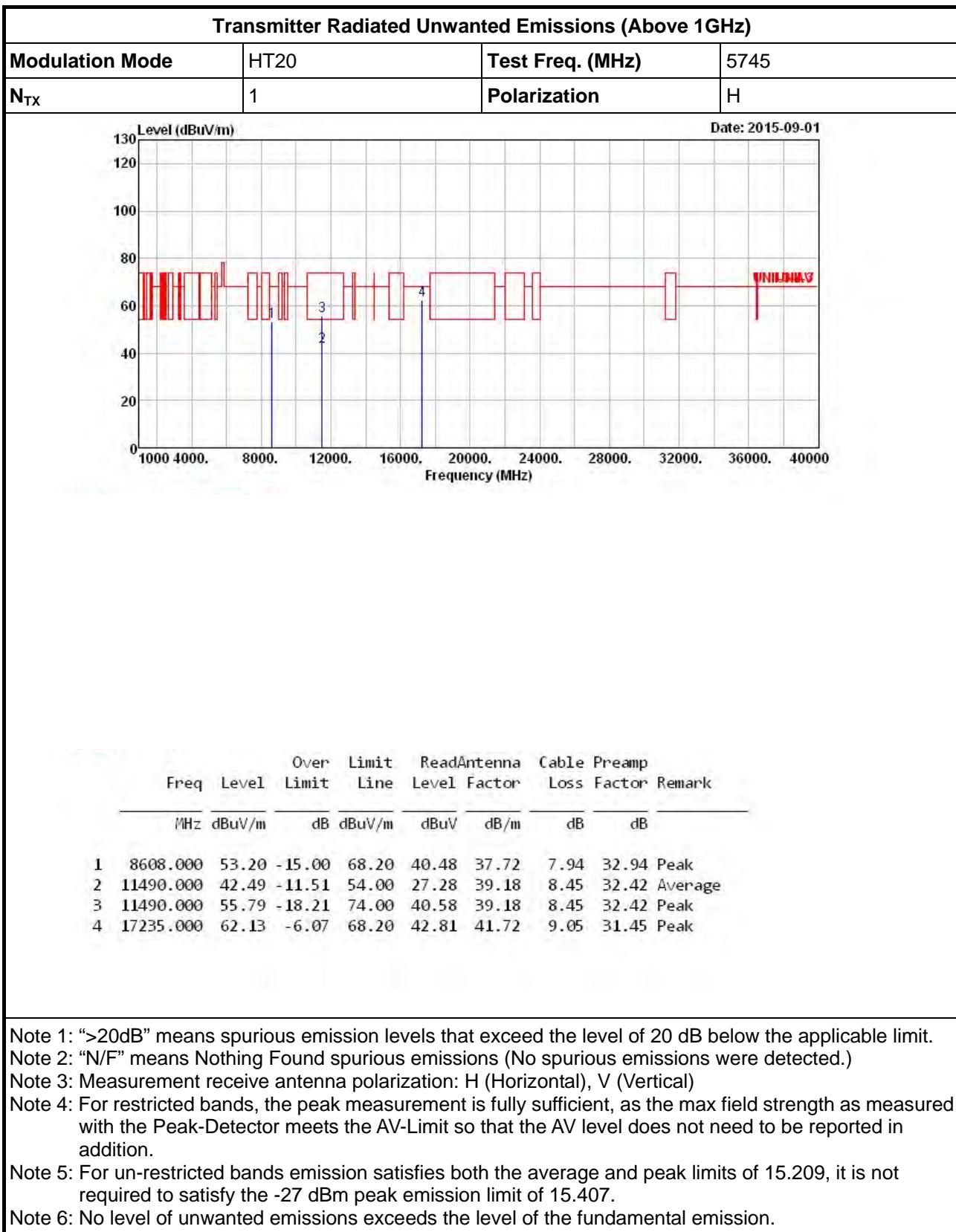
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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.





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

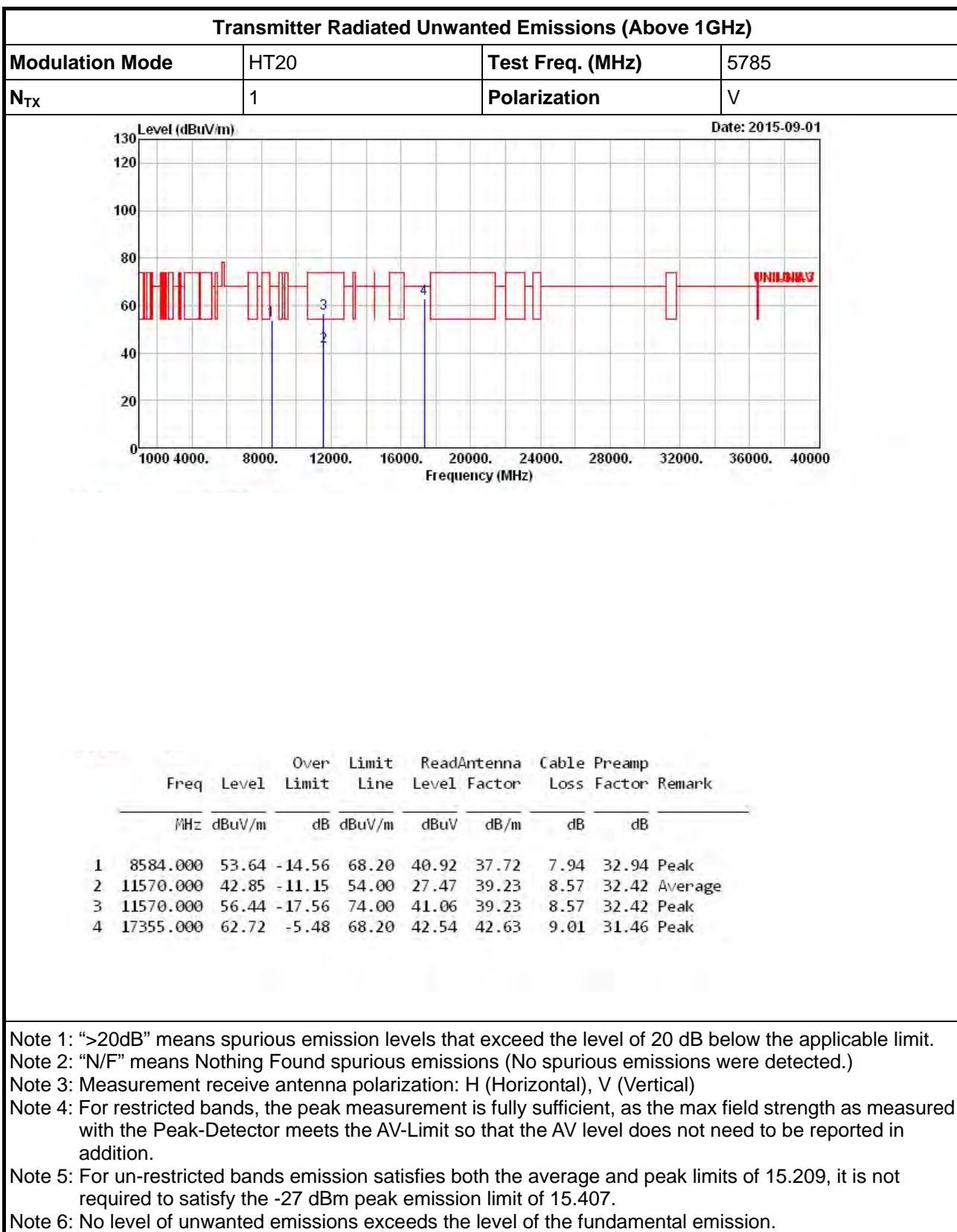
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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.



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

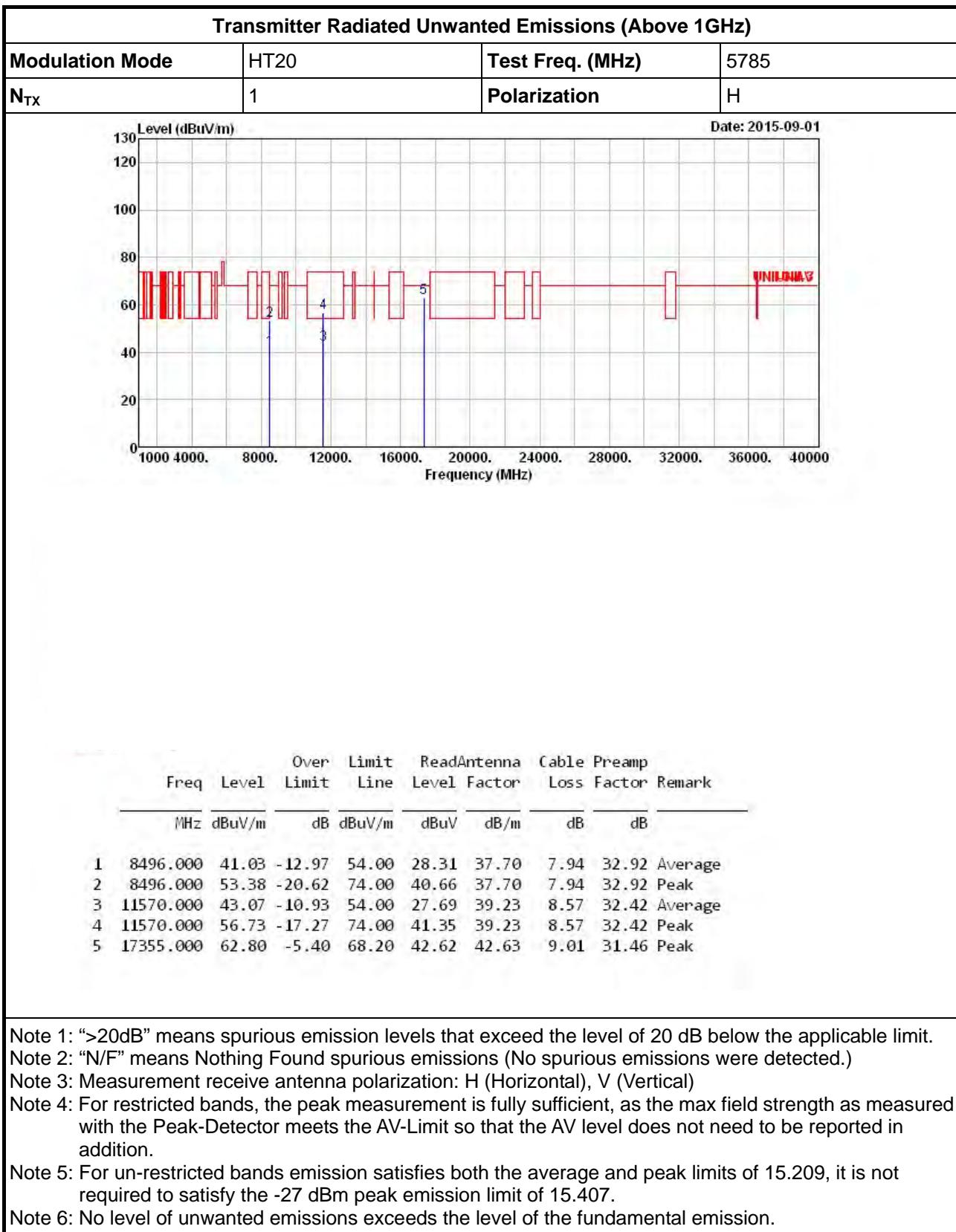
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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.

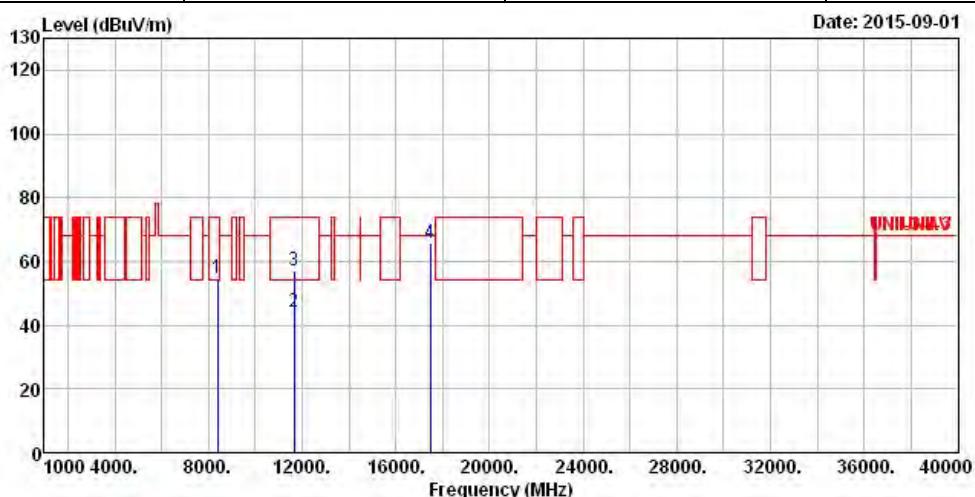
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.





## Transmitter Radiated Unwanted Emissions (Above 1GHz)

<b>Modulation Mode</b>	HT20	<b>Test Freq. (MHz)</b>	5825
<b>N<sub>TX</sub></b>	1	<b>Polarization</b>	V



Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark
		Limit	Line	Level	Factor	Loss	Factor	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 8408.000	54.83	-19.17	74.00	42.18	37.60	7.96	32.91	Peak
2 11650.000	44.15	-9.85	54.00	28.62	39.26	8.69	32.42	Average
3 11650.000	57.16	-16.84	74.00	41.63	39.26	8.69	32.42	Peak
4 17475.000	65.66	-2.54	68.20	44.63	43.54	8.96	31.47	Peak

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

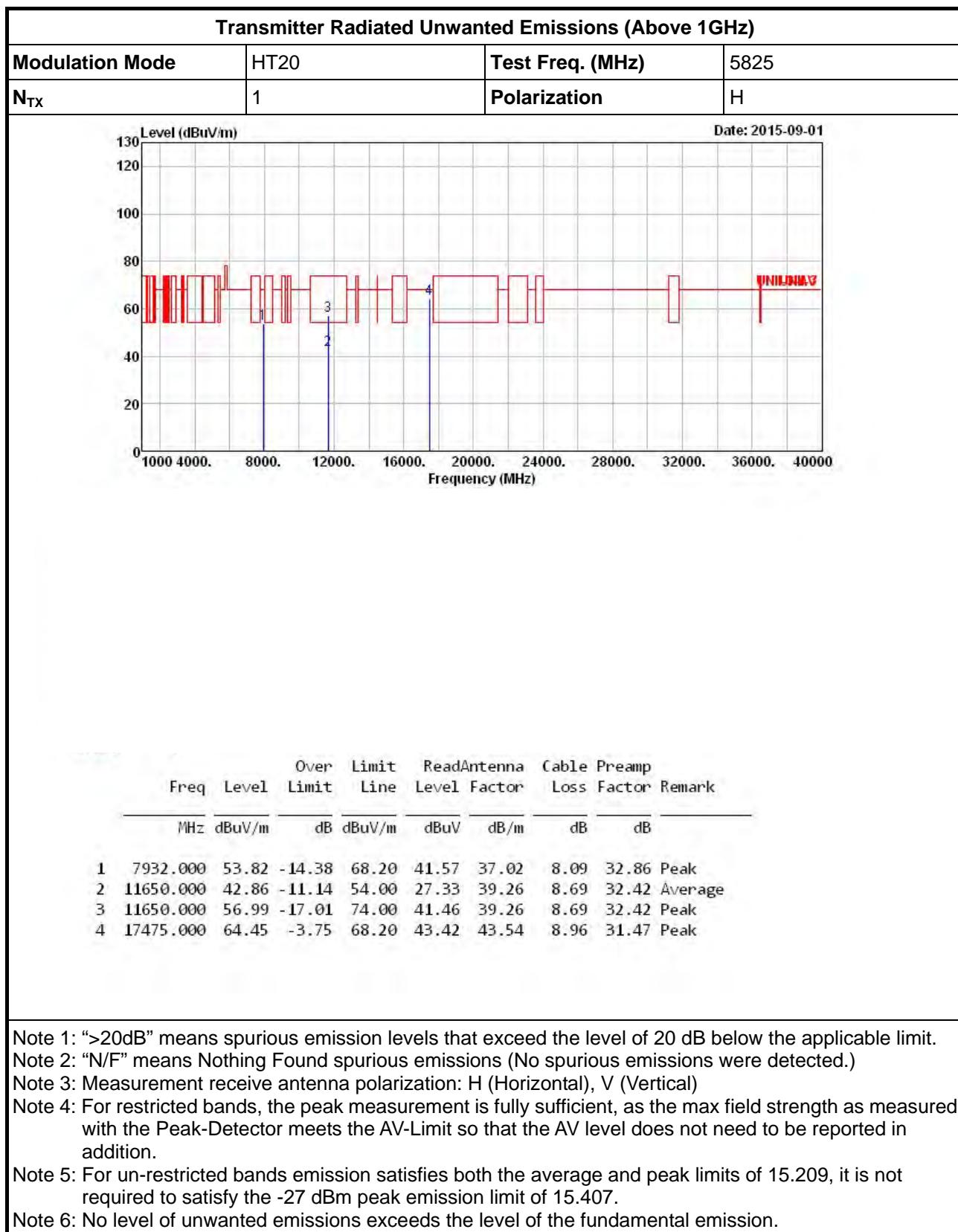
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

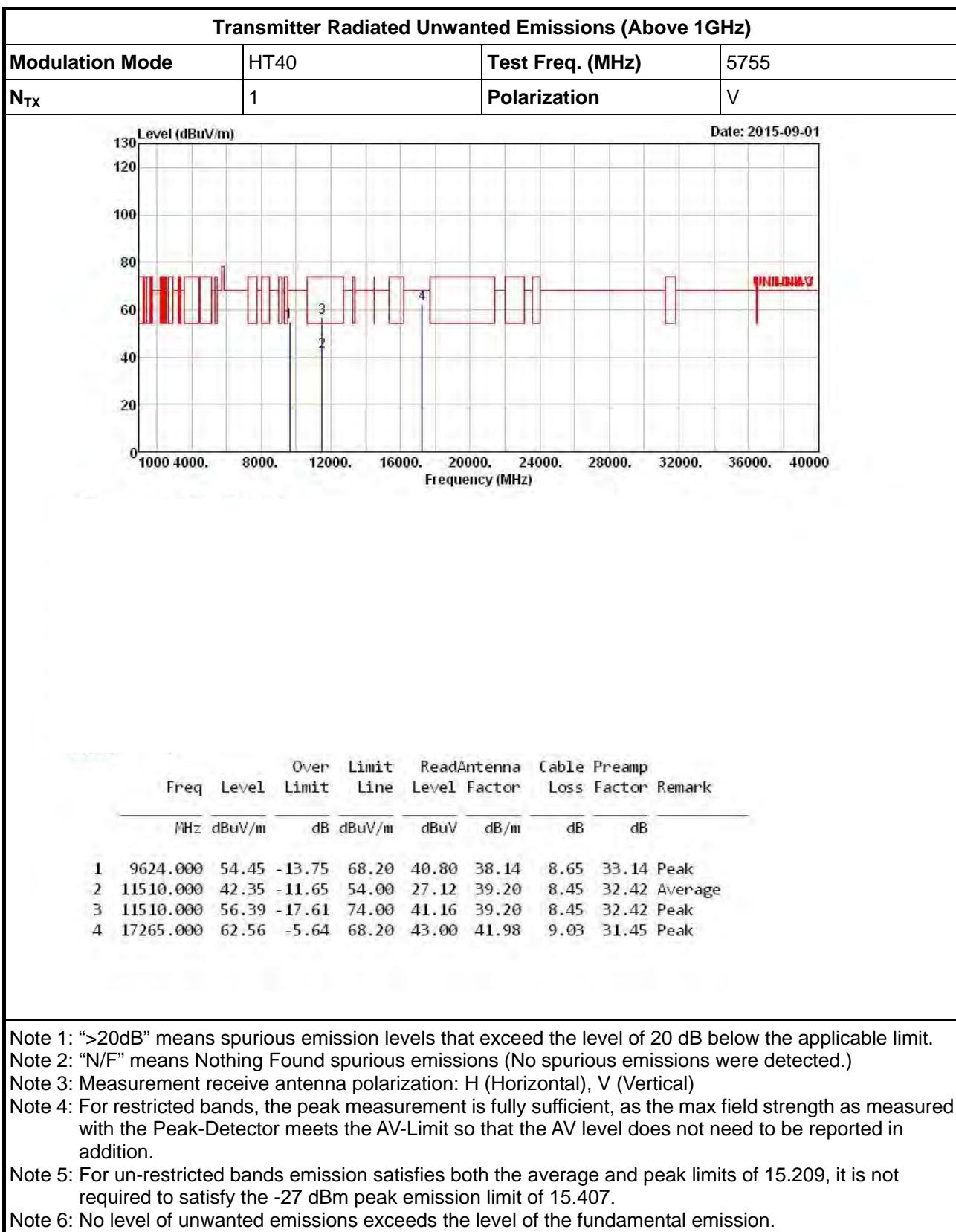
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

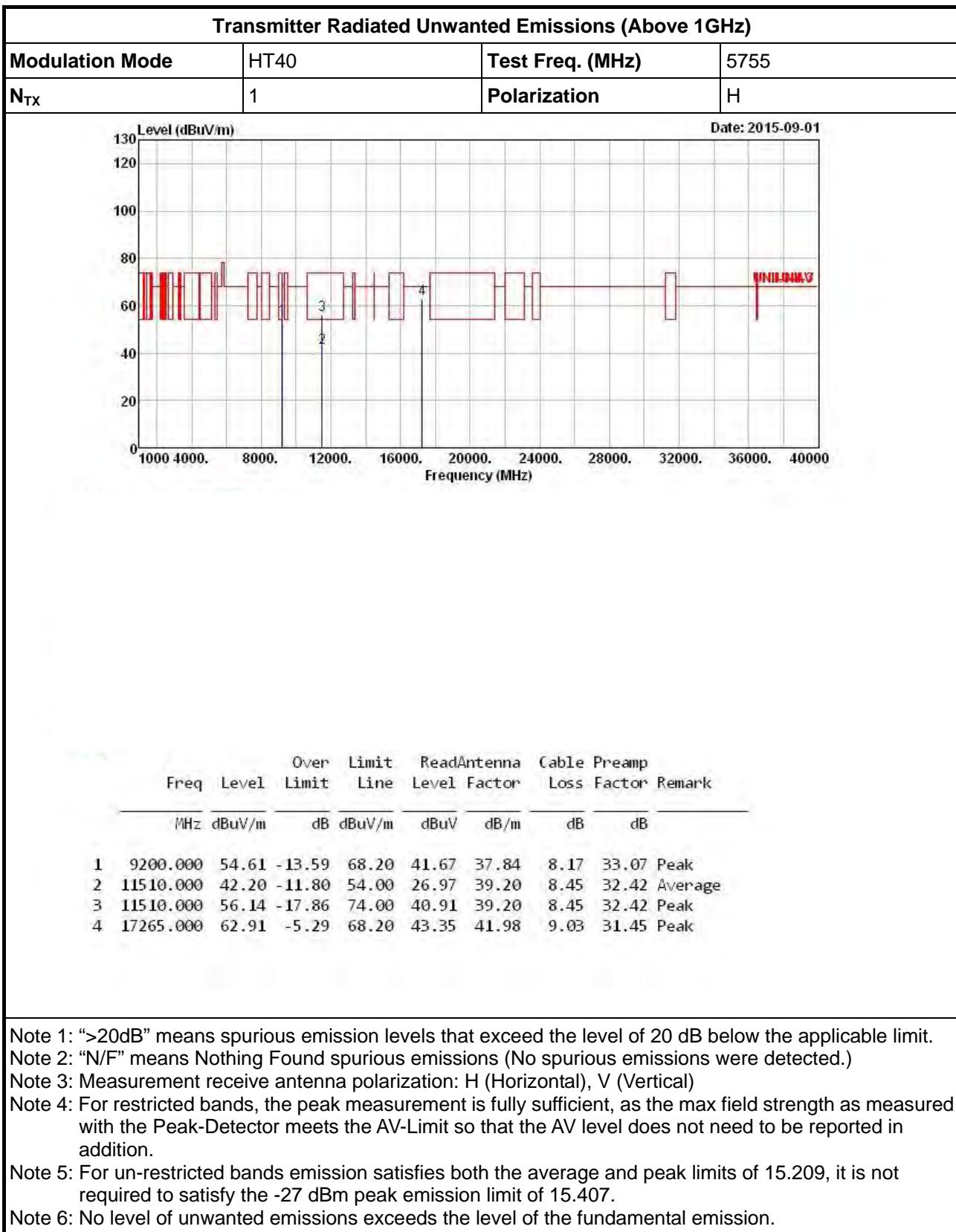
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

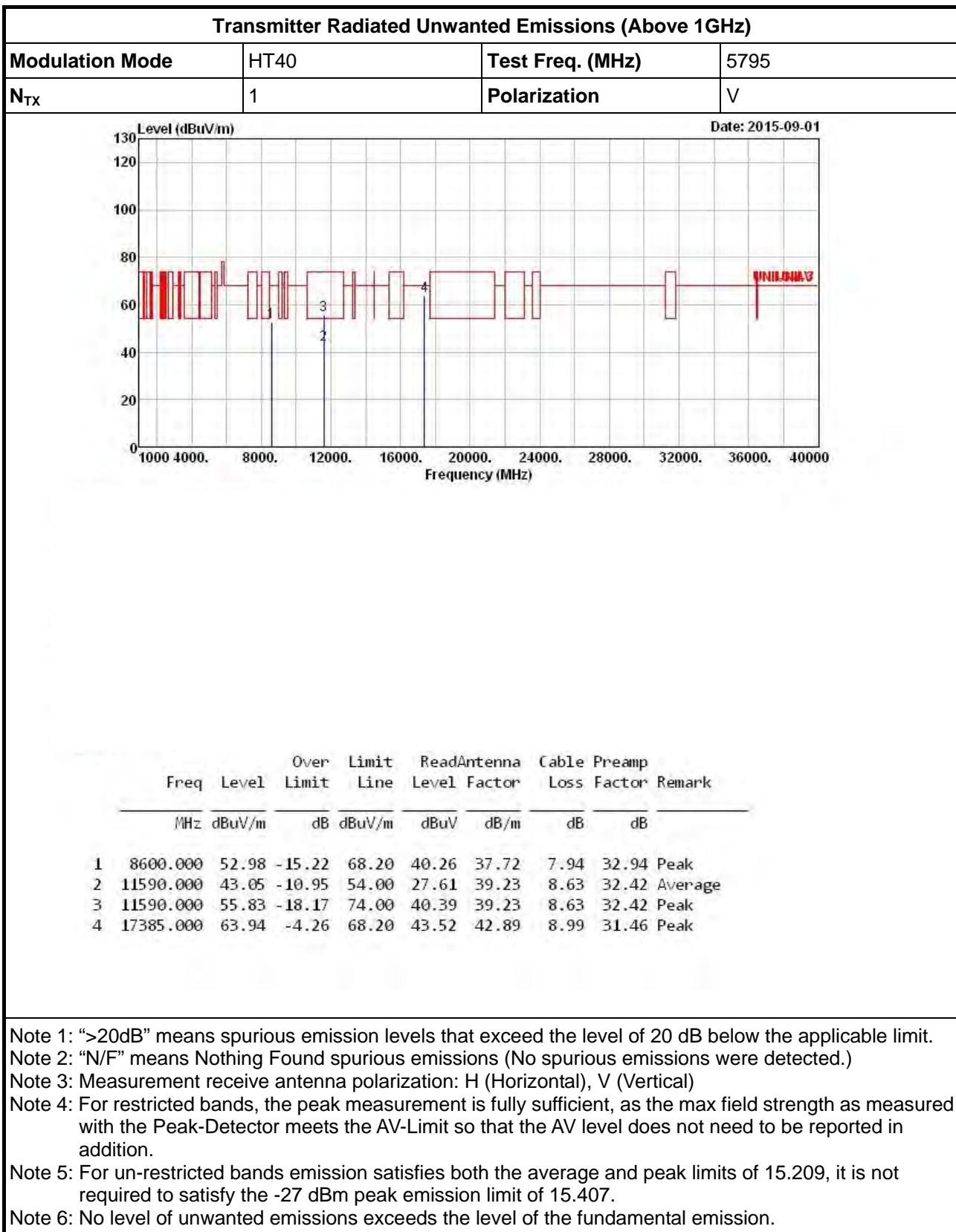
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

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









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

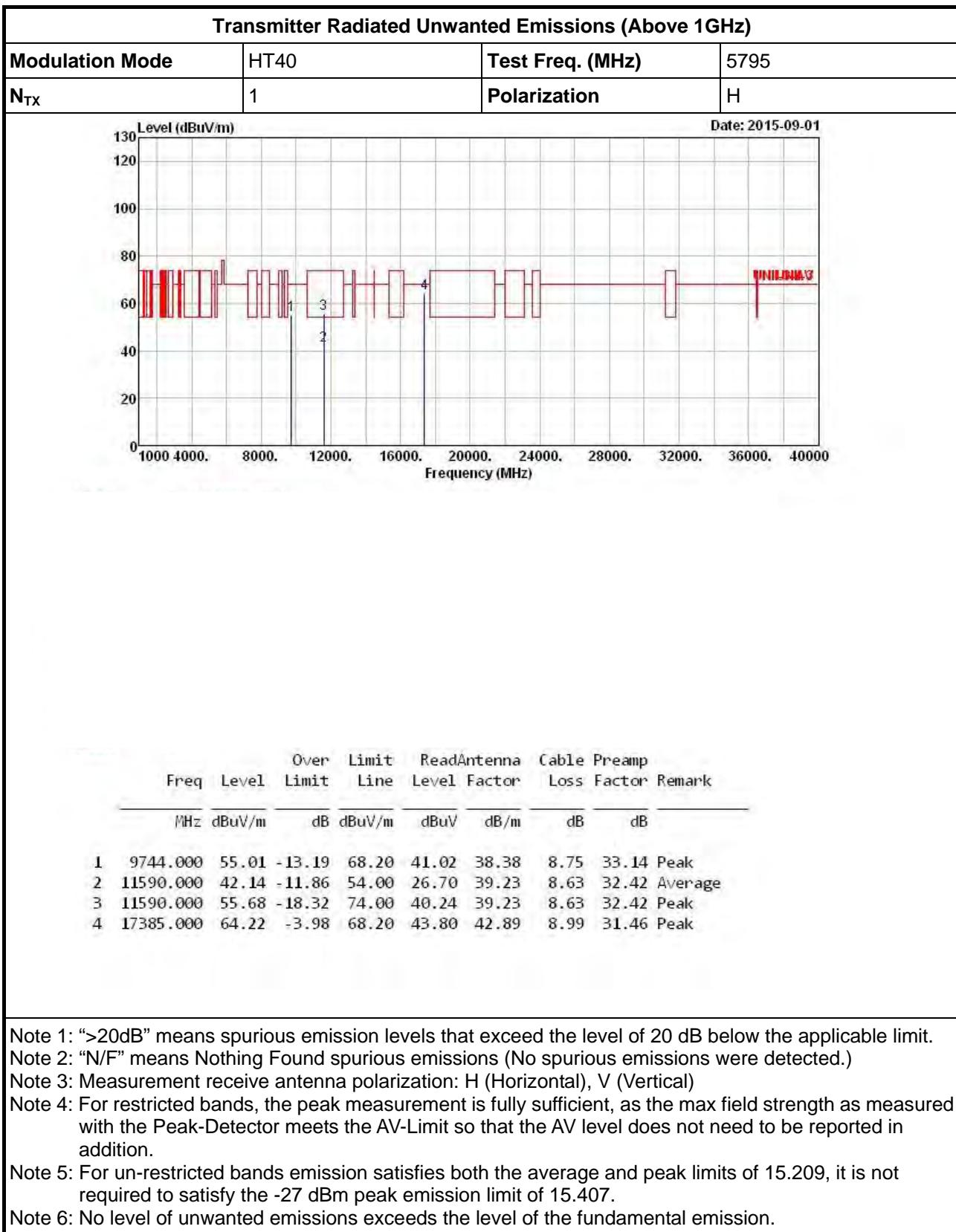
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

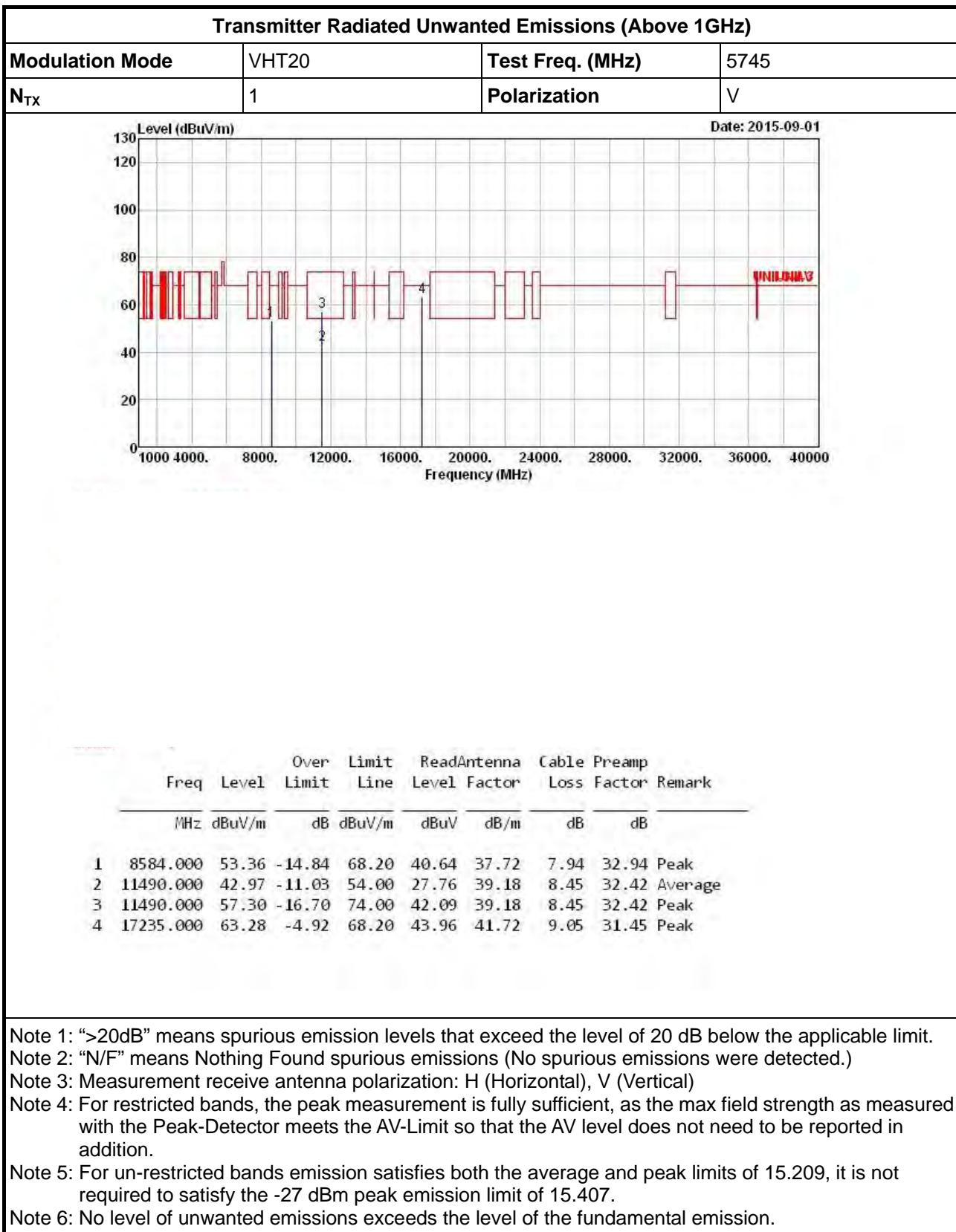
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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.





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

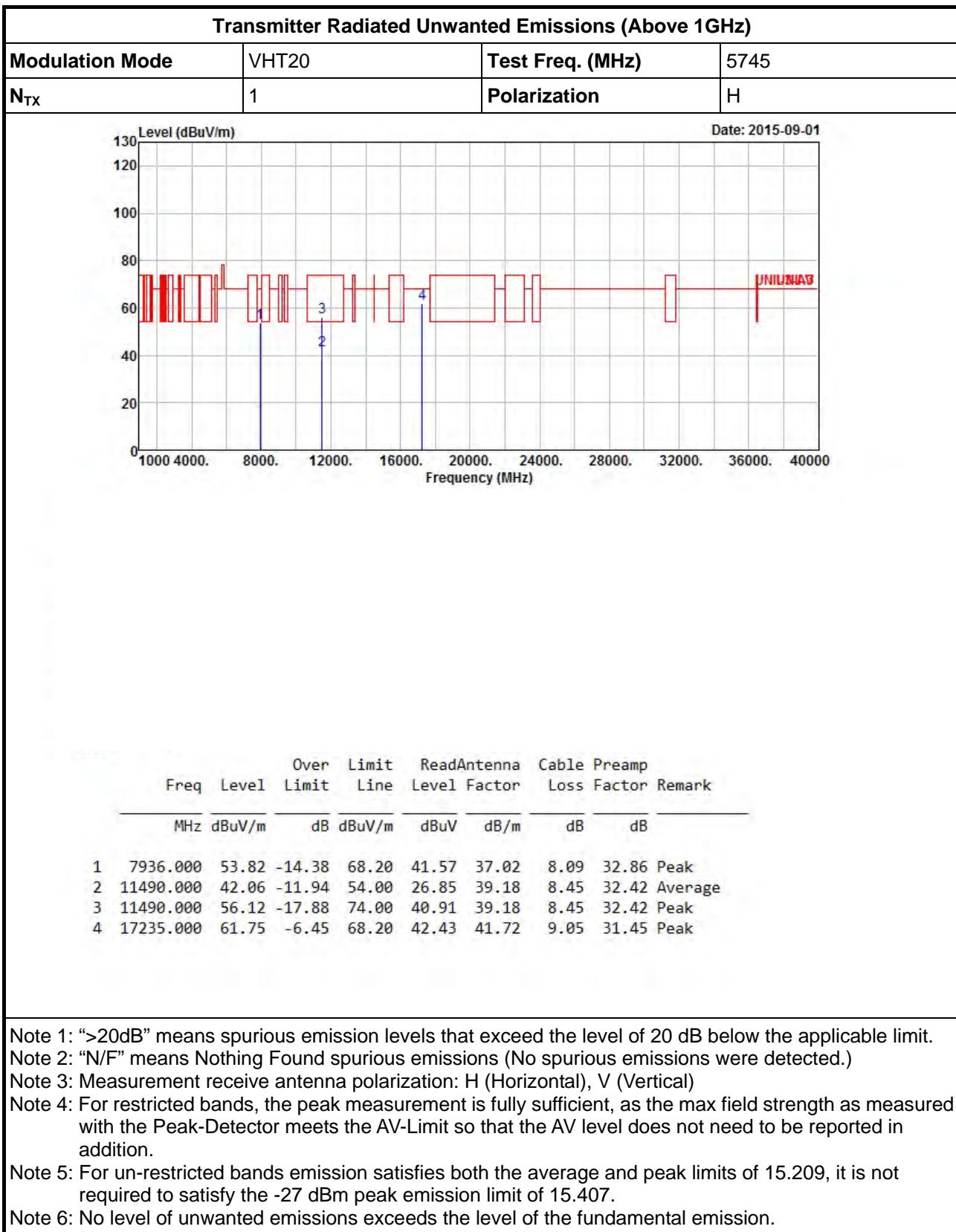
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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.

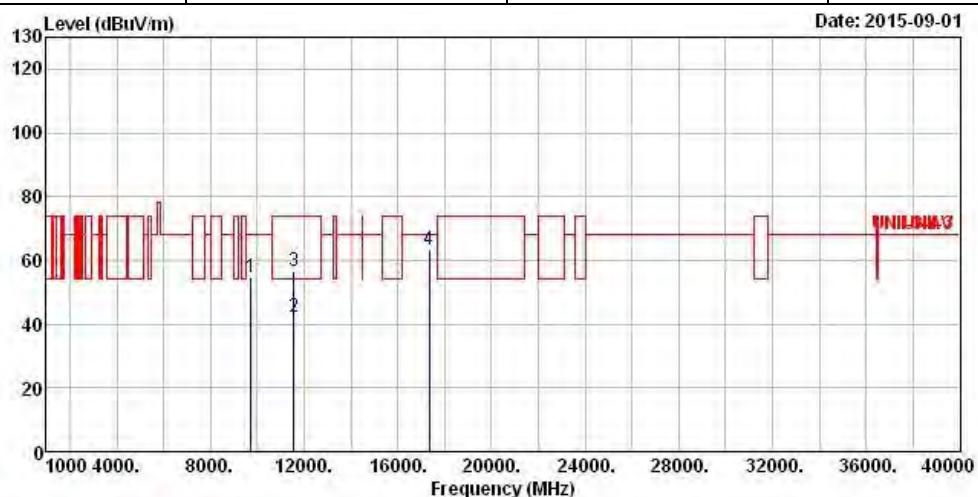
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.





## Transmitter Radiated Unwanted Emissions (Above 1GHz)

<b>Modulation Mode</b>	VHT20	<b>Test Freq. (MHz)</b>	5785
<b>N<sub>TX</sub></b>	1	<b>Polarization</b>	V



Freq MHz	Over Limit		Read Line Level dBuV	Antenna Factor dB/m	Cable Loss dB	Preamp Factor dB	Remark
	Freq MHz	Level dBuV/m					
1 9720.000	54.68	-13.52	68.20	40.72	38.35	8.75	33.14 Peak
2 11570.000	42.10	-11.90	54.00	26.72	39.23	8.57	32.42 Average
3 11570.000	56.54	-17.46	74.00	41.16	39.23	8.57	32.42 Peak
4 17355.000	63.15	-5.05	68.20	42.97	42.63	9.01	31.46 Peak

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

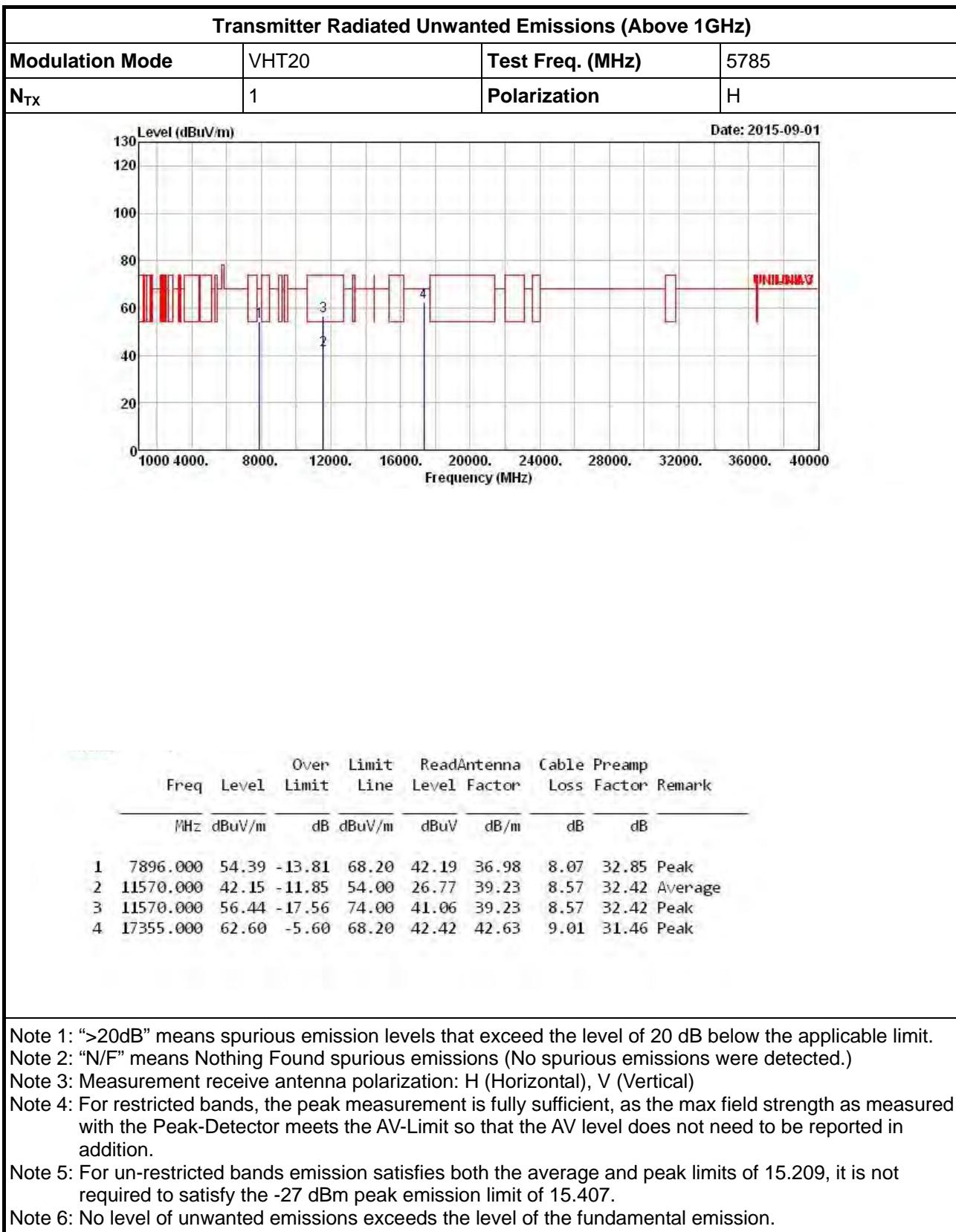
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

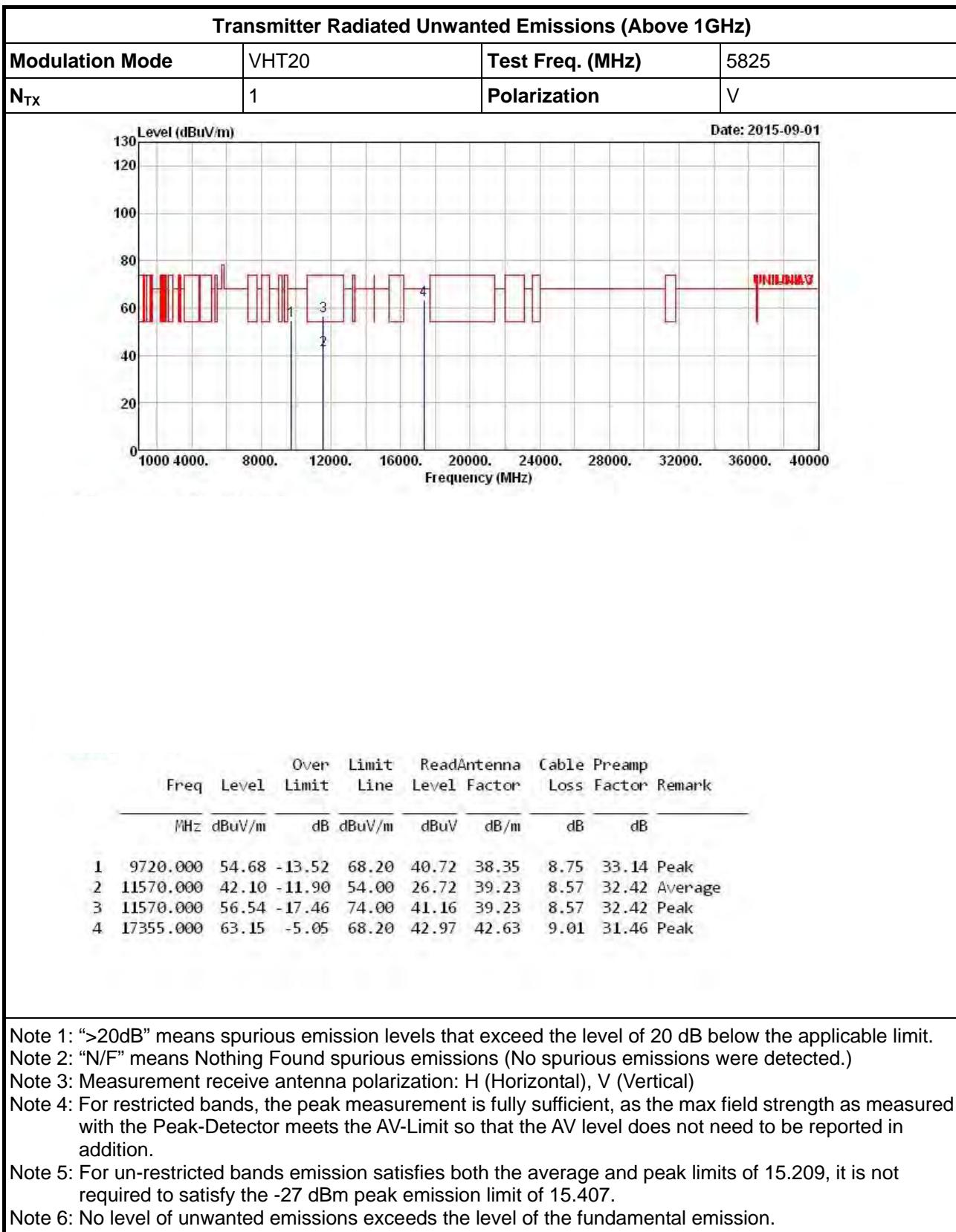
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

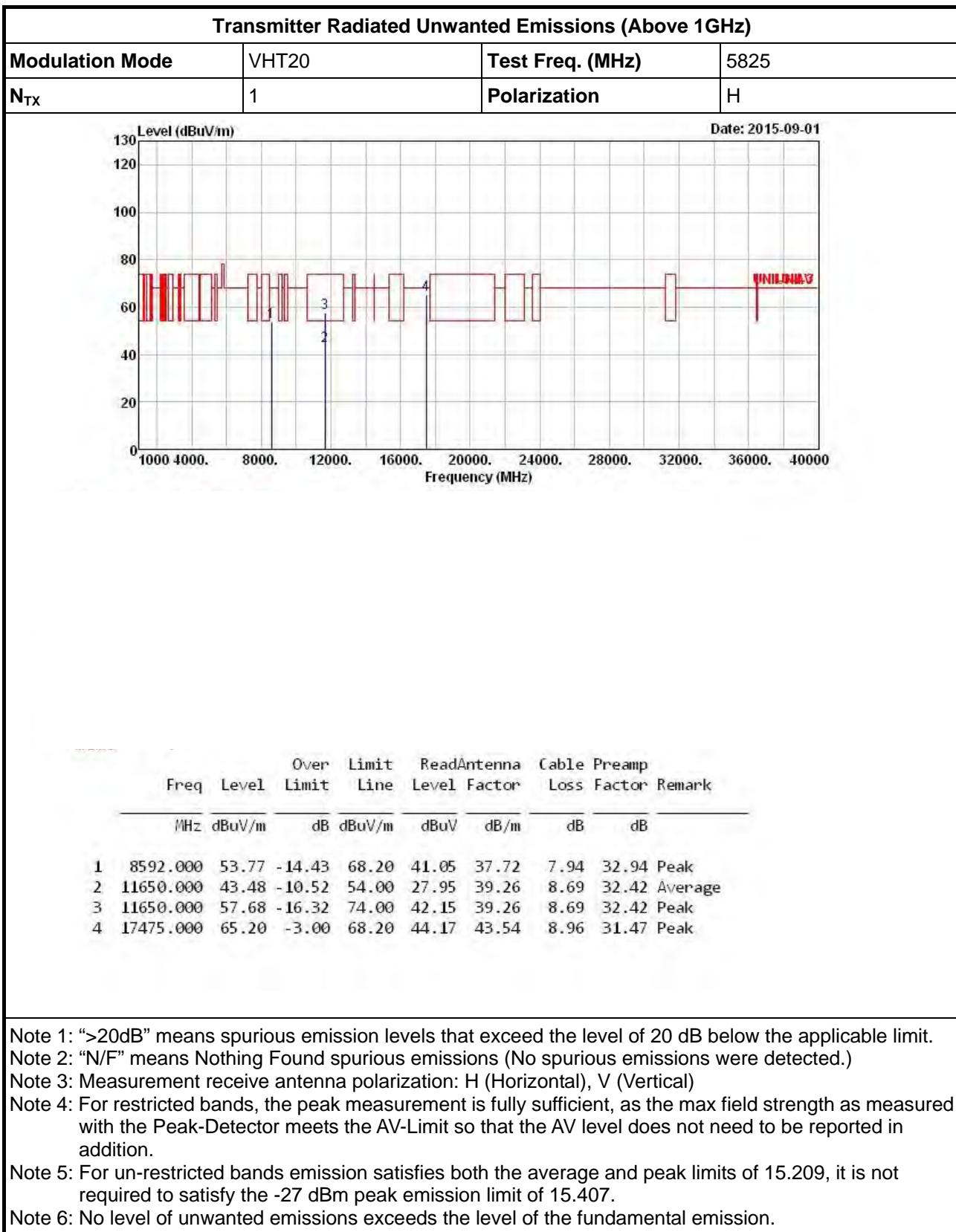
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

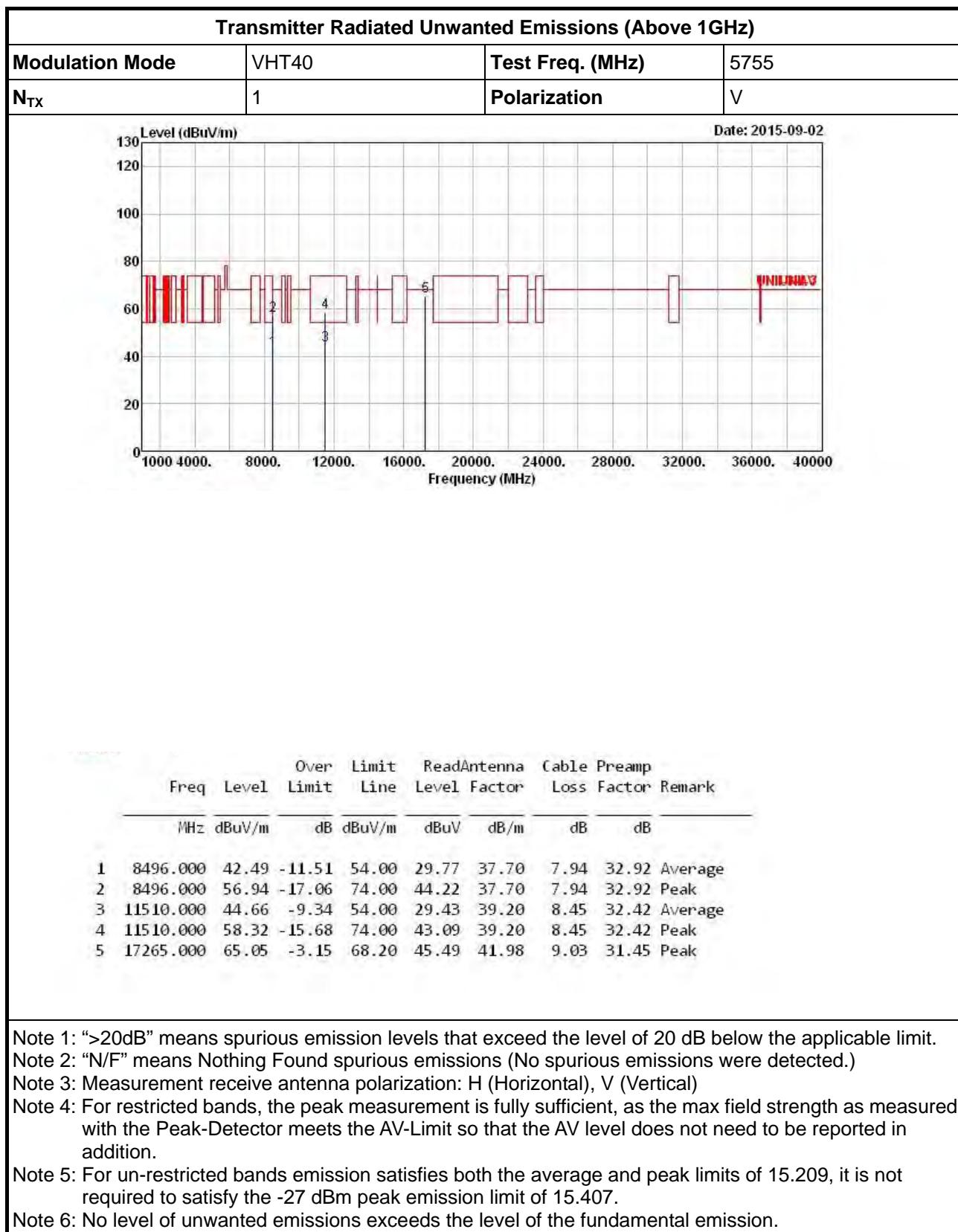
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

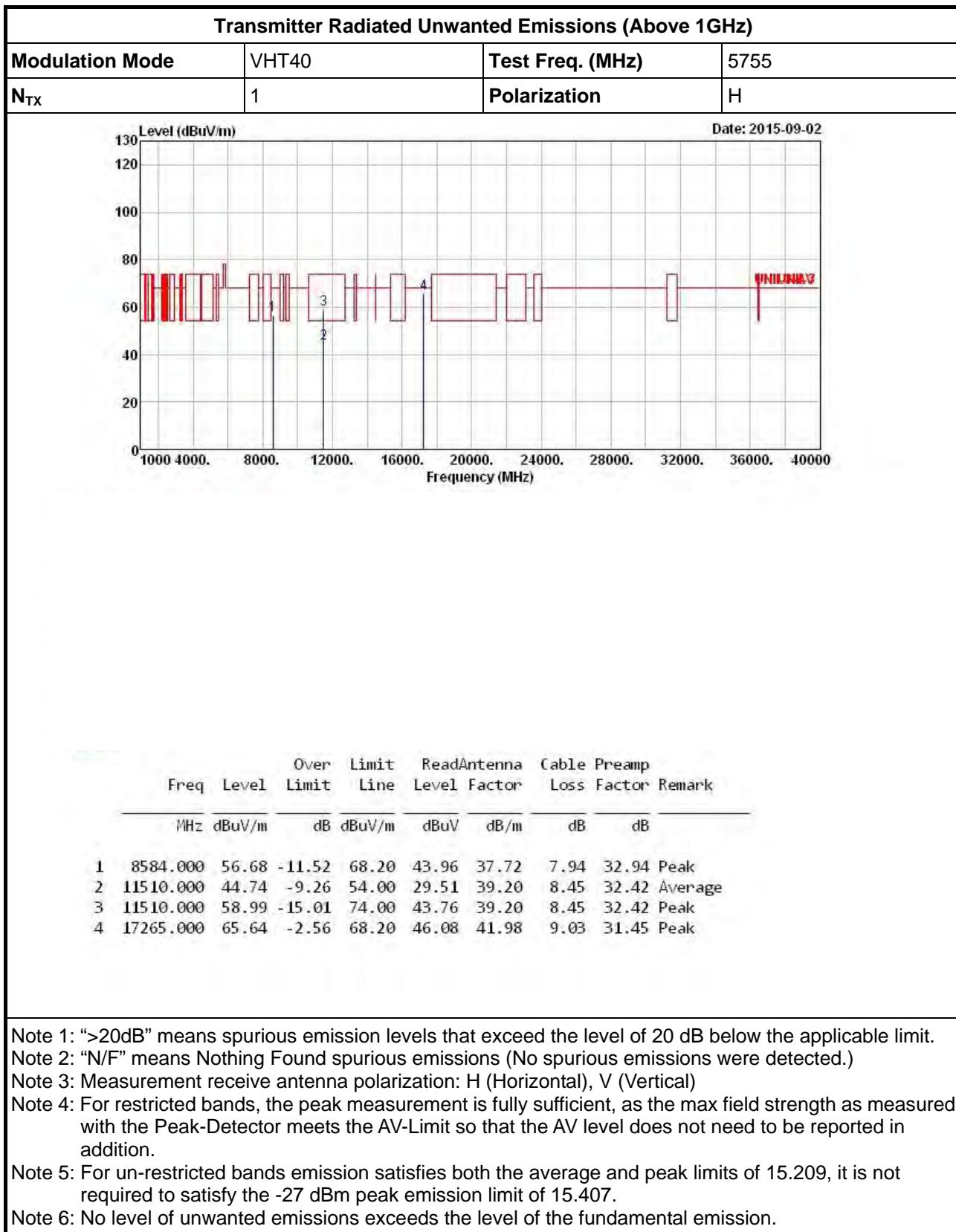
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

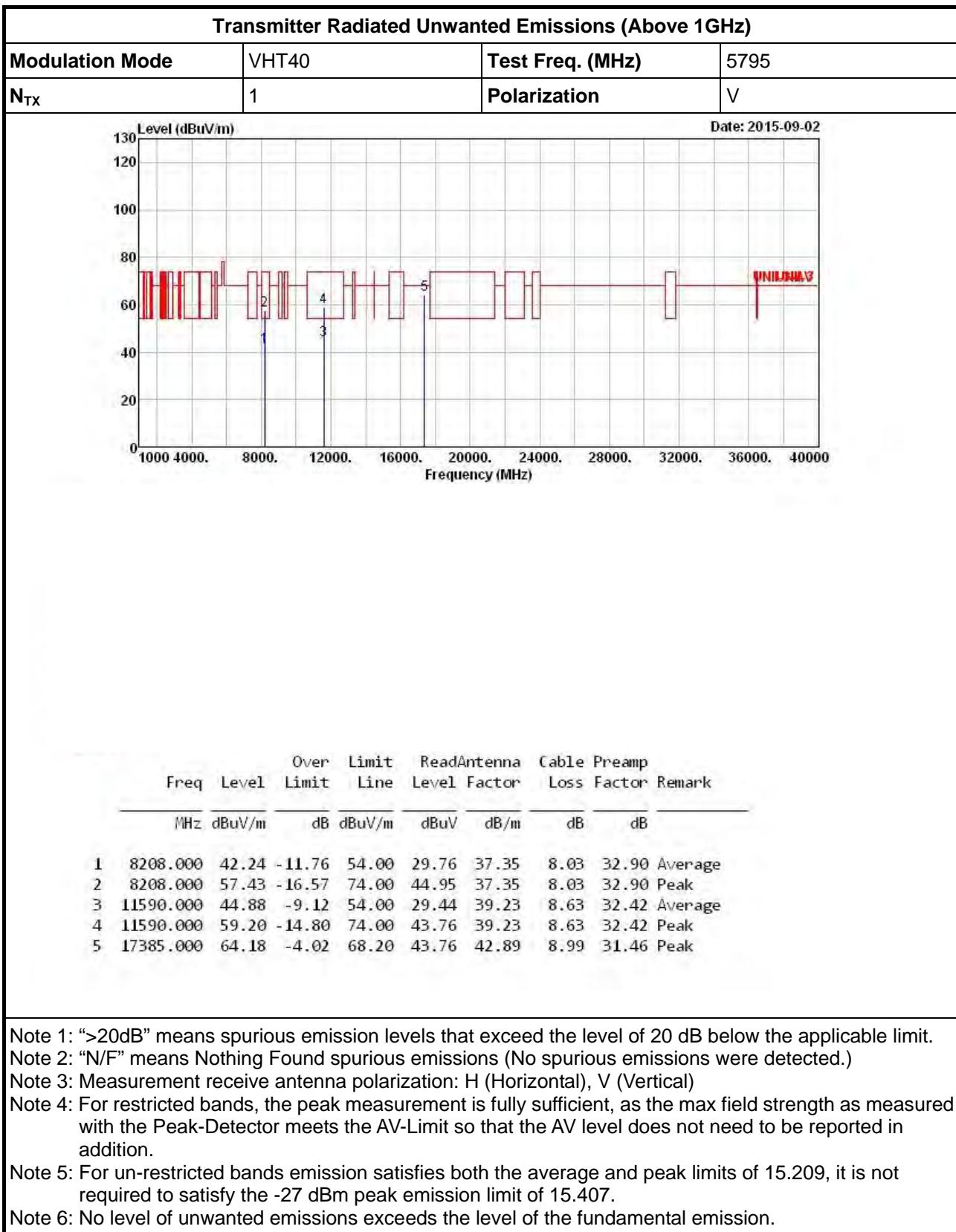


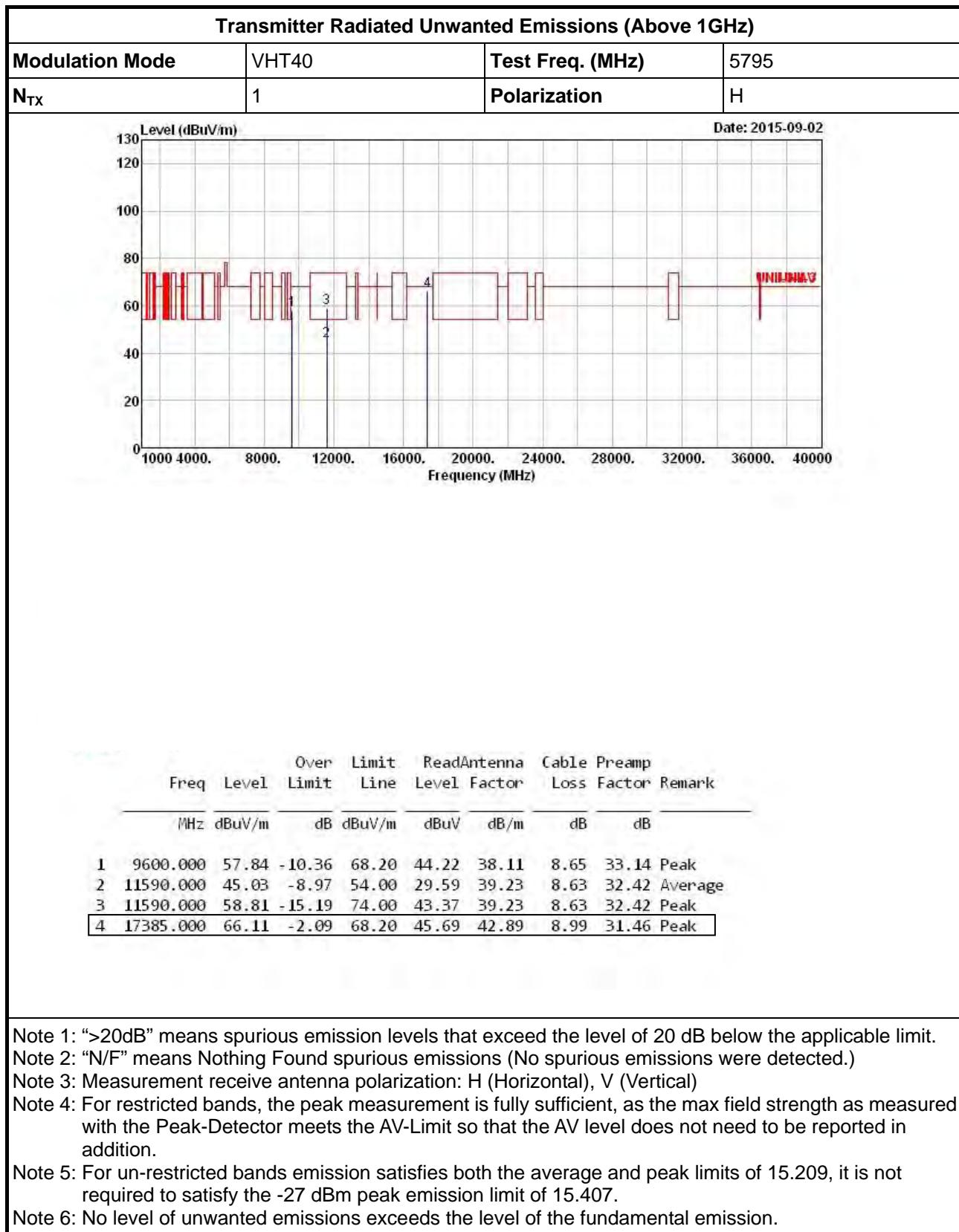


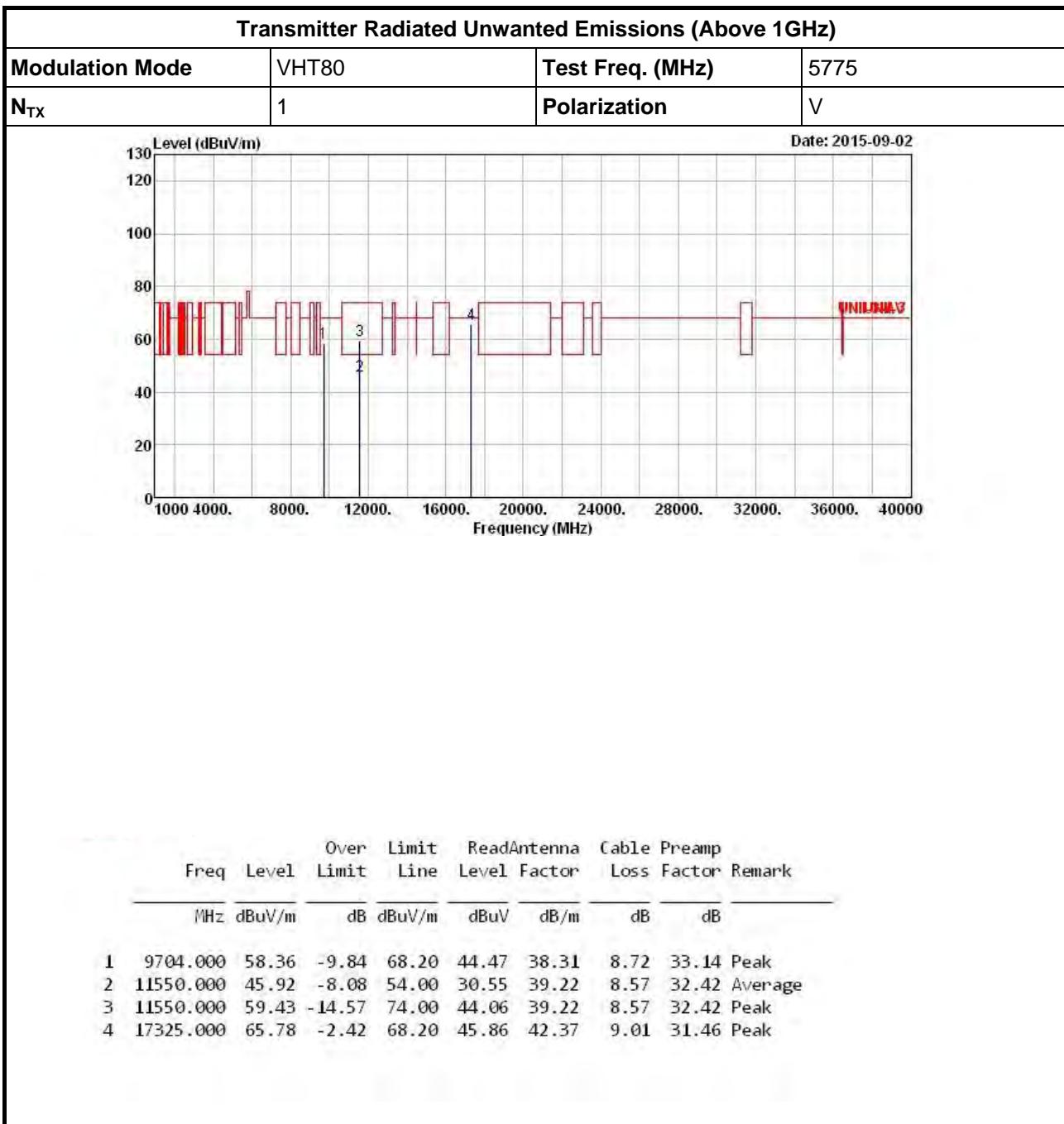












Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

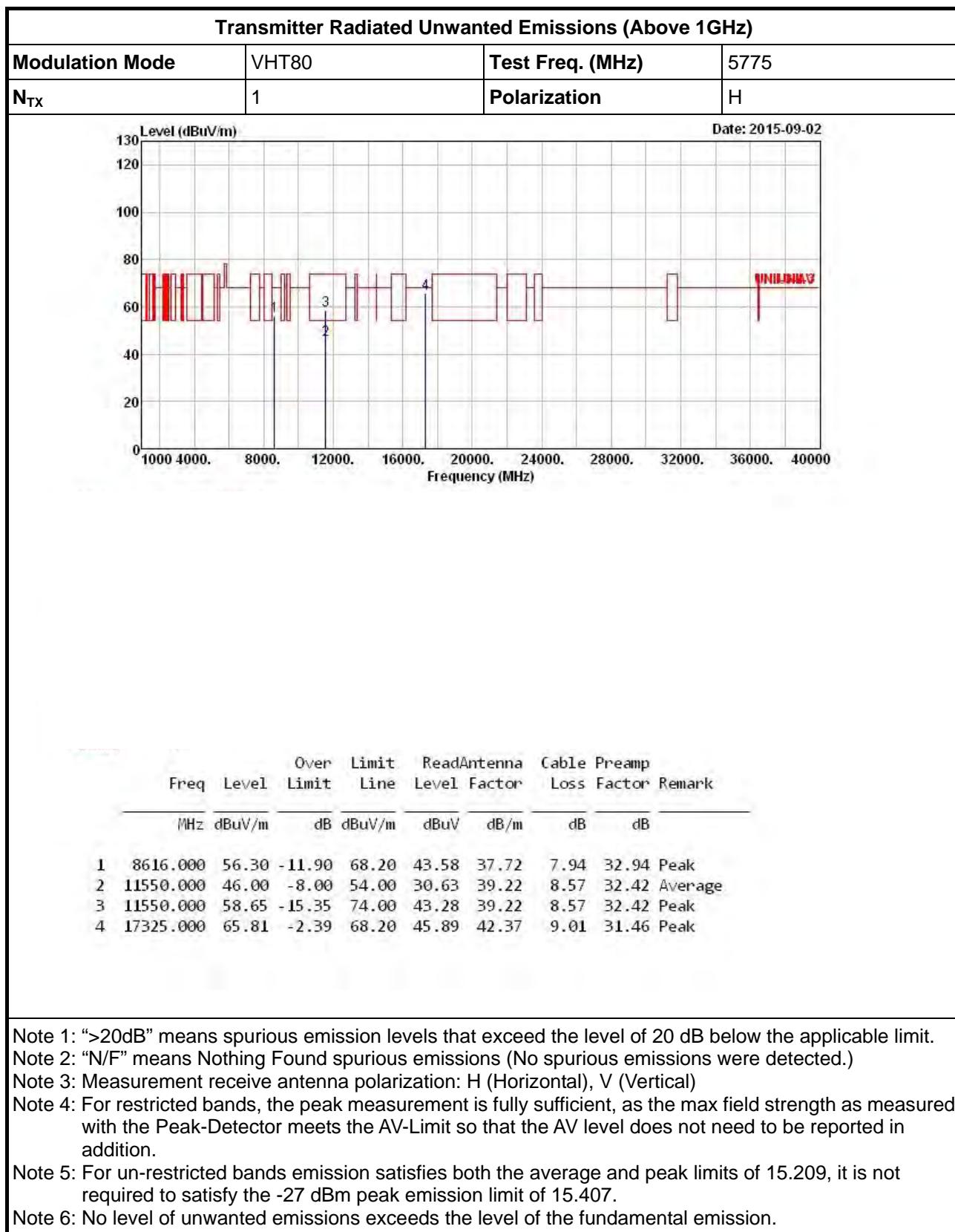
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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 and $\pm 25$ ppm maximum for the 2.4 GHz band.	

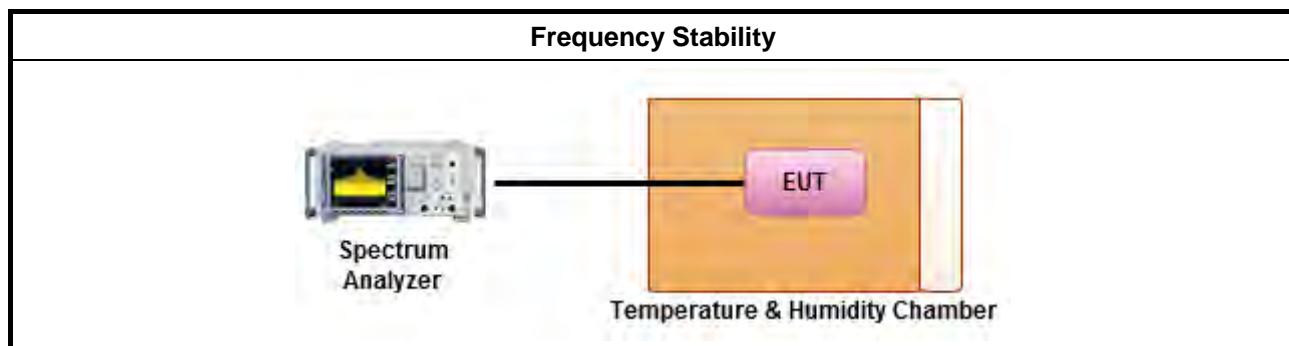
### 3.7.2 Measuring Instruments

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: 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	5300	0.0000	6.8302	6.8302	13.6792
T <sub>20°C</sub> Vmin	5300	0.0000	6.7925	6.9094	6.9283
T <sub>50°C</sub> Vnom	5300	0.0000	-6.7925	6.8868	-13.5849
T <sub>40°C</sub> Vnom	5300	0.0000	0.0000	0.0000	6.7925
T <sub>30°C</sub> Vnom	5300	0.0000	6.7925	6.7925	-13.5849
T <sub>20°C</sub> Vnom	5300	-6.7925	0.0000	0.0000	13.6792
T <sub>10°C</sub> Vnom	5300	13.6792	13.6792	11.7925	0.0000
T <sub>0°C</sub> Vnom	5300	6.8868	6.9094	6.8868	6.8943
T <sub>-10°C</sub> Vnom	5300	6.8868	6.8868	6.7925	6.7925
T <sub>-20°C</sub> Vnom	5300	6.8302	6.7925	6.9283	6.8868
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

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

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101500	9KHz~40GHz	May 06, 2015	RF Conducted
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jul. 28, 2015	RF Conducted
Power Sensor	Anritsu	MA2411B	1027452	300MHz ~ 40GHz	Jan. 29, 2015	RF Conducted
Power Meter	Anritsu	ML2495A	1124009	300MHz ~ 40GHz	Jan. 29, 2015	RF Conducted
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	-20 ~ 100°C	Jun. 12, 2015	RF Conducted
AC Power Source	G.W	APS-9102	EL920581	AC 0V ~ 300V	Jun. 22, 2015	RF Conducted

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

### <Radiation Emissions >

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Nov. 29, 2014	Radiation
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May 11, 2015	Radiation
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Oct. 20, 2014	Radiation
Spectrum	R&S	FSP40	100004	9kHz ~ 40GHz	Apr. 02, 2015	Radiation
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 20, 2014	Radiation
Horn Antenna	ETS • LINDGREN	3115	6741	1GHz ~ 18GHz	Jul. 15, 2015	Radiation
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz ~ 40GHz	Jan. 27, 2015	Radiation
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 15, 2014	Radiation
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec. 12, 2014	Radiation
Turn Table	EM Electronics	EM Electronics	060615	0 ~ 360 degree	N/A	Radiation
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiation

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Amplifier	EMC INSTRUMENTS	EMC184045B	980192	18GHz ~ 40GHz	Aug. 25.2014	Radiation
Loop Antenna	TESEQ	HLA 6120	24155	9 kHz~30 MHz	Mar 12, 2015	Radiation

Note: Calibration Interval of instruments listed above is two years.