



# FCC Test Report

**Equipment** : RF Module  
**Brand Name** : Chicony  
**Model No.** : AR5B22  
**FCC ID** : E8H-AR5B22  
**Standard** : 47 CFR FCC Part 15.407  
**Operating Band** : 5150 MHz – 5250 MHz  
5250 MHz – 5350 MHz  
5470 MHz – 5725 MHz  
**FCC Classification** : NII  
**Applicant** : Chicony Electronics Co., Ltd.  
**Manufacturer** : No.25,Wugong 6th RD.,Wugu Dist.,  
New Taipei City 248 , Taiwan (R.O.C)

The product sample received on Jun. 16, 2015 and completely tested on Jul. 21, 2015. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 and shown compliance with the applicable technical standards.

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

Reviewed by:

  
Vic Hsiao / Supervisor



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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	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]:0.2173520MHz 26.02 (Margin26.90dB) - AV 42.15 (Margin20.77dB) - QP	FCC 15.207	Complied
-	15.407(a)	Emission Bandwidth	-	Information only	-
3.2	15.407(a)	RF Output Power (Maximum Conducted Output Power)	Power [dBm] 5150-5250MHz:16.45 5250-5350MHz:18.59 5470-5725MHz:16.46	Power [dBm] 5150-5250MHz:17 5250-5350MHz:24 5470-5725MHz:24	Complied
-	15.407(a)	Peak Power Spectral Density	-	PPSD [dBm/MHz] 5150-5250MHz:4 5250-5350MHz:11 5470-5725MHz:11	-
-	15.407(a)	Peak Excursion	-	13 dB	-
3.3	15.407(b)	Transmitter Radiated Bandedge Emissions	Restricted Bands [dBuV/m at 3m]: 5149.940MHz 64.83 (Margin 9.17dB) - PK 48.66 (Margin 5.34dB) - AV	Non-Restricted Bands: $\leq$ -27dBm (54dBuV/m@3m) Restricted Bands: FCC 15.209	Complied
3.4	15.407(b)	Transmitter Radiated Unwanted Emissions	Restricted Bands <b>Below 1GHz</b> [dBuV/m at 3m]:385.020MHz 42.32 (Margin 3.68dB) - PK <b>Above 1GHz(Worst)</b> [dBuV/m at 3m]: 15780MHz 67.59 (Margin 6.41dB) - PK 52.76 (Margin 1.24dB) - AV	Non-Restricted Bands: $\leq$ -27dBm (54dBuV/m@3m) Restricted Bands: FCC 15.209	Complied
-	15.407(g)	Frequency Stability	-	Signal shall remain in-band	-

Note: Standard clause 15.247(a)、15.247(g) have been done module test by Atheros / AR5B22.



## Revision History



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

RF General Information						
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N <sub>TX</sub> )	RF Output Power (dBm)	Co-location
5150-5250	a	5180-5240	36-48 [4]	1	14.63	Yes
5250-5350		5260-5320	52-64 [4]	1	17.29	
5470-5725		5500-5700	100-140 [8]	1	16.46	
5150-5250	a	5180-5240	36-48 [4]	2	14.34	Yes
5250-5350		5260-5320	52-64 [4]	2	18.59	
5470-5725		5500-5700	100-140 [8]	2	14.02	
5150-5250	n (HT20)	5180-5240	36-48 [4]	2	14.19	Yes
5250-5350		5260-5320	52-64 [4]	2	17.42	
5470-5725		5500-5700	100-140 [8]	2	14.31	
5150-5250	n (HT40)	5190-5230	38-46 [2]	2	16.45	Yes
5250-5350		5270-5310	54-62 [2]	2	17.91	
5470-5725		5510-5670	102-134 [3]	2	15.33	

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: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other. (i.e., EUT has simultaneously co-transmitting that operating 2.4GHz and 5GHz.)

### 1.1.2 Antenna Information

EUT may match the two group antennas use. The only difference is the antennas. For more detailed features description, please refer to the specifications or user's manual.

Antenna Group	Port. No.	Antenna Model Name
1	1	WPB107-1(Mini 1.13 Antenna with MHF L70mm)
	2	WPB107-1(Mini 1.13 Antenna with MHF L49mm)
2	1	WPB220 (Mini 1.13 Antenna with MHF L70mm)
	2	WPB220 (Mini 1.13 Antenna with MHF L49mm)

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				
Group	Port. No.	Ant. Cat.	Ant. Type	Gain (dBi)
1	1/2	Integral	PCB	3.01 / 3.01
2	1/2	Integral	PIFA	2.97 /3.08

Remark:

1. In modulation mode 11a, this EUT supports 1TX and diversity. Port 1 is the worst case of the EUT. The test result of Port 1 was recorded in this report.
2. In modulation mode 11a/n, this EUT supports 2TX.
3. Original equipment is PIFA antenna. The additional PIFA antenna not the higher gain and worst configuration that all items didn't retest. Therefore, we tested and recorded PCB antenna in this report.

### 1.1.3 Type of EUT

Identify EUT	
EUT Serial Number	N/A
Presentation of Equipment	<input type="checkbox"/> Production ; <input type="checkbox"/> Pre-Production ; <input checked="" 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 EUT Operational Condition

Supply Voltage	<input type="checkbox"/> AC mains	<input checked="" type="checkbox"/> DC	
Type of DC Source	<input checked="" type="checkbox"/> From Host System	<input type="checkbox"/> External AC adapter	<input type="checkbox"/> Li-ion Battery



## 1.2 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5540	DoC
2	Test Fixture	NA	NA	NA

Note : The test fixture provides is by customer.

## 1.3 Testing Applied Standards

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

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2009
- ♦ FCC KDB 789033
- ♦ FCC KDB 662911
- ♦ FCC KDB 412172

## 1.4 Testing Location Information

Testing Location				
<input checked="" type="checkbox"/>	HWA YA	ADD	: No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.	
		TEL	: 886-3-327-3456	FAX : 886-3-327-0973
Test Condition		Test Site No.	Test Engineer	Test Environment
AC Conduction		CO04-HY	Zeus	23°C / 59%
RF Conducted		TH06-HY	Rory	22.2°C / 65%
Radiated Emission		03CH03-HY	Hunter	25.4°C / 56.1%



## 1.5 Measurement Uncertainty

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

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



## 2 Test Configuration of EUT

### 2.1 The Worst Case Modulation Configuration

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

### 2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (5150-5250MHz band)						
Test Software Version	ART2					
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)				
		NCB: 20MHz		NCB: 40MHz		
		5180	5200	5240	5190	5230
11a	1	14.5	14	13.5	-	-
11a	2	12	11.5	11.5	-	-
HT20	2	11.5	11.5	11	-	-
HT40	2	-	-	-	9.5	13.5

The Worst Case Power Setting Parameter (5250-5350MHz band)						
Test Software Version	ART2					
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)				
		NCB: 20MHz		NCB: 40MHz		
		5260	5300	5320	5270	5310
11a	1	17.5	17	17.5	-	-
11a	2	15	17	14.5	-	-
HT20	2	14.5	15	15	-	-
HT40	2	-	-	-	15	9.5



The Worst Case Power Setting Parameter (5470-5725MHz band)								
Test Software Version	ART2							
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)						
		NCB: 20MHz				NCB: 40MHz		
		5500	5580	5660	5700	5510	5550	5670
11a	1	14.5	17	15	13	-	-	
11a	2	10.5	11.5	11.5	10.5	-	-	
HT20	2	11.5	12	11.5	10.5	-	-	
HT40	2	-	-		-	8.5	13.	12



## 2.3 The Worst Case Measurement Configuration

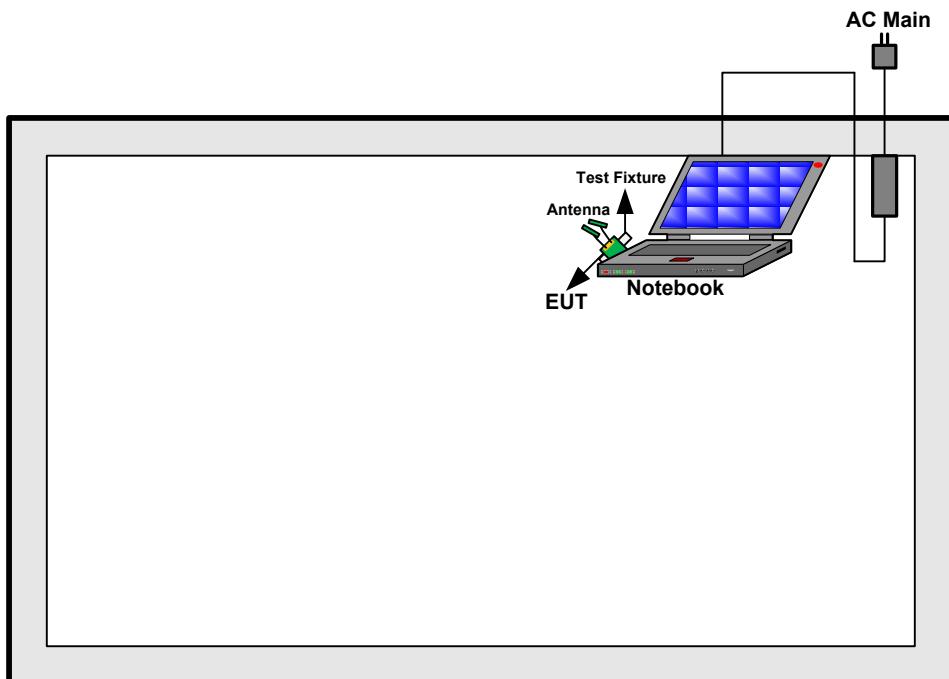
The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	Transmit Mode (WLAN)

The Worst Case Mode for Following Conformance Tests	
Tests Item	RF Output Power
Test Condition	Conducted measurement at transmit chains
Modulation Mode	11a, HT20, HT40

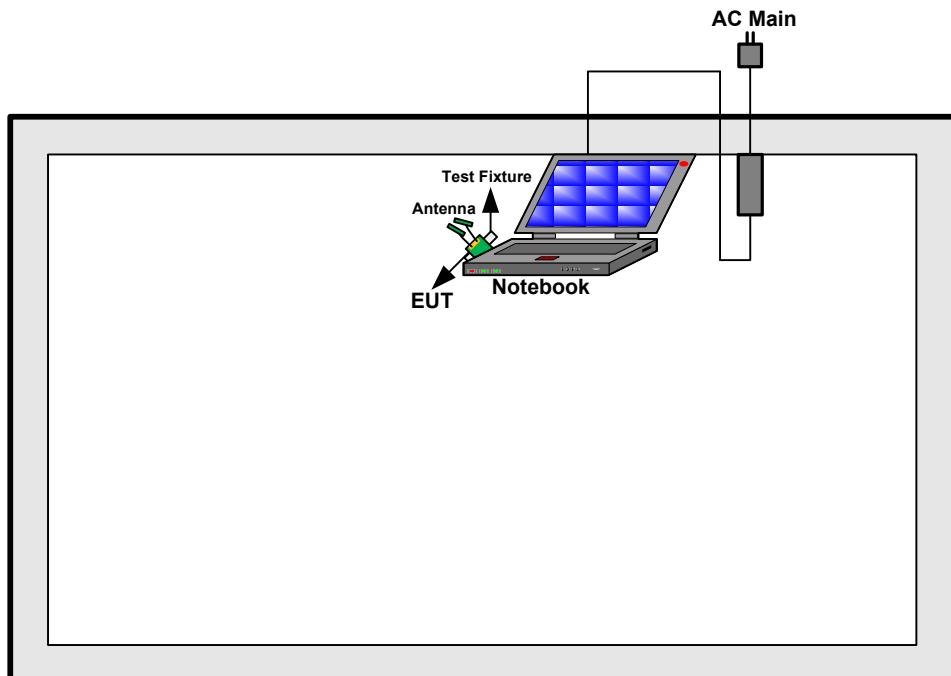
The Worst Case Mode for Following Conformance Tests							
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions						
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.						
User Position	<input type="checkbox"/> EUT will be placed in fixed position. <input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. EUT shall be performed two orthogonal planes. <input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.						
Operating Mode	1. Transmit Mode (WLAN)						
Modulation Mode	11a, HT20, HT40						
Orthogonal Planes of EUT	<table><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					
Worst Planes of EUT	V						

## 2.4 Test Setup Diagram

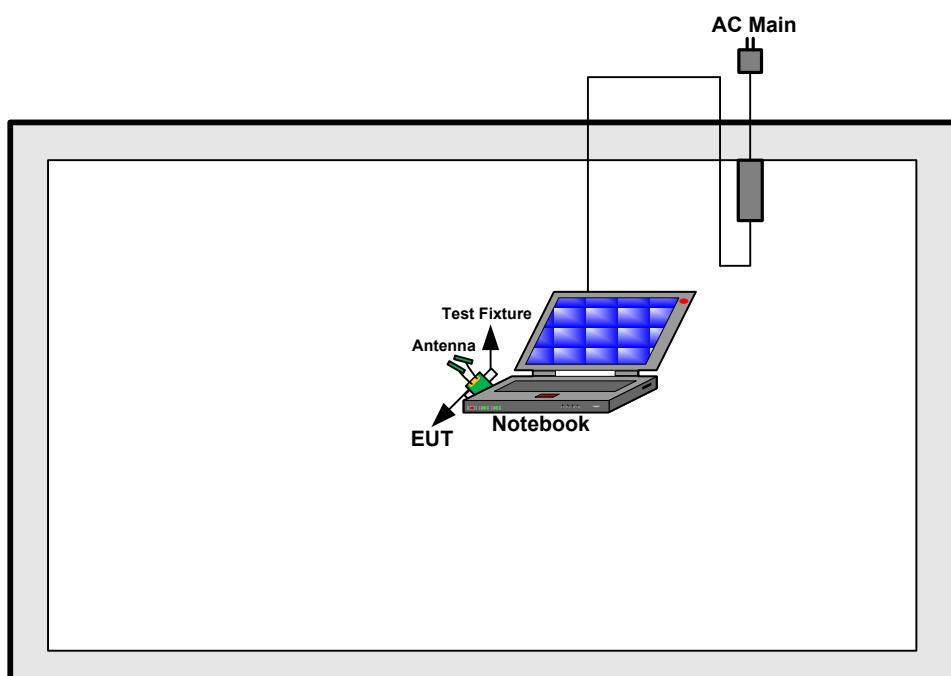
Test Setup Diagram – AC Line Conducted Emission Test



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



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



### 3 Transmitter Test Result

#### 3.1 AC Power-line Conducted Emissions

##### 3.1.1 AC Power-line Conducted Emissions Limit

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

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

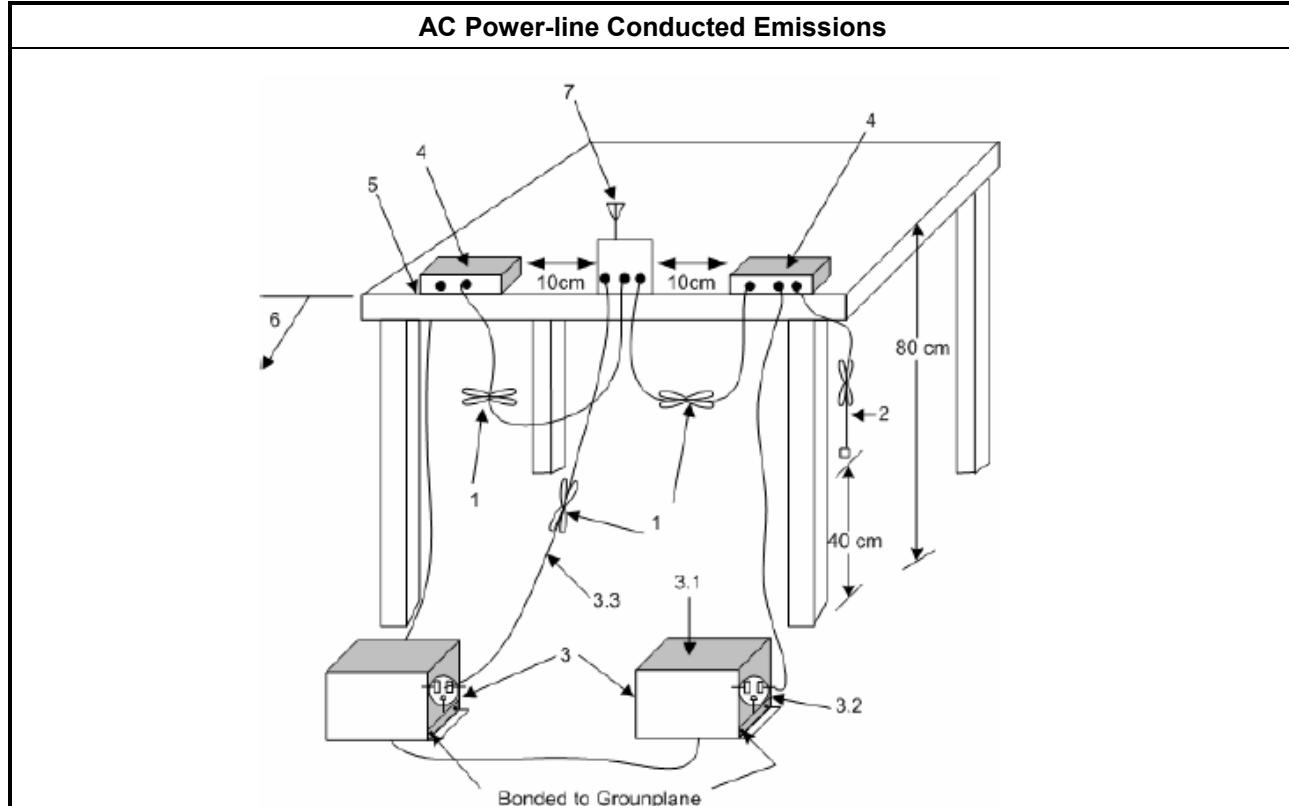
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

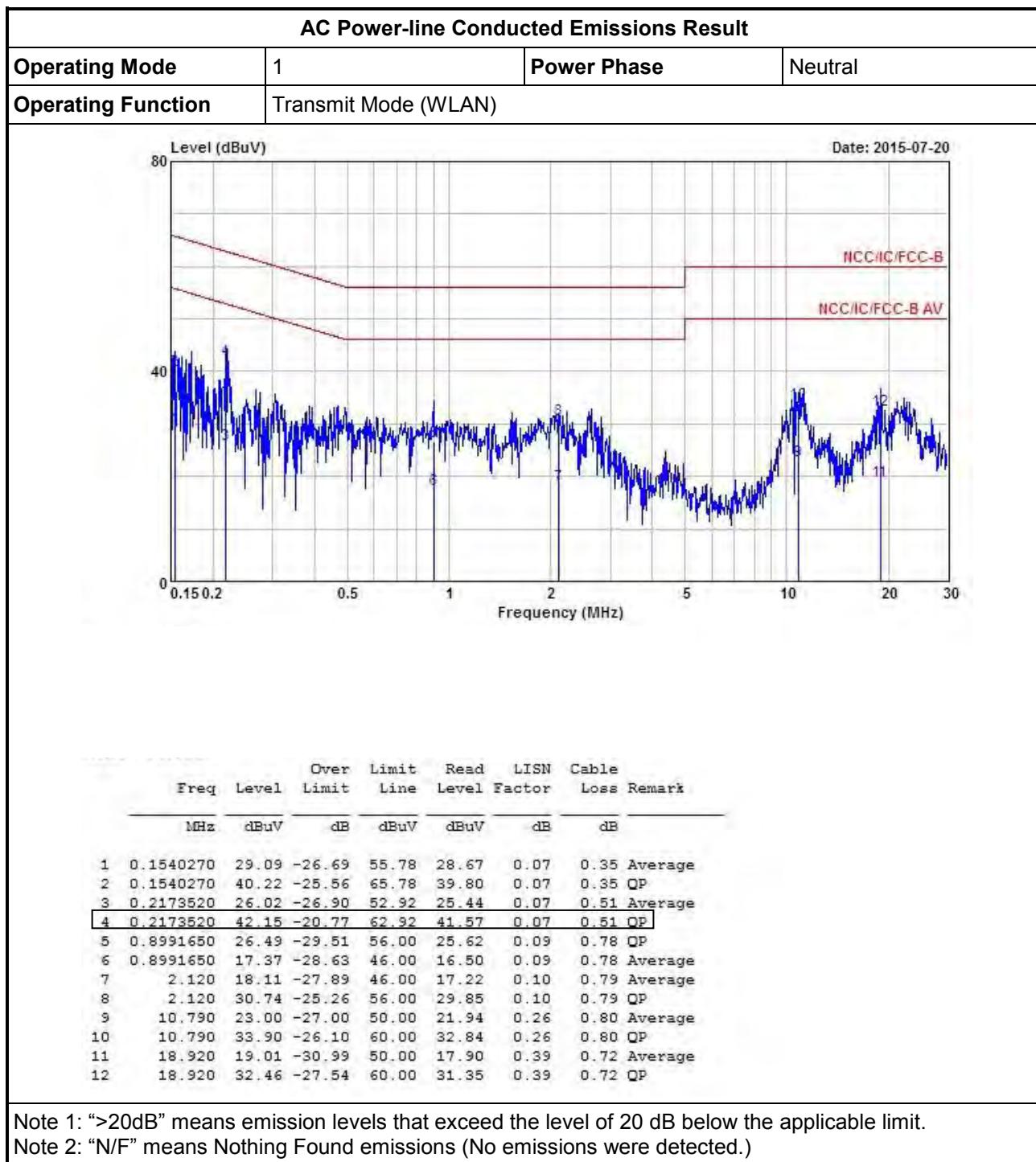
Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions.

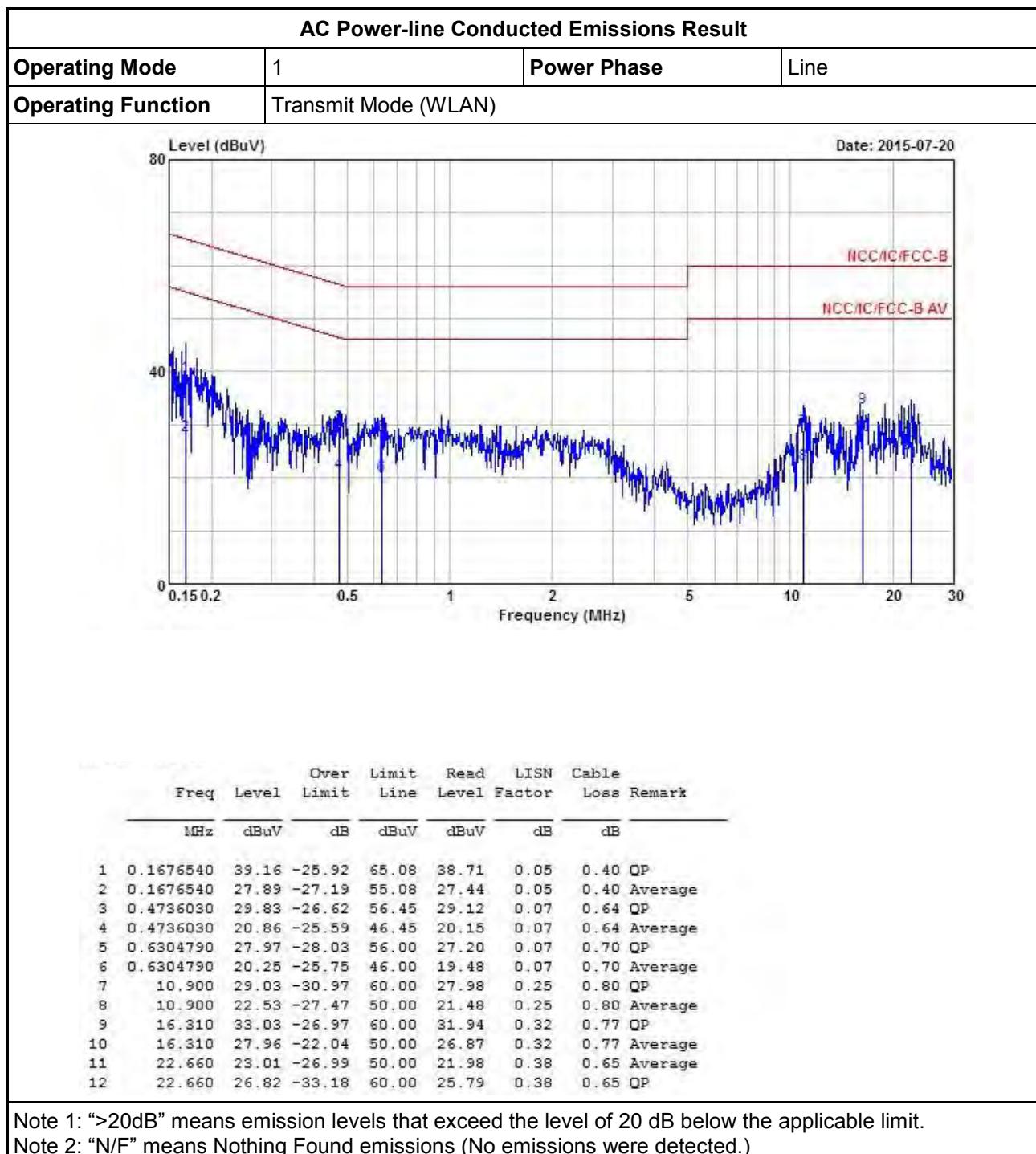
##### 3.1.4 Test Setup





## 3.1.5 Test Result of AC Power-line Conducted Emissions







## 3.2 RF Output Power

### 3.2.1 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, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6 \text{ dBi}$ , then $P_{Out} = 17 - (G_{TX} - 6)$ .
<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 $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6 \text{ dBi}$ , 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 $11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6 \text{ dBi}$ , then $P_{Out} = 24 - (G_{TX} - 6)$ .
<input type="checkbox"/>	For the 5.725-5.825 GHz band:
<input type="checkbox"/>	<input type="checkbox"/> Point-to-multipoint systems (P2M): the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W or $17 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6 \text{ dBi}$ , then $P_{Out} = 30 - (G_{TX} - 6)$ .
<input type="checkbox"/>	<input type="checkbox"/> Point-to-point systems (P2P): the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W or $17 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 23 \text{ dBi}$ , then $P_{Out} = 30 - (G_{TX} - 23)$ .

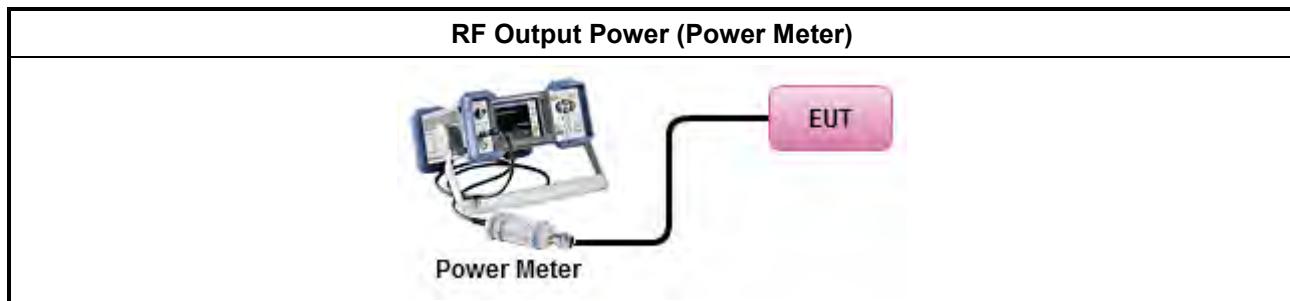
### 3.2.2 Measuring Instruments

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

### 3.2.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/> Maximum Conducted Output Power	
	[duty cycle $\geq$ 98% or external video / power trigger]
<input type="checkbox"/>	Refer as FCC KDB 789033, clause E Method SA-1 (spectral trace averaging).
<input type="checkbox"/>	Refer as FCC KDB 789033, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)
	duty cycle $<$ 98% and average over on/off periods with duty factor
<input type="checkbox"/>	Refer as FCC KDB 789033, clause E Method SA-2 (spectral trace averaging).
<input type="checkbox"/>	Refer as FCC KDB 789033, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
	Wideband RF power meter and average over on/off periods with duty factor
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause E Method PM (using an RF average power meter).
<input checked="" type="checkbox"/> For conducted measurement.	
<input type="checkbox"/>	The EUT supports single transmit chain and measurements performed on this transmit chain.
<input checked="" type="checkbox"/>	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
<input checked="" type="checkbox"/>	The EUT supports multiple transmit chains using options given below: 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]) $EIRP_{total} = P_{total} + DG$

### 3.2.4 Test Setup





### 3.2.5 Directional Gain for Power Measurement

Directional Gain (DG) Result					
Transmit Chains No.		1	2	-	-
Maximum $G_{ANT}$ (dBi)		3.01	3.01	-	-
Modulation Mode	DG (dBi)	$N_{TX}$	$N_{SS}$ (Min.)	STBC	Array Gain (dB)
a	3.01	1	1		0
a	6.02	2	1	-	3.01 (Note1)
n (HT20)	6.02	2	1	-	3.01 (Note1)
n (HT40)	6.02	2	1	-	3.01 (Note1)

Note 1: For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows:  
Any transmit signals are correlated, Directional Gain =  $G_{ANT} + 10 \log(N_{TX}) = 3.01 + 10 \log(2) = 6.02$   
All transmit signals are completely uncorrelated, Directional Gain =  $G_{ANT}$

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

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

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



## 3.2.6 Test Result of Maximum Conducted Output Power

Maximum Conducted Output Power (5150-5250MHz band)							
Test Date: Jul. 21, 2015			RF Output Power (dBm)				
Condition							
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)
11a	1	5180	14.63	-	14.63	17	3.01
11a	1	5200	14.43	-	14.43	17	3.01
11a	1	5240	14.44	-	14.44	17	3.01
11a	2	5180	11.69	10.56	14.17	16.98	6.02
11a	2	5200	11.78	10.70	14.28	16.98	6.02
11a	2	5240	11.99	10.54	14.34	16.98	6.02
HT20	2	5180	11.47	10.54	14.04	16.98	6.02
HT20	2	5200	11.64	10.66	14.19	16.98	6.02
HT20	2	5240	11.62	10.12	13.95	16.98	6.02
HT40	2	5190	9.81	8.84	12.36	16.98	6.02
HT40	2	5230	14.26	12.45	16.45	16.98	6.02
Result		Complied					

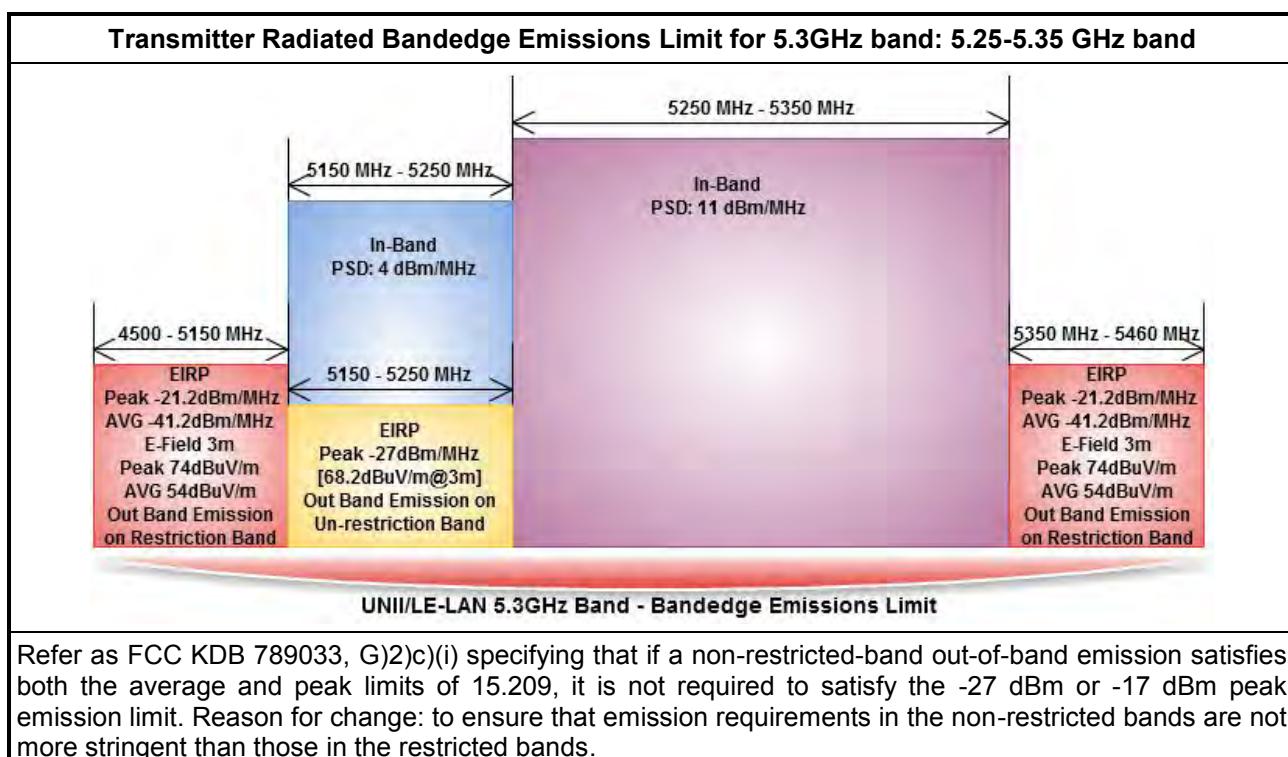
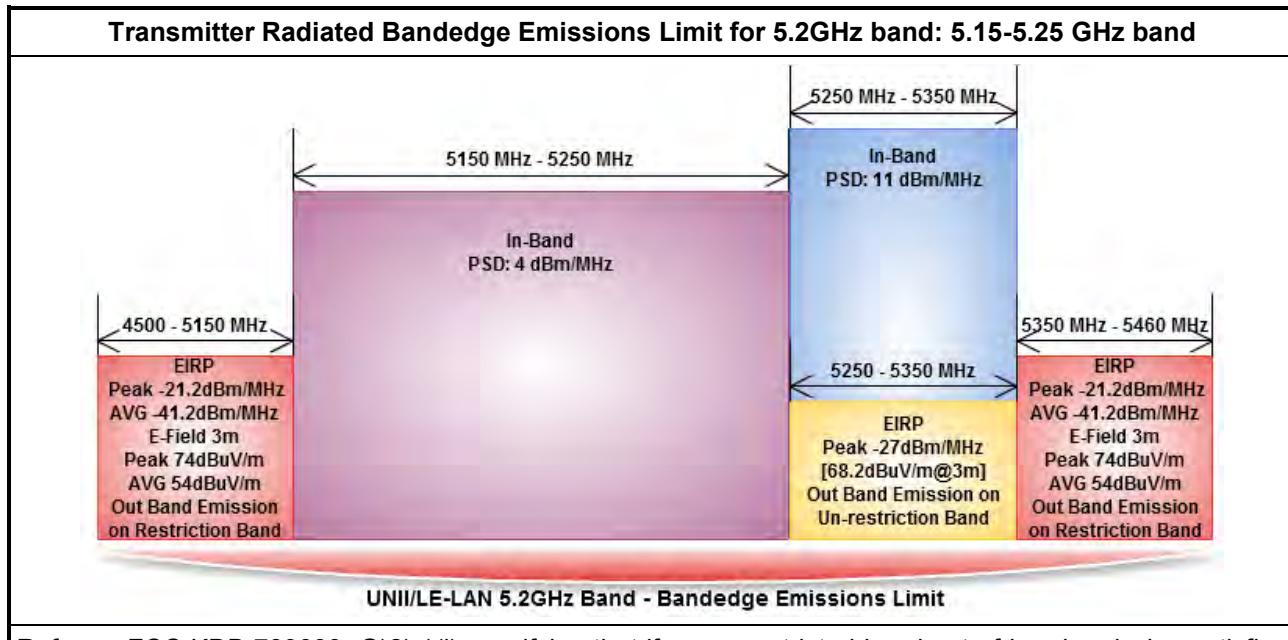
Maximum Conducted Output Power (5250-5350MHz band)							
Test Date: Jul. 21, 2015			RF Output Power (dBm)				
Condition							
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)
11a	1	5260	17.29	-	17.29	24	3.01
11a	1	5300	16.37	-	16.37	24	3.01
11a	1	5320	16.50	-	16.50	24	3.01
11a	2	5260	15.39	13.17	17.43	23.98	6.02
11a	2	5300	16.32	14.68	18.59	23.98	6.02
11a	2	5320	13.69	11.94	15.91	23.98	6.02
HT20	2	5260	15.10	13.59	17.42	23.98	6.02
HT20	2	5300	14.86	13.73	17.34	23.98	6.02
HT20	2	5320	14.65	13.08	16.95	23.98	6.02
HT40	2	5270	15.66	14.00	17.91	23.98	6.02
HT40	2	5310	10.08	8.30	12.29	23.98	6.02
Result		Complied					

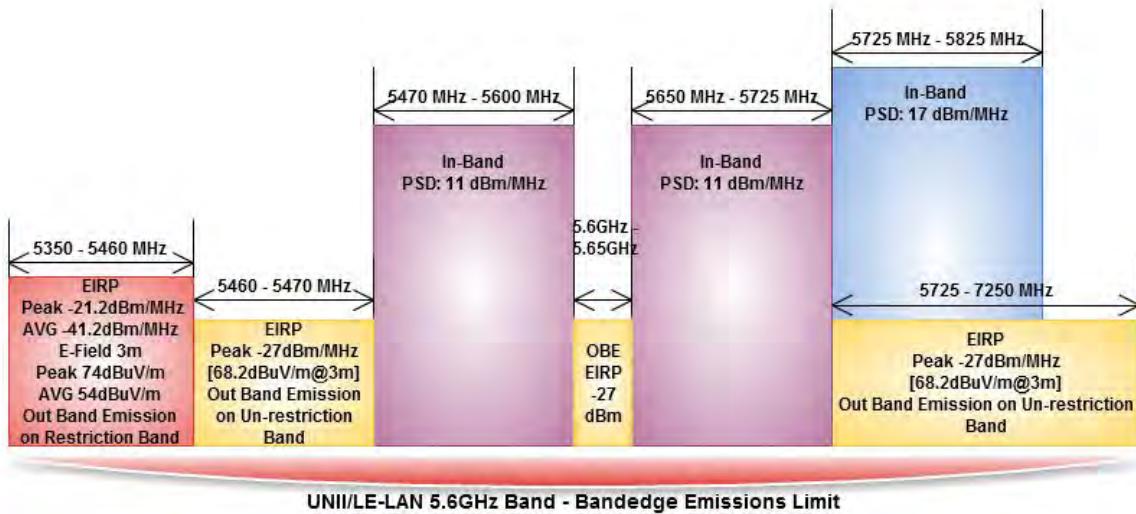


Maximum Conducted Output Power (5470-5725MHz band)							
Test Date: Jul. 21, 2015		RF Output Power (dBm)					
Condition			Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)
11a	1	5500	14.48	-	14.48	24	3.01
11a	1	5580	16.46	-	16.46	24	3.01
11a	1	5660	14.88	-	14.88	24	3.01
11a	1	5700	13.68	-	13.68	24	3.01
11a	2	5500	10.37	9.76	13.09	23.98	6.02
11a	2	5580	11.27	10.59	13.95	23.98	6.02
11a	2	5660	11.69	10.21	14.02	23.98	6.02
11a	2	5700	11.18	10.10	13.68	23.98	6.02
HT20	2	5500	10.96	10.42	13.71	23.98	6.02
HT20	2	5580	11.78	10.76	14.31	23.98	6.02
HT20	2	5660	11.41	10.08	13.81	23.98	6.02
HT20	2	5700	10.69	9.41	13.11	23.98	6.02
HT40	2	5510	8.65	8.59	11.63	23.98	6.02
HT40	2	5550	12.59	12.05	15.33	23.98	6.02
HT40	2	5670	12.42	11.53	15.00	23.98	6.02
Result			Complied				

### 3.3 Transmitter Radiated Bandedge Emissions

#### 3.3.1 Transmitter Radiated Bandedge Emissions Limit



**Transmitter Radiated Bandedge Emissions Limit for 5.6GHz band: 5.47-5.725 GHz band**


Refer as FCC KDB 789033, G2)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.

### 3.3.2 Measuring Instruments

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

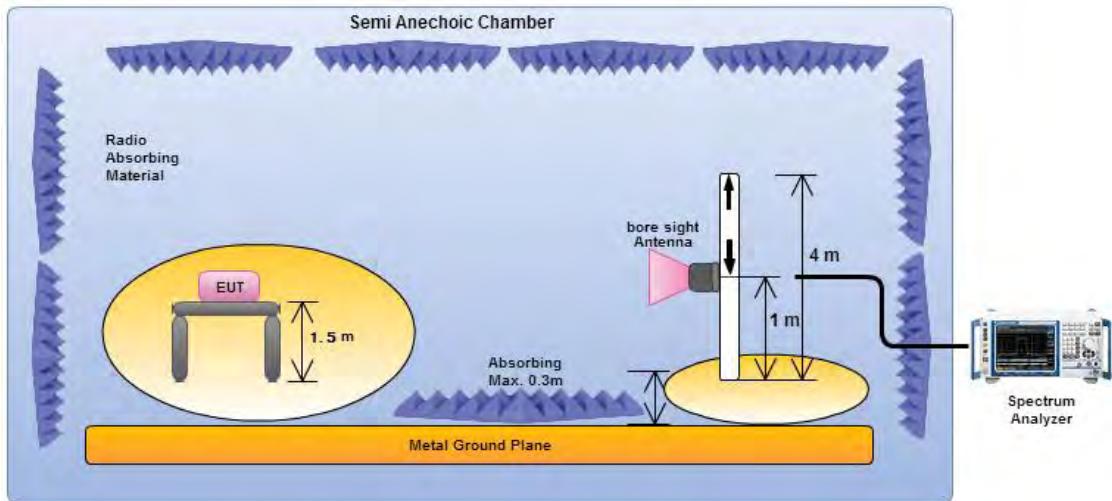


### 3.3.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	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.
<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 6.9.2.2 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
<input type="checkbox"/>	If EUT operate in adjacent contiguous bands, bandedge testing performed at the lowest frequency channel at lower-band and highest frequency channel at higher-band. Transmitter in-band emissions will consist of adjacent contiguous bands (e.g., IEEE 802.11ac VHT160 The lowest frequency channel at lower-band and highest frequency channel at higher-band in-band emissions will consist of two adjacent contiguous bands.)
<input type="checkbox"/>	Operating in 5.15-5.25 GHz band (lower-band) and 5.25-5.35 GHz band (higher-band).
<input type="checkbox"/>	Operating in 5.47-5.725 GHz band (lower-band) and 5.725-5.825 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 5.725-5.825 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, clause H)2) for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause H)1) for unwanted emissions into restricted bands.
	<input type="checkbox"/> Refer as FCC KDB 789033, H)6) Method AD (Trace Averaging).
	<input type="checkbox"/> Refer as FCC KDB 789033, H)6) Method VB (Reduced VBW).
	<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). $VBW \geq 1/T$ , where T is pulse time.
	<input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
	<input checked="" type="checkbox"/> Refer as FCC KDB 789033, clause H)5) measurement procedure peak limit.
	<input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.
<input checked="" type="checkbox"/>	For the transmitter bandedge emissions shall be measured using following options below:
	<input type="checkbox"/> Refer as FCC KDB 789033, 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 6.9.2 for band-edge testing.
	<input type="checkbox"/> Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements.
<input checked="" type="checkbox"/>	For radiated measurement, refer as ANSI C63.10, clause 6.5 for radiated emissions from above 1 GHz.

### 3.3.4 Test Setup

#### Transmitter Radiated Bandedge Emissions



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

Note: FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 02, 2014.



## 3.3.5 Test Result of Transmitter Radiated Bandedge Emissions

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	5149.400	60.75	74	5150.000	45.49	54	H
11a	2	5180	3	5137.400	59.26	74	5106.000	45.44	54	H
HT20	2	5180	3	5132.600	58.98	74	5137.600	45.41	54	H
HT40	2	5190	3	5149.940	64.83	74	5149.940	48.66	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	5320	3	5350.110	69.44	74	5350.250	48.28	54	H
11a	2	5320	3	5352.280	63.21	74	5360.120	46.41	54	H
HT20	2	5320	3	5351.580	66.82	74	5350.320	46.88	54	H
HT40	2	5310	3	5350.570	62.37	74	5350.300	47.82	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	5443.120	60.14	74.0	H
11a	1	5700	3	5726.240	67.16	68.2	H
11a	2	5500	3	5433.360	60.37	74.0	H
11a	2	5700	3	5725.160	62.48	68.2	H
HT20	2	5500	3	5447.600	60.55	74.0	H
HT20	2	5700	3	5725.280	66.61	68.2	H
HT40	2	5510	3	5441.200	59.72	74.0	H
HT40	2	5670	3	5726.000	60.35	68.2	H

Note 1: Measurement worst emissions of receive antenna polarization.



## 3.4 Transmitter Radiated Unwanted Emissions

### 3.4.1 Transmitter Radiated Unwanted Emissions Limit

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

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

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

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

### 3.4.2 Measuring Instruments

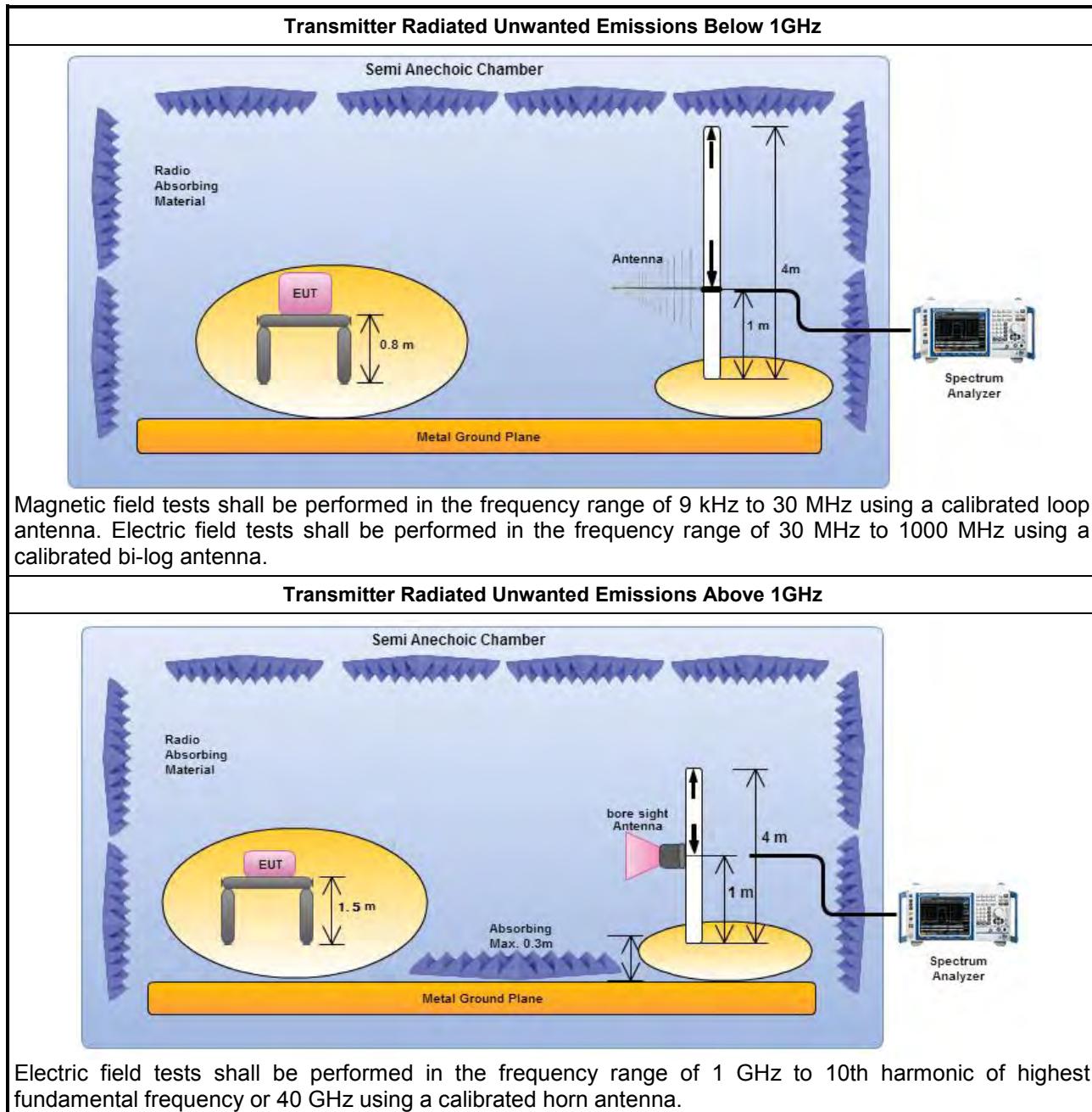
Refer a test equipment and calibration data table in this test report.



### 3.4.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> 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, clause H)2) for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/> Refer as FCC KDB 789033, clause H)1) for unwanted emissions into restricted bands.
<input type="checkbox"/> Refer as FCC KDB 789033, H)6) Method AD (Trace Averaging).
<input type="checkbox"/> Refer as FCC KDB 789033, H)6) Method VB (Reduced VBW).
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq$ 1/T, where T is pulse time.
<input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/> Refer as FCC KDB 789033, clause H)5) measurement procedure peak limit.
<input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.
<input checked="" type="checkbox"/> For radiated measurement.
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz.
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.6 for radiated emissions from above 1 GHz.

### 3.4.4 Test Setup



Note: FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 02, 2014.

### 3.4.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

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



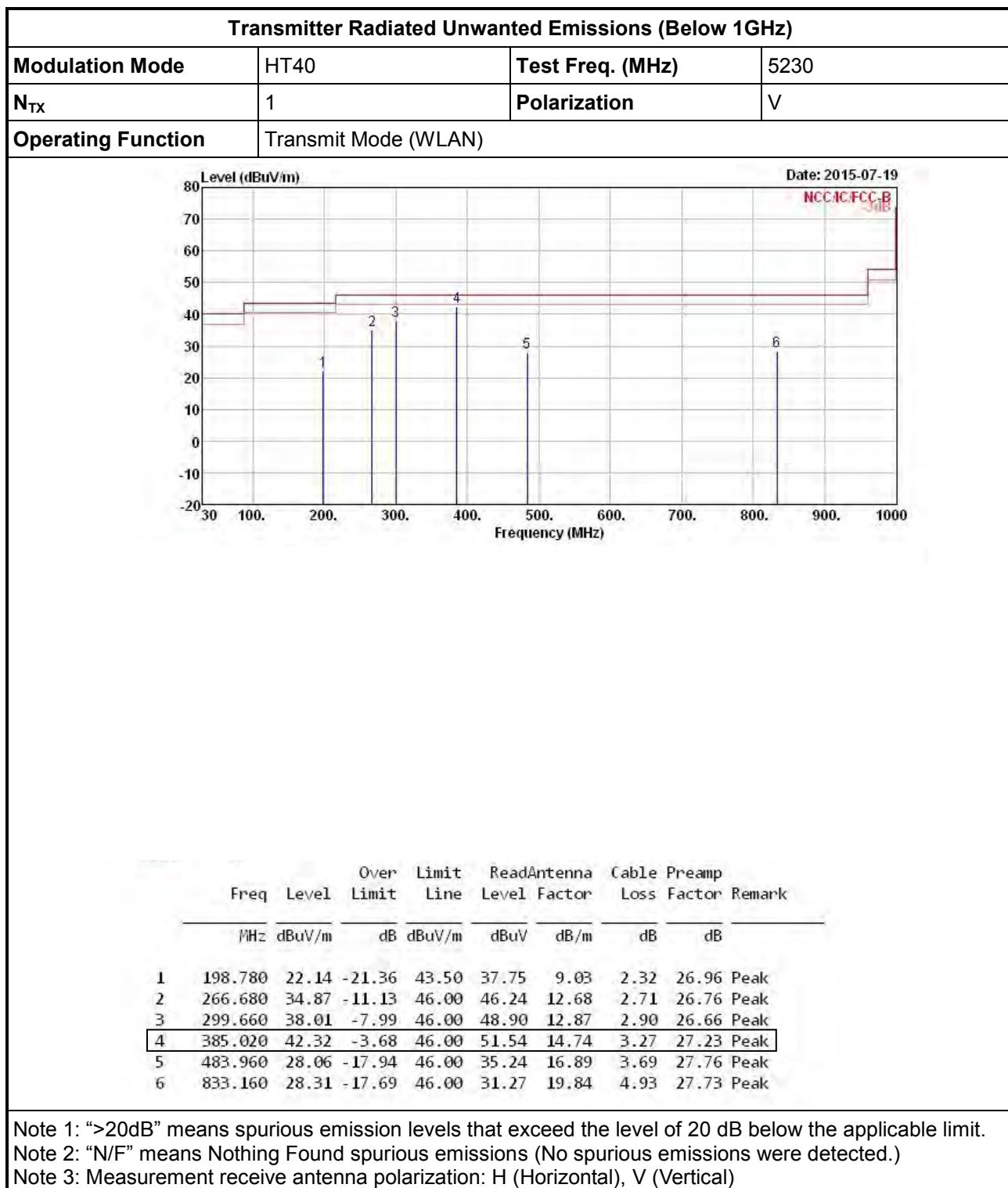
## 3.4.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Transmitter Radiated Unwanted Emissions (Below 1GHz)																																																																													
Modulation Mode	HT40		Test Freq. (MHz)		5230																																																																								
N <sub>TX</sub>	1		Polarization		V																																																																								
Operating Function	Transmit Mode (WLAN)																																																																												
<table border="1"> <thead> <tr> <th rowspan="2">Freq (MHz)</th> <th rowspan="2">Level (dBuV/m)</th> <th rowspan="2">Over Limit (dB)</th> <th rowspan="2">Limit Line (dBuV/m)</th> <th colspan="2">Read Antenna Level (dBuV)</th> <th colspan="2">Cable Loss (dB)</th> <th rowspan="2">Preamp Factor</th> <th rowspan="2">Remark</th> </tr> <tr> <th>Antenna Factor</th> <th>Line Factor</th> <th>dB/m</th> <th>dB</th> </tr> </thead> <tbody> <tr> <td>61.040</td> <td>21.81</td> <td>-18.19</td> <td>40.00</td> <td>41.72</td> <td>6.31</td> <td>1.26</td> <td>27.48</td> <td>Peak</td> </tr> <tr> <td>173.560</td> <td>24.22</td> <td>-19.28</td> <td>43.50</td> <td>39.91</td> <td>9.20</td> <td>2.17</td> <td>27.06</td> <td>Peak</td> </tr> <tr> <td>299.660</td> <td>23.84</td> <td>-22.16</td> <td>46.00</td> <td>34.73</td> <td>12.87</td> <td>2.90</td> <td>26.66</td> <td>Peak</td> </tr> <tr> <td>398.600</td> <td>32.20</td> <td>-13.80</td> <td>46.00</td> <td>40.94</td> <td>15.24</td> <td>3.34</td> <td>27.32</td> <td>Peak</td> </tr> <tr> <td>736.160</td> <td>25.91</td> <td>-20.09</td> <td>46.00</td> <td>29.67</td> <td>19.48</td> <td>4.63</td> <td>27.87</td> <td>Peak</td> </tr> <tr> <td>833.160</td> <td>40.08</td> <td>-5.92</td> <td>46.00</td> <td>43.04</td> <td>19.84</td> <td>4.93</td> <td>27.73</td> <td>Peak</td> </tr> </tbody> </table>										Freq (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Antenna Level (dBuV)		Cable Loss (dB)		Preamp Factor	Remark	Antenna Factor	Line Factor	dB/m	dB	61.040	21.81	-18.19	40.00	41.72	6.31	1.26	27.48	Peak	173.560	24.22	-19.28	43.50	39.91	9.20	2.17	27.06	Peak	299.660	23.84	-22.16	46.00	34.73	12.87	2.90	26.66	Peak	398.600	32.20	-13.80	46.00	40.94	15.24	3.34	27.32	Peak	736.160	25.91	-20.09	46.00	29.67	19.48	4.63	27.87	Peak	833.160	40.08	-5.92	46.00	43.04	19.84	4.93	27.73	Peak
Freq (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Antenna Level (dBuV)		Cable Loss (dB)		Preamp Factor	Remark																																																																				
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Note 1: "&gt;20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

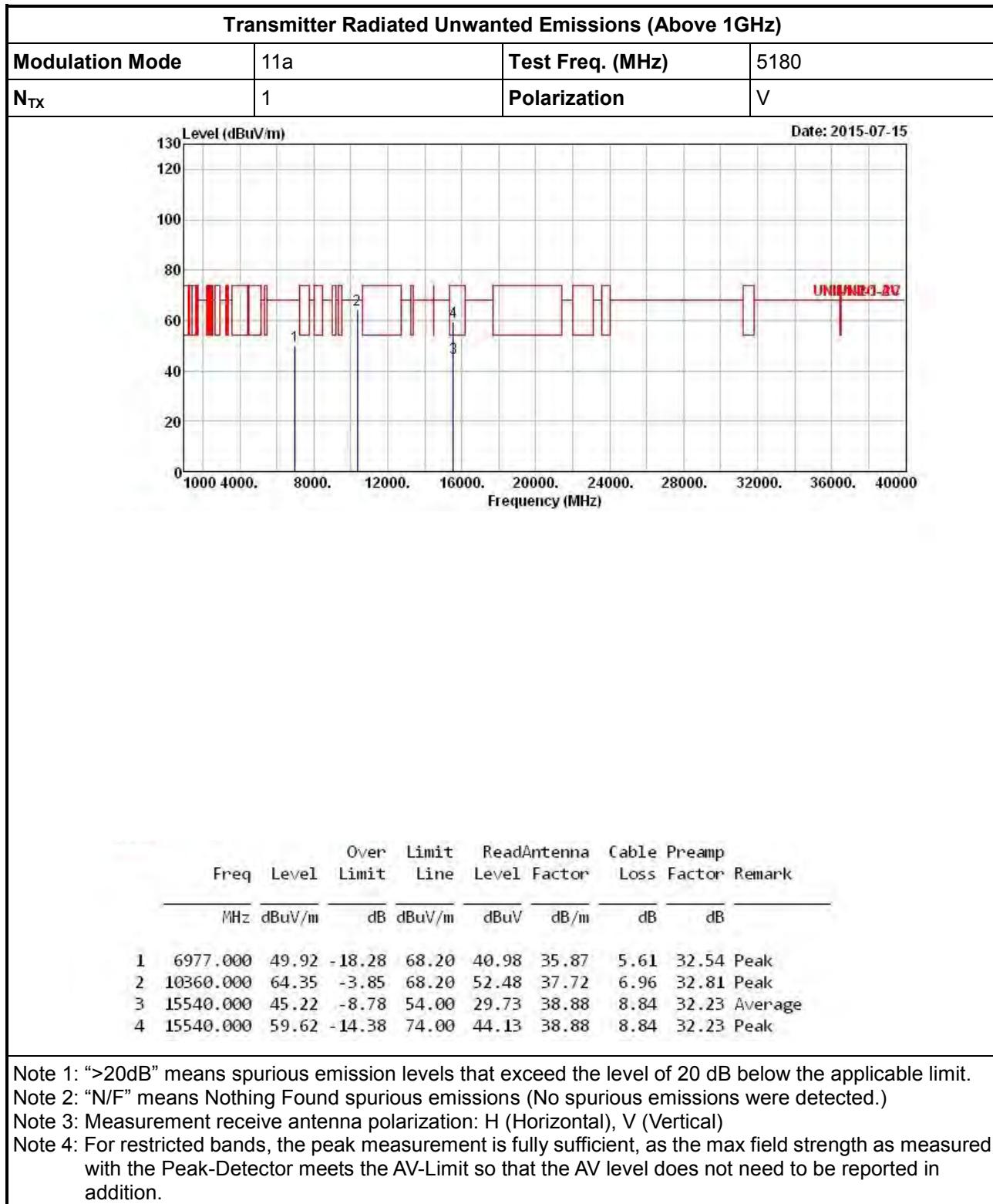
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

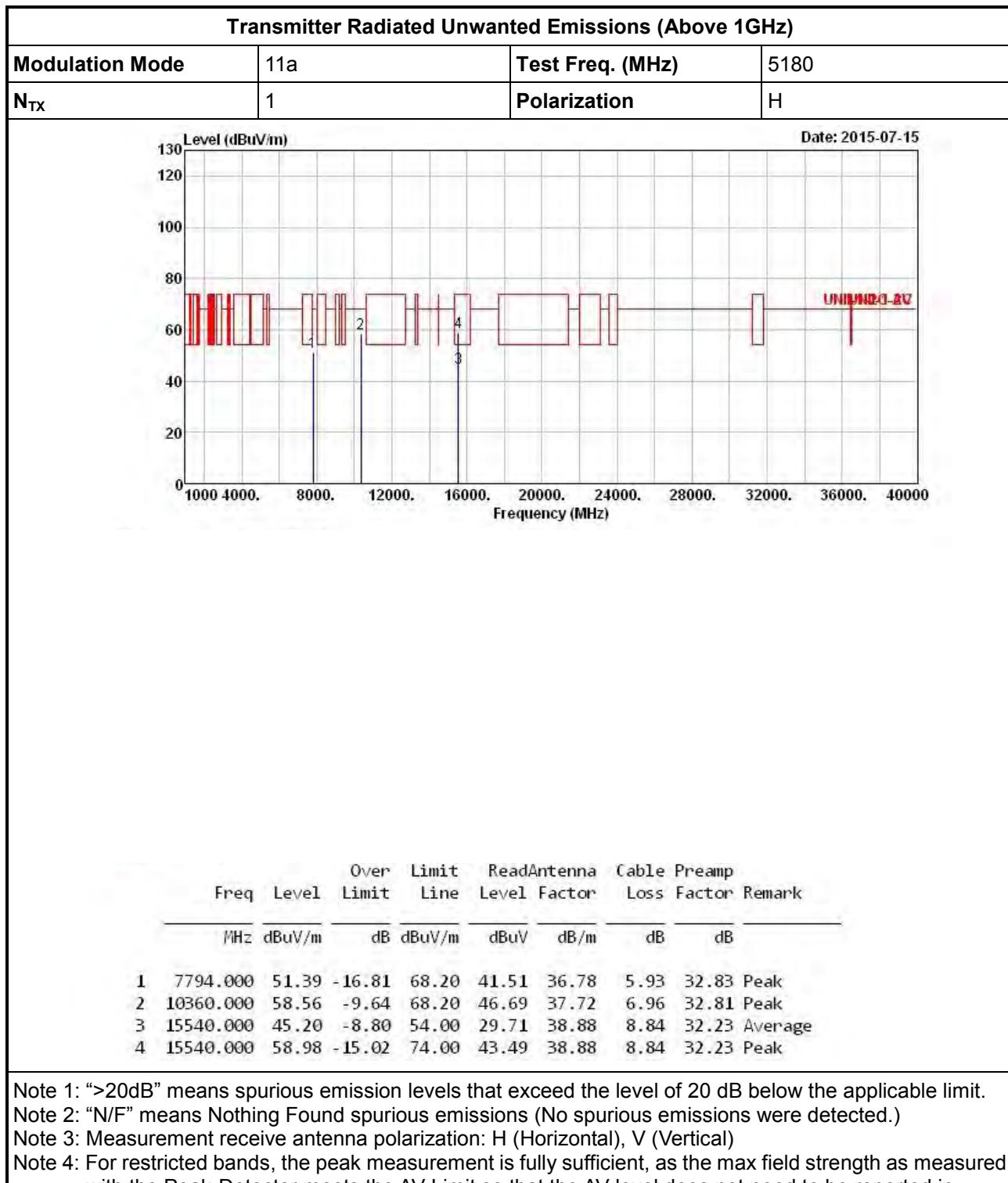
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

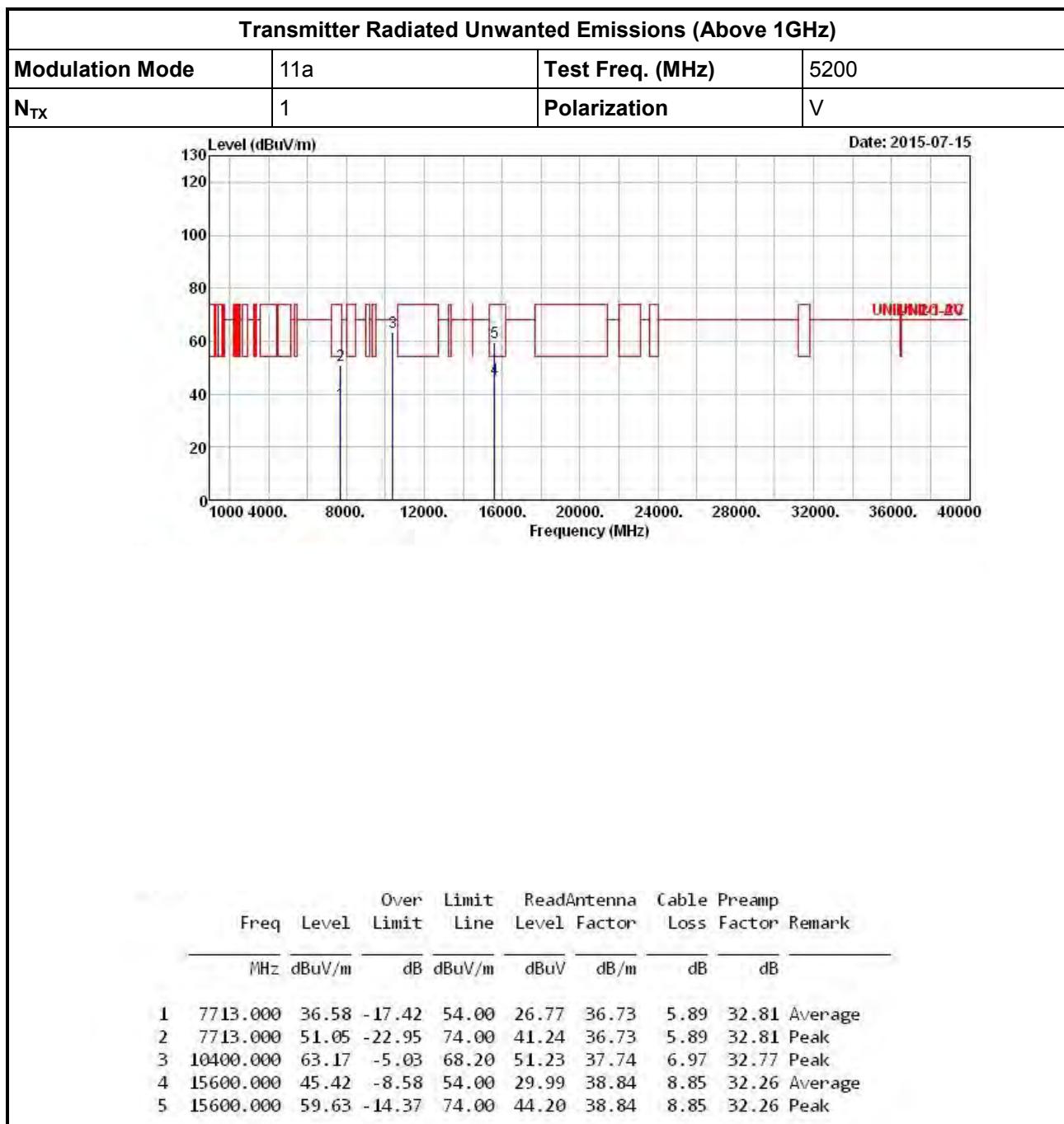




## 3.4.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11a





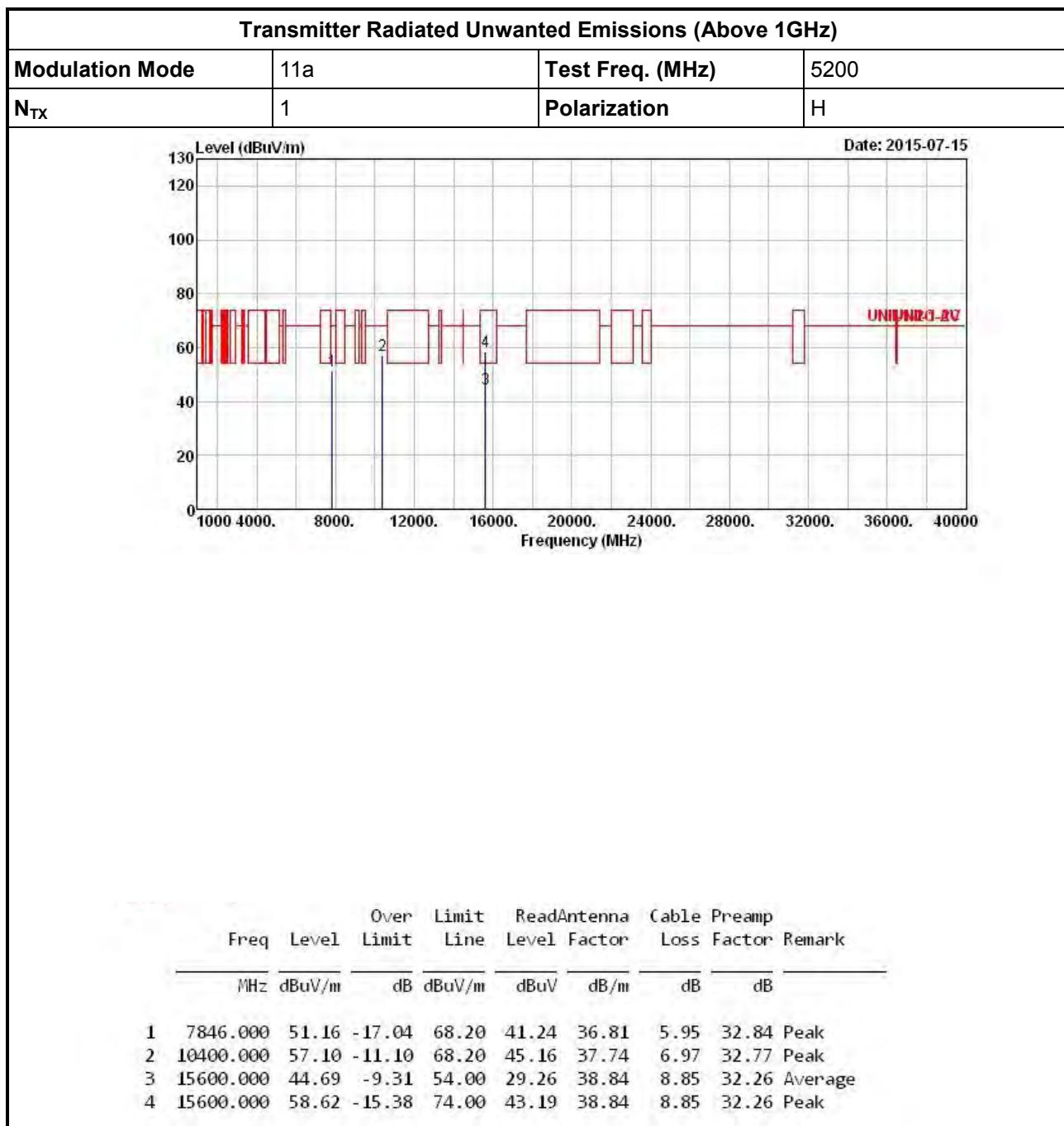


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

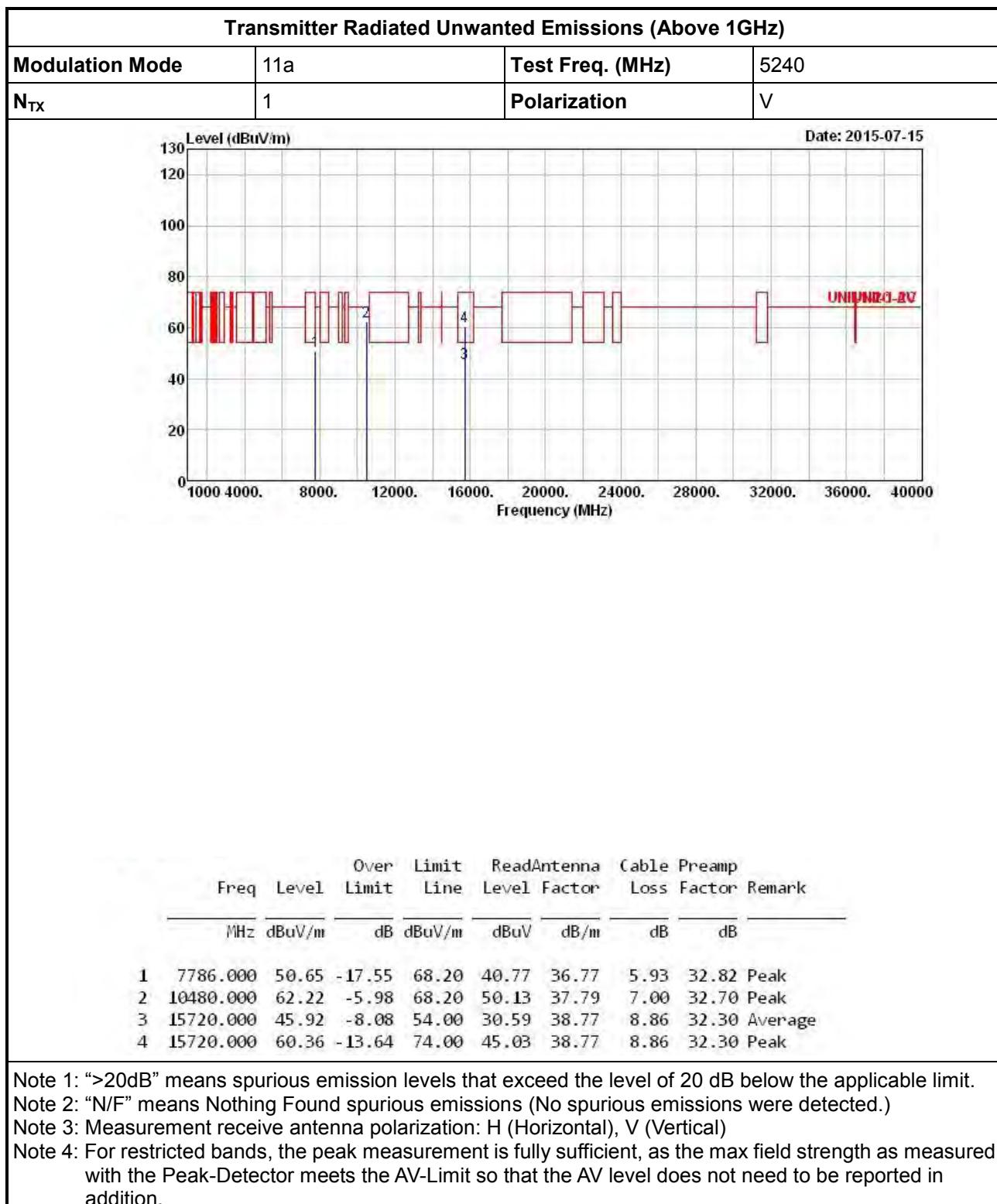


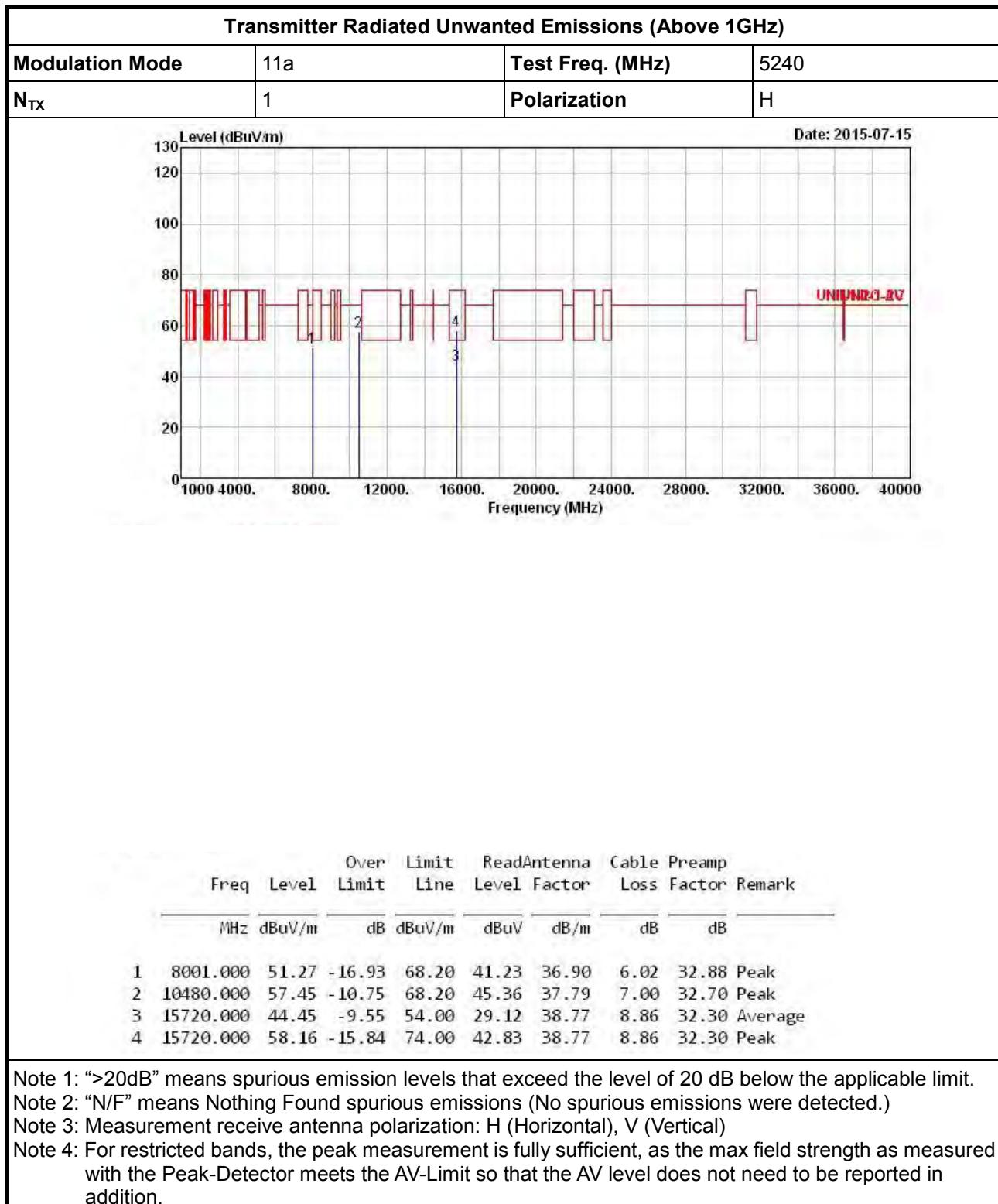
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

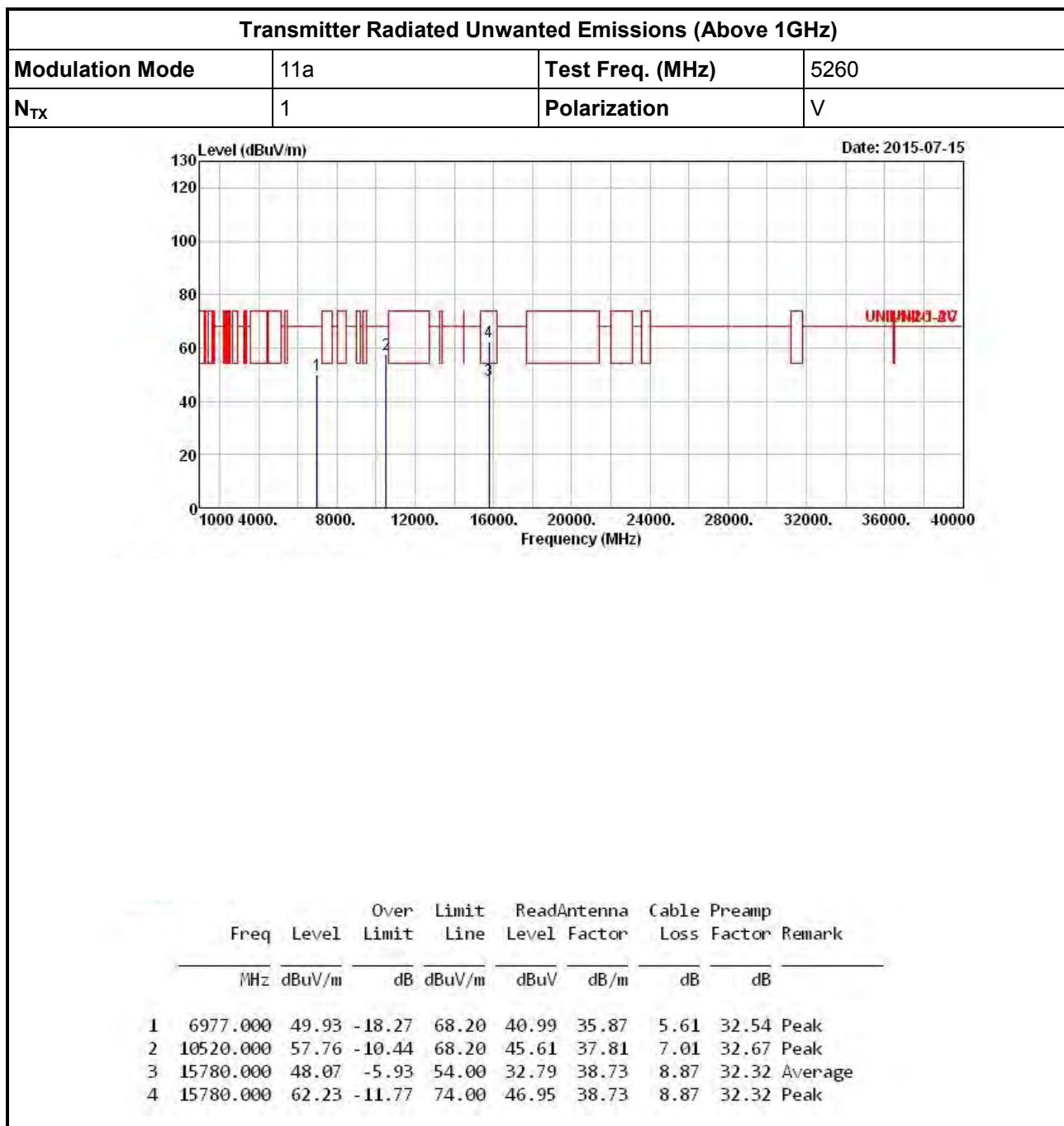
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

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





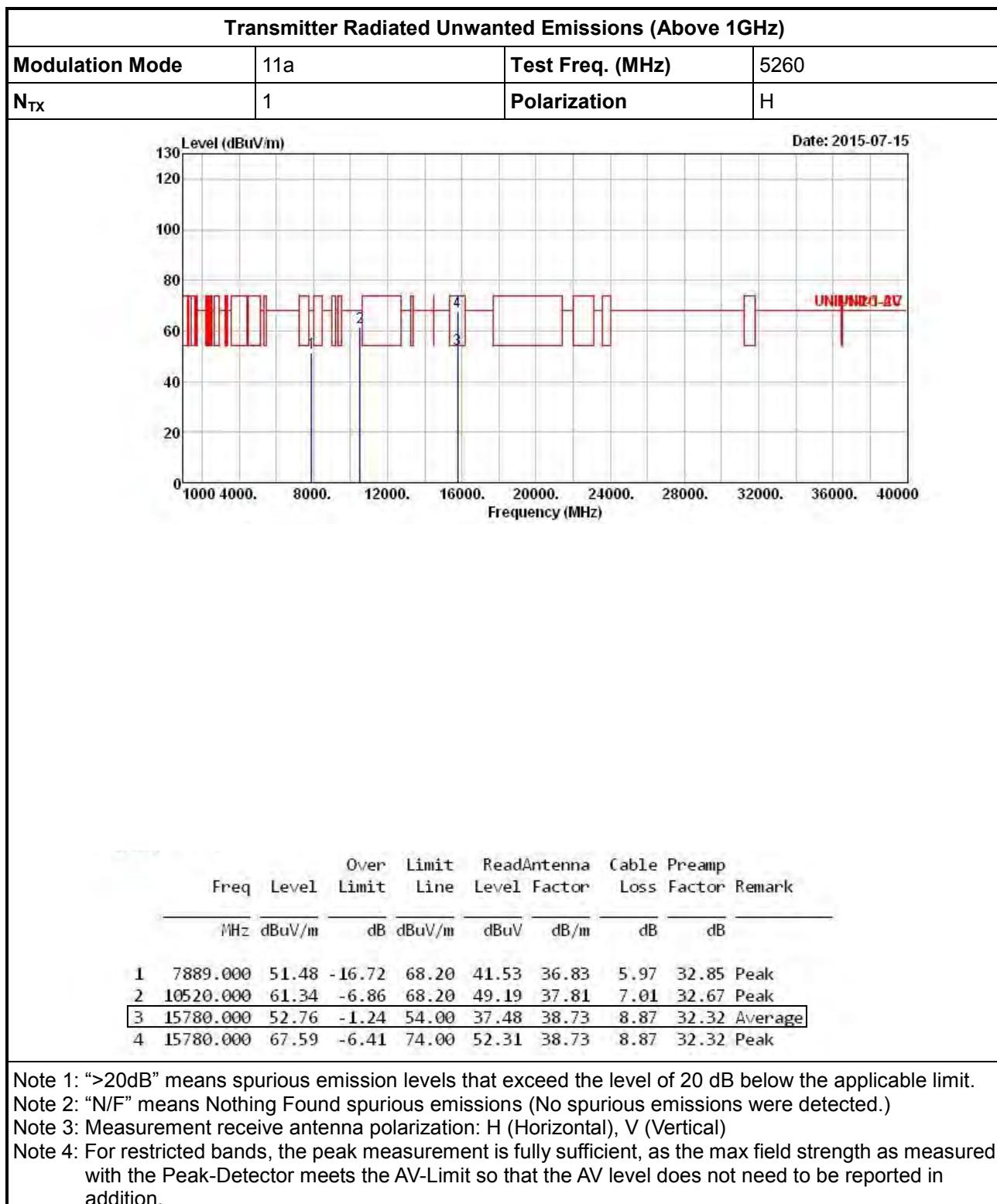


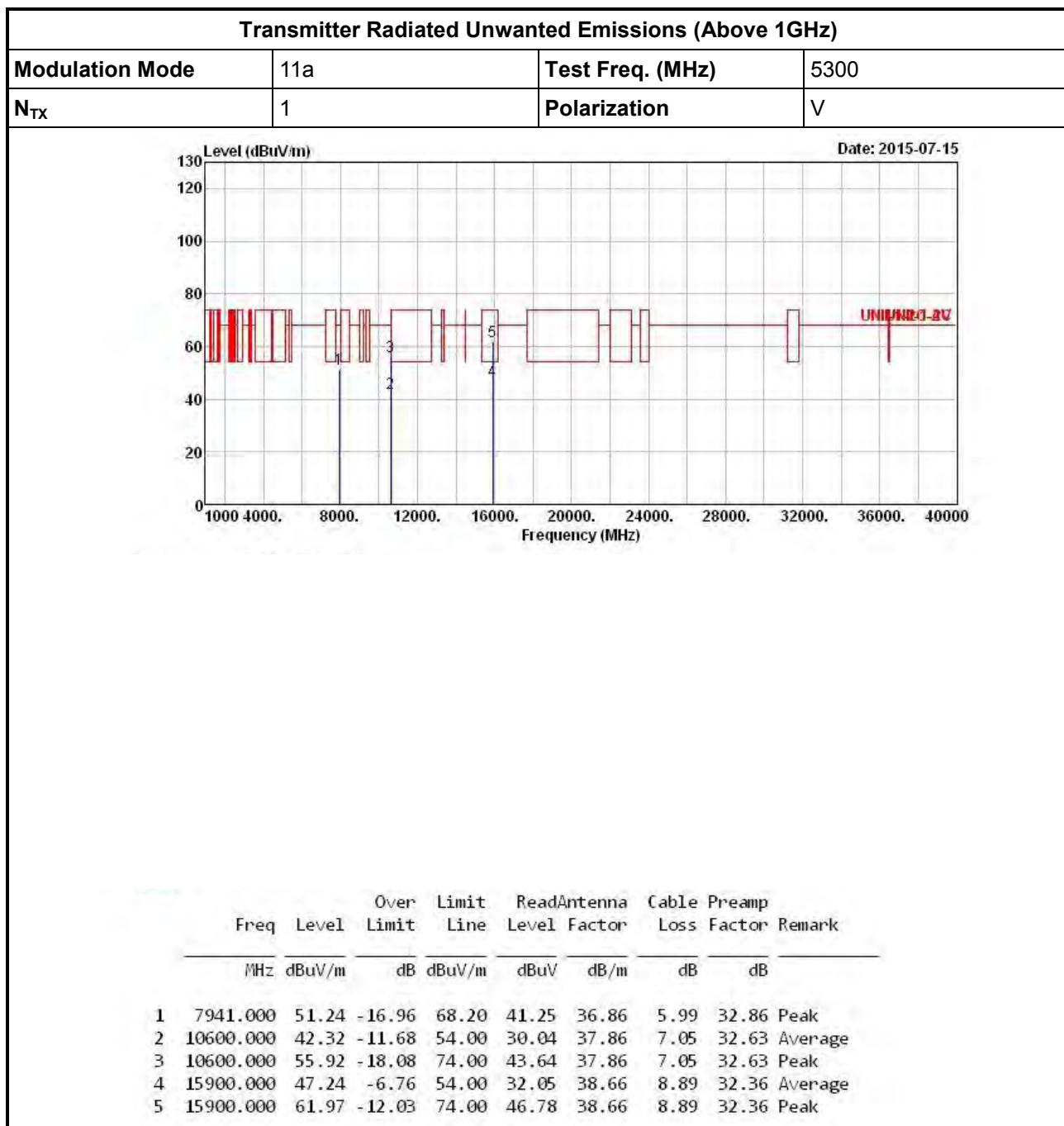
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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



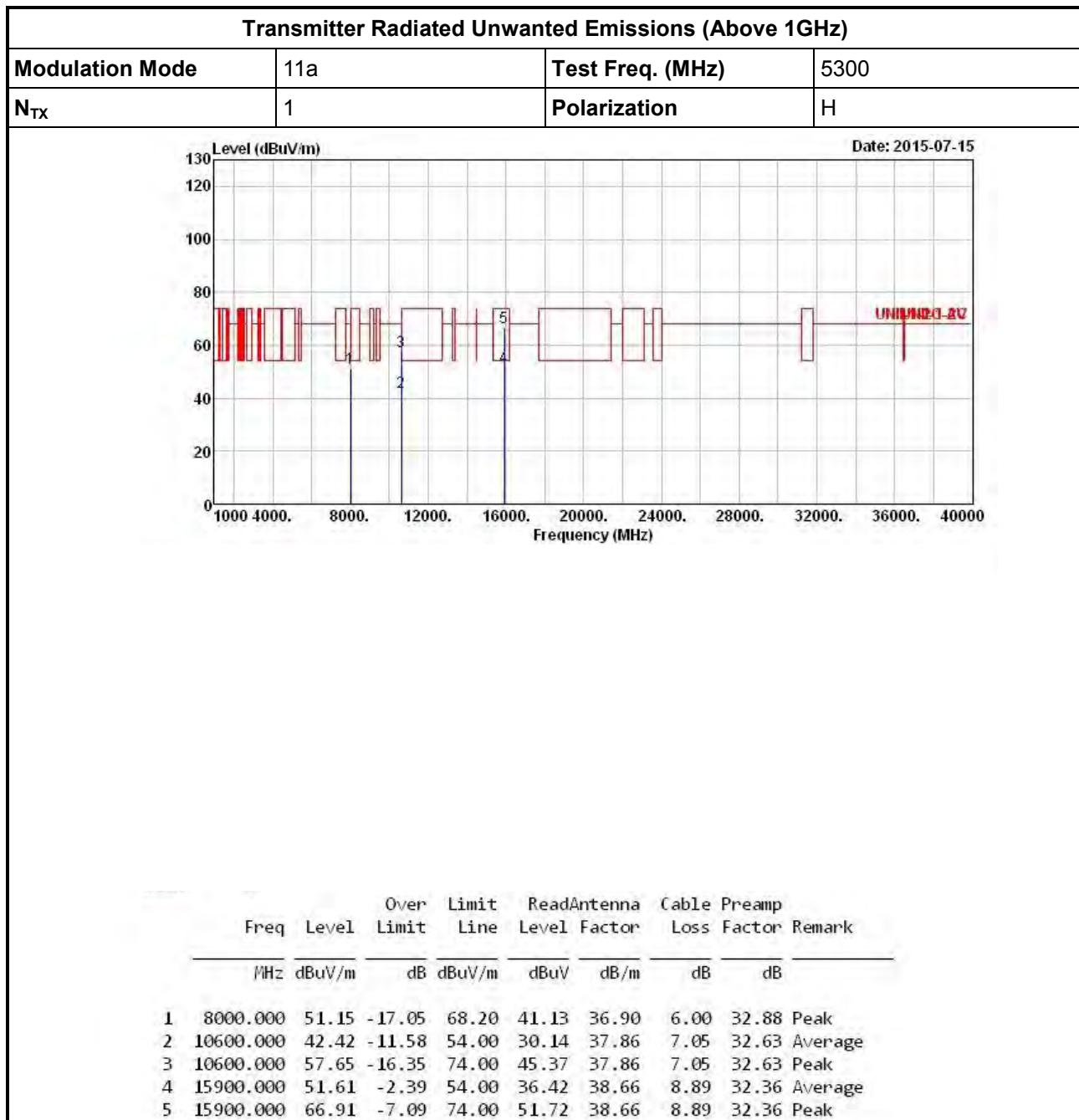


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

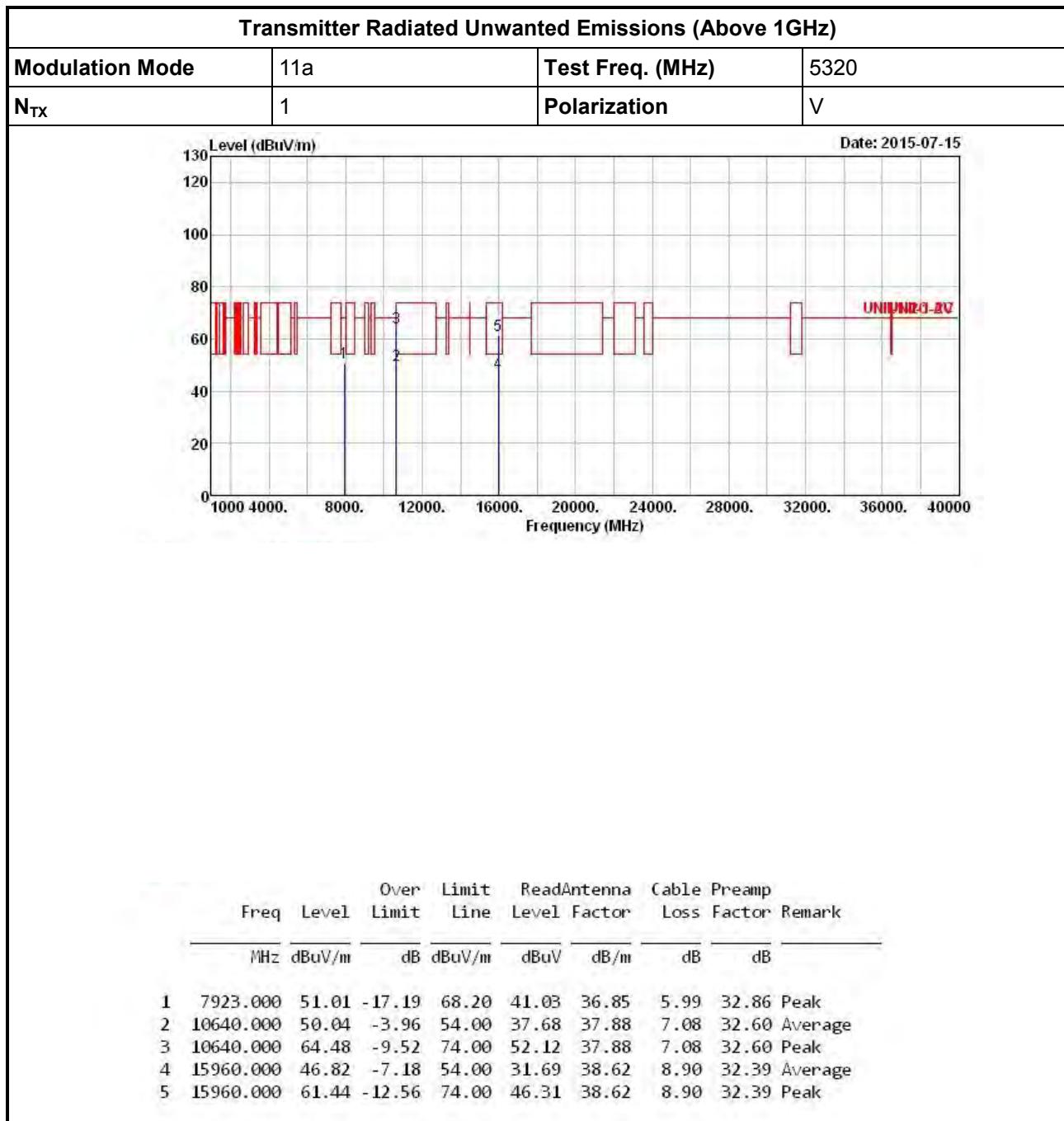


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

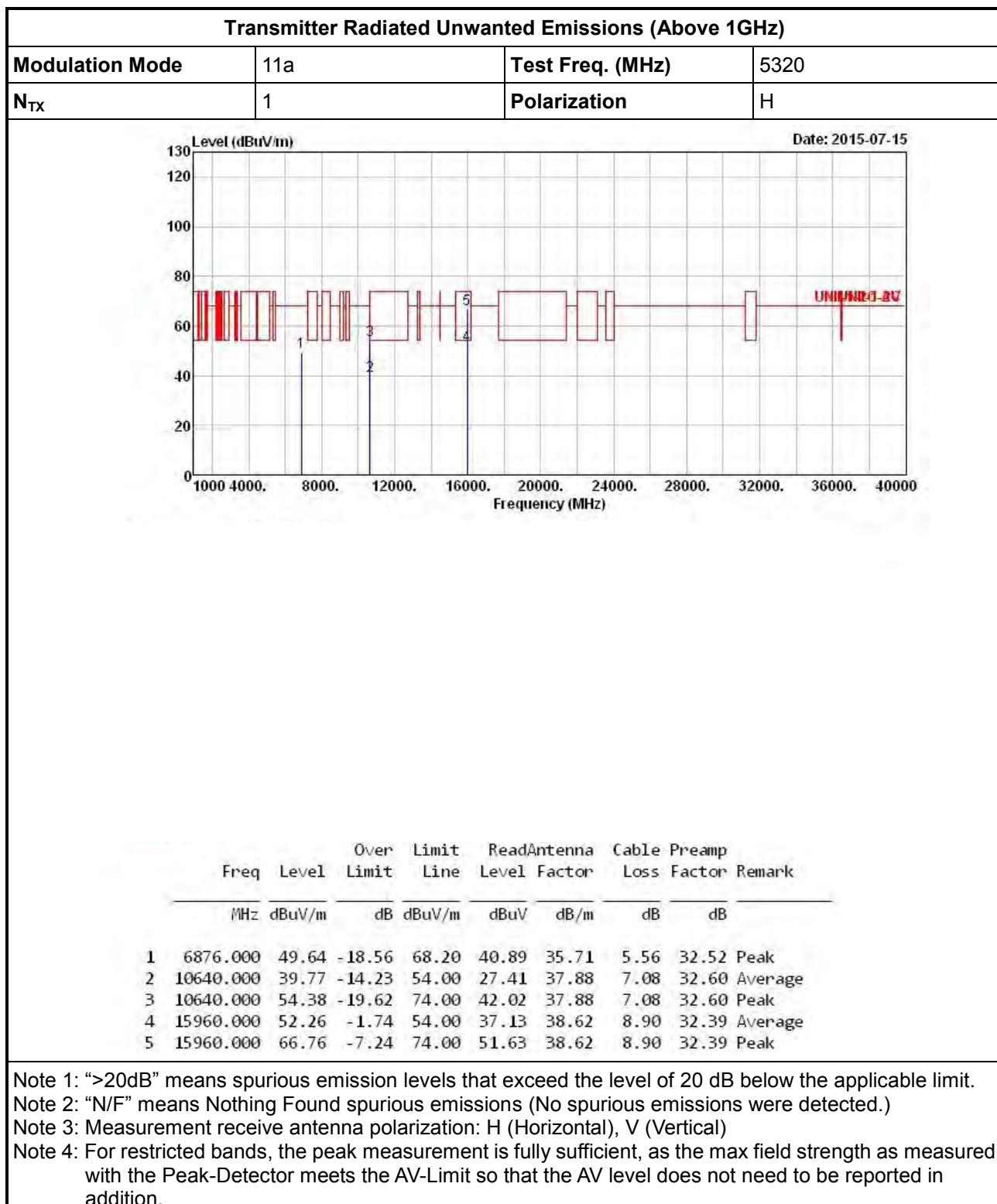


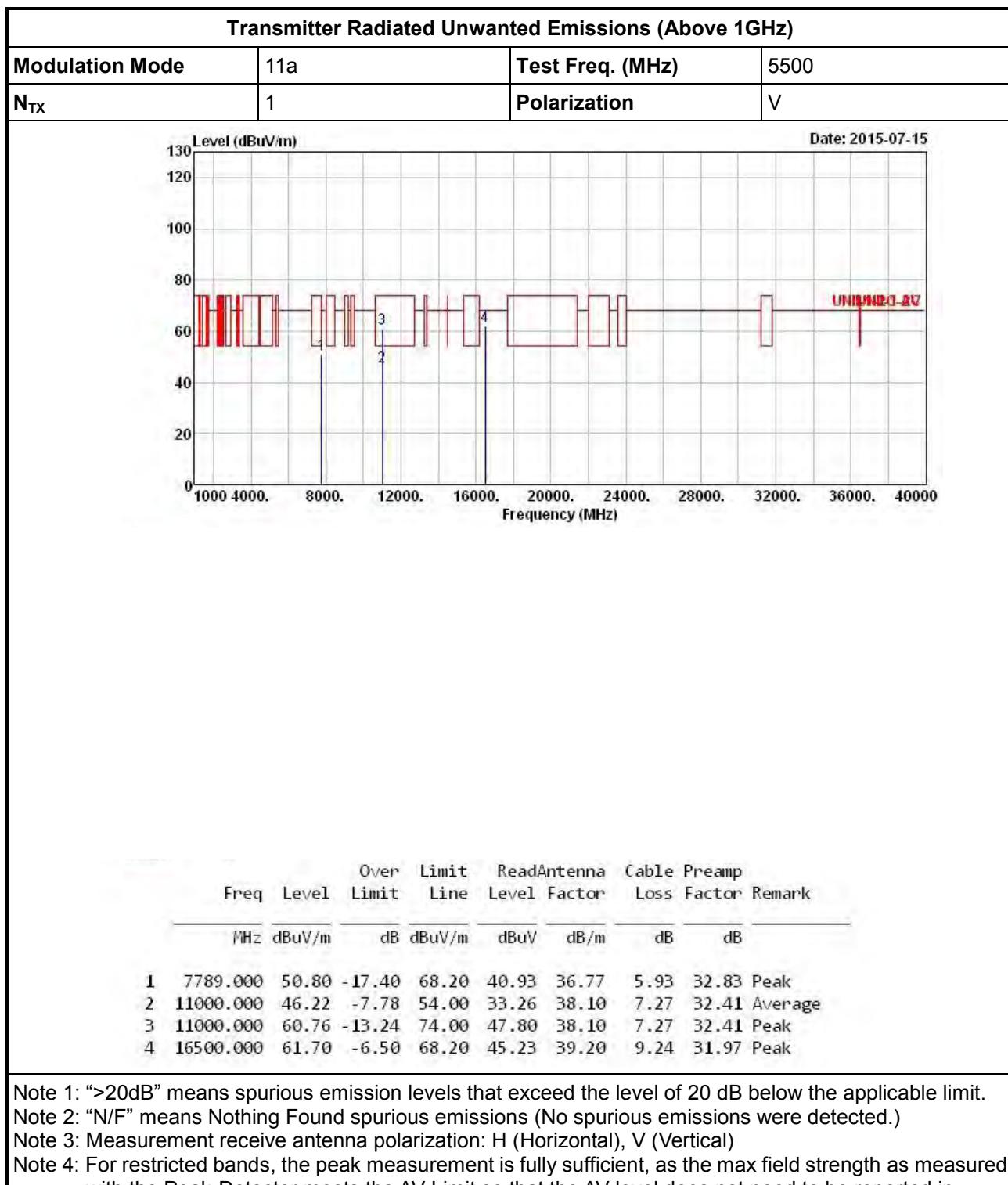
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

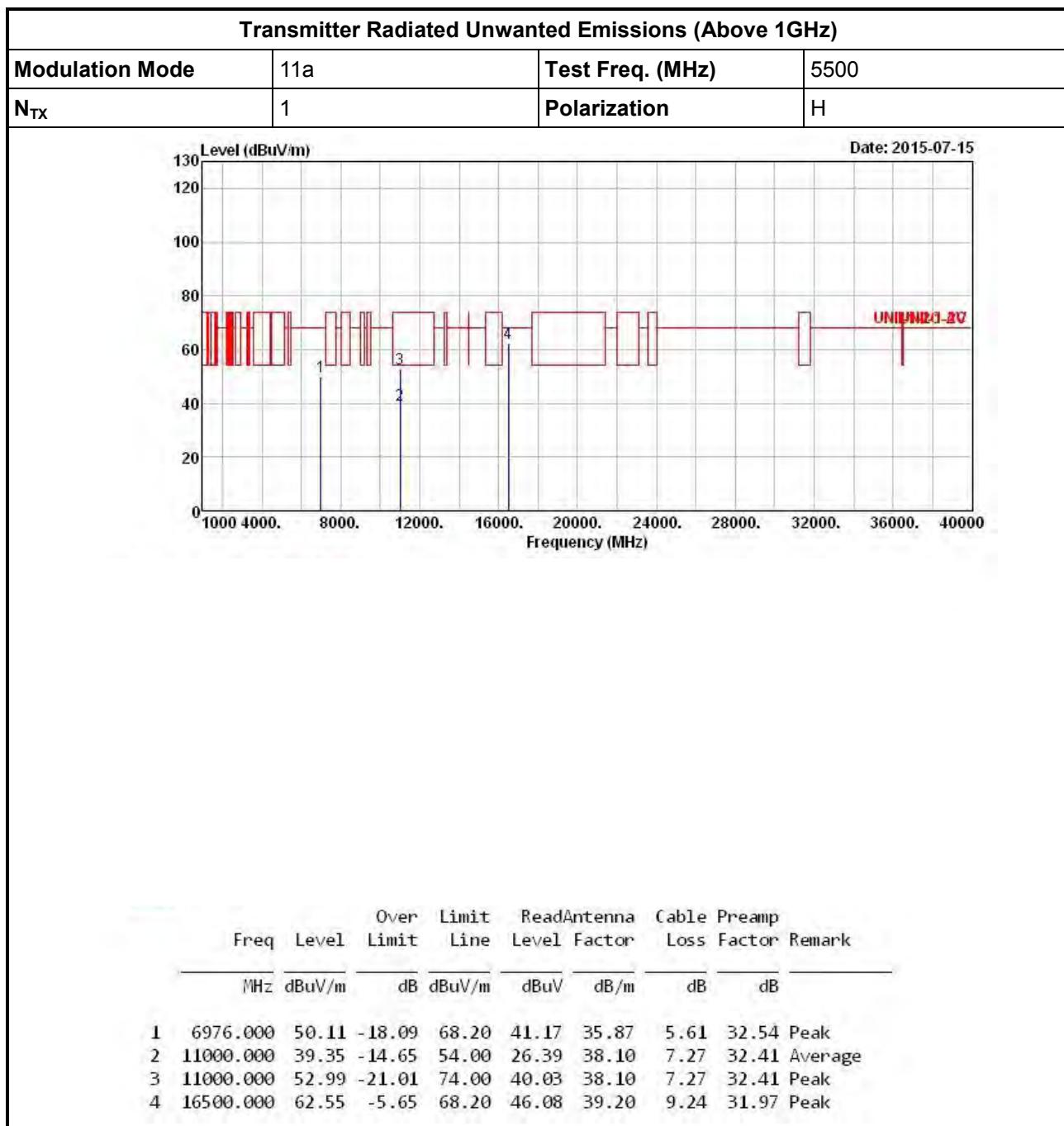
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

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





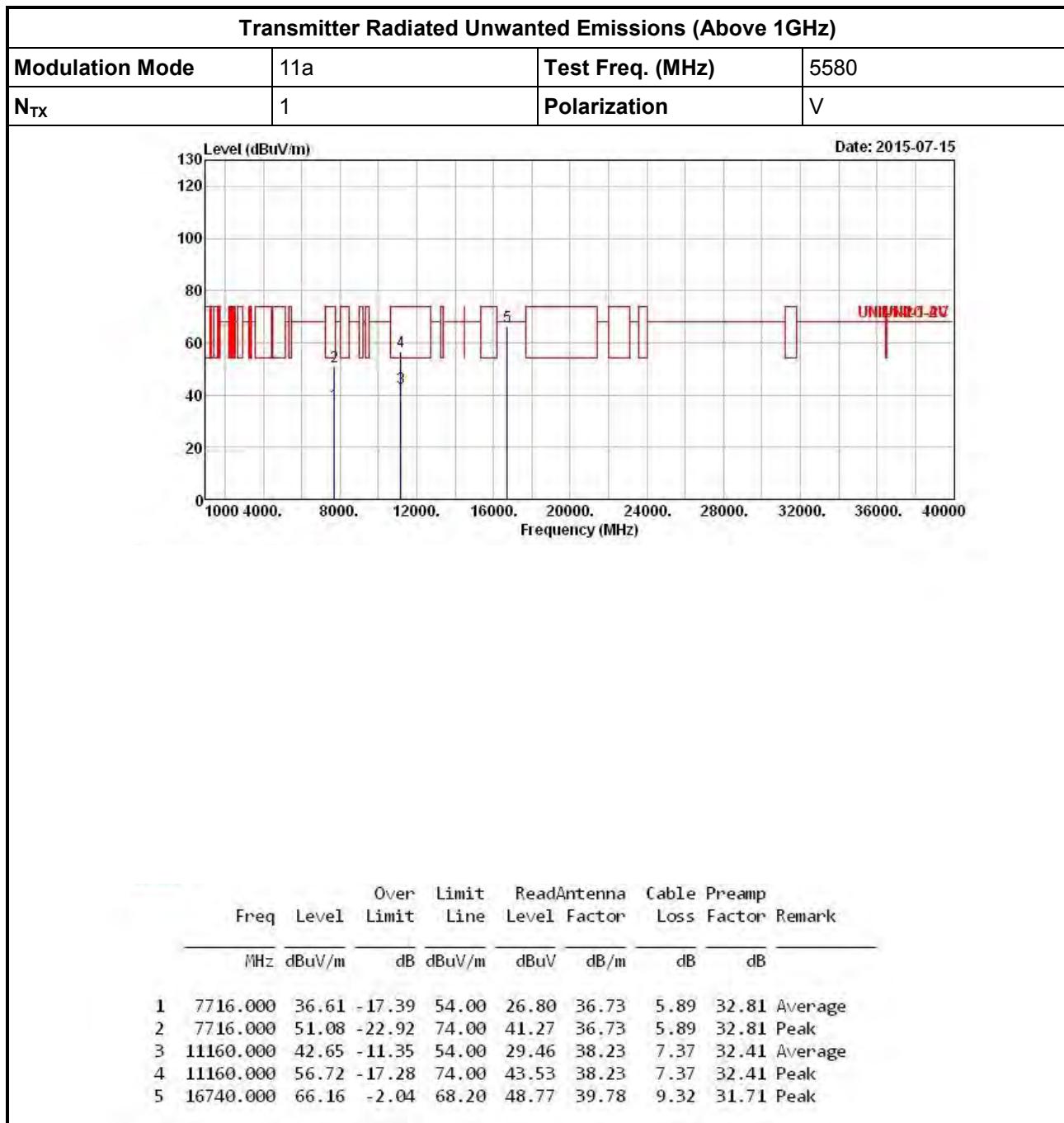


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

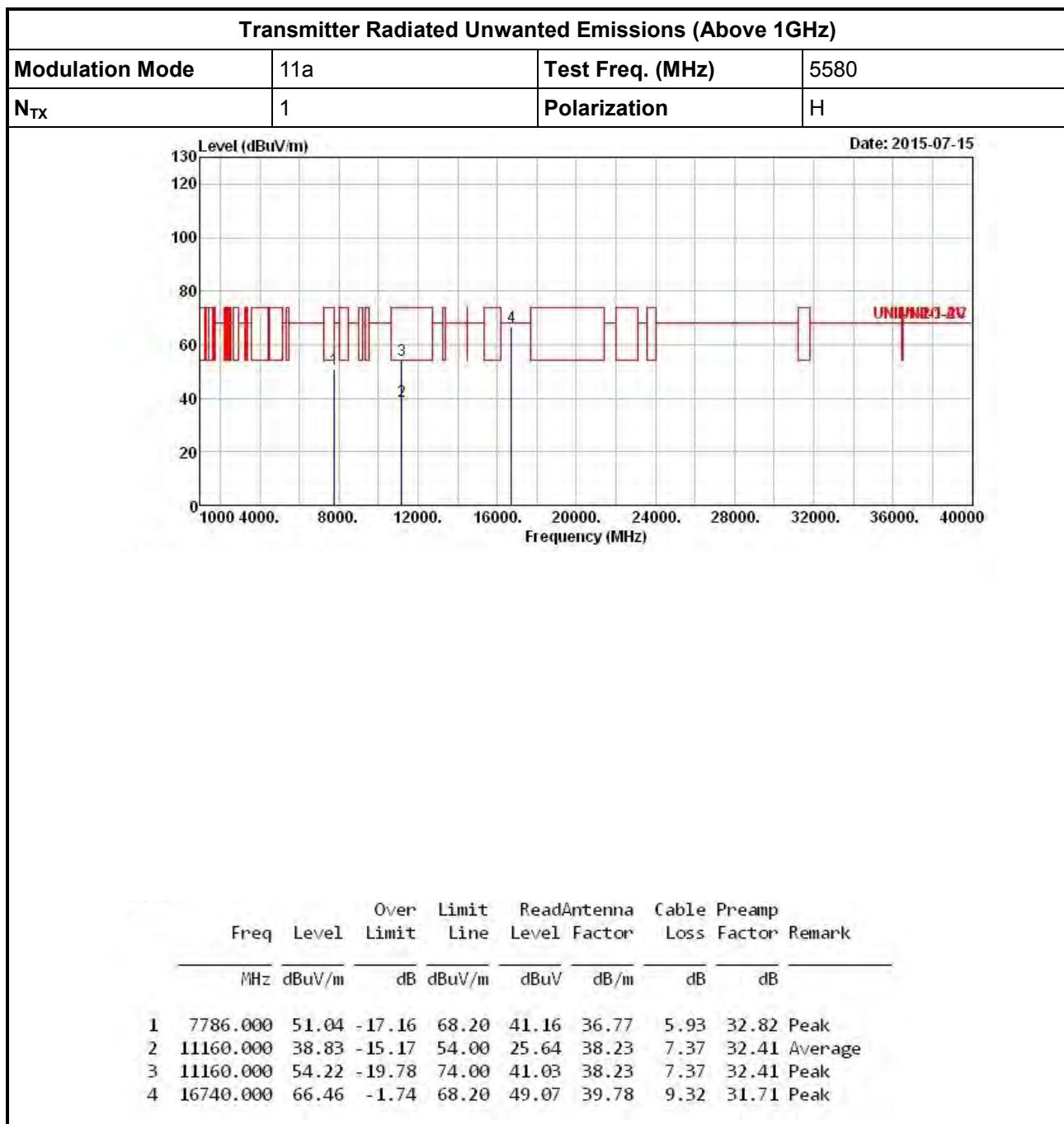


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

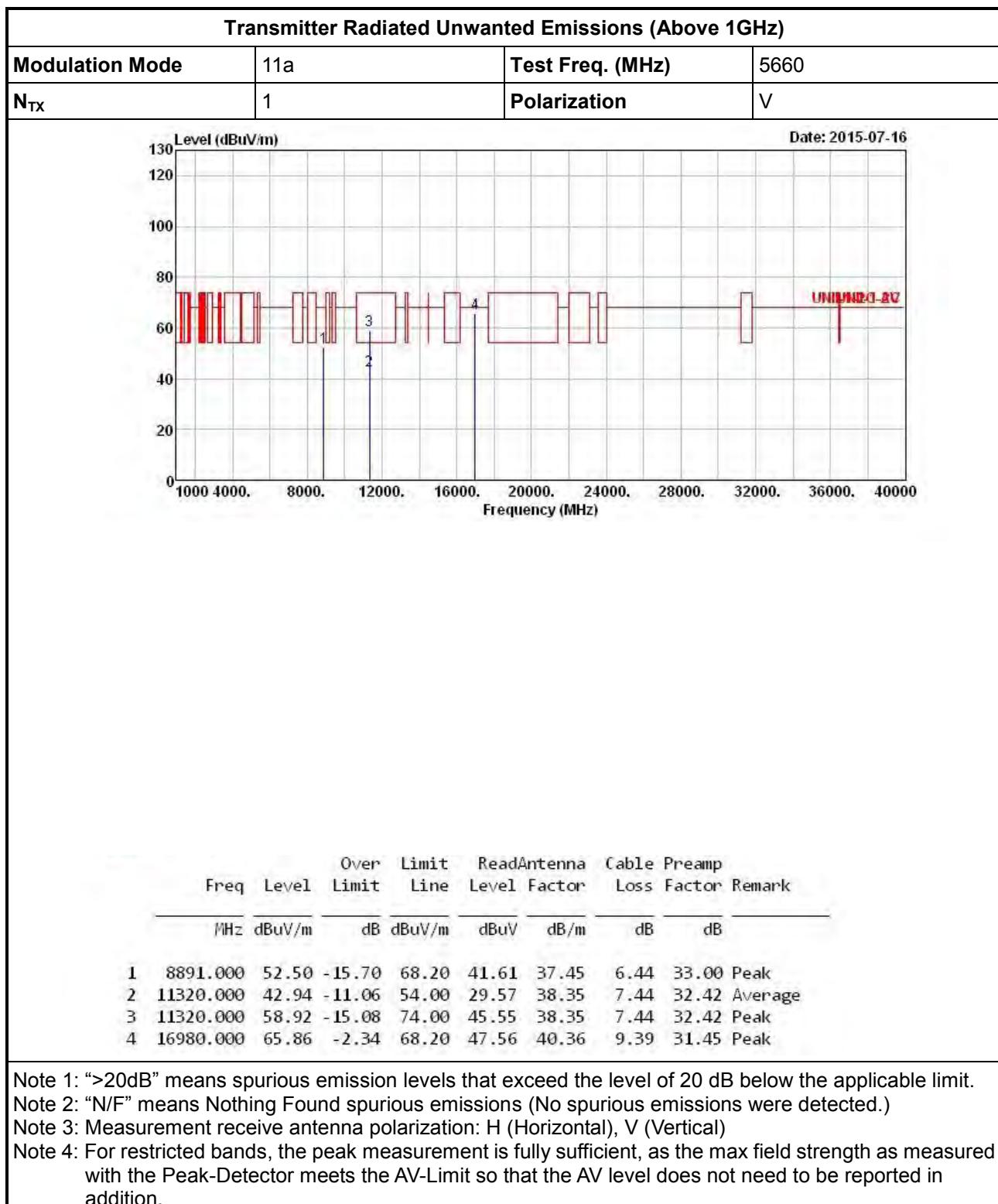


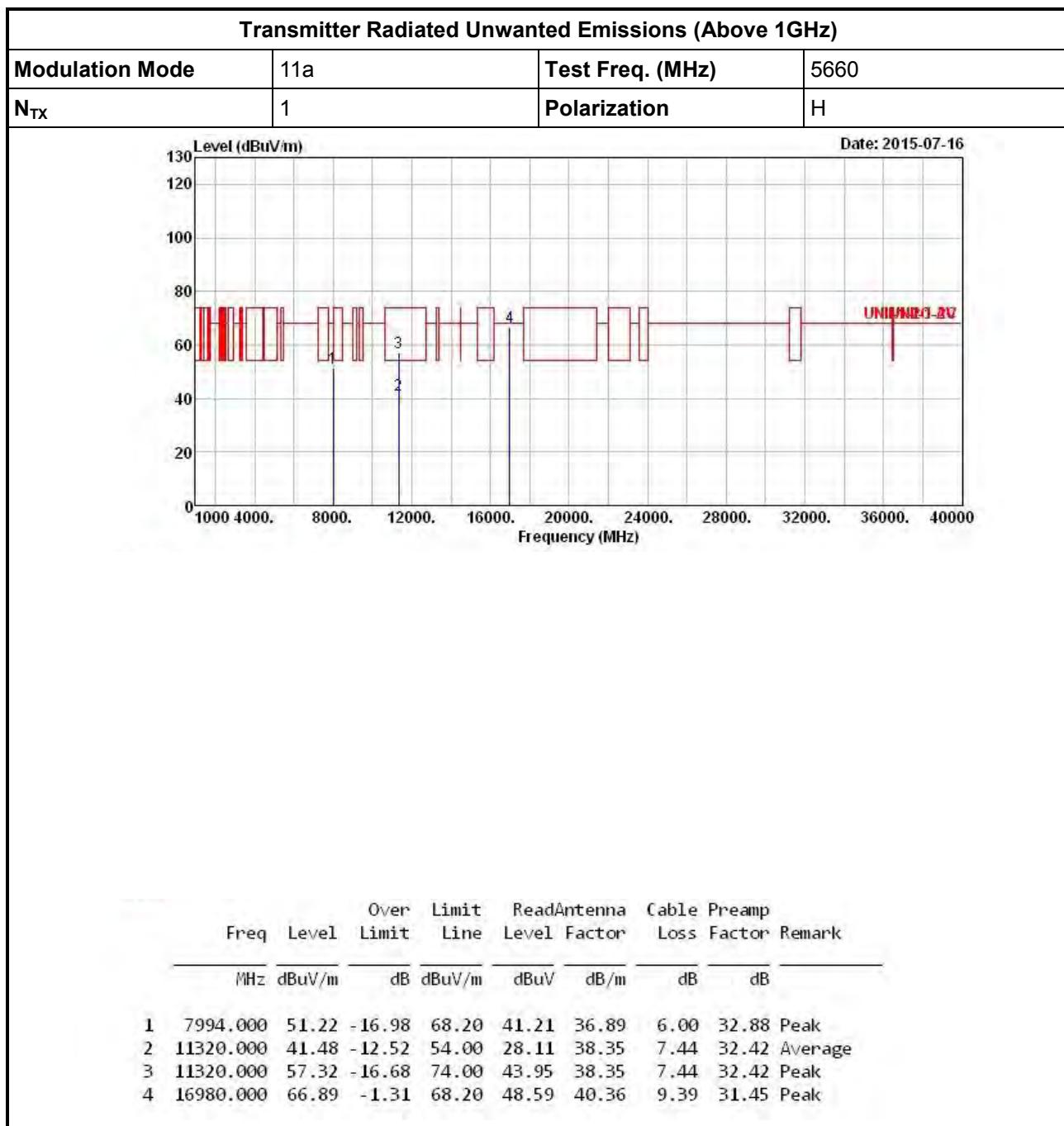
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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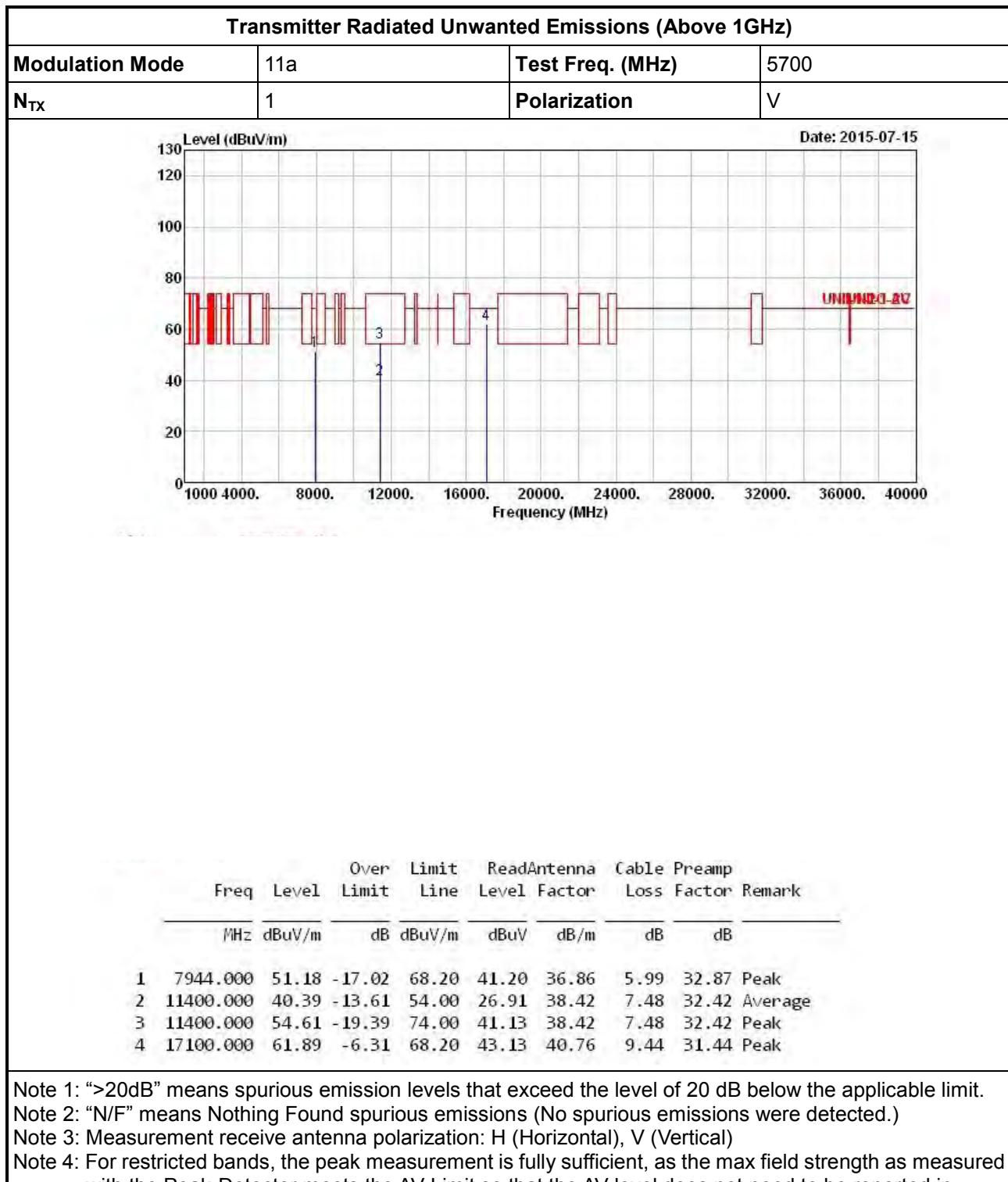


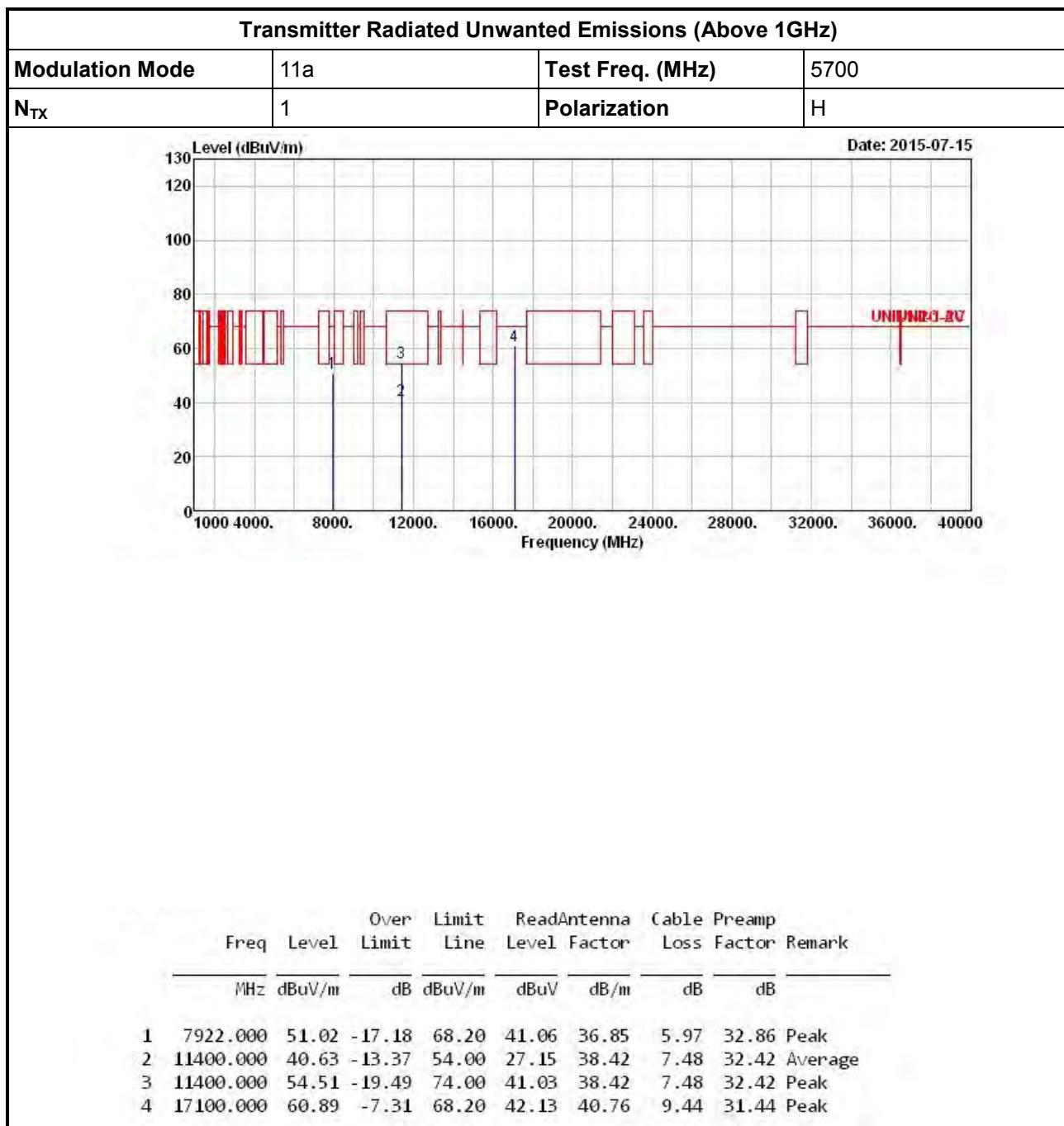
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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



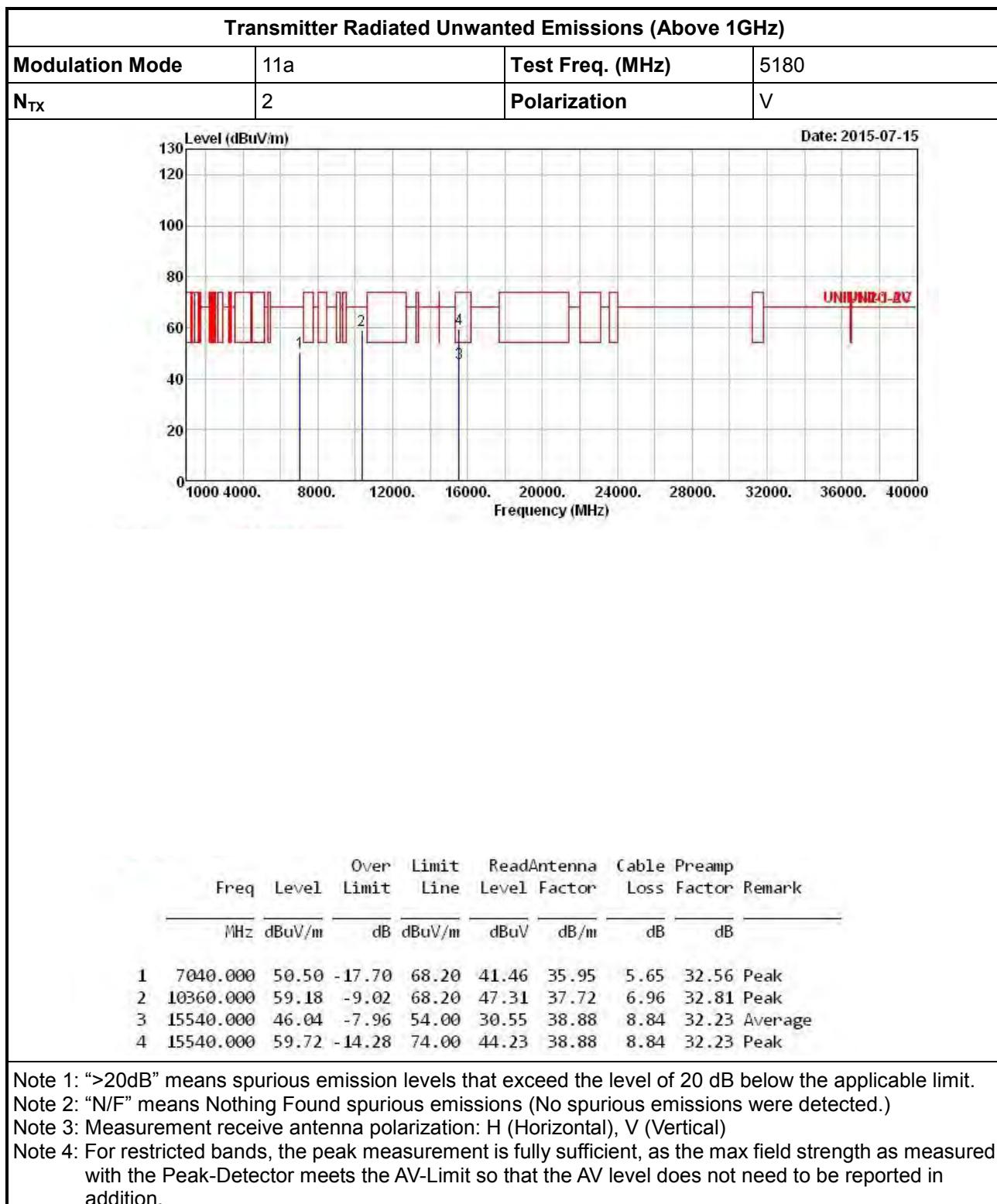


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

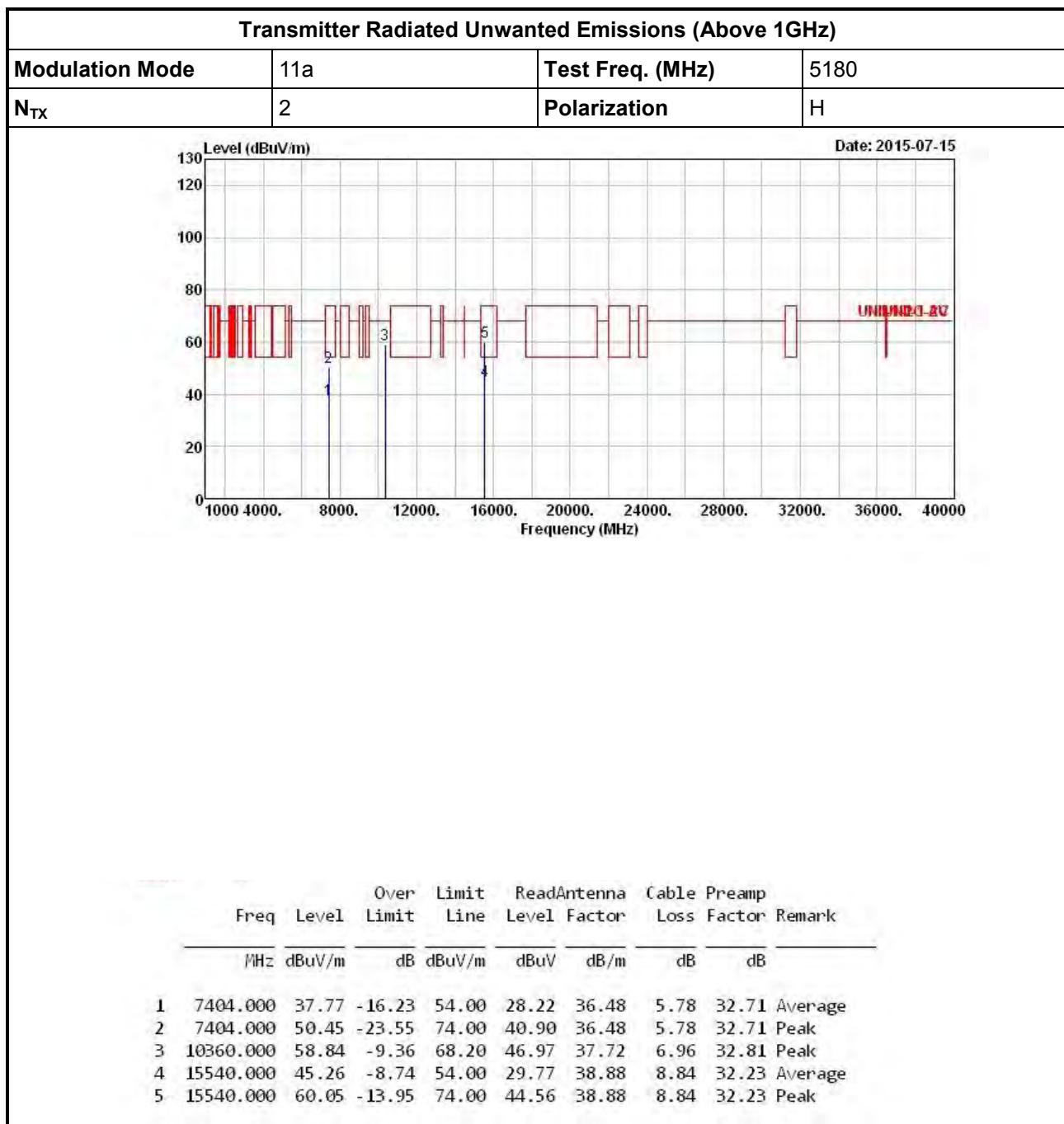


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

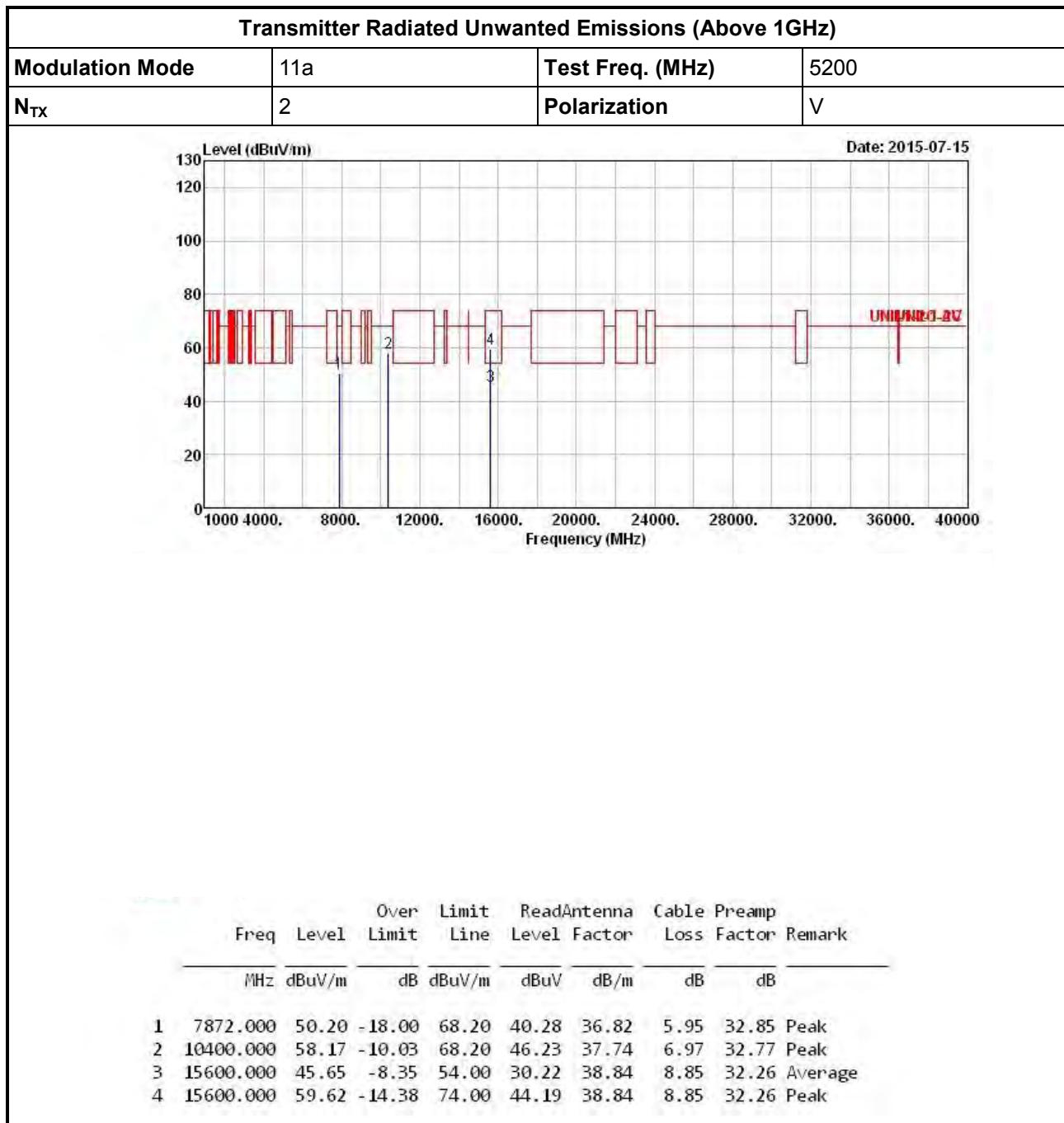


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

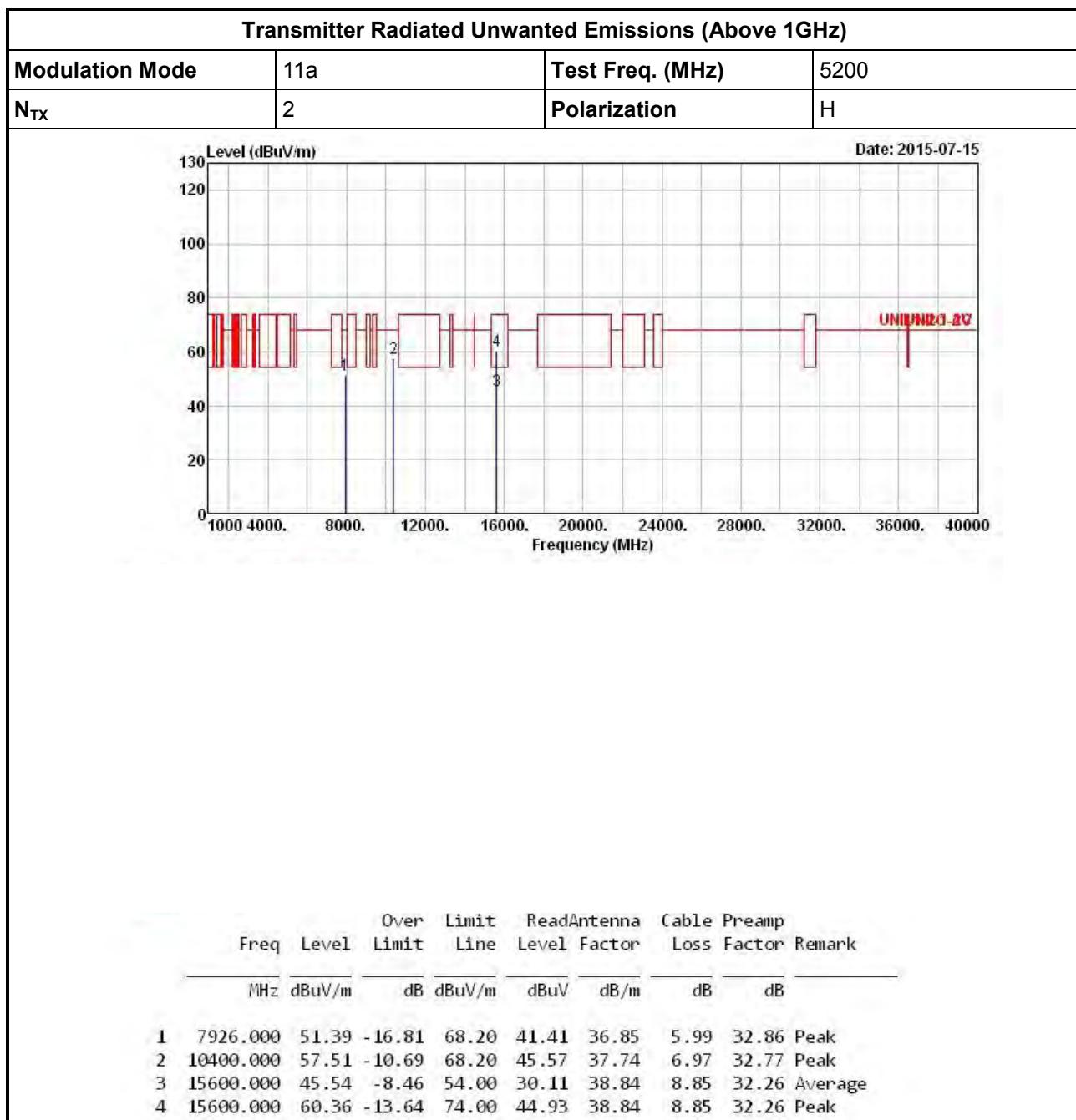


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

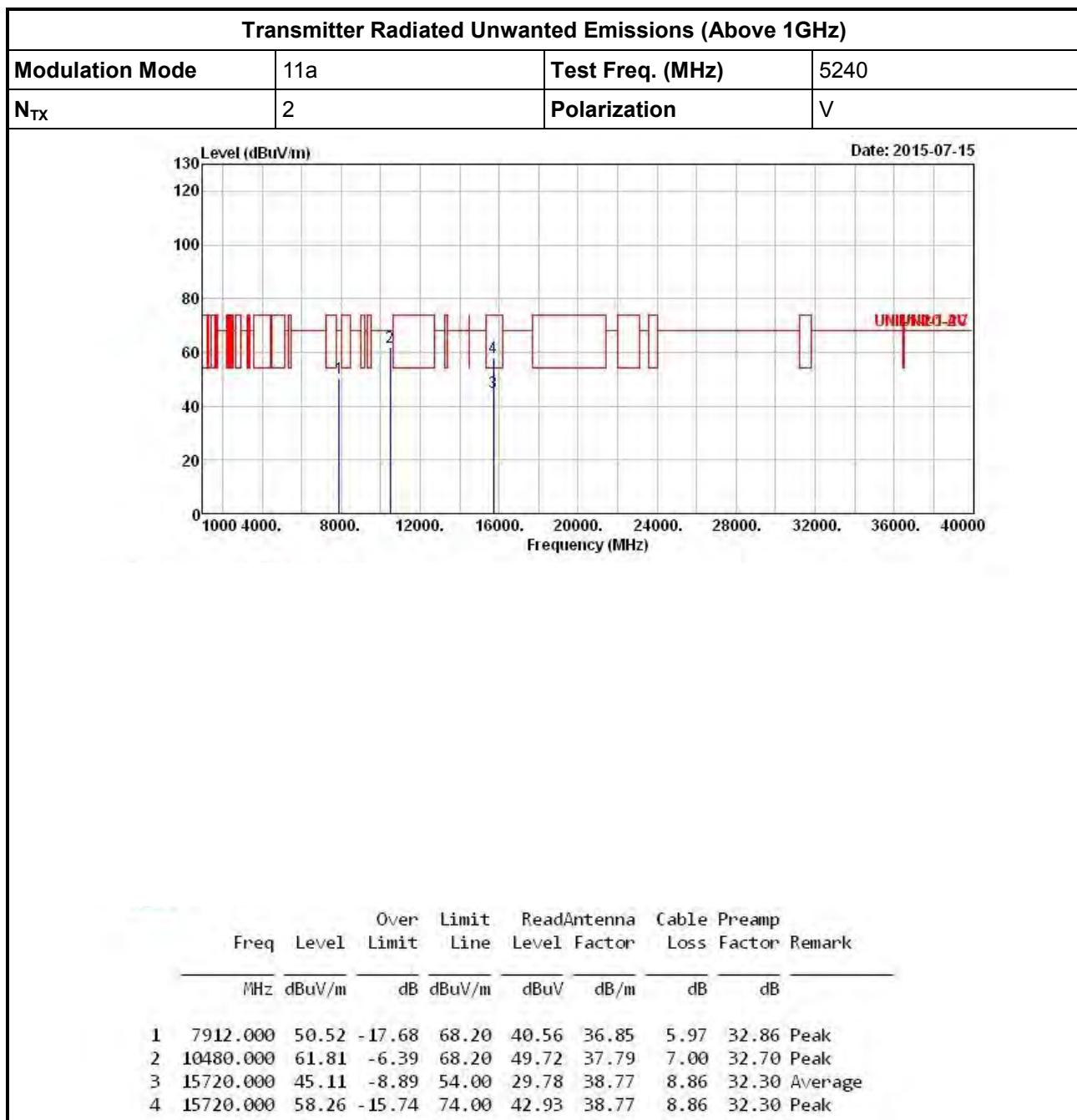


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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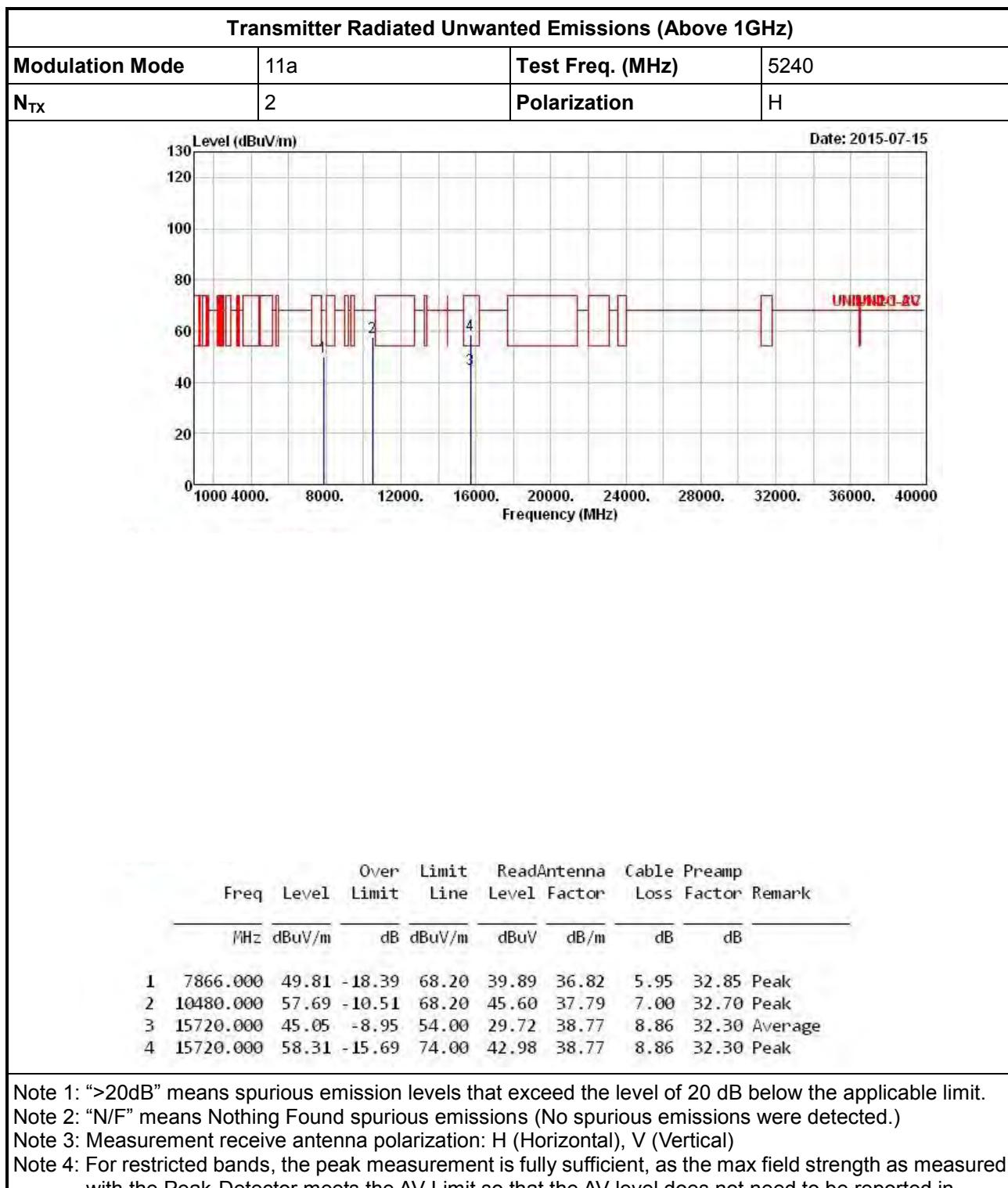


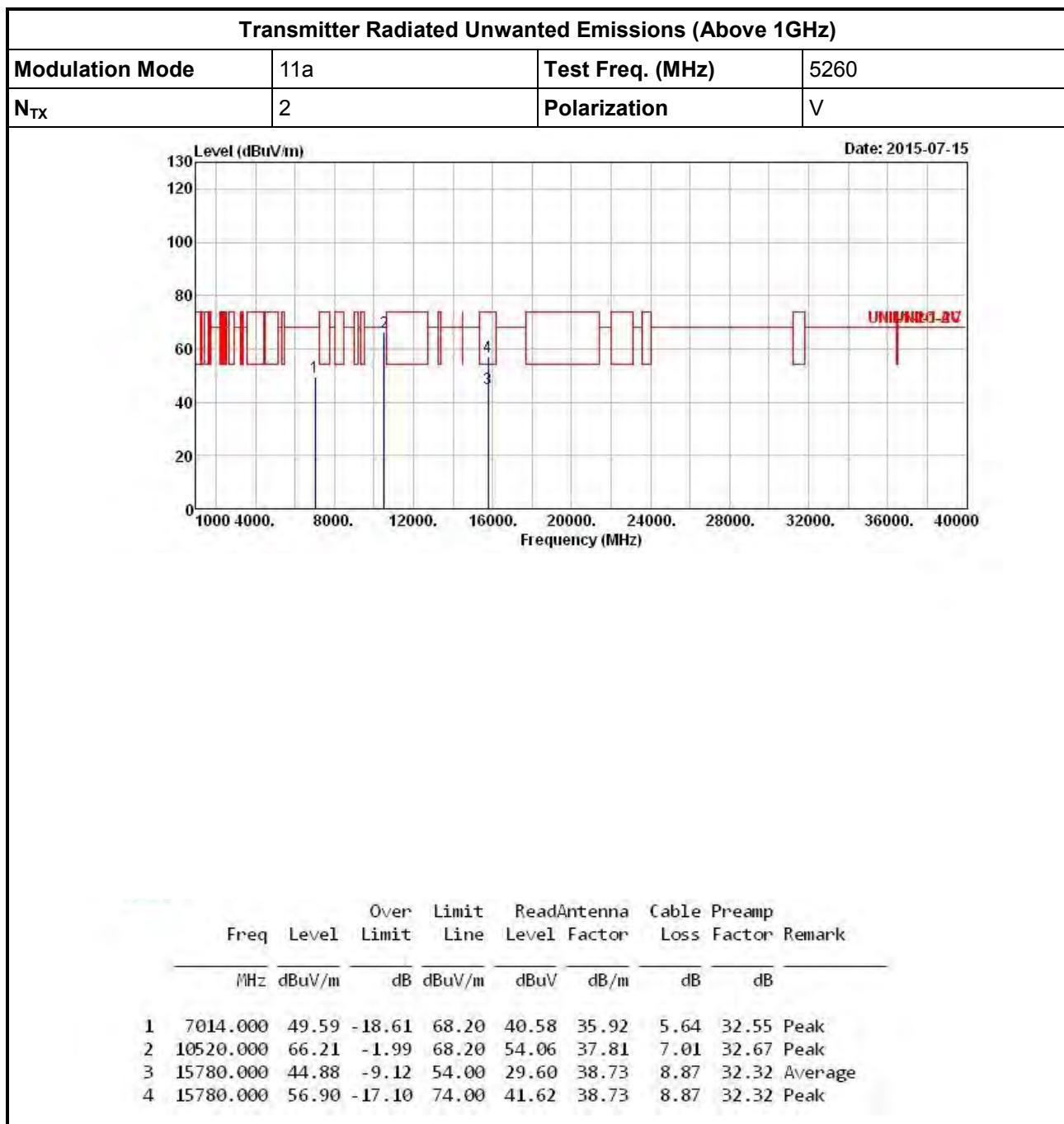
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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



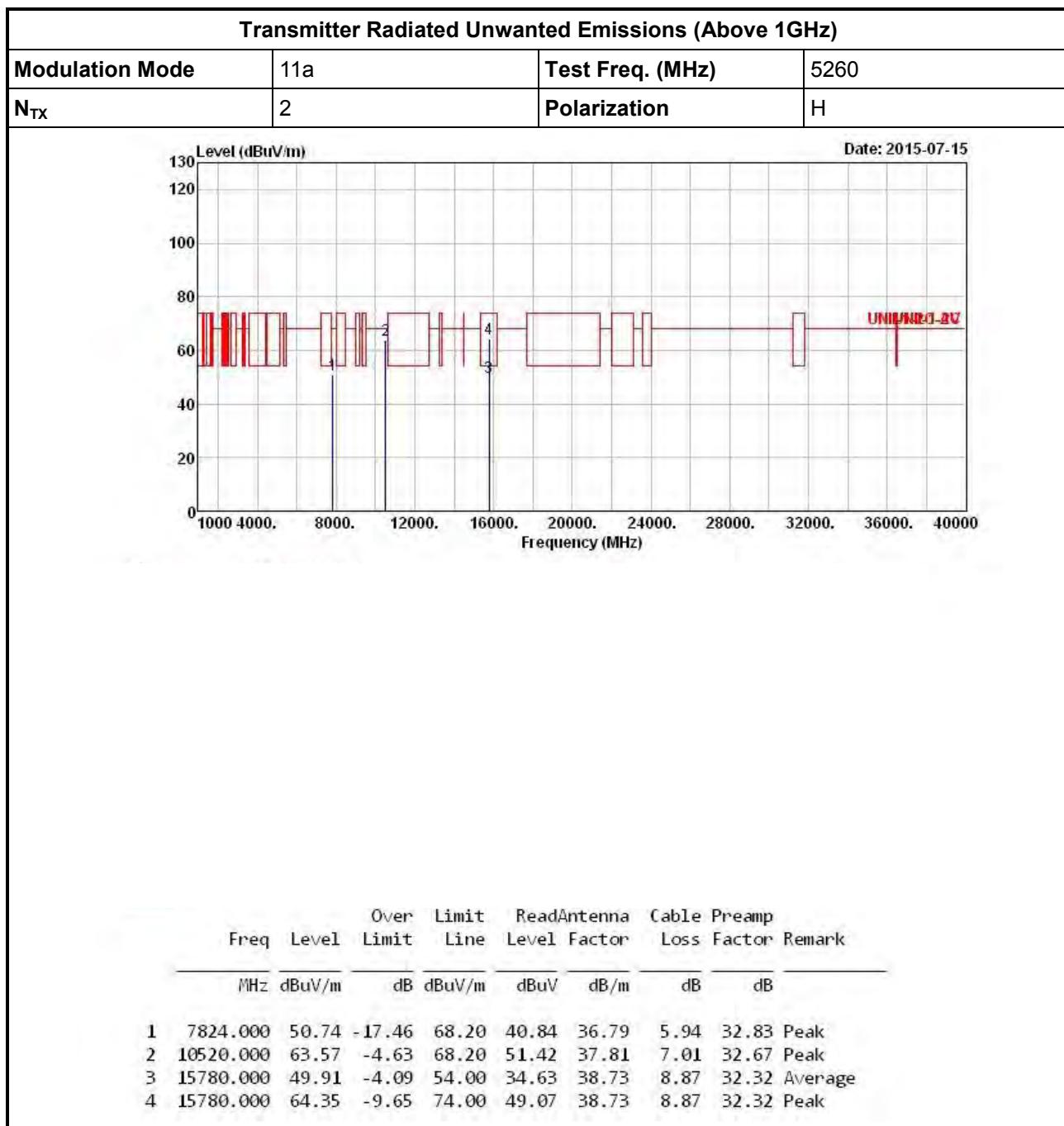


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

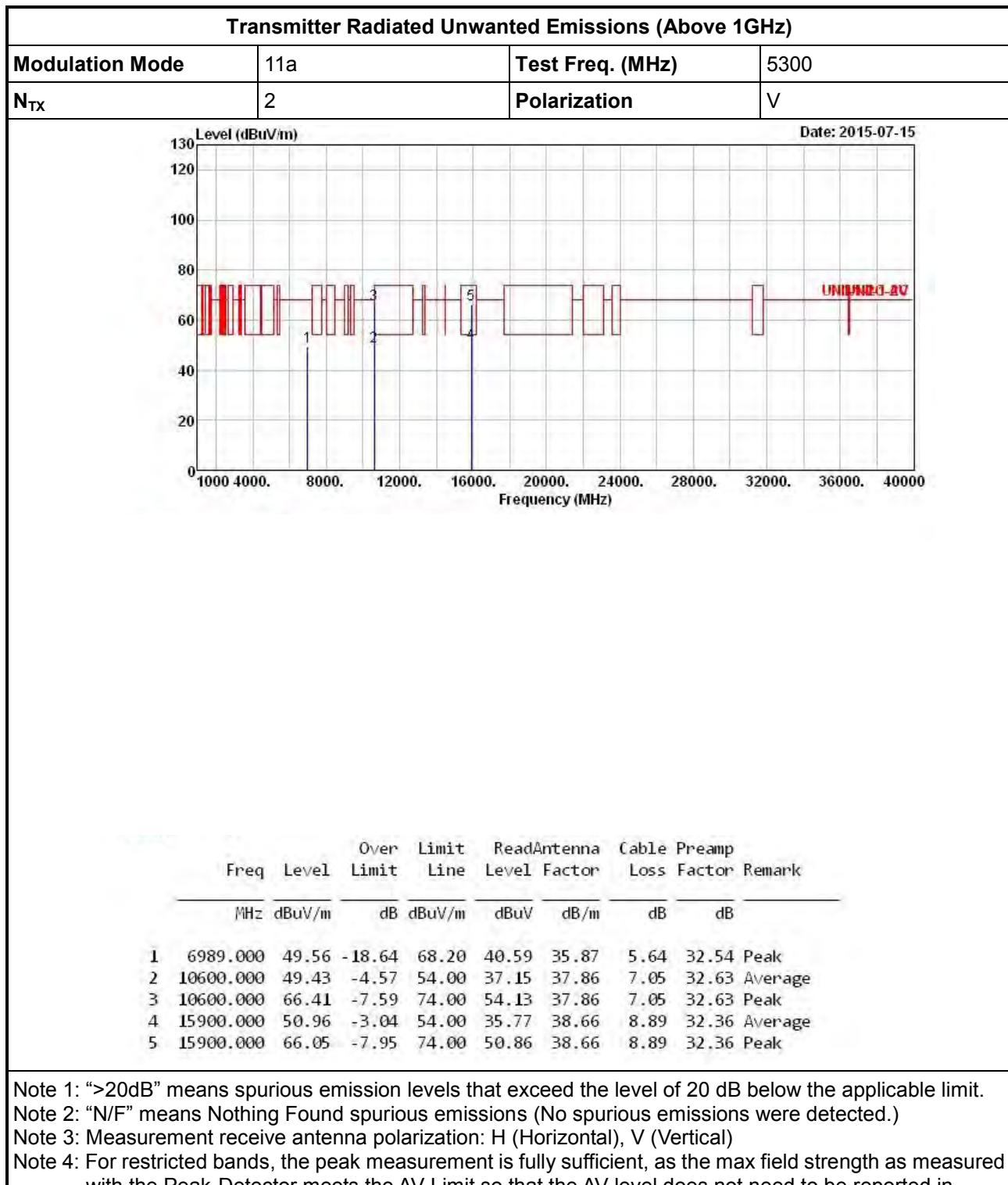


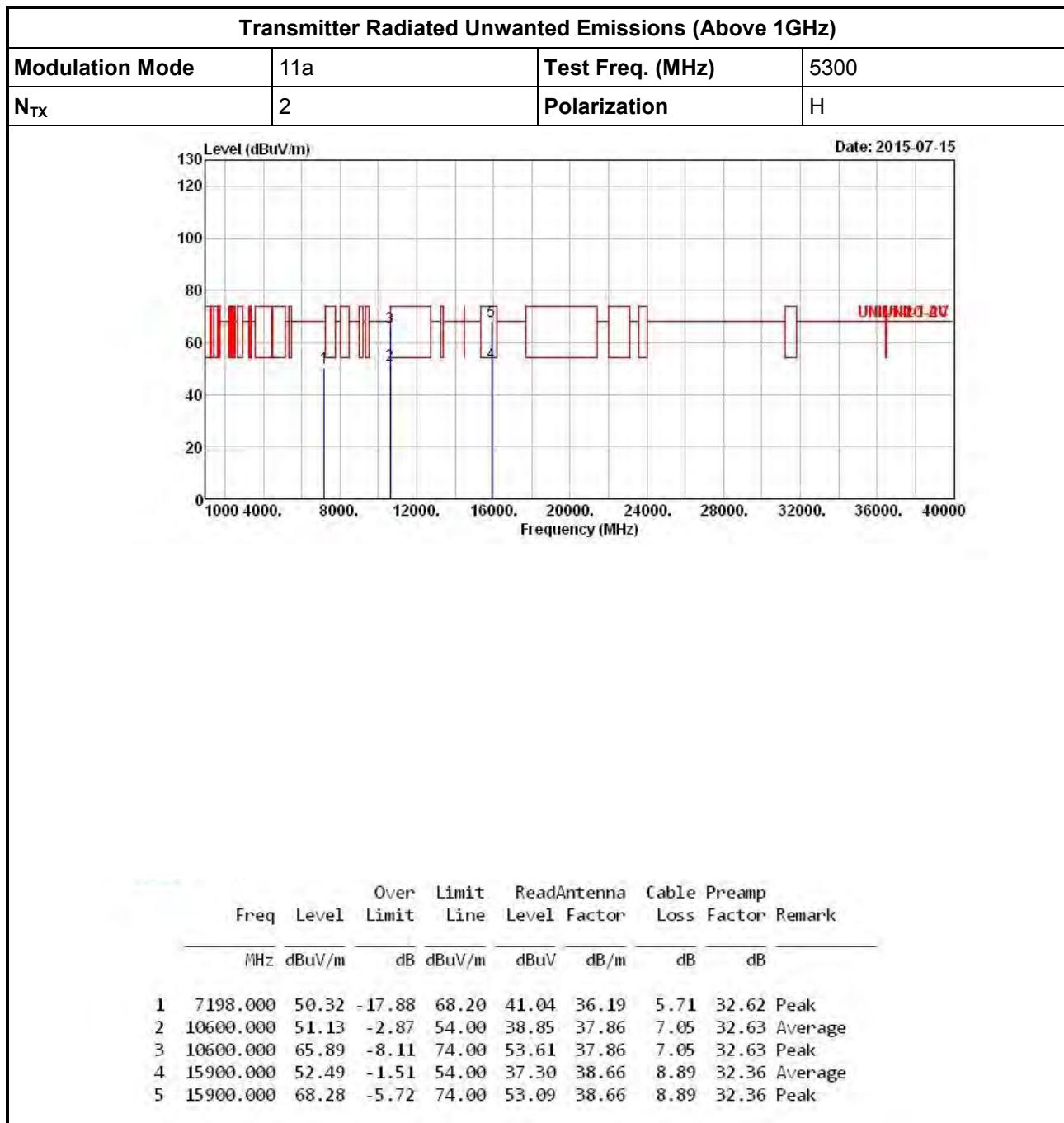
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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



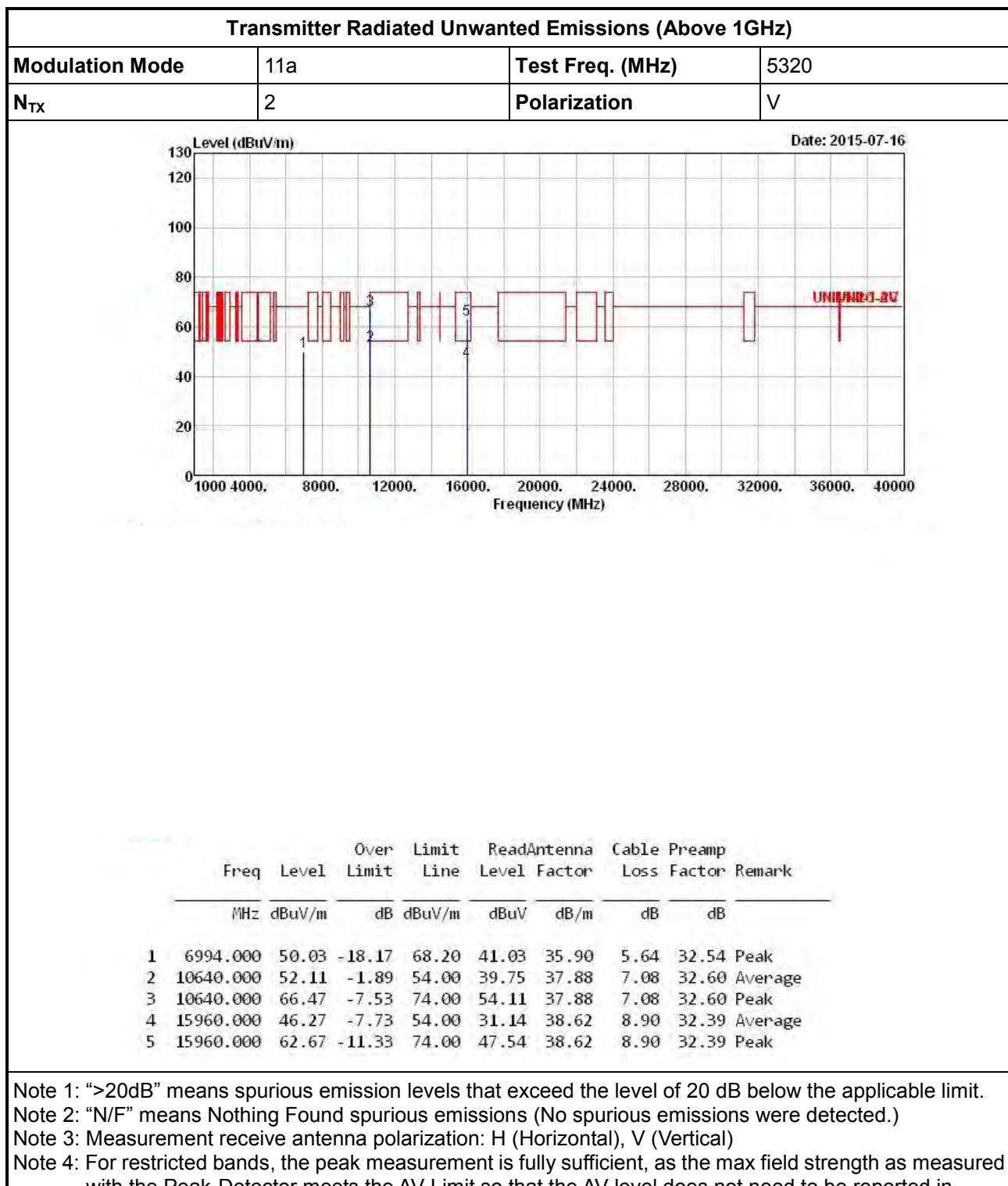


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

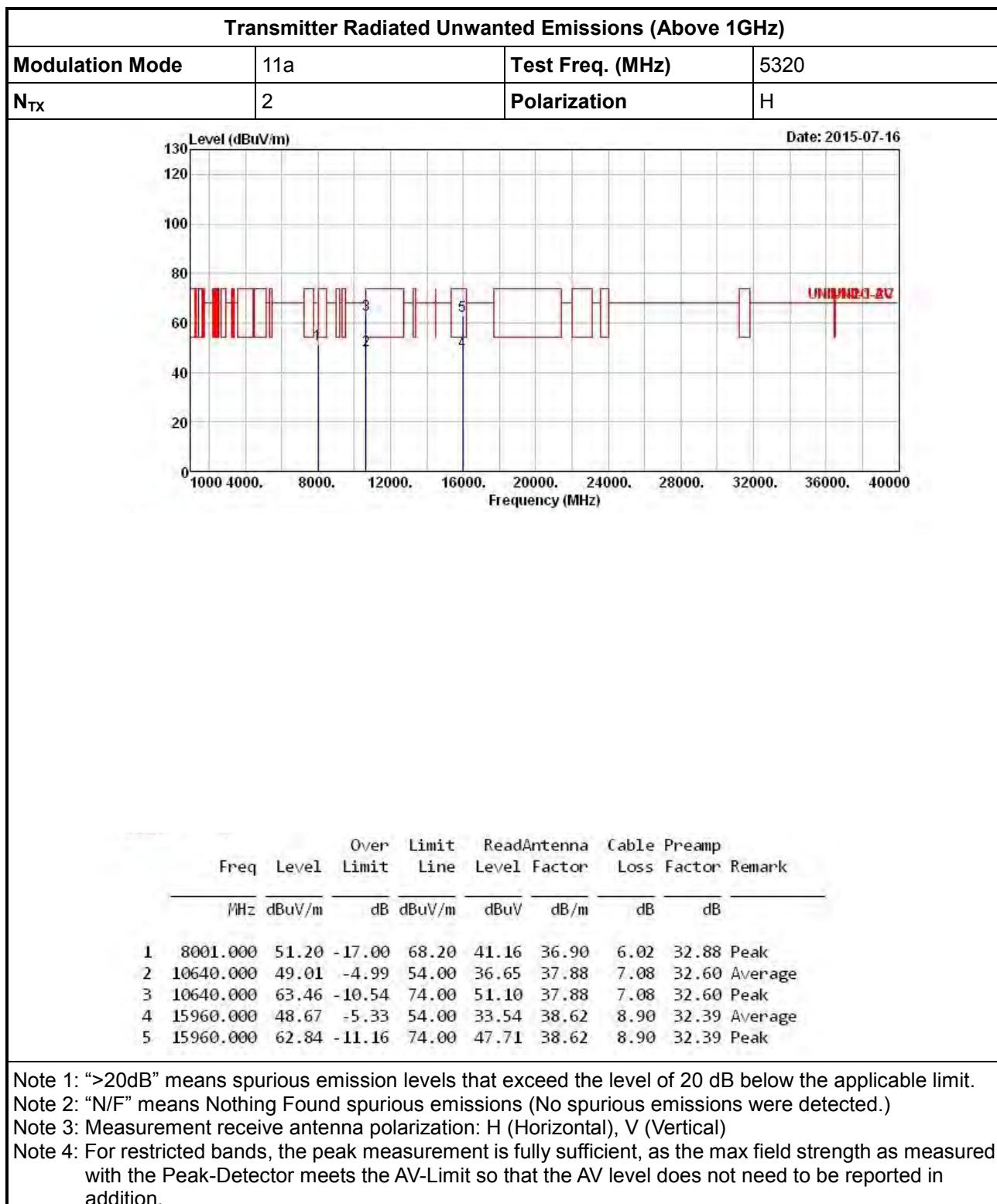


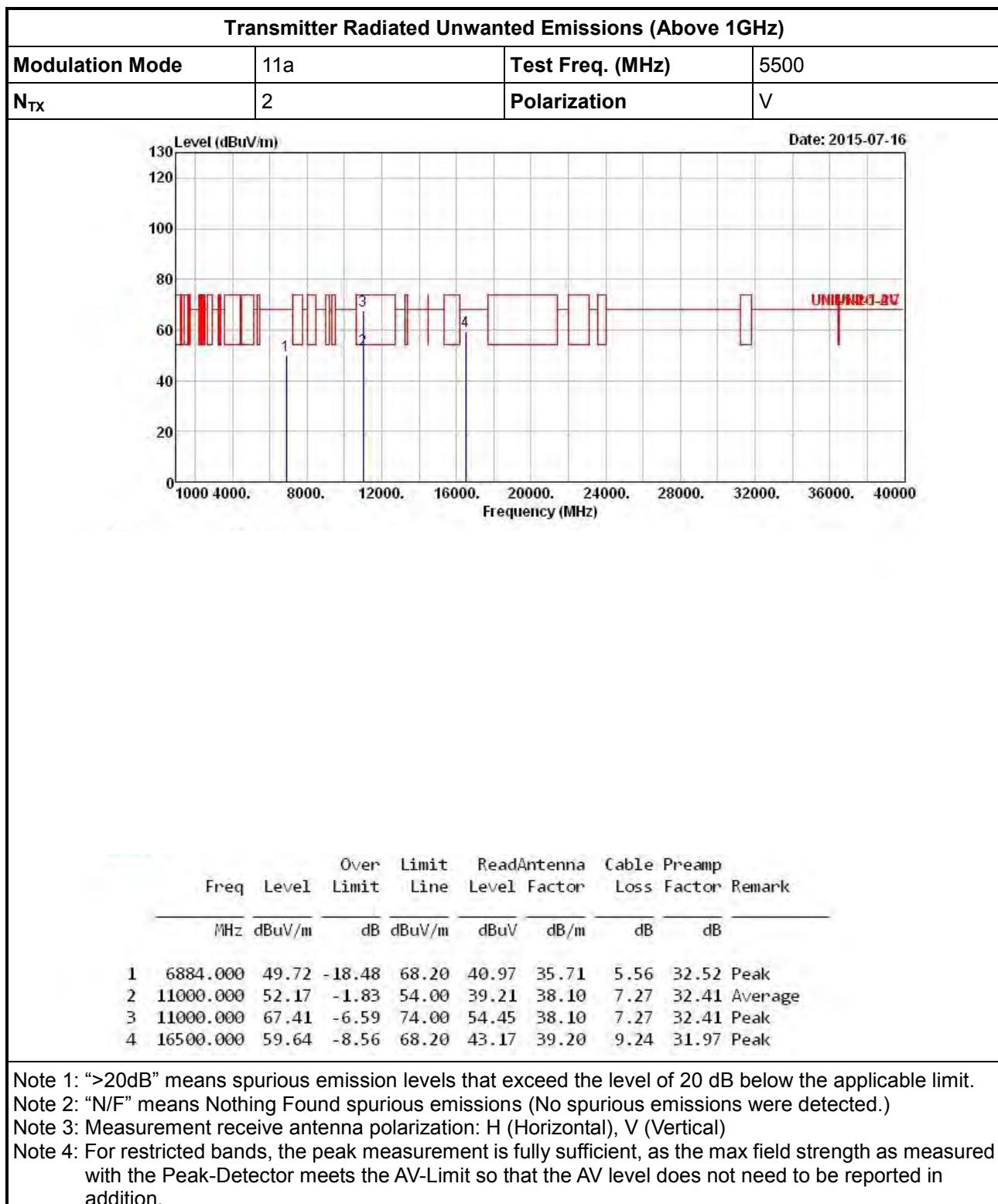
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

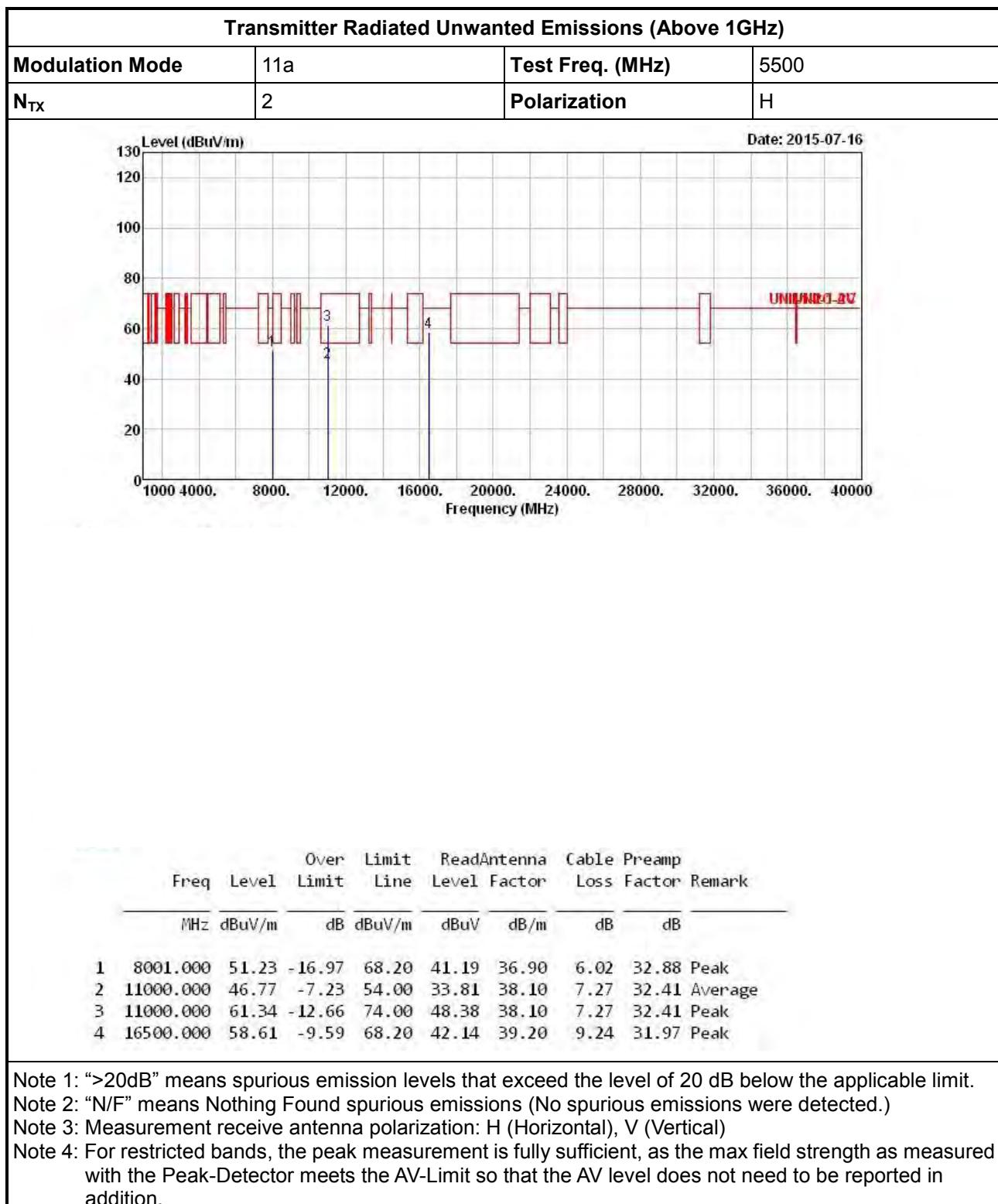
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

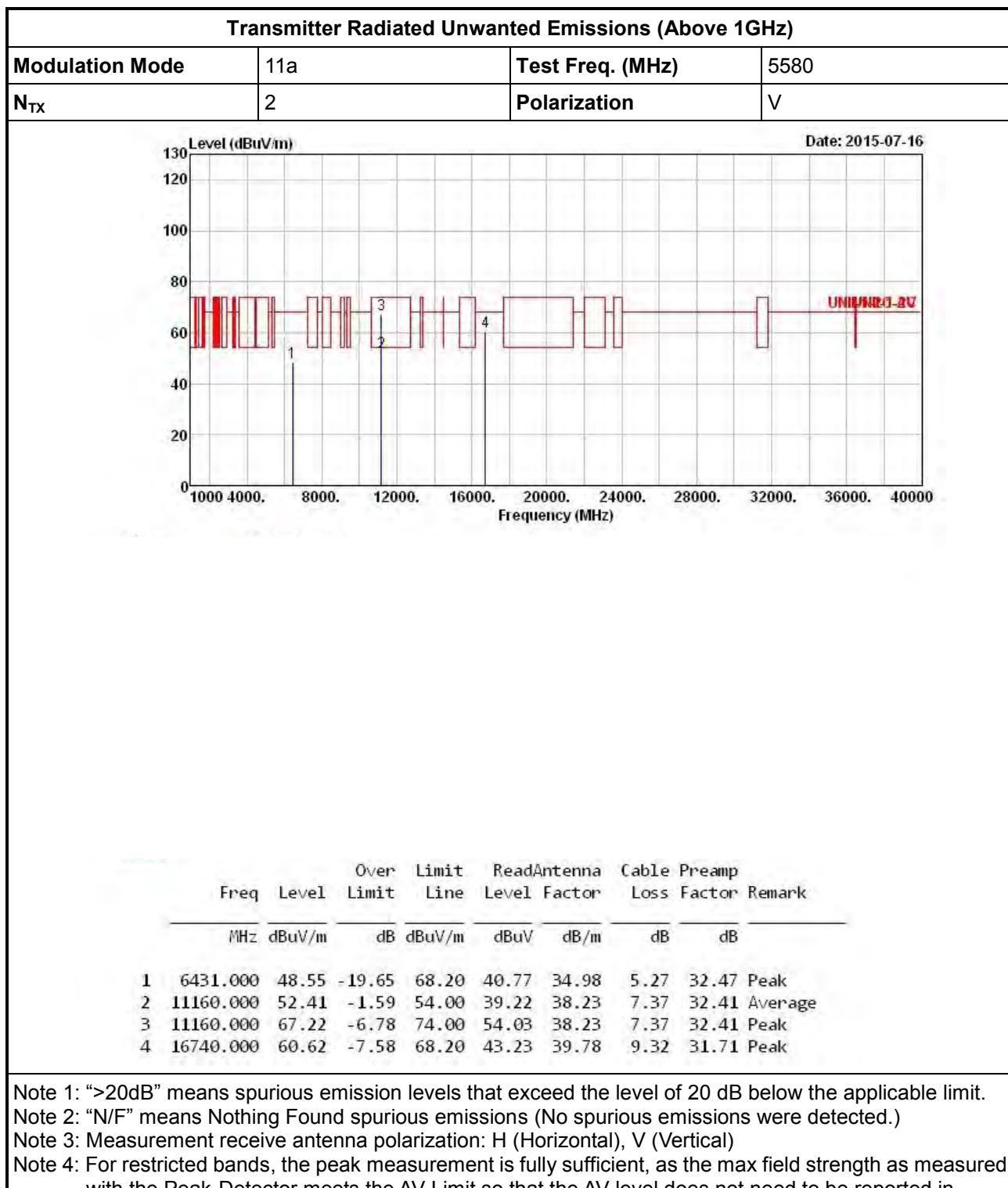
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

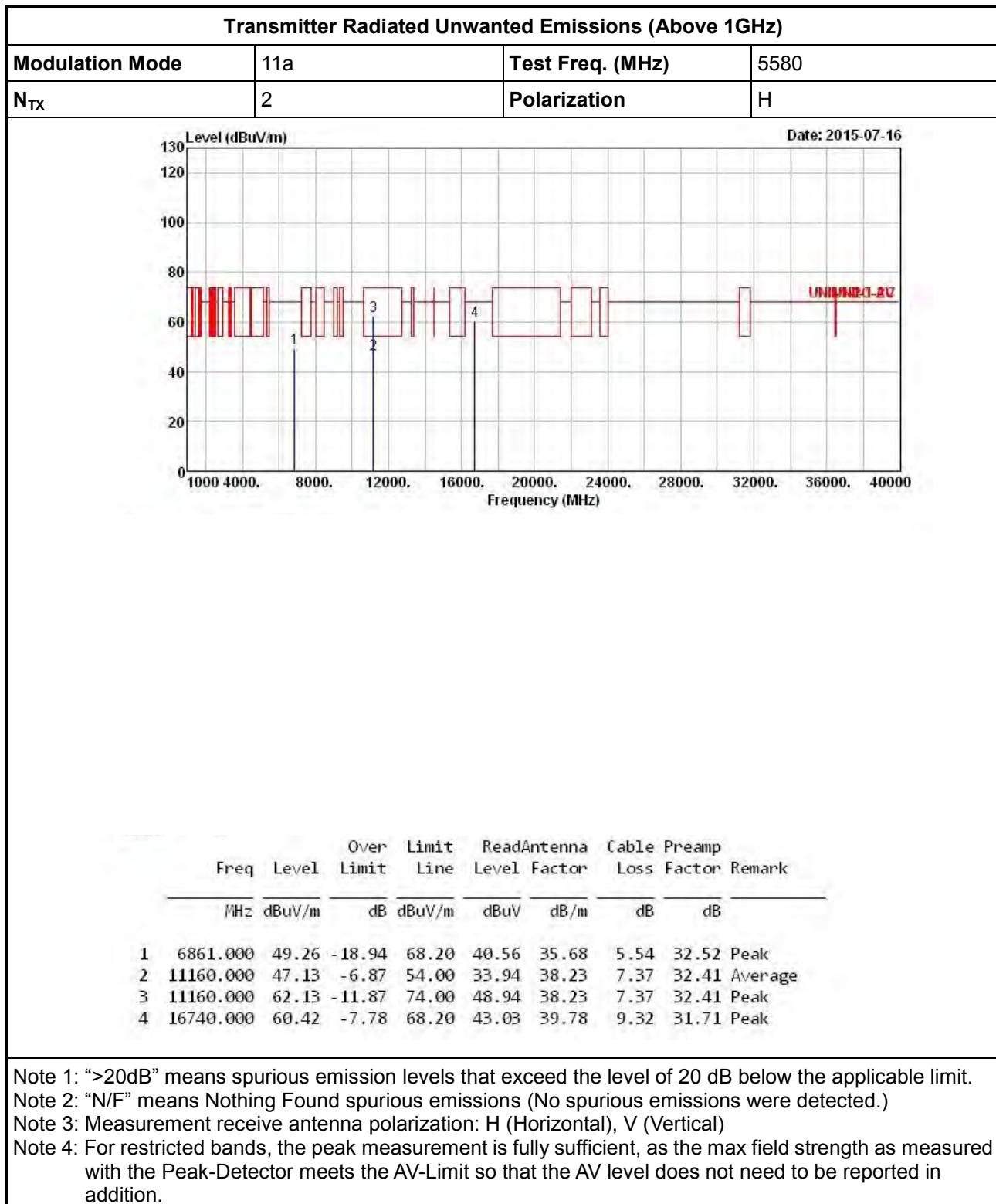
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

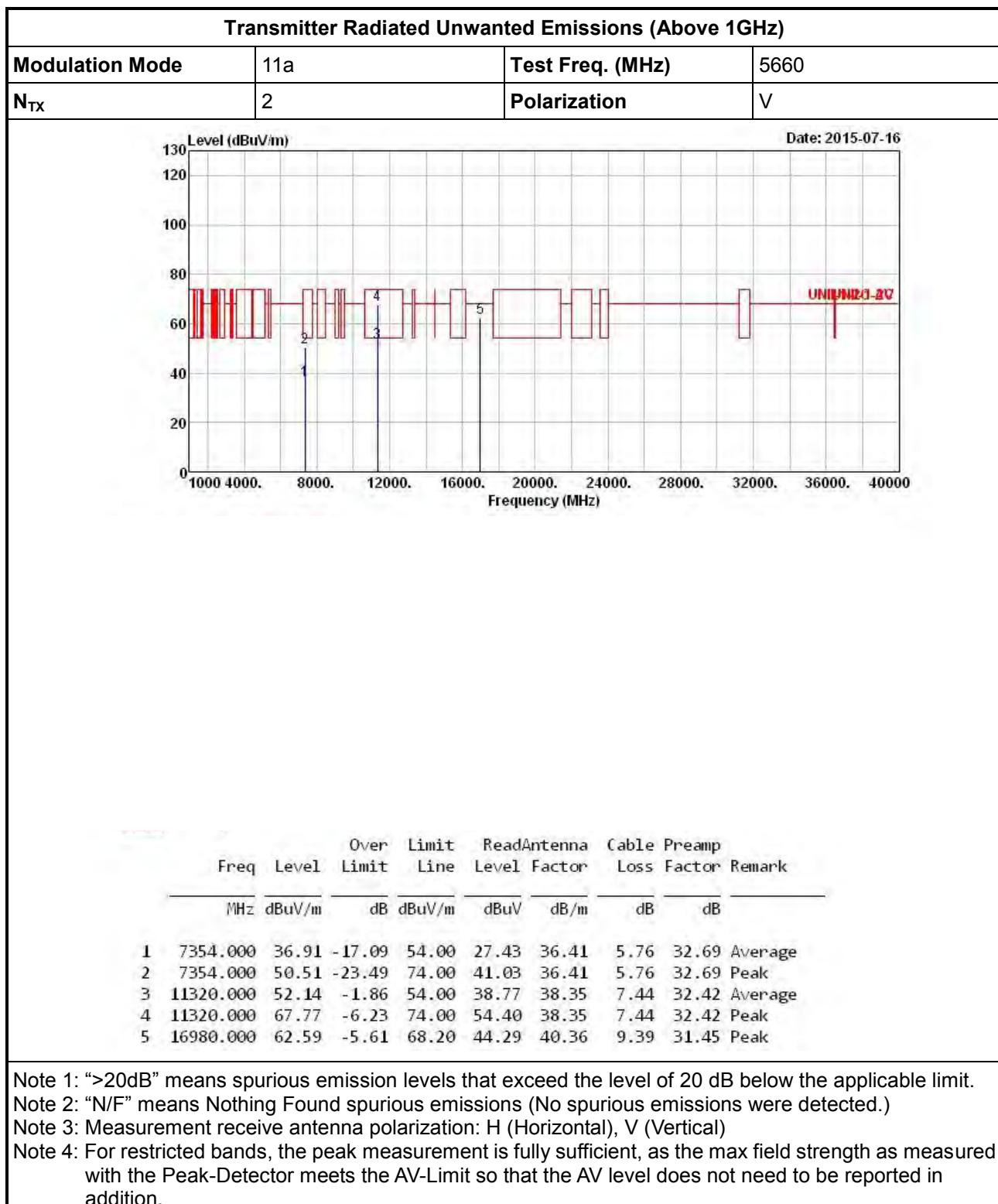


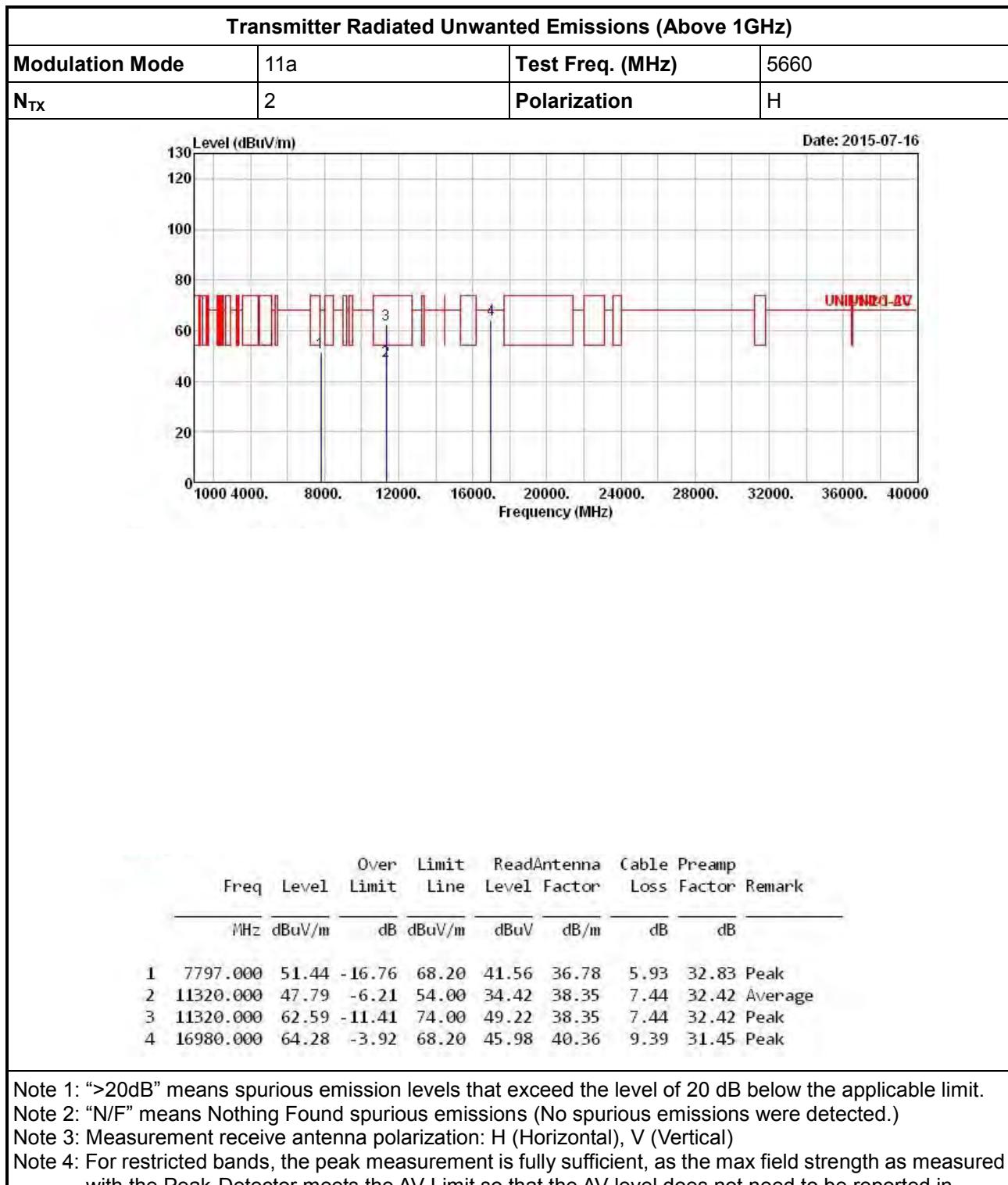


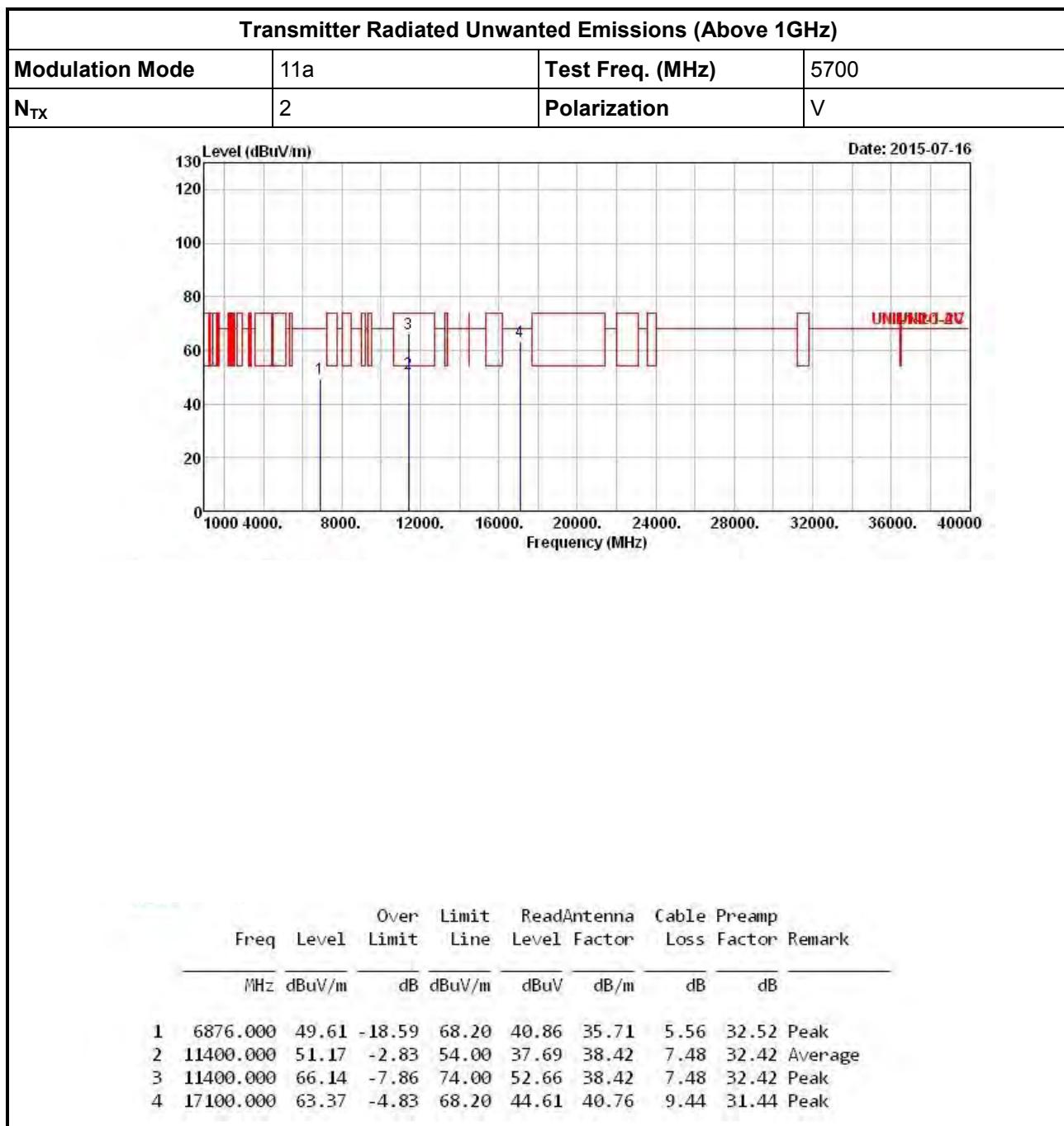










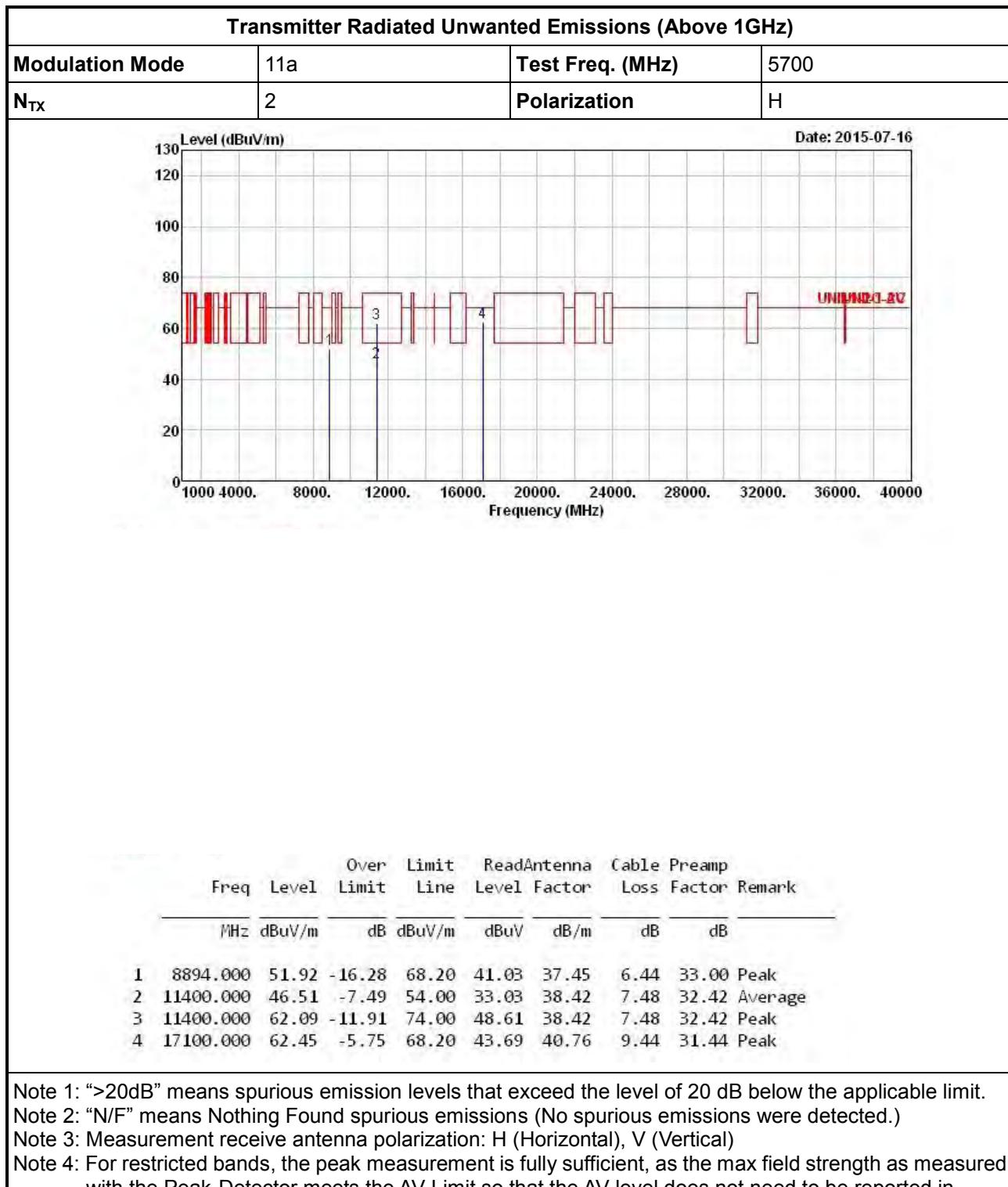


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

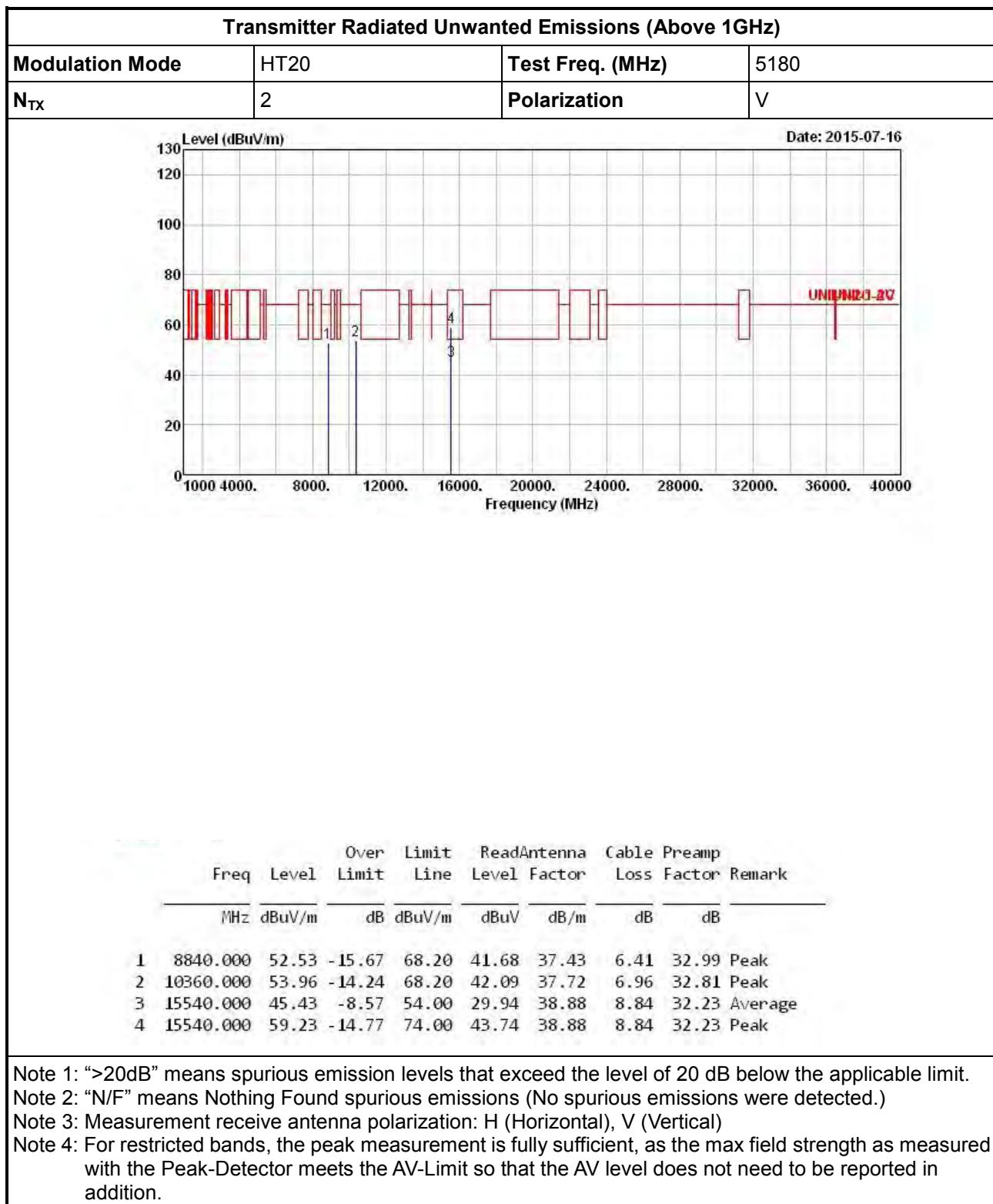
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

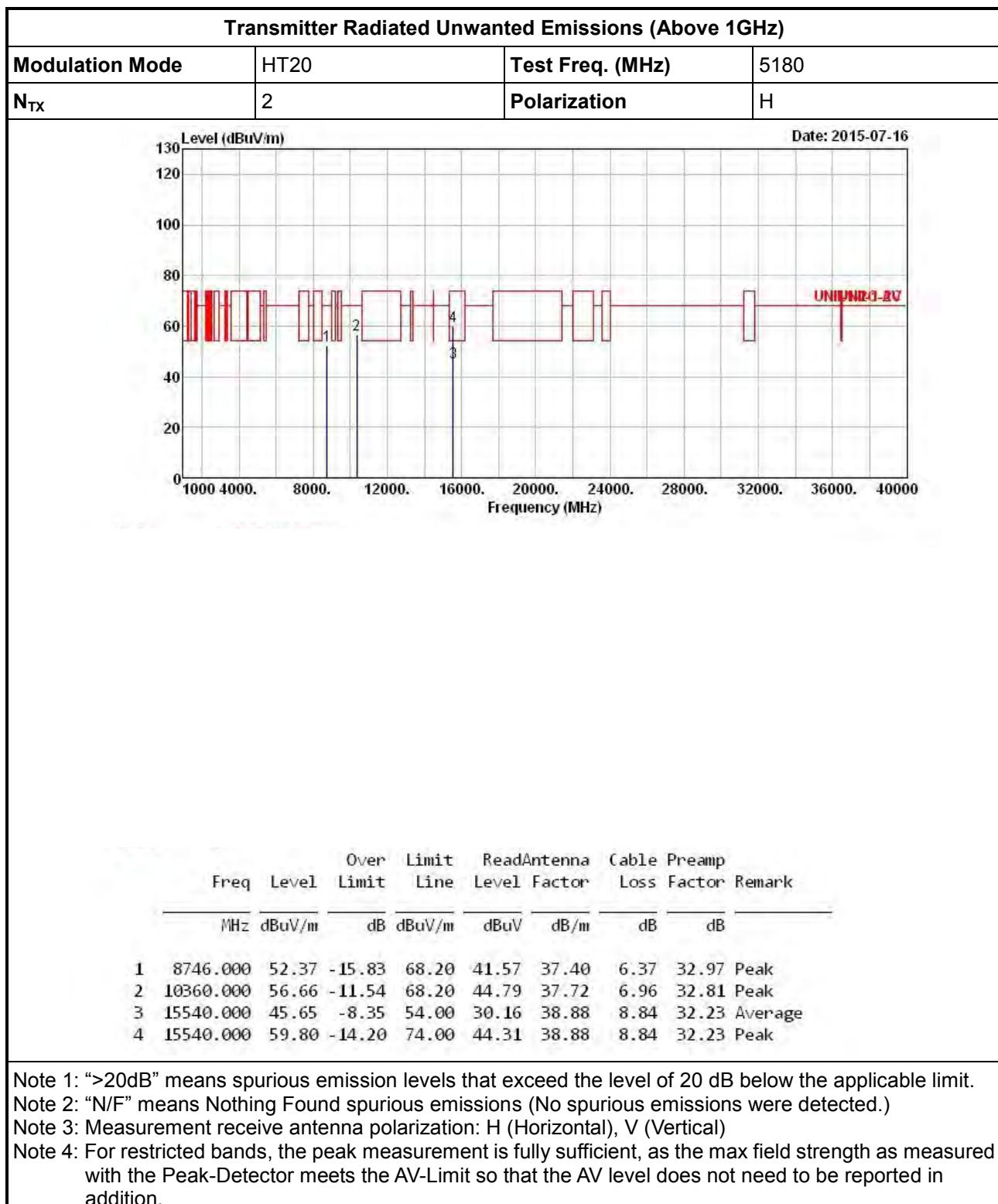
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

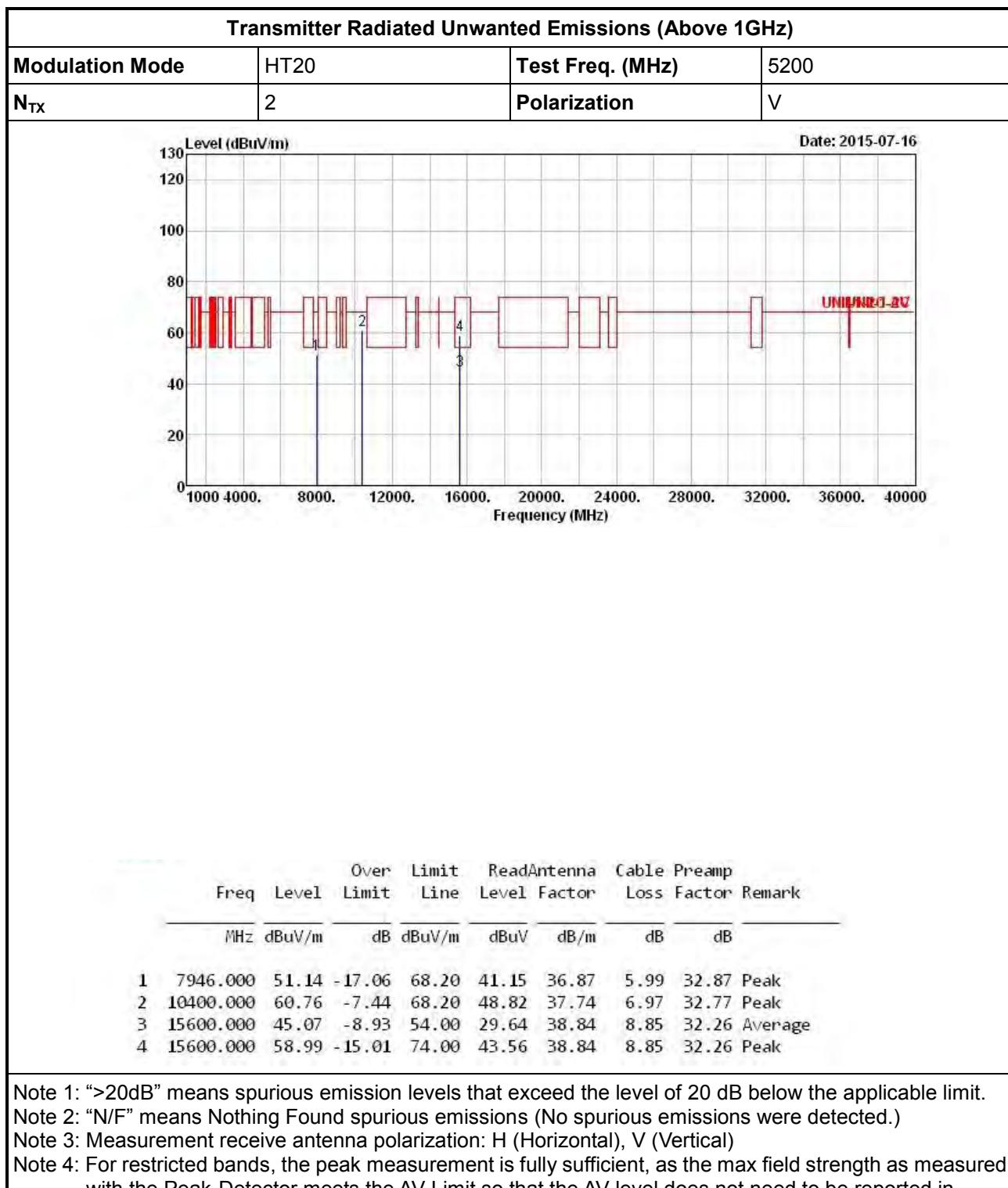


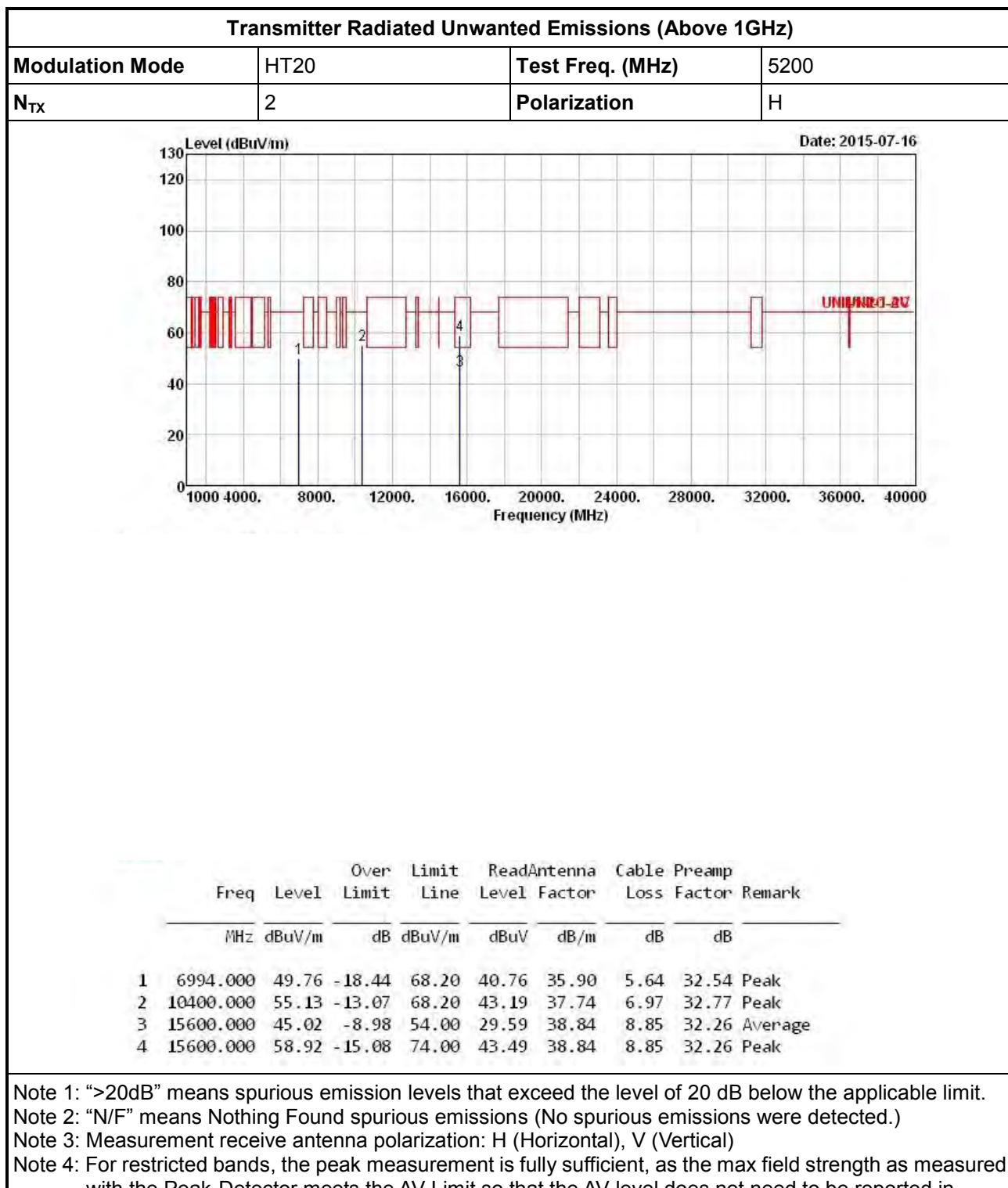


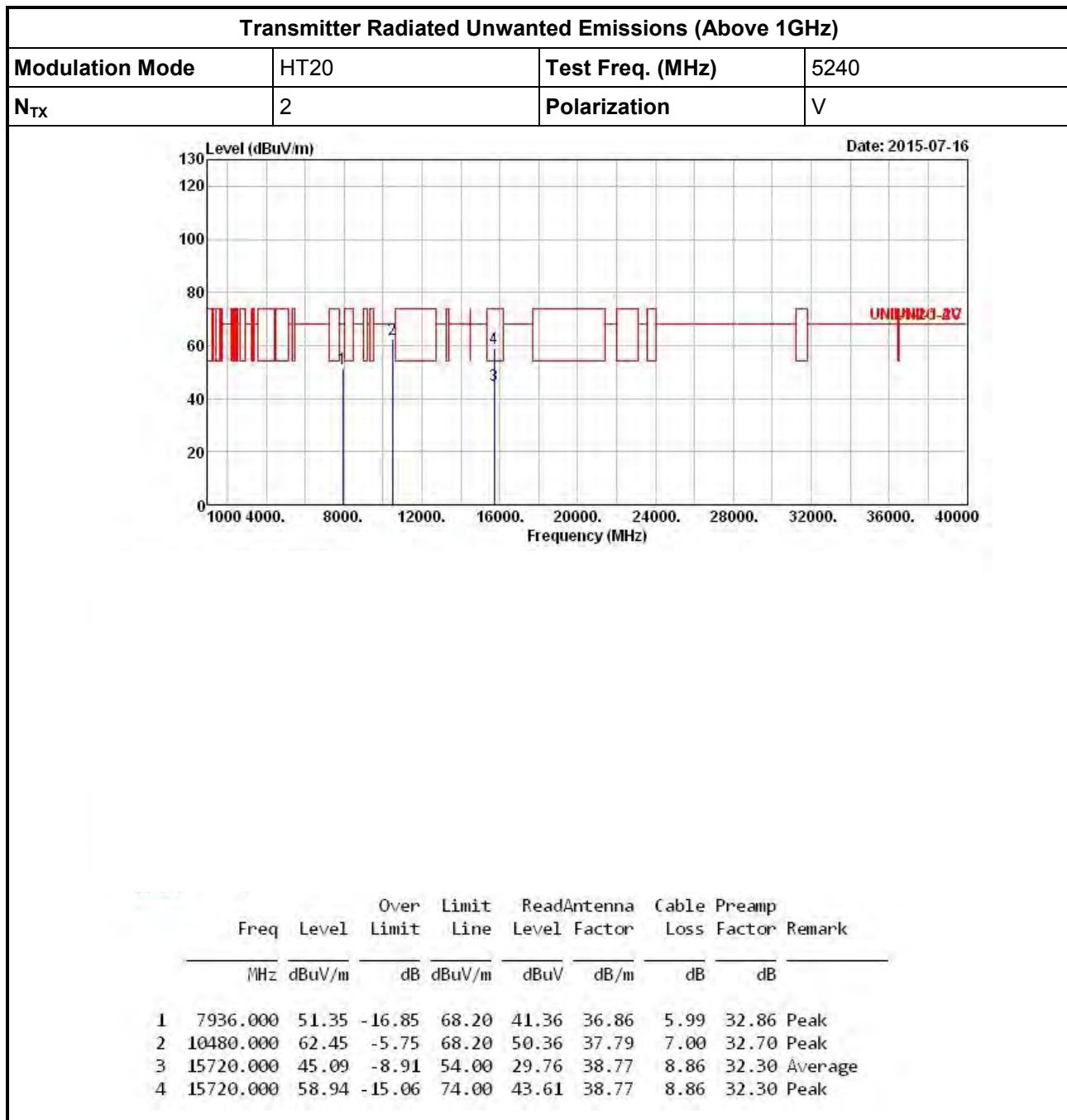
## 3.4.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT20











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

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

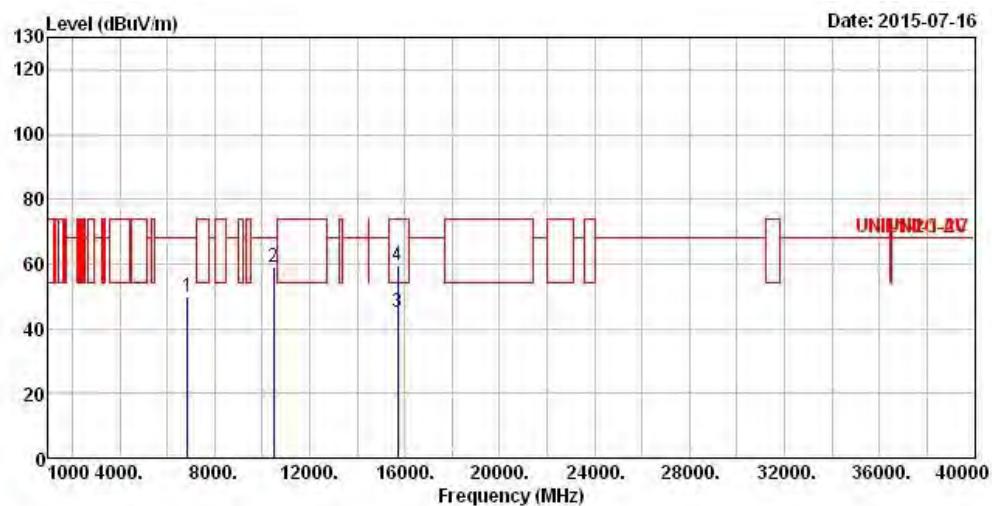
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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



## Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	HT20	Test Freq. (MHz)	5240
N <sub>TX</sub>	2	Polarization	H



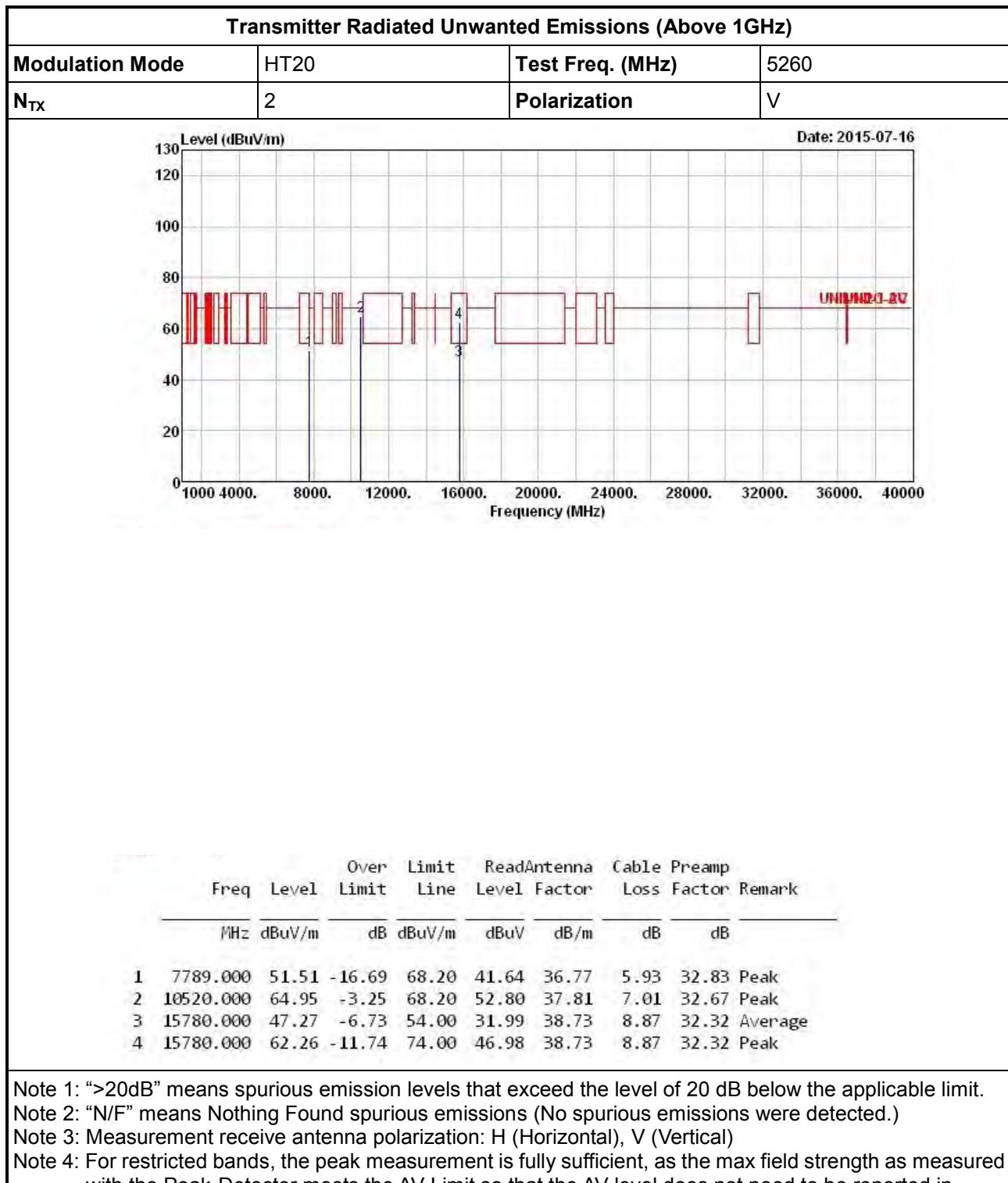
Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark
		Limit	Line	Antenna	Level	Factor	Loss	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	6843.000	49.68	-18.52	68.20	41.01	35.65	5.54	32.52 Peak
2	10480.000	59.11	-9.09	68.20	47.02	37.79	7.00	32.70 Peak
3	15720.000	45.12	-8.88	54.00	29.79	38.77	8.86	32.30 Average
4	15720.000	59.64	-14.36	74.00	44.31	38.77	8.86	32.30 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 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

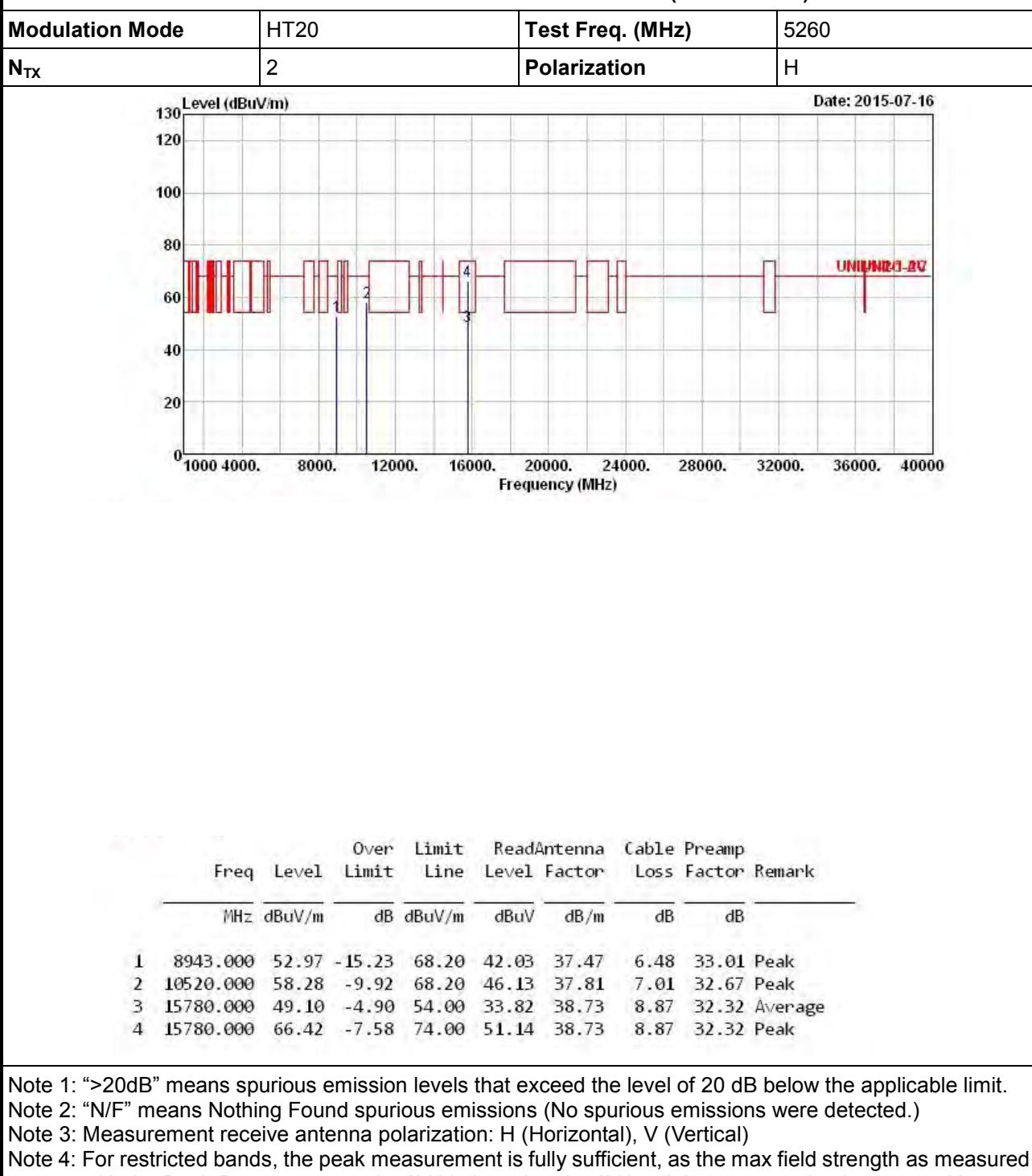
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

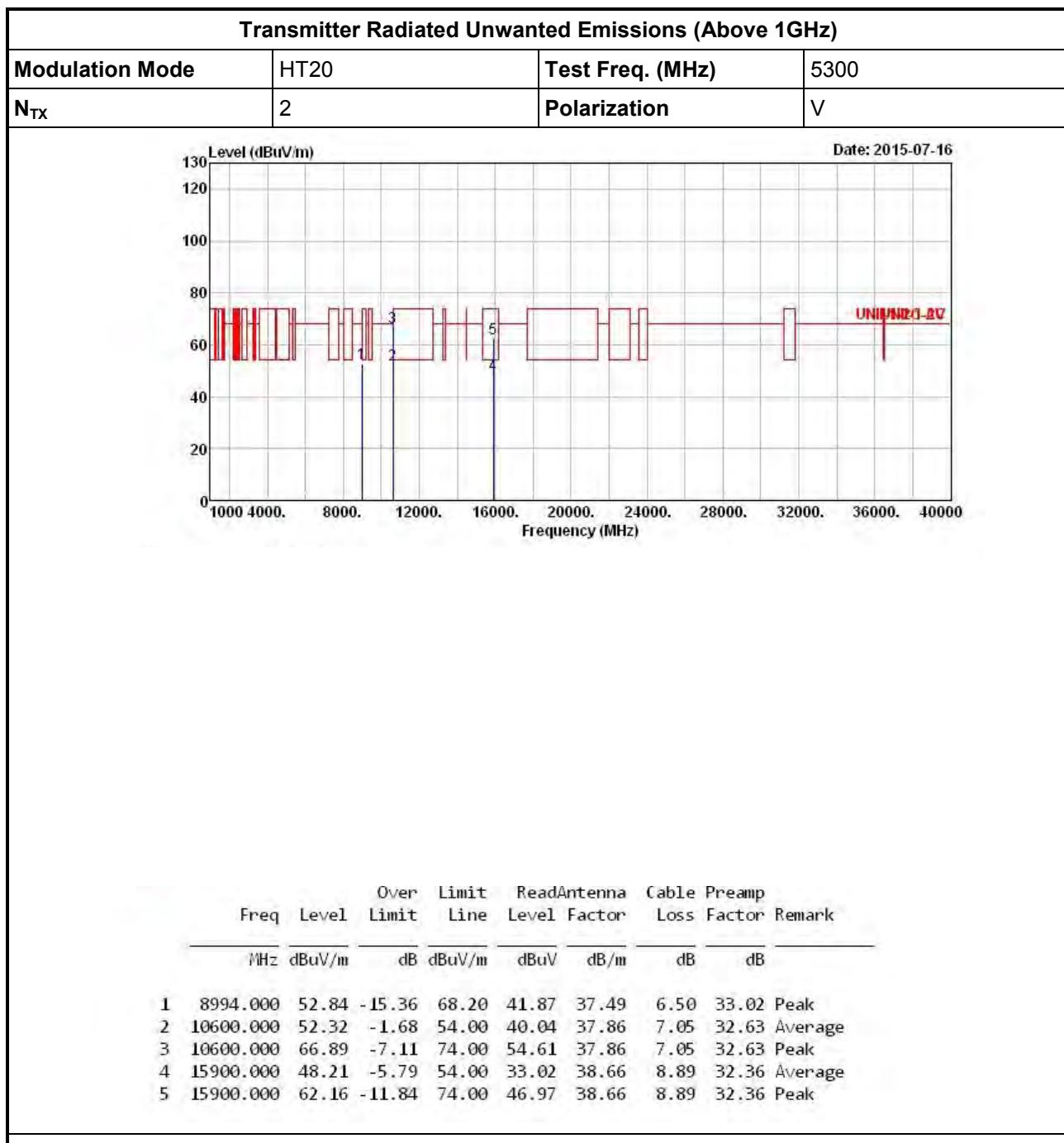
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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



## Transmitter Radiated Unwanted Emissions (Above 1GHz)



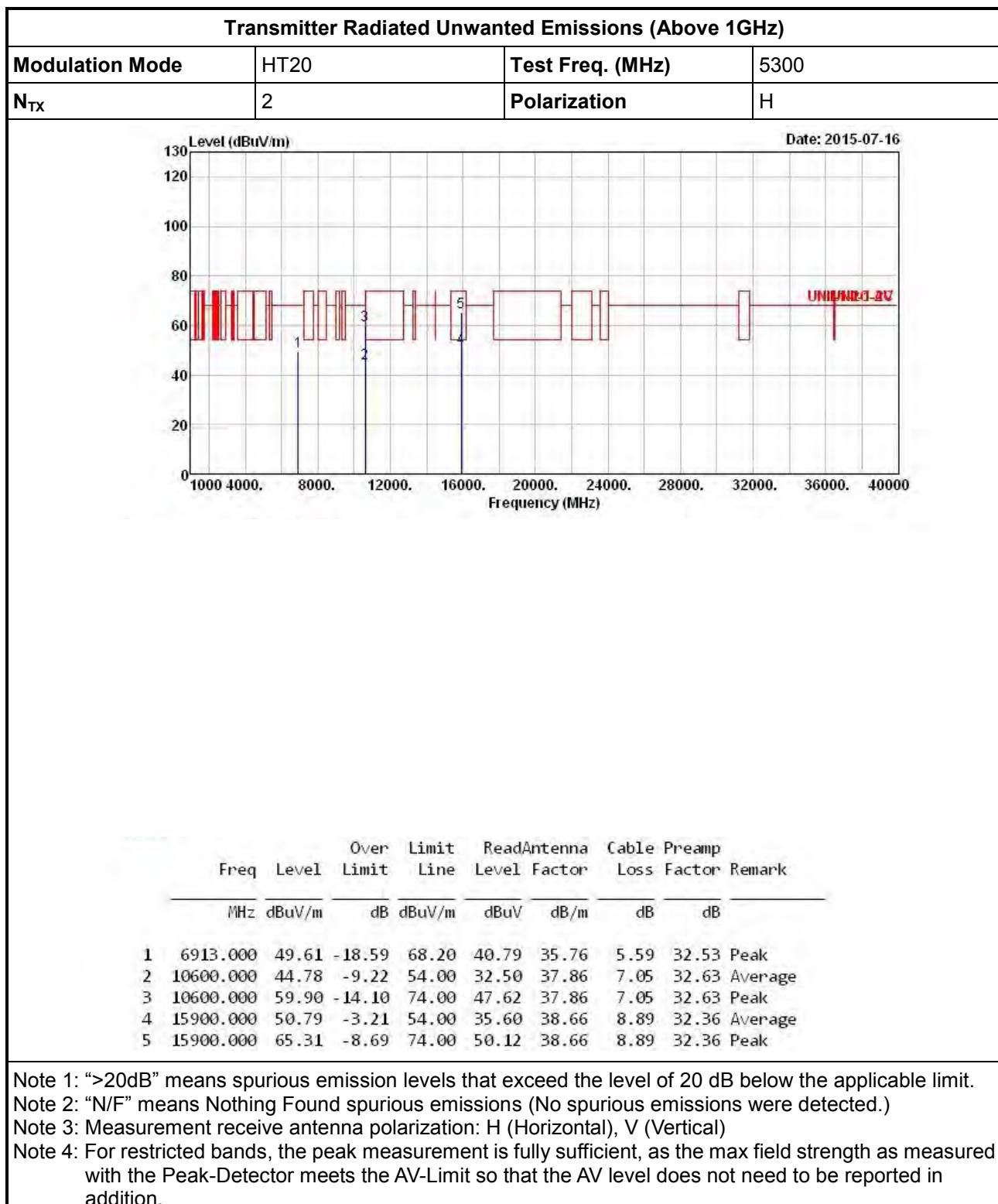


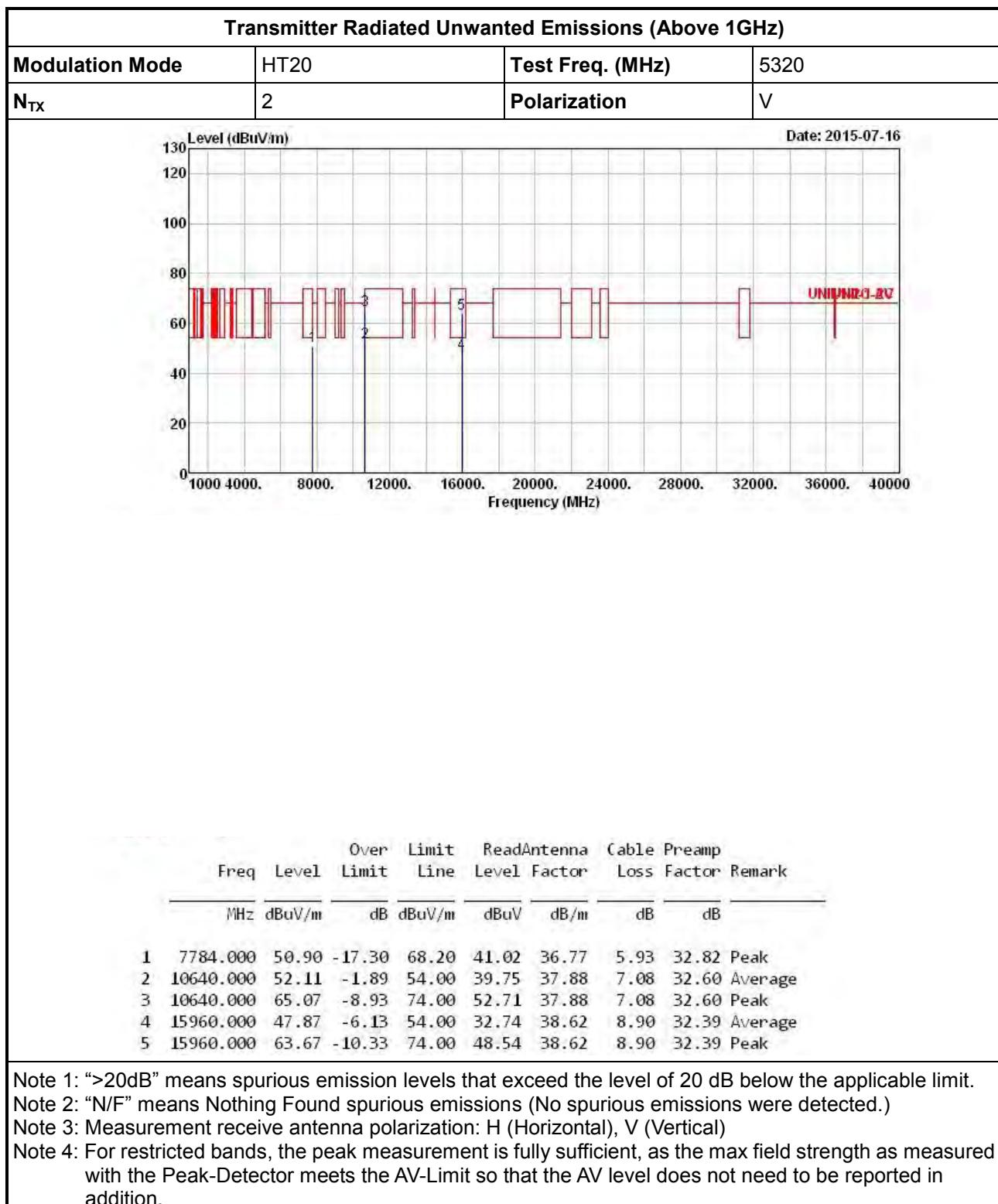
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

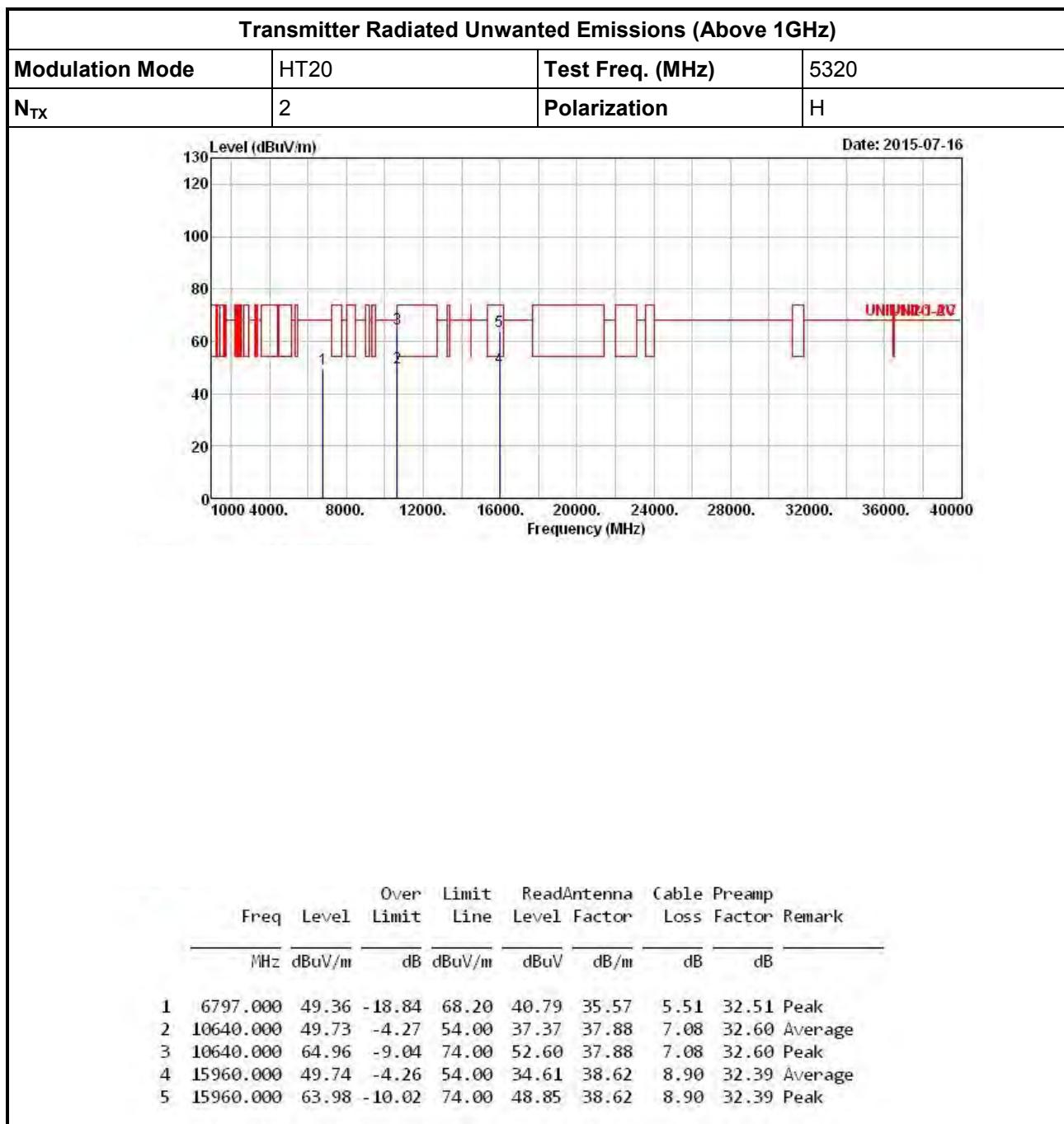
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

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





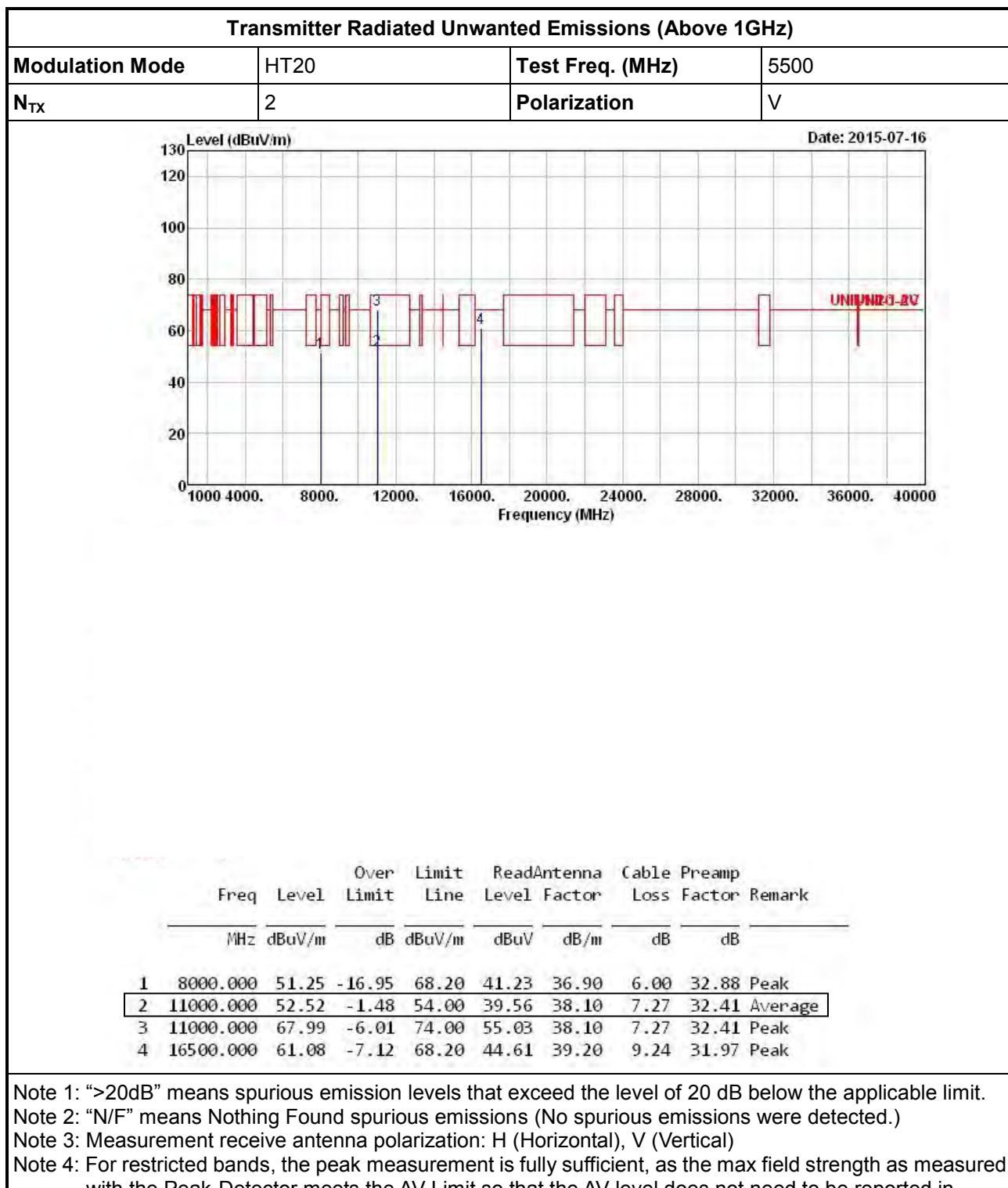


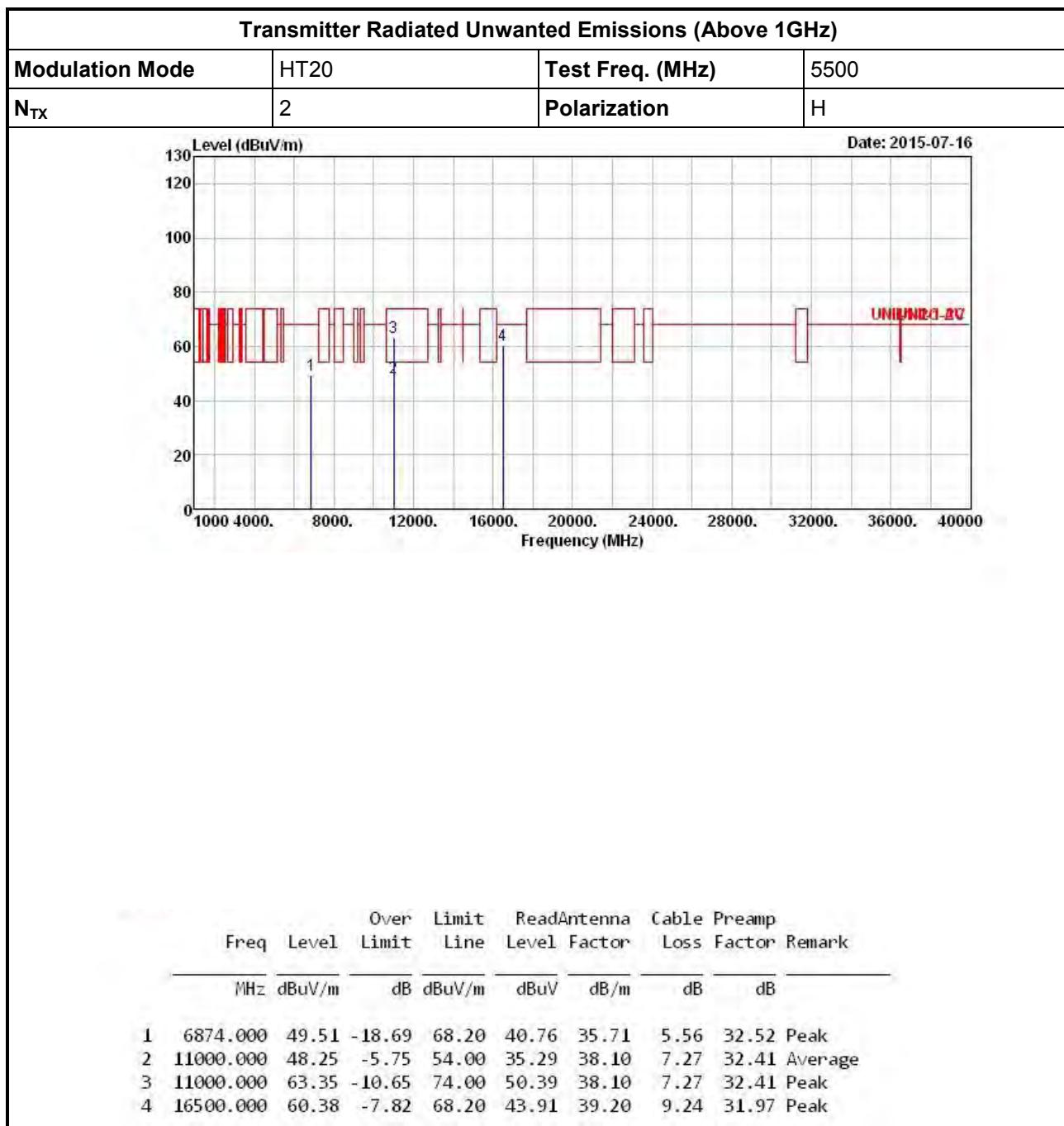
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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



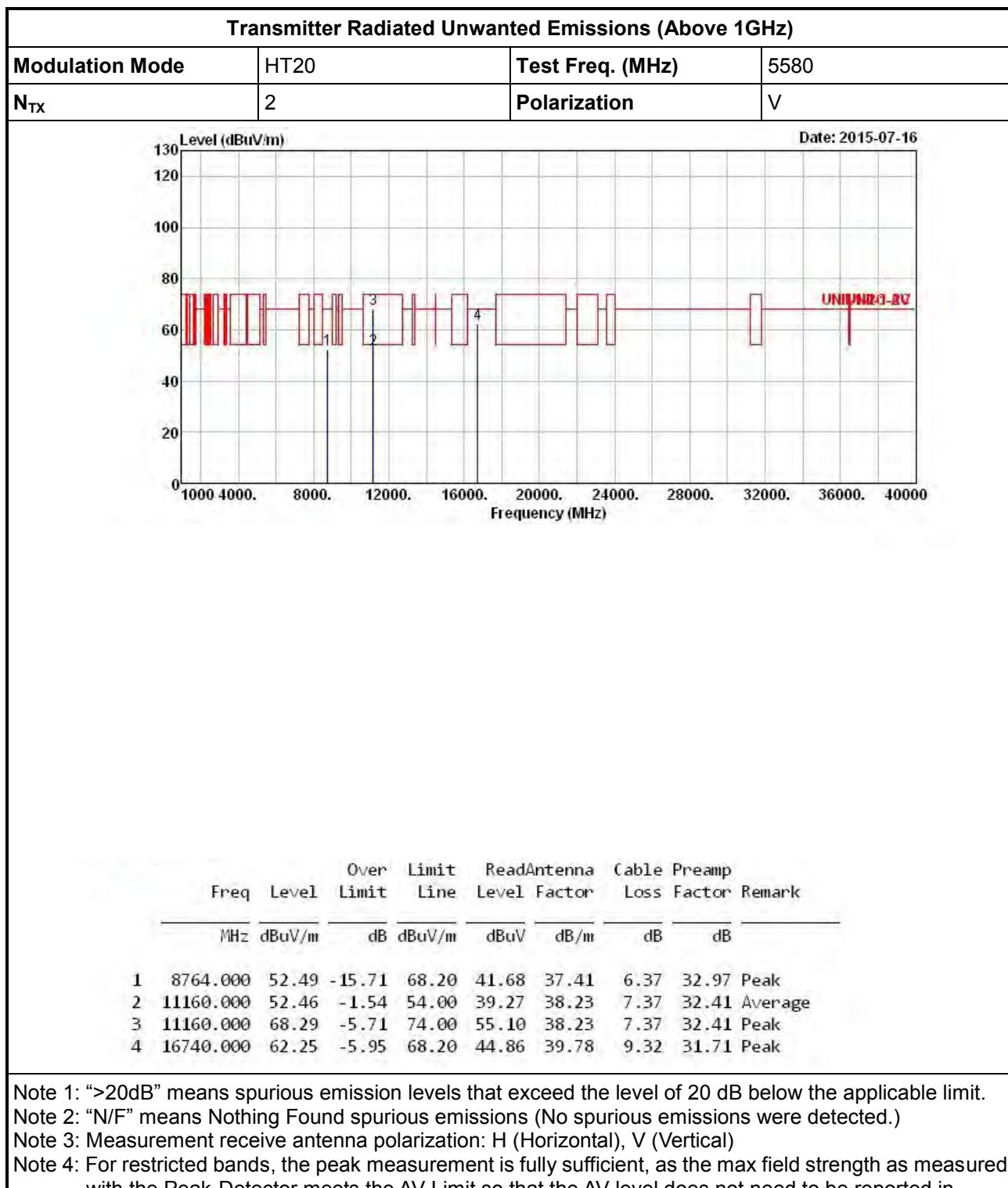


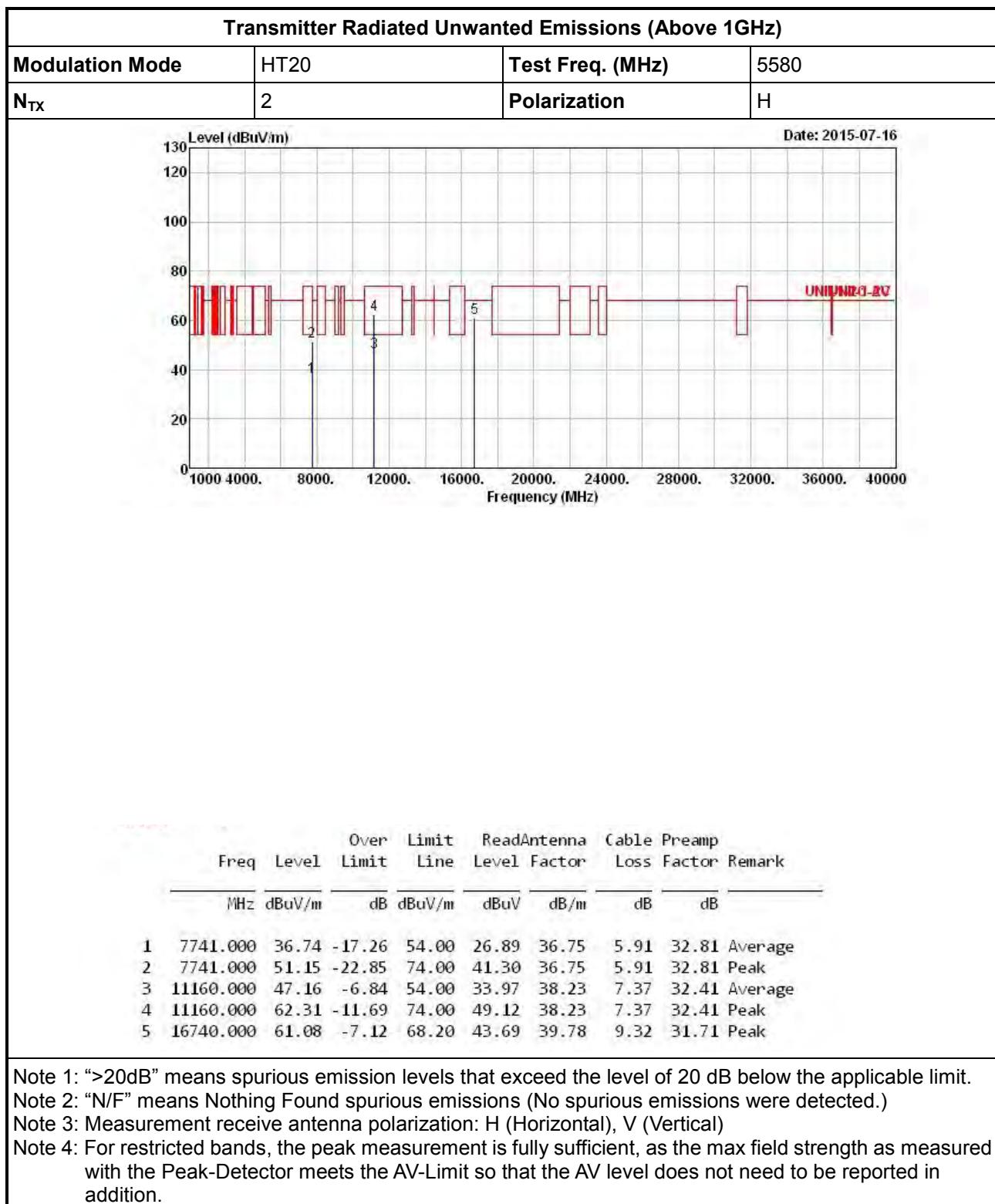
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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



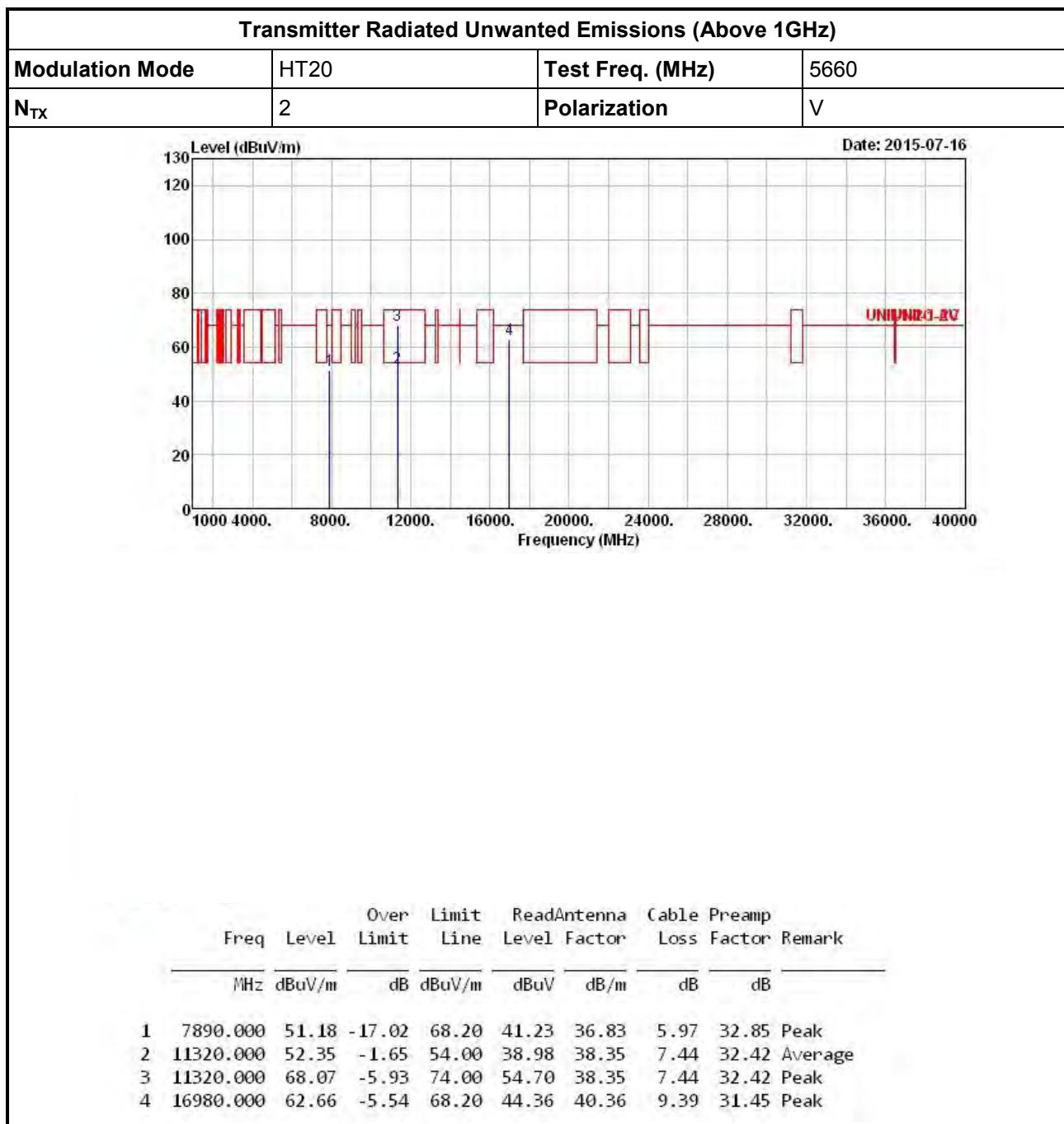


Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

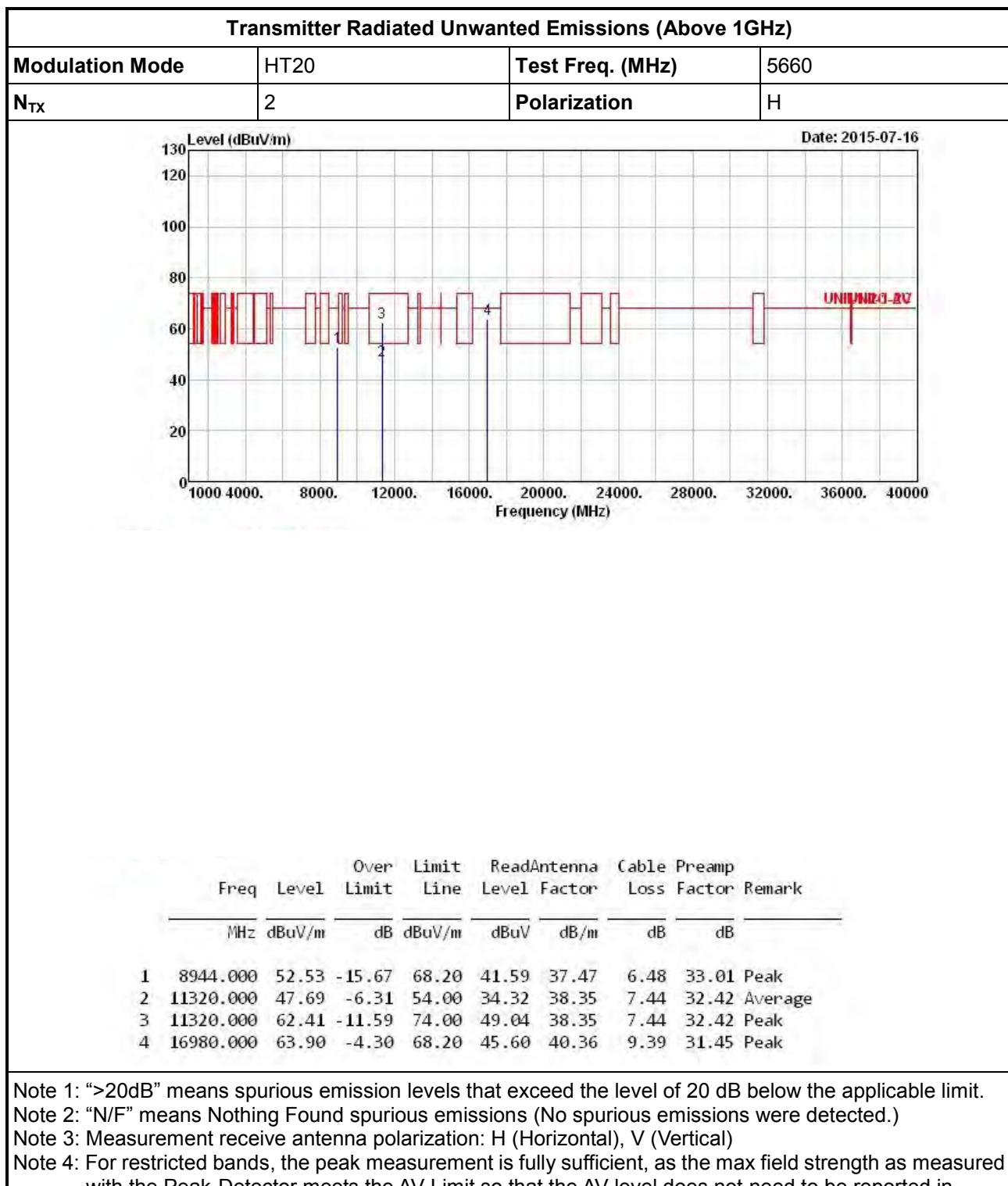


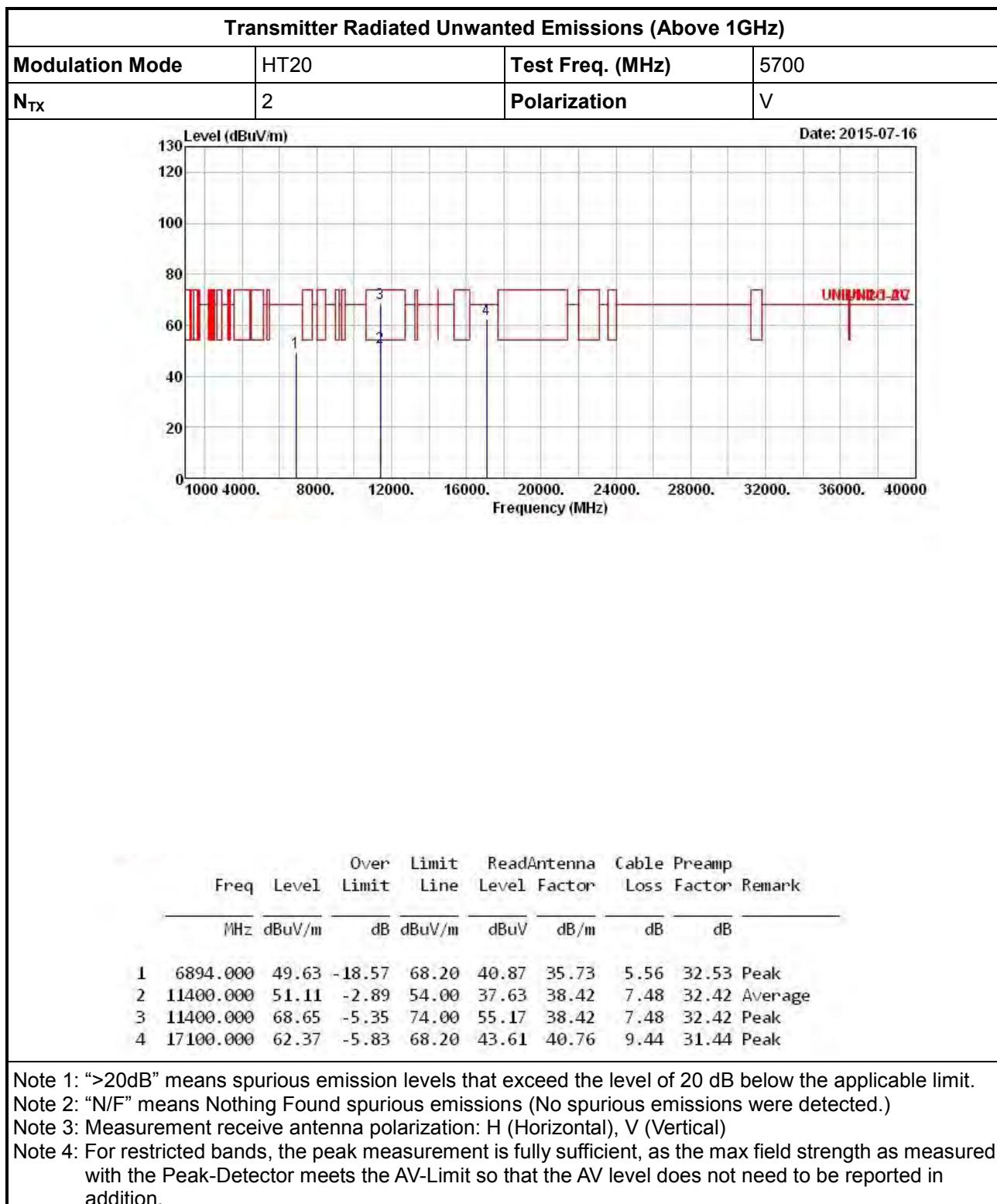
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

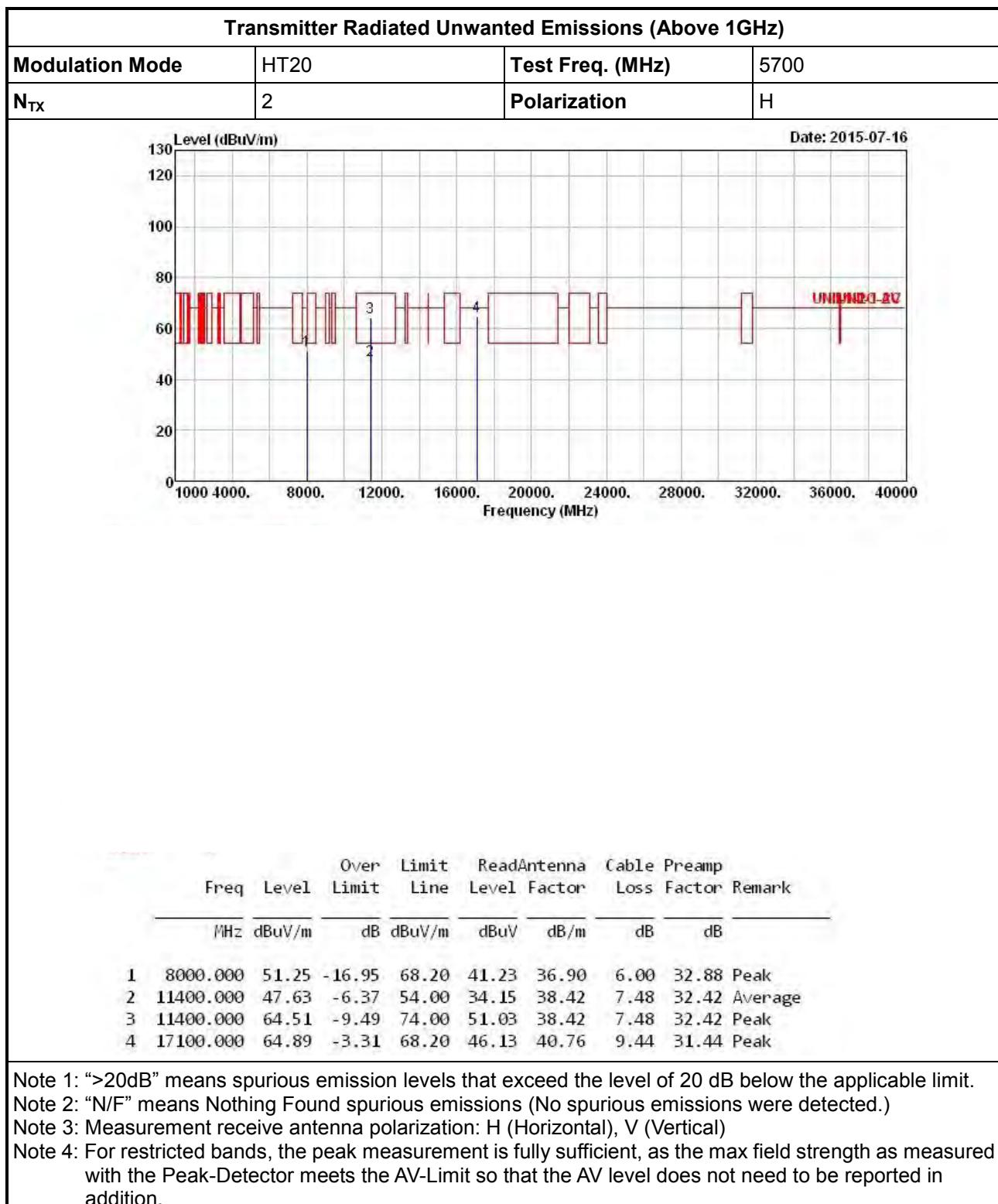
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

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

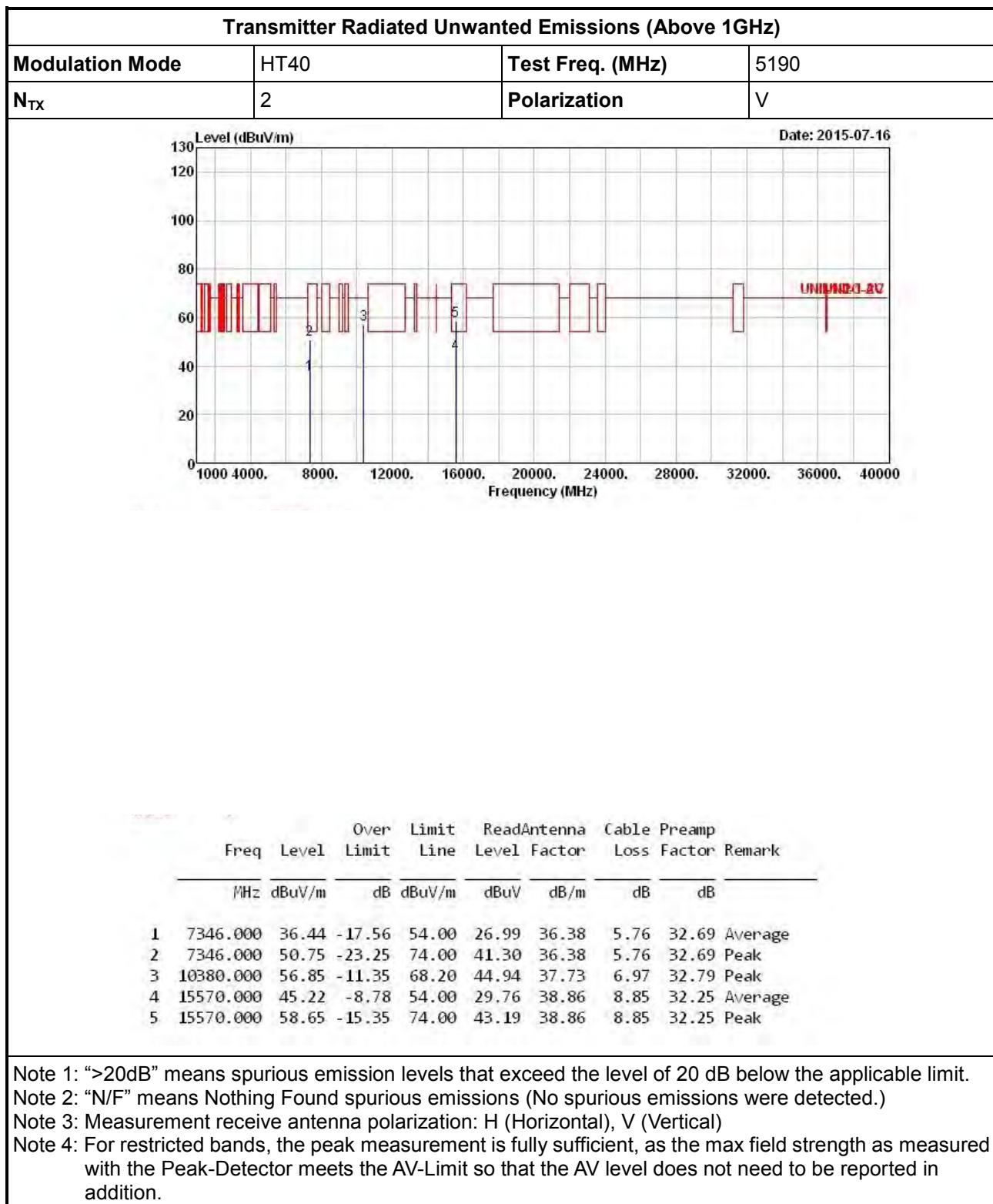


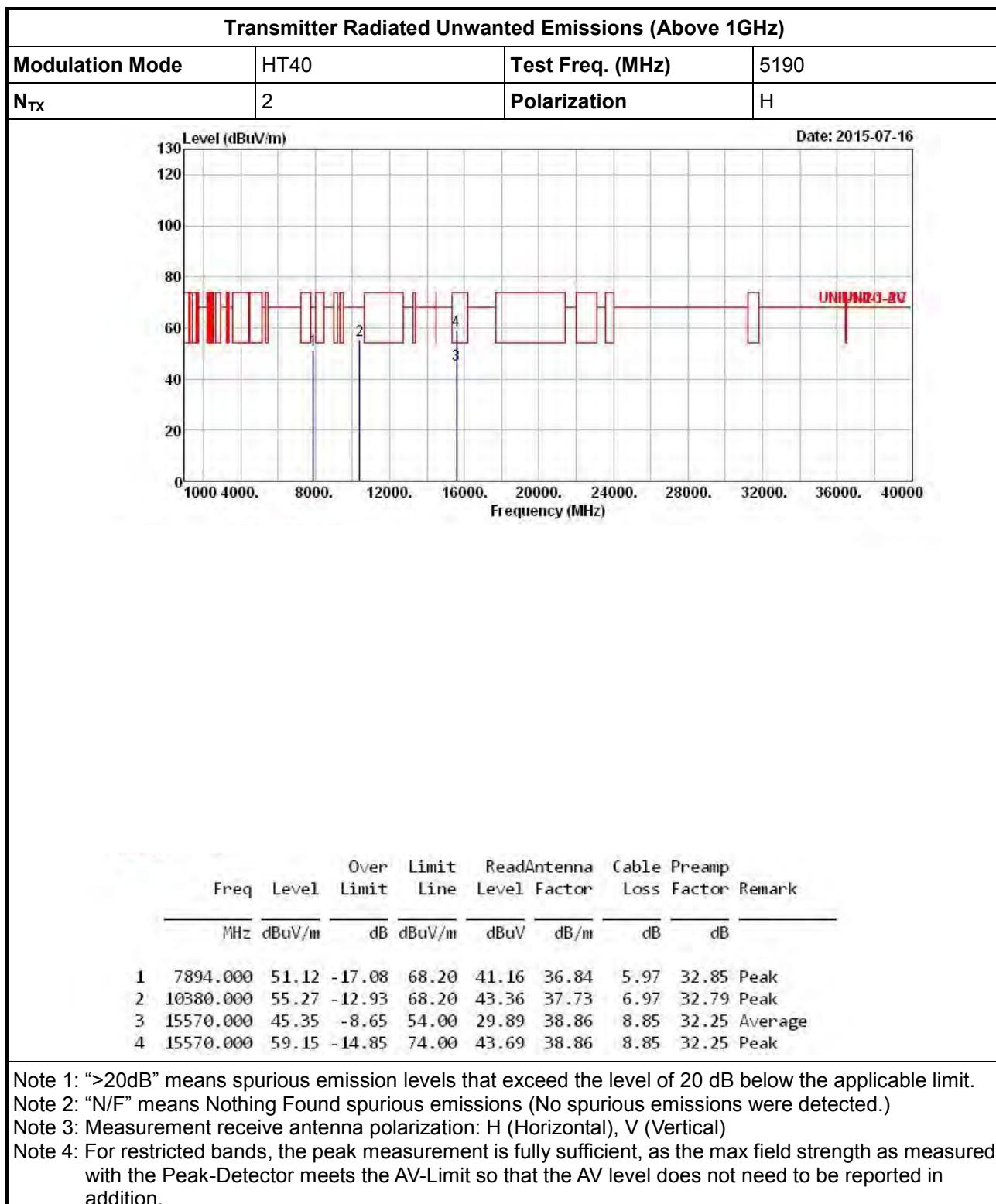


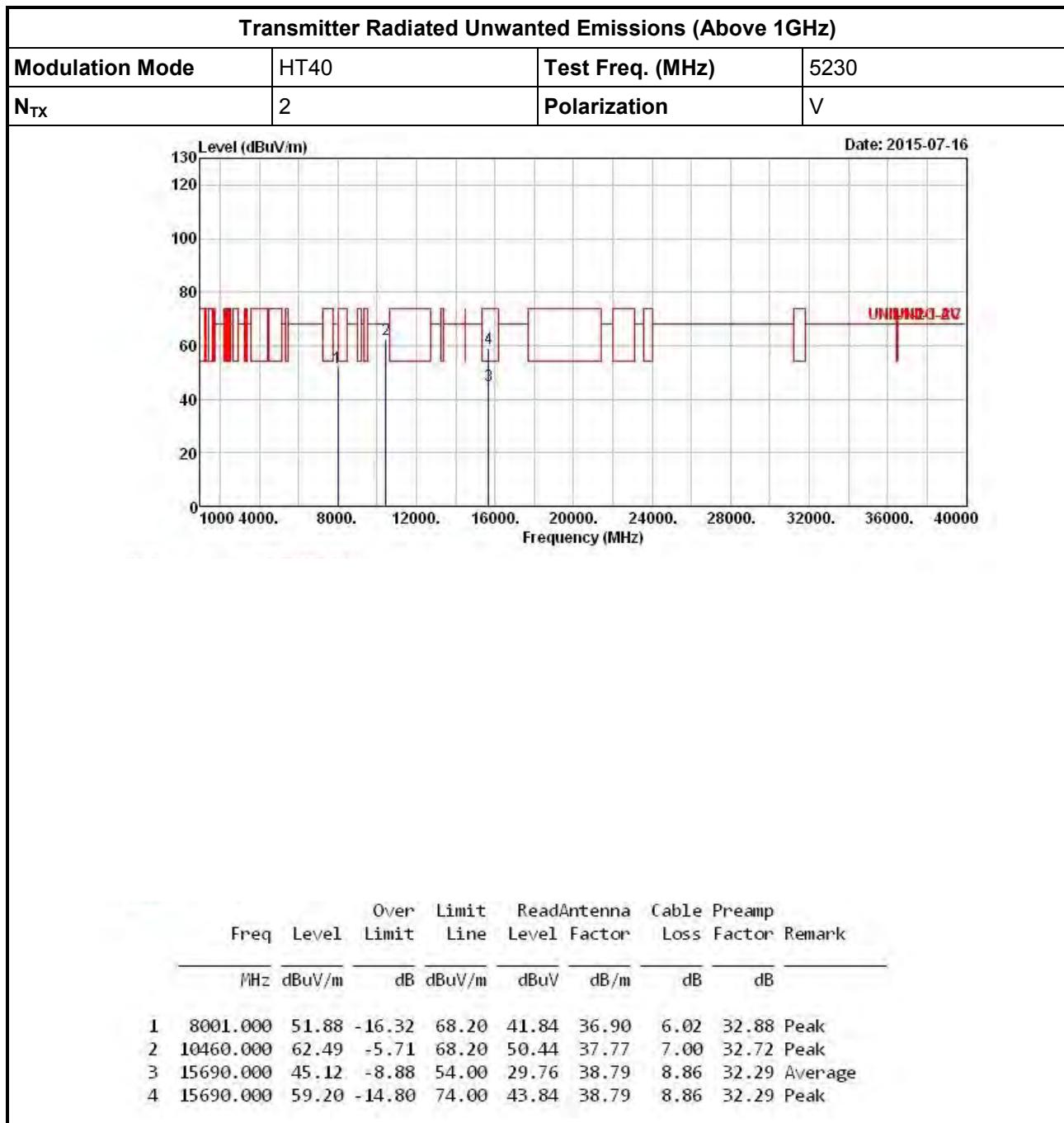




## 3.4.9 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT40







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

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

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

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



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

Modulation Mode	HT40	Test Freq. (MHz)	5230
N <sub>TX</sub>	2	Polarization	H

Level (dBuV/m)      Date: 2015-07-16

Frequency (MHz)

	Freq (MHz)	Level (dBuV/m)	Over Limit (dB)	Line Limit (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Remark
1	7894.000	51.17	-17.03	68.20	41.21	36.84	5.97	32.85	Peak
2	10460.000	57.87	-10.33	68.20	45.82	37.77	7.00	32.72	Peak
3	15690.000	45.14	-8.86	54.00	29.78	38.79	8.86	32.29	Average
4	15592.000	52.28	-15.22	71.00	42.64	32.72	8.26	32.39	Peak

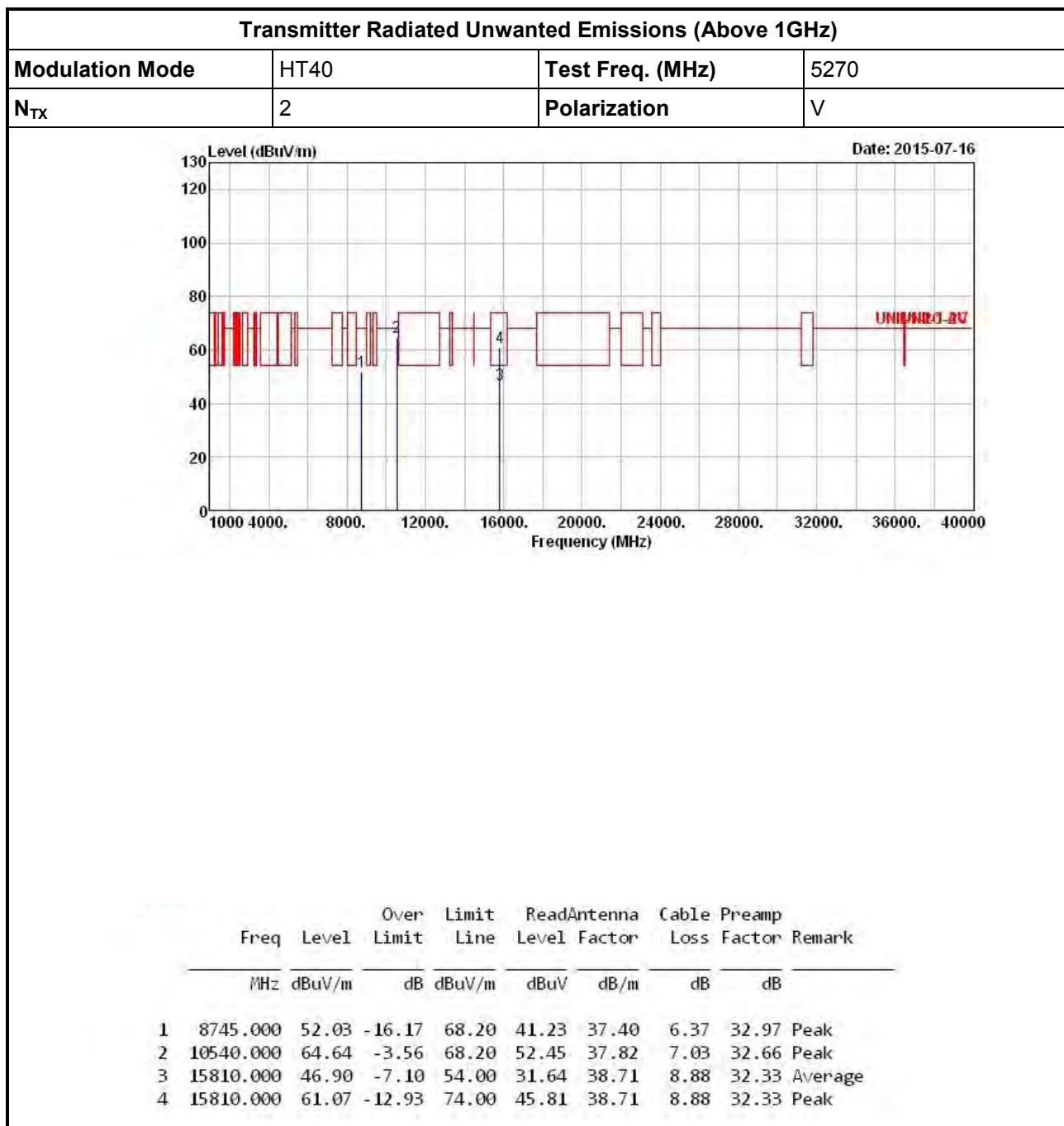
Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit

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

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

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

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

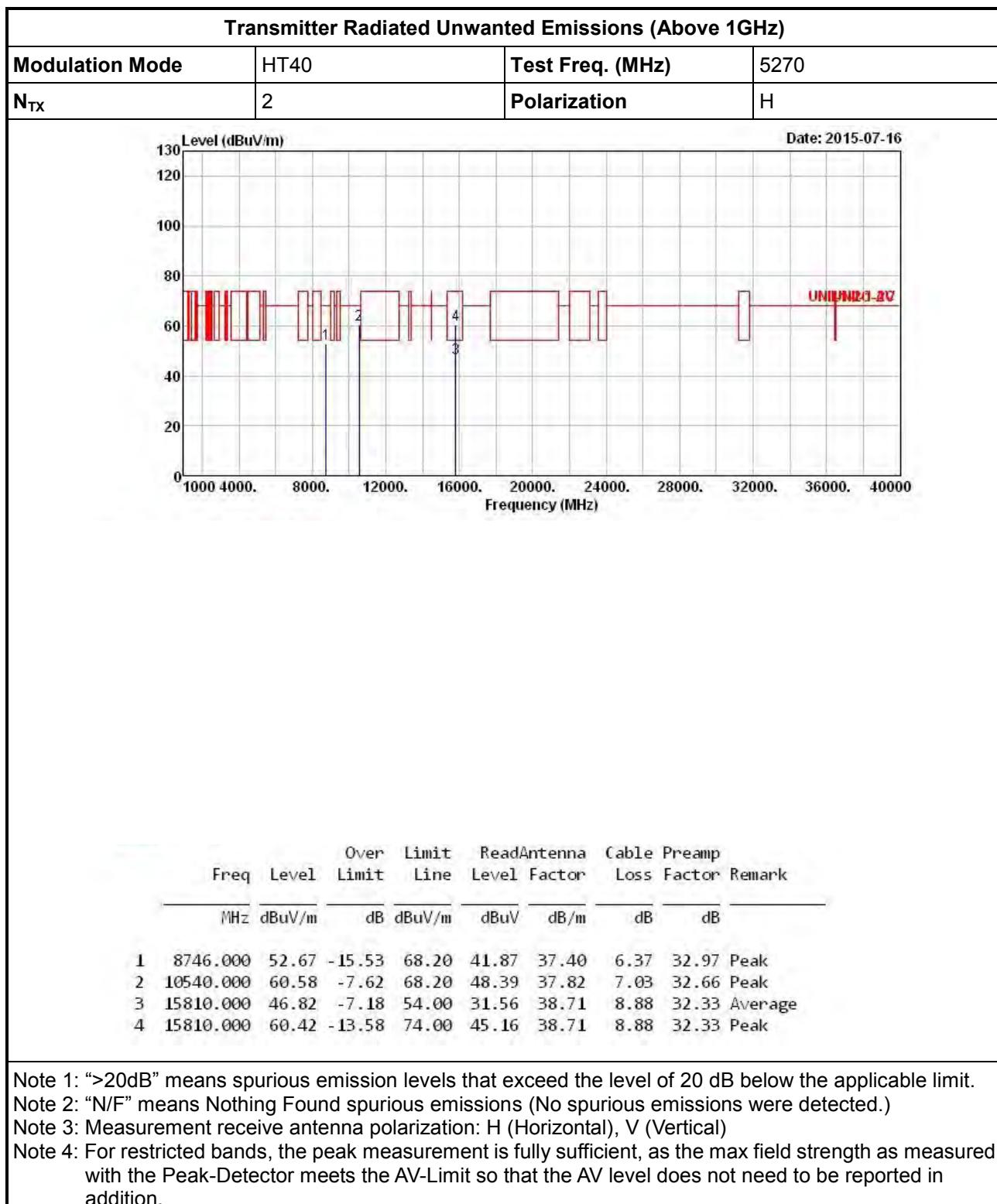


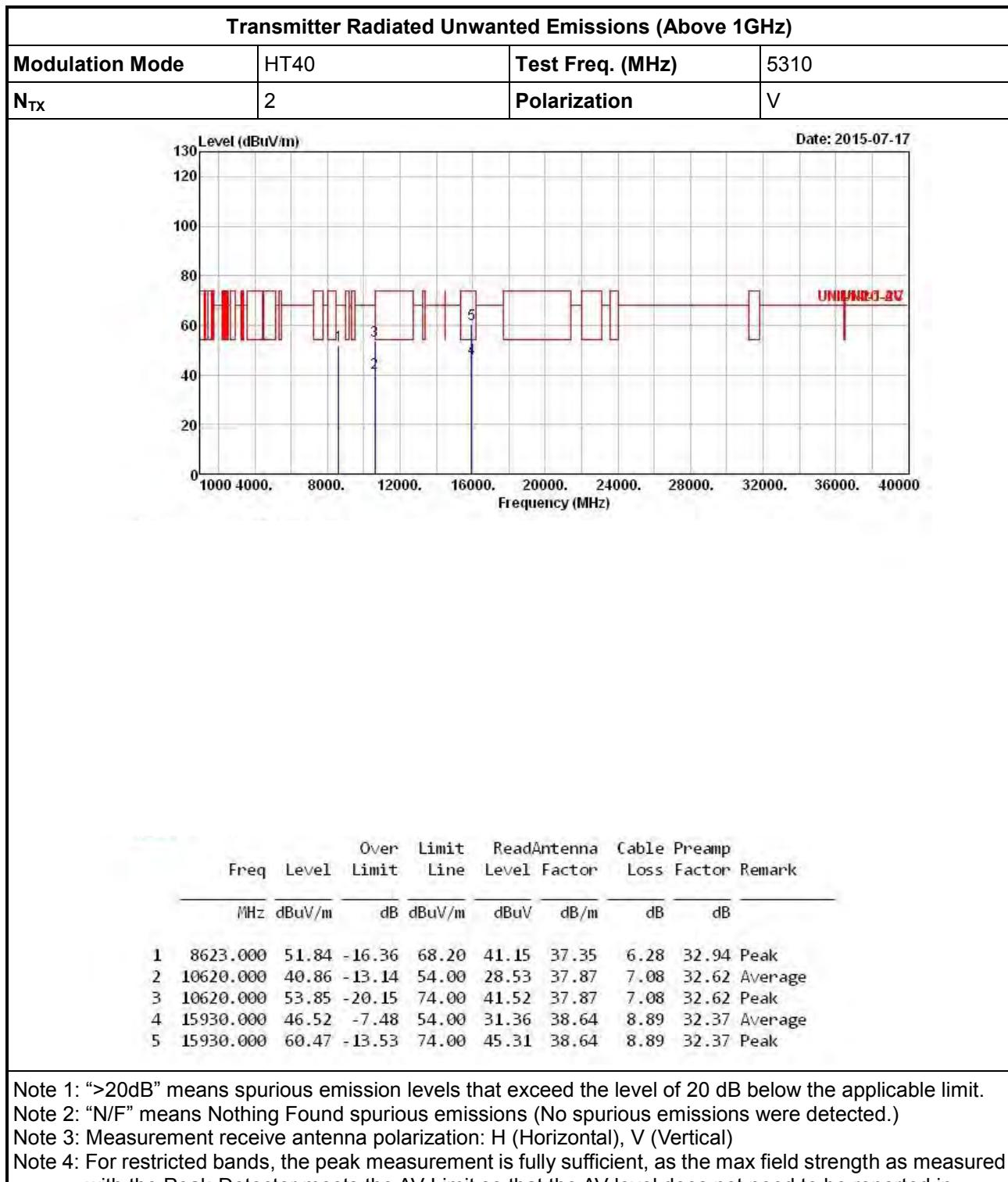
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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



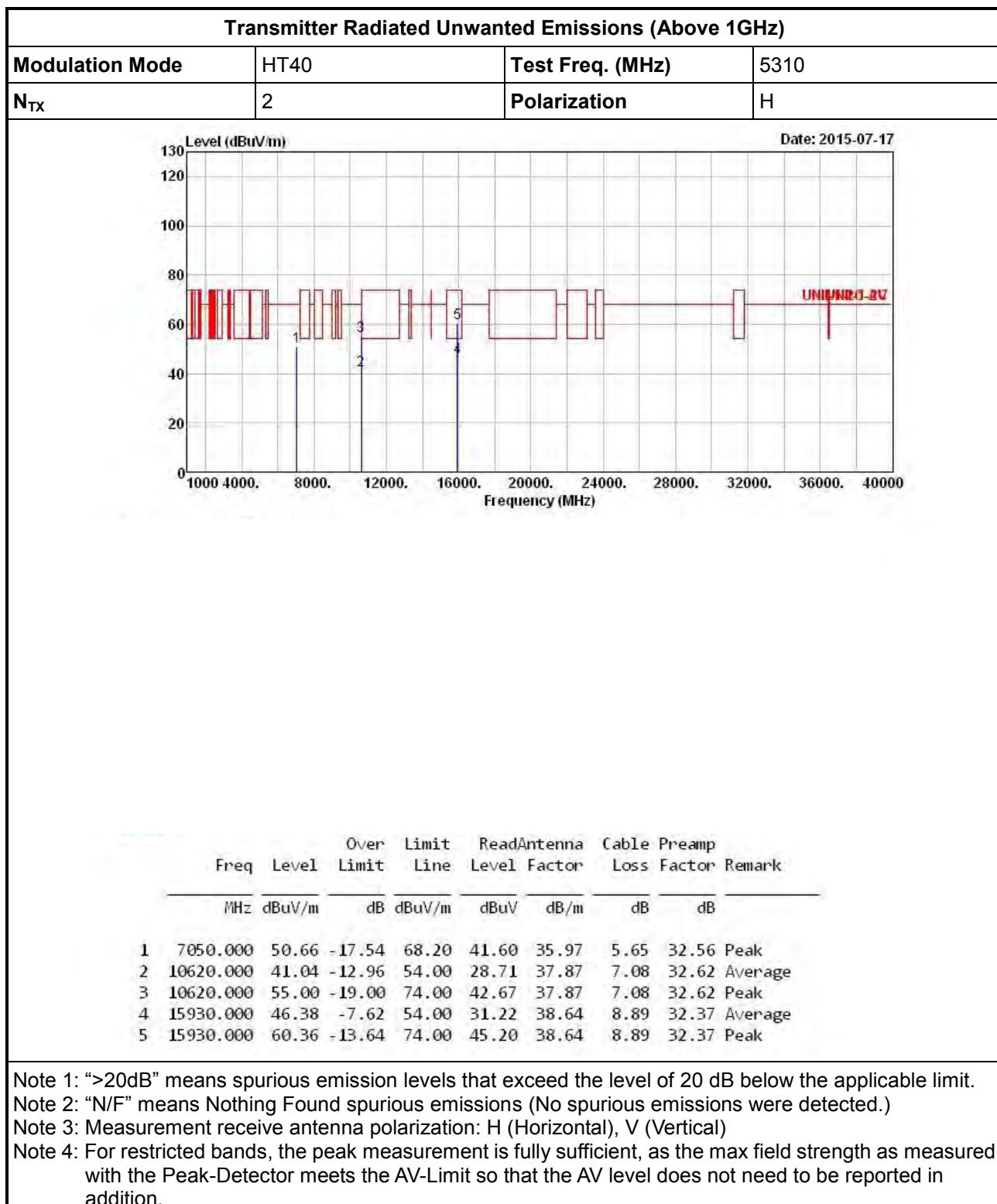


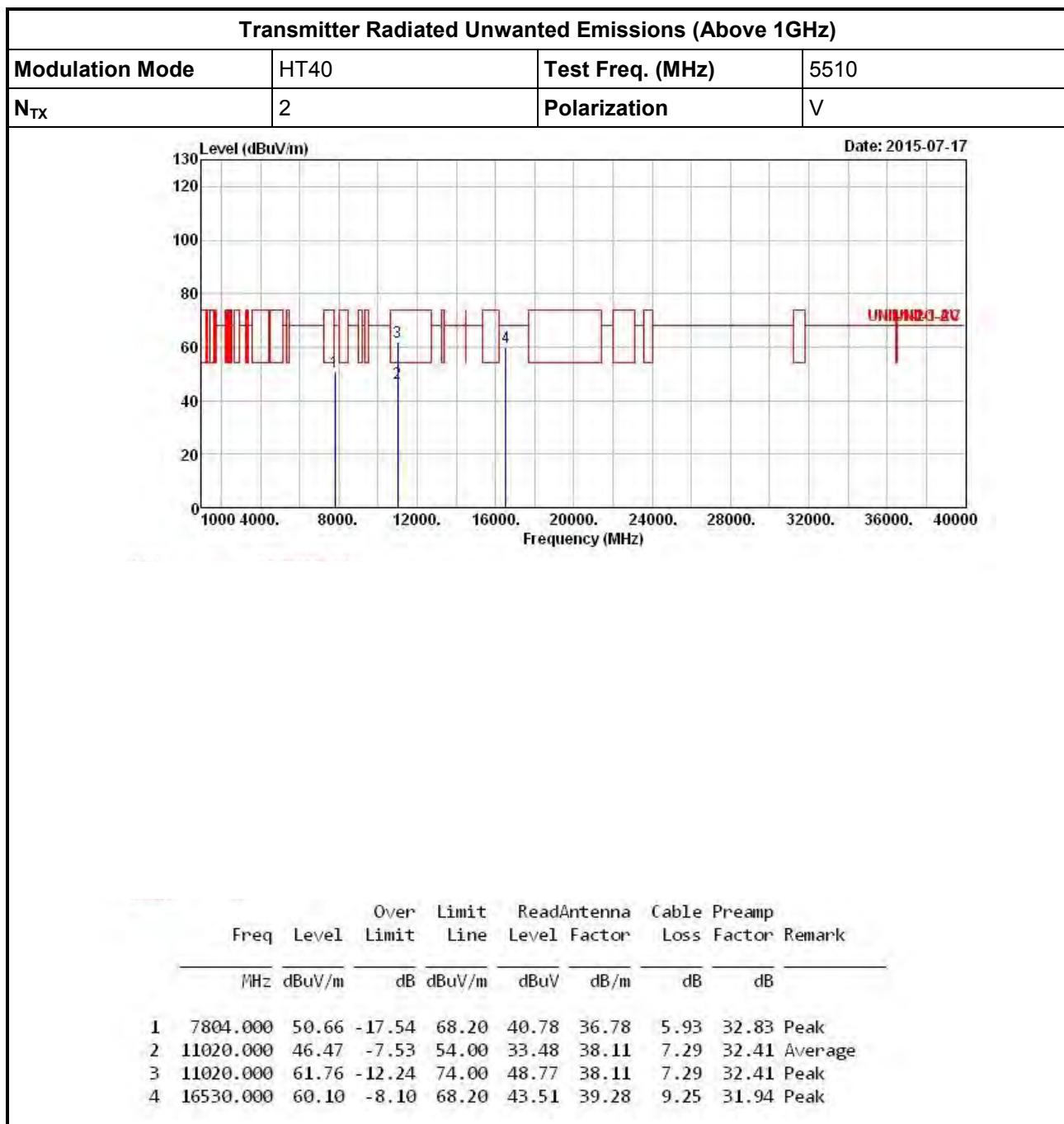
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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



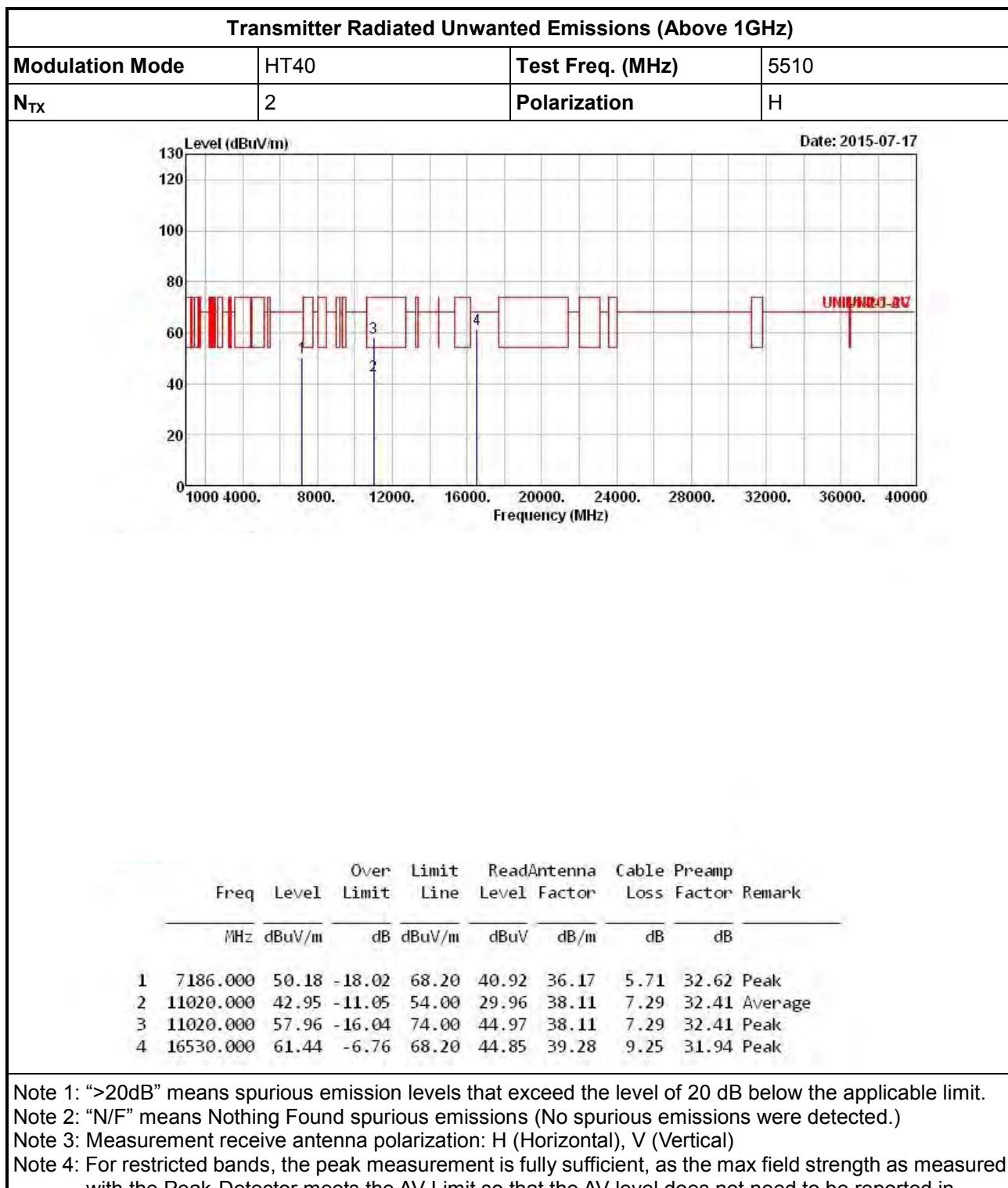


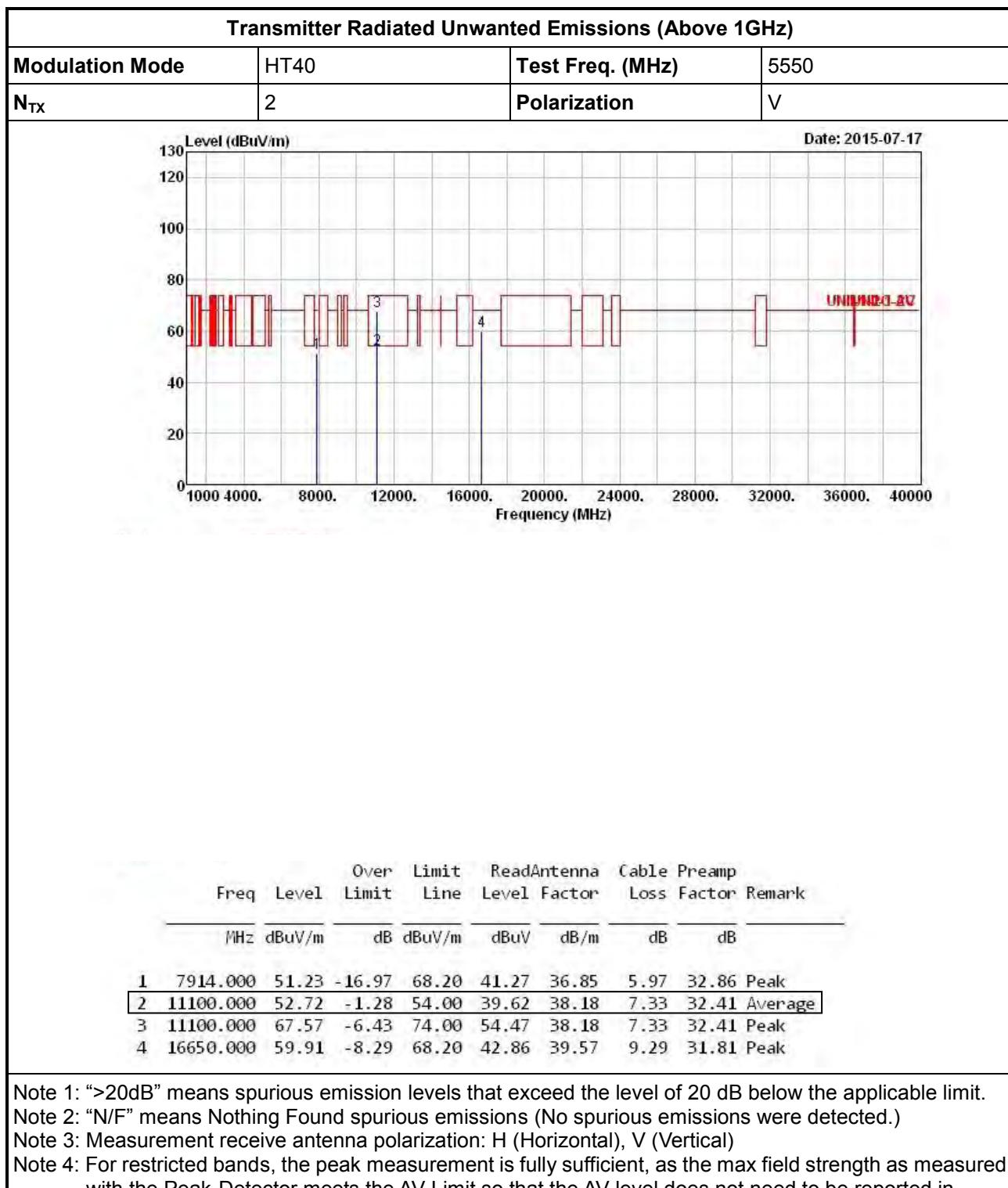
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

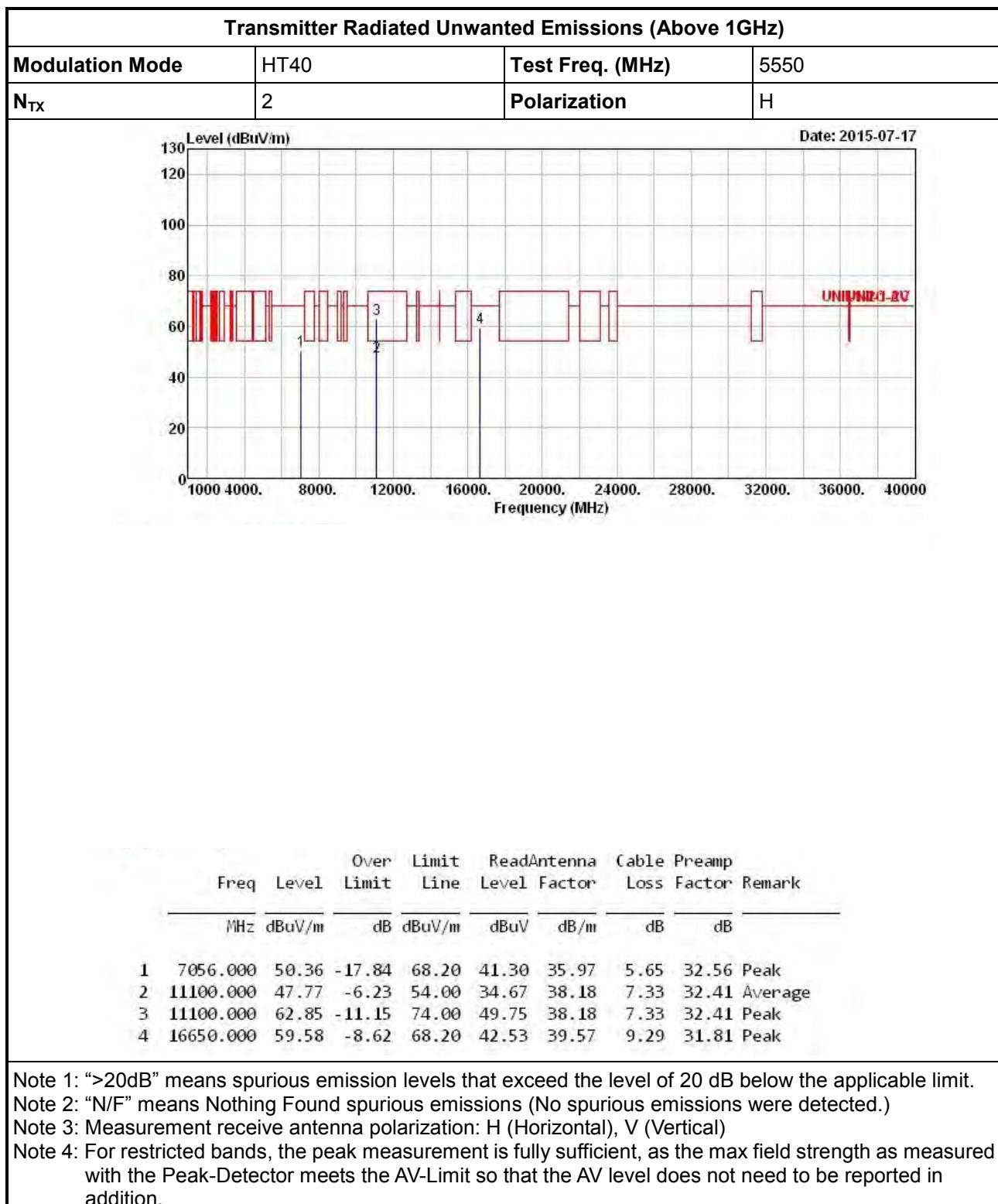
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

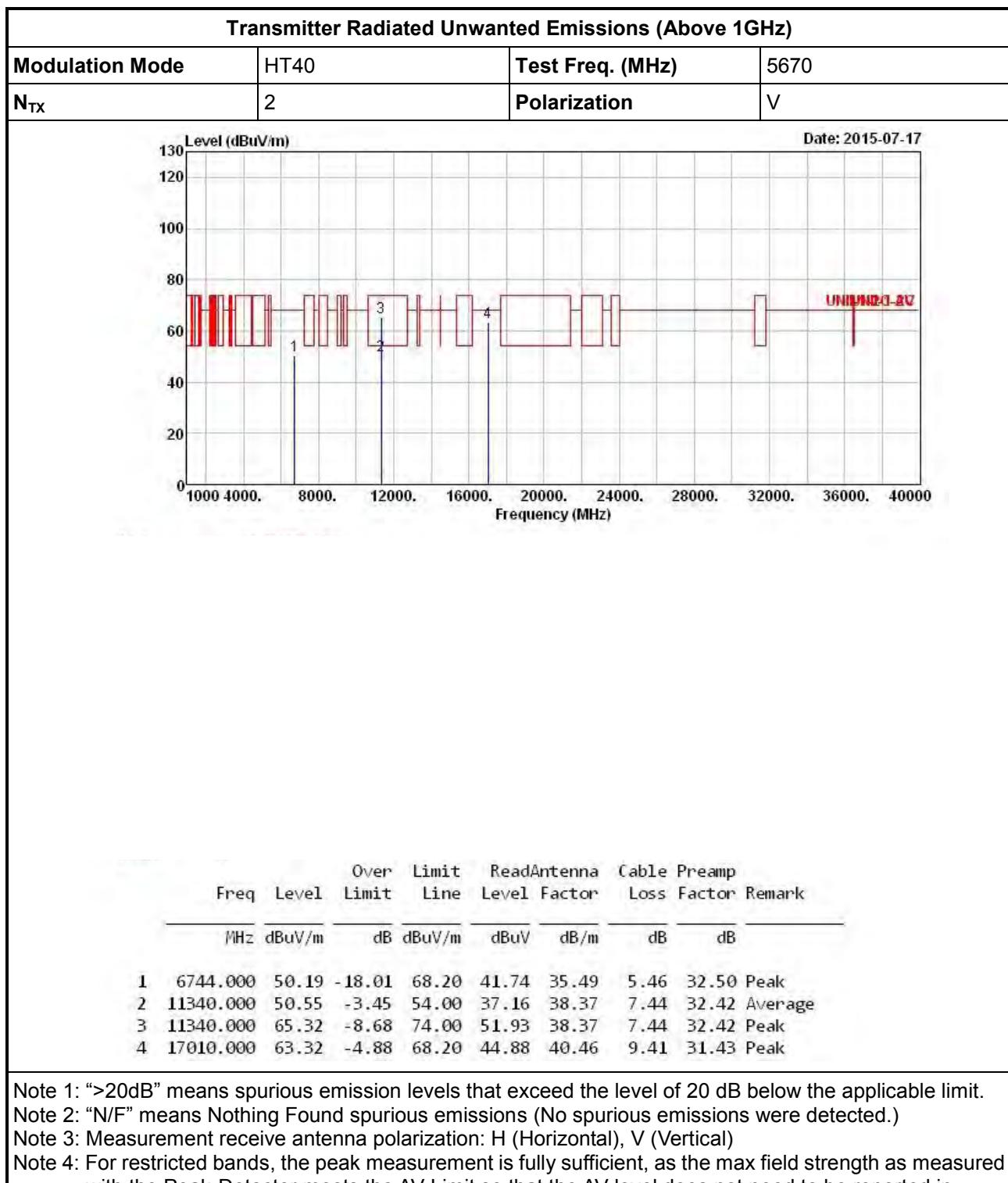
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

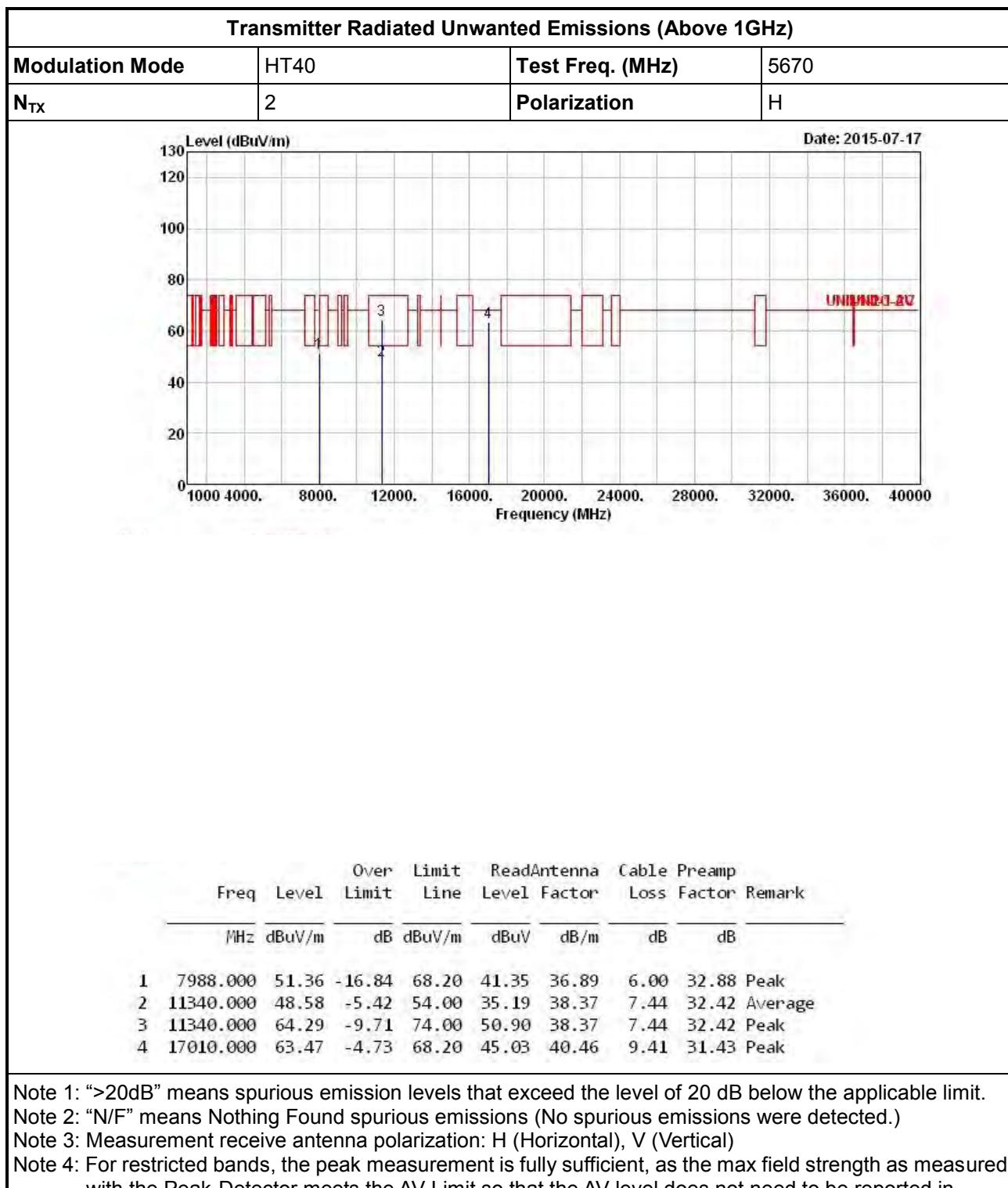
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.













## 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	N/A	AC Conduction

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jul. 31, 2014	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

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



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	Radiated Emission
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May 11, 2015	Radiated Emission
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Sep. 01, 2014	Radiated Emission
Spectrum	R&S	FSP40	100004	9kHz ~ 40GHz	Apr. 02, 2015	Radiated Emission
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 20, 2014	Radiated Emission
Horn Antenna	AARONIA AG	POWERLOG 70180	05192	1GHz ~ 18GHz	May 01, 2015	Radiated Emission
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz ~ 40GHz	Jan. 27, 2015	Radiated Emission
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 15, 2014	Radiated Emission
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec. 12, 2014	Radiated Emission
Turn Table	EM Electronics	EM Electronics	060615	0 ~ 360 degree	N/A	Radiated Emission
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiated Emission

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	Radiated Emission
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	Feb. 02, 2015	Radiated Emission

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