



# FCC Test Report

**Equipment** : 802.11n, Dual Band, Wireless LAN PCI Express Half Mini Card

**Brand Name** : Sparklan

**Model No.** : WPEA-121N

**FCC ID** : RYK-WPEA-121N

**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** : SparkLAN Communications, Inc.

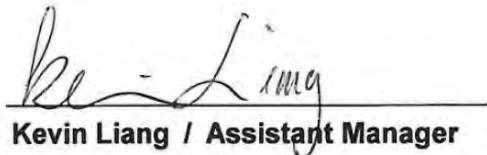
**Manufacturer** : 8F., No. 257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan

**Function** :  Outdoor - Use       Fixed P2P AP  
     Indoor - Use       Portable Client

The product sample received on Oct. 26, 2015 and completely tested on Nov. 13, 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]	2	12.31
5150-5250	n (HT20)	5180-5240	36-48 [4]	2	12.67
5150-5250	n (HT40)	5190-5230	38-46 [2]	2	13.10

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

RF General Information (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]	2	19.26
5250-5350	n (HT20)	5260-5320	52-64 [4]	2	17.43
5250-5350	n (HT40)	5270-5310	54-62 [2]	2	18.90

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

RF General Information (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]	2	17.81
5470-5725	n (HT20)	5500-5700	100-140 [8]	2	17.80
5470-5725	n (HT40)	5510-5670	102-134 [3]	2	17.59

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

RF General Information (5725-5850MHz band)					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N <sub>TX</sub> )	RF Output Power (dBm)
5725-5850	a	5745-5825	149-165 [5]	2	20.02
5725-5850	n (HT20)	5745-5825	149-165 [5]	2	19.37
5725-5850	n (HT40)	5755-5795	151-159 [2]	2	17.65

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



### 1.1.2 Antenna Information

Antenna Category	
<input type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	<input type="checkbox"/> Temporary RF connector provided
<input type="checkbox"/>	<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.
<input checked="" type="checkbox"/>	External antenna (dedicated antennas)
<input checked="" type="checkbox"/>	<input type="checkbox"/> Single power level with corresponding antenna(s).
<input checked="" type="checkbox"/>	<input type="checkbox"/> Multiple power level and corresponding antenna(s).

Antenna General Information						
Ant. Group	Port. No.	Ant. Cat.	Ant. Type	Ant. Connector	Model No.	Gain (dBi)
1	1/2	External	Dipole	Reverse SMA	C642-510049-A	2.0 / 2.0
2	1/2	External	Dipole	Reverse SMA	R3410110203	2.0 / 2.0
Remark: EUT was pre-tested Ant. Group 1 and 2 for using; the worst case was Ant. Group 2 and result of that was recorded as the final test result.						

### 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		
		Power Duty Factor [dB] – (10 log 1/x)
Test Signal Duty Cycle (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"/> 98.97% - IEEE 802.11a		0.05
<input checked="" type="checkbox"/> 98.90% - IEEE 802.11n (HT20)		0.05
<input checked="" type="checkbox"/> 97.83% - IEEE 802.11n (HT40)		0.10

### 1.1.5 EUT Operational Condition

Supply Voltage	<input type="checkbox"/> AC mains	<input checked="" type="checkbox"/> DC	
Type of DC Source	<input type="checkbox"/> Internal DC supply	<input checked="" type="checkbox"/> From system	<input type="checkbox"/> External DC adapter
Test Voltage	<input checked="" type="checkbox"/> Vnom (3.63 V)	<input checked="" type="checkbox"/> Vmax (4.17 V)	<input checked="" type="checkbox"/> Vmin (3.09 V)
Test Climatic	<input checked="" type="checkbox"/> Tnom (20°C)	<input checked="" type="checkbox"/> Tmax (50°C)	<input checked="" type="checkbox"/> Tmin (-20°C)



## 1.2 Support Equipment

Support Equipment - RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5530	DoC
2	Adapter for NB	DELL	HA65NM130	DoC
3	Test Fixture	-	-	-

Note: The fixture provide by customer.

### Support Equipment - AC Conduction and Radiated Emission

No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5530	DoC
	Adapter for NB	DELL	LA65NS-01	DoC
2	Test Fixture	-	-	-

Note: The fixture provide 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 C63.10-2013
- ◆ FCC KDB 789033 D02 v01
- ◆ FCC KDB 644545 D03 v01
- ◆ FCC KDB 662911 v02r01
- ◆ FCC-14-30A1-UNII

## 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 site registered number [636805] with FCC.			
Test Condition	Test Site No.	Test Engineer	Test Environment
AC Conduction	CO04-HY	Anthony	21°C / 59%
RF Conducted	TH01-HY	Howard	23.5°C / 63%
Radiated Emission	03CH03-HY	Allen	23.6°C / 57%



## 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	2	6-54Mbps	6 Mbps
HT20	2	MCS 0-15	MCS 0
HT40	2	MCS 0-15	MCS 0

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). The EUT supports HT20 and HT40. Worst modulation mode of Guard Interval (GI) is 800ns.

Note 2: Modulation modes consist below configuration:  
11a: IEEE 802.11a, HT20/HT40: IEEE 802.11n

Note 3: RF output power specifies that Maximum Conducted Output Power.

### 2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (5150-5250MHz band)						
Test Software Version	Atheros Radio Test2 (ART2-GUI)_2.3					
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)				
		NCB: 20MHz		NCB: 40MHz		
		5180	5200	5240	5190	5230
11a	2	11	11	12	-	-
HT20	2	11.5	11.5	12.5	-	-
HT40	2	-	-	-	10.5	12.5

The Worst Case Power Setting Parameter (5250-5350MHz band)						
Test Software Version	Atheros Radio Test2 (ART2-GUI)_2.3					
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)				
		NCB: 20MHz		NCB: 40MHz		
		5260	5300	5320	5270	5310
11a	2	19.5	18.5	16.5	-	-
HT20	2	17.5	17	16.5	-	-
HT40	2	-	-	-	19	13



The Worst Case Power Setting Parameter (5470-5725MHz band)							
Test Software Version		Atheros Radio Test2 (ART2-GUI)_2.3					
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)					
		NCB: 20MHz			NCB: 40MHz		
		5500	5580	5700	5510	5550	5670
11a	2	14.5	17	15	-	-	-
HT20	2	13.5	17	14	-	-	-
HT40	2	-	-	-	9.5	17.5	16

The Worst Case Power Setting Parameter (5725-5850MHz band)							
Test Software Version		Atheros Radio Test2 (ART2-GUI)_2.3					
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)					
		NCB: 20MHz			NCB: 40MHz		
		5745	5785	5825	5755	5795	
11a	2	13	21	15	-	-	-
HT20	2	12.5	19.5	14	-	-	-
HT40	2	-	-	-	8.5	17	



## 2.3 The Worst Case Measurement Configuration

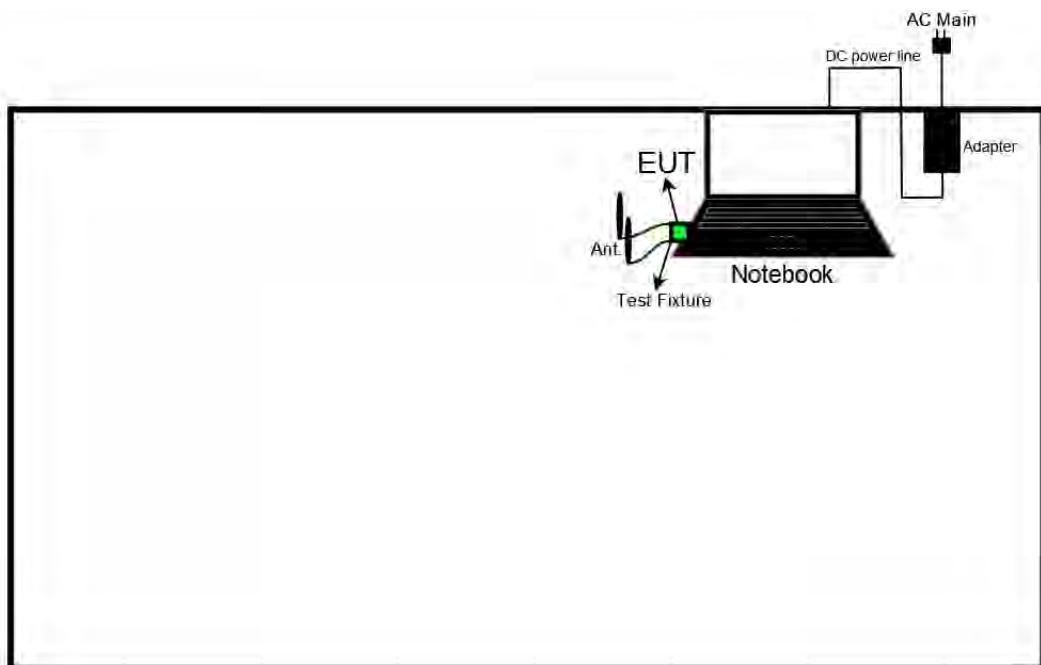
The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	Transmit Mod

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

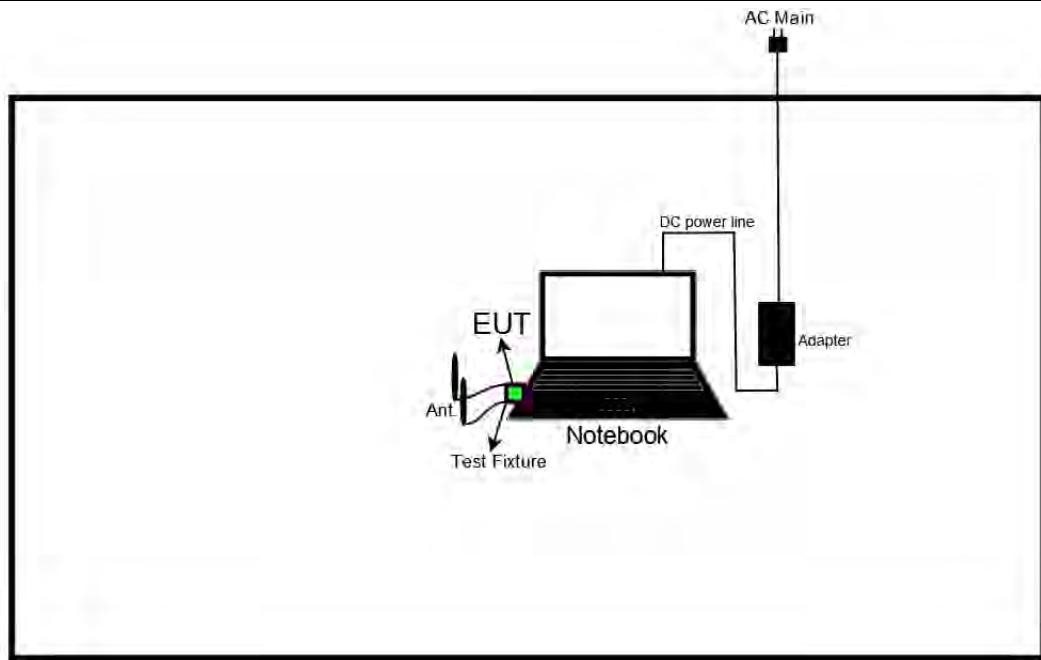
The Worst Case Mode for Following Conformance Tests	
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
User Position	<input 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.
Operating Mode	Operating Mode Description
1	Transmit Mod
Modulation Mode	11a, HT20, HT40
Orthogonal Planes of EUT	<b>X Plane</b> 

## 2.4 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Test Setup Diagram - Radiated 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.

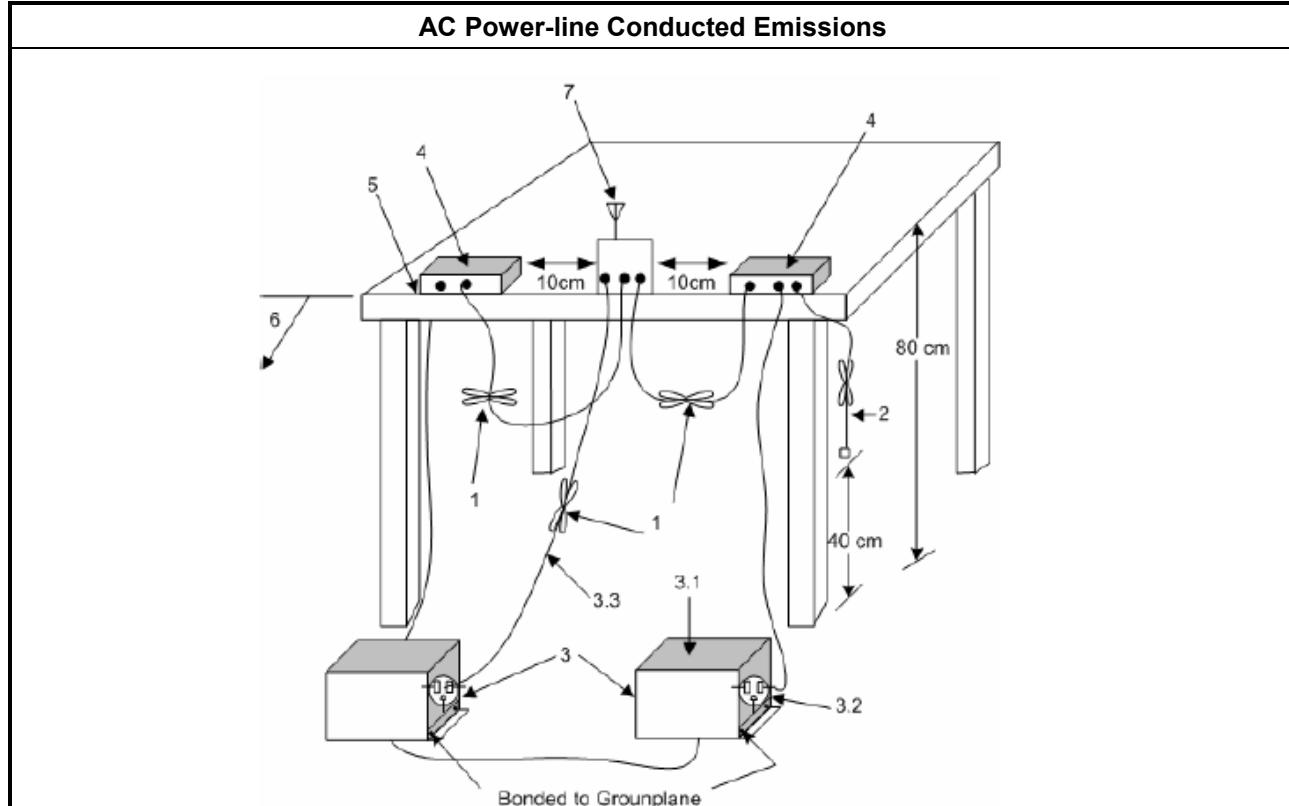
### 3.1.2 Measuring Instruments

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

### 3.1.3 Test Procedures

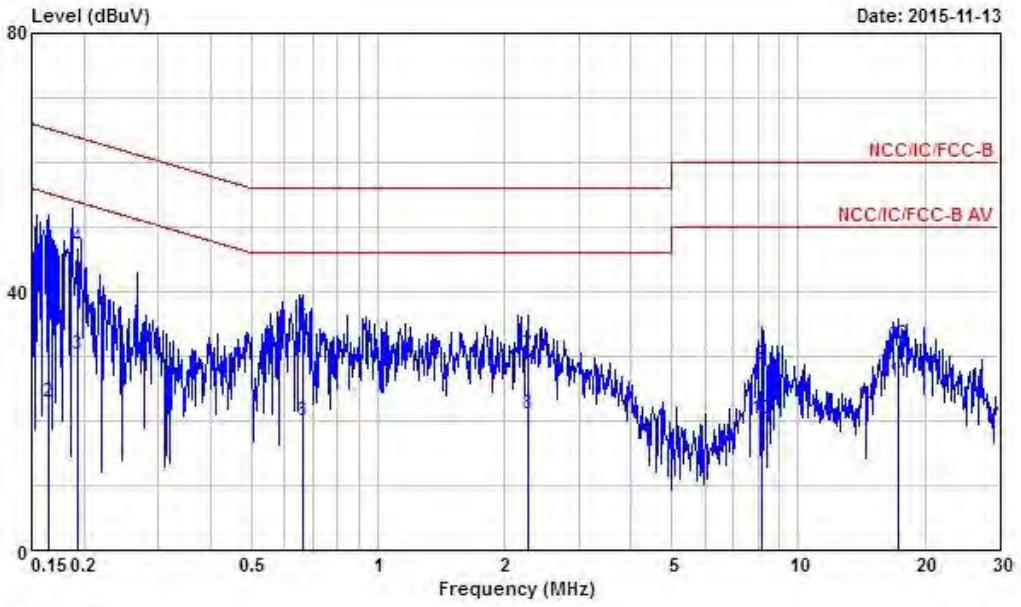
Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

### 3.1.4 Test Setup



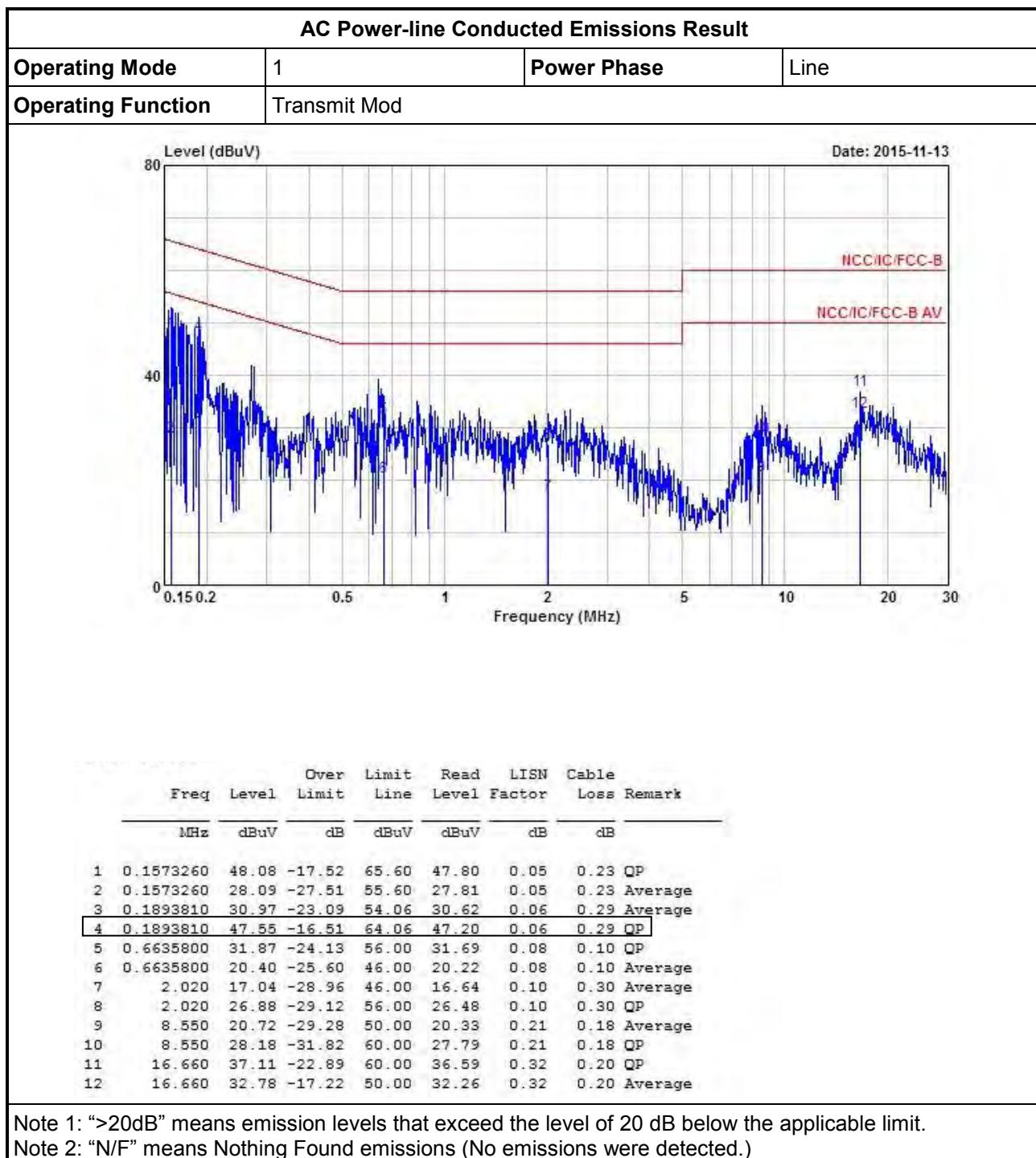


## 3.1.5 Test Result of AC Power-line Conducted Emissions

AC Power-line Conducted Emissions Result							
Operating Mode	1	Power Phase	Neutral				
Operating Function	Transmit Mod						
Date: 2015-11-13							
							
Emissions Data (dBuV)							
Freq	Level	Over Limit	Limit	Read Line	LISN	Cable	Remark
MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1641380	44.48	-20.77	65.25	44.17	0.07	0.24 QP
2	0.1641380	22.98	-32.27	55.25	22.67	0.07	0.24 Average
3	0.1921850	30.16	-23.78	53.94	29.80	0.07	0.29 Average
4	0.1921850	46.77	-17.17	63.94	46.41	0.07	0.29 QP
5	0.6612710	34.38	-21.62	56.00	34.20	0.08	0.10 QP
6	0.6612710	20.02	-25.98	46.00	19.84	0.08	0.10 Average
7	2.270	30.21	-25.79	56.00	29.84	0.11	0.26 QP
8	2.270	21.04	-24.96	46.00	20.67	0.11	0.26 Average
9	8.150	28.65	-31.35	60.00	28.26	0.21	0.18 QP
10	8.150	20.30	-29.70	50.00	19.91	0.21	0.18 Average
11	17.290	26.02	-23.98	50.00	25.45	0.37	0.20 Average
12	17.290	31.96	-28.04	60.00	31.39	0.37	0.20 QP

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, the bandwidth is for reference.
<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.

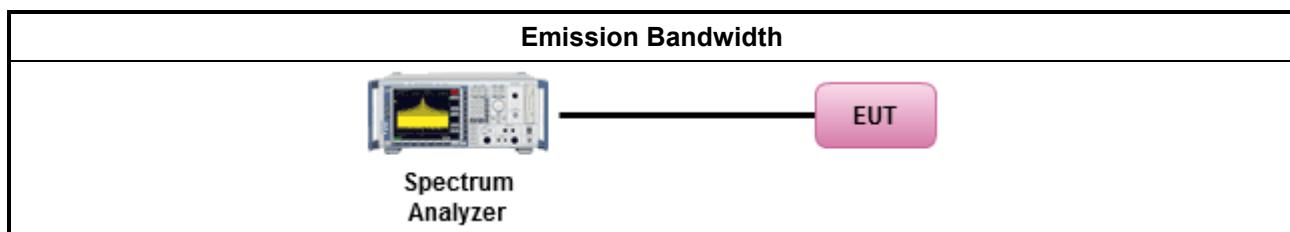
### 3.2.2 Measuring Instruments

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 type="checkbox"/>	The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/>	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
<input checked="" type="checkbox"/>	The EUT supports multiple transmit chains using options given below:
	<input type="checkbox"/> Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
	<input checked="" type="checkbox"/> Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.

### 3.2.4 Test Setup





### 3.2.5 Test Result of Emission Bandwidth

UNII Emission Bandwidth Result (5150-5250MHz band)						
Condition			Emission Bandwidth (MHz)			
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	99% Bandwidth		26dB Bandwidth	
			Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2
11a	2	5180	16.61	16.59	20.55	20.62
11a	2	5200	16.49	16.56	21.22	20.87
11a	2	5240	16.54	16.59	20.27	20.17
HT20	2	5180	17.89	17.86	21.00	22.37
HT20	2	5200	17.64	17.86	20.55	21.07
HT20	2	5240	17.79	17.74	22.05	21.00
HT40	2	5190	36.74	36.82	48.28	46.88
HT40	2	5230	37.02	36.58	47.68	46.28
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	
			Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2
11a	2	5260	17.41	16.76	29.95	28.07
11a	2	5300	16.94	16.84	24.17	23.70
11a	2	5320	16.71	16.66	21.42	20.15
HT20	2	5260	17.69	17.81	25.82	23.45
HT20	2	5300	17.91	17.81	21.57	22.60
HT20	2	5320	17.71	17.61	21.60	21.47
HT40	2	5270	37.66	37.06	77.48	68.80
HT40	2	5310	36.86	36.66	48.88	46.04
Result			Complied			

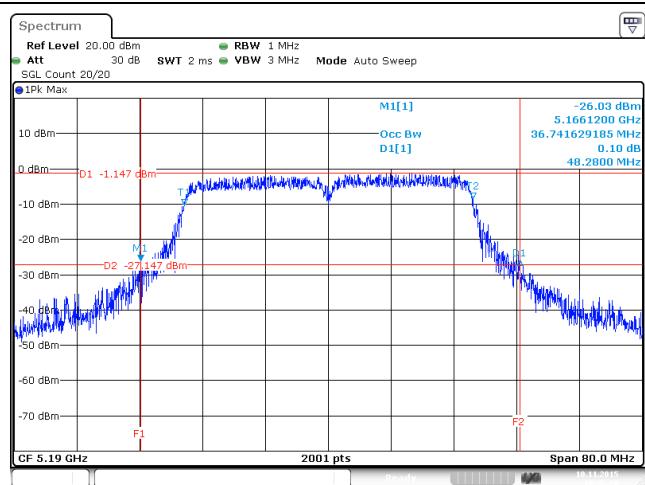


UNII Emission Bandwidth Result (5470-5725MHz band)						
Condition			Emission Bandwidth (MHz)			
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	99% Bandwidth		26dB Bandwidth	
			Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2
11a	2	5500	16.64	16.56	25.95	20.87
11a	2	5580	17.24	16.91	28.20	31.52
11a	2	5700	16.49	16.36	23.92	18.95
HT20	2	5500	18.14	17.74	26.97	20.75
HT20	2	5580	18.91	17.89	36.27	28.50
HT20	2	5700	17.81	17.79	22.07	21.32
HT40	2	5510	36.78	36.86	49.52	45.36
HT40	2	5550	38.50	36.78	75.72	64.88
HT40	2	5670	37.06	36.86	69.48	60.44
Result			Complied			

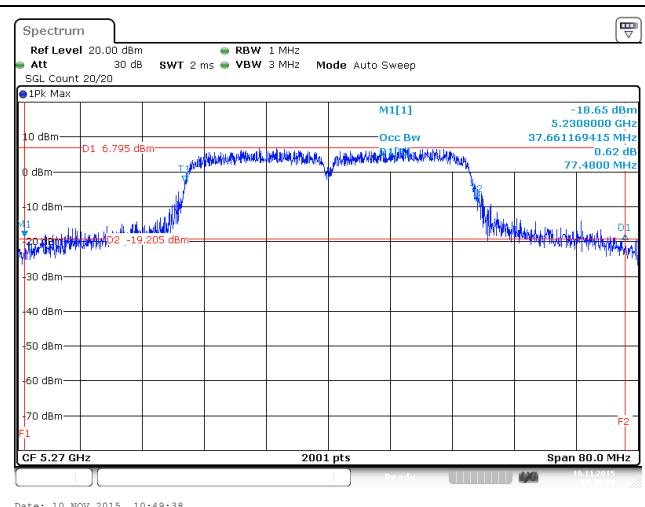
UNII Emission Bandwidth Result (5725-5850MHz band)						
Condition			Emission Bandwidth (MHz)			
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	99% Bandwidth		26dB Bandwidth	
			Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2
11a	2	5745	16.47	16.38	16.47	14.67
11a	2	5785	17.22	16.98	16.36	16.42
11a	2	5825	16.47	16.43	16.32	16.42
HT20	2	5745	17.60	17.63	16.89	17.68
HT20	2	5785	18.03	17.79	16.53	17.68
HT20	2	5825	17.61	17.58	16.68	13.42
HT40	2	5755	36.18	36.14	33.84	34.64
HT40	2	5795	36.46	36.30	34.40	35.08
Result			Complied			



## 5150-5250MHz - Worst Emission 26Bandwidth Plots

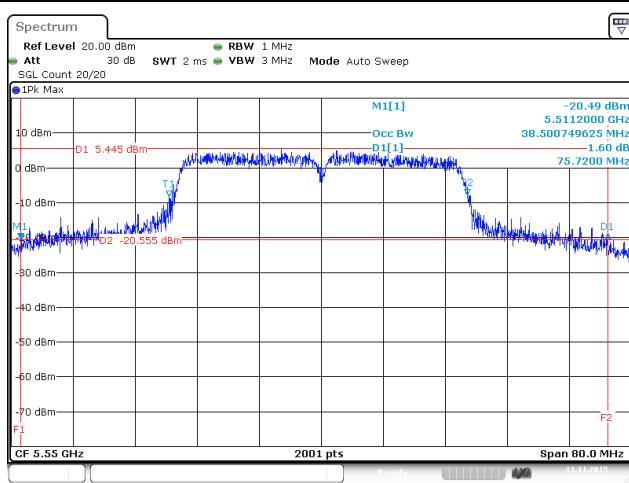


## 5250-5350MHz - Worst Emission 26Bandwidth Plots

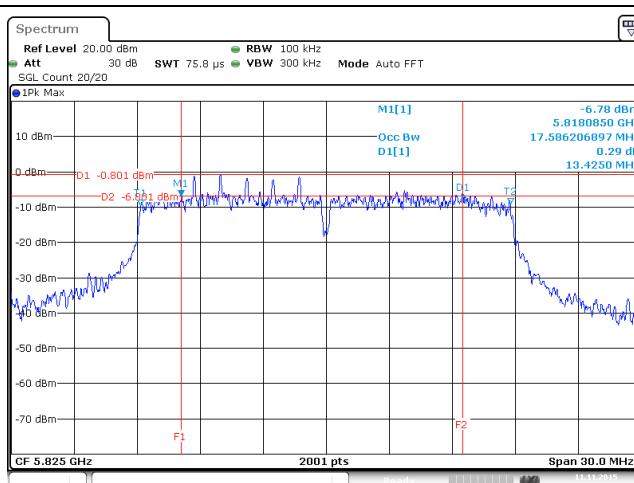




## 5470-5725MHz - Worst Emission 26Bandwidth Plots



## 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.	

Note: The value have added the factor of clause 1.1.4 table.

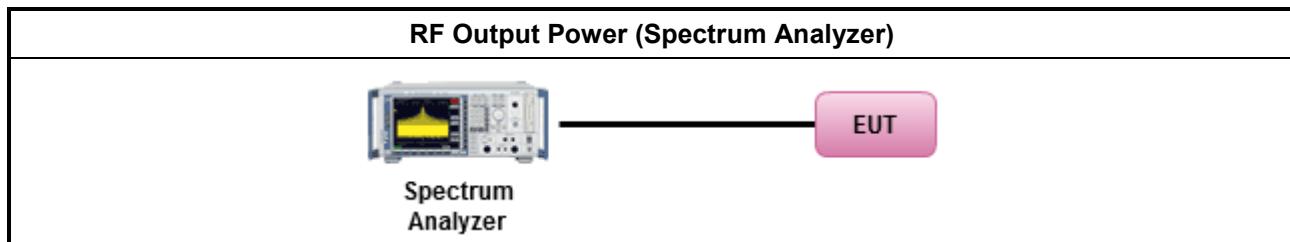
#### 3.3.2 Measuring Instruments

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

### 3.3.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/> Maximum Conducted Output Power	
	[duty cycle $\geq$ 98% or external video / power trigger]
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033 D02 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 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 type="checkbox"/>	The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/>	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
<input checked="" type="checkbox"/>	The EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
<input checked="" type="checkbox"/>	If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

### 3.3.4 Test Setup





### 3.3.5 Directional Gain for Power Measurement

Directional Gain (DG) Result					
Transmit Chains No.		1	2	-	-
Maximum $G_{ANT}$ (dBi)		2.0	2.0	-	-
Modulation Mode	DG (dBi)	$N_{TX}$	$N_{SS}$ (Min.)	STBC	Array Gain (dB)
11a	5.01	2	1	-	3.01 (Note3)
HT20	5.01	2	1	-	3.01 (Note3)
HT40	5.01	2	1	-	3.01 (Note3)

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 =  $G_{ANT} + 10 \log(N_{TX}) = 2.0 + 10 \log(2) = 5.01$   
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 =  $10 \log[(10^{G_{1/20}} + \dots + 10^{G_{N/20}})^2 / N_{TX}]$   
All transmit signals are completely uncorrelated, Directional Gain =  $10 \log[(10^{G_{1/10}} + \dots + 10^{G_{N/10}}) / N_{TX}]$

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  $N_{TX}$ ;



### 3.3.6 Test Result of Maximum Conducted Output Power

Maximum Conducted Output Power (5150-5250MHz band)							
Condition			RF Output Power (dBm)				
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)
11a	2	5180	8.22	9.15	11.72	30.00	5.01
11a	2	5200	8.53	8.87	11.71	30.00	5.01
11a	2	5240	9.13	9.48	12.31	30.00	5.01
HT20	2	5180	8.64	9.39	12.04	30.00	5.01
HT20	2	5200	8.68	9.20	11.96	30.00	5.01
HT20	2	5240	9.53	9.78	12.67	30.00	5.01
HT40	2	5190	7.65	8.59	11.15	30.00	5.01
HT40	2	5230	9.74	10.42	13.10	30.00	5.01
Result			Complied				

Maximum Conducted Output Power (5250-5350MHz band)							
Condition			RF Output Power (dBm)				
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)
11a	2	5260	15.66	16.78	19.26	24.00	5.01
11a	2	5300	14.23	16.17	18.31	24.00	5.01
11a	2	5320	11.93	14.06	16.13	24.00	5.01
HT20	2	5260	13.94	14.85	17.43	24.00	5.01
HT20	2	5300	12.99	14.73	16.95	24.00	5.01
HT20	2	5320	11.89	13.67	15.88	24.00	5.01
HT40	2	5270	15.33	16.39	18.90	24.00	5.01
HT40	2	5310	9.04	10.69	12.95	24.00	5.01
Result			Complied				

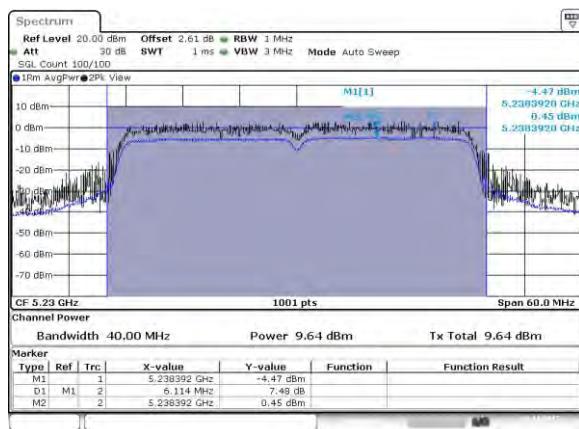


Maximum Conducted Output Power (5470-5725MHz band)							
Condition			RF Output Power (dBm)				
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)
11a	2	5500	13.19	11.91	15.60	24.00	5.01
11a	2	5580	14.72	14.89	17.81	24.00	5.01
11a	2	5700	12.53	12.22	15.38	23.78	5.01
HT20	2	5500	12.14	11.12	14.67	24.00	5.01
HT20	2	5580	14.58	14.99	17.80	24.00	5.01
HT20	2	5700	11.75	11.41	14.59	24.00	5.01
HT40	2	5510	8.41	7.15	10.83	24.00	5.01
HT40	2	5550	14.63	14.53	17.59	24.00	5.01
HT40	2	5670	13.24	13.28	16.27	24.00	5.01
Result			Complied				

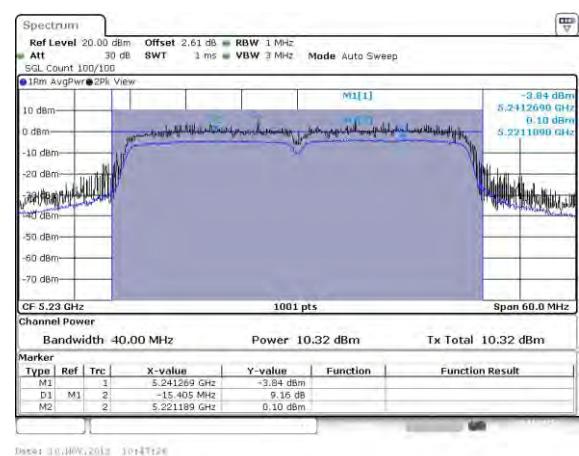
Maximum Conducted Output Power (5725-5850MHz band)							
Condition			RF Output Power (dBm)				
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)
11a	2	5745	11.58	11.15	14.38	30.00	5.01
11a	2	5785	16.50	17.47	20.02	30.00	5.01
11a	2	5825	13.82	12.46	16.20	30.00	5.01
HT20	2	5745	10.76	10.35	13.57	30.00	5.01
HT20	2	5785	16.59	16.12	19.37	30.00	5.01
HT20	2	5825	12.95	11.75	15.40	30.00	5.01
HT40	2	5755	7.75	6.89	10.35	30.00	5.01
HT40	2	5795	15.02	14.24	17.65	30.00	5.01
Result			Complied				



## 5150-5250MHz - Worst RF Output Power Plots (Port 1)

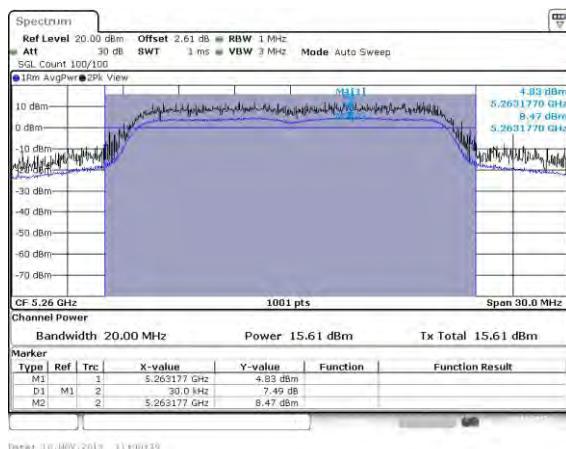


## 5150-5250MHz - Worst RF Output Power Plots (Port 2)

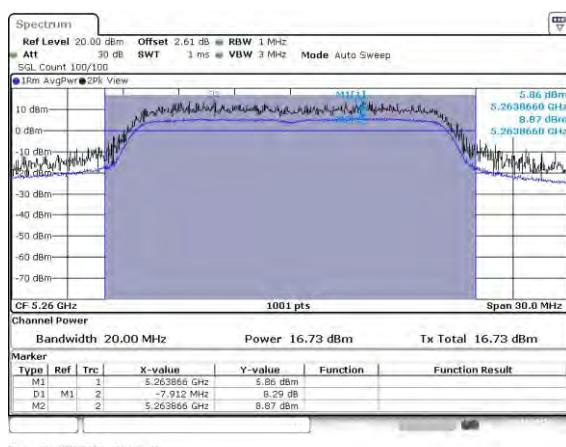




## 5250-5350MHz - Worst RF Output Power Plots (Port 1)

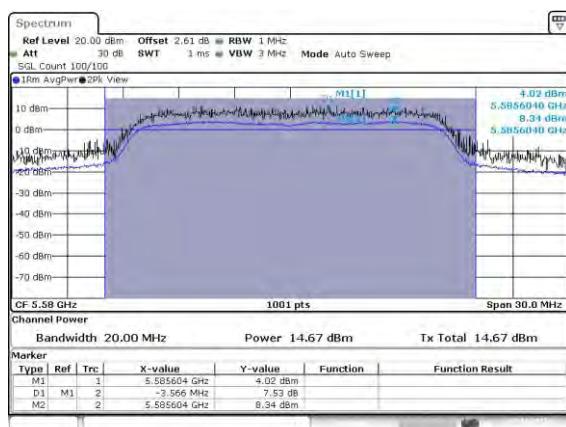


## 5250-5350MHz - Worst RF Output Power Plots (Port 2)

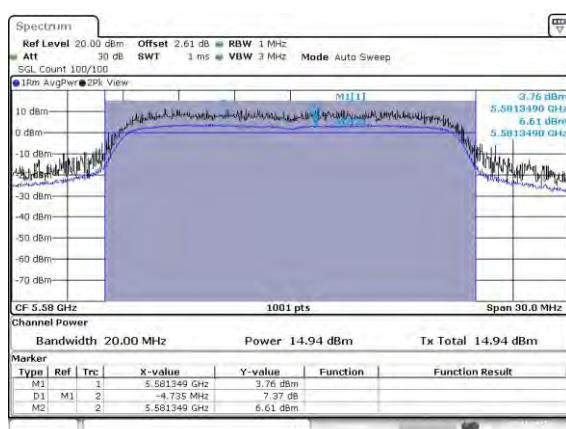




## 5470-5725MHz - Worst RF Output Power Plots (Port 1)

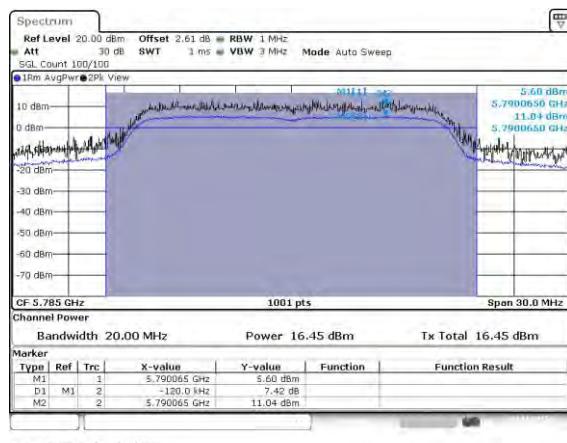


## 5470-5725MHz - Worst RF Output Power Plots (Port 2)

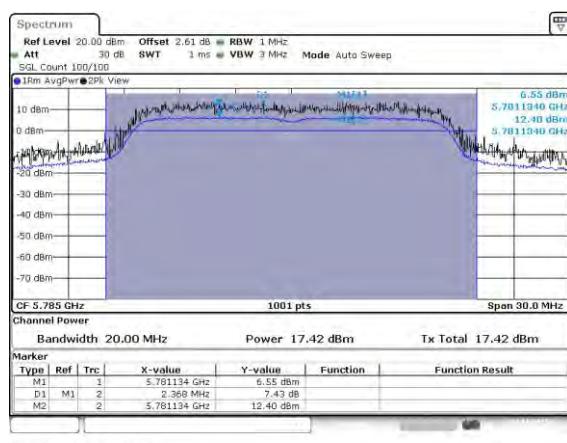




## 5725-5850MHz - Worst RF Output Power Plots (Port 1)



## 5725-5850MHz - Worst RF Output Power Plots (Port 2)





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

### 3.4.2 Measuring Instruments

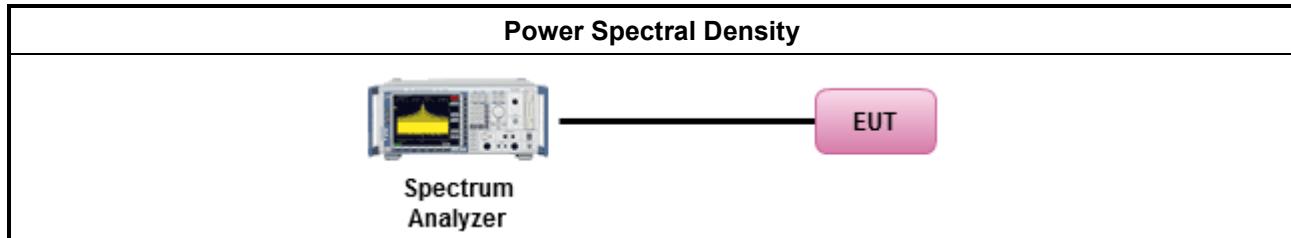
Refer a test equipment and calibration data table in this test report.

### 3.4.3 Test Procedures

<b>Test Method</b>	
<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 checked="" 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 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 type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.	
<input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.	
<input checked="" type="checkbox"/> The EUT supports multiple transmit chains using options given below:	
	<input checked="" type="checkbox"/> Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	<input type="checkbox"/> Option 2: Measure and add $10 \log(N)$ dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with $10 \log(N)$ . Or each transmit chains shall be add $10 \log(N)$ to compared with the limit.
	<input checked="" 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.

Note: The value have added the factor of clause 1.1.4 table.

### 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	DG (dBi)
11a	2	5180	0.75	17.00	5.01
11a	2	5200	0.68	17.00	5.01
11a	2	5240	1.38	17.00	5.01
HT20	2	5180	0.86	17.00	5.01
HT20	2	5200	0.73	17.00	5.01
HT20	2	5240	1.43	17.00	5.01
HT40	2	5190	-2.99	17.00	5.01
HT40	2	5230	-1.19	17.00	5.01
Result		Complied			

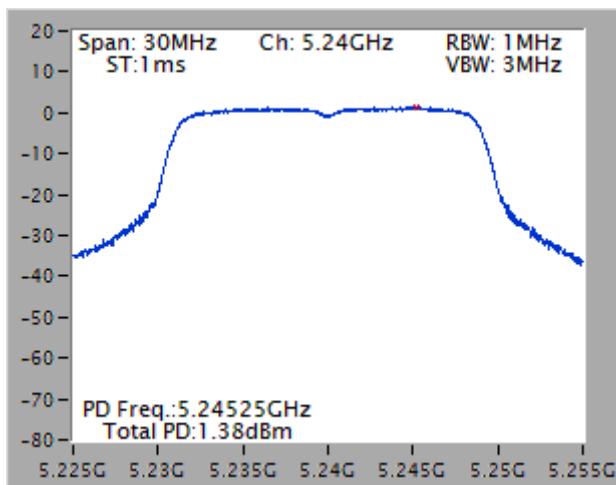
Peak Power Spectral Density Result (5250-5350MHz band)					
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Peak Power Spectral Density (dBm)	PSD Limit	DG (dBi)
11a	2	5260	8.20	11.00	5.01
11a	2	5300	7.22	11.00	5.01
11a	2	5320	5.42	11.00	5.01
HT20	2	5260	6.20	11.00	5.01
HT20	2	5300	5.61	11.00	5.01
HT20	2	5320	5.22	11.00	5.01
HT40	2	5270	4.82	11.00	5.01
HT40	2	5310	-1.36	11.00	5.01
Result		Complied			



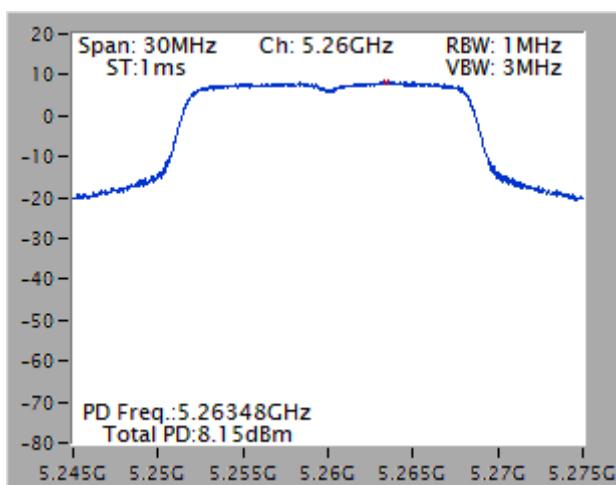
Peak Power Spectral Density Result (5470-5725MHz band)					
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Peak Power Spectral Density (dBm)	PSD Limit	DG (dBi)
11a	2	5500	4.51	11.00	5.01
11a	2	5580	6.86	11.00	5.01
11a	2	5700	4.39	11.00	5.01
HT20	2	5500	3.41	11.00	5.01
HT20	2	5580	6.74	11.00	5.01
HT20	2	5700	3.09	11.00	5.01
HT40	2	5510	-3.41	11.00	5.01
HT40	2	5550	3.54	11.00	5.01
HT40	2	5670	1.89	11.00	5.01
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	DG (dBi)
11a	2	5745	7.81	30.00	5.01
11a	2	5785	12.62	30.00	5.01
11a	2	5825	8.88	30.00	5.01
HT20	2	5745	6.01	30.00	5.01
HT20	2	5785	11.45	30.00	5.01
HT20	2	5825	7.93	30.00	5.01
HT40	2	5755	0.14	30.00	5.01
HT40	2	5795	7.20	30.00	5.01
Result		Complied			

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

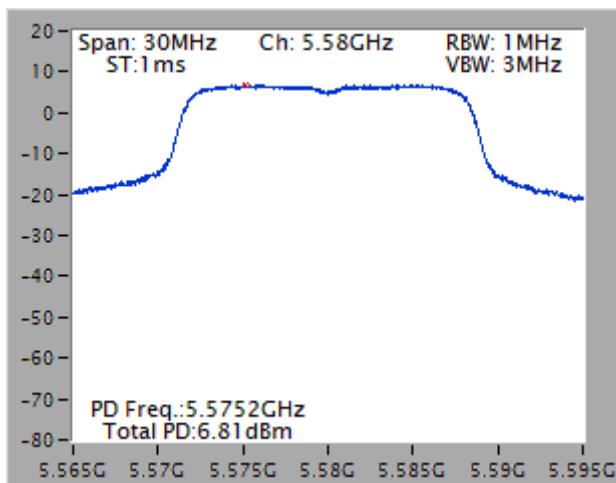


## 5250-5350MHz - Worst Power Spectral Density Plots

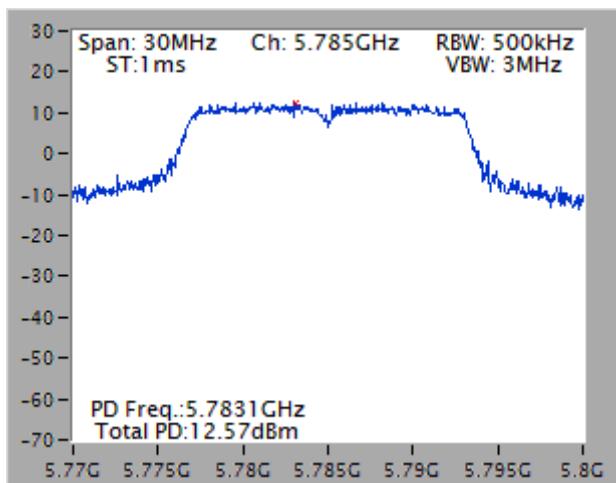




## 5470-5725MHz - Worst Power Spectral Density Plots

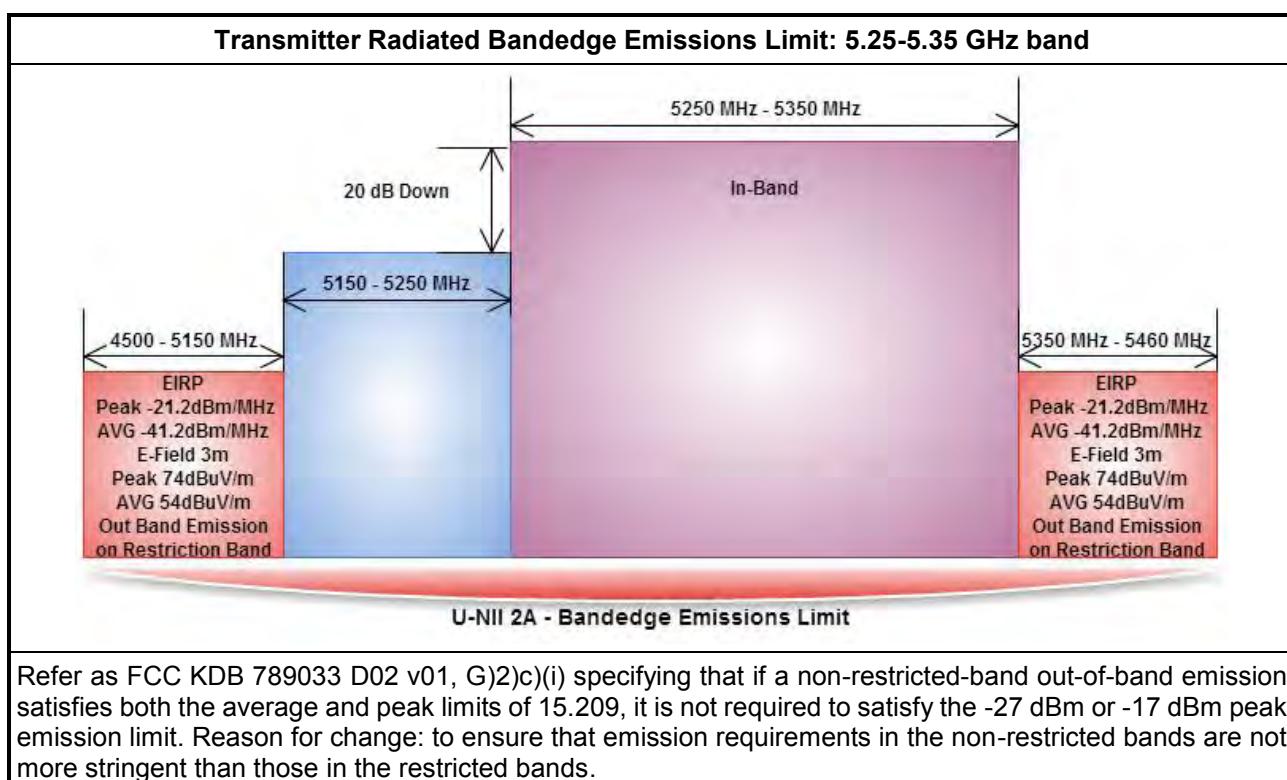
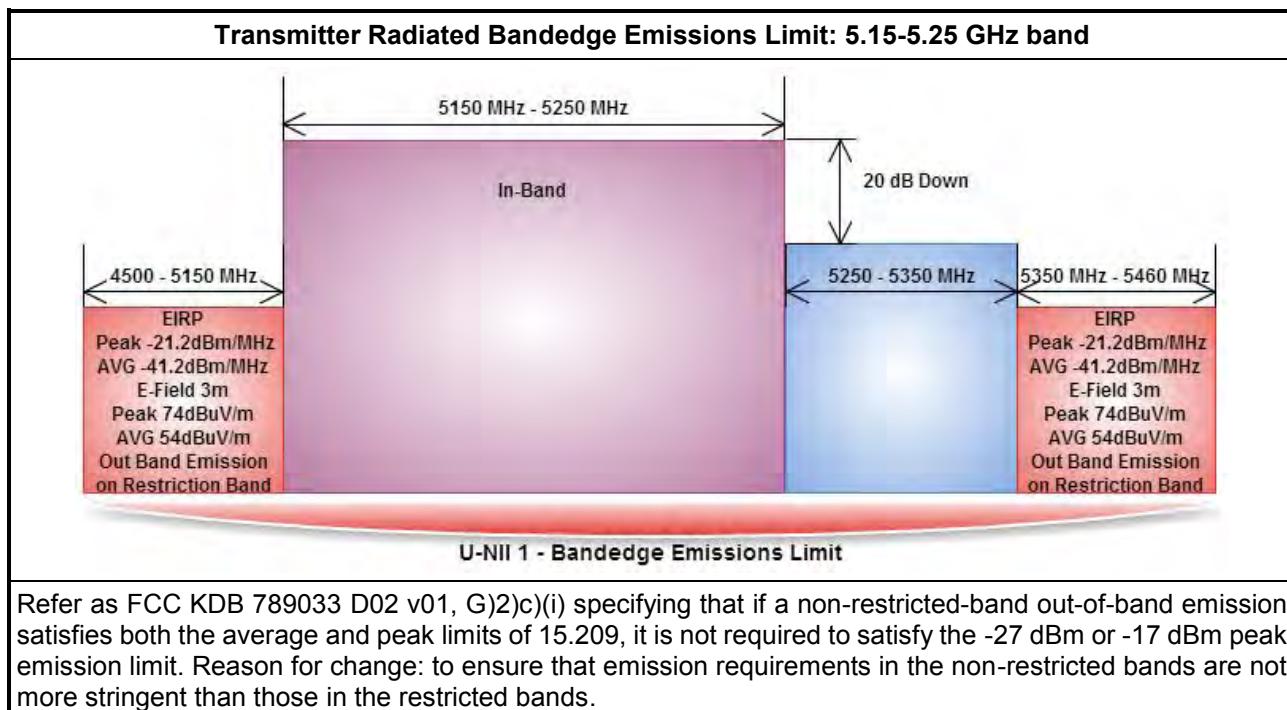


## 5725-5850MHz - Worst Power Spectral Density Plots



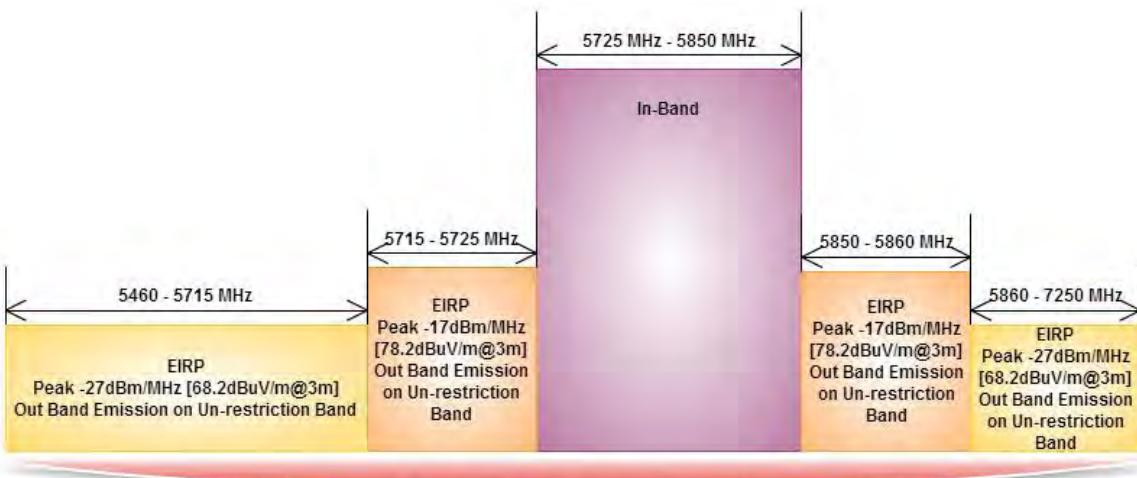
## 3.5 Transmitter Bandedge Emissions

### 3.5.1 Transmitter Radiated Bandedge Emissions Limit



**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.

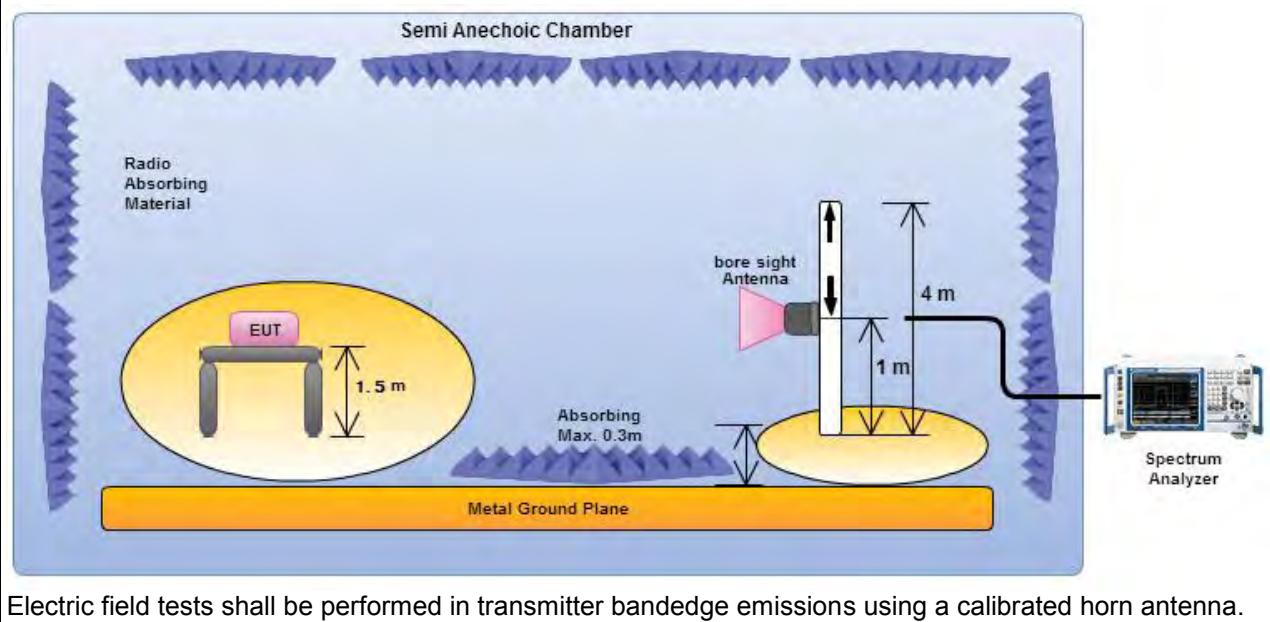


### 3.5.3 Test Procedures

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 type="checkbox"/> If EUT operate in adjacent contiguous bands, bandedge testing performed at the lowest frequency channel at lower-band and highest frequency channel at higher-band. Transmitter in-band emissions will consist of adjacent contiguous bands (e.g., IEEE 802.11ac VHT160 The lowest frequency channel at lower-band and highest frequency channel at higher-band in-band emissions will consist of two adjacent contiguous bands.) <ul style="list-style-type: none"><li><input type="checkbox"/> Operating in 5.15-5.25 GHz band (lower-band) and 5.25-5.35 GHz band (higher-band).</li><li><input type="checkbox"/> Operating in 5.47-5.725 GHz band (lower-band) and 5.725-5.85 GHz band (higher-band).</li></ul>
<input type="checkbox"/> If EUT operate in individual non-contiguous bands, bandedge testing performed at the lowest frequency channel and highest frequency channel within lower-band and higher-band. (e.g., (e.g., IEEE 802.11ac VHT160) <ul style="list-style-type: none"><li><input type="checkbox"/> Operating in 5.25-5.35 GHz band (lower-band) and 5.47-5.725 GHz band (higher-band).</li><li><input type="checkbox"/> Operating in 5.15-5.25 GHz band (lower-band) and 5.725-5.85 GHz band (higher-band).</li></ul>
<input checked="" type="checkbox"/> For the transmitter unwanted emissions shall be measured using following options below: <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause H)2) for unwanted emissions into non-restricted bands.</li><li><input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause H)1) for unwanted emissions into restricted bands.<ul style="list-style-type: none"><li><input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, H)6) Method AD (Trace Averaging).</li><li><input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, H)6) Method VB (Reduced VBW).</li><li><input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). <math>VBW \geq 1/T</math>, where T is pulse time.</li><li><input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.</li><li><input checked="" type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause H)5) measurement procedure peak limit.</li><li><input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.</li></ul></li></ul>
<input checked="" type="checkbox"/> For the transmitter bandedge emissions shall be measured using following options below: <ul style="list-style-type: none"><li><input type="checkbox"/> Refer as FCC KDB 789033 D02 v01, clause H)3)d) for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).</li><li><input type="checkbox"/> Refer as ANSI C63.10, clause 6.10 for band-edge testing.</li><li><input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.10.6.2 for marker-delta method for band-edge measurements.</li></ul>
<input checked="" type="checkbox"/> For radiated measurement, refer as ANSI C63.10, clause 6.6. Test distance is 3m.
<input checked="" type="checkbox"/> Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements). Measurements in the bandedge are typically made at a closer distance 3m, because the instrumentation noise floor is typically close to the radiated emission limit.

### 3.5.4 Test Setup

#### Transmitter Radiated Bandedge Emissions



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



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

U-NII 5150-5250MHz Transmitter Radiated Bandedge (with Antenna)										
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Freq. (MHz) AV	Level (dBuV/m) AV	Limit (dBuV/m) AV	Pol.
11a	2	5180	3	5110.000	57.40	74	5123.800	43.55	54	V
11a	2	5240	3	5106.000	57.61	74	5107.800	43.80	54	V
HT20	2	5180	3	5108.600	57.25	74	5119.800	43.71	54	V
HT20	2	5240	3	5132.400	56.84	74	5119.800	43.76	54	V
HT40	2	5190	3	5148.840	61.68	74	5149.940	46.41	54	V
HT40	2	5230	3	5136.000	57.14	74	5137.200	43.71	54	V

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	2	5260	3	5370.600	57.08	74	5350.800	43.75	54	V
11a	2	5320	3	5353.400	59.25	74	5359.840	44.73	54	V
HT20	2	5260	3	5353.200	57.76	74	5360.400	44.04	54	V
HT20	2	5320	3	5350.040	59.63	74	5359.980	44.78	54	V
HT40	2	5270	3	5351.400	57.01	74	5350.200	44.45	54	V
HT40	2	5310	3	5350.660	59.86	74	5350.000	46.28	54	V

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	2	5500	3	5469.040	61.12	68.2	V
11a	2	5700	3	5725.160	63.41	68.2	V
HT20	2	5500	3	5467.760	60.20	68.2	V
HT20	2	5700	3	5725.040	63.75	68.2	V
HT40	2	5510	3	5463.800	59.18	68.2	V
HT40	2	5670	3	5726.000	60.65	68.2	V

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	2	5745	3	5724.340	75.31	78.2	V
11a	2	5825	3	5862.460	58.08	68.2	V
HT20	2	5745	3	5724.970	75.43	78.2	V
HT20	2	5825	3	5902.780	58.85	68.2	V
HT40	2	5755	3	5713.180	61.73	68.2	V
HT40	2	5795	3	5861.800	57.34	68.2	V

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

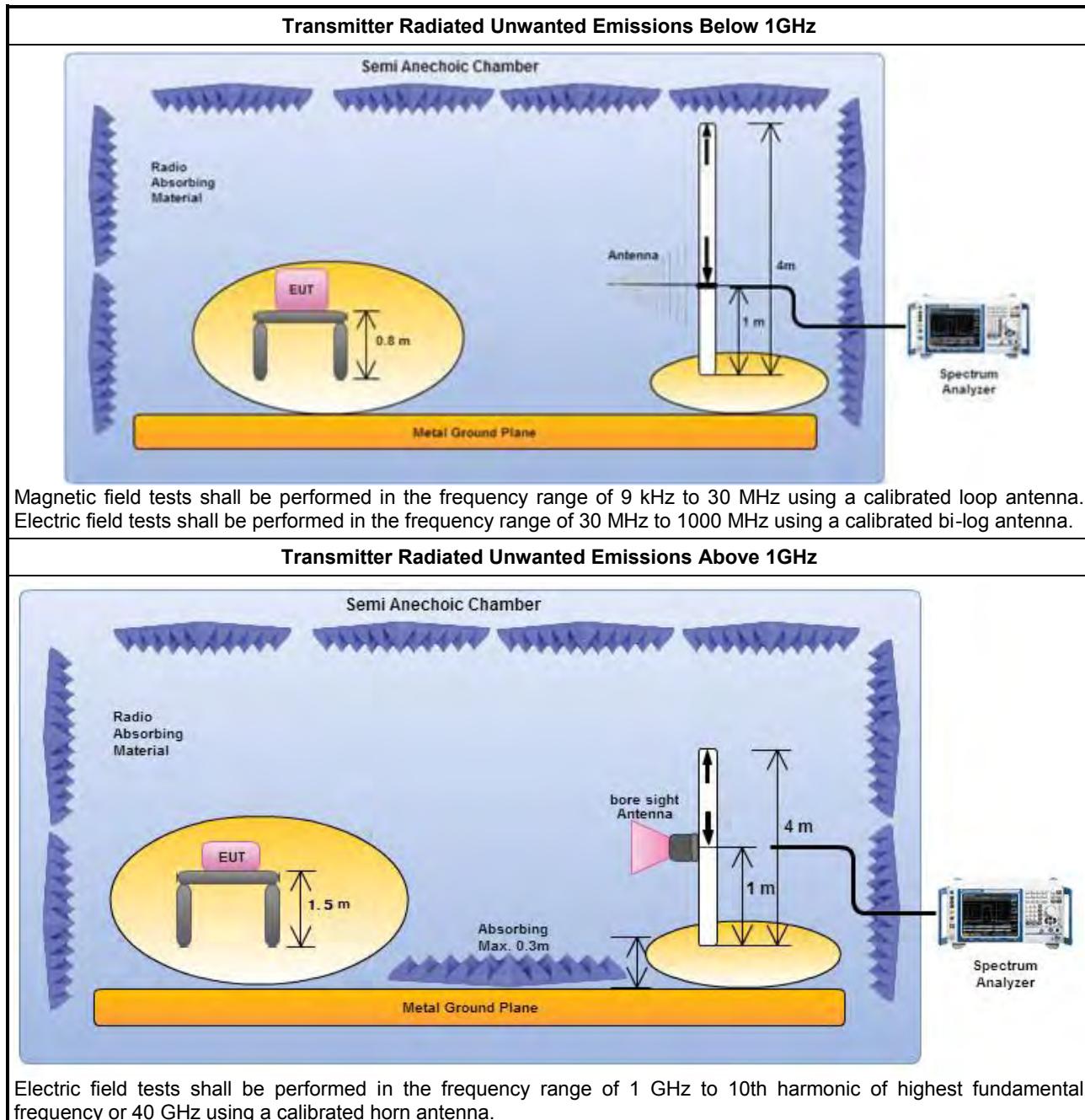
Refer a test equipment and calibration data table in this test report.



### 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 4.1.4.2.3 (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 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

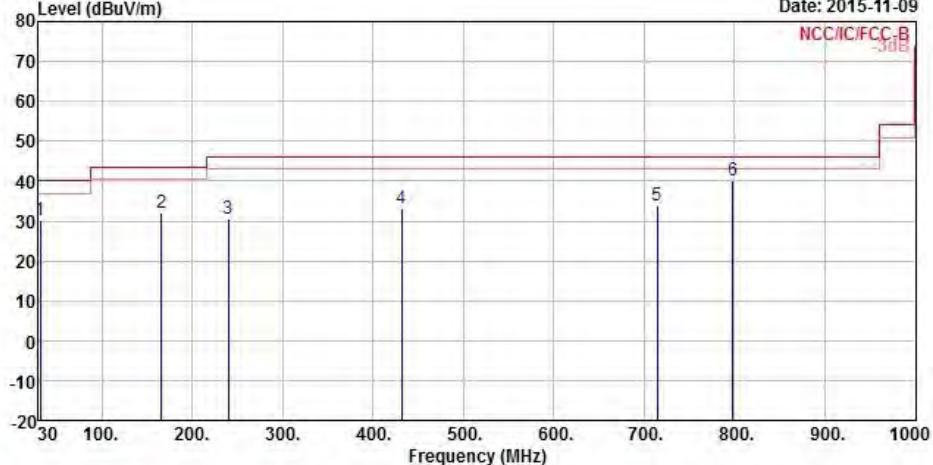


### 3.6.5 Transmitter Radiated Unwanted Emissions-with Antenna (Below 30MHz)

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

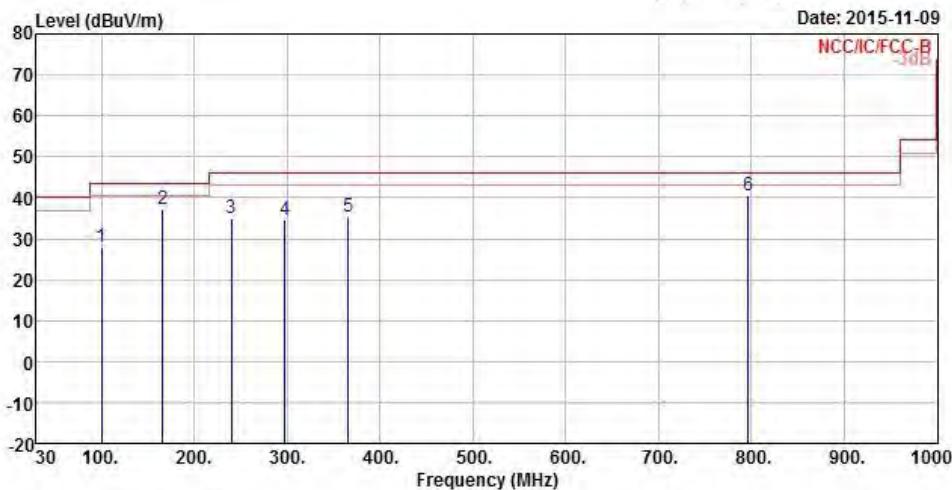


## 3.6.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Transmitter Radiated Unwanted Emissions (Below 1GHz)											
Operating Mode	1		Polarization		V						
Operating Function	Transmit Mod										
Level (dBuV/m)									Date: 2015-11-09		
									NCC/IC/FCC-B -30dB		
Freq Level Over Limit Line ReadAntenna Cable Preamp											
Freq		Level	Over Limit	Line	ReadAntenna	Cable	Preamp				
MHz		dBuV/m	dB	dBuV/m	dBuV	dB/m	dB				
1	31.940	30.32	-9.68	40.00	38.66	18.72	0.80	27.86	Peak		
2	165.800	32.10	-11.40	43.50	47.32	10.46	1.87	27.55	Peak		
3	239.520	30.67	-15.33	46.00	43.40	12.30	2.25	27.28	Peak		
4	431.580	33.23	-12.77	46.00	41.14	17.02	3.13	28.06	Peak		
5	714.820	33.90	-12.10	46.00	38.06	19.98	4.14	28.28	Peak		
6	798.240	40.32	-5.68	46.00	43.00	20.78	4.52	27.98	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: No level of unwanted emissions exceeds the level of the fundamental emission.											



## Transmitter Radiated Unwanted Emissions (Below 1GHz)

Operating Mode	1	Polarization	H																																																																																
Operating Function	Transmit Mod																																																																																		
																																																																																			
<table><thead><tr><th></th><th>Freq</th><th>Level</th><th>Over Limit</th><th>Limit</th><th>Read</th><th>Antenna</th><th>Cable</th><th>Preamp</th><th>Remark</th></tr><tr><th></th><th>MHz</th><th>dBuV/m</th><th>dB</th><th>dBuV/m</th><th>dBuV</th><th>dB/m</th><th>dB</th><th>dB</th><th></th></tr></thead><tbody><tr><td>1</td><td>99.840</td><td>27.92</td><td>-15.58</td><td>43.50</td><td>42.78</td><td>11.40</td><td>1.50</td><td>27.76</td><td>Peak</td></tr><tr><td>2</td><td>165.800</td><td>37.27</td><td>-6.23</td><td>43.50</td><td>52.49</td><td>10.46</td><td>1.87</td><td>27.55</td><td>Peak</td></tr><tr><td>3</td><td>239.520</td><td>34.95</td><td>-11.05</td><td>46.00</td><td>47.68</td><td>12.30</td><td>2.25</td><td>27.28</td><td>Peak</td></tr><tr><td>4</td><td>297.720</td><td>34.70</td><td>-11.30</td><td>46.00</td><td>45.21</td><td>13.94</td><td>2.59</td><td>27.04</td><td>Peak</td></tr><tr><td>5</td><td>365.620</td><td>35.21</td><td>-10.79</td><td>46.00</td><td>44.14</td><td>15.81</td><td>2.85</td><td>27.59</td><td>Peak</td></tr><tr><td>6</td><td>796.300</td><td>40.56</td><td>-5.44</td><td>46.00</td><td>43.27</td><td>20.77</td><td>4.51</td><td>27.99</td><td>Peak</td></tr></tbody></table>					Freq	Level	Over Limit	Limit	Read	Antenna	Cable	Preamp	Remark		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		1	99.840	27.92	-15.58	43.50	42.78	11.40	1.50	27.76	Peak	2	165.800	37.27	-6.23	43.50	52.49	10.46	1.87	27.55	Peak	3	239.520	34.95	-11.05	46.00	47.68	12.30	2.25	27.28	Peak	4	297.720	34.70	-11.30	46.00	45.21	13.94	2.59	27.04	Peak	5	365.620	35.21	-10.79	46.00	44.14	15.81	2.85	27.59	Peak	6	796.300	40.56	-5.44	46.00	43.27	20.77	4.51	27.99	Peak
	Freq	Level	Over Limit	Limit	Read	Antenna	Cable	Preamp	Remark																																																																										
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6	796.300	40.56	-5.44	46.00	43.27	20.77	4.51	27.99	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: No level of unwanted emissions exceeds the level of the fundamental emission.



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

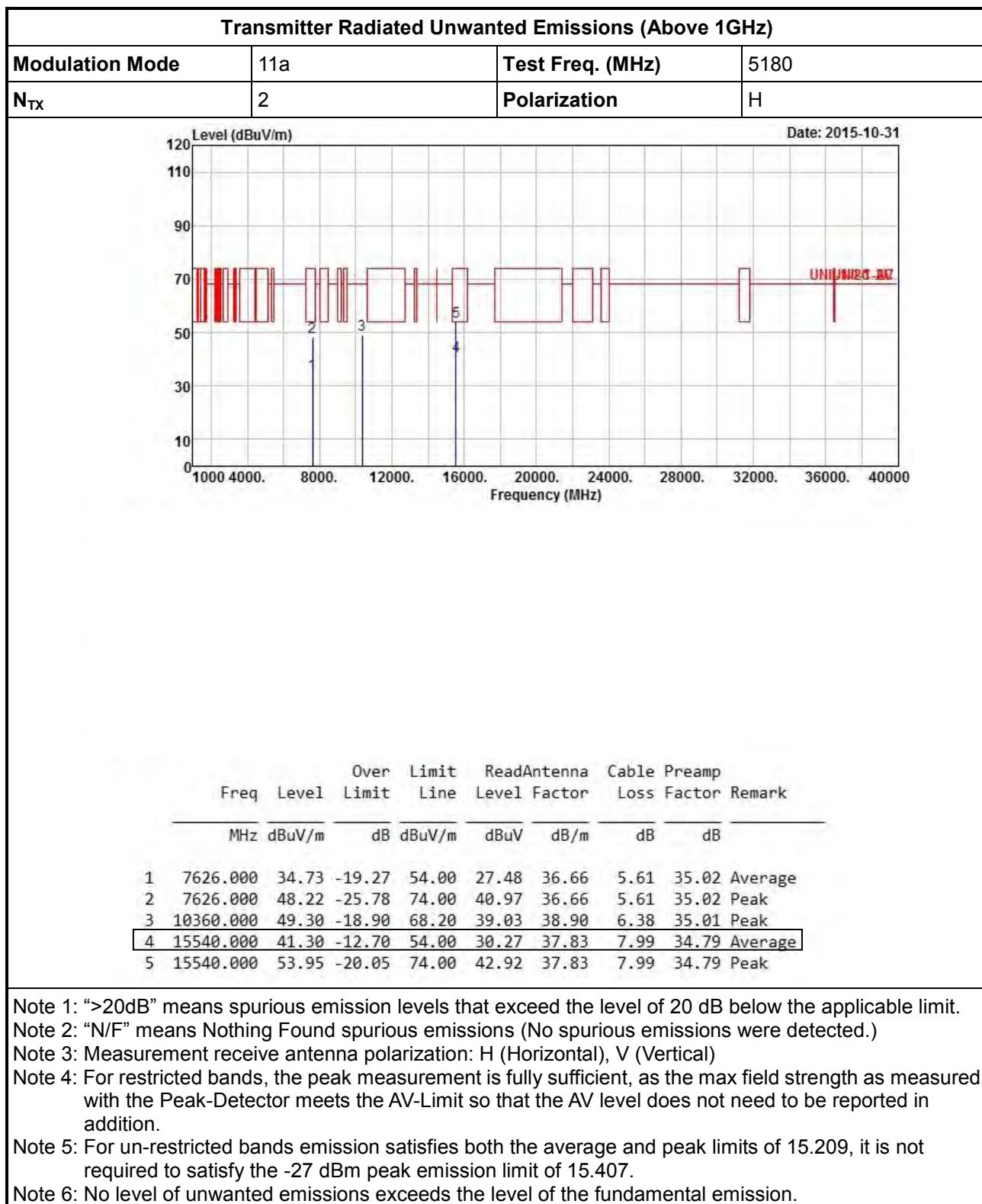
**Transmitter Radiated Unwanted Emissions (Above 1GHz)**

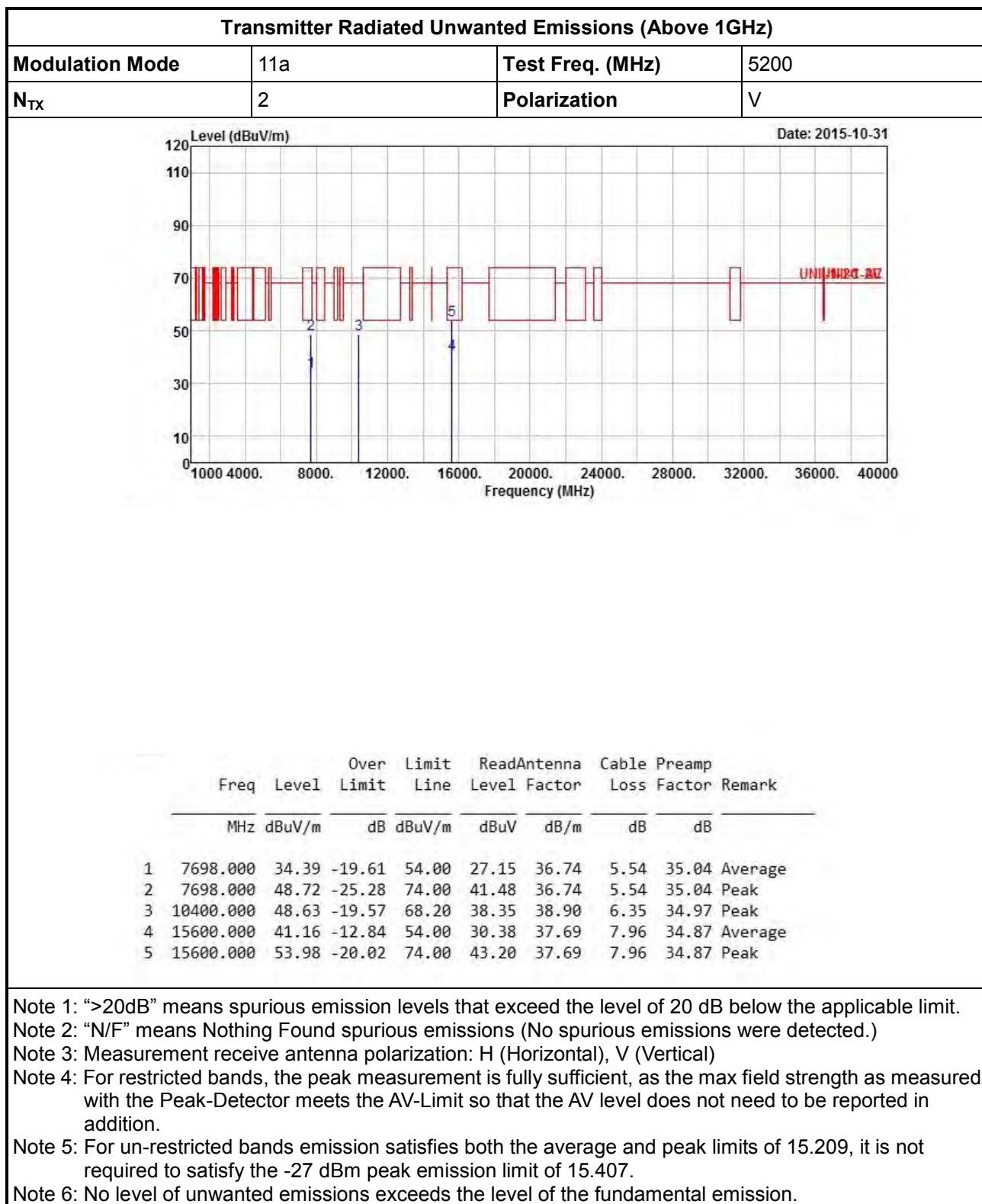
Modulation Mode	11a	Test Freq. (MHz)	5180
N <sub>TX</sub>	2	Polarization	V

Date: 2015-10-31

	Freq	Level	Over Limit	Limit Line	Read Antenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8436.000	35.20	-18.80	54.00	27.20	37.62	5.45	35.07	Average
2	8436.000	49.39	-24.61	74.00	41.39	37.62	5.45	35.07	Peak
3	10360.000	49.43	-18.77	68.20	39.16	38.90	6.38	35.01	Peak
4	15540.000	41.26	-12.74	54.00	30.23	37.83	7.99	34.79	Average
5	15540.000	54.72	-19.28	74.00	43.69	37.83	7.99	34.79	Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.  
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)  
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)  
 Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.  
 Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.  
 Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

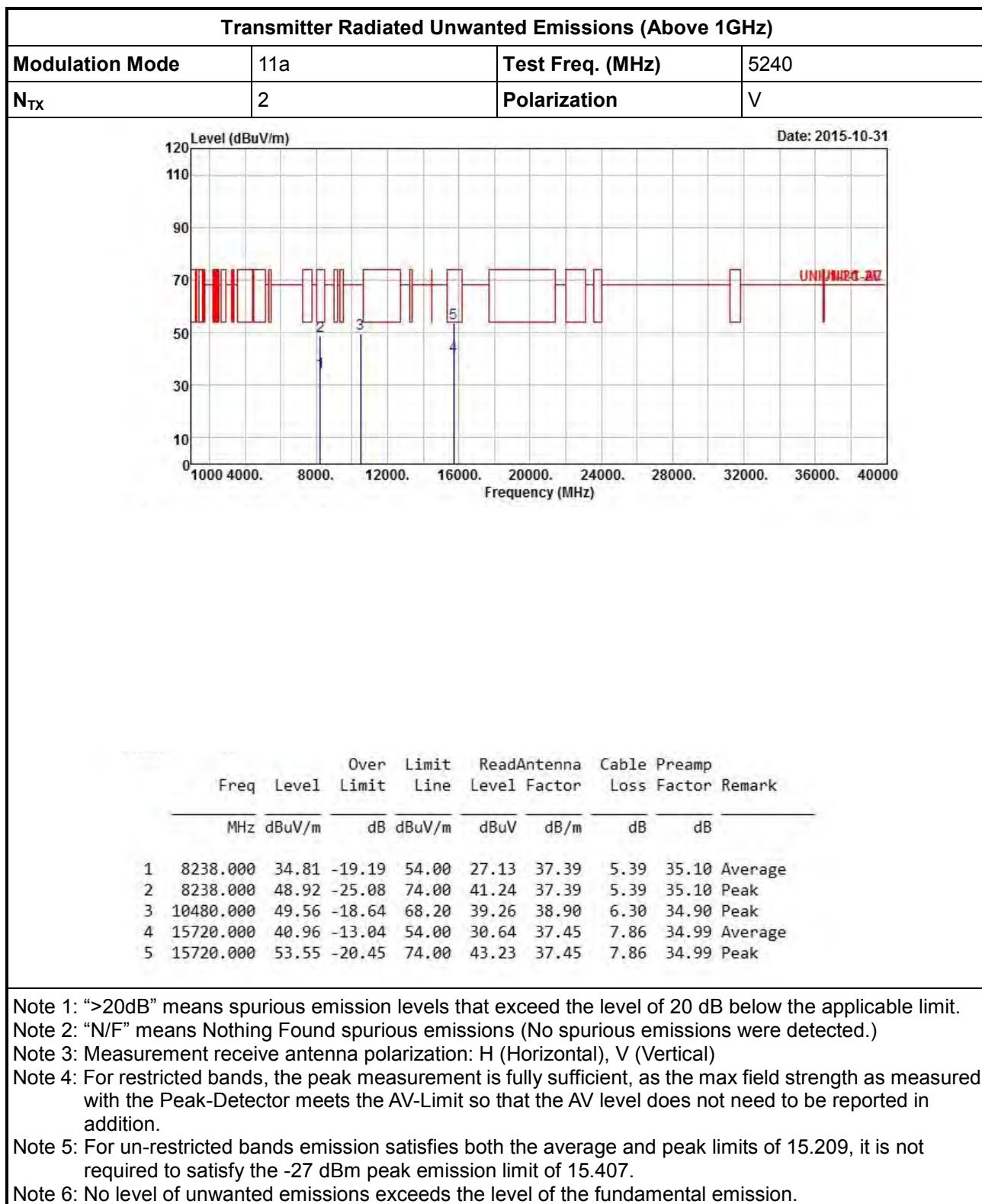


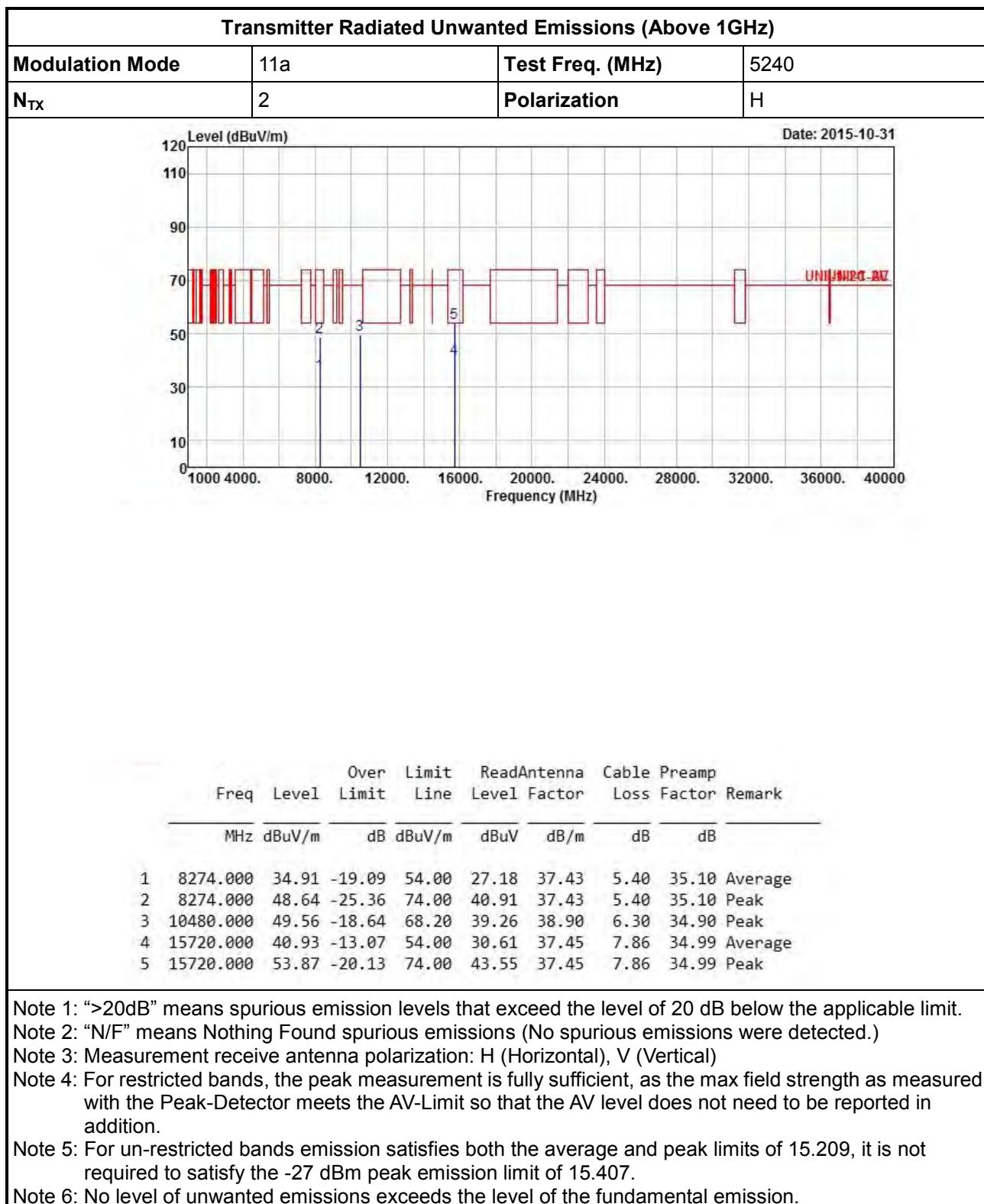


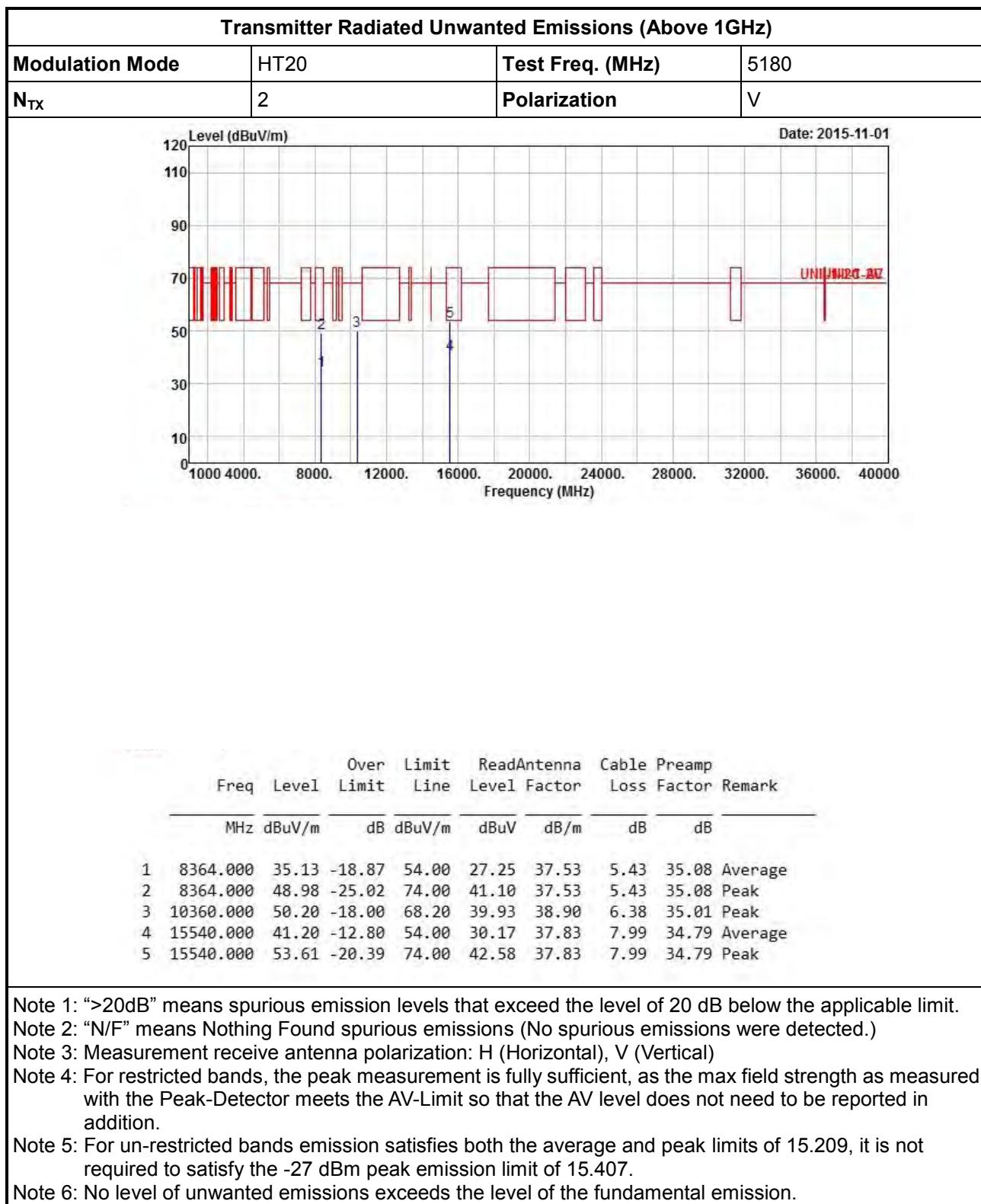


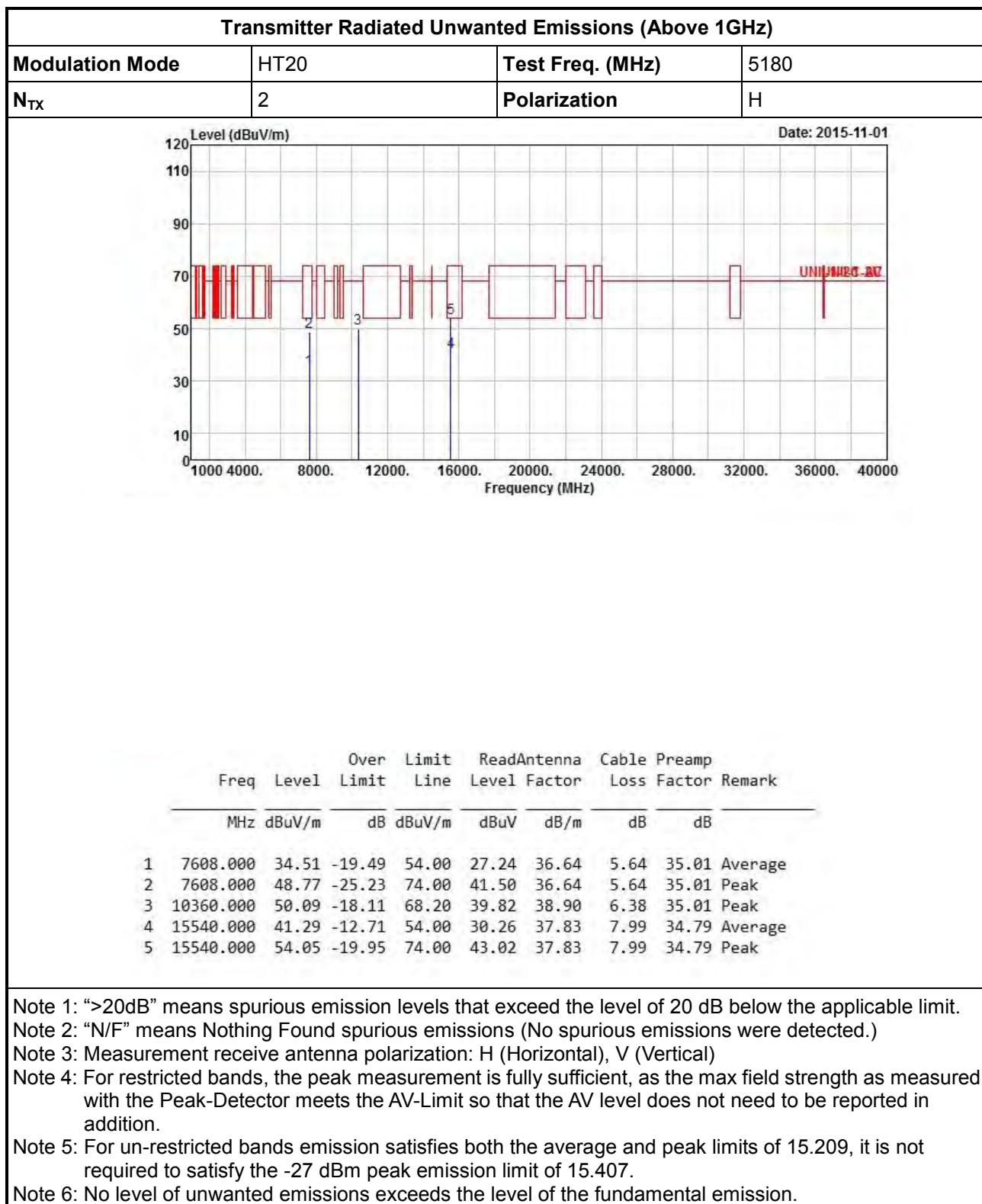
Transmitter Radiated Unwanted Emissions (Above 1GHz)									
Modulation Mode	11a		Test Freq. (MHz)		5200				
N <sub>TX</sub>	2		Polarization		H				
Level (dBuV/m)									Date: 2015-10-31
1	8094.000	34.39	-19.61	54.00	26.97	37.20	5.35	35.13	Average
2	8094.000	48.55	-25.45	74.00	41.13	37.20	5.35	35.13	Peak
3	10400.000	48.95	-19.25	68.20	38.67	38.90	6.35	34.97	Peak
4	15600.000	41.11	-12.89	54.00	30.33	37.69	7.96	34.87	Average
5	15600.000	54.46	-19.54	74.00	43.68	37.69	7.96	34.87	Peak

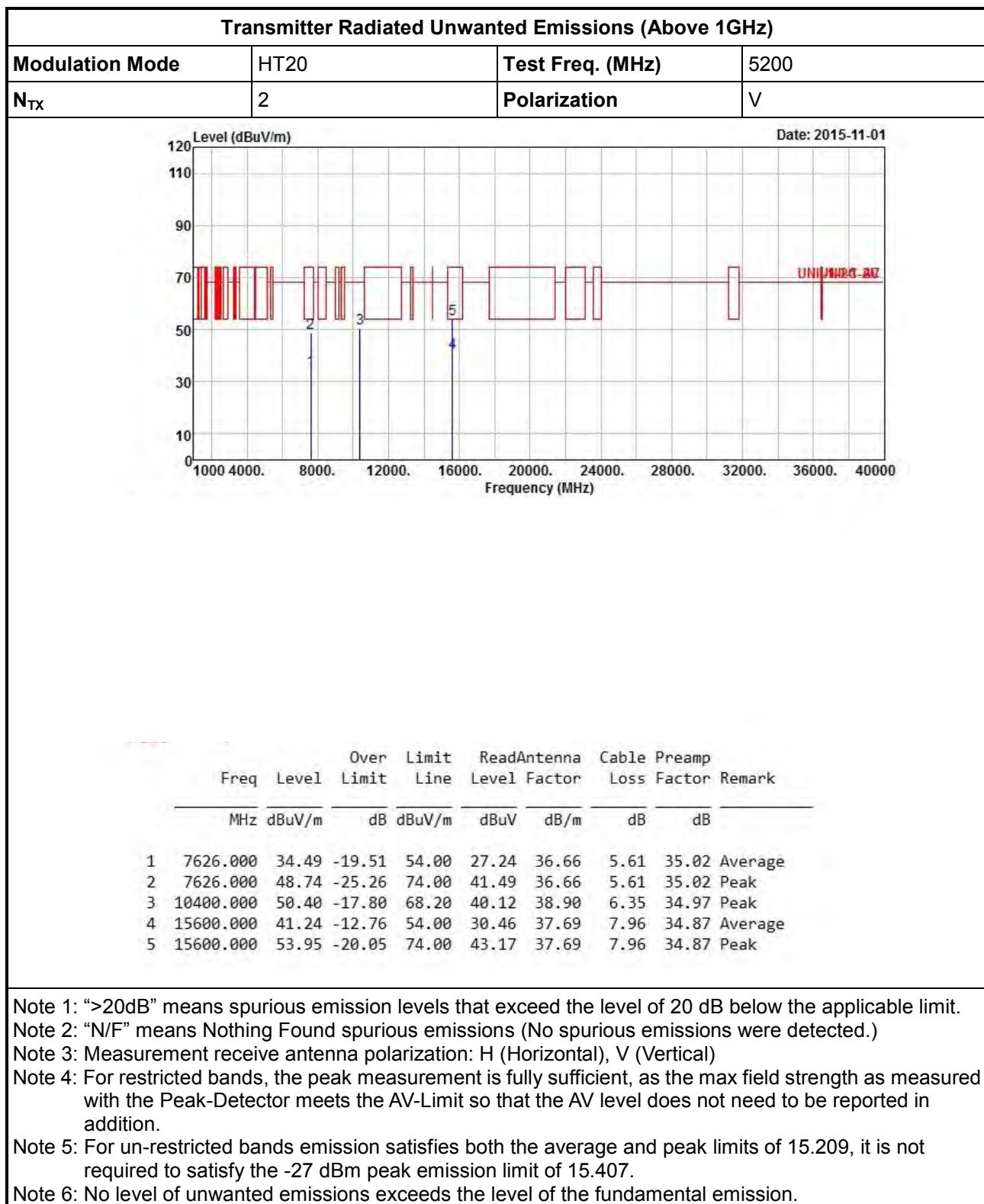
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.  
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)  
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)  
 Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.  
 Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.  
 Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

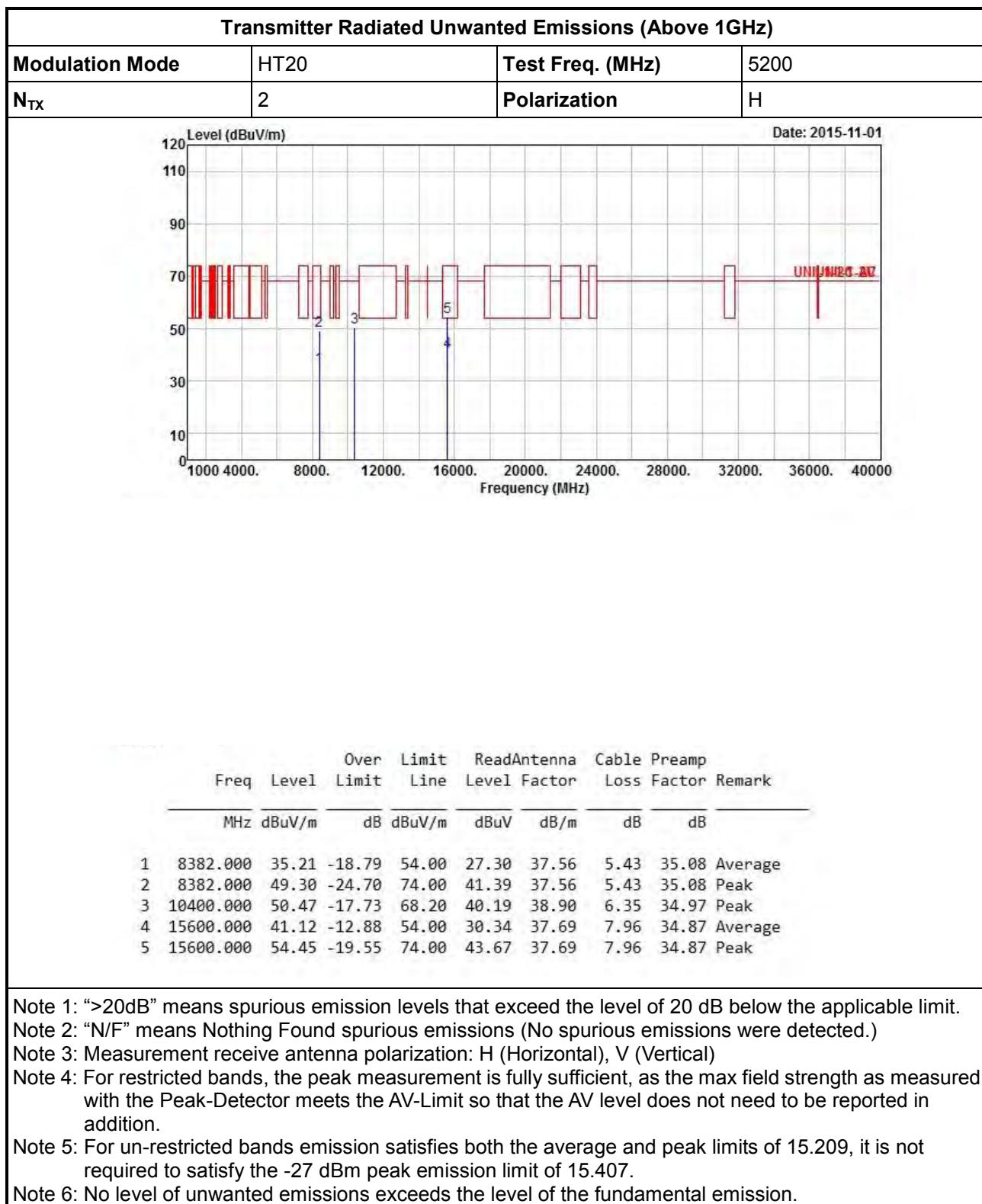


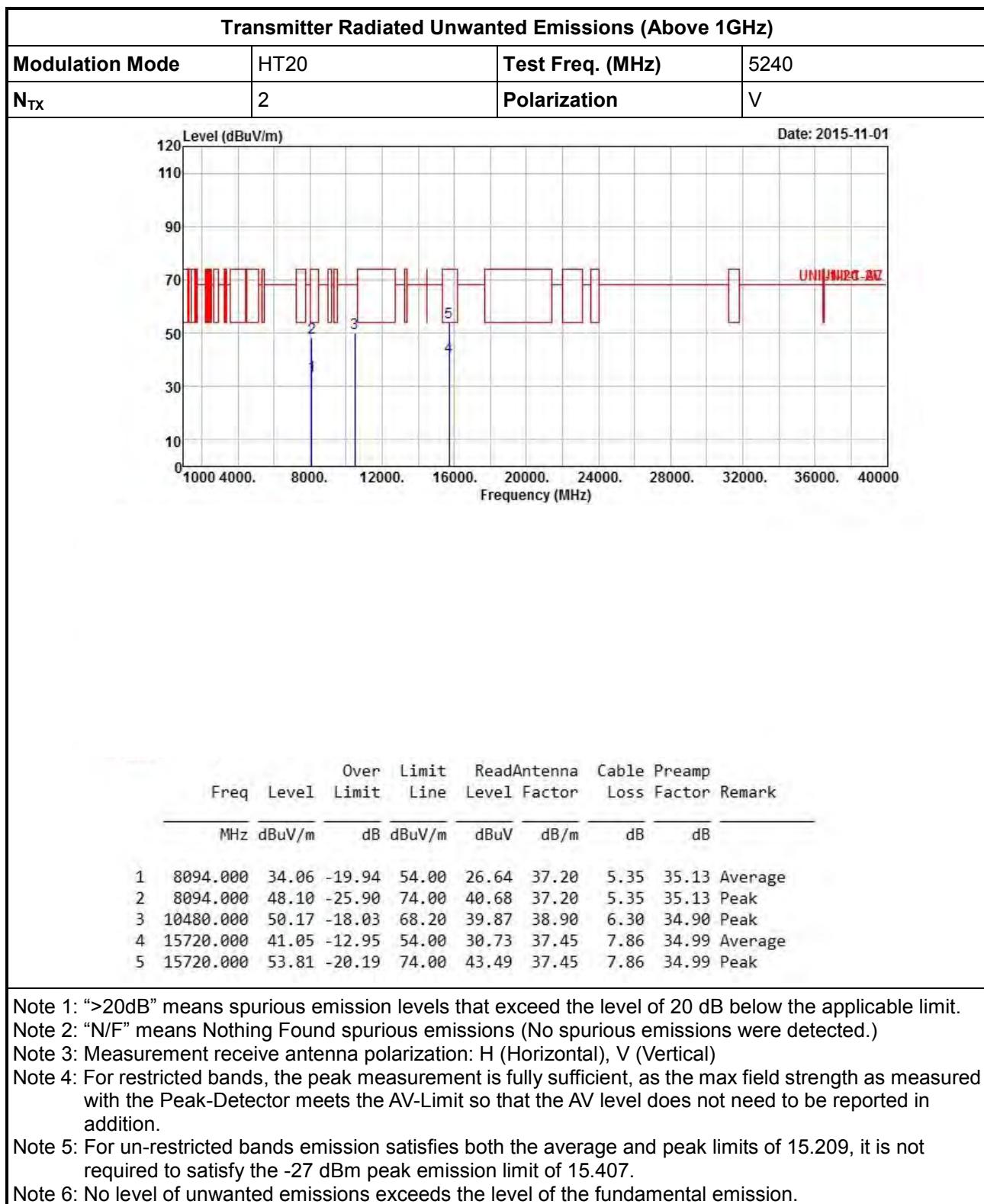


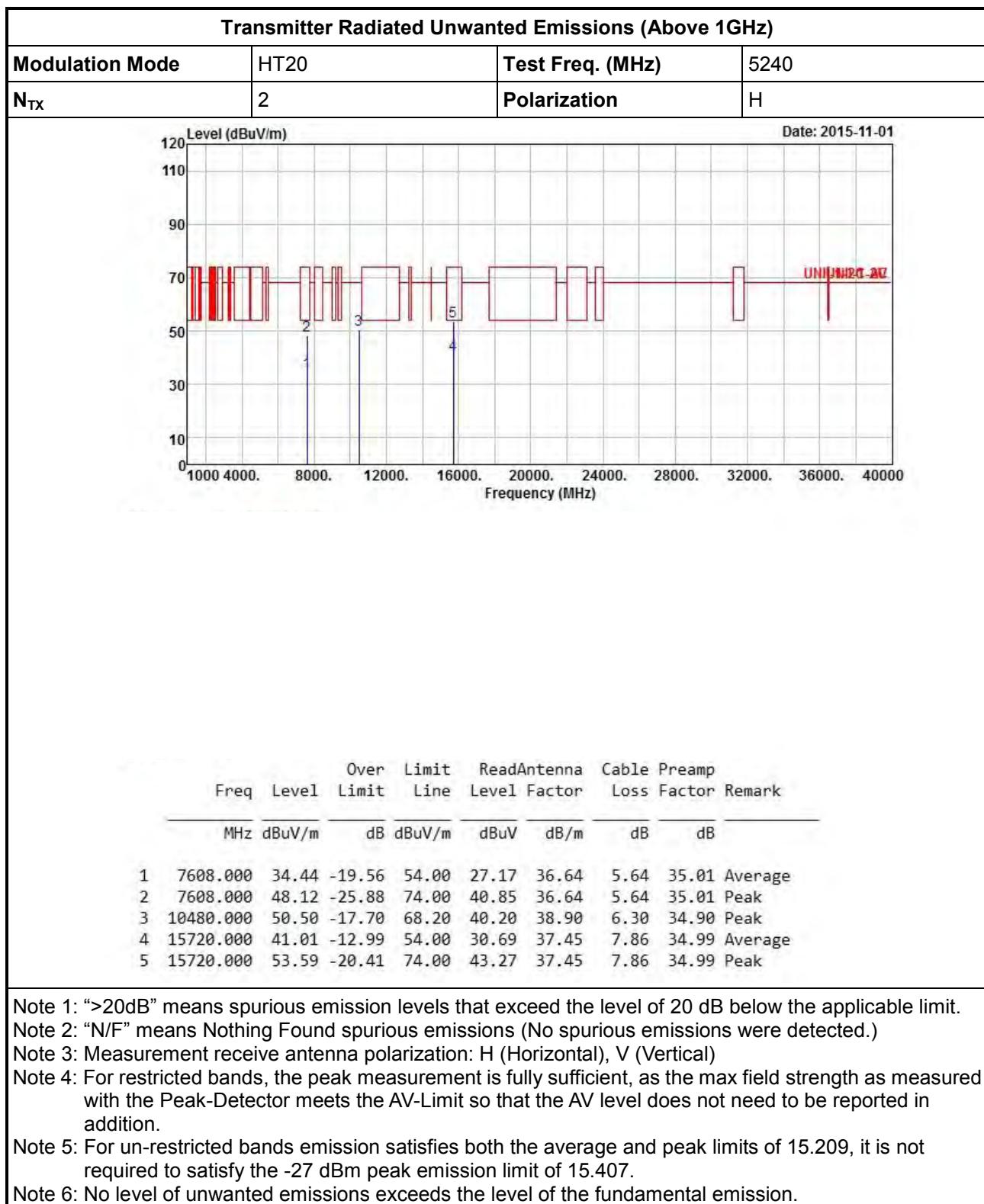


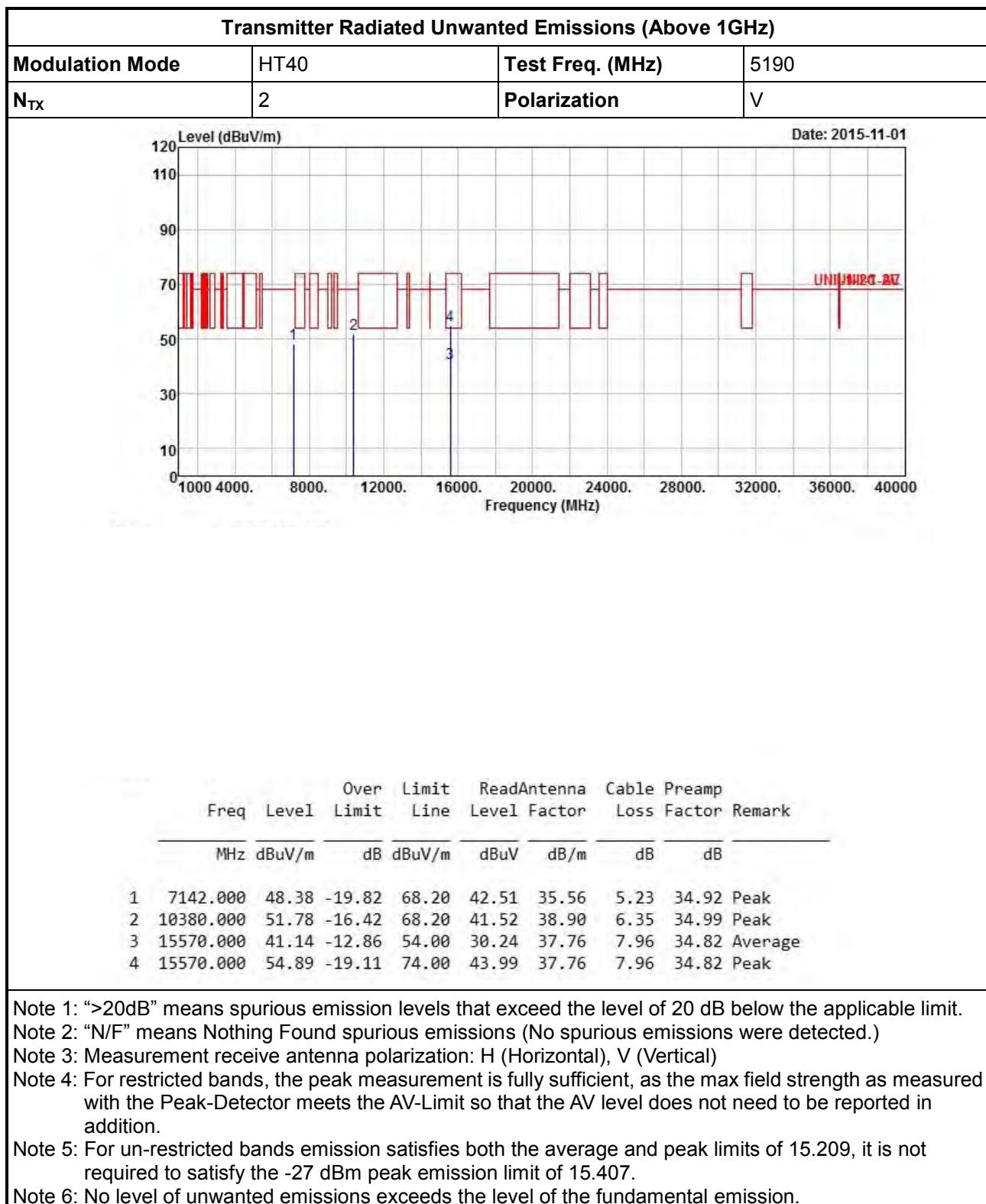


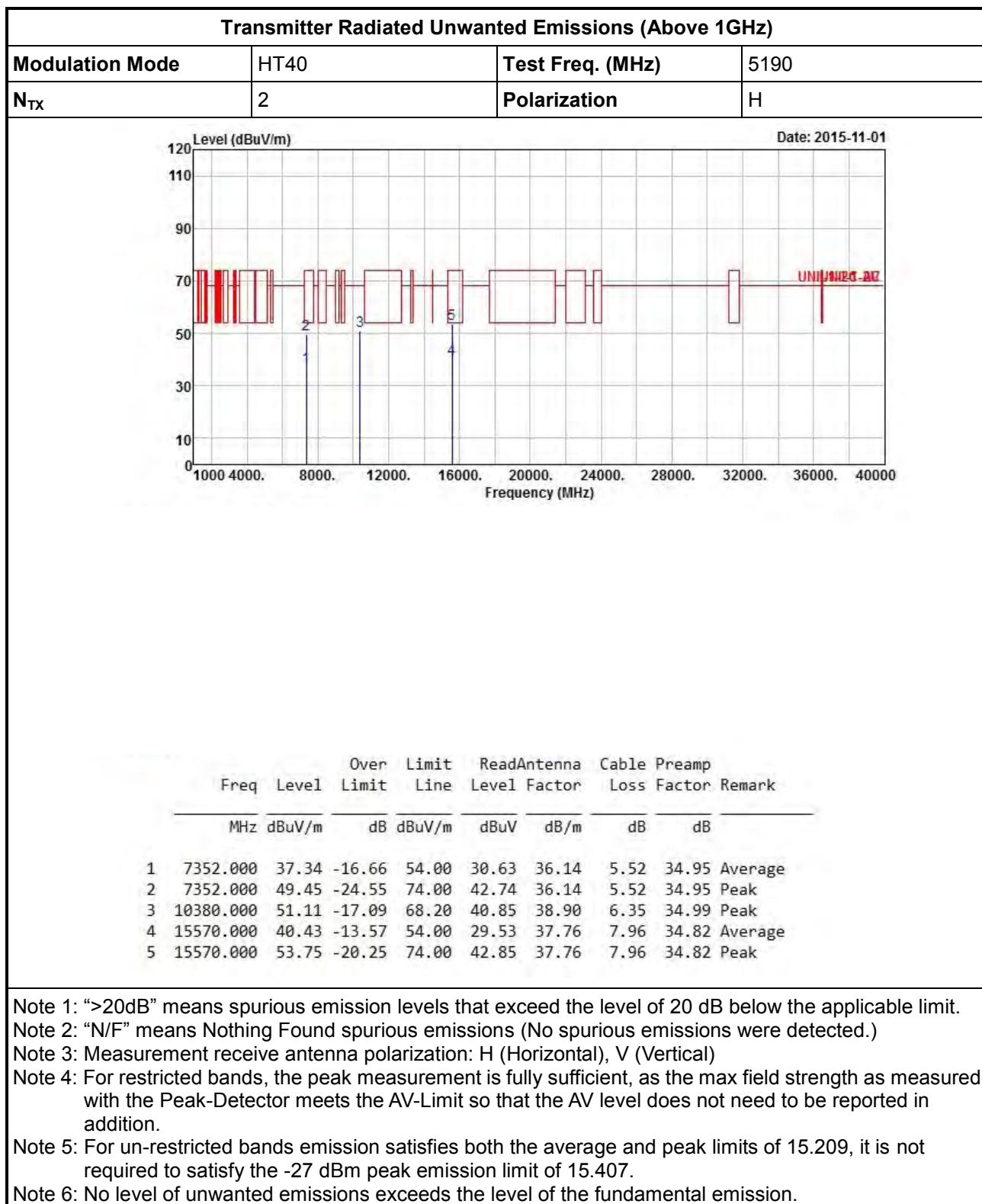


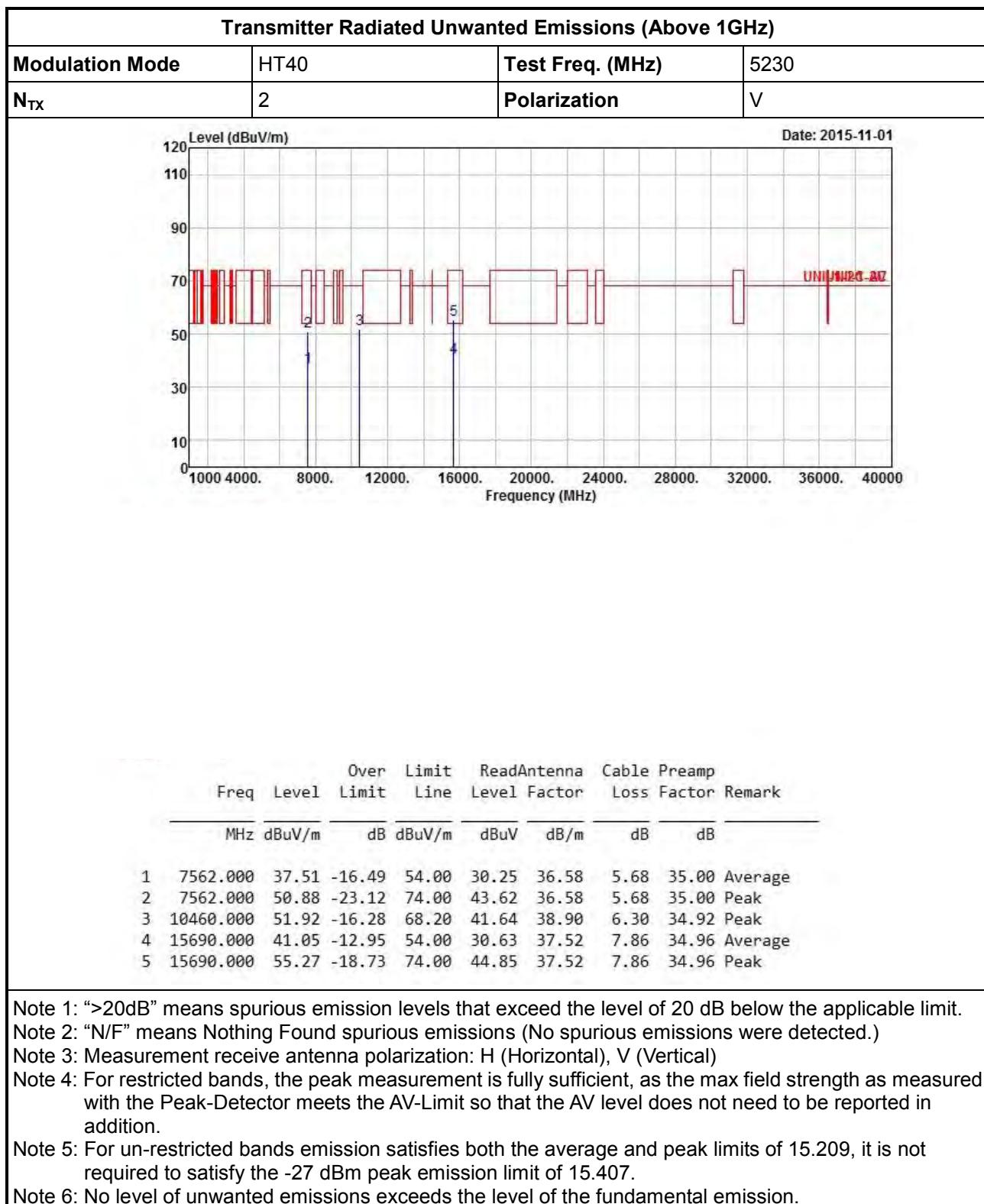


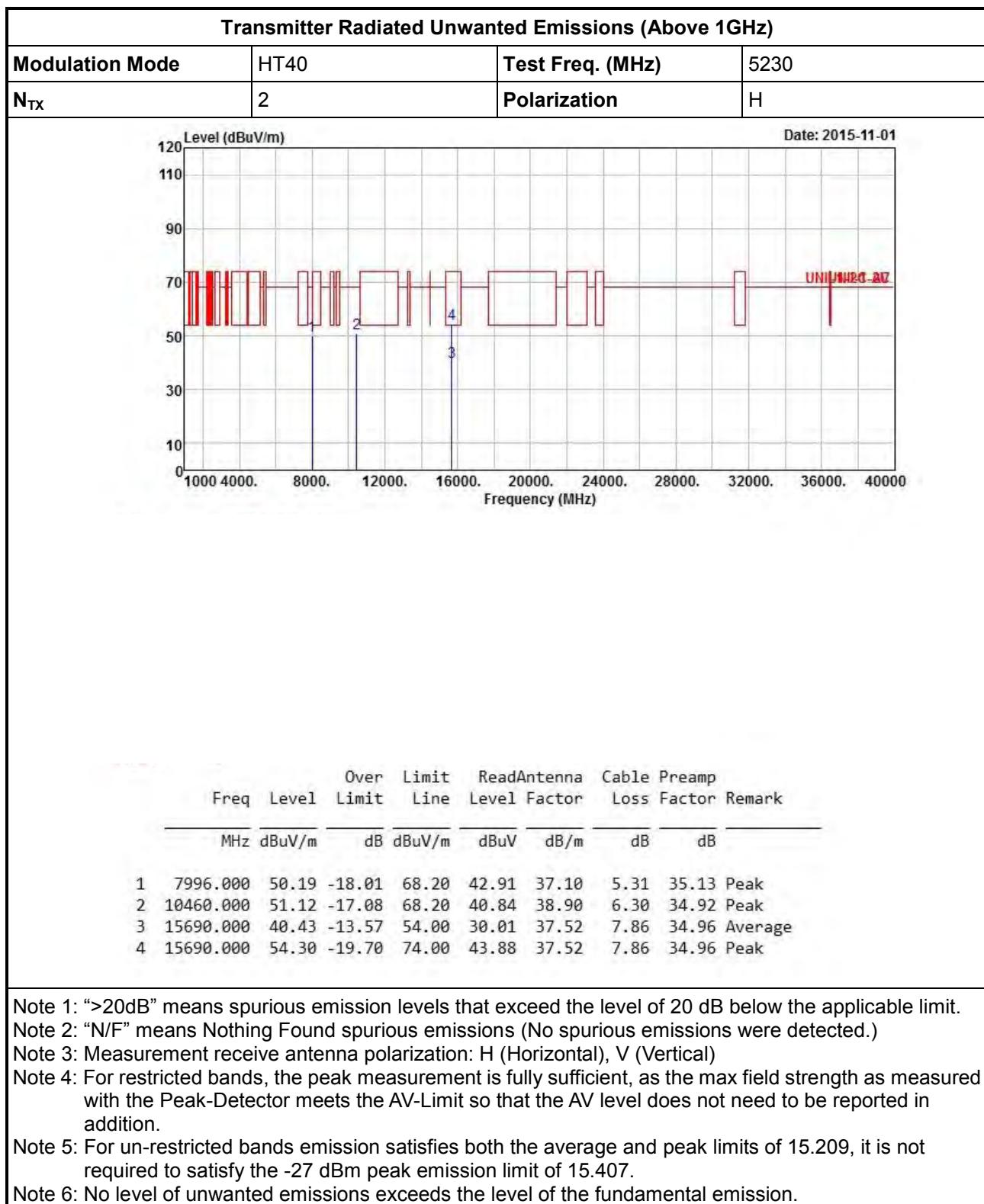














### 3.6.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 5250-5350MHz

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

Modulation Mode	11a	Test Freq. (MHz)	5260
N <sub>TX</sub>	2	Polarization	V

Date: 2015-10-31

Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	
		MHz	dBuV/m	dB	Line	Level Factor	Loss Factor	Remark
1	7788.000	48.40	-19.80	68.20	41.15	36.84	5.48	35.07 Peak
2	10520.000	51.70	-16.50	68.20	41.42	38.89	6.27	34.88 Peak
3	15780.000	40.59	-13.41	54.00	30.52	37.35	7.79	35.07 Average
4	15780.000	52.96	-21.04	74.00	42.89	37.35	7.79	35.07 Peak

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

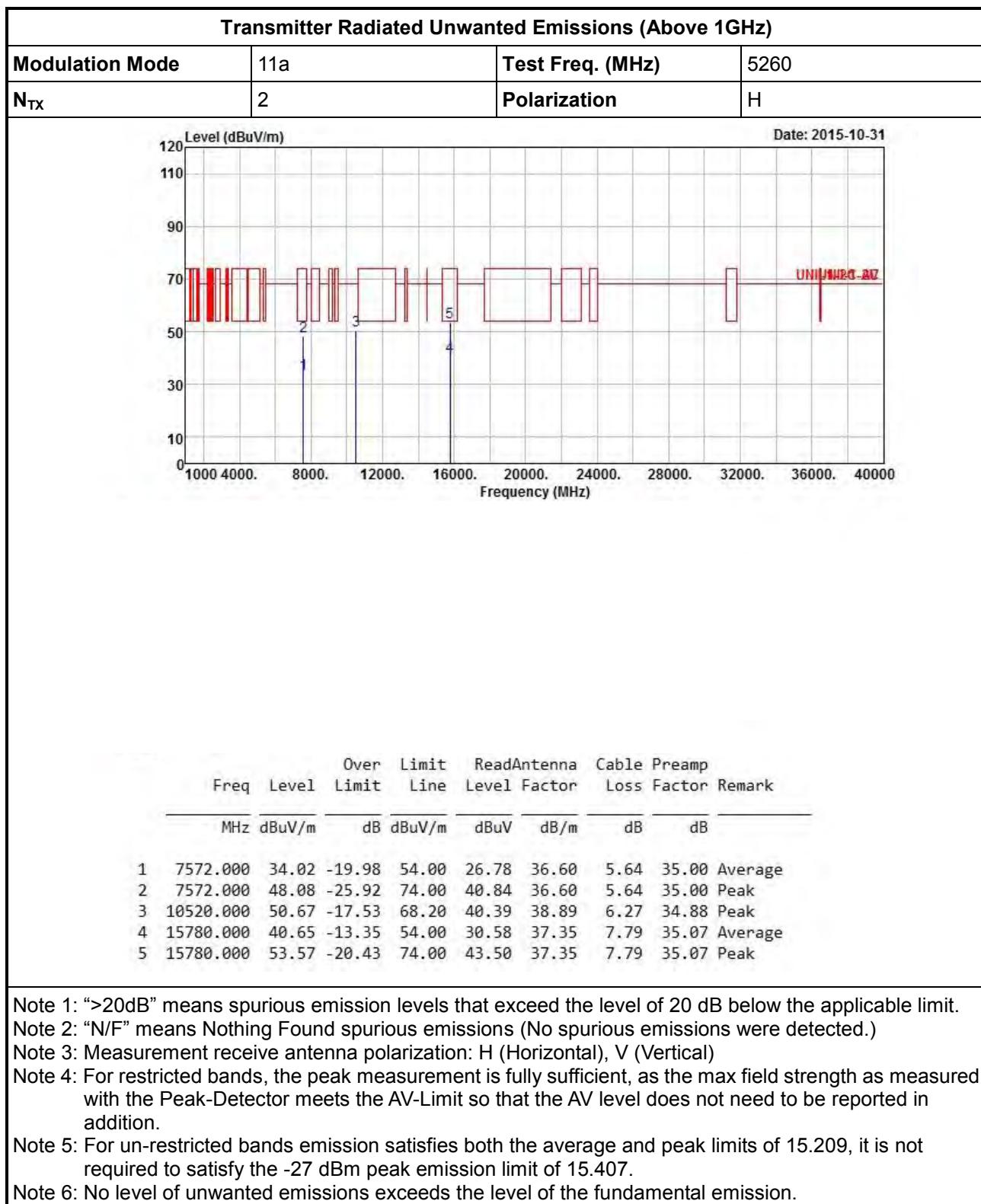
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

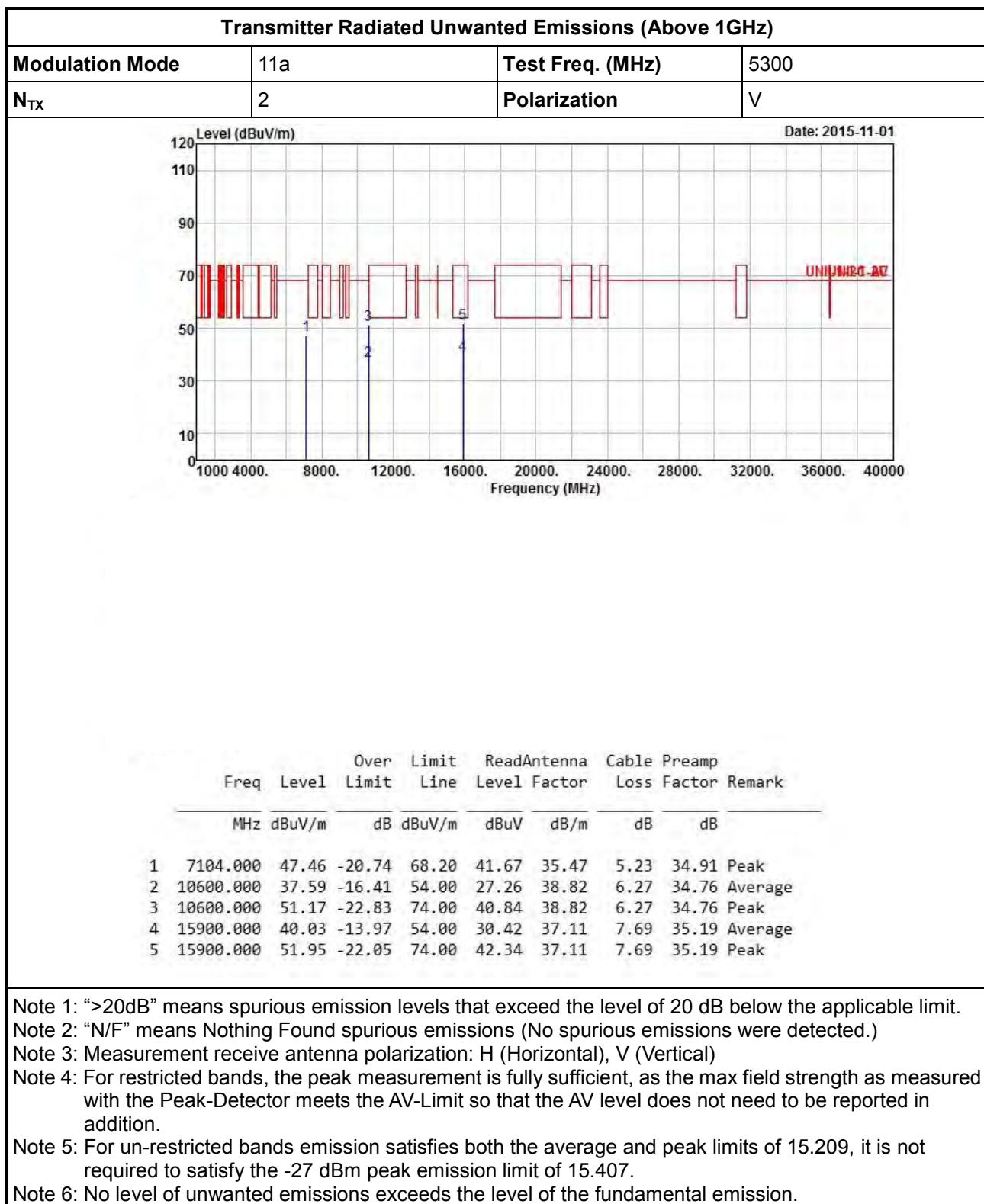
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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

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

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

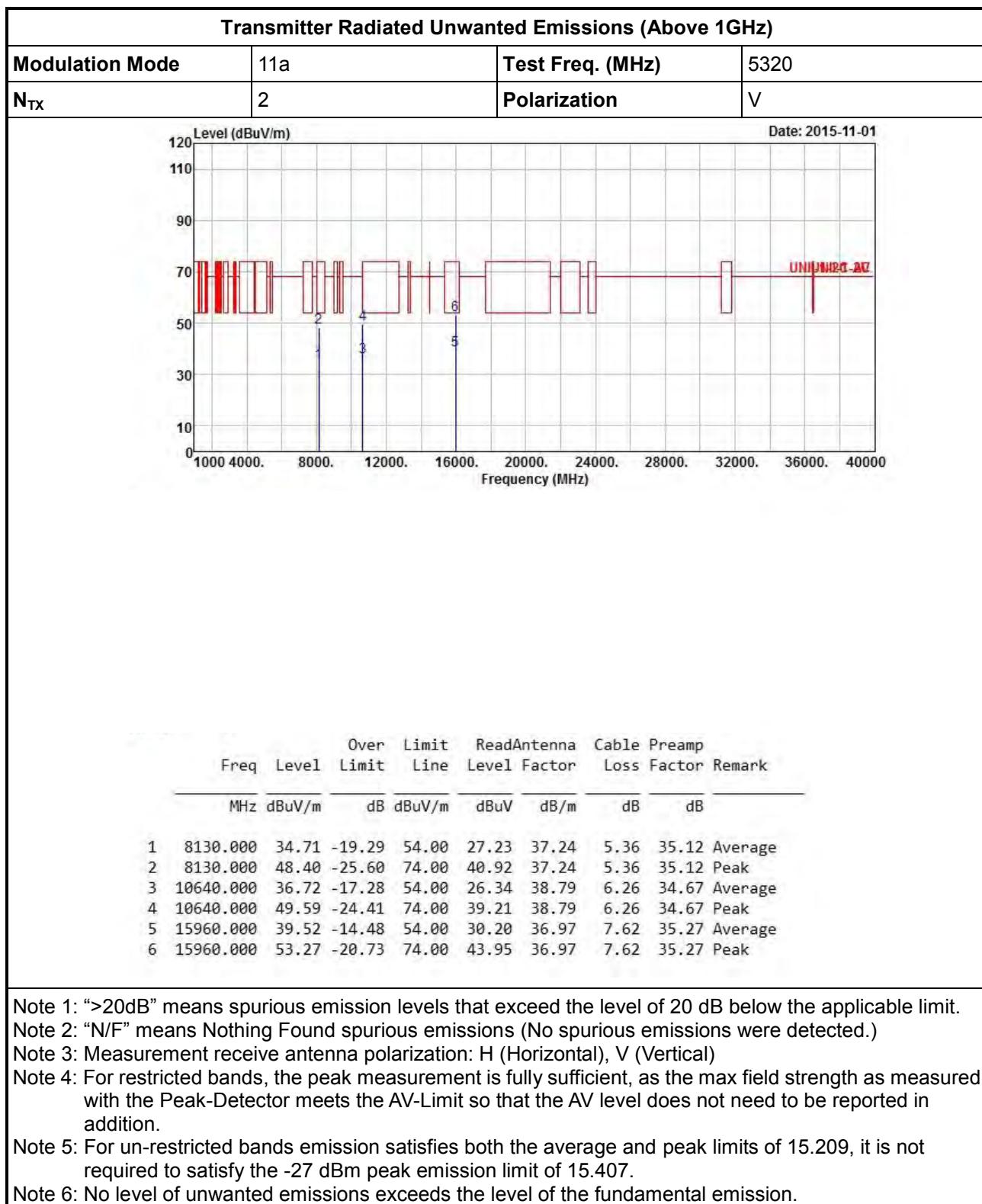


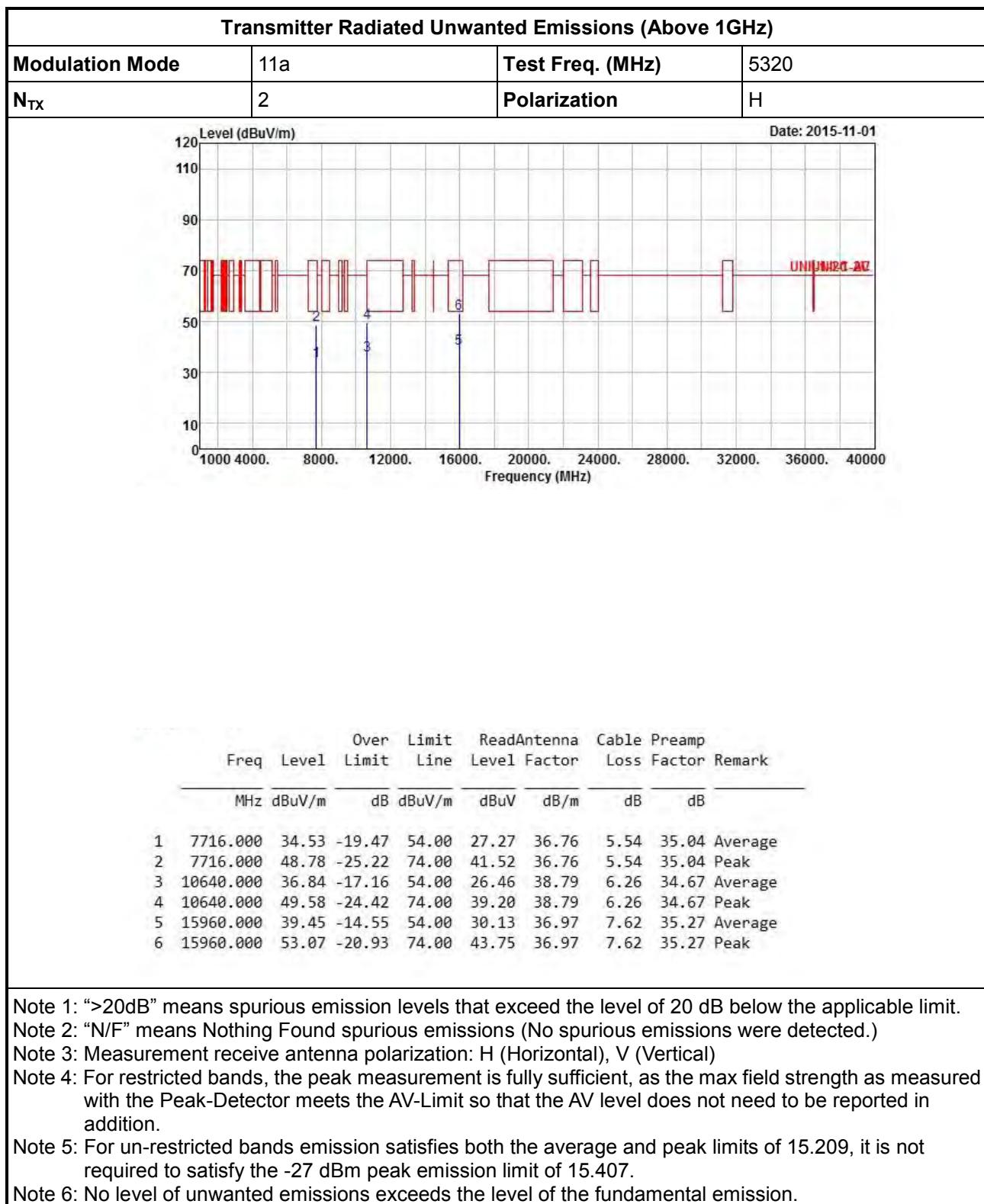




Transmitter Radiated Unwanted Emissions (Above 1GHz)									
Modulation Mode	11a		Test Freq. (MHz)		5300				
N <sub>TX</sub>	2		Polarization		H				
Level (dB <sub>UV</sub> /m)									Date: 2015-11-01
1000	4000.	8000.	12000.	16000.	20000.	24000.	28000.	32000.	36000. 40000
0	10	20	30	40	50	60	70	80	90 100 110 120
Freq	Level	Over Limit	Line	Read	Antenna	Cable	Preamp	Remark	
MHz	dB <sub>UV</sub> /m	dB	dB <sub>UV</sub> /m	dB <sub>UV</sub>	dB/m	dB	dB		
1	8274.000	37.37	-16.63	54.00	29.64	37.43	5.40	35.10 Average	
2	8274.000	49.47	-24.53	74.00	41.74	37.43	5.40	35.10 Peak	
3	10600.000	37.24	-16.76	54.00	26.91	38.82	6.27	34.76 Average	
4	10600.000	49.44	-24.56	74.00	39.11	38.82	6.27	34.76 Peak	
5	15900.000	40.00	-14.00	54.00	30.39	37.11	7.69	35.19 Average	
6	15900.000	53.50	-20.50	74.00	43.89	37.11	7.69	35.19 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.

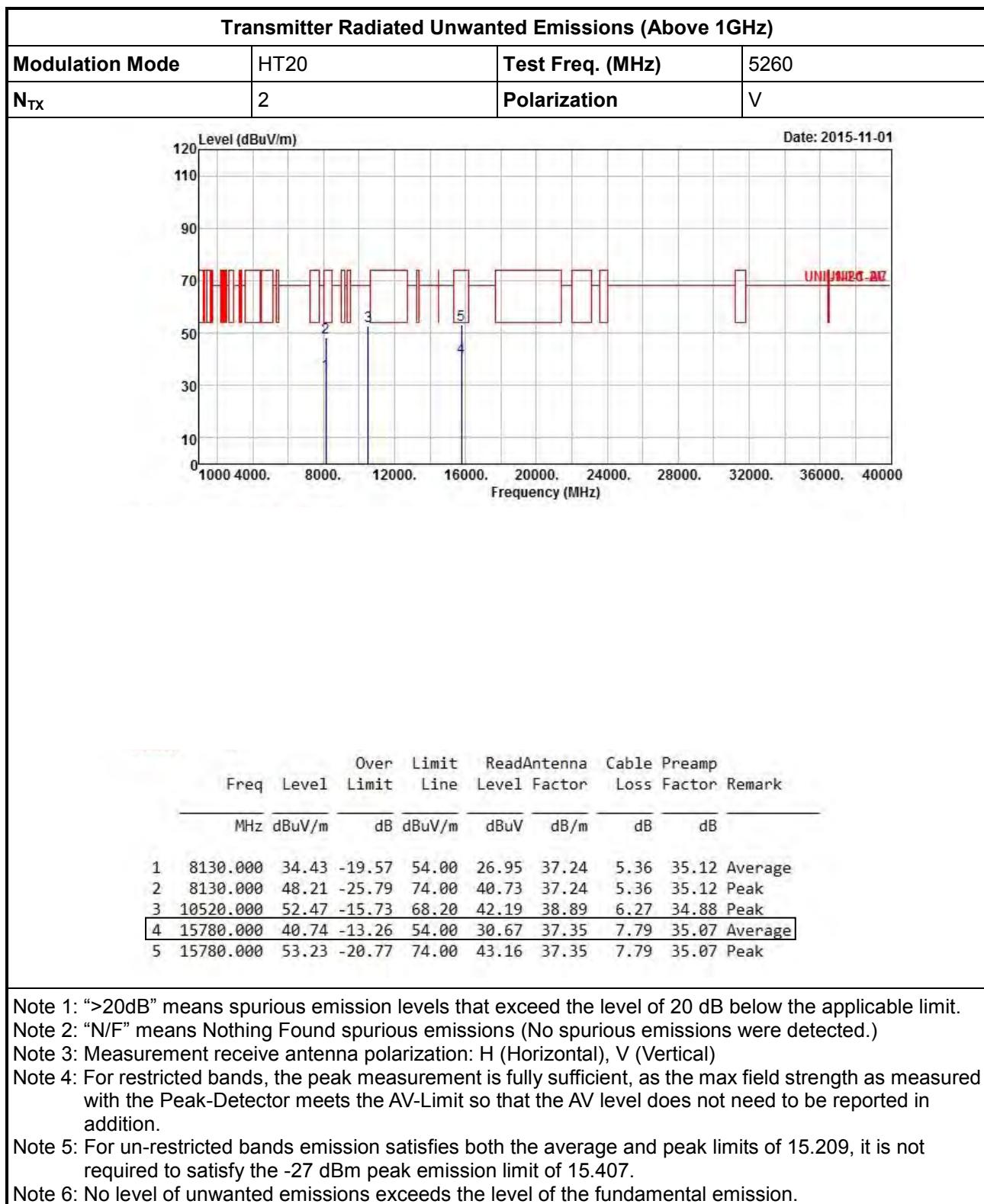
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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.

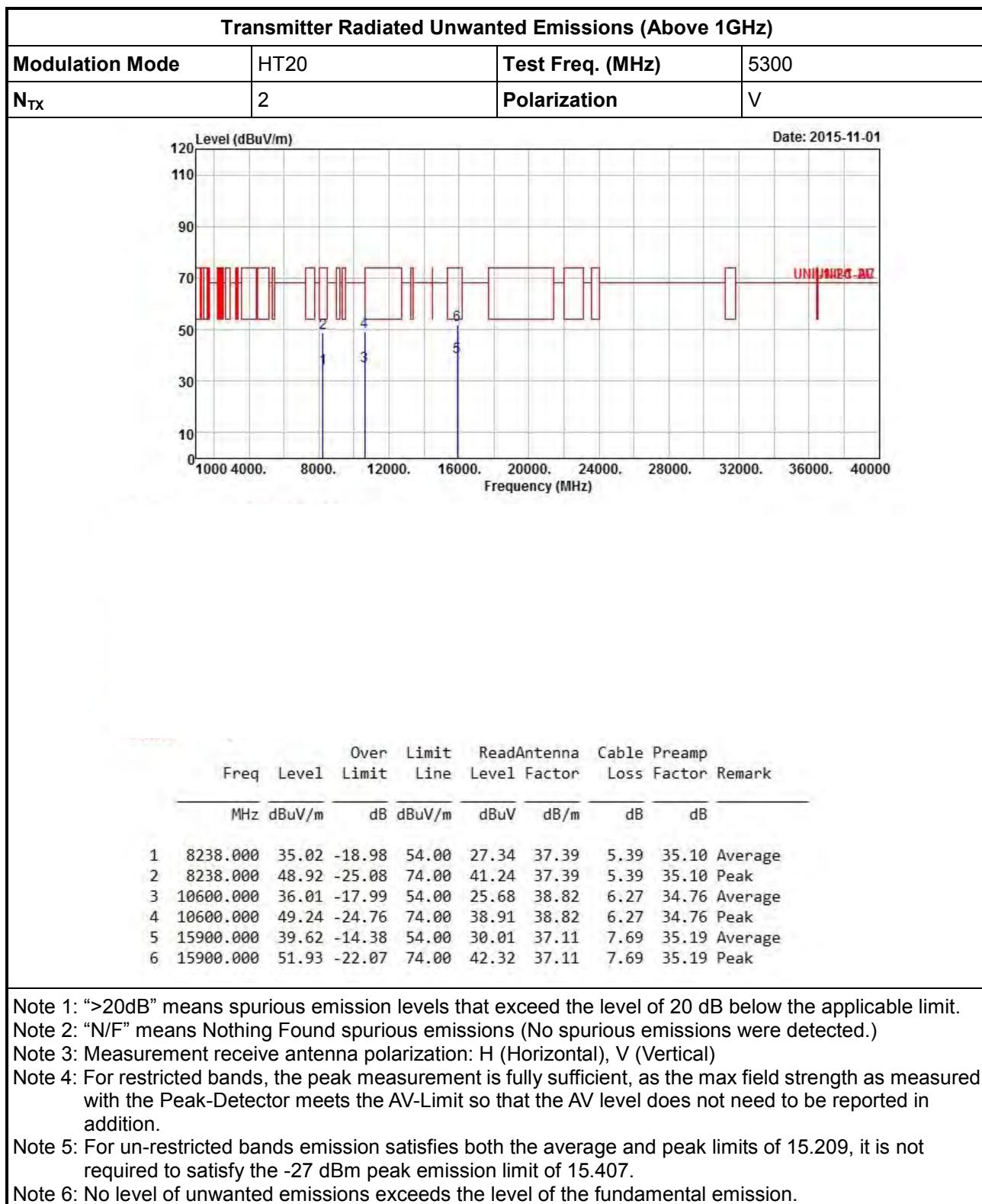
Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.

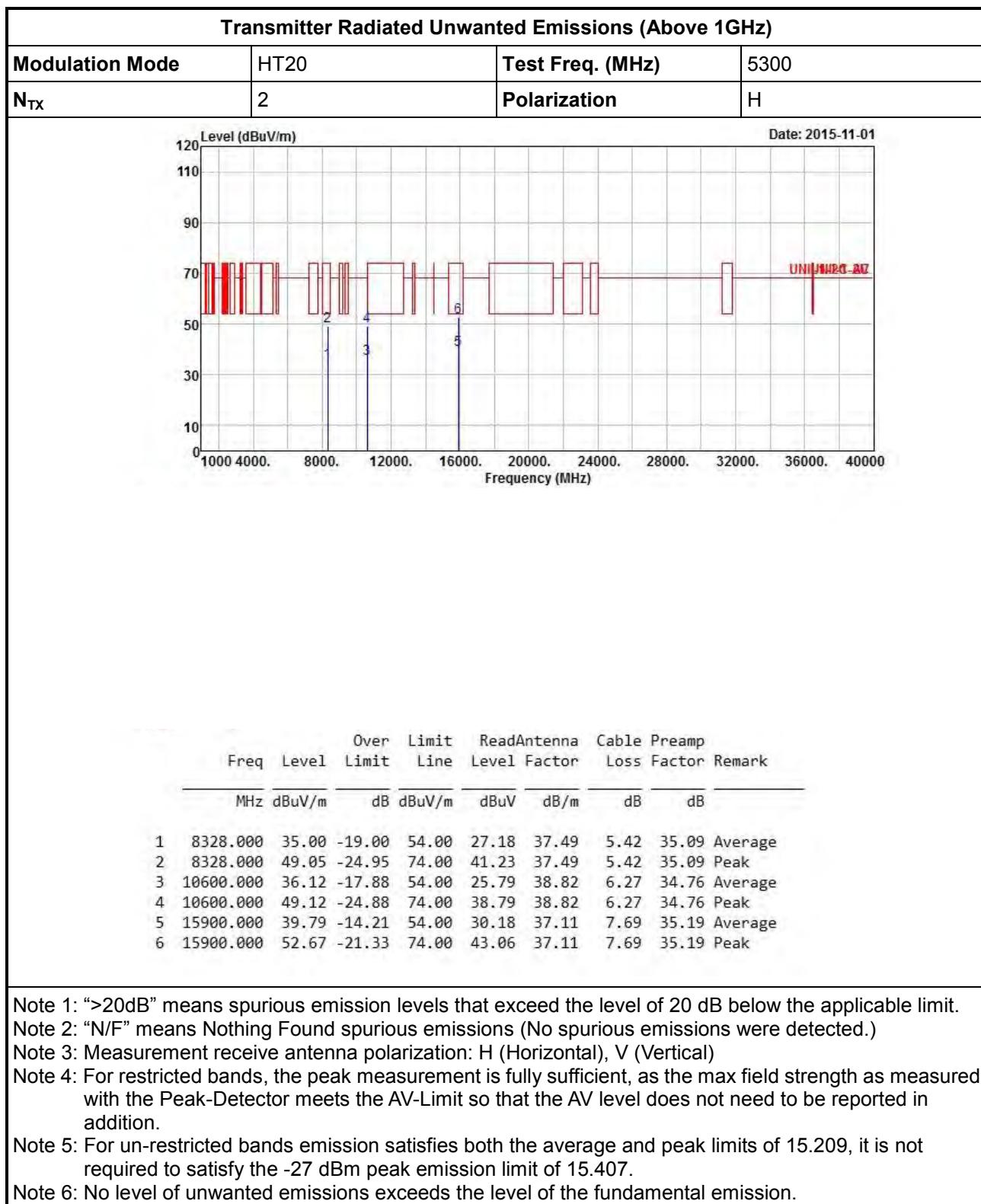
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

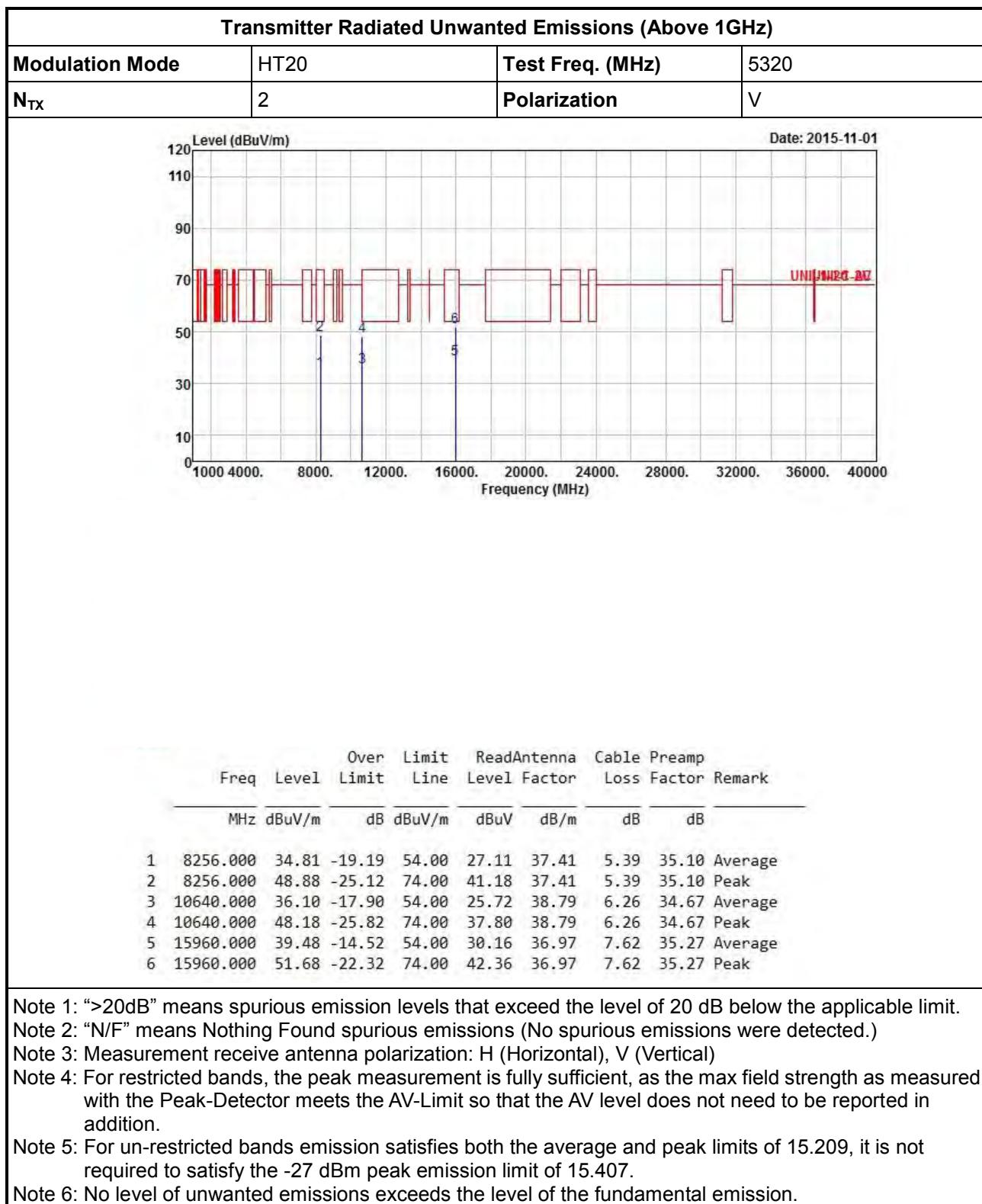


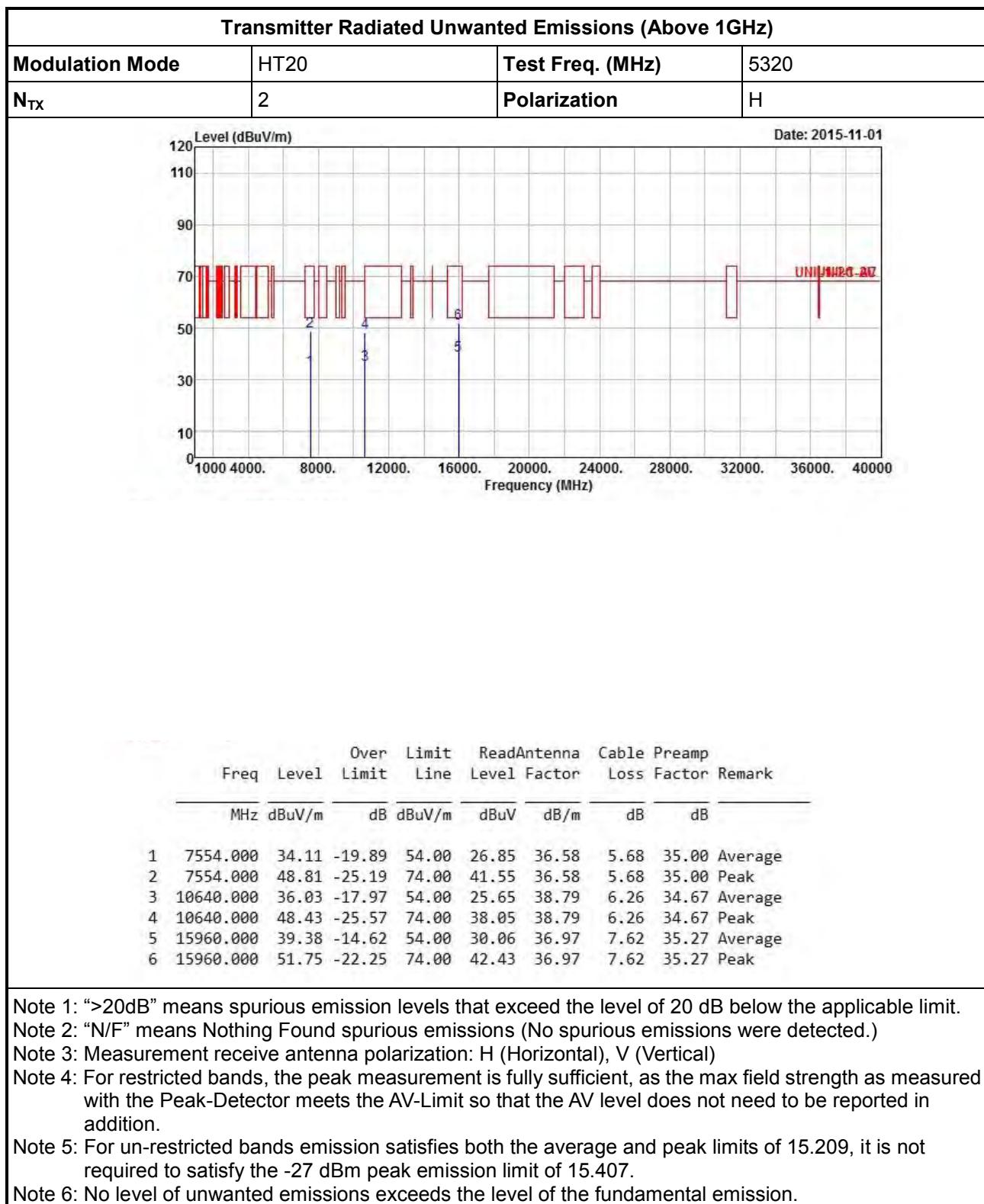


Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																														
Modulation Mode	HT20		Test Freq. (MHz)		5260																																																																									
N <sub>TX</sub>	2		Polarization		H																																																																									
Level (dB <sub>uV/m</sub> )									Date: 2015-11-01																																																																					
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Freq</th> <th rowspan="2">Level</th> <th>Over</th> <th>Limit</th> <th>Read</th> <th>Antenna</th> <th>Cable</th> <th>Preamp</th> <th rowspan="2">Remark</th> </tr> <tr> <th>Limit</th> <th>Line</th> <th>Level</th> <th>Factor</th> <th>Loss</th> <th>Factor</th> </tr> </thead> <tbody> <tr> <td>MHz</td> <td>dB<sub>uV/m</sub></td> <td>dB</td> <td>dB<sub>uV/m</sub></td> <td>dB<sub>uV</sub></td> <td>dB/m</td> <td>dB</td> <td>dB</td> <td></td> </tr> <tr> <td>1</td> <td>8454.000</td> <td>35.09</td> <td>-18.91</td> <td>54.00</td> <td>27.07</td> <td>37.64</td> <td>5.45</td> <td>35.07 Average</td> </tr> <tr> <td>2</td> <td>8454.000</td> <td>48.96</td> <td>-25.04</td> <td>74.00</td> <td>40.94</td> <td>37.64</td> <td>5.45</td> <td>35.07 Peak</td> </tr> <tr> <td>3</td> <td>10520.000</td> <td>52.57</td> <td>-15.63</td> <td>68.20</td> <td>42.29</td> <td>38.89</td> <td>6.27</td> <td>34.88 Peak</td> </tr> <tr> <td>4</td> <td>15780.000</td> <td>40.72</td> <td>-13.28</td> <td>54.00</td> <td>30.65</td> <td>37.35</td> <td>7.79</td> <td>35.07 Average</td> </tr> <tr> <td>5</td> <td>15780.000</td> <td>54.15</td> <td>-19.85</td> <td>74.00</td> <td>44.08</td> <td>37.35</td> <td>7.79</td> <td>35.07 Peak</td> </tr> </tbody> </table>										Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Limit	Line	Level	Factor	Loss	Factor	MHz	dB <sub>uV/m</sub>	dB	dB <sub>uV/m</sub>	dB <sub>uV</sub>	dB/m	dB	dB		1	8454.000	35.09	-18.91	54.00	27.07	37.64	5.45	35.07 Average	2	8454.000	48.96	-25.04	74.00	40.94	37.64	5.45	35.07 Peak	3	10520.000	52.57	-15.63	68.20	42.29	38.89	6.27	34.88 Peak	4	15780.000	40.72	-13.28	54.00	30.65	37.35	7.79	35.07 Average	5	15780.000	54.15	-19.85	74.00	44.08	37.35	7.79	35.07 Peak
Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark																																																																						
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1	8454.000	35.09	-18.91	54.00	27.07	37.64	5.45	35.07 Average																																																																						
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Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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

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



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

Modulation Mode	HT40	Test Freq. (MHz)	5270
N <sub>TX</sub>	2	Polarization	V

Level (dBuV/m)      Date: 2015-11-01

Frequency (MHz)

Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark
		Limit	Line					
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 7152.000	48.48	-19.72	68.20	42.52	35.60	5.28	34.92	Peak
2 10540.000	51.53	-16.67	68.20	41.23	38.87	6.27	34.84	Peak
3 15810.000	40.45	-13.55	54.00	30.51	37.28	7.76	35.10	Average
4 15810.000	54.78	-19.22	74.00	44.84	37.28	7.76	35.10	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.

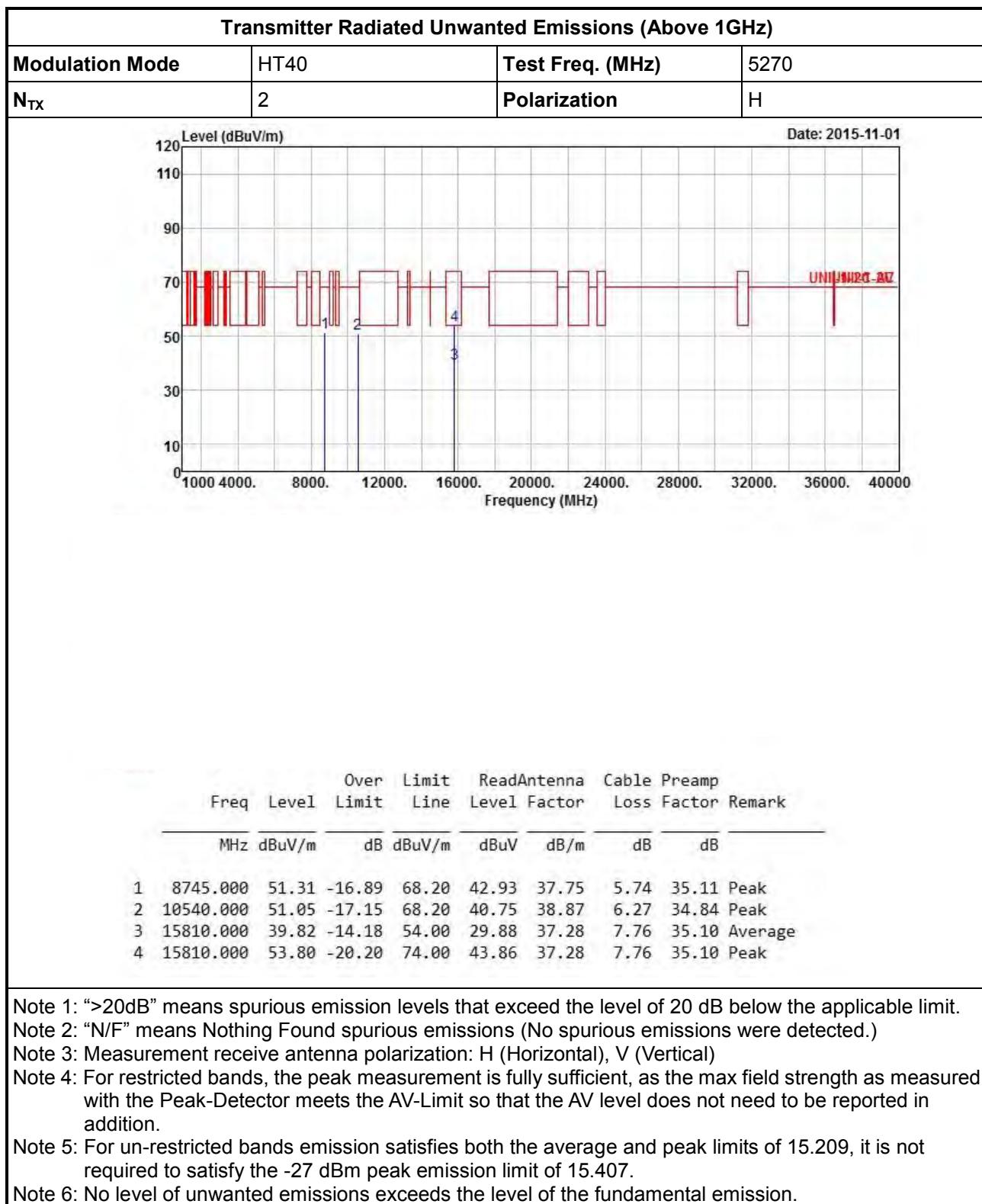
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

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

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

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





Transmitter Radiated Unwanted Emissions (Above 1GHz)									
Modulation Mode	HT40		Test Freq. (MHz)		5310				
N <sub>TX</sub>	2		Polarization		V				
Level (dB <sub>u</sub> V/m)									Date: 2015-11-01
1	8452.000	37.65	-16.35	54.00	29.63	37.64	5.45	35.07	Average
2	8452.000	50.83	-23.17	74.00	42.81	37.64	5.45	35.07	Peak
3	10620.000	36.98	-17.02	54.00	26.64	38.80	6.26	34.72	Average
4	10620.000	50.58	-23.42	74.00	40.24	38.80	6.26	34.72	Peak
5	15930.000	39.47	-14.53	54.00	29.98	37.04	7.66	35.21	Average
6	15930.000	53.47	-20.53	74.00	43.98	37.04	7.66	35.21	Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.  
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)  
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)  
 Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.  
 Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.  
 Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.



Transmitter Radiated Unwanted Emissions (Above 1GHz)																	
Modulation Mode		HT40		Test Freq. (MHz)		5310											
N <sub>TX</sub>	2			Polarization		H											
Level (dB <sub>u</sub> V/m)																	
Date: 2015-11-01																	
1	7652.000	35.75	-18.25	54.00	28.52	36.68	5.58	35.03	Average								
2	7652.000	49.98	-24.02	74.00	42.75	36.68	5.58	35.03	Peak								
3	10620.000	36.38	-17.62	54.00	26.04	38.80	6.26	34.72	Average								
4	10620.000	50.37	-23.63	74.00	40.03	38.80	6.26	34.72	Peak								
5	15930.000	38.11	-15.89	54.00	28.62	37.04	7.66	35.21	Average								
6	15930.000	52.26	-21.74	74.00	42.77	37.04	7.66	35.21	Peak								

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.  
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)  
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)  
 Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.  
 Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.  
 Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.



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

Transmitter Radiated Unwanted Emissions (Above 1GHz)									
Modulation Mode	11a	Test Freq. (MHz)		5500					
N <sub>TX</sub>	2	Polarization		V					
Level (dBuV/m)									Date: 2015-11-01
1000	4000.	8000.	12000.	16000.	20000.	24000.	28000.	32000.	36000. 40000
120	110	100	90	80	70	60	50	40	30 20 10 0
7742.000	7742.000	11000.000	11000.000	16500.000					
34.58	48.51	39.13	51.41	54.82					
-19.42	-25.49	-14.87	-22.59	-13.38					
54.00	74.00	54.00	74.00	68.20					
27.32	41.25	28.50	40.78	42.99					
36.80	36.80	38.50	38.50	37.90					
5.51	5.51	6.23	6.23	8.70					
35.05	35.05	34.10	34.10	34.77					
Average	Peak	Average	Peak	Peak					

Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 7742.000	34.58	-19.42	54.00	27.32	36.80	5.51	35.05	Average
2 7742.000	48.51	-25.49	74.00	41.25	36.80	5.51	35.05	Peak
3 11000.000	39.13	-14.87	54.00	28.50	38.50	6.23	34.10	Average
4 11000.000	51.41	-22.59	74.00	40.78	38.50	6.23	34.10	Peak
5 16500.000	54.82	-13.38	68.20	42.99	37.90	8.70	34.77	Peak

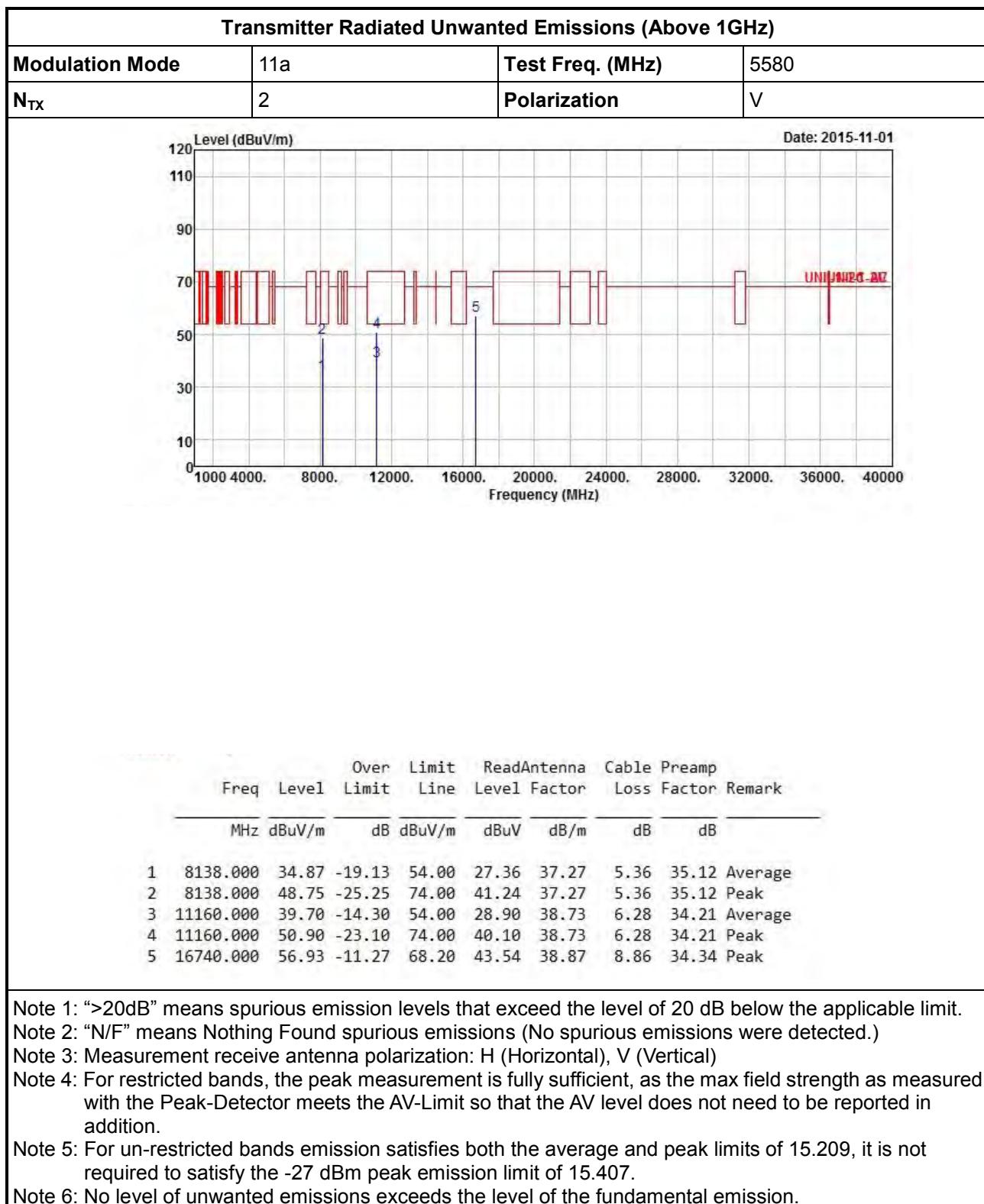
  

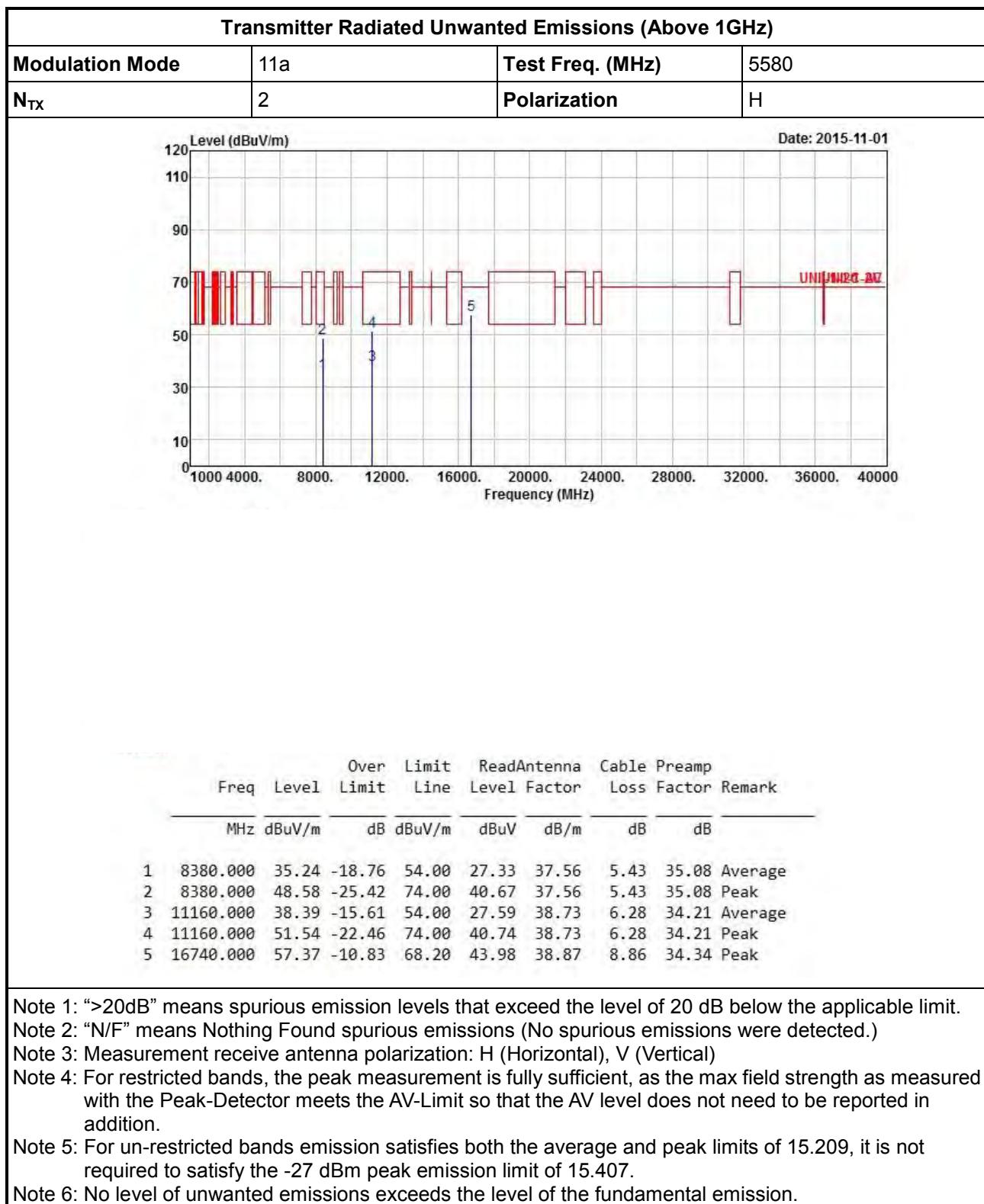
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.  
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)  
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)  
 Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.  
 Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.  
 Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

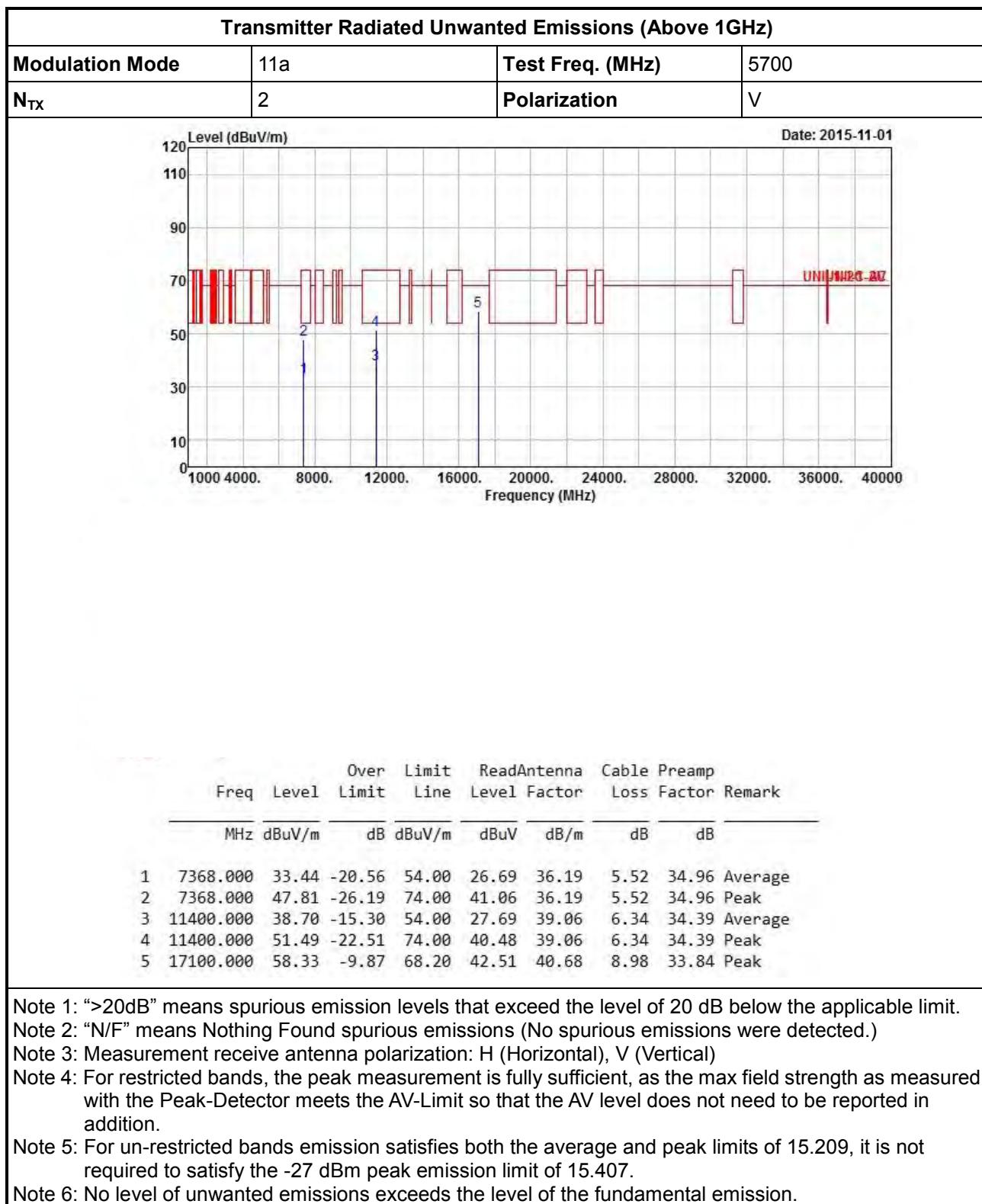


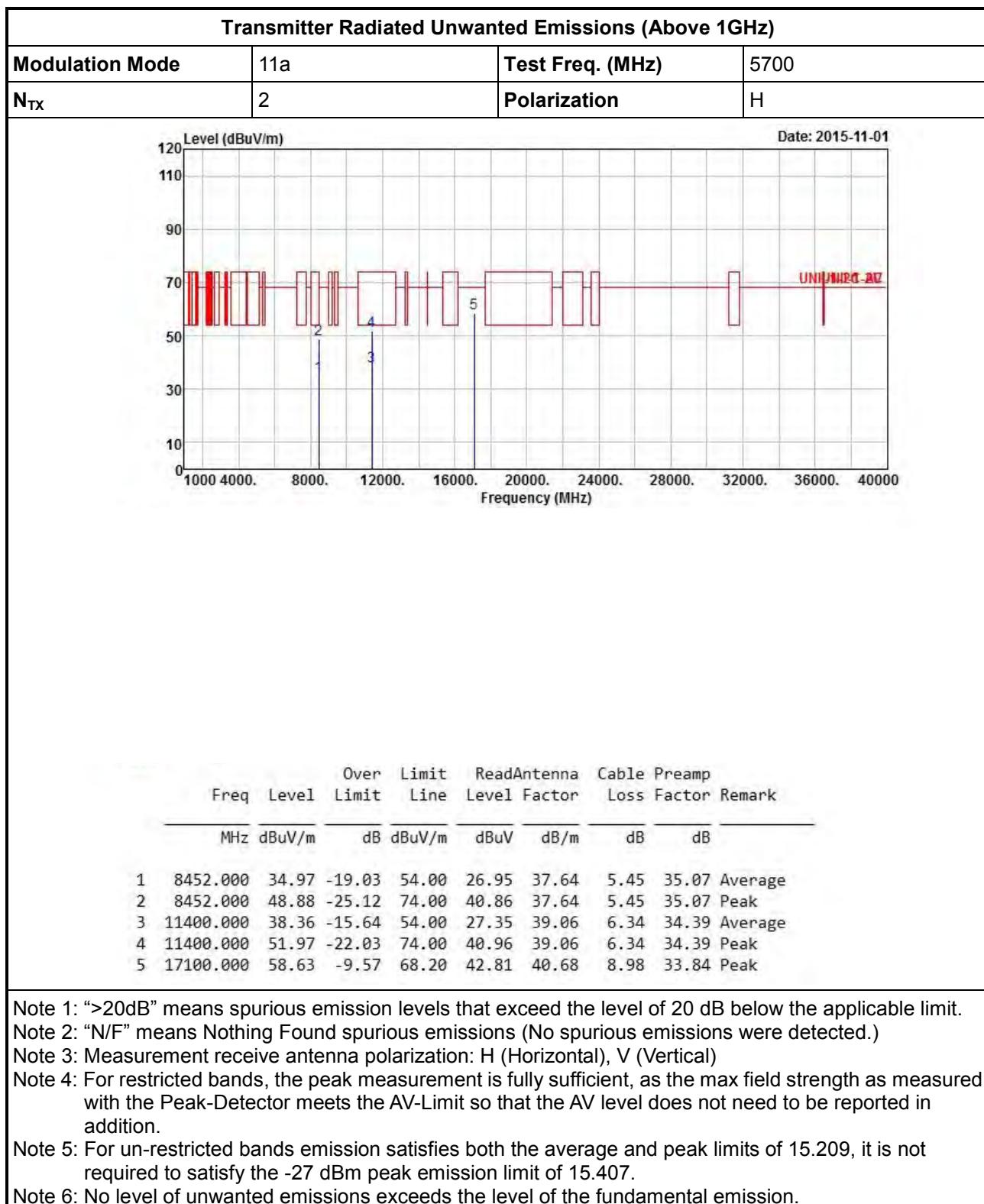
## Transmitter Radiated Unwanted Emissions (Above 1GHz)

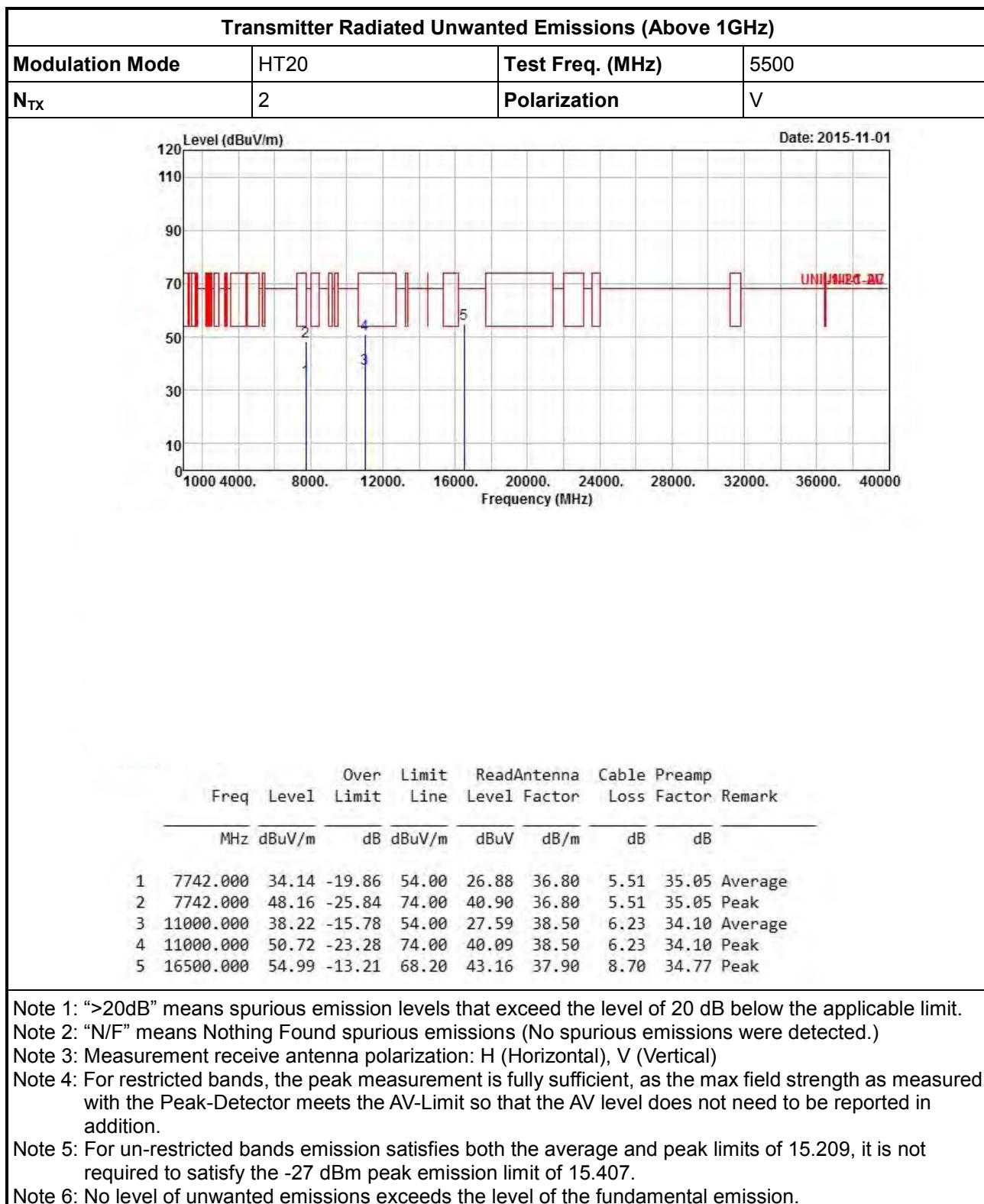
Modulation Mode	11a	Test Freq. (MHz)	5500																																																
N <sub>TX</sub>	2	Polarization	H																																																
			Date: 2015-11-01																																																
<table border="1"> <thead> <tr> <th>Freq</th> <th>Level</th> <th>Over Limit</th> <th>Limit</th> <th>Read</th> <th>Antenna</th> <th>Cable</th> <th>Preamp</th> </tr> <tr> <th>MHz</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV/m</th> <th>dBuV</th> <th>dB/m</th> <th>dB</th> <th>dB</th> </tr> </thead> <tbody> <tr> <td>1 8534.000</td> <td>49.48</td> <td>-18.72</td> <td>68.20</td> <td>41.33</td> <td>37.71</td> <td>5.50</td> <td>35.06 Peak</td> </tr> <tr> <td>2 11000.000</td> <td>38.35</td> <td>-15.65</td> <td>54.00</td> <td>27.72</td> <td>38.50</td> <td>6.23</td> <td>34.10 Average</td> </tr> <tr> <td>3 11000.000</td> <td>50.67</td> <td>-23.33</td> <td>74.00</td> <td>40.04</td> <td>38.50</td> <td>6.23</td> <td>34.10 Peak</td> </tr> <tr> <td>4 16500.000</td> <td>54.26</td> <td>-13.94</td> <td>68.20</td> <td>42.43</td> <td>37.90</td> <td>8.70</td> <td>34.77 Peak</td> </tr> </tbody> </table>			Freq	Level	Over Limit	Limit	Read	Antenna	Cable	Preamp	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	1 8534.000	49.48	-18.72	68.20	41.33	37.71	5.50	35.06 Peak	2 11000.000	38.35	-15.65	54.00	27.72	38.50	6.23	34.10 Average	3 11000.000	50.67	-23.33	74.00	40.04	38.50	6.23	34.10 Peak	4 16500.000	54.26	-13.94	68.20	42.43	37.90	8.70	34.77 Peak	Remark
Freq	Level	Over Limit	Limit	Read	Antenna	Cable	Preamp																																												
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB																																												
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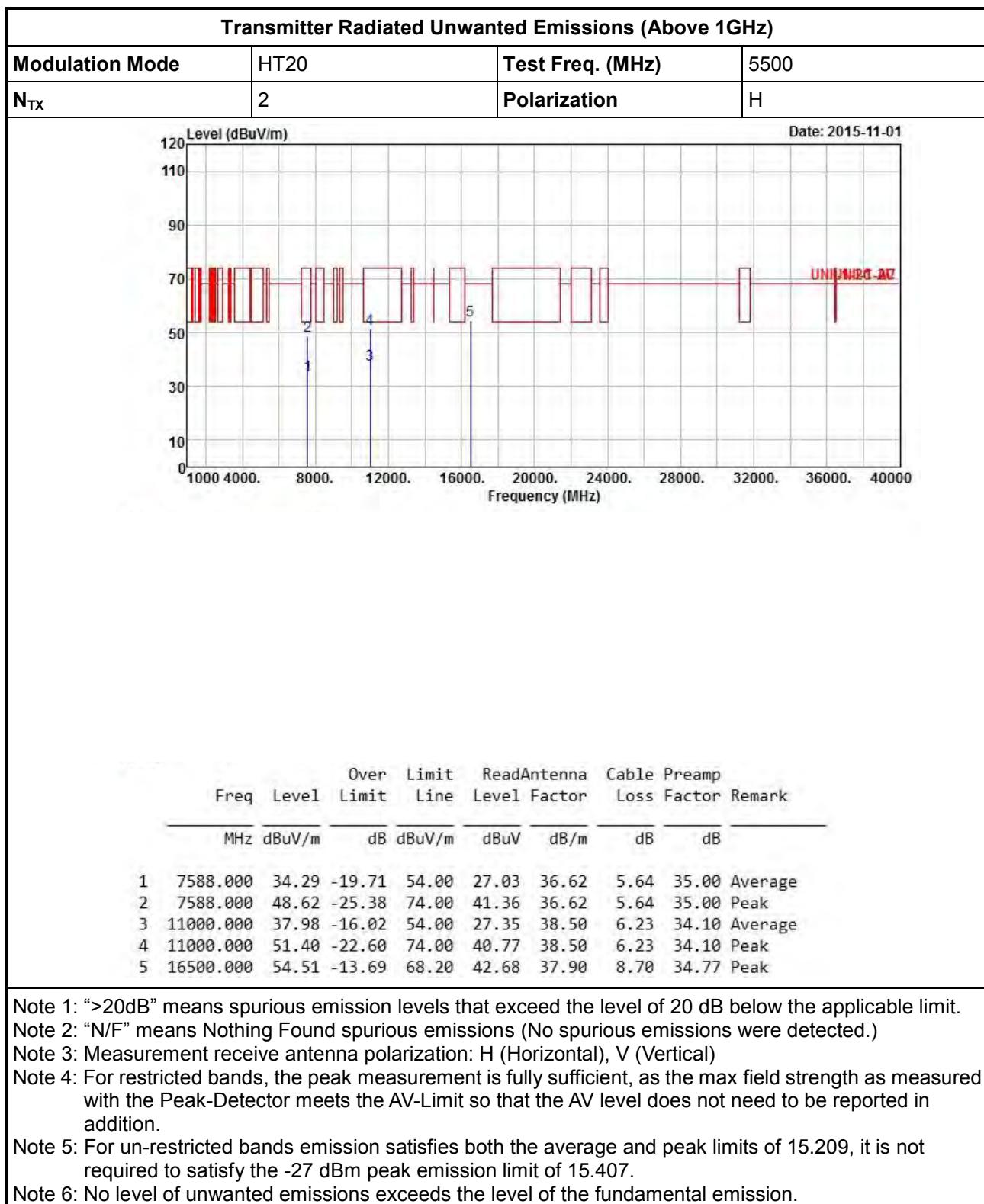


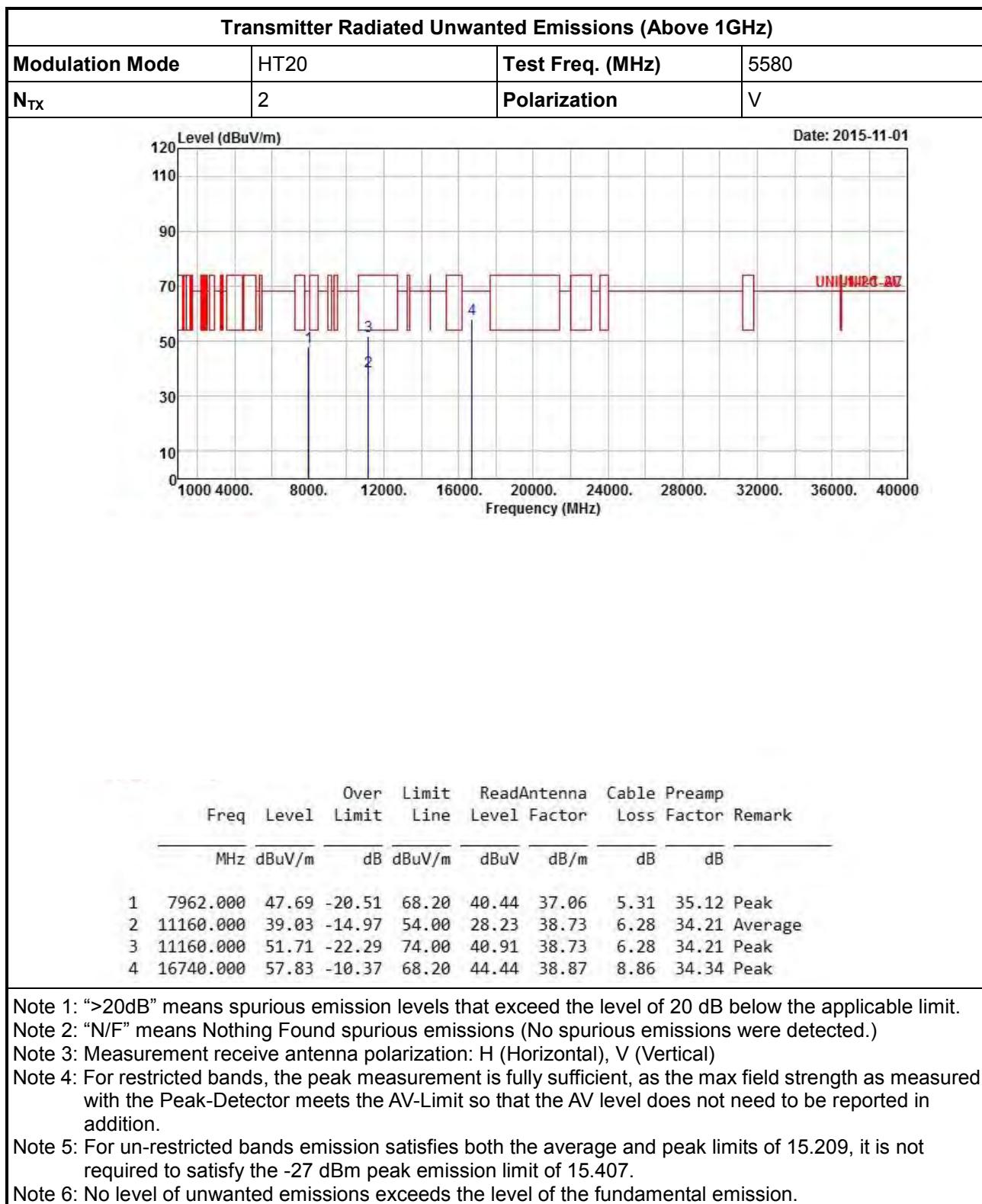


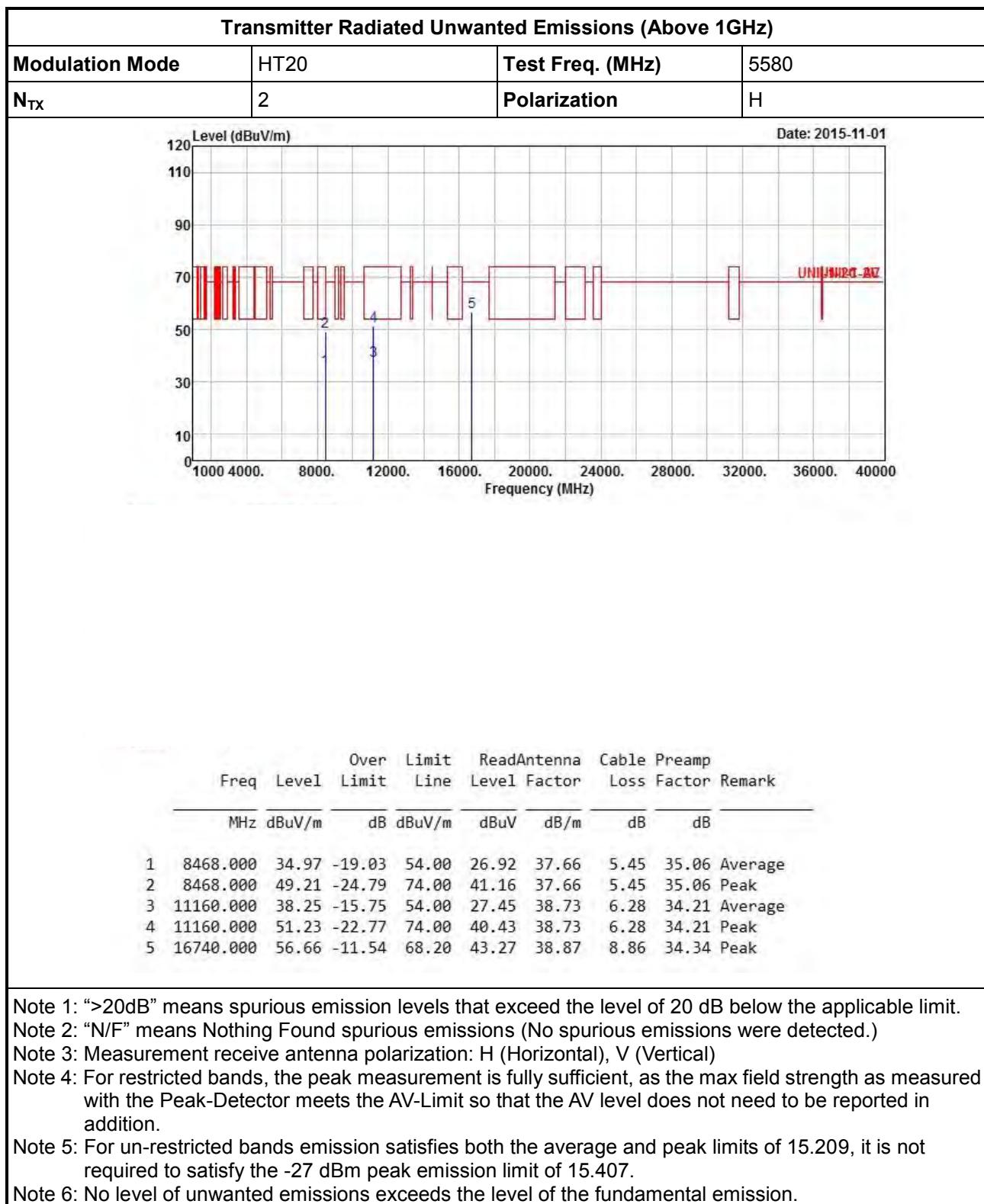


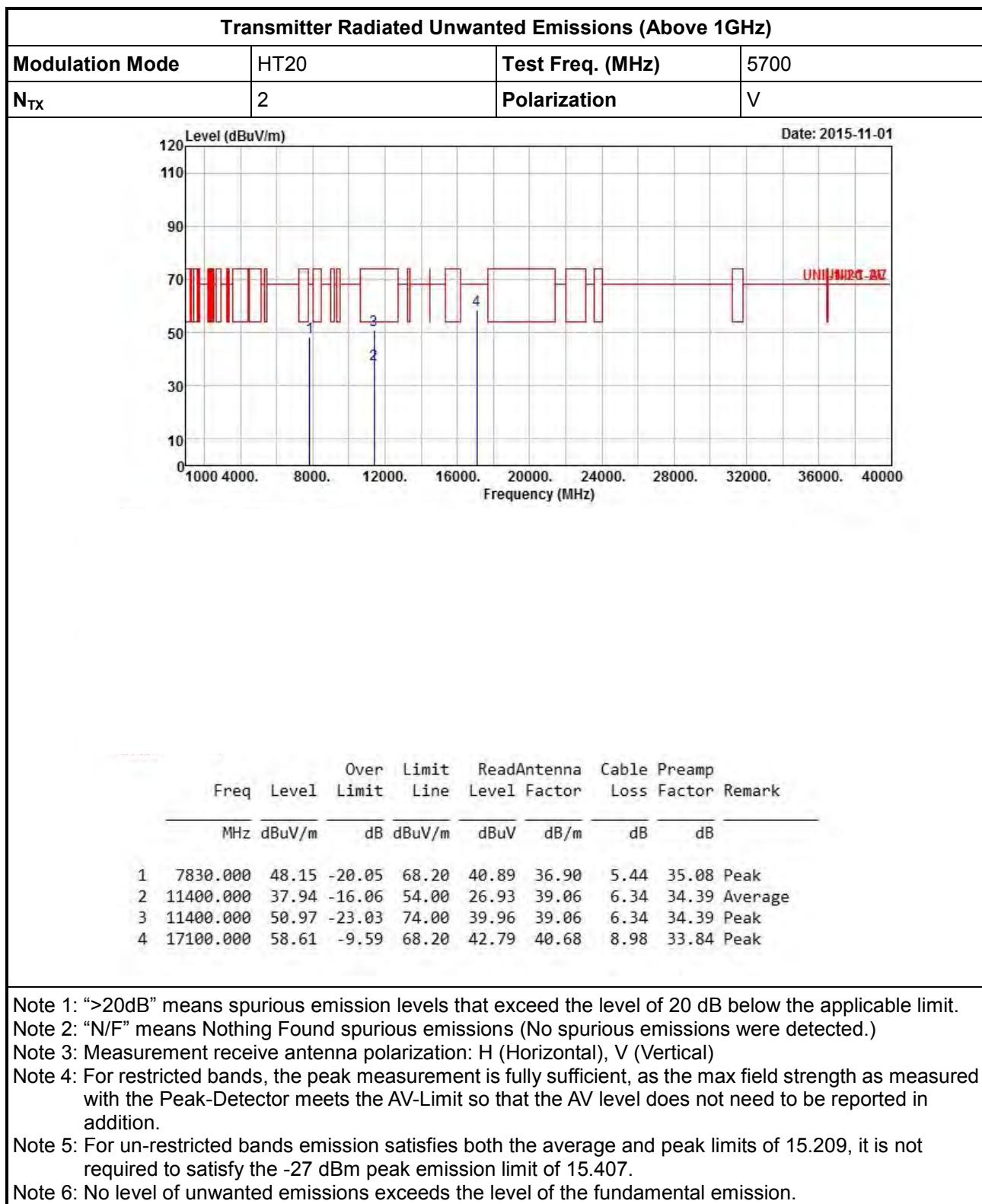












Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

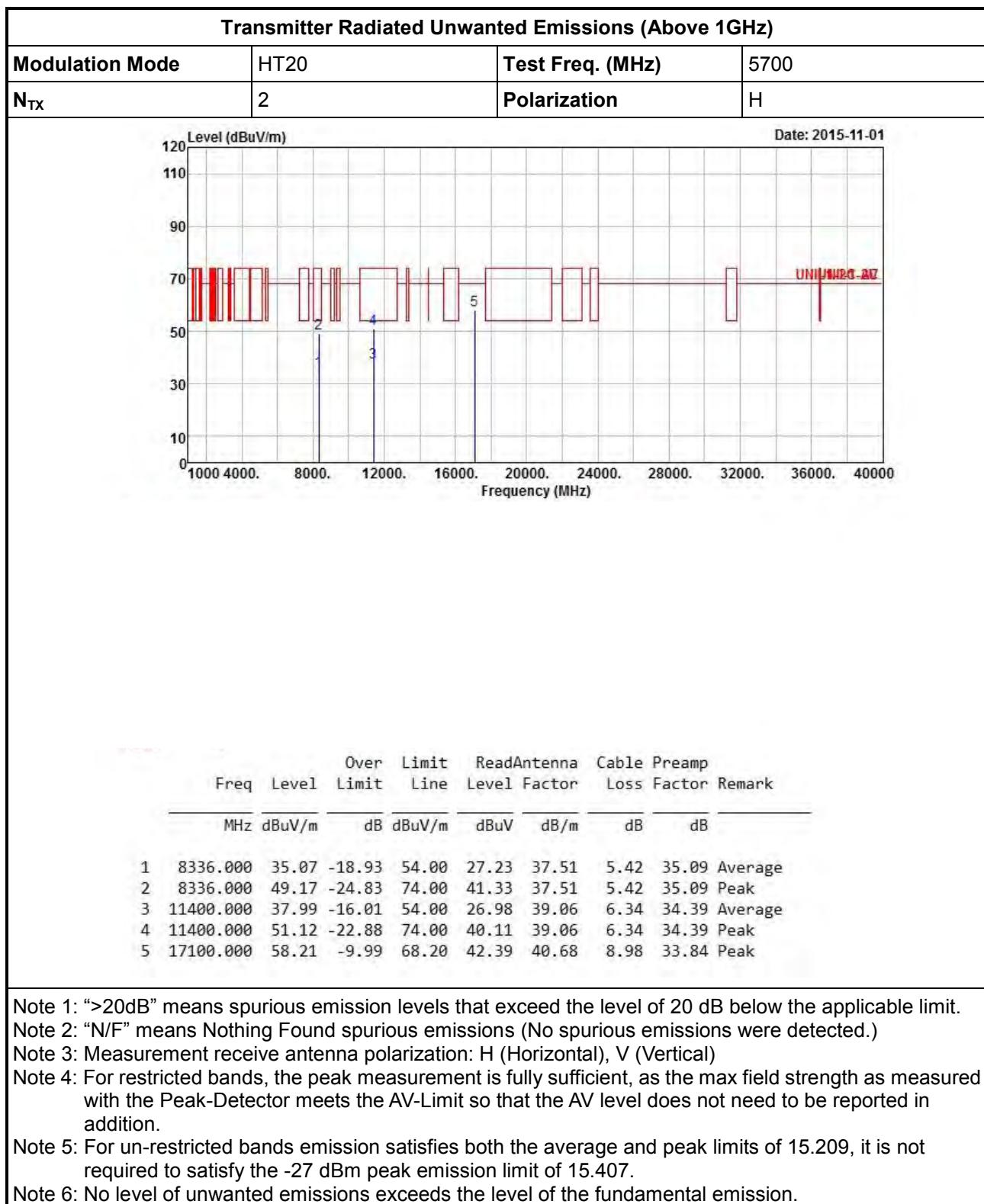
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

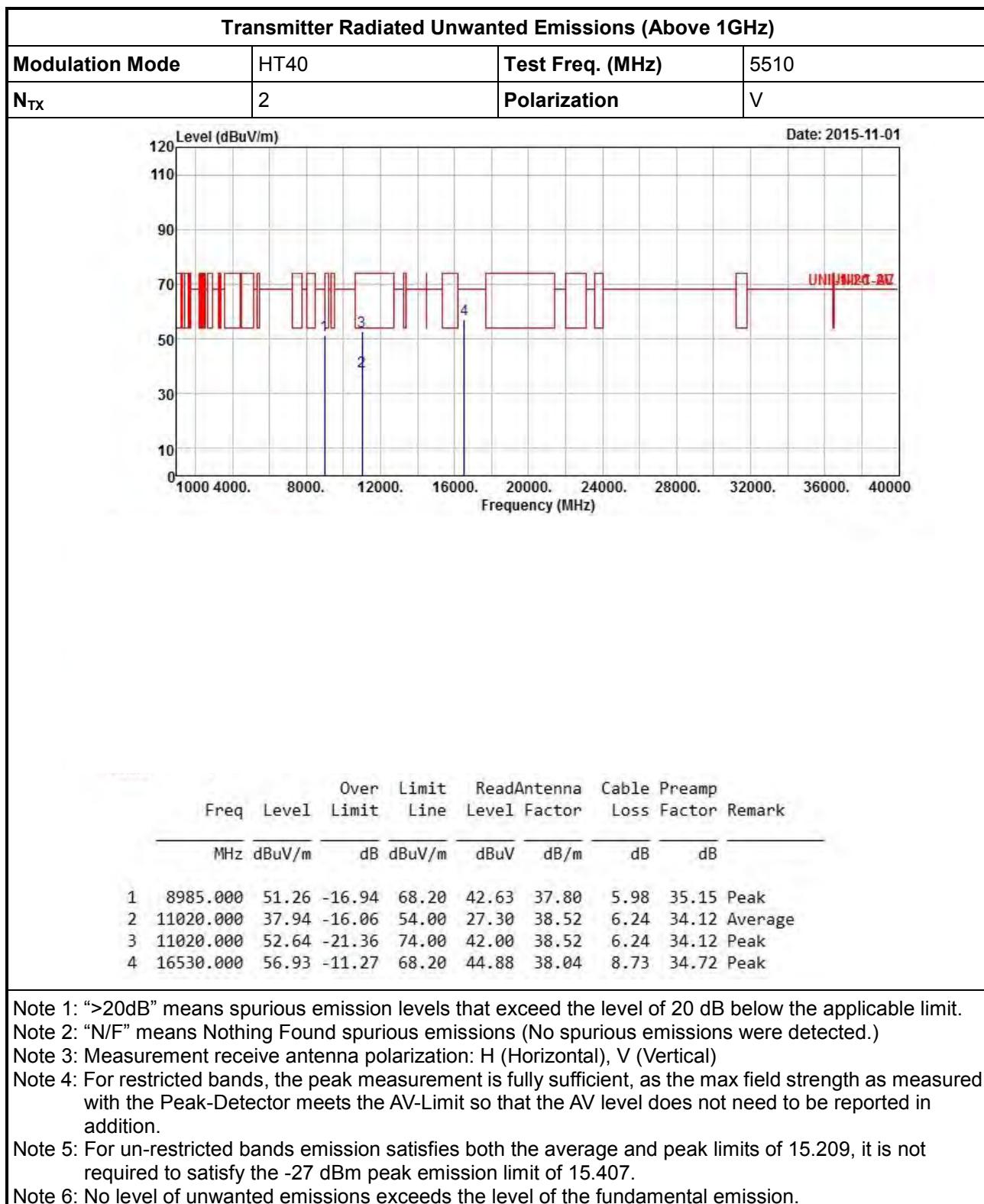
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

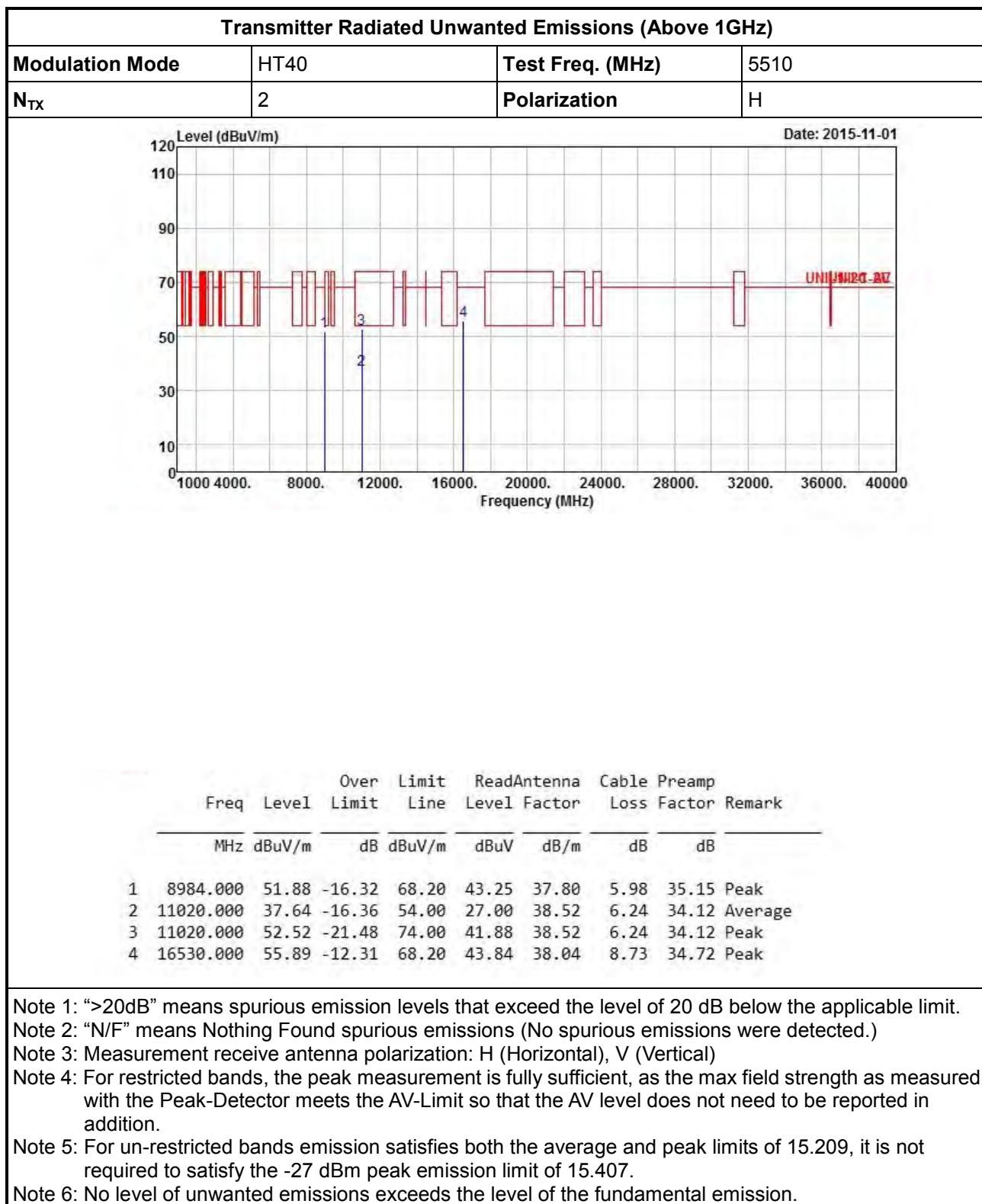
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

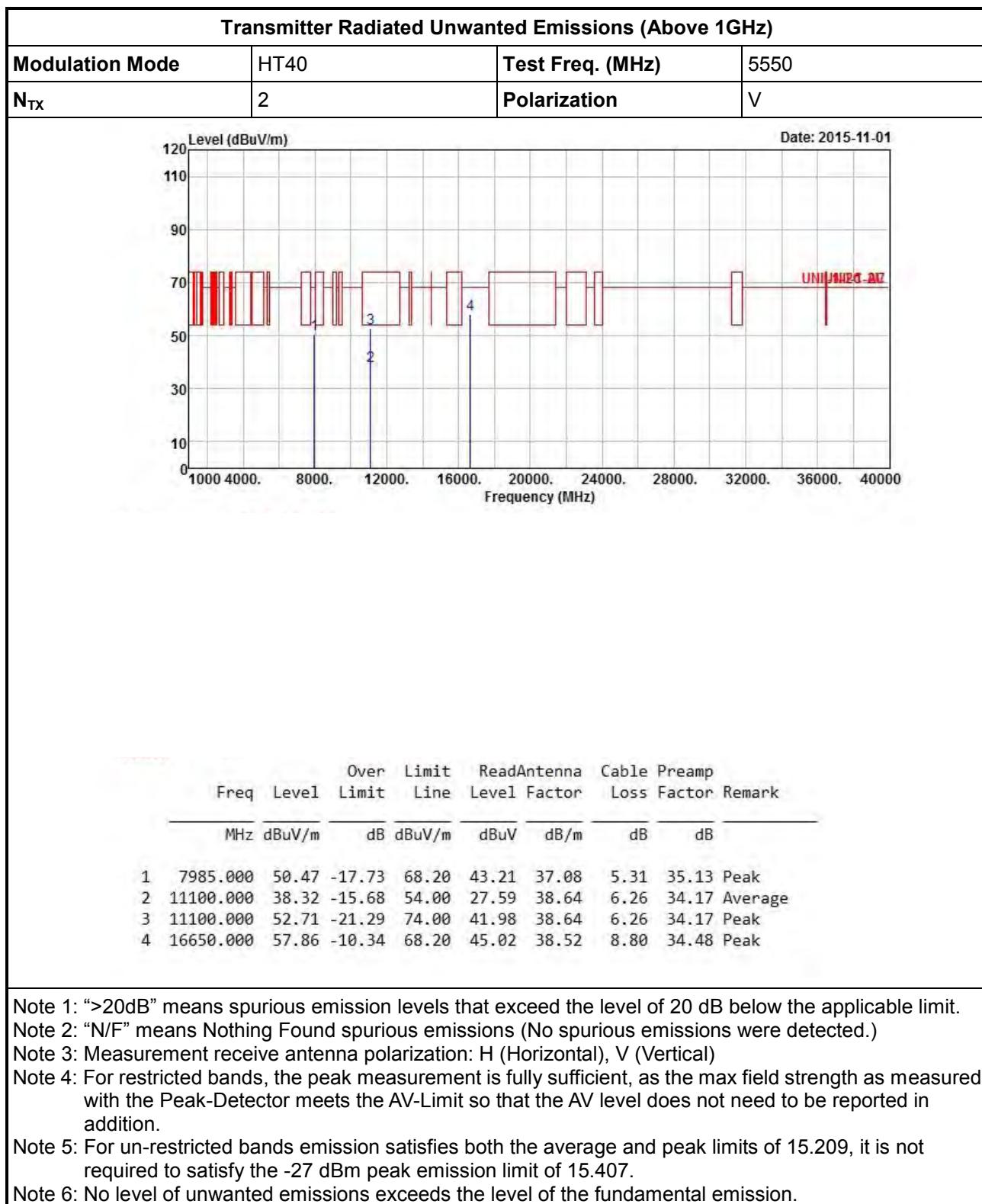
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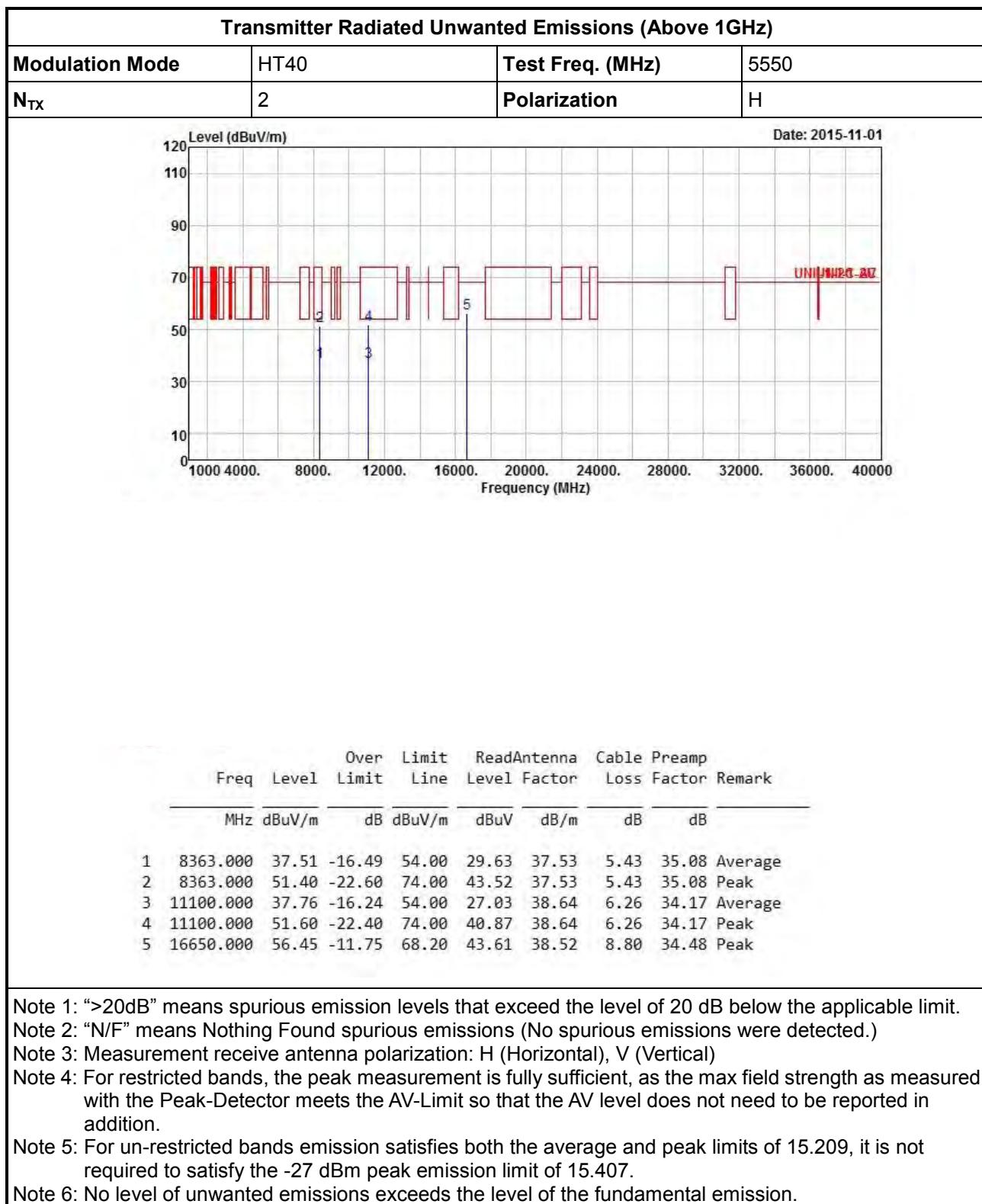
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

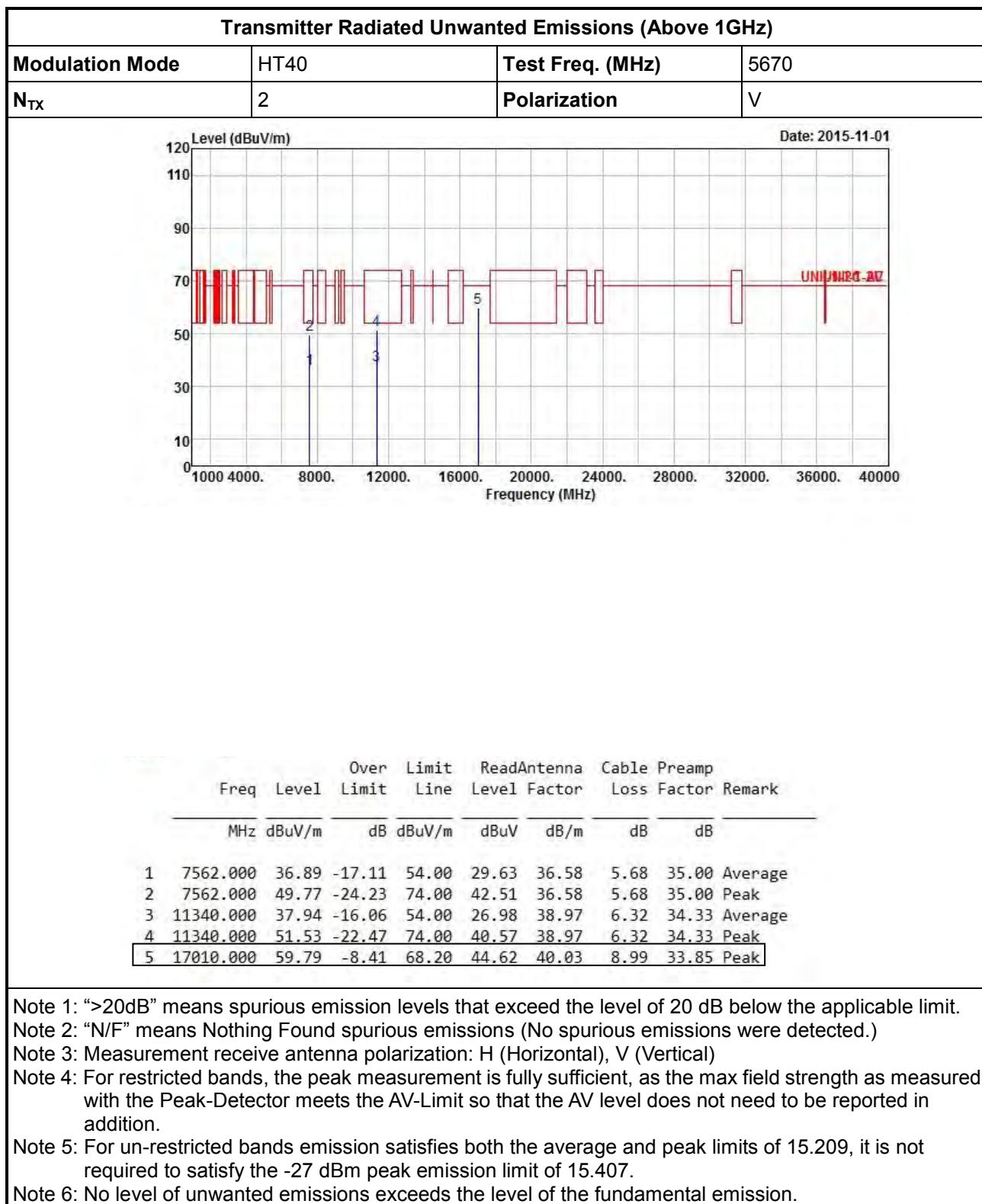


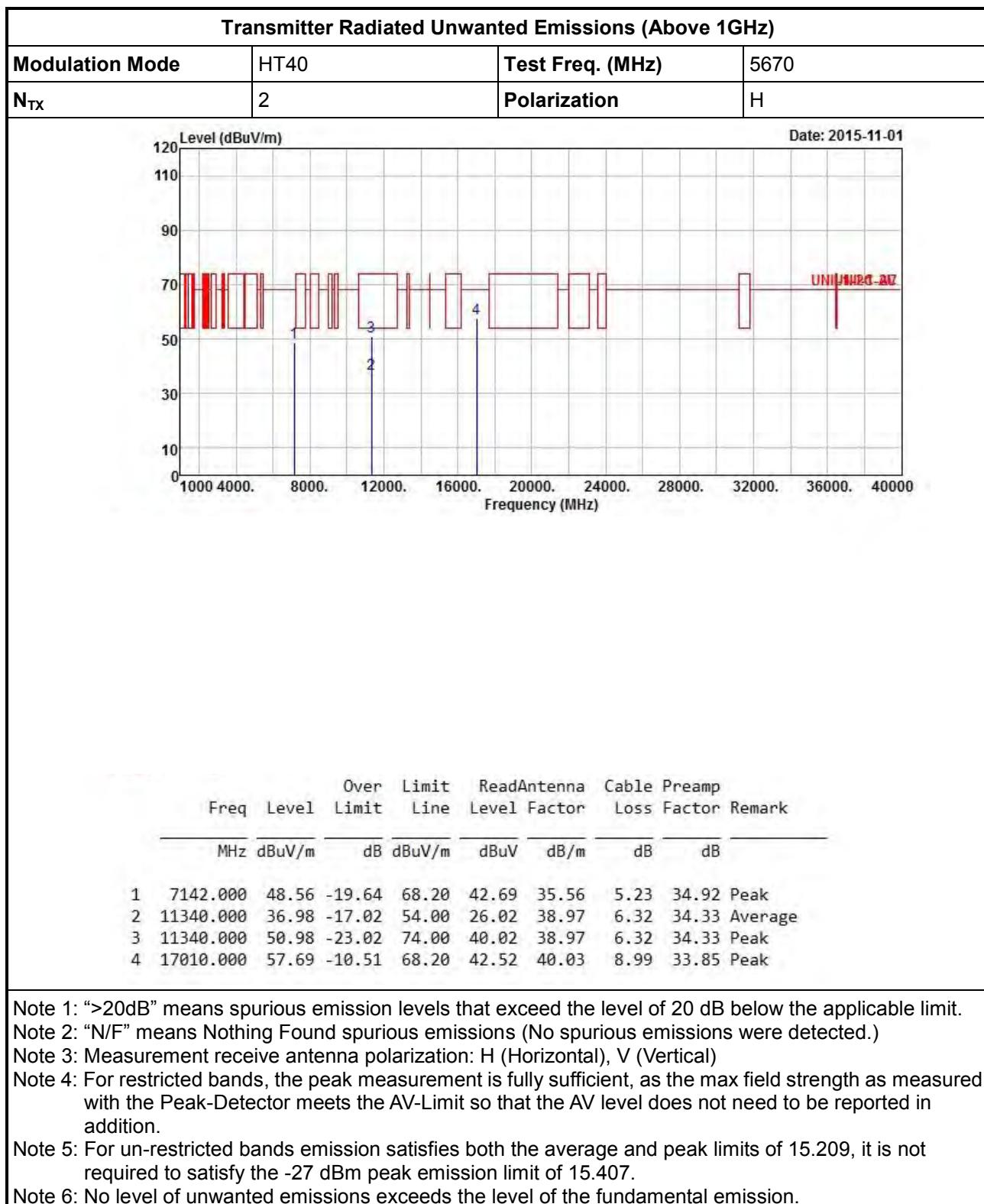








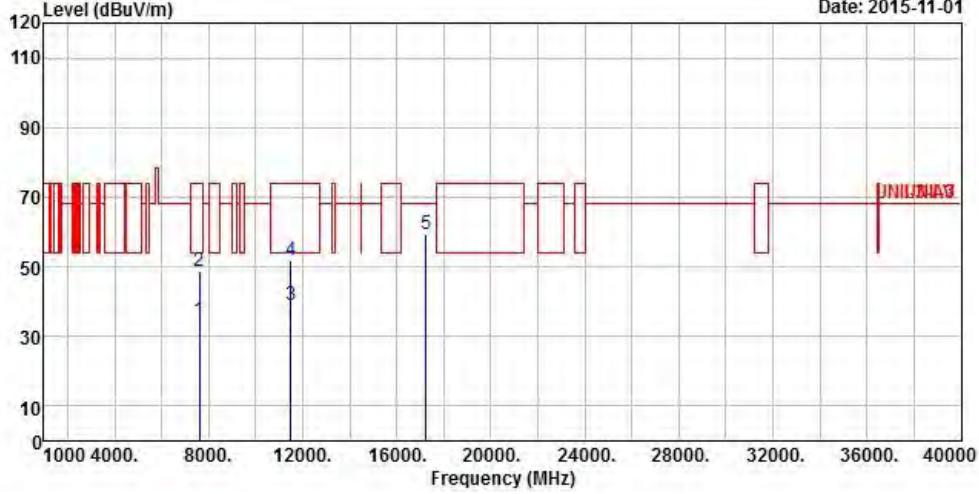






## 3.6.10 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 5725-5850MHz

## Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5745																																																																
N <sub>TX</sub>	2	Polarization	V																																																																
																																																																			
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## Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11a	Test Freq. (MHz)	5745																												
N <sub>TX</sub>	2	Polarization	H																												
			Date: 2015-11-01																												
<table border="1"><thead><tr><th></th><th>Over Limit</th><th>Line</th><th>Read</th><th>Antenna</th><th>Cable</th><th>Preamp</th><th></th></tr><tr><th>Freq</th><th>Level</th><th>Limit</th><th>Level</th><th>Antenna</th><th>Cable</th><th>Loss</th><th>Factor</th></tr></thead><tbody><tr><td>MHz</td><td>dBuV/m</td><td>dB</td><td>dBuV/m</td><td>dBuV</td><td>dB/m</td><td>dB</td><td>dB</td></tr></tbody></table>									Over Limit	Line	Read	Antenna	Cable	Preamp		Freq	Level	Limit	Level	Antenna	Cable	Loss	Factor	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB
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1 7720.000 34.36 -19.64 54.00 27.11 36.76 5.54 35.05 Average				2 7720.000 48.27 -25.73 74.00 41.02 36.76 5.54 35.05 Peak																											
3 11490.000 38.80 -15.20 54.00 27.70 39.18 6.36 34.44 Average				4 11490.000 51.52 -22.48 74.00 40.42 39.18 6.36 34.44 Peak																											
5 17235.000 60.60 -7.60 68.20 43.72 41.72 8.96 33.80 Peak																															
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**Transmitter Radiated Unwanted Emissions (Above 1GHz)**

Modulation Mode	11a	Test Freq. (MHz)	5785
N <sub>TX</sub>	2	Polarization	V

Date: 2015-11-01

Level (dBuV/m)

Frequency (MHz)

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	8688.000	49.47	-18.73	68.20	41.16	37.74	5.66	35.09 Peak
2	11570.000	42.78	-11.22	54.00	31.62	39.23	6.44	34.51 Average
3	11570.000	53.19	-20.81	74.00	42.03	39.23	6.44	34.51 Peak
4	17355.000	60.34	-7.86	68.20	42.55	42.63	8.94	33.78 Peak

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

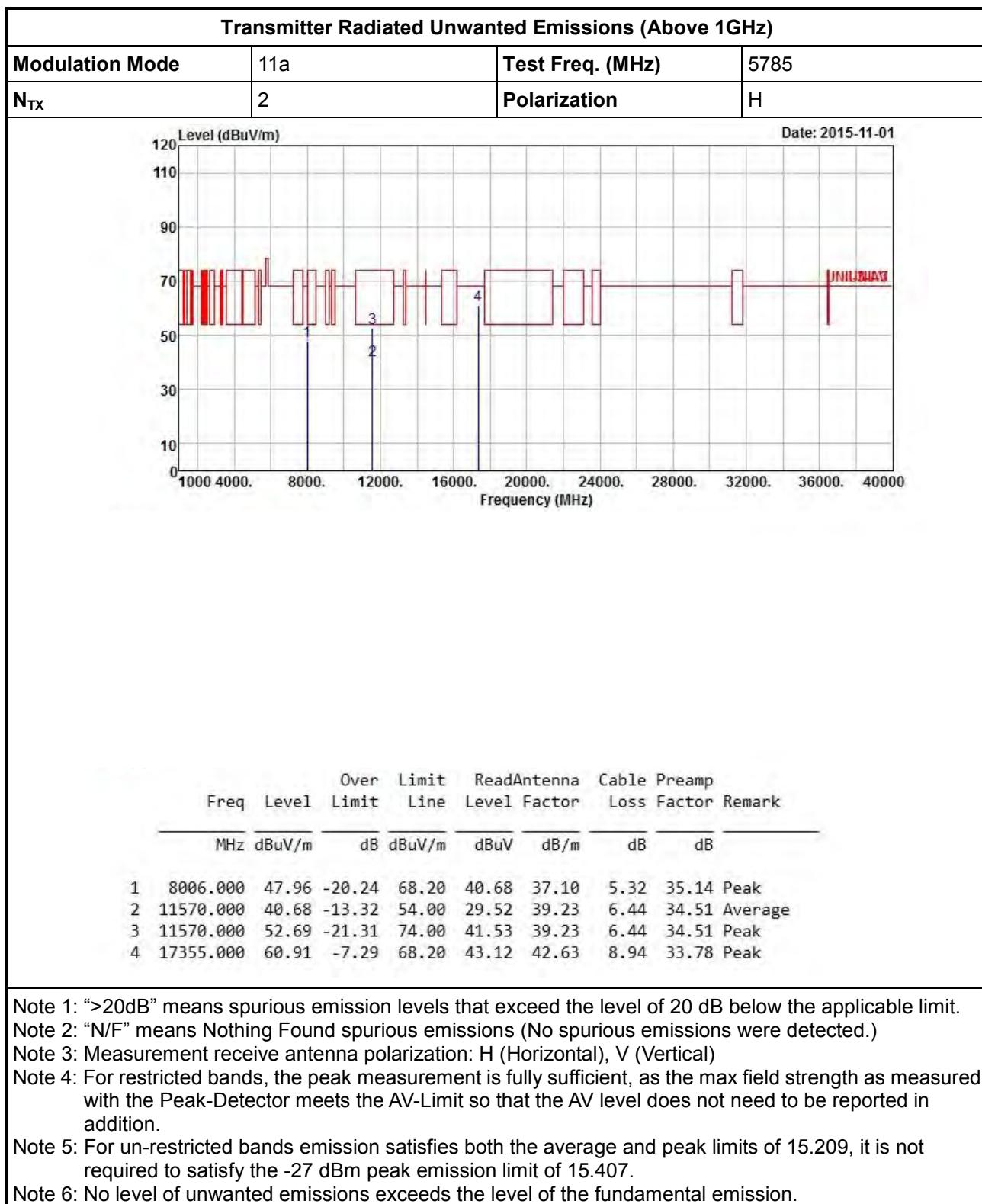
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

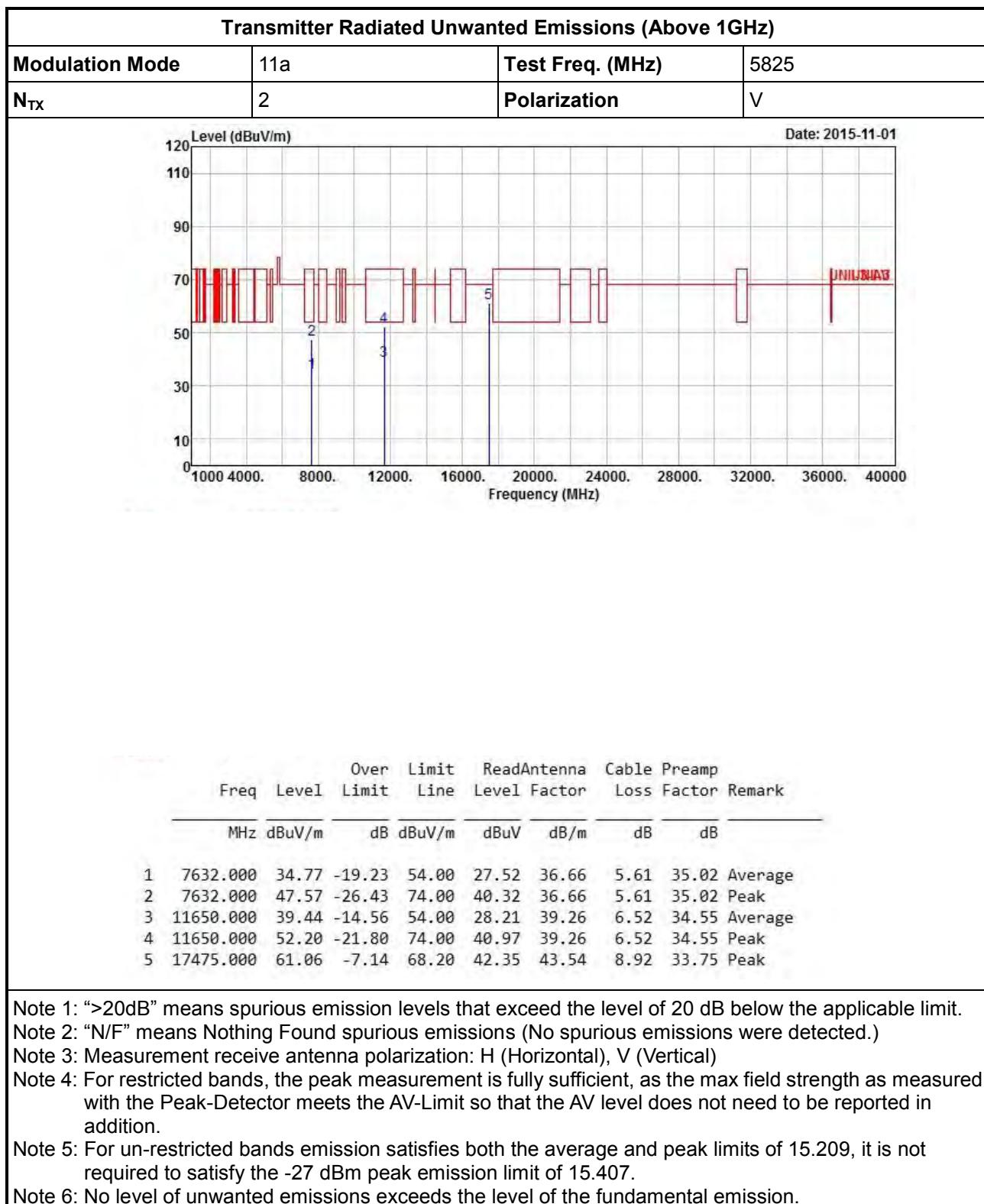
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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

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

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







Transmitter Radiated Unwanted Emissions (Above 1GHz)									
Modulation Mode	11a		Test Freq. (MHz)		5825				
N <sub>TX</sub>	2		Polarization		H				
Date: 2015-11-01									
1000	4000.	8000.	12000.	16000.	20000.	24000.	28000.	32000.	36000. 40000
120	110	90	70	50	30	10	0	0	0
Freq	Level	Over Limit	Limit	Read	Antenna	Cable	Preamp		
MHz	dBuV/m	dB	dBuV/m	Line	Level Factor	dBuV	dB/m	dB	dB
1	8072.000	34.17	-19.83	54.00	26.79	37.18	5.33	35.13	Average
2	8072.000	48.95	-25.05	74.00	41.57	37.18	5.33	35.13	Peak
3	11650.000	38.96	-15.04	54.00	27.73	39.26	6.52	34.55	Average
4	11650.000	50.72	-23.28	74.00	39.49	39.26	6.52	34.55	Peak
5	17475.000	60.94	-7.26	68.20	42.23	43.54	8.92	33.75	Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.  
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)  
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)  
 Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.  
 Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407.  
 Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.



Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																															
Modulation Mode	HT20		Test Freq. (MHz)		5745																																																																										
N <sub>TX</sub>	2		Polarization		V																																																																										
Level (dB <sub>u</sub> V/m)									Date: 2015-11-01																																																																						
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Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																					
Modulation Mode	HT20		Test Freq. (MHz)		5745																																																																
N <sub>TX</sub>	2		Polarization		H																																																																
Level (dBuV/m)									Date: 2015-11-01																																																												
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3	11490.000	52.23	-21.77	74.00	41.13	39.18	6.36	34.44 Peak																																																													
4	17235.000	59.64	-8.56	68.20	42.76	41.72	8.96	33.80 Peak																																																													
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit. Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.) Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical) Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition. Note 5: For un-restricted bands emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm peak emission limit of 15.407. Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.																																																																					



Transmitter Radiated Unwanted Emissions (Above 1GHz)																																						
Modulation Mode		HT20		Test Freq. (MHz)		5785																																
N <sub>TX</sub>	2			Polarization		V																																
Level (dB <sub>u</sub> V/m)										Date: 2015-11-01																												
<table border="1"> <thead> <tr> <th rowspan="2">Freq</th> <th rowspan="2">Level</th> <th>Over</th> <th>Limit</th> <th>Read</th> <th>Antenna</th> <th>Cable</th> <th>Preamp</th> <th colspan="3" rowspan="2">Remark</th> </tr> <tr> <th>Limit</th> <th>Line</th> <th>Level</th> <th>Factor</th> <th>Loss</th> <th>Factor</th> </tr> </thead> <tbody> <tr> <td>MHz</td> <td>dB<sub>u</sub>V/m</td> <td>dB</td> <td>dB<sub>u</sub>V/m</td> <td>dB<sub>u</sub>V</td> <td>dB/m</td> <td>dB</td> <td>dB</td> <td colspan="3"></td> </tr> </tbody> </table>											Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark			Limit	Line	Level	Factor	Loss	Factor	MHz	dB <sub>u</sub> V/m	dB	dB <sub>u</sub> V/m	dB <sub>u</sub> V	dB/m	dB	dB			
Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark																														
		Limit	Line	Level	Factor	Loss	Factor																															
MHz	dB <sub>u</sub> V/m	dB	dB <sub>u</sub> V/m	dB <sub>u</sub> V	dB/m	dB	dB																															
1	8116.000	34.53	-19.47	54.00	27.06	37.24	5.35	35.12	Average																													
2	8116.000	48.10	-25.90	74.00	40.63	37.24	5.35	35.12	Peak																													
3	11570.000	41.58	-12.42	54.00	30.42	39.23	6.44	34.51	Average																													
4	11570.000	53.27	-20.73	74.00	42.11	39.23	6.44	34.51	Peak																													
5	17355.000	60.29	-7.91	68.20	42.50	42.63	8.94	33.78	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.

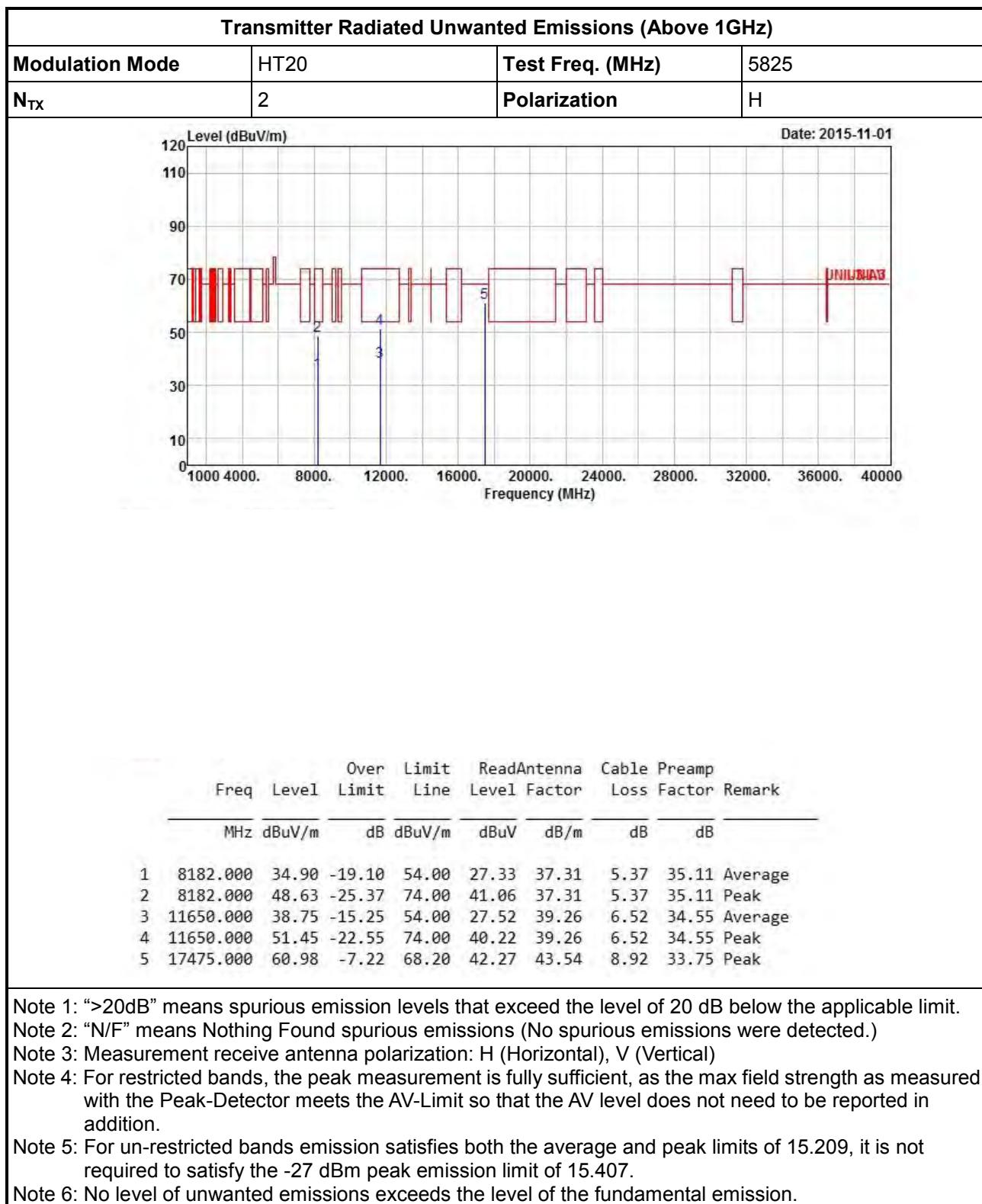
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

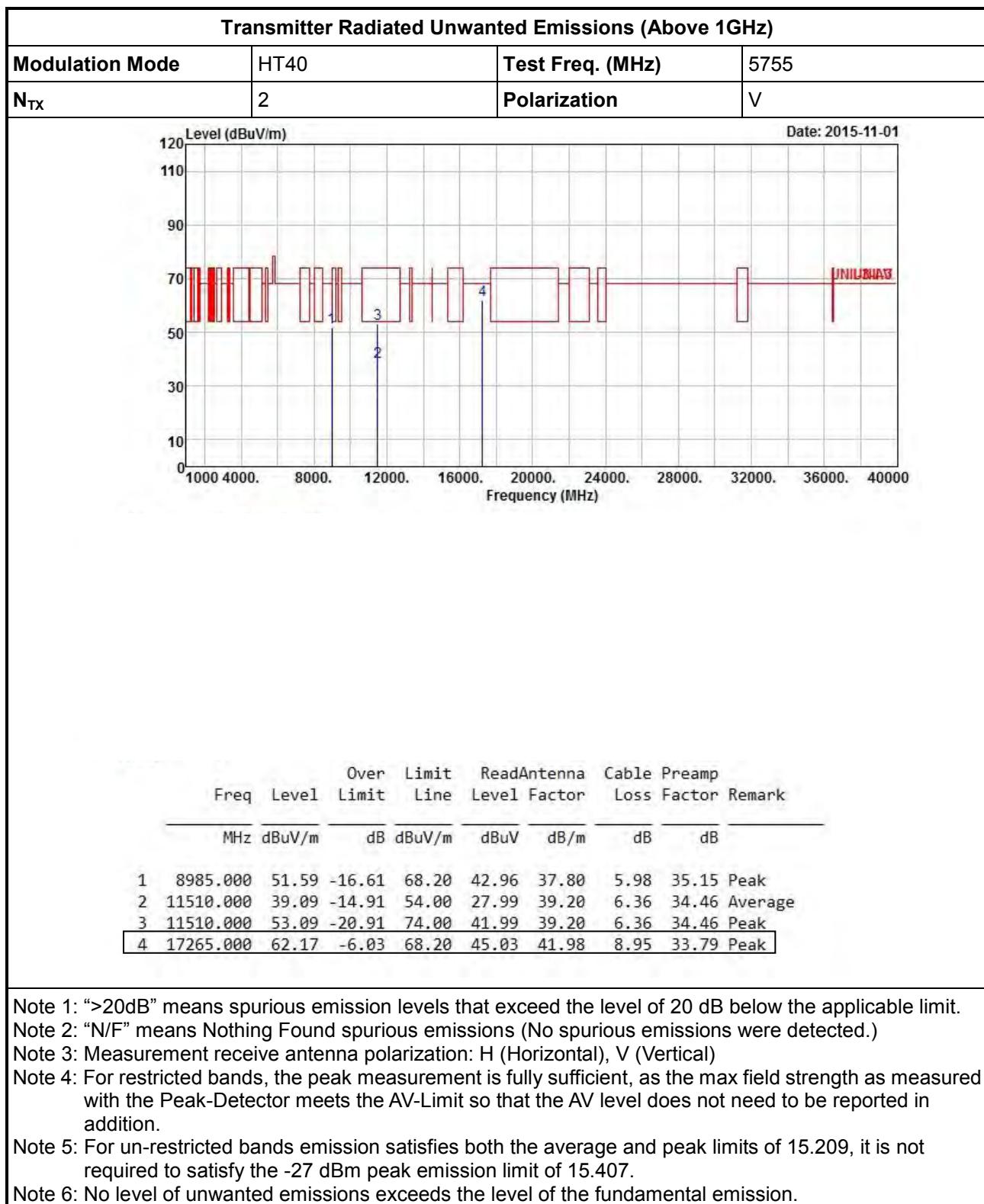


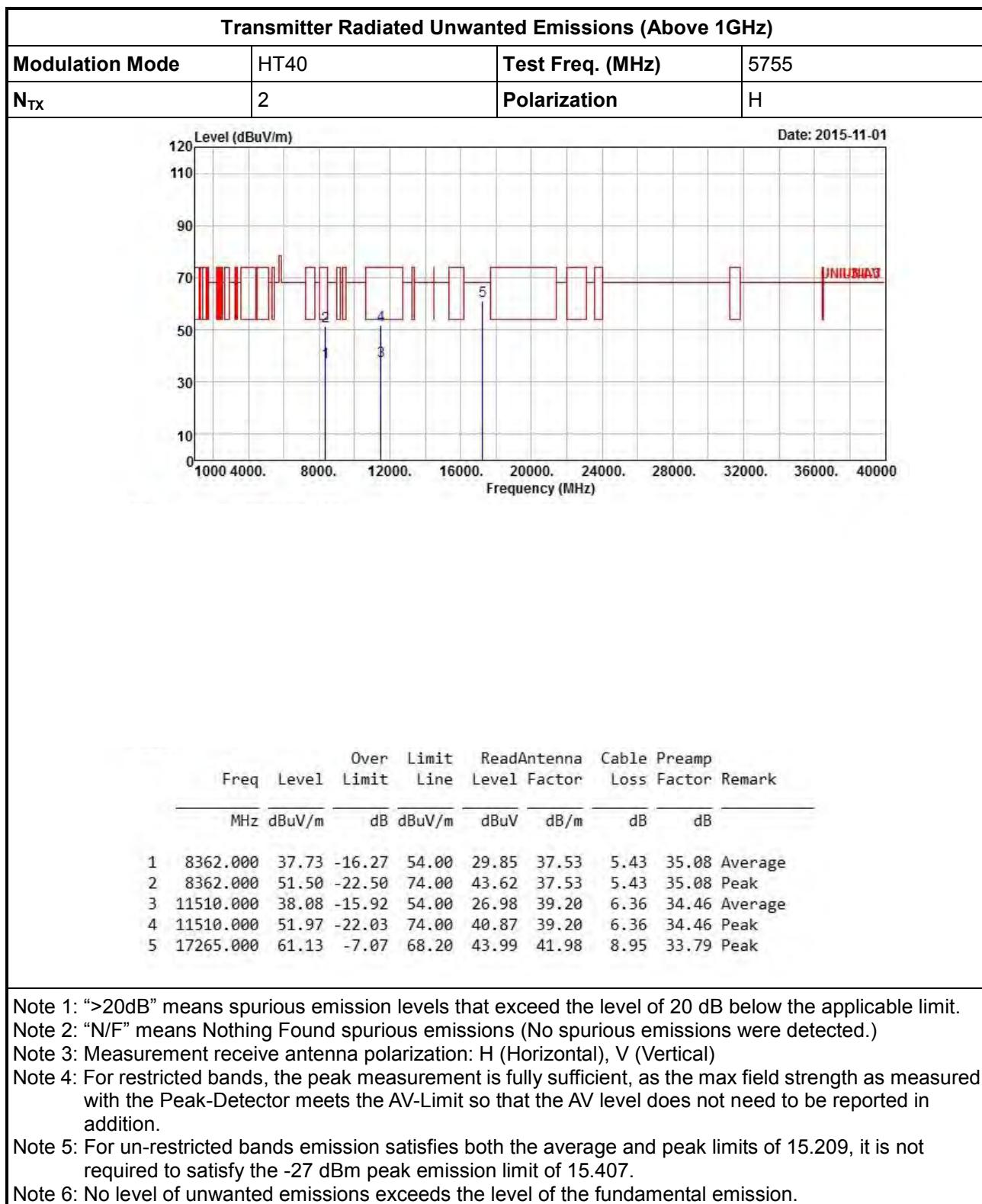
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Freq	Level	Over Limit	Line	Read	Antenna	Cable	Preamp	Remark																																																																				
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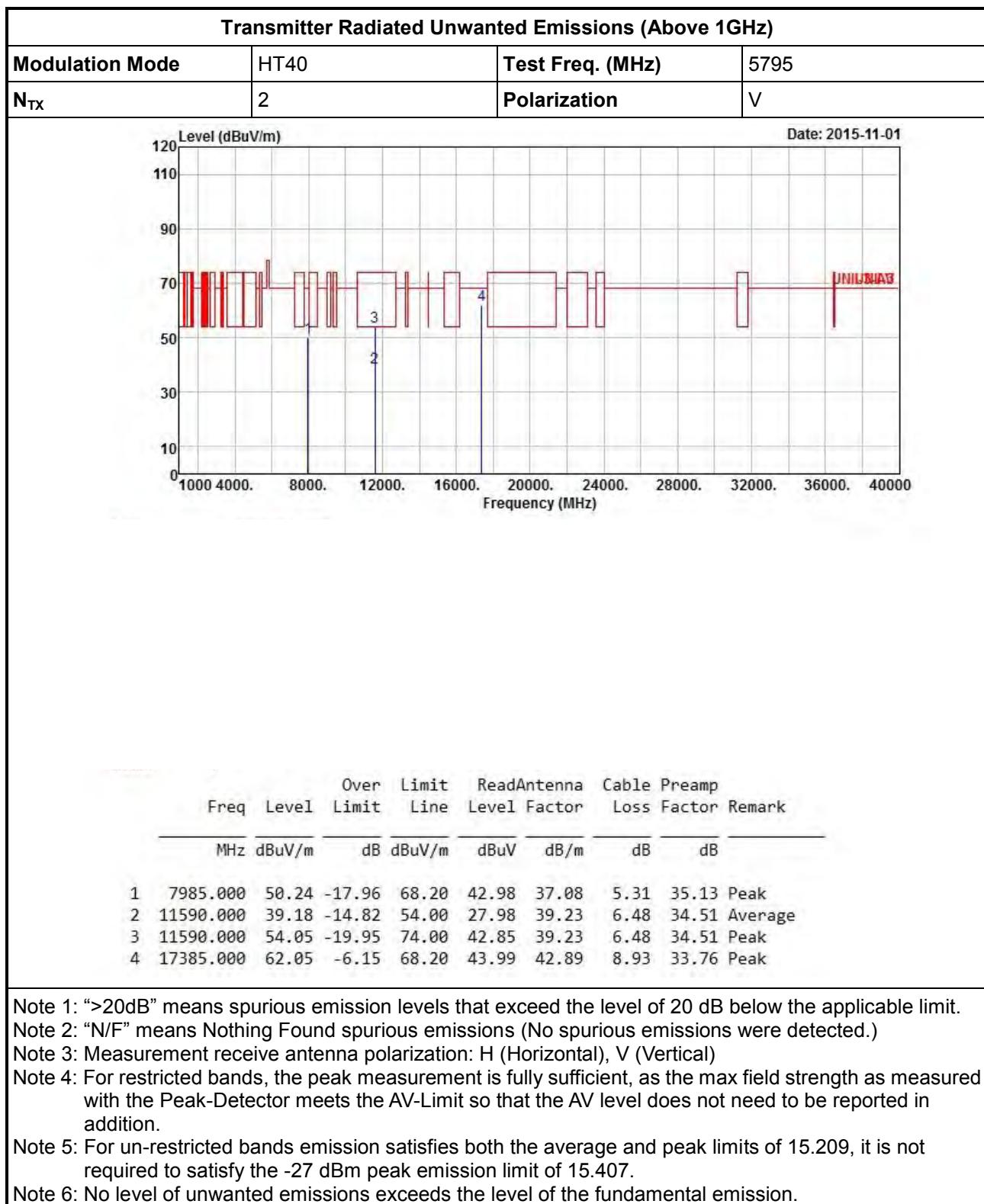


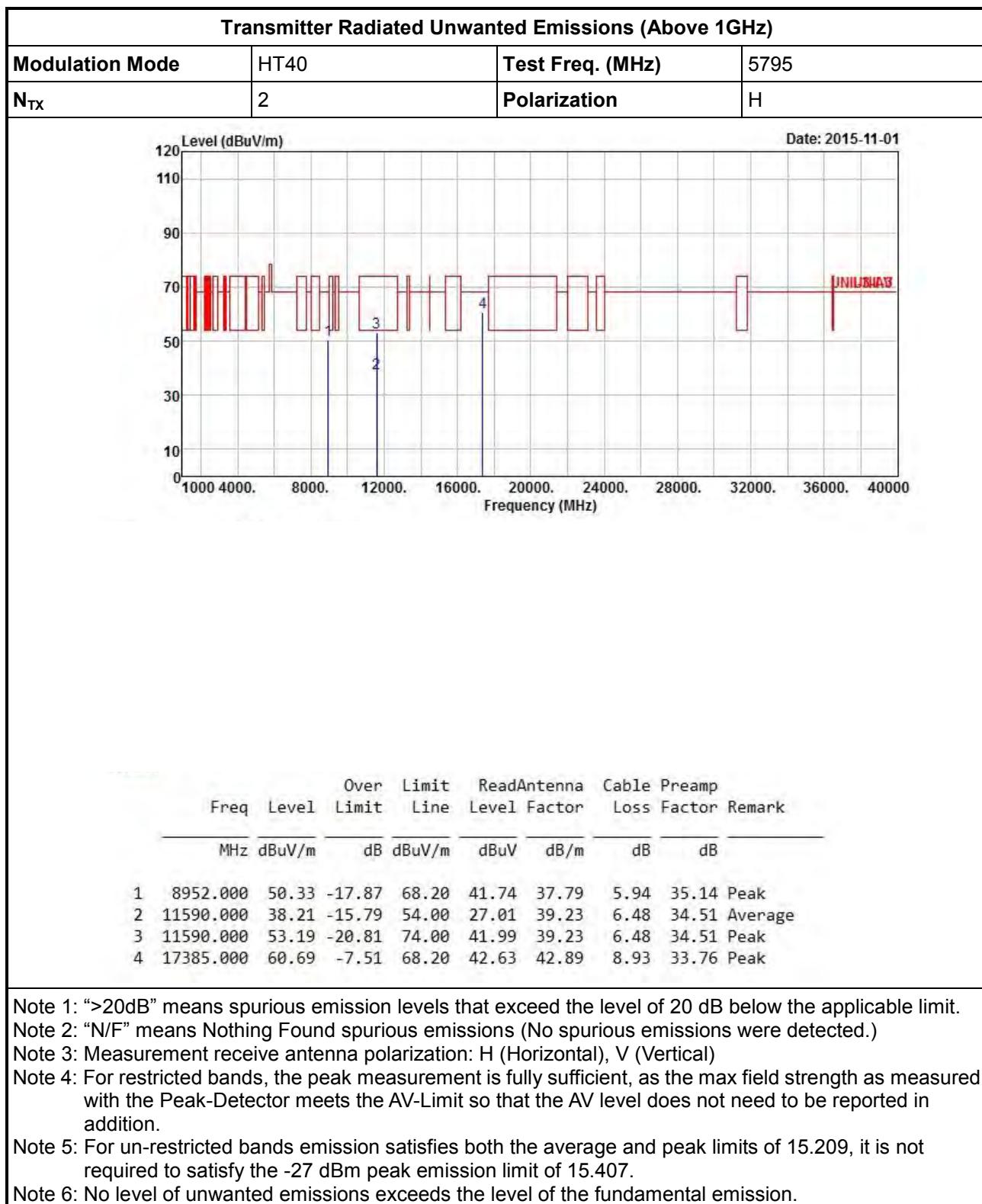
Transmitter Radiated Unwanted Emissions (Above 1GHz)													
Modulation Mode	HT20		Test Freq. (MHz)		5825								
N <sub>TX</sub>	2		Polarization		V								
Level (dB <sub>uV/m</sub> )									Date: 2015-11-01				
Over Limit Line Read Antenna Cable Preamp													
Freq		Level	Over Limit	Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark				
MHz		dB <sub>uV/m</sub>	dB	dB <sub>uV/m</sub>	dB <sub>uV</sub>	dB/m	dB	dB					
1	8666.000	48.55	-19.65	68.20	40.25	37.73	5.66	35.09	Peak				
2	11650.000	38.98	-15.02	54.00	27.75	39.26	6.52	34.55	Average				
3	11650.000	52.26	-21.74	74.00	41.03	39.26	6.52	34.55	Peak				
4	17475.000	61.21	-6.99	68.20	42.50	43.54	8.92	33.75	Peak				
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.													
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## 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.	

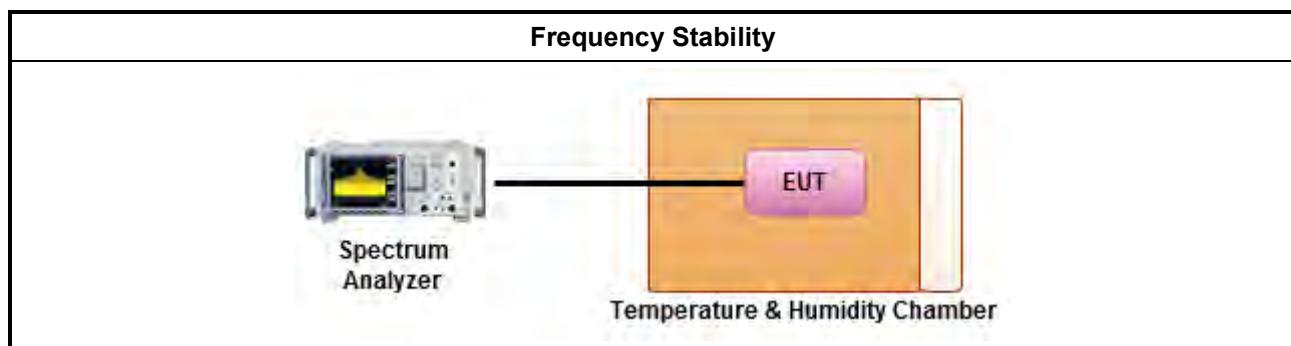
### 3.7.2 Measuring Instruments

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	5200	-4.0302	-4.0283	-3.9321	-4.0132
T <sub>20°C</sub> Vmin	5200	-4.0132	-3.9321	-4.0283	-4.0302
T <sub>50°C</sub> Vnom	5200	-5.6432	-5.2434	-5.0792	-4.9151
T <sub>40°C</sub> Vnom	5200	-5.9226	-6.1434	-5.9226	-6.2264
T <sub>30°C</sub> Vnom	5200	-5.6528	-5.7340	-5.7849	-5.7358
T <sub>20°C</sub> Vnom	5200	-3.9321	-4.0302	-4.0132	-4.0283
T <sub>10°C</sub> Vnom	5200	-0.9019	-0.9830	-0.9189	-0.9774
T <sub>0°C</sub> Vnom	5200	3.2774	3.1943	3.2943	3.2075
T <sub>-10°C</sub> Vnom	5200	6.5528	6.4717	6.4151	6.6358
T <sub>-20°C</sub> Vnom	5200	10.5679	10.5679	10.6491	10.6491
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 0 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. 30, 2015	AC Conduction
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	NCR	AC Conduction

Note: Calibration Interval of instruments listed above is one year. NCR: No Calibration Request.

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	0917017	300MHz ~ 40GHz	Feb. 17, 2015	RF Conducted
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	Feb. 17, 2015	RF Conducted
4 Port switch	CEI	P4R-720120	TH01	1GHz~26.5GHz	Jul. 01, 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. 28, 2015	Radiation
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1GHz ~ 6GHz 3m	Dec. 17, 2014	Radiation
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May 11, 2015	Radiation
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Sep. 02, 2015	Radiation
Spectrum	R&S	FSP40	100004	9kHz ~ 40GHz	Apr. 02, 2015	Radiation
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 18, 2015	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	Oct. 28, 2015	Radiation
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Oct. 29, 2015	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	MITEQ	JS44-18004000-33-8P	1840917	18GHz ~ 40GHz	Jun. 02, 2015	Radiation
Loop Antenna	R&S	HFH2-Z2	100330	9 kHz~30 MHz	Nov.16.2015	Radiation

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