



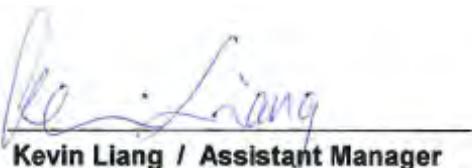
FCC Test Report

Equipment : WiFi abgn module
Brand Name : TSC
Model No. : RF-WRN
FCC ID : VTV-RFWRN
Standard : 47 CFR FCC Part 15.247
Operating Band : 2400 MHz – 2483.5 MHz
FCC Classification : DTS
Applicant / Manufacturer : **TSC Auto ID Technology Co., Ltd.**
No. 35, Sec. 2, Ligong 1st Rd., Wujie Town,
I-Lan County 26841, TAIWAN

The product sample received on Aug. 22, 2015 and completely tested on Aug. 18, 2016. 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	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 0.1926310MHz 52.59 (Margin 11.33dB) - QP 40.01 (Margin 13.91dB) - AV	FCC 15.207	Complied
3.2	15.247(a)	6dB Bandwidth	6dB Bandwidth Unit [MHz]:9.39	\geq 500kHz	Complied
3.3	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm]: 21.75	Power [dBm]:30	Complied
3.4	15.247(e)	Power Spectral Density	PSD [dBm/100kHz]: -10.04	PSD [dBm/3kHz]:8	Complied
3.5	15.247(d)	Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2503.000MHz: 20.54dB Restricted Bands [dBuV/m at 3m]: 2483.500MHz 72.80 (Margin 1.20dB) - PK 52.93 (Margin 1.07dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied
3.6	15.247(d)	Transmitter Radiated Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 31.940MHz 38.85 (Margin 1.15dB) - QP	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied



Revision History



1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N _{TX})	RF Output Power (dBm)
2400-2483.5	b	2412-2462	1-11 [11]	1	19.79
2400-2483.5	g	2412-2462	1-11 [11]	1	21.26
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	1	21.75

Note 1: RF output power specifies that Maximum Peak Conducted Output Power.
 Note 2: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
 Note 3: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

1.1.2 Antenna Information

Antenna Category	
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	<input checked="" 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 type="checkbox"/>	<input checked="" type="checkbox"/> Single power level with corresponding antenna(s).
<input type="checkbox"/>	<input type="checkbox"/> Multiple power level and corresponding antenna(s).

Antenna General Information				
No.	Ant. Cat.	Ant. Type	Model No.	Gain (dBi)
1	External	Dipole	-	2
2	Integral	PCB	-	0.99
3	External	PIFA	RFA-25-P393B-70B140R	-0.5
4	External	PIFA <Add>	C1721-510006-A(SRF2016787)	0.35
5	External	PIFA <Add>	C1721-510007-A(SRF2016788)	1.67

Note 1: EUT can match with above antennas for using. Higher gain in each type of antenna was used to perform the worst configuration and result of that was recorded as the final test result.
 Note 2: IEEE 802.11b/g/n only includes 1TX and Port1 for emission.



1.1.3 Type of EUT

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

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
<input type="checkbox"/> Operated normal mode for worst duty cycle	
<input checked="" type="checkbox"/> Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	Power Duty Factor [dB] – (10 log 1/x)
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11b	0.00
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11g	0.00
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11n (HT20)	0.00

1.1.5 EUT Operational Condition

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



1.2 Support Equipment

Support Equipment - RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5540	DoC
2	Adapter for NB	DELL	HA65NM130	DoC
3	Test Fixture	-	-	-

Note: Support equipment No.3 was provided by customer.

Support Equipment - AC Conduction				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5540	DoC
2	Adapter for NB	DELL	HA65NM130	DoC
3	Test Fixture	-	-	-

Note: Support equipment No.3 was provided by customer.

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

Note: Support equipment No.3 was provided by customer.

Support Equipment - AC Conduction and Radiated Emission <Add>				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5540	DoC
2	Adapter for NB	DELL	DA90E3-00	-
3	Test Fixture	-	-	-
4	USB Cable	-	-	-

Note: Support equipment No.3 and No.4 were provided 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
- KDB 558074 D01 v03r05



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 [553509] with FCC.			
Test Condition	Test Site No.	Test Engineer	Test Environment
AC Conduction	CO04-HY	Ryan	22°C / 56%
RF Conducted	TH01-HY	Candy	21.1°C / 58.2%
Radiated Emission for LF	03CH02-HY	Daniel	23.8°C / 56.1%
Radiated Emission for HF		Joe	26.8°C / 61%
Radiated Emission <Add>	03CH02-HY	Daniel	23.8°C / 56%



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, 6dB bandwidth	±0.6 %	
RF output power, conducted	±0.1 dB	
Power density, conducted	±0.6 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	±0.6 %	



2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing			
Modulation Mode	Transmit Chains (N _{TX})	Data Rate / MCS	Worst Data Rate / MCS
11b,1-11Mbps	1	1-11 Mbps	1 Mbps
11g,6-54Mbps	1	6-54 Mbps	6 Mbps
HT20,M0-7	1	MCS 0-7	MCS 0

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

Note 2: Modulation modes consist below configuration:
11b: IEEE 802.11b, 11g: IEEE 802.11g, HT-20: IEEE 802.11n

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

2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (2400-2483.5MHz band)					
Test Software Version	QCOM_V1.0 10.12.21.15.08				
Modulation Mode	N _{TX}	Test Frequency (MHz)			
		NCB: 20MHz			
		2412	2437	2462	
11b	1	15	18	14	
11g	1	12	17	9	
HT-20	1	10	17	7	



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	EUT with Dipole Antenna
2	EUT with PCB Antenna
3	EUT with PIFA Antenna

Mode 3 configuration was pretested and found to be the worst case and measured during the test.

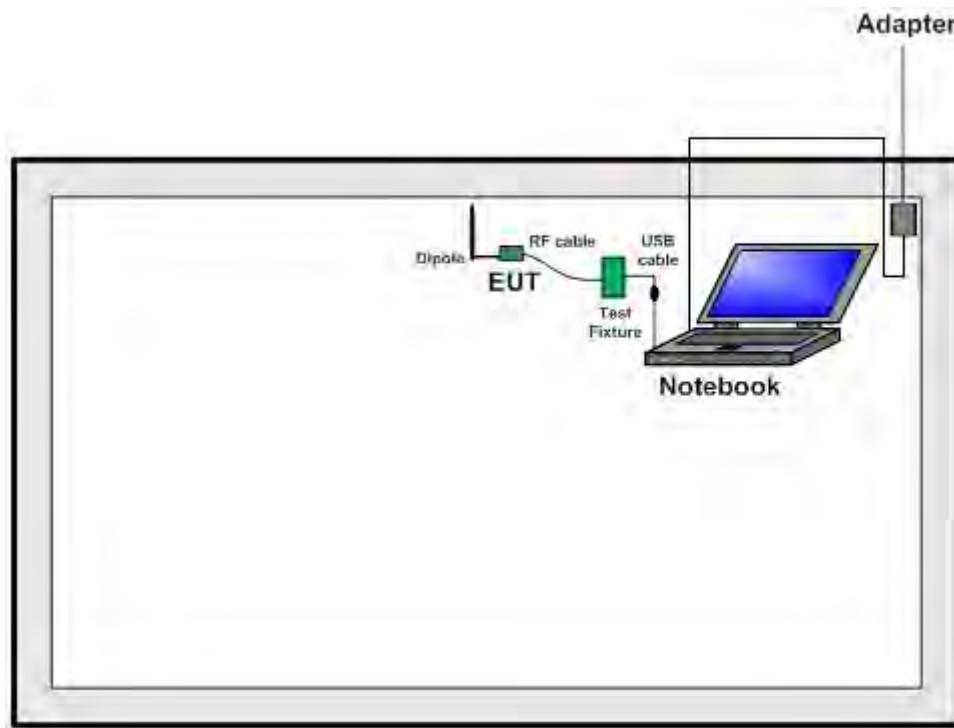
The Worst Case Mode for Following Conformance Tests	
Tests Item	RF Output Power, Power Spectral Density, 6 dB Bandwidth
Test Condition	Conducted measurement at transmit chains
Modulation Mode	11b, 11g, HT20



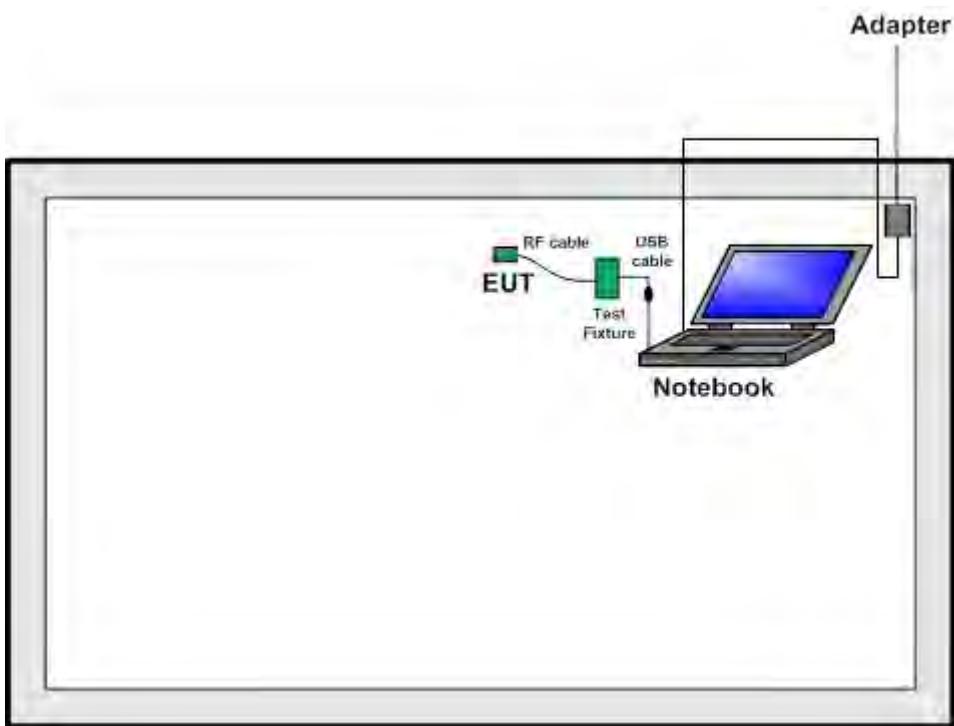
The Worst Case Mode for Following Conformance Tests			
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
User Position	<input type="checkbox"/> EUT will be placed in fixed position.		
	<input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions.		
	<input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.		
Operating Mode	Operating Mode Description		
Radiated Emissions Below 1GHz	<input checked="" type="checkbox"/> 1. EUT with Dipole Antenna		
	<input checked="" type="checkbox"/> 2. EUT with PCB Antenna		
	<input checked="" type="checkbox"/> 3. EUT with PIFA Antenna		
Mode 1 configuration was pretested and found to be the worst case and measured during the test.			
Radiated Emissions Above 1GHz	<input checked="" type="checkbox"/> 1. EUT with Dipole Antenna		
	<input checked="" type="checkbox"/> 2. EUT with PCB Antenna		
	<input checked="" type="checkbox"/> 3. EUT with PIFA Antenna		
Modulation Mode	11b, 11g, HT20		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
Worst Planes of EUT	Dipole	V	
	PCB	V	
	PIFA	V	
Worst Planes of ANT	Dipole		V
	PCB	V	
	PIFA	V	

2.4 Test Setup Diagram

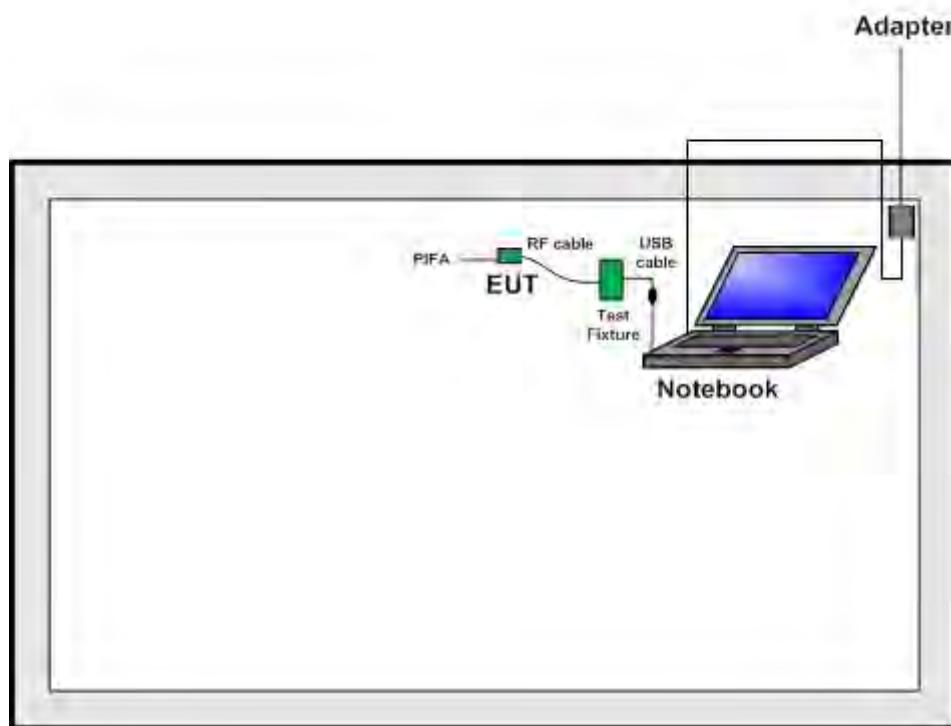
Test Setup Diagram – AC Line Conducted Emission Test (Mode 1)



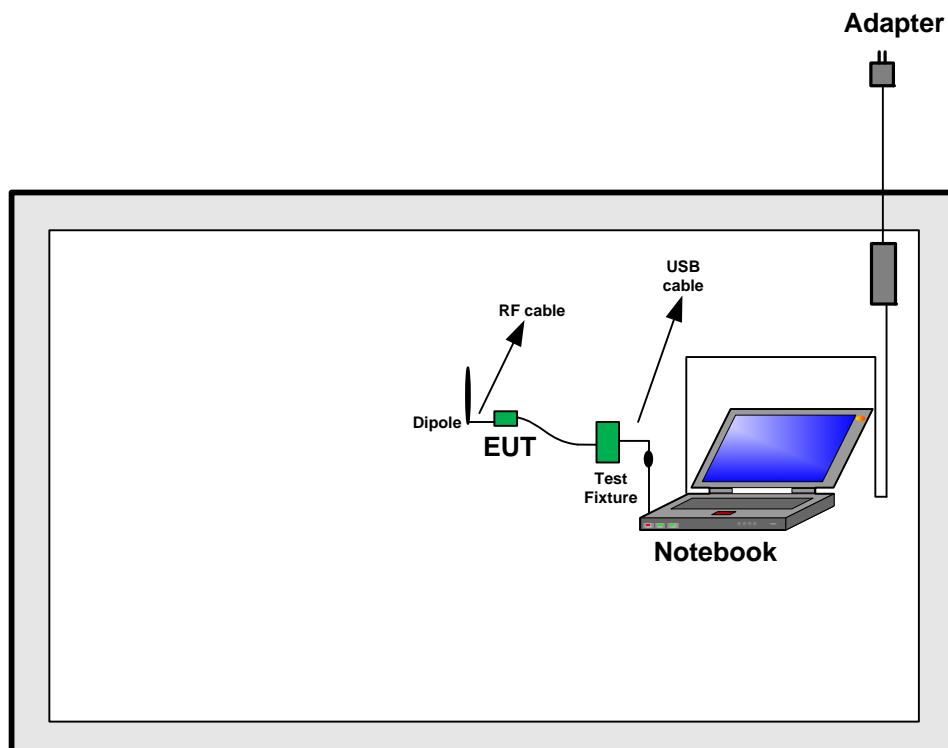
Test Setup Diagram – AC Line Conducted Emission Test (Mode 2)



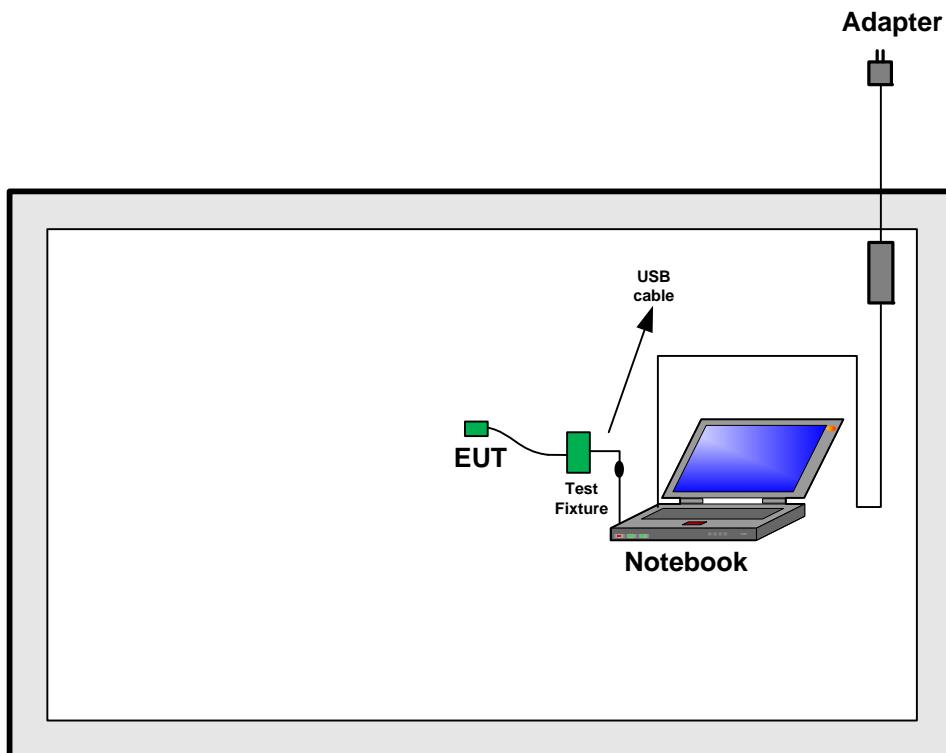
Test Setup Diagram – AC Line Conducted Emission Test (Mode 3)



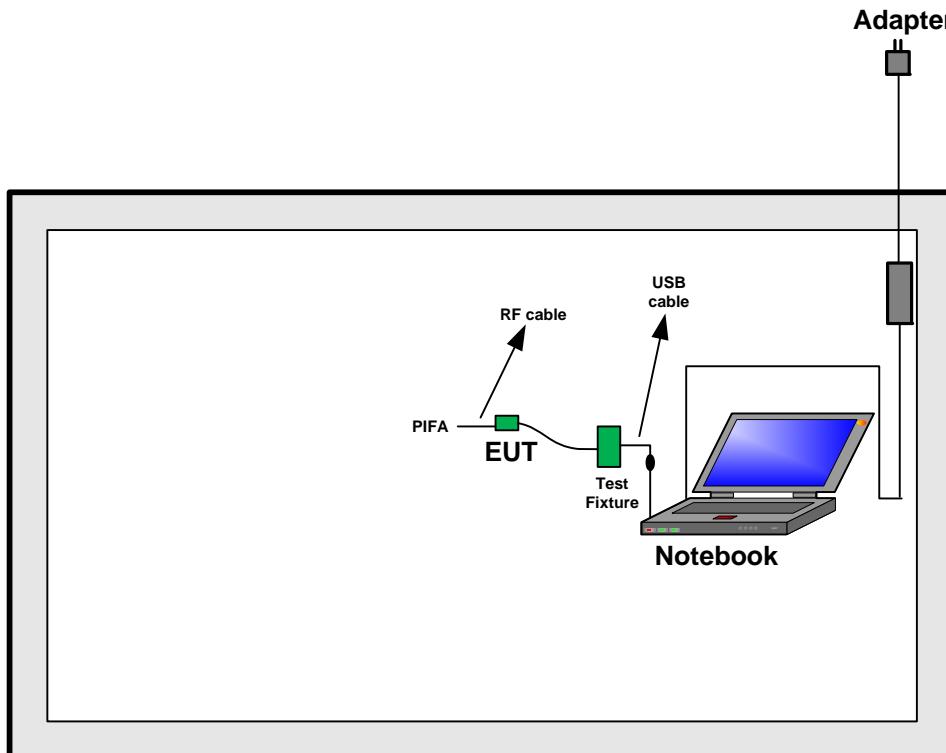
Test Setup Diagram - Radiated Test (Mode 1)



Test Setup Diagram - Radiated Test (Mode 2)



Test Setup Diagram - Radiated Test (Mode 3)



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.

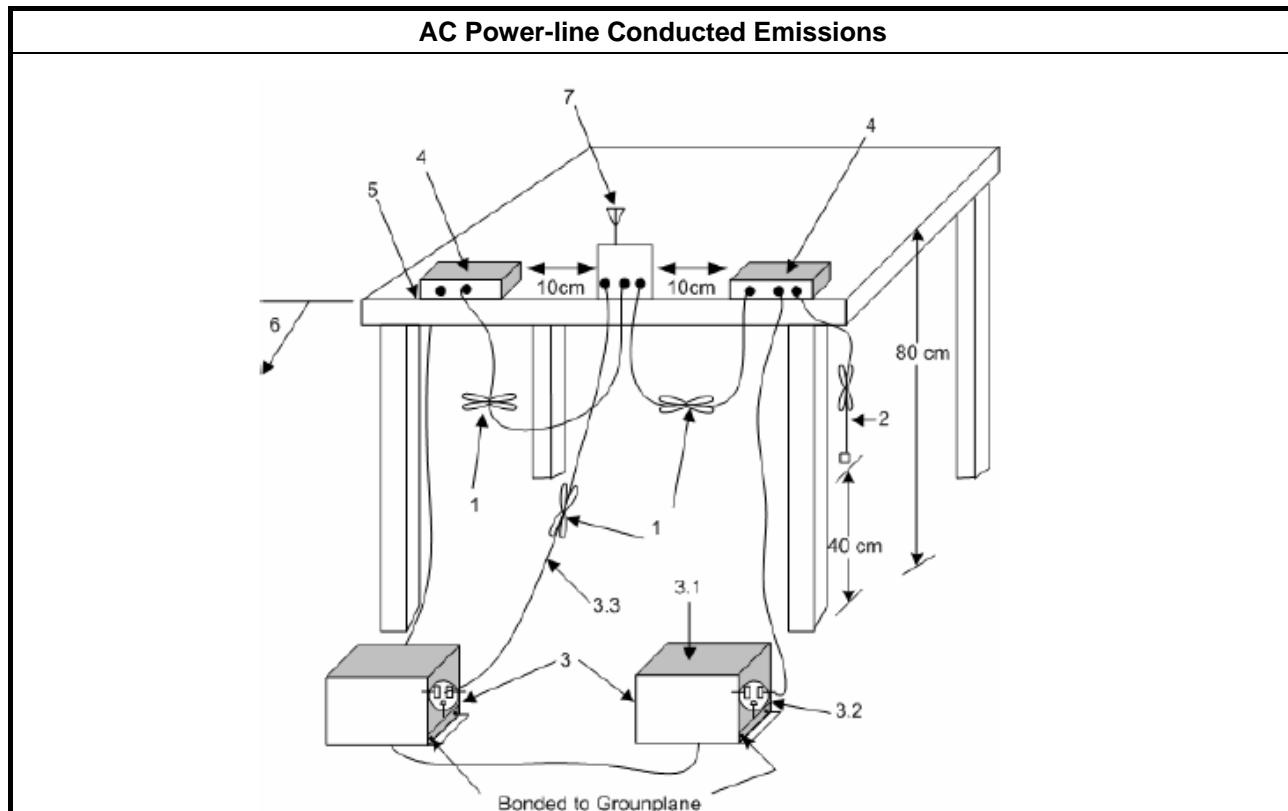
3.1.2 Measuring Instruments

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





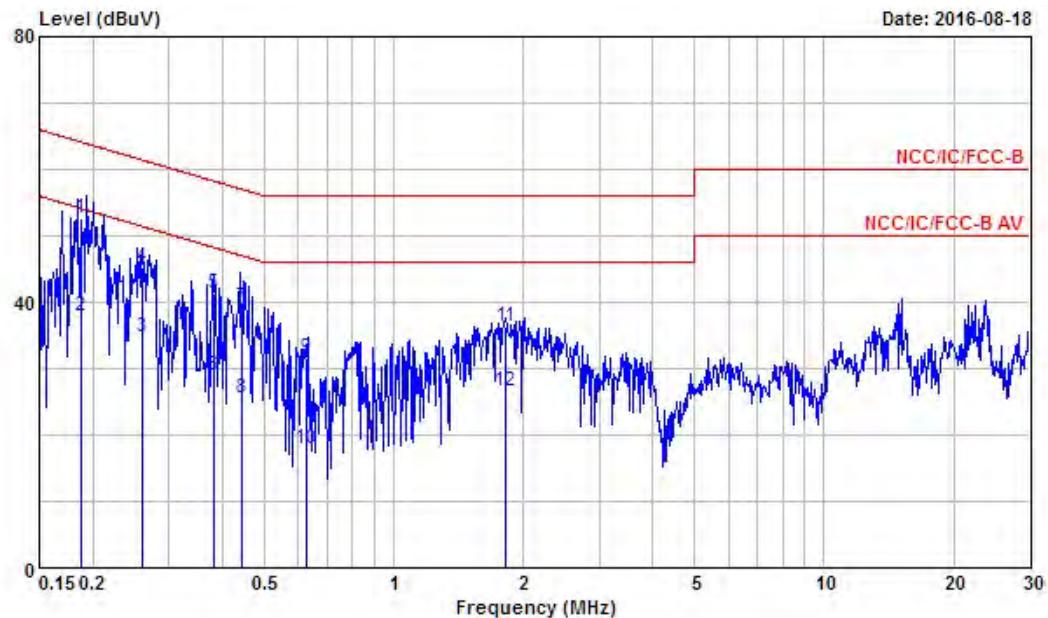
3.1.5 Test Result of AC Power-line Conducted Emissions

AC Power-line Conducted Emissions Result																																																																																																																						
Operating Mode	3	Power Phase	Neutral																																																																																																																			
Operating Function	EUT with PIFA Antenna																																																																																																																					
							Date: 2016-08-18																																																																																																															
<table><thead><tr><th>Freq</th><th>Level</th><th>Over Limit</th><th>Limit</th><th>Read Line</th><th>LISN</th><th>Cable</th><th>Remark</th></tr><tr><th>MHz</th><th>dBuV</th><th>dB</th><th>dBuV</th><th>dBuV</th><th>dB</th><th>dB</th><th></th></tr></thead><tbody><tr><td>1</td><td>52.59</td><td>-11.33</td><td>63.92</td><td>52.19</td><td>0.11</td><td>0.29</td><td>QP</td></tr><tr><td>2</td><td>40.01</td><td>-13.91</td><td>53.92</td><td>39.61</td><td>0.11</td><td>0.29</td><td>Average</td></tr><tr><td>3</td><td>33.52</td><td>-18.17</td><td>51.69</td><td>33.18</td><td>0.11</td><td>0.23</td><td>Average</td></tr><tr><td>4</td><td>45.19</td><td>-16.50</td><td>61.69</td><td>44.85</td><td>0.11</td><td>0.23</td><td>QP</td></tr><tr><td>5</td><td>39.14</td><td>-19.05</td><td>58.19</td><td>38.91</td><td>0.12</td><td>0.11</td><td>QP</td></tr><tr><td>6</td><td>26.78</td><td>-21.41</td><td>48.19</td><td>26.55</td><td>0.12</td><td>0.11</td><td>Average</td></tr><tr><td>7</td><td>34.81</td><td>-21.42</td><td>56.23</td><td>34.59</td><td>0.12</td><td>0.10</td><td>QP</td></tr><tr><td>8</td><td>21.90</td><td>-24.33</td><td>46.23</td><td>21.68</td><td>0.12</td><td>0.10</td><td>Average</td></tr><tr><td>9</td><td>36.36</td><td>-19.64</td><td>56.00</td><td>36.14</td><td>0.12</td><td>0.10</td><td>QP</td></tr><tr><td>10</td><td>22.93</td><td>-23.07</td><td>46.00</td><td>22.71</td><td>0.12</td><td>0.10</td><td>Average</td></tr><tr><td>11</td><td>38.65</td><td>-17.35</td><td>56.00</td><td>38.23</td><td>0.15</td><td>0.27</td><td>QP</td></tr><tr><td>12</td><td>30.25</td><td>-15.75</td><td>46.00</td><td>29.83</td><td>0.15</td><td>0.27</td><td>Average</td></tr></tbody></table>							Freq	Level	Over Limit	Limit	Read Line	LISN	Cable	Remark	MHz	dBuV	dB	dBuV	dBuV	dB	dB		1	52.59	-11.33	63.92	52.19	0.11	0.29	QP	2	40.01	-13.91	53.92	39.61	0.11	0.29	Average	3	33.52	-18.17	51.69	33.18	0.11	0.23	Average	4	45.19	-16.50	61.69	44.85	0.11	0.23	QP	5	39.14	-19.05	58.19	38.91	0.12	0.11	QP	6	26.78	-21.41	48.19	26.55	0.12	0.11	Average	7	34.81	-21.42	56.23	34.59	0.12	0.10	QP	8	21.90	-24.33	46.23	21.68	0.12	0.10	Average	9	36.36	-19.64	56.00	36.14	0.12	0.10	QP	10	22.93	-23.07	46.00	22.71	0.12	0.10	Average	11	38.65	-17.35	56.00	38.23	0.15	0.27	QP	12	30.25	-15.75	46.00	29.83	0.15	0.27	Average
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Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.																																																																																																																						
Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)																																																																																																																						



AC Power-line Conducted Emissions Result

Operating Mode	3	Power Phase	Line
Operating Function	EUT with PIFA Antenna		



Freq	Level	Over Limit		Line	Read Level	LISN Factor	Cable Loss		Remark
		MHz	dBuV				dBuV	dB	
1	0.1872150	52.72	-11.44	64.16	52.33	0.11	0.28	QP	
2	0.1872150	37.86	-16.30	54.16	37.47	0.11	0.28	Average	
3	0.2602550	34.85	-16.57	51.42	34.52	0.11	0.22	Average	
4	0.2602550	45.20	-16.22	61.42	44.87	0.11	0.22	QP	
5	0.3811300	41.20	-17.05	58.25	40.97	0.12	0.11	QP	
6	0.3811300	28.87	-19.38	48.25	28.64	0.12	0.11	Average	
7	0.4450210	39.33	-17.64	56.97	39.11	0.12	0.10	QP	
8	0.4450210	25.62	-21.35	46.97	25.40	0.12	0.10	Average	
9	0.6280790	31.66	-24.34	56.00	31.44	0.12	0.10	QP	
10	0.6280790	17.80	-28.20	46.00	17.58	0.12	0.10	Average	
11		1.820	36.40	-19.60	56.00	35.98	0.15	0.27	QP
12		1.820	26.71	-19.29	46.00	26.29	0.15	0.27	Average

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

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

3.2 6dB Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit
Systems using digital modulation techniques:
<input checked="" type="checkbox"/> 6 dB bandwidth \geq 500 kHz.

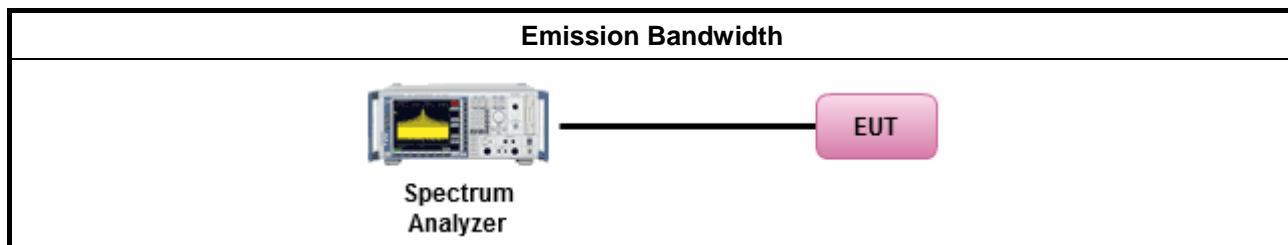
3.2.2 Measuring Instruments

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 KDB 558074, clause 8.1 Option 1 for 6 dB bandwidth measurement.
<input type="checkbox"/> Refer as KDB 558074, clause 8.2 Option 2 for 6 dB bandwidth measurement.
<input type="checkbox"/> Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
<input checked="" type="checkbox"/> For conducted measurement.
<input checked="" type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
<input type="checkbox"/> The EUT supports multiple transmit chains using options given below:
<input type="checkbox"/> Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
<input type="checkbox"/> Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.

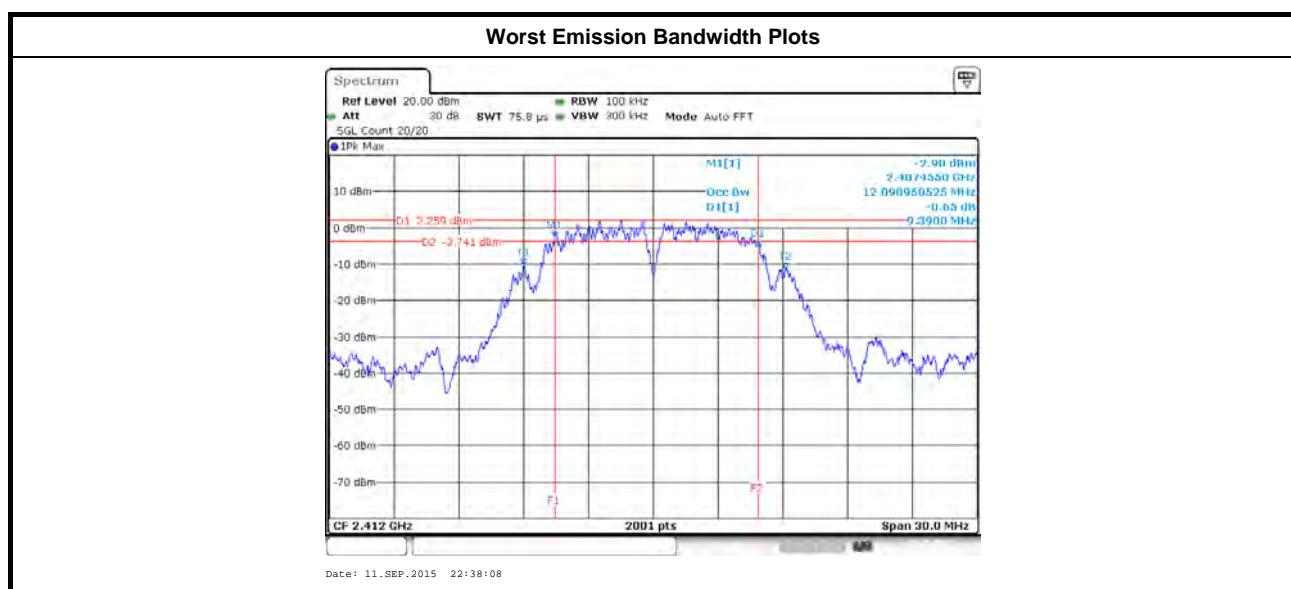
3.2.4 Test Setup





3.2.5 Test Result of Emission Bandwidth

Emission Bandwidth Result					
Condition			Emission Bandwidth (MHz)		
Modulation Mode	N _{TX}	Freq. (MHz)	99% Bandwidth	6dB Bandwidth	
11b	1	2412	12.09	9.39	
11b	1	2437	12.48	9.93	
11b	1	2462	12.15	9.64	
11g	1	2412	16.47	16.45	
11g	1	2437	17.15	16.57	
11g	1	2462	16.49	16.53	
HT20	1	2412	17.72	17.77	
HT20	1	2437	18.48	17.68	
HT20	1	2462	17.64	17.71	
Limit			N/A	≥500 kHz	
Result			Complied		

Note 1: N_{TX} = Number of Transmit Chains



3.3 RF Output Power

3.3.1 RF Output Power Limit

RF Output Power Limit	
Maximum Peak Conducted Output Power or Maximum Conducted Output Power Limit	
<input checked="" type="checkbox"/> 2400-2483.5 MHz Band:	
<input checked="" type="checkbox"/> If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)	
<input type="checkbox"/> Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm	
<input checked="" type="checkbox"/> Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm	
<input type="checkbox"/> Smart antenna system (SAS):	
	<input type="checkbox"/> Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<input type="checkbox"/> Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<input type="checkbox"/> Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3 + 8$ dB dBm
e.i.r.p. Power Limit:	
<input checked="" type="checkbox"/> 2400-2483.5 MHz Band	
<input type="checkbox"/> Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)	
<input checked="" type="checkbox"/> Point-to-point systems (P2P): $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])$ dBm	
<input type="checkbox"/> Smart antenna system (SAS)	
	<input type="checkbox"/> Single beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	<input type="checkbox"/> Overlap beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	<input type="checkbox"/> Aggregate power on all beams: $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX} + 8])$ dBm
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi. P_{eirp} = e.i.r.p. Power in dBm.	

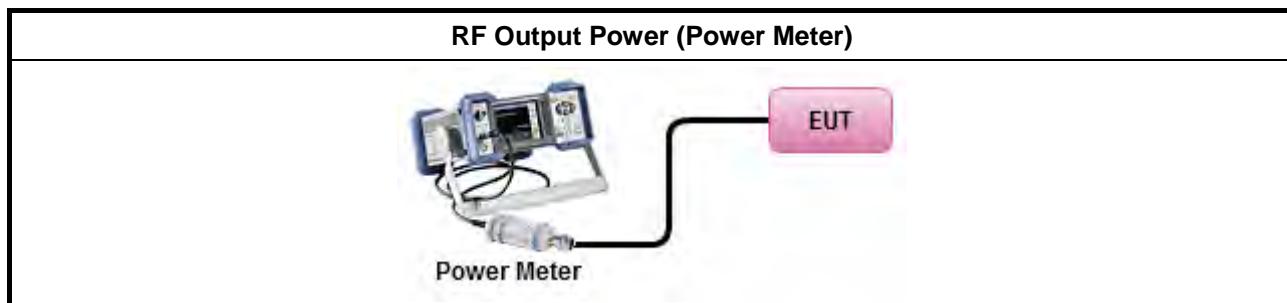
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/> Maximum Peak Conducted Output Power	<input type="checkbox"/> Refer as KDB 558074, clause 9.1.1 Option 1 (RBW \geq EBW method). <input checked="" type="checkbox"/> Refer as KDB 558074, clause 9.1.2 Option 2 (peak power meter for VBW \geq DTS BW)
<input checked="" type="checkbox"/> Maximum Conducted Output Power	<p>[duty cycle \geq 98% or external video / power trigger]</p> <p><input type="checkbox"/> Refer as KDB 558074, clause 9.2.2.2 Method AVGSA-1 (spectral trace averaging).</p> <p><input type="checkbox"/> Refer as KDB 558074, clause 9.2.2.3 Method AVGSA-1 Alt. (slow sweep speed)</p> <p>duty cycle < 98% and average over on/off periods with duty factor</p> <p><input type="checkbox"/> Refer as KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).</p> <p><input type="checkbox"/> Refer as KDB 558074, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed)</p> <p>RF power meter and average over on/off periods with duty factor or gated trigger</p> <p><input checked="" type="checkbox"/> Refer as KDB 558074, clause 9.2.3 Method AVGPM (using an RF average power meter).</p>
<input checked="" type="checkbox"/> For conducted measurement.	<p><input checked="" type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.</p> <p><input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.</p> <p><input type="checkbox"/> The EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.</p> <p><input type="checkbox"/> If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$</p>

3.3.4 Test Setup





3.3.5 Test Result of Maximum Peak Conducted Output Power

Maximum Peak Conducted Output Power Result							
Condition			RF Output Power (dBm)				
Modulation Mode	N _{TX}	Freq. (MHz)	RF Output Power	Power Limit	Antenna Gain (dBi)	EIRP Power	EIRP Limit
11b	1	2412	16.69	30.00	2.00	18.69	36.00
11b	1	2437	19.79	30.00	2.00	21.79	36.00
11b	1	2462	16.41	30.00	2.00	18.41	36.00
11g	1	2412	15.65	30.00	2.00	17.65	36.00
11g	1	2437	21.26	30.00	2.00	23.26	36.00
11g	1	2462	11.96	30.00	2.00	13.96	36.00
HT20	1	2412	13.84	30.00	2.00	15.84	36.00
HT20	1	2437	21.75	30.00	2.00	23.75	36.00
HT20	1	2462	10.47	30.00	2.00	12.47	36.00
Result			Complied				

3.3.6 Test Result of Maximum Average Conducted Output Power

Maximum Conducted Output Power							
Condition			RF Output Power (dBm)				
Modulation Mode	N _{TX}	Freq. (MHz)	RF Output Power	Power Limit	Antenna Gain (dBi)	EIRP Power	EIRP Limit
11b	1	2412	13.82	30.00	2.00	15.82	36.00
11b	1	2437	16.89	30.00	2.00	18.89	36.00
11b	1	2462	13.53	30.00	2.00	15.53	36.00
11g	1	2412	10.69	30.00	2.00	12.69	36.00
11g	1	2437	16.38	30.00	2.00	18.38	36.00
11g	1	2462	7.08	30.00	2.00	9.08	36.00
HT20	1	2412	8.93	30.00	2.00	10.93	36.00
HT20	1	2437	16.86	30.00	2.00	18.86	36.00
HT20	1	2462	5.65	30.00	2.00	7.65	36.00
Result			Complied				



3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit
<input checked="" type="checkbox"/> Power Spectral Density (PSD) $\leq 8 \text{ dBm/3kHz}$

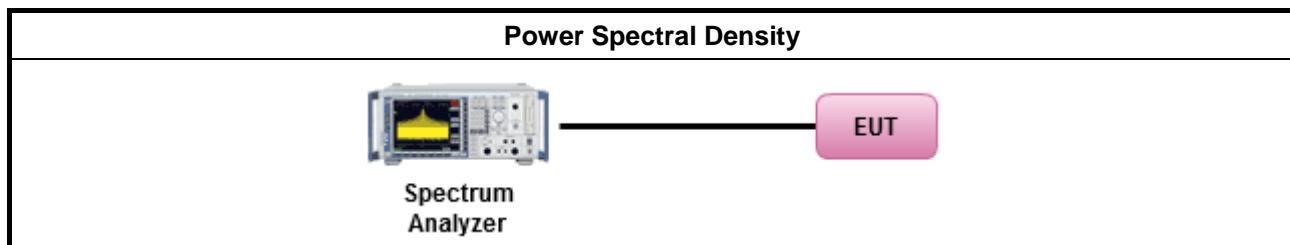
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

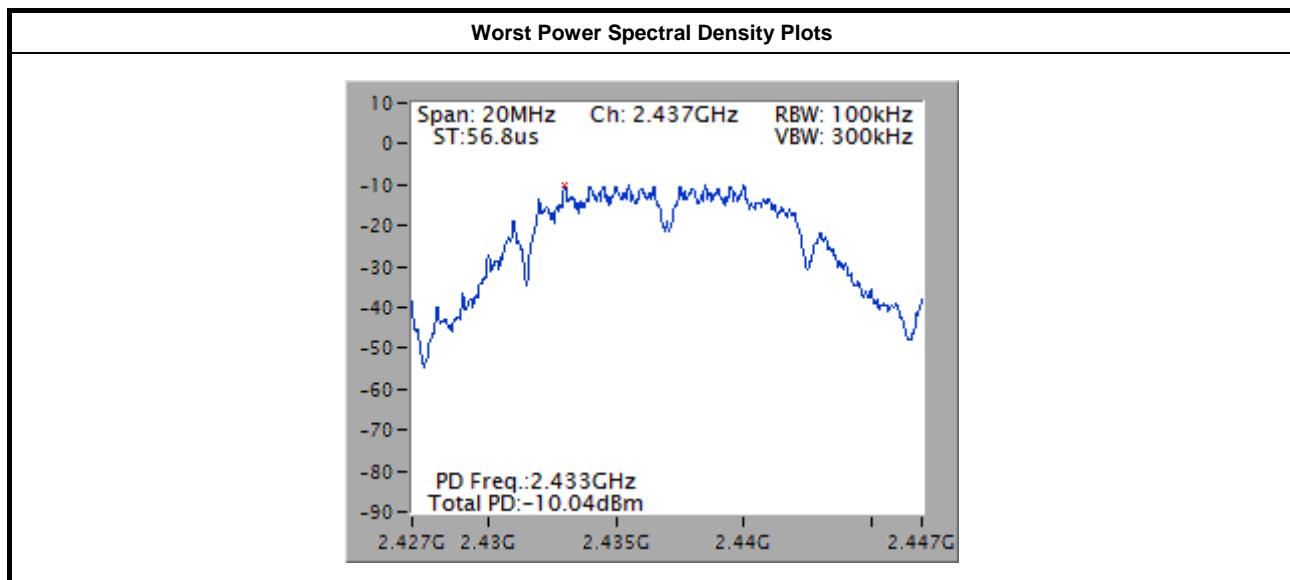
Test Method
<input checked="" type="checkbox"/> Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz;detector=peak).. [duty cycle $\geq 98\%$ or external video / power trigger]
<input type="checkbox"/> Refer as KDB 558074, clause 10.3 Method AVGPSD-1 (spectral trace averaging).
<input type="checkbox"/> Refer as KDB 558074, clause 10.4 Method AVGPSD-1 Alt. (slow sweep speed)
duty cycle $< 98\%$ and average over on/off periods with duty factor
<input type="checkbox"/> Refer as KDB 558074, clause 10.5 Method AVGPSD-2 (spectral trace averaging).
<input type="checkbox"/> Refer as KDB 558074, clause 10.6 Method AVGPSD-2 Alt. (slow sweep speed)
<input checked="" type="checkbox"/> For conducted measurement.
<input checked="" type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
<input type="checkbox"/> The EUT supports multiple transmit chains using options given below:
<input type="checkbox"/> Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the N_{TX} output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.
<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.

3.4.4 Test Setup



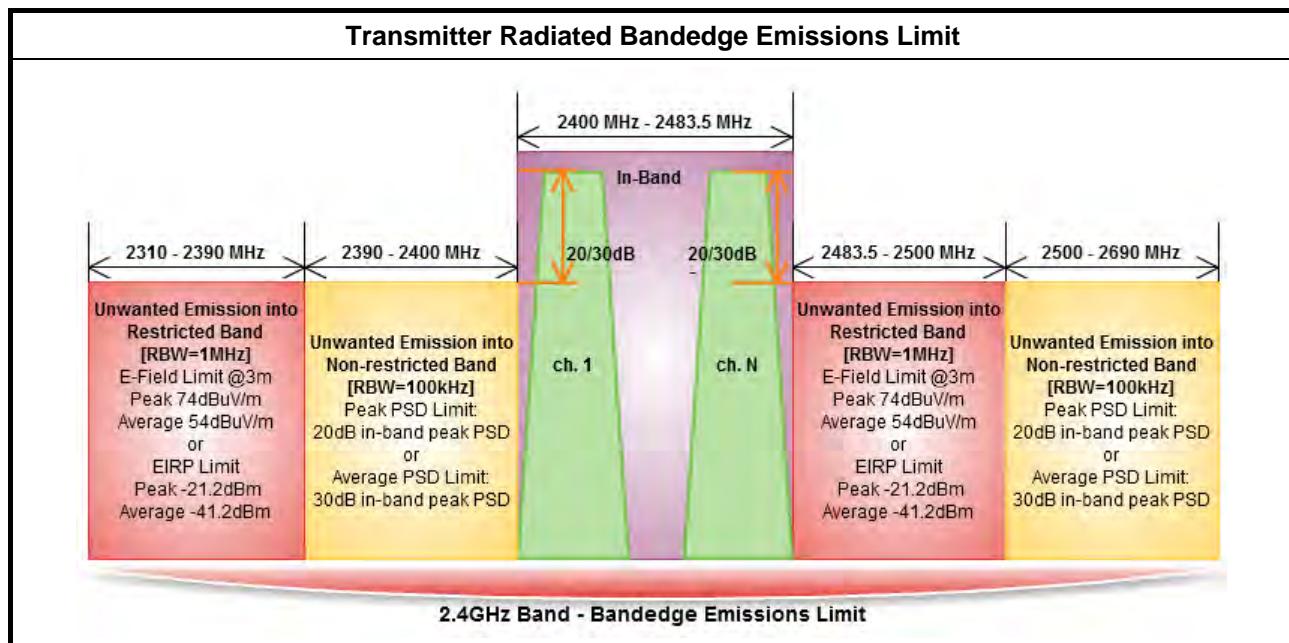
3.4.5 Test Result of Power Spectral Density

Condition			Power Spectral Density	
Modulation Mode	N _{TX}	Freq. (MHz)	Sum Chain (dBm/100kHz)	PSD Limit (dBm/3kHz)
11b	1	2412	-13.04	8.00
11b	1	2437	-10.04	8.00
11b	1	2462	-14.03	8.00
11g	1	2412	-19.73	8.00
11g	1	2437	-14.47	8.00
11g	1	2462	-22.33	8.00
HT20	1	2412	-22.36	8.00
HT20	1	2437	-14.16	8.00
HT20	1	2462	-25.73	8.00
Result		Complied		



3.5 Transmitter Radiated Bandedge Emissions

3.5.1 Transmitter Radiated Bandedge Emissions Limit



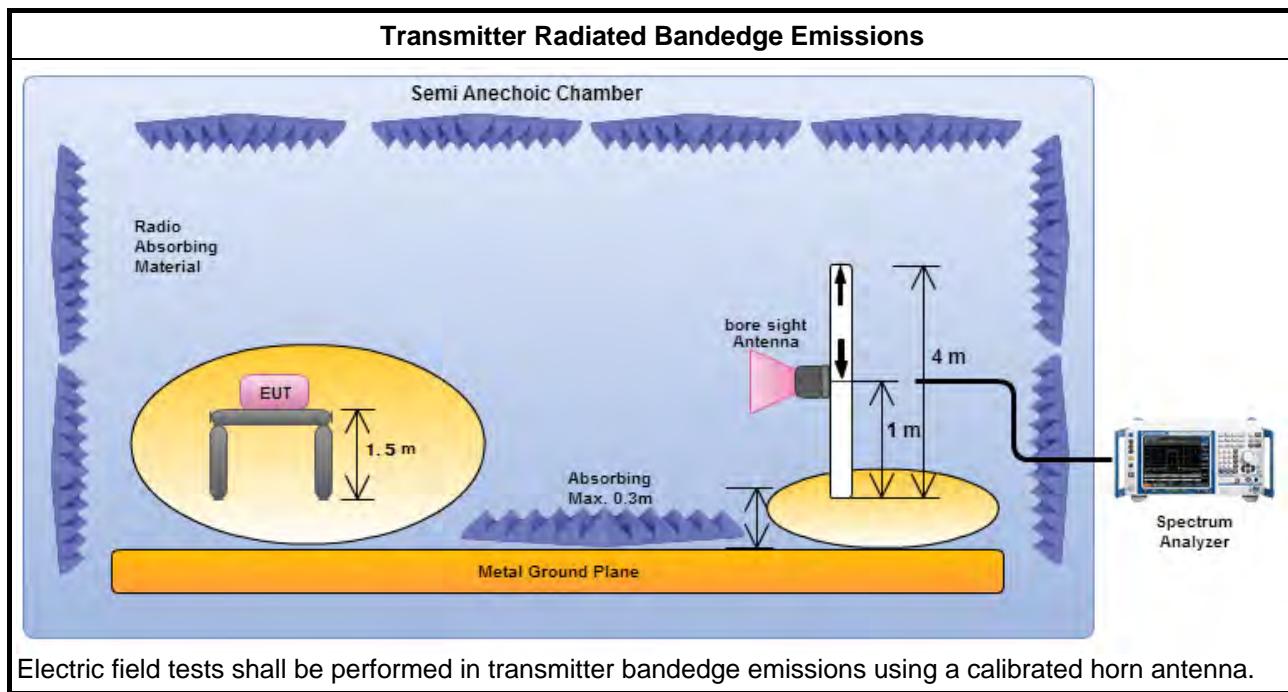
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> The average emission levels shall be measured in [duty cycle \geq 98 or duty factor].
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.10 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
<input checked="" type="checkbox"/> For the transmitter unwanted emissions shall be measured using following options below:
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 12 for unwanted emissions into restricted bands.
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq 98\%$)
<input type="checkbox"/> Refer as KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
<input type="checkbox"/> Refer as KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW $\geq 1/T$).
<input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq 1/T$, where T is pulse time.
<input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
<input checked="" type="checkbox"/> For the transmitter bandedge emissions shall be measured using following options below:
<input type="checkbox"/> Refer as KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.10 for band-edge testing.
<input type="checkbox"/> Refer as ANSI C63.10, clause 6.10.6.2 for marker-delta method for band-edge measurements.
<input checked="" type="checkbox"/> For radiated measurement, refer as KDB 558074, clause 12.2.7 and ANSI C63.10, clause 6.6. Test distance is 3m.

3.5.4 Test Setup





3.5.5 Test Result of Transmitter Radiated Bandedge Emissions

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Non-restricted Band) – Dipole Antenna								
Modulation	N _{TX}	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
11b	1	2412	103.06	2397.136	70.80	32.26	20	V
11b	1	2462	100.37	2503.800	64.29	36.08	20	V
11g	1	2412	90.00	2397.360	65.53	24.47	20	V
11g	1	2462	91.74	2528.400	64.35	27.39	20	V
HT20	1	2412	92.73	2399.600	68.04	24.69	20	V
HT20	1	2462	89.66	2536.600	64.40	25.26	20	V

Note 1: Measurement worst emissions of receive antenna polarization

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Non-restricted Band) – PCB Antenna								
Modulation	N _{TX}	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
11b	1	2412	98.04	2397.136	69.22	28.82	20	H
11b	1	2462	93.42	2530.600	64.10	29.32	20	H
11g	1	2412	89.12	2392.432	64.48	24.64	20	H
11g	1	2462	88.13	2501.200	63.93	24.20	20	H
HT20	1	2412	85.59	2399.824	64.59	21.00	20	H
HT20	1	2462	86.05	2502.200	64.65	21.40	20	H

Note 1: Measurement worst emissions of receive antenna polarization

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Non-restricted Band) – PIFA Antenna								
Modulation	N _{TX}	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
11b	1	2412	93.49	2397.136	65.64	27.85	20	H
11b	1	2462	93.07	2545.400	64.39	28.68	20	H
11g	1	2412	91.04	2399.600	65.31	25.73	20	H
11g	1	2462	88.12	2532.000	64.37	23.75	20	H
HT20	1	2412	88.82	2399.824	65.50	23.32	20	H
HT20	1	2462	84.60	2503.000	64.06	20.54	20	H

Note 1: Measurement worst emissions of receive antenna polarization



2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band) – Dipole Antenna										
Modulation Mode	N _{TX}	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.
11b	1	2412	3	2389.968	62.05	74	2389.296	52.63	54	V
11b	1	2462	3	2483.600	62.49	74	2483.500	52.71	54	V
11g	1	2412	3	2389.968	71.33	74	2389.968	52.37	54	V
11g	1	2462	3	2483.500	72.80	74	2483.500	52.93	54	V
HT20	1	2412	3	2389.296	71.31	74	2389.968	52.92	54	V
HT20	1	2462	3	2483.500	71.33	74	2483.500	52.06	54	V

Note 1: Measurement worst emissions of receive antenna polarization.

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band) – PCB Antenna										
Modulation Mode	N _{TX}	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.
11b	1	2412	3	2389.968	63.92	74	2389.968	52.31	54	H
11b	1	2462	3	2484.200	61.68	74	2483.500	52.43	54	H
11g	1	2412	3	2389.968	71.06	74	2389.968	52.00	54	H
11g	1	2462	3	2483.600	67.40	74	2483.500	50.88	54	H
HT20	1	2412	3	2389.968	68.90	74	2389.968	51.05	54	H
HT20	1	2462	3	2484.600	68.26	74	2483.500	50.11	54	H

Note 1: Measurement worst emissions of receive antenna polarization.

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band) – PIFA Antenna										
Modulation Mode	N _{TX}	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.
11b	1	2412	3	2389.520	61.57	74	2389.296	52.16	54	H
11b	1	2462	3	2483.500	61.70	74	2483.500	52.46	54	H
11g	1	2412	3	2389.744	67.19	74	2389.968	51.25	54	H
11g	1	2462	3	2483.500	68.98	74	2483.500	52.37	54	H
HT20	1	2412	3	2389.296	65.47	74	2389.968	49.64	54	H
HT20	1	2462	3	2484.000	68.15	74	2483.600	49.90	54	H

Note 1: Measurement worst emissions of receive antenna polarization.



3.6 Transmitter Radiated Unwanted Emissions

3.6.1 Transmitter Radiated Unwanted Emissions Limit

Restricted Band Emissions 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 Limit	
RF output power procedure	Limit (dB)
Peak output power procedure	20
Average output power procedure	30

Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

3.6.2 Measuring Instruments

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

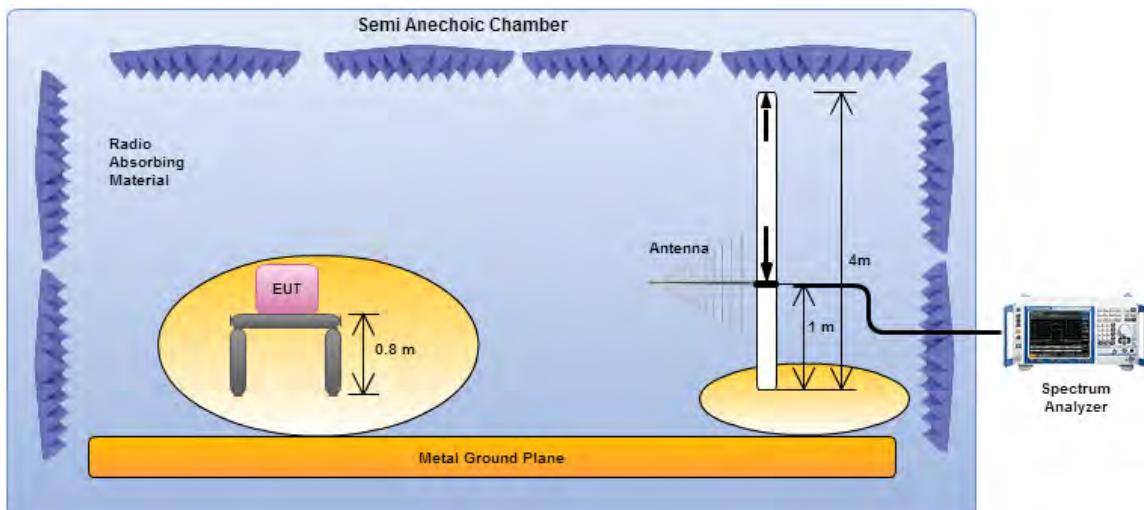


3.6.3 Test Procedures

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. 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 KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 12 for unwanted emissions into restricted bands.
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq 98\%$)
<input type="checkbox"/> Refer as KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
<input type="checkbox"/> Refer as KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW $\geq 1/T$).
<input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). VBW $\geq 1/T$, where T is pulse time.
<input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 12.2.3 measurement procedure Quasi-Peak limit.
<input checked="" type="checkbox"/> For radiated measurement, refer as KDB 558074, clause 12.2.7.
<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 1 GHz and test distance is 3m.
<input checked="" type="checkbox"/> The any unwanted emissions level shall not exceed the fundamental emission level.
<input checked="" type="checkbox"/> All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

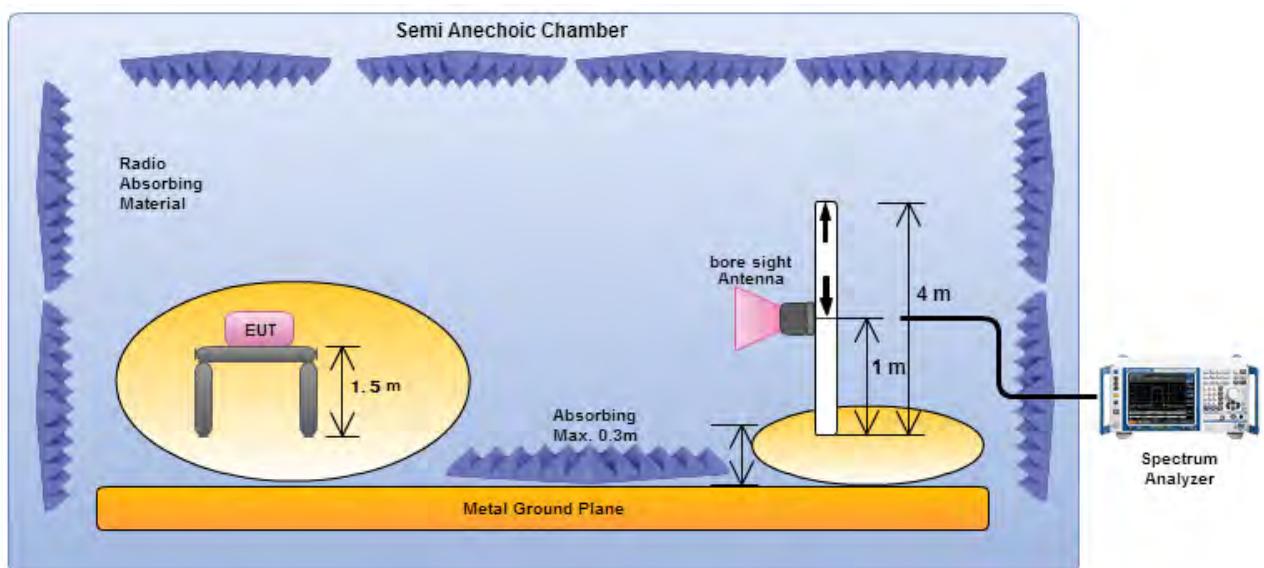
3.6.4 Test Setup

Transmitter Radiated Unwanted Emissions (below 1GHz)



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

Transmitter Radiated Unwanted Emissions (Above 1GHz)



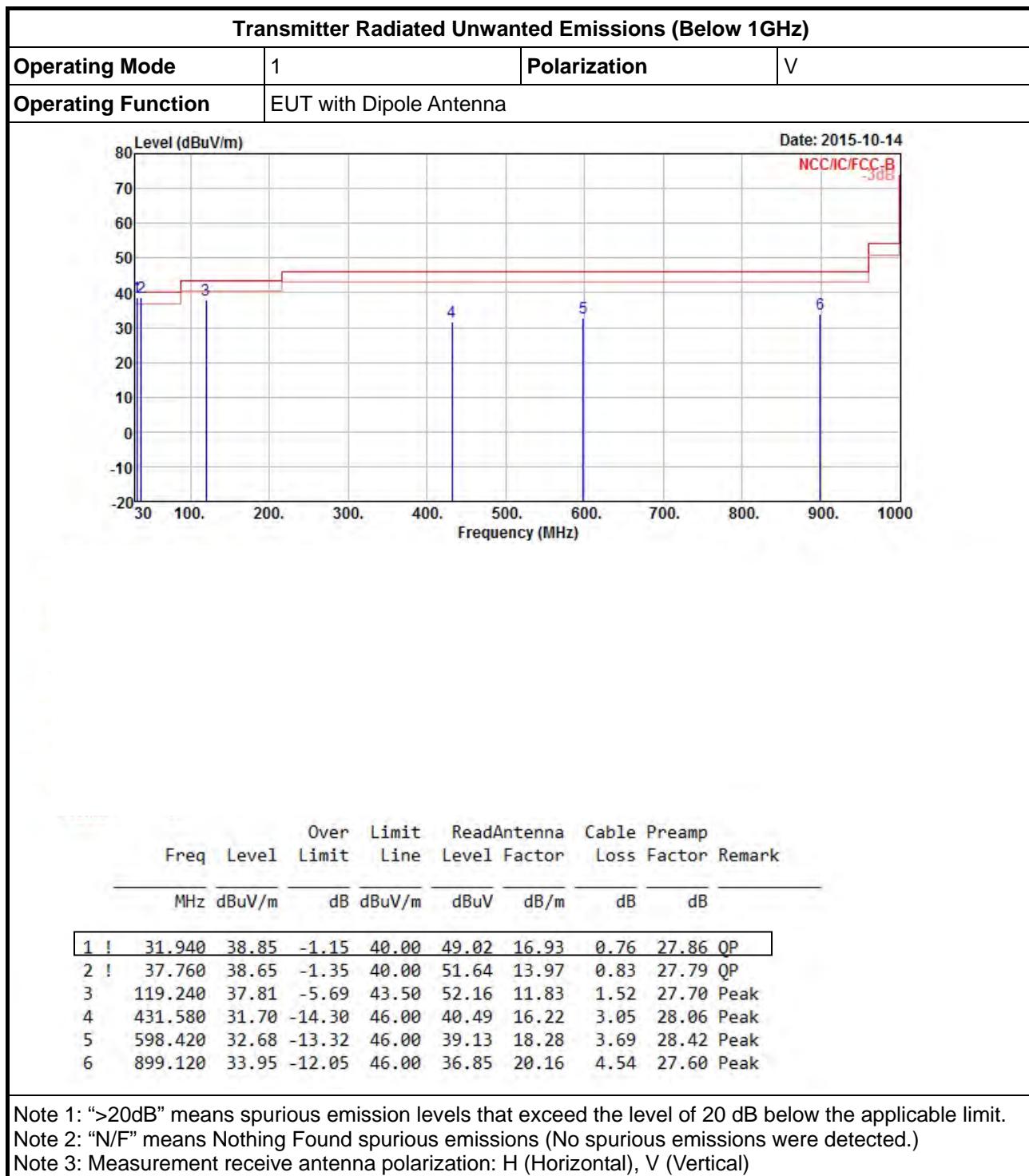
Electric field tests shall be performed in the frequency range of 1 GHz to 10th harmonic of highest fundamental frequency or 40 GHz using a calibrated horn antenna.

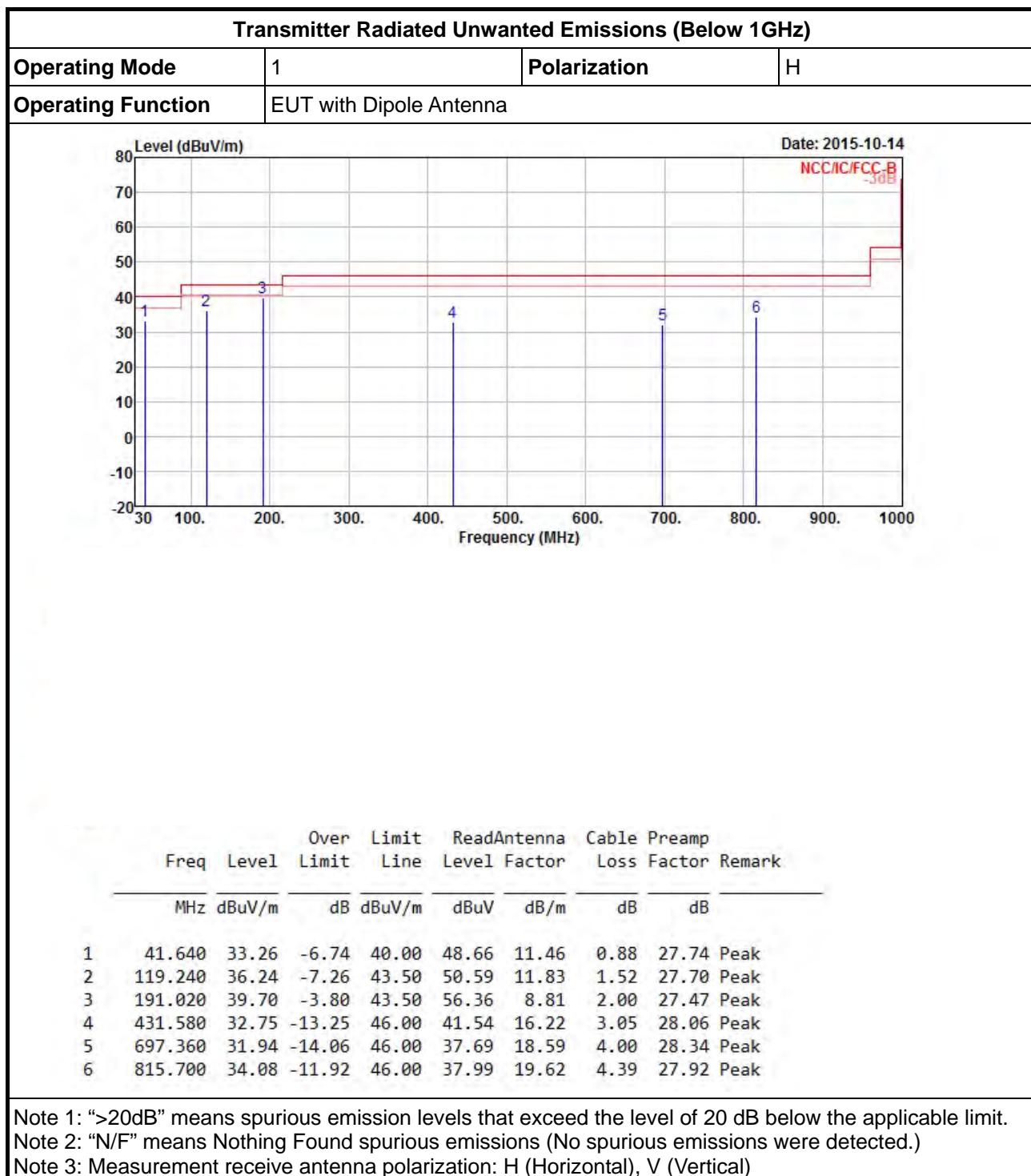
3.6.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

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



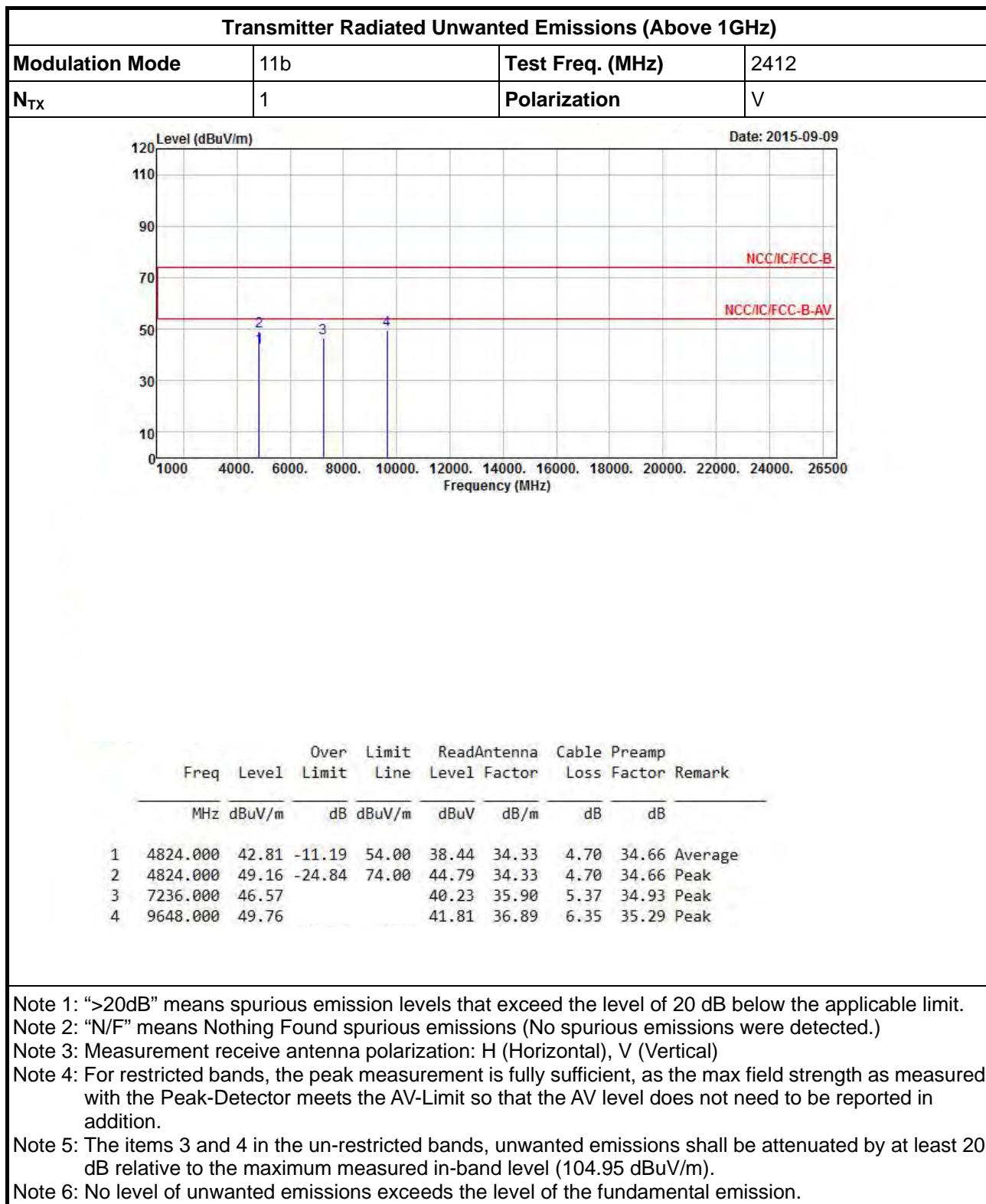
3.6.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

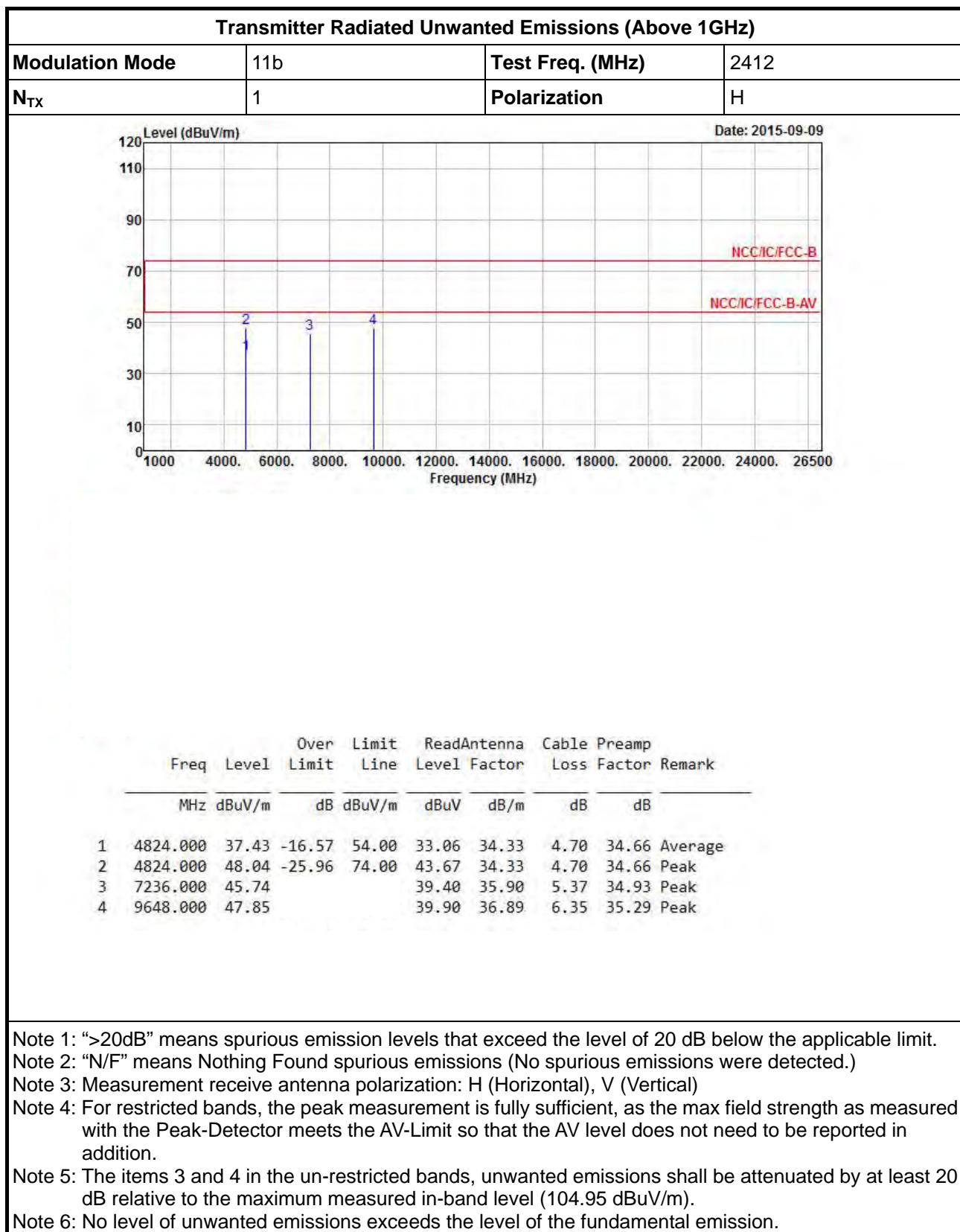


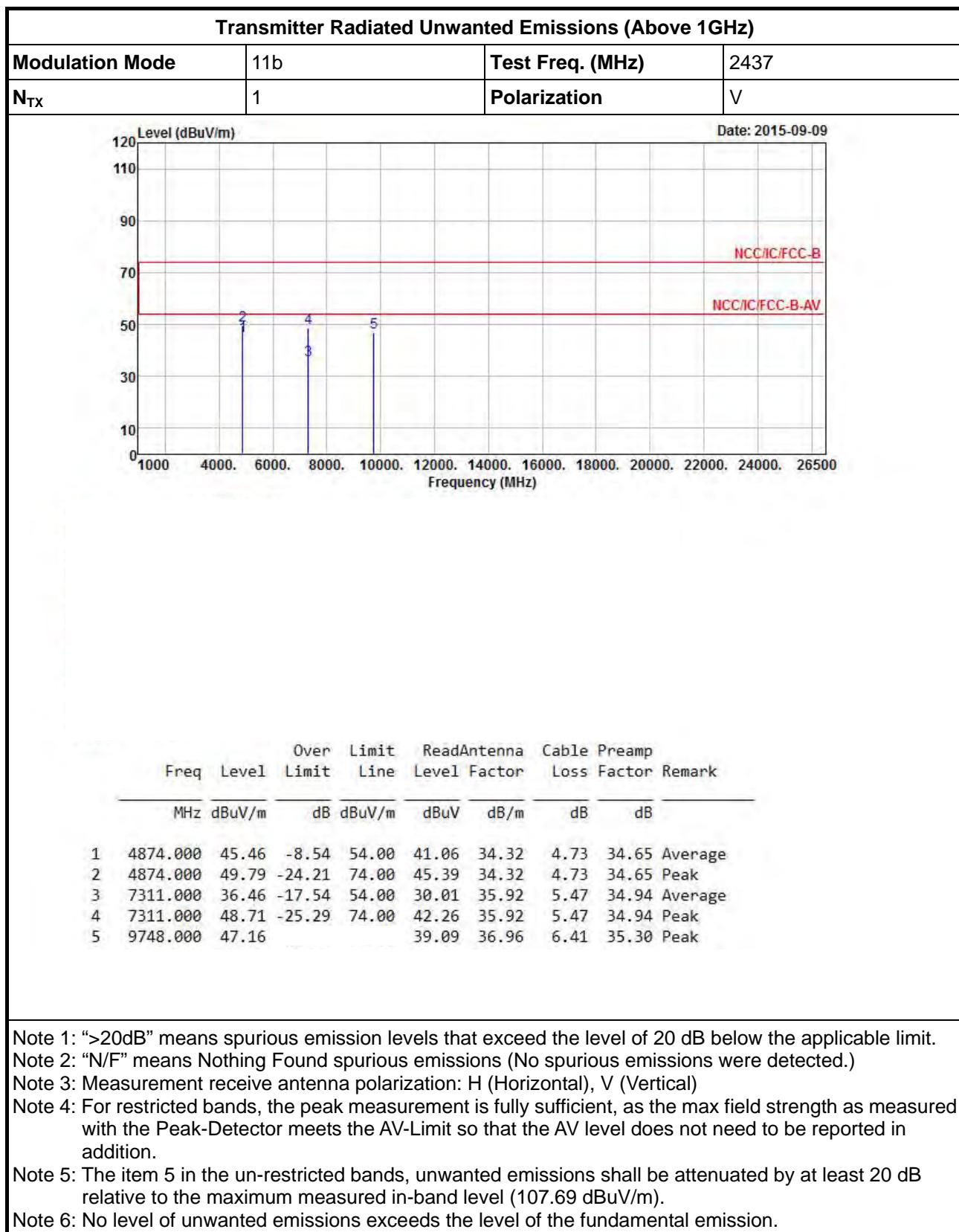


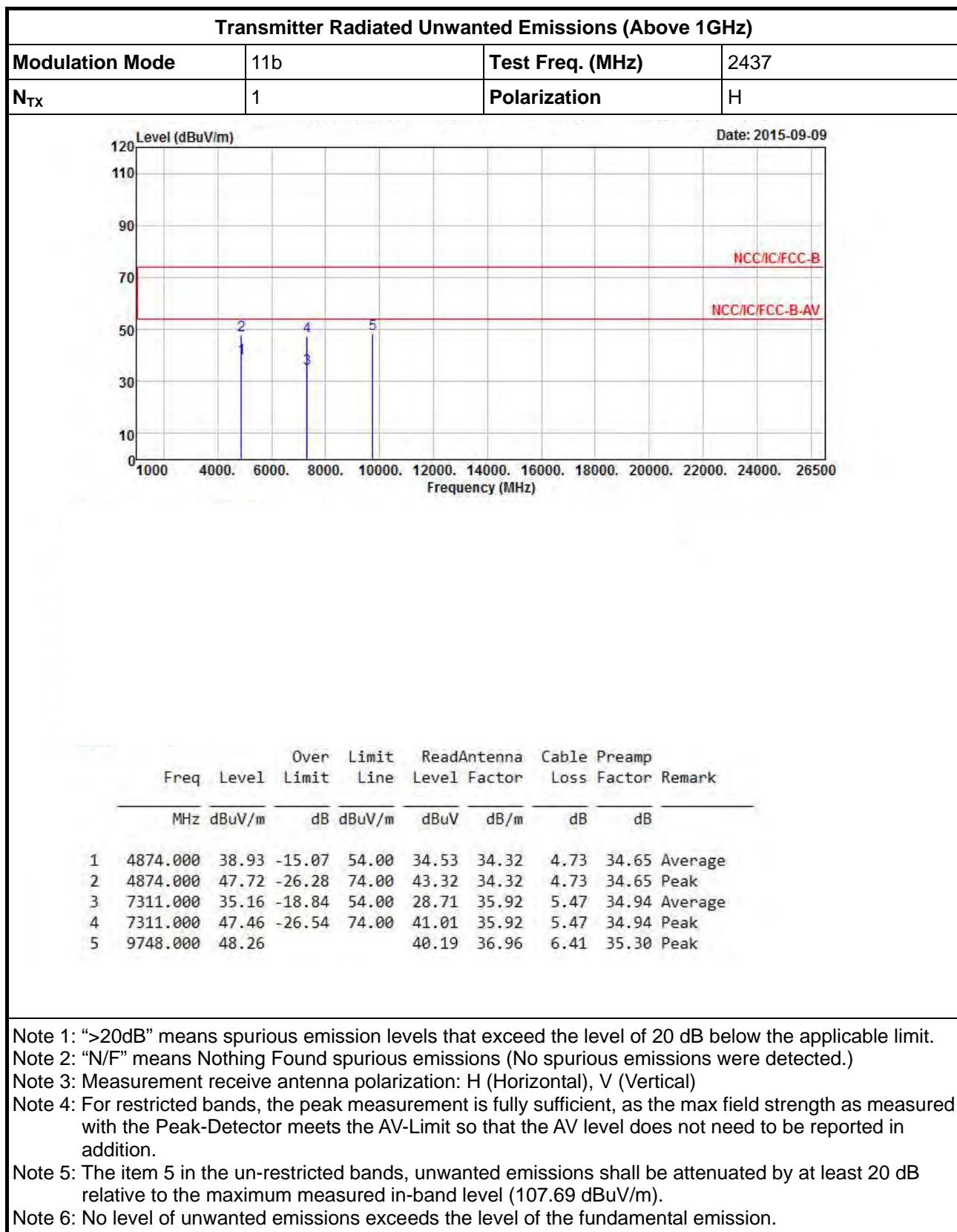


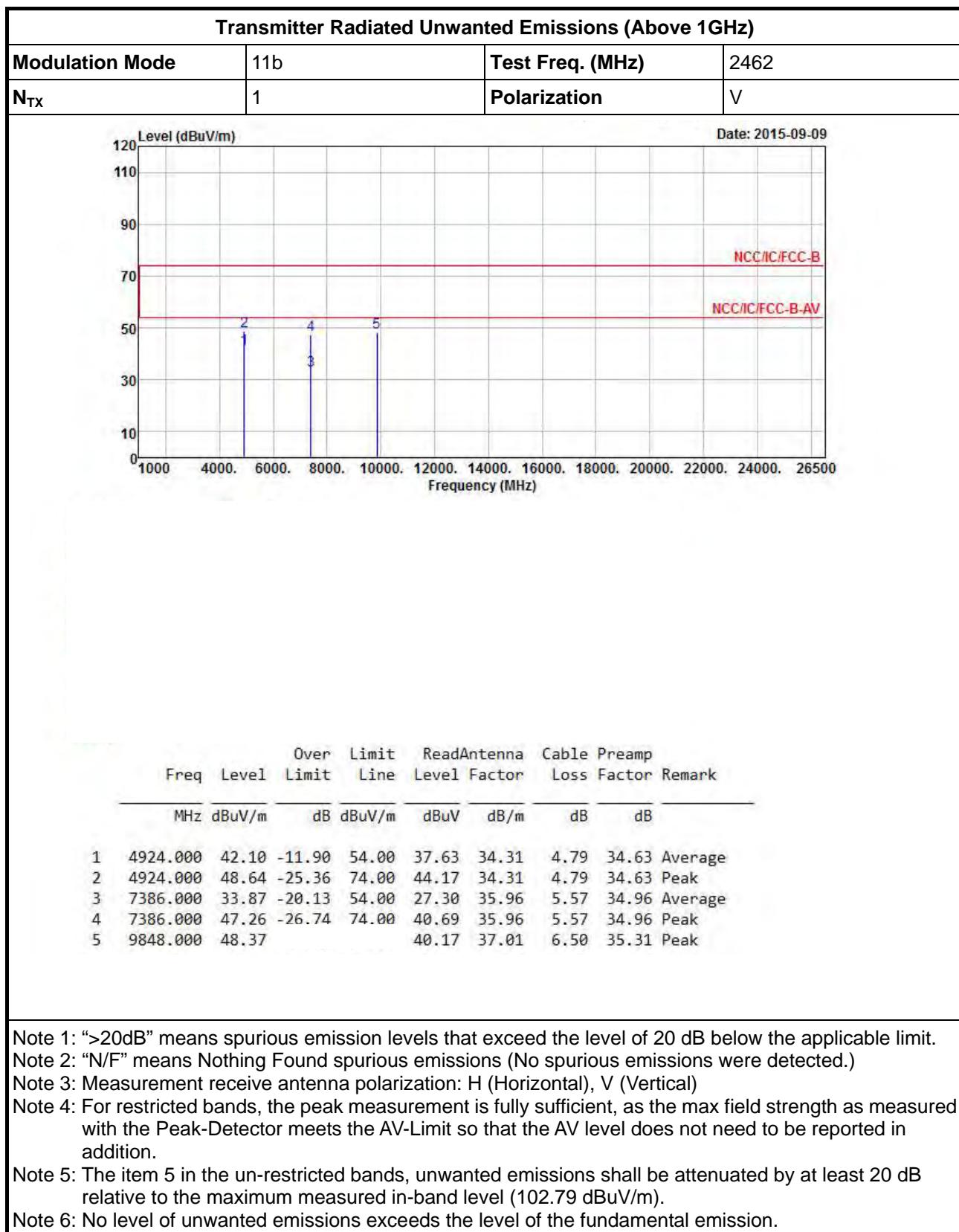
3.6.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) – Dipole Antenna











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

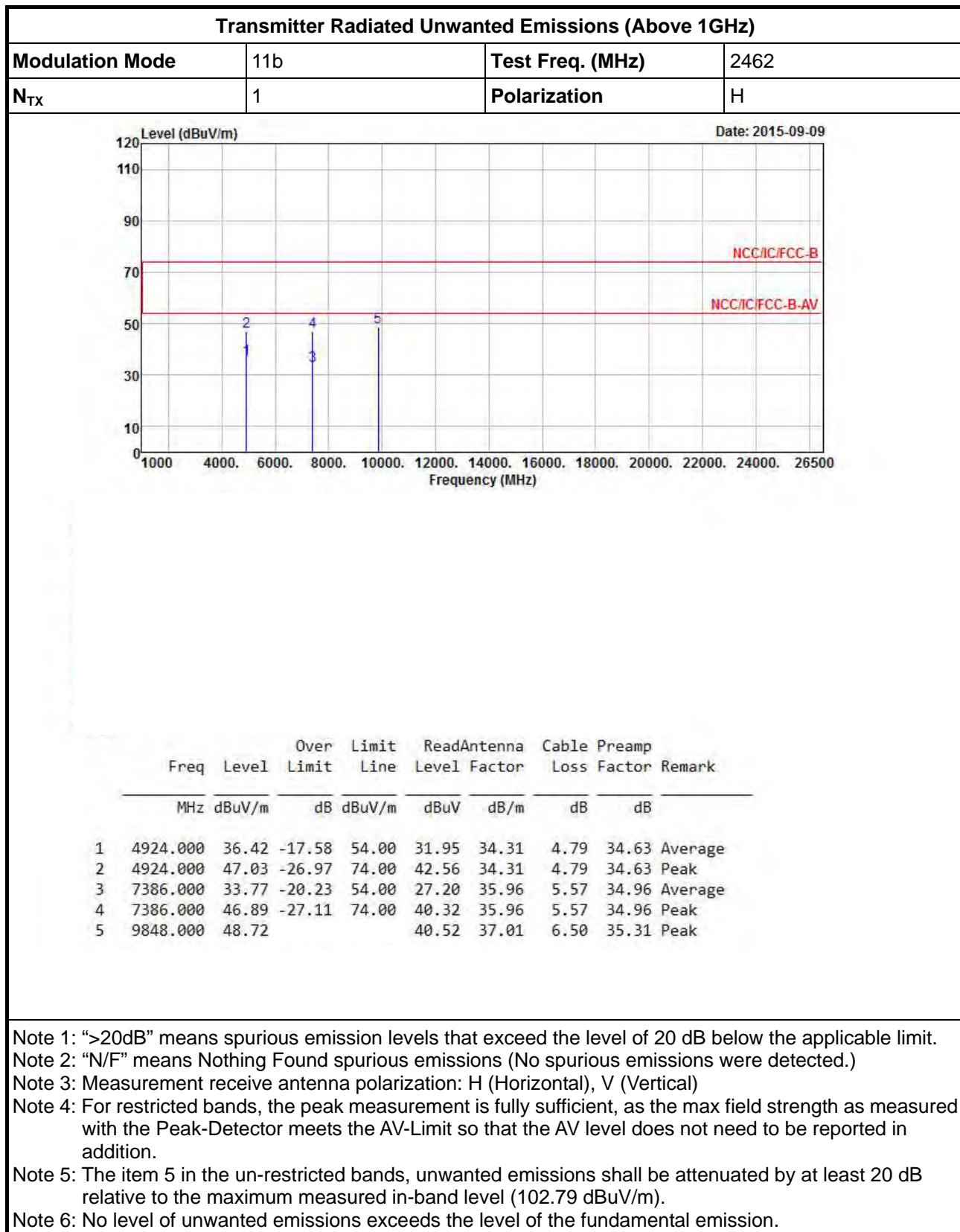
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

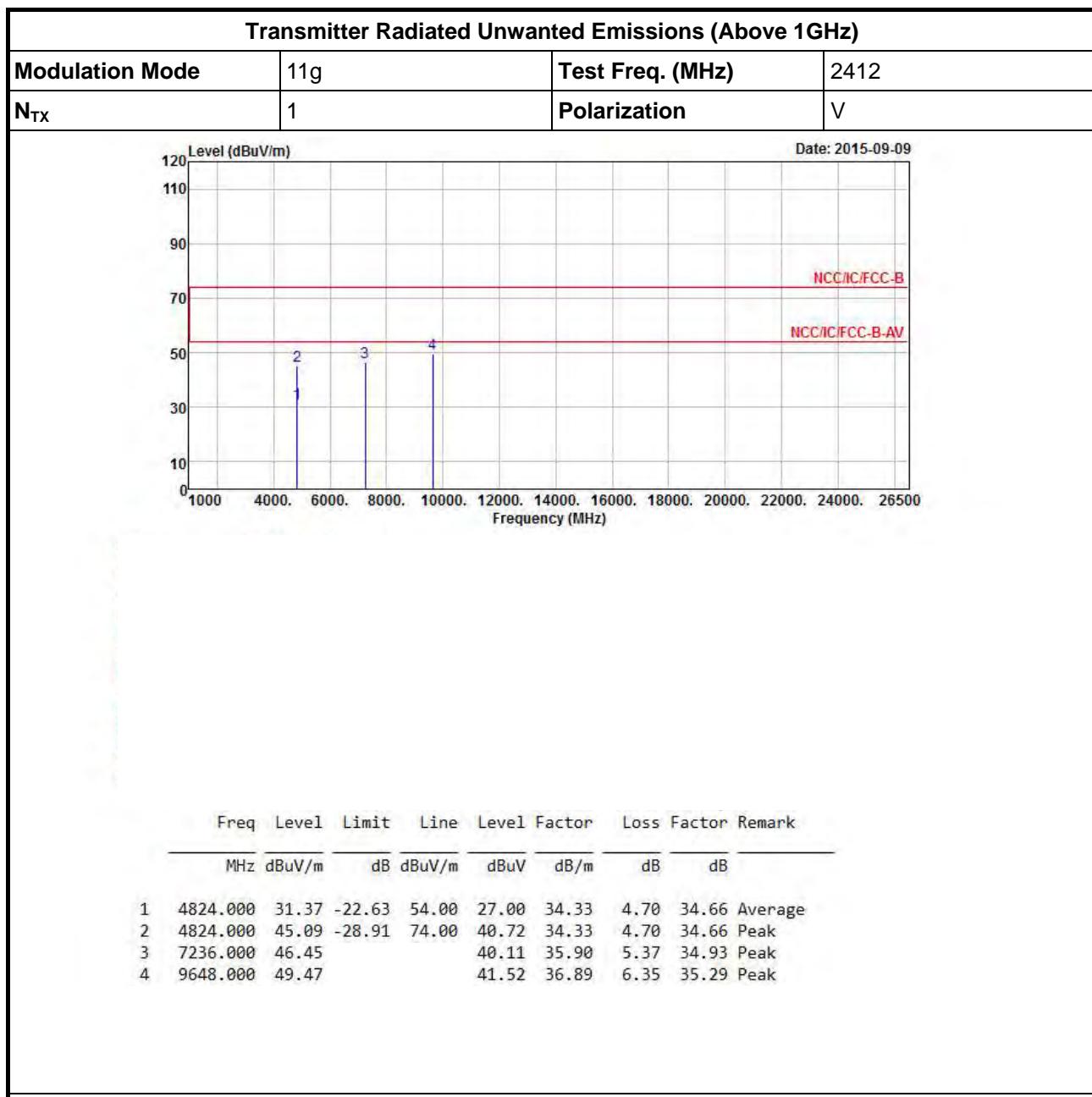
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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: The item 5 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (102.79 dBuV/m).

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.

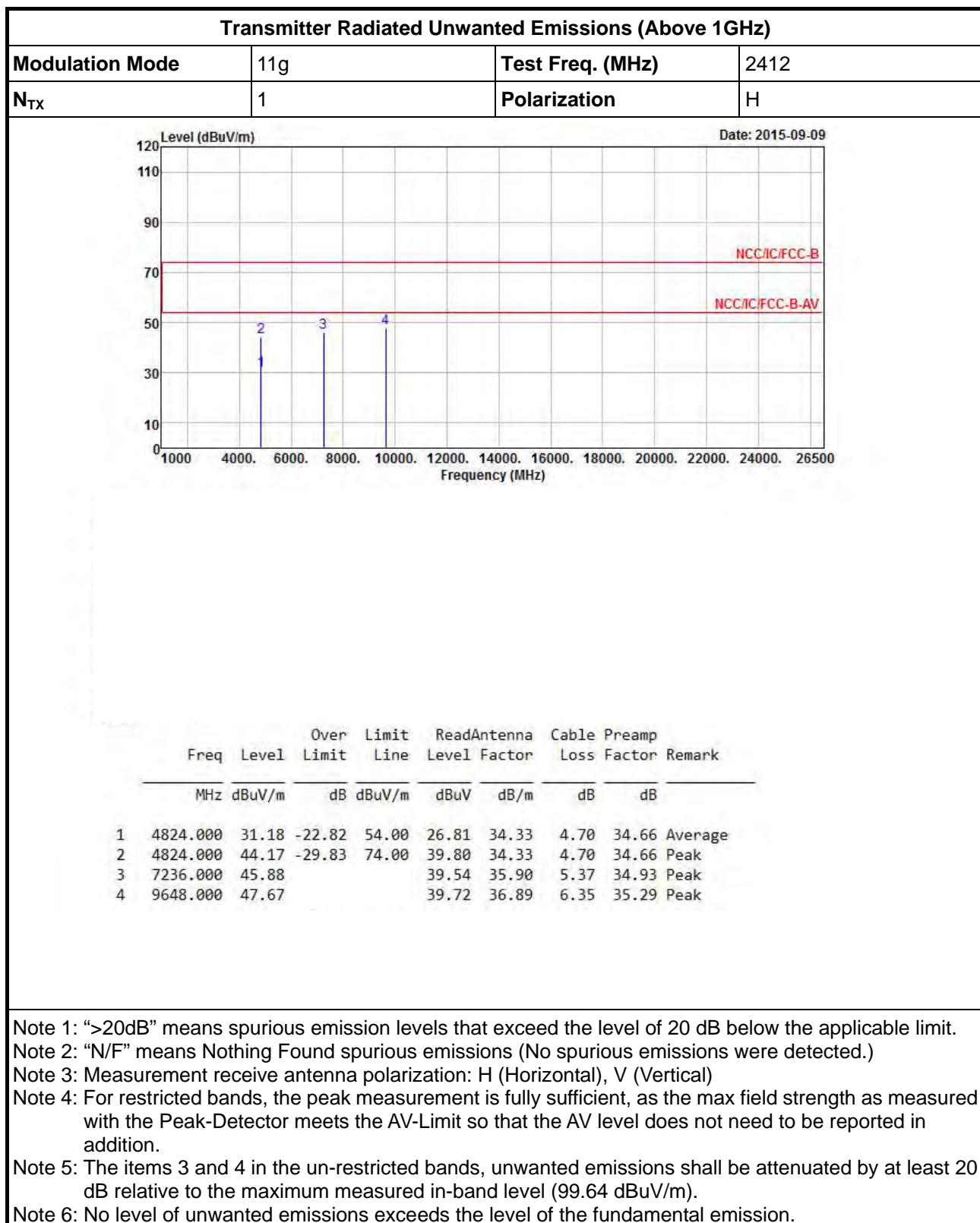
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

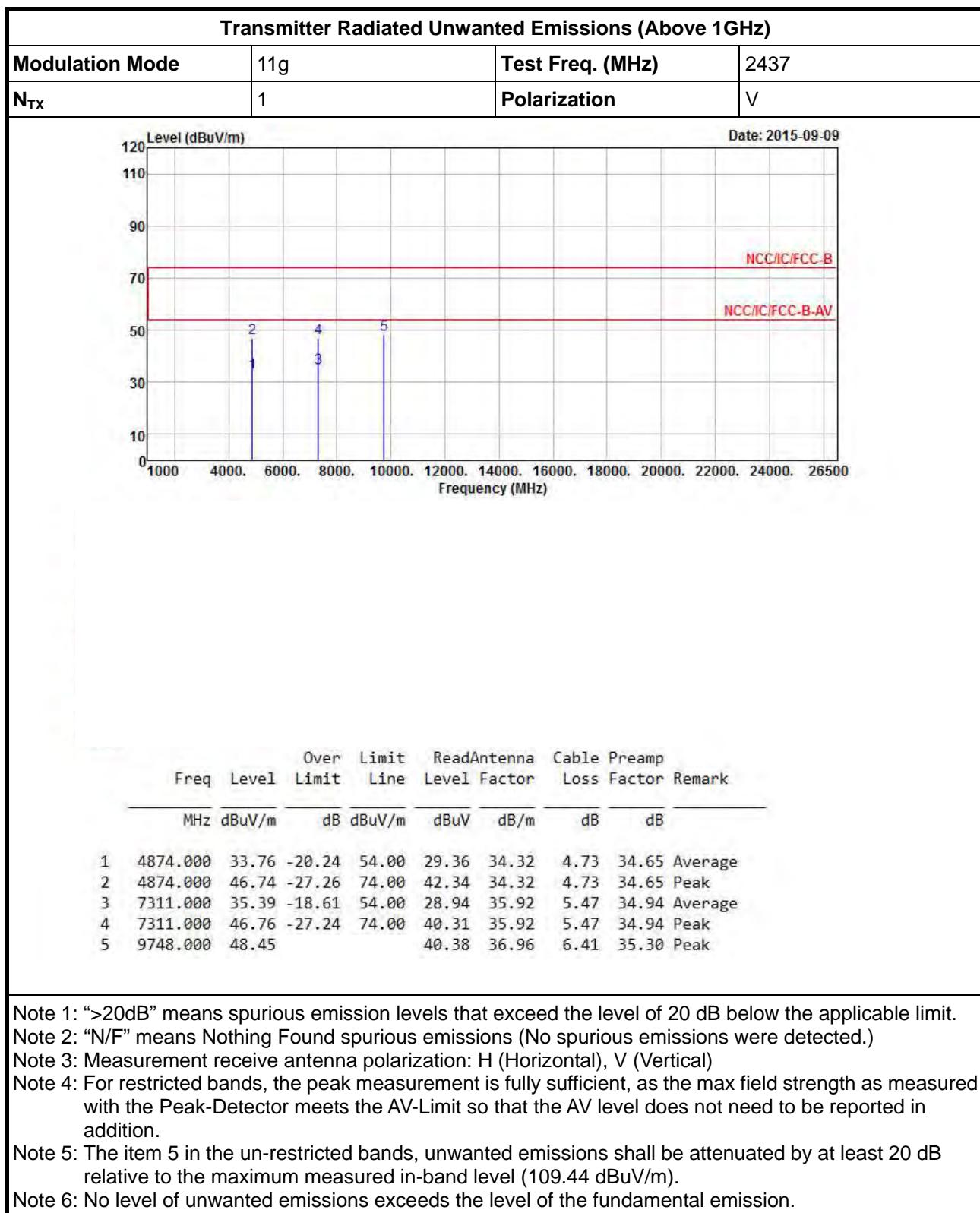
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

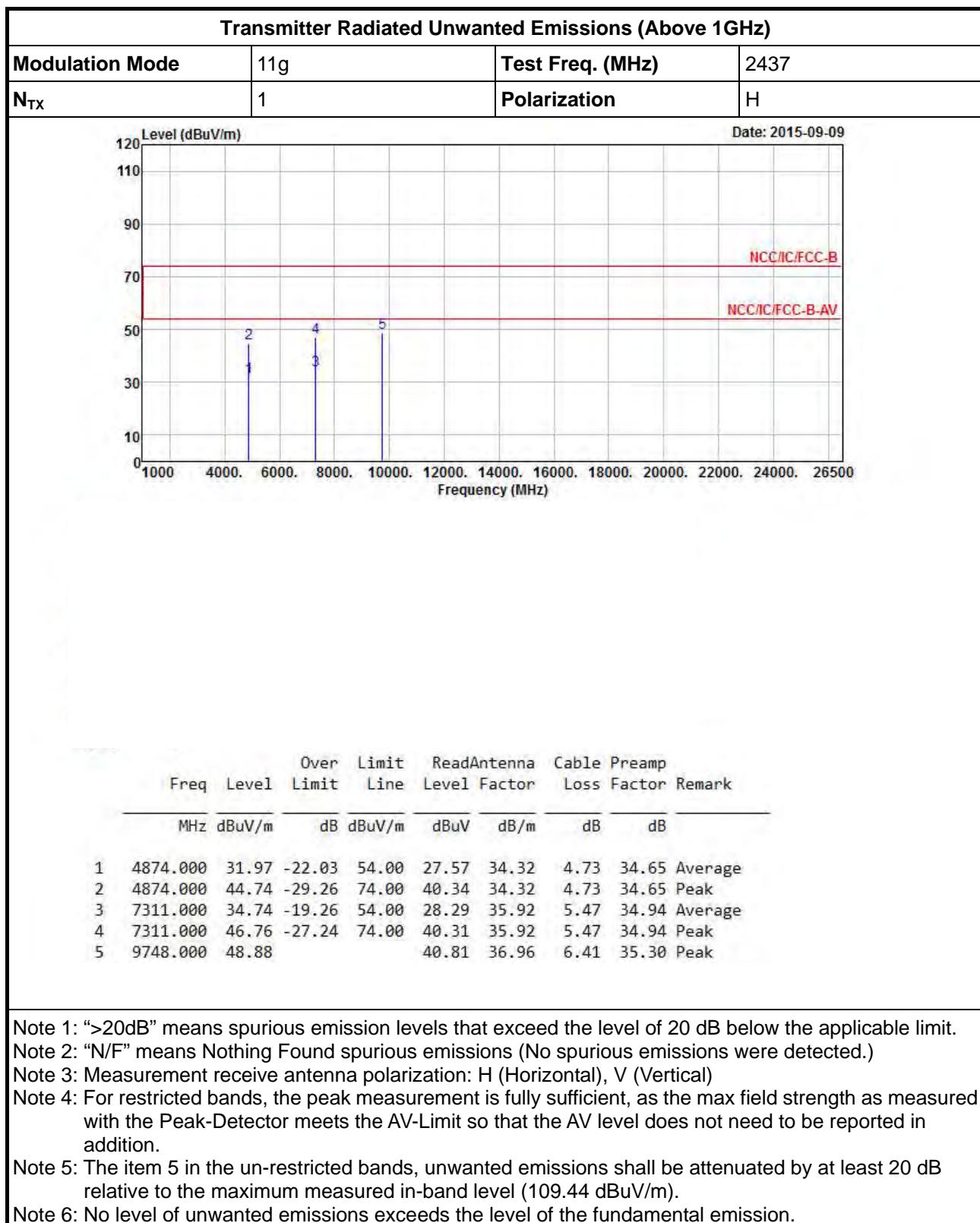
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

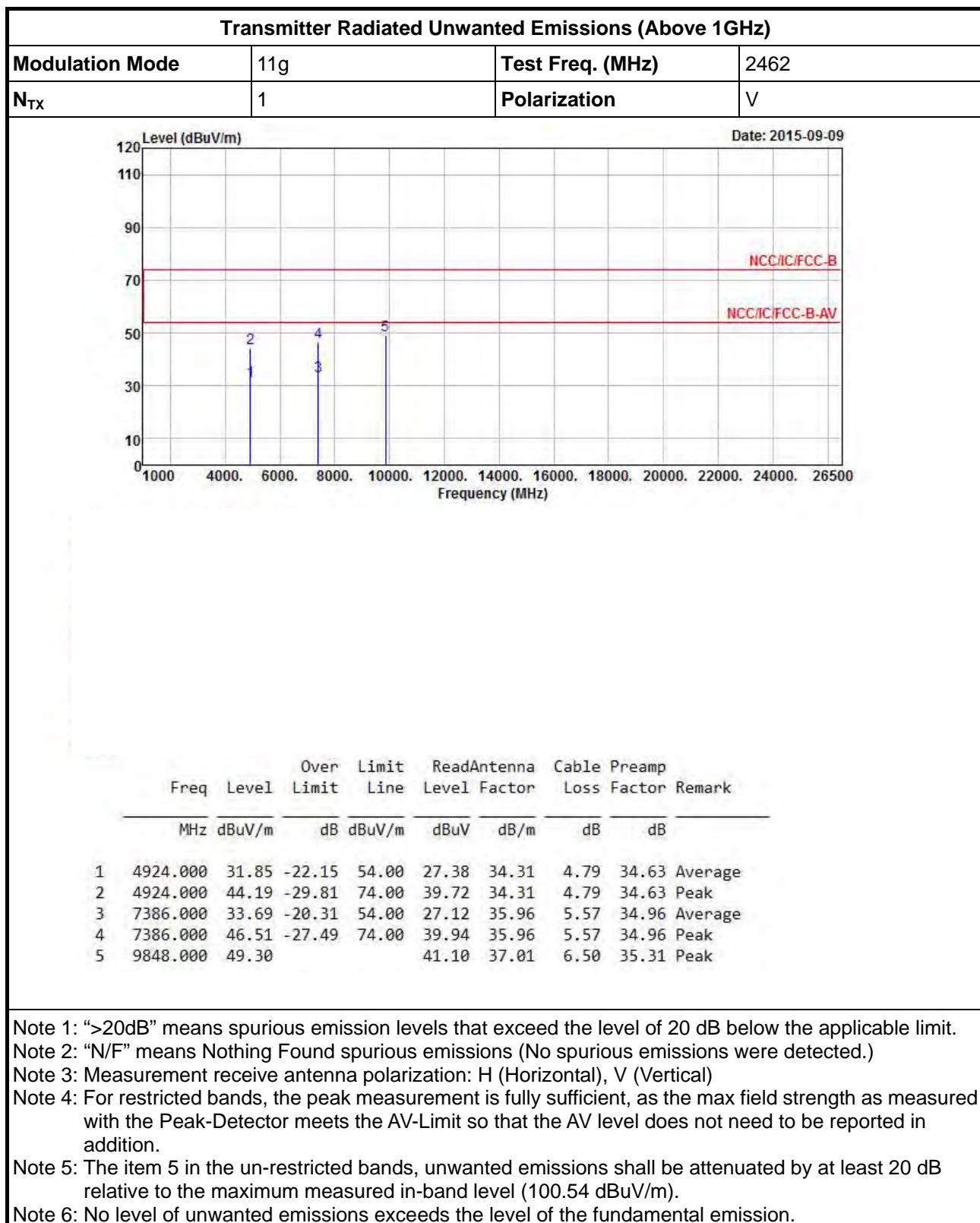
Note 5: The items 3 and 4 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (99.64 dBuV/m).

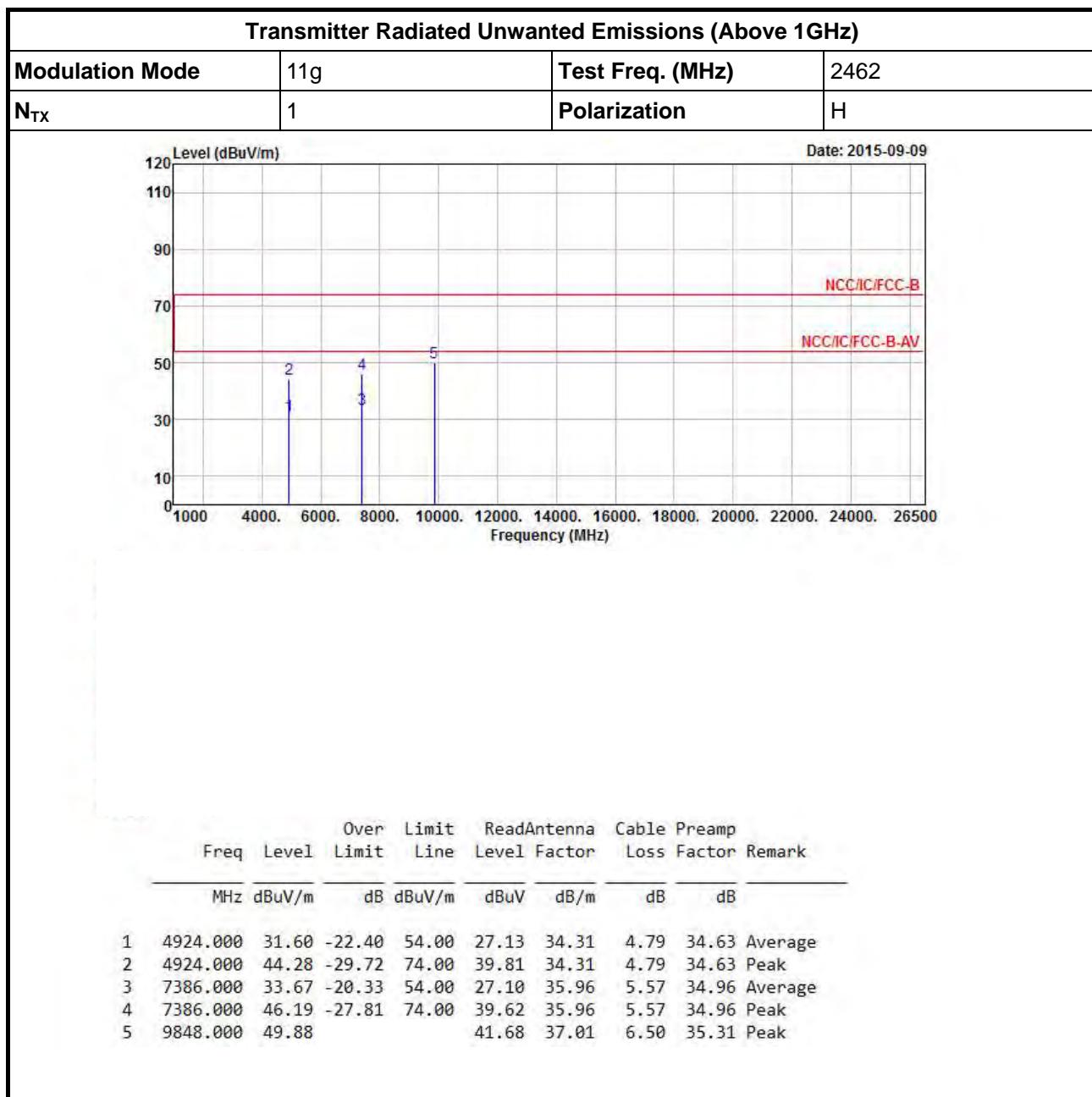
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.











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

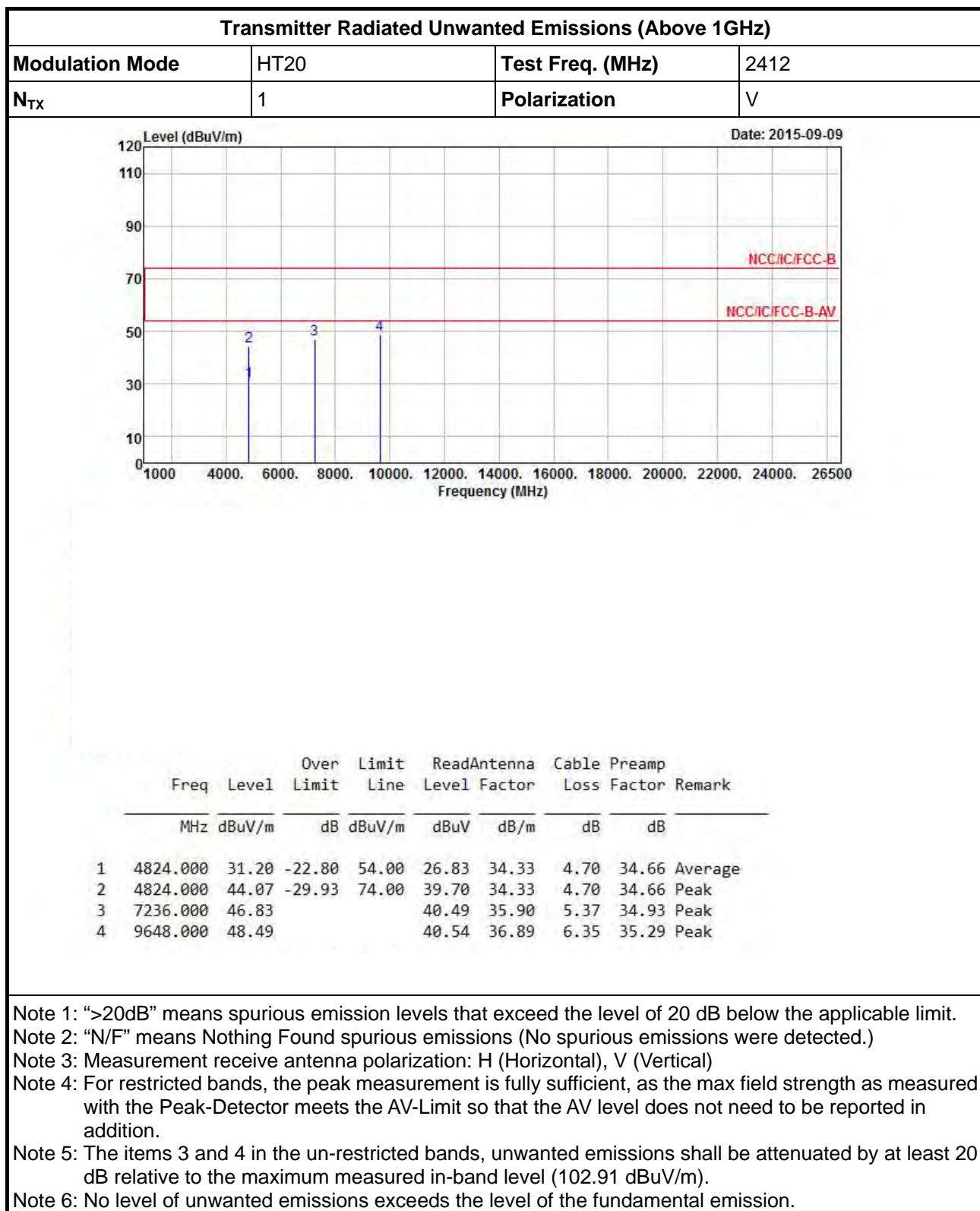
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

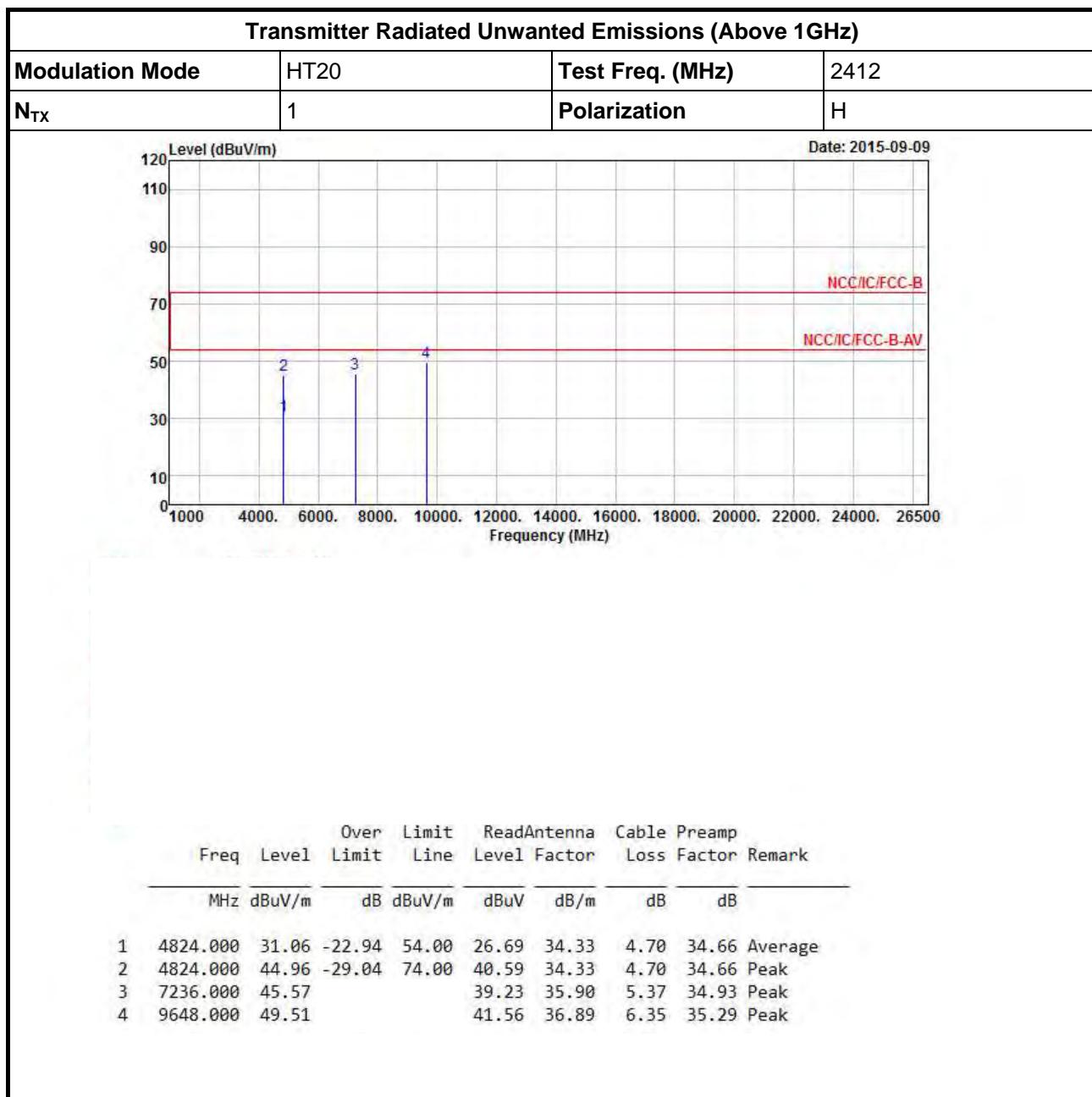
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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: The item 5 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (100.54 dBuV/m).

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.

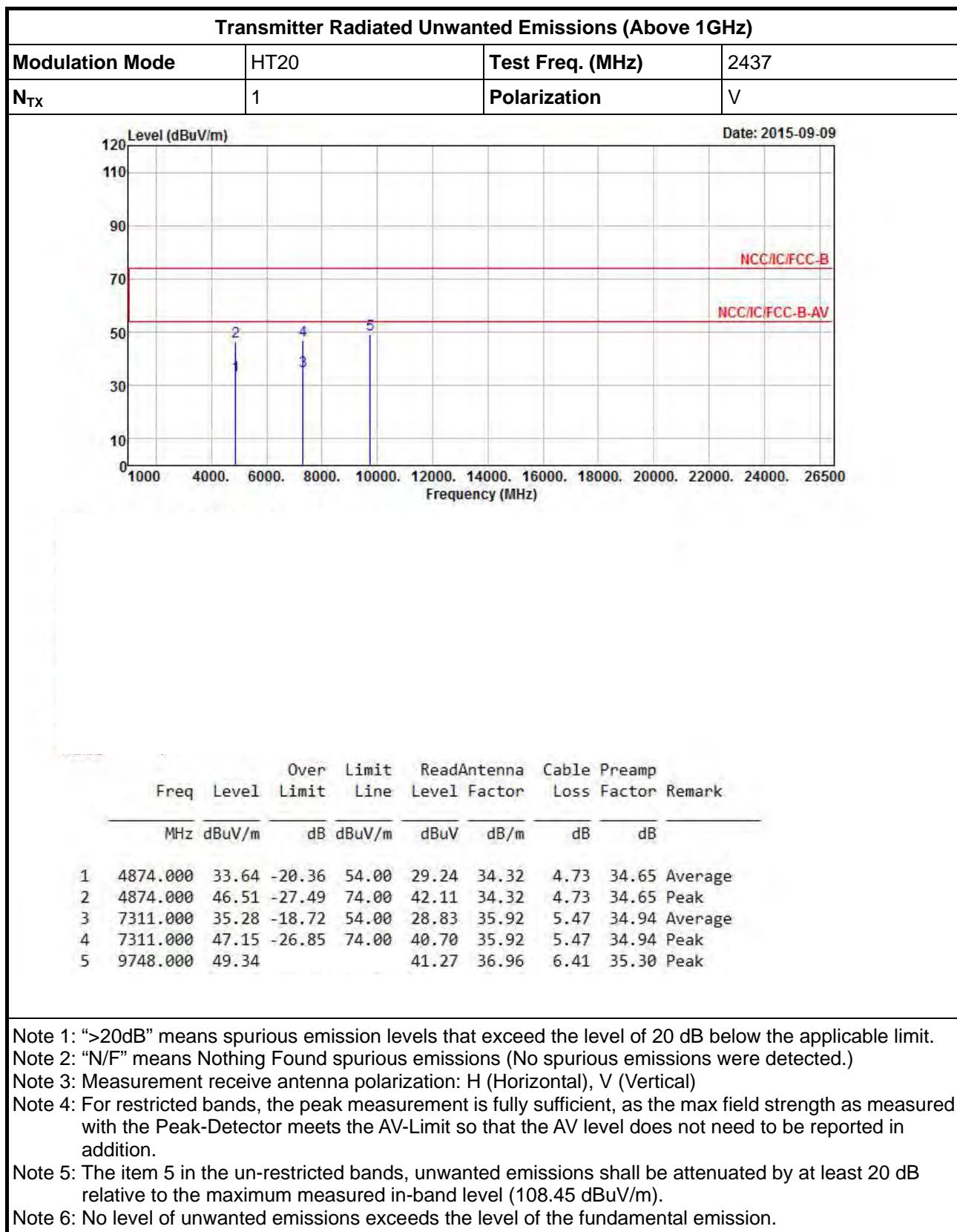
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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: The items 3 and 4 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (102.91 dBuV/m).

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.

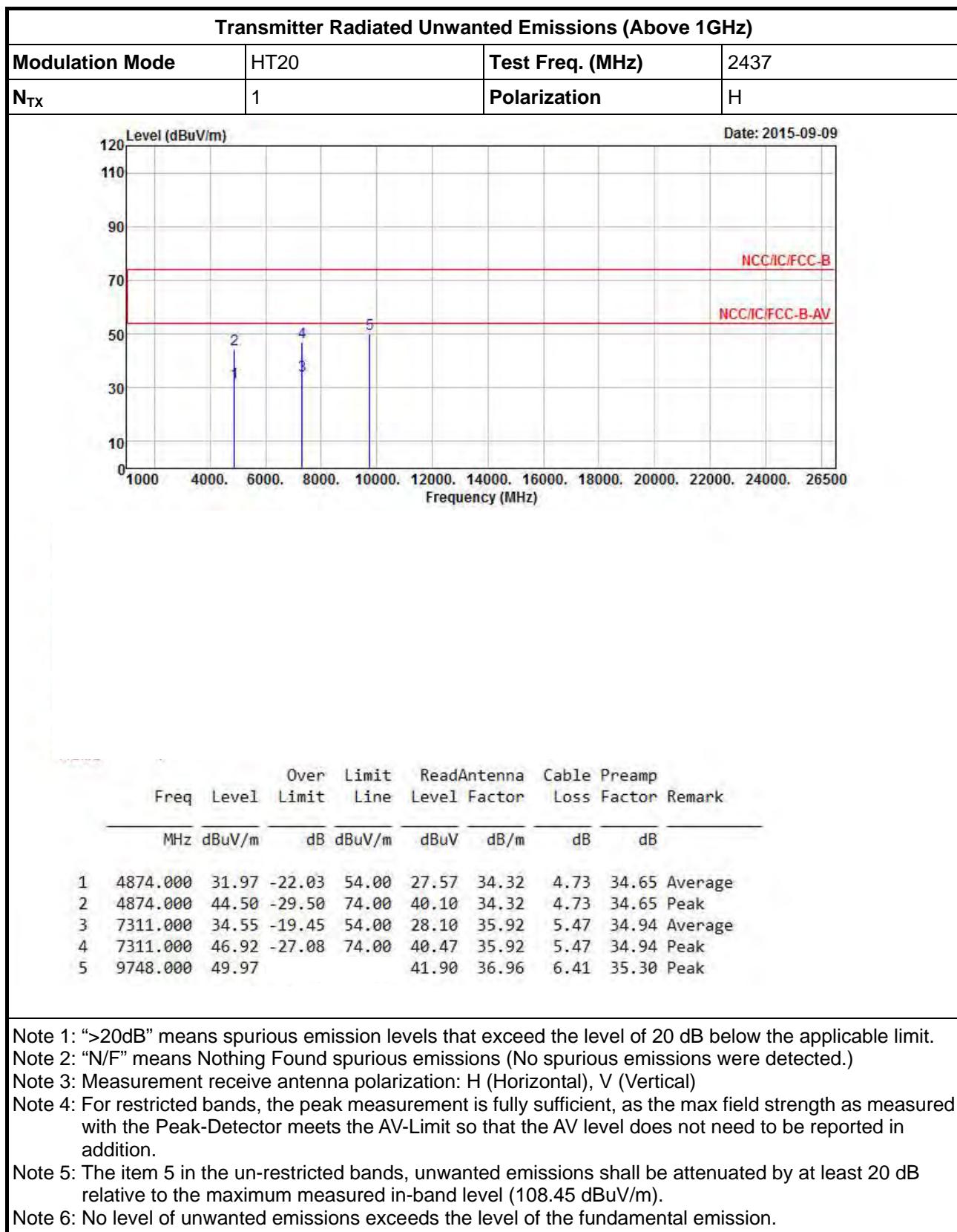
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

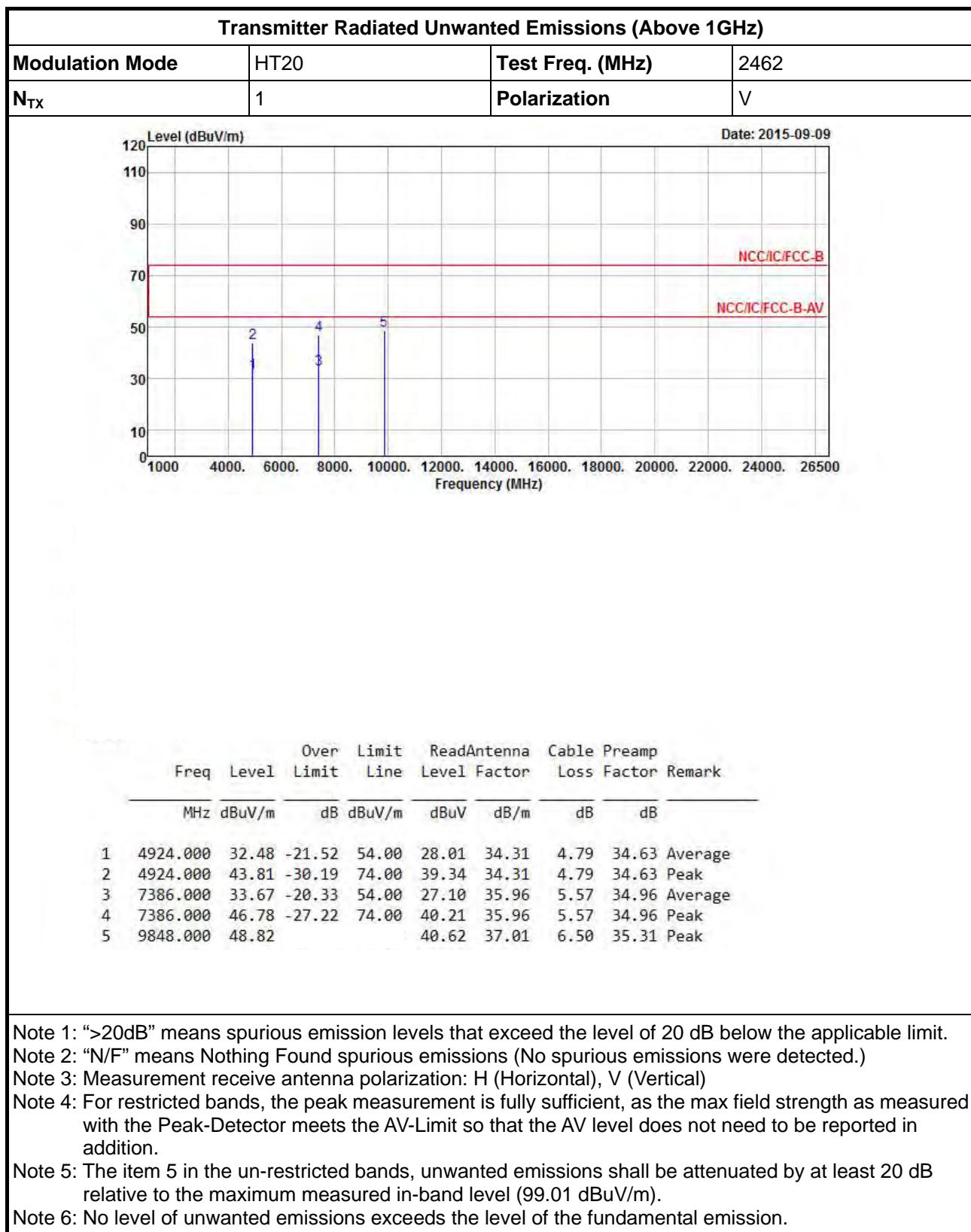
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

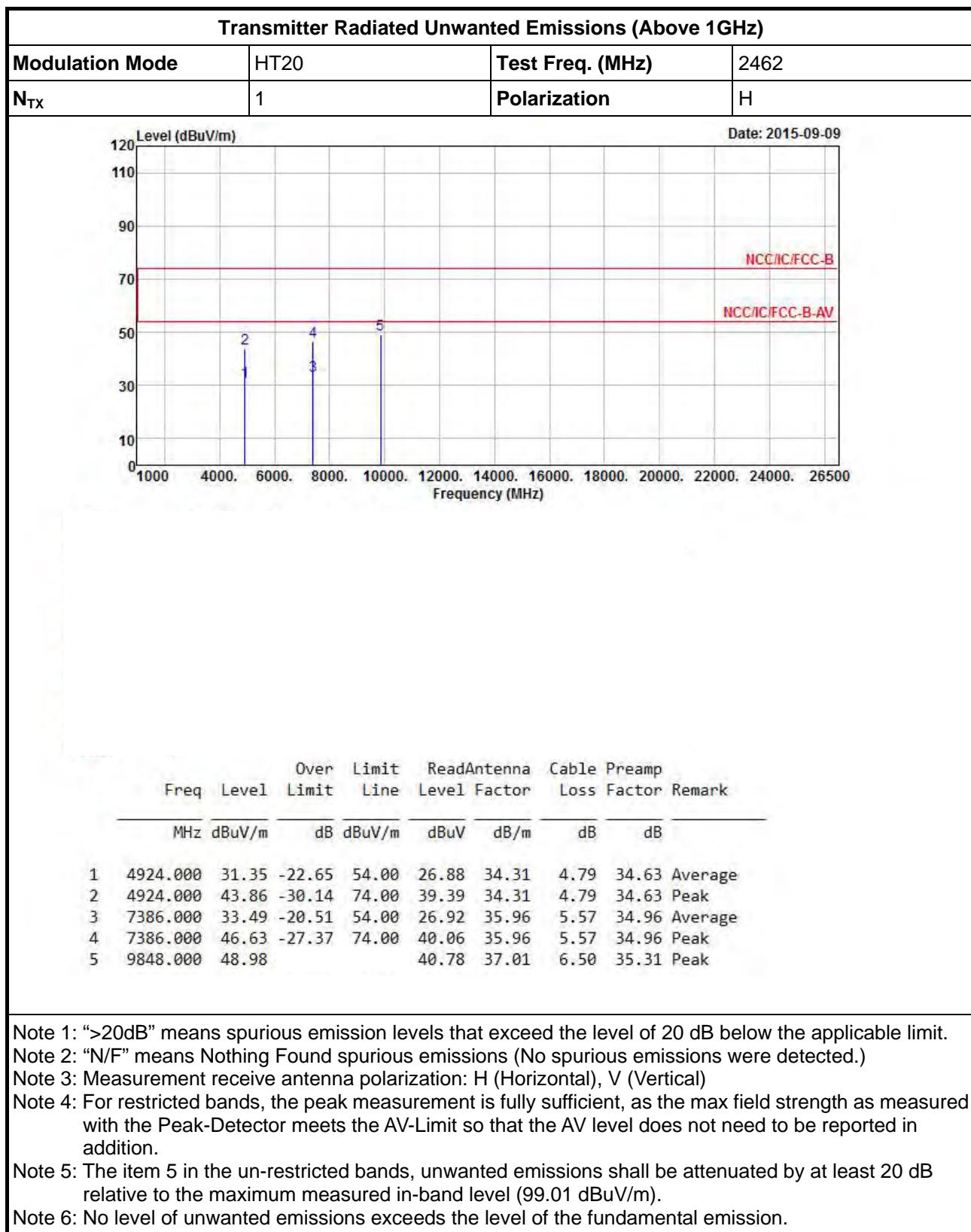
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 5: The item 5 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (108.45 dBuV/m).

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

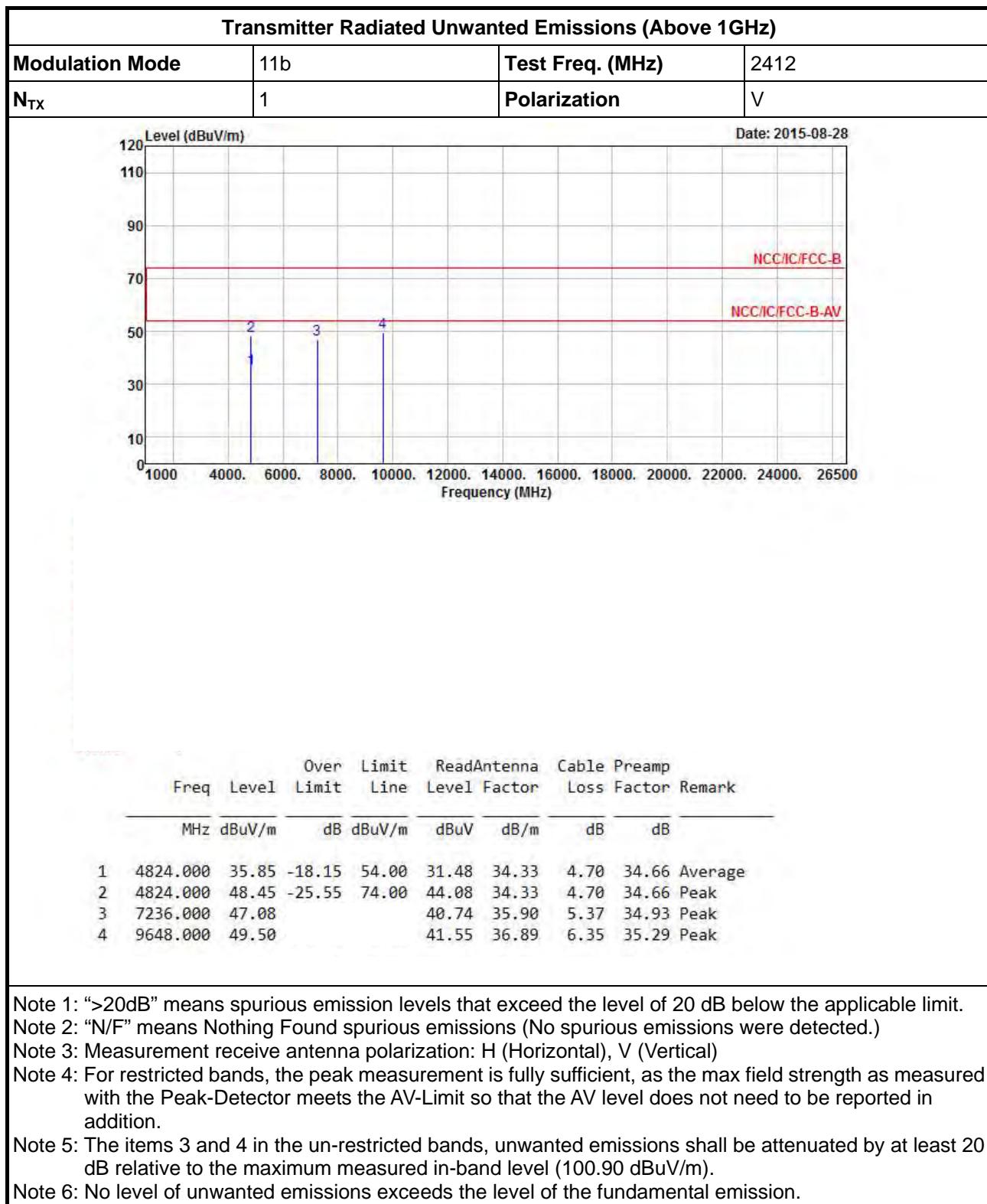


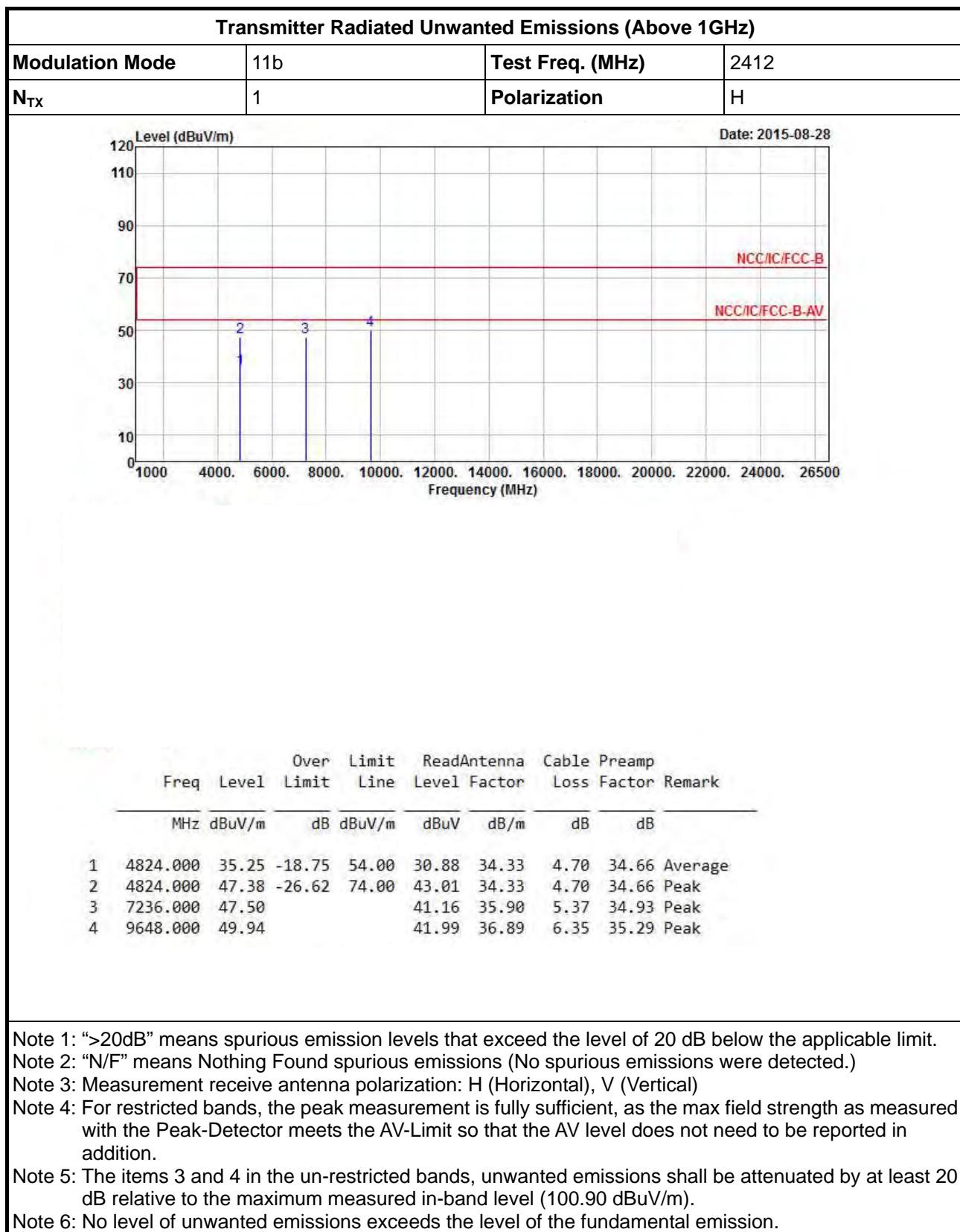






3.6.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) – PCB Antenna





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

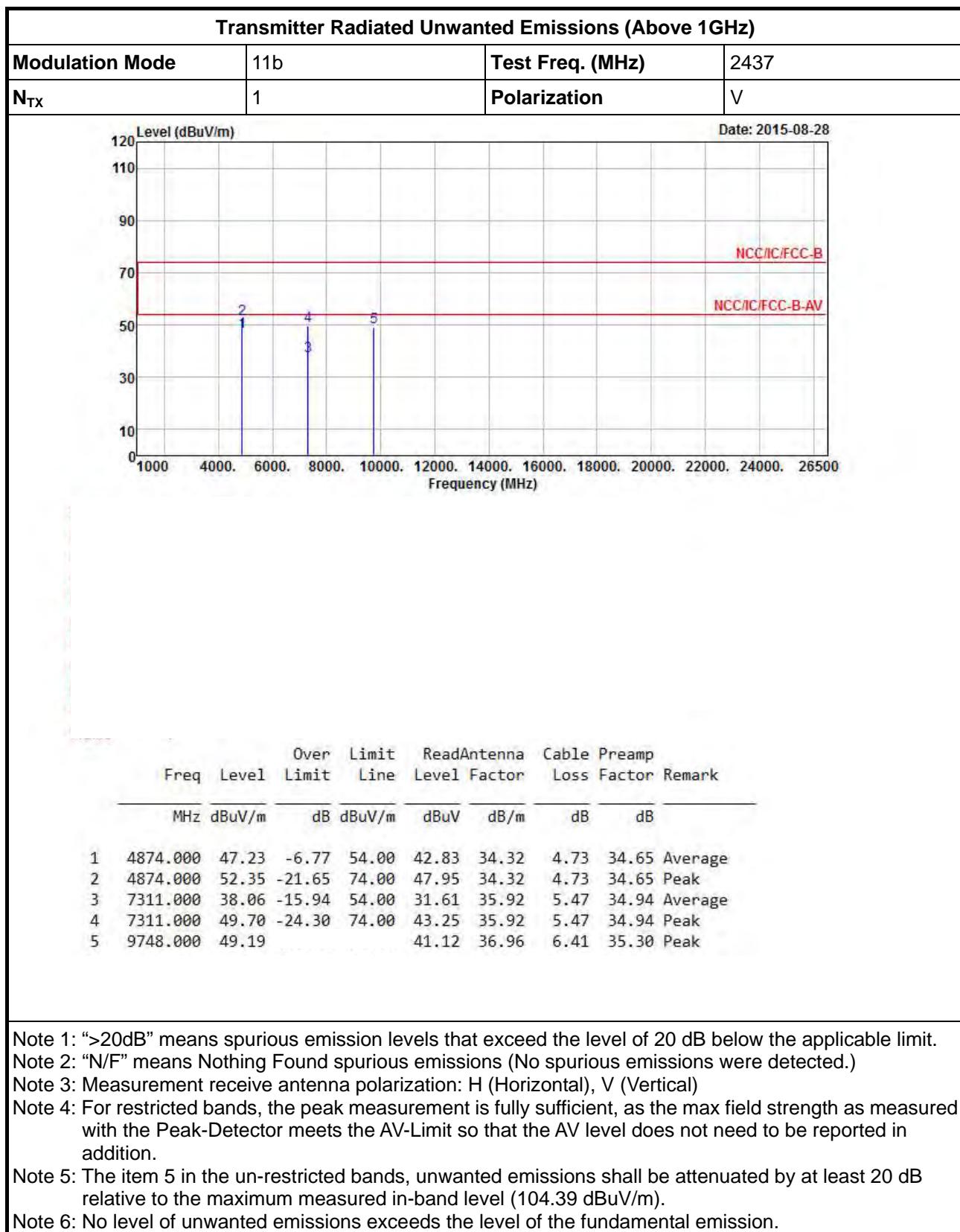
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

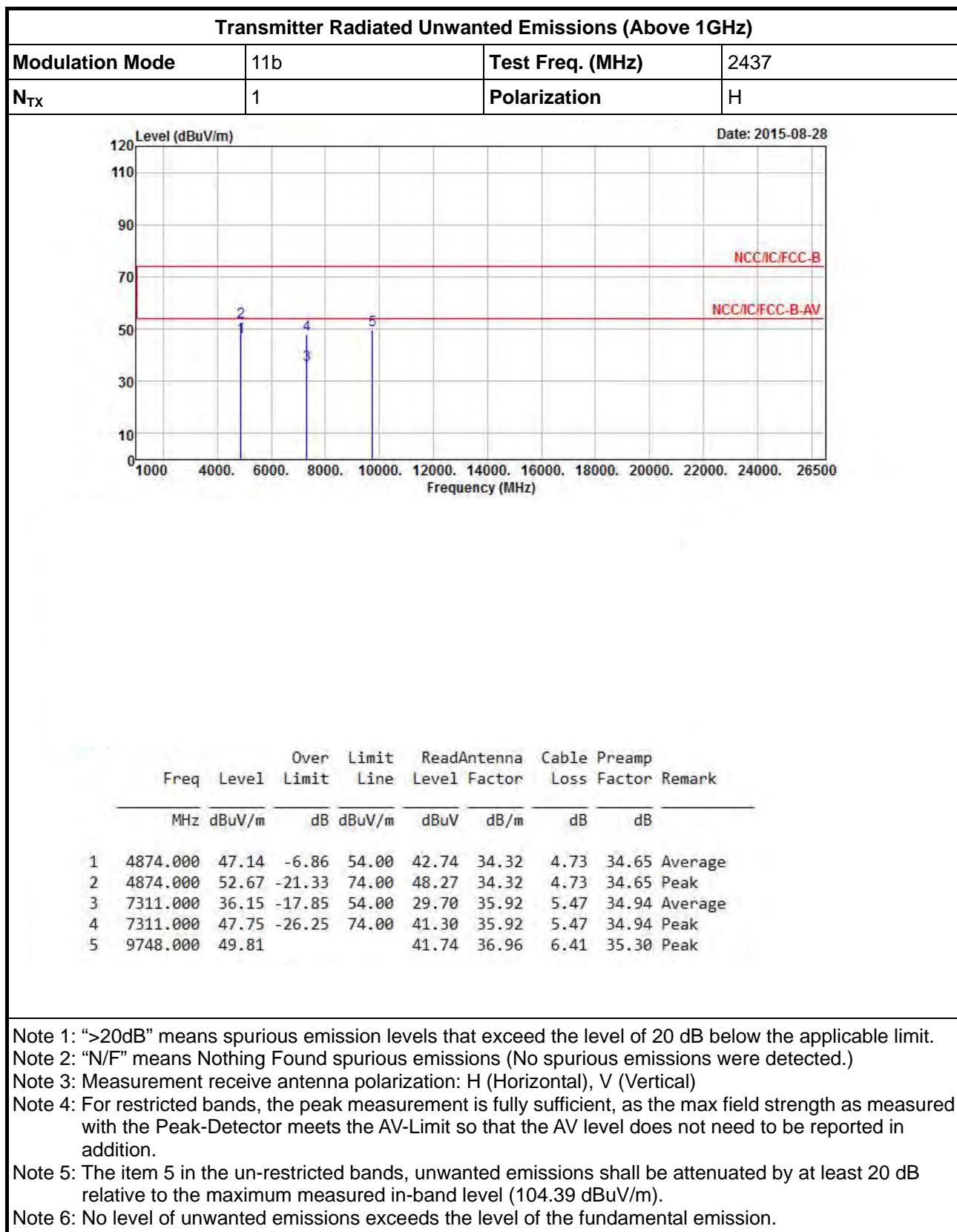
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

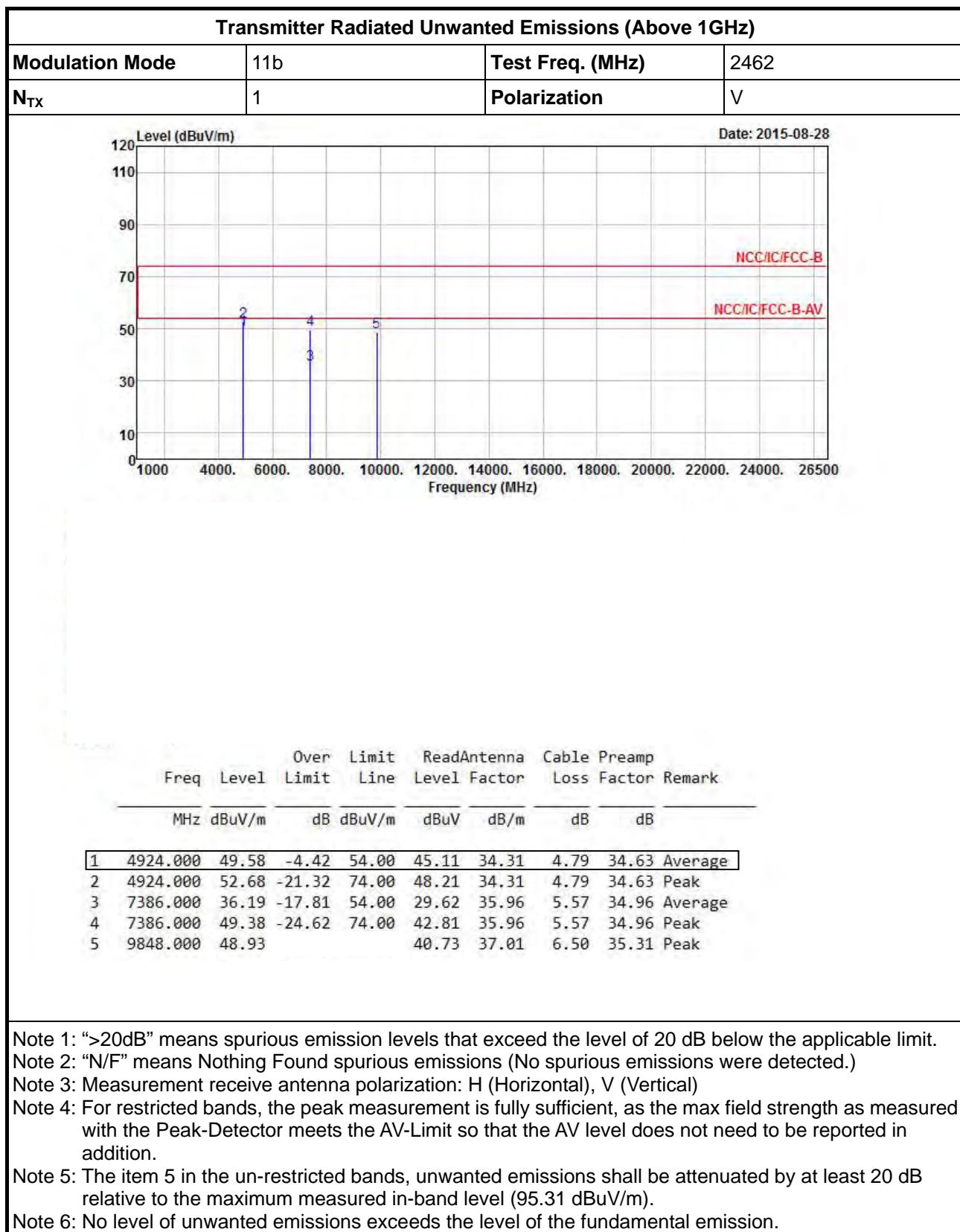
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

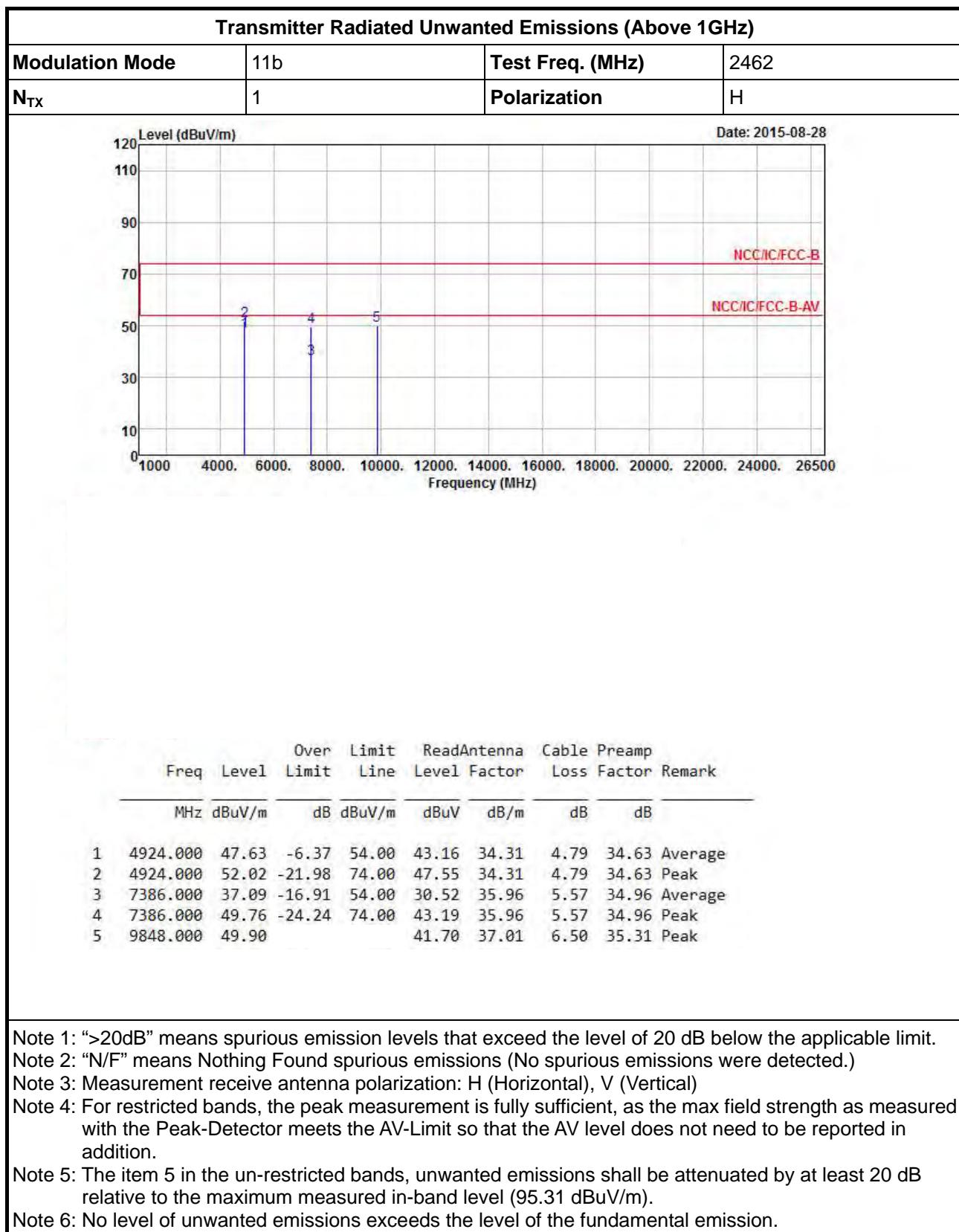
Note 5: The items 3 and 4 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (100.90 dBuV/m).

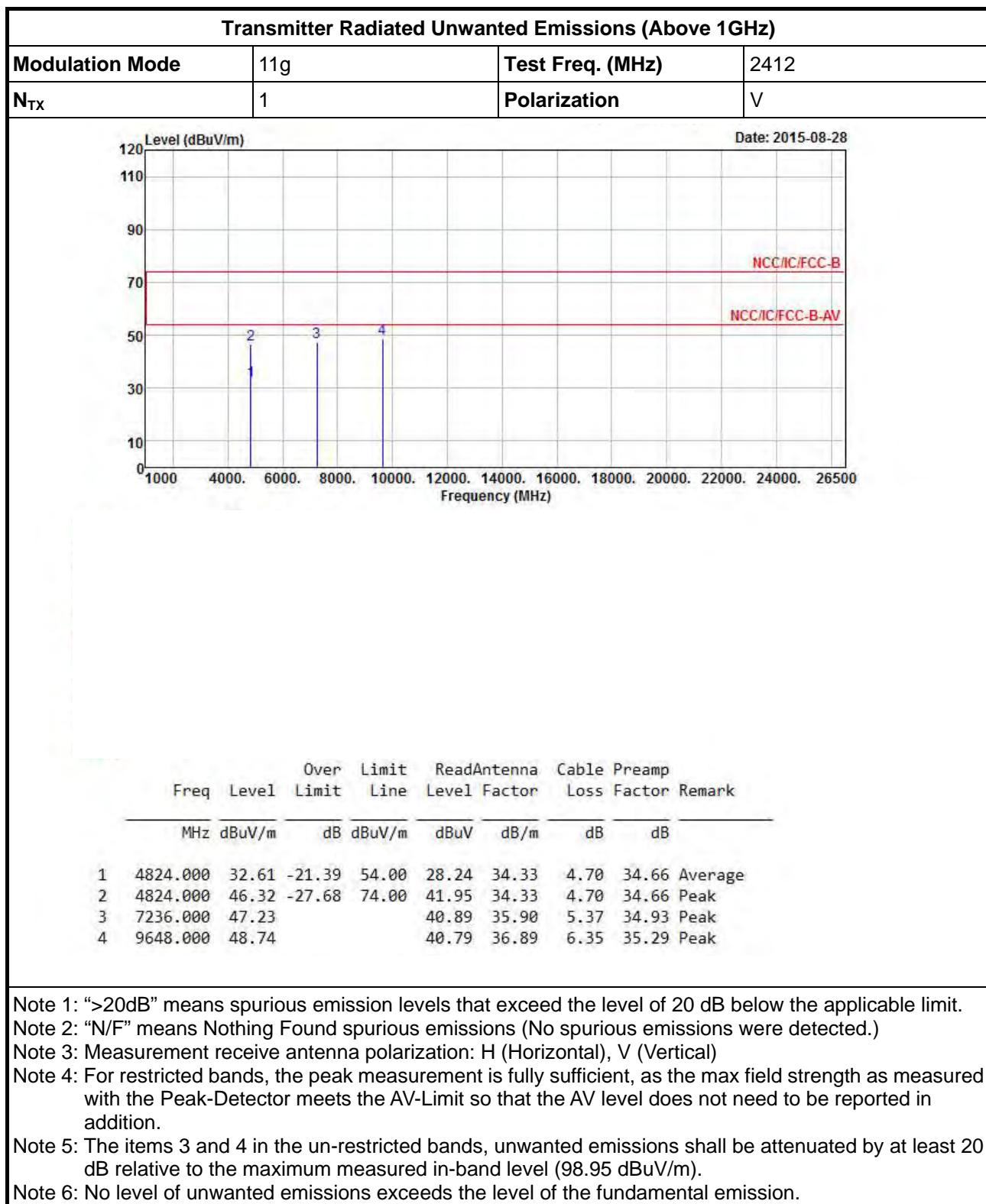
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.













Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11g	Test Freq. (MHz)	2412																																																
N _{TX}	1	Polarization	H																																																
Level (dB _{UV} /m)			Date: 2015-08-28																																																
<table border="1"> <thead> <tr> <th>Freq</th> <th>Level</th> <th>Over Limit</th> <th>Line</th> <th>ReadAntenna</th> <th>Cable</th> <th>Preamp</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>MHz</td> <td>dB_{UV}/m</td> <td>dB</td> <td>dB_{UV}/m</td> <td>dB_{UV}</td> <td>dB/m</td> <td>dB</td> <td>dB</td> </tr> <tr> <td>1</td> <td>4824.000</td> <td>32.27</td> <td>-21.73</td> <td>54.00</td> <td>27.90</td> <td>34.33</td> <td>4.70 34.66 Average</td> </tr> <tr> <td>2</td> <td>4824.000</td> <td>45.04</td> <td>-28.96</td> <td>74.00</td> <td>40.67</td> <td>34.33</td> <td>4.70 34.66 Peak</td> </tr> <tr> <td>3</td> <td>7236.000</td> <td>46.71</td> <td></td> <td></td> <td>40.37</td> <td>35.90</td> <td>5.37 34.93 Peak</td> </tr> <tr> <td>4</td> <td>9648.000</td> <td>48.98</td> <td></td> <td></td> <td>41.03</td> <td>36.89</td> <td>6.35 35.29 Peak</td> </tr> </tbody> </table>			Freq	Level	Over Limit	Line	ReadAntenna	Cable	Preamp	Remark	MHz	dB _{UV} /m	dB	dB _{UV} /m	dB _{UV}	dB/m	dB	dB	1	4824.000	32.27	-21.73	54.00	27.90	34.33	4.70 34.66 Average	2	4824.000	45.04	-28.96	74.00	40.67	34.33	4.70 34.66 Peak	3	7236.000	46.71			40.37	35.90	5.37 34.93 Peak	4	9648.000	48.98			41.03	36.89	6.35 35.29 Peak	
Freq	Level	Over Limit	Line	ReadAntenna	Cable	Preamp	Remark																																												
MHz	dB _{UV} /m	dB	dB _{UV} /m	dB _{UV}	dB/m	dB	dB																																												
1	4824.000	32.27	-21.73	54.00	27.90	34.33	4.70 34.66 Average																																												
2	4824.000	45.04	-28.96	74.00	40.67	34.33	4.70 34.66 Peak																																												
3	7236.000	46.71			40.37	35.90	5.37 34.93 Peak																																												
4	9648.000	48.98			41.03	36.89	6.35 35.29 Peak																																												

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

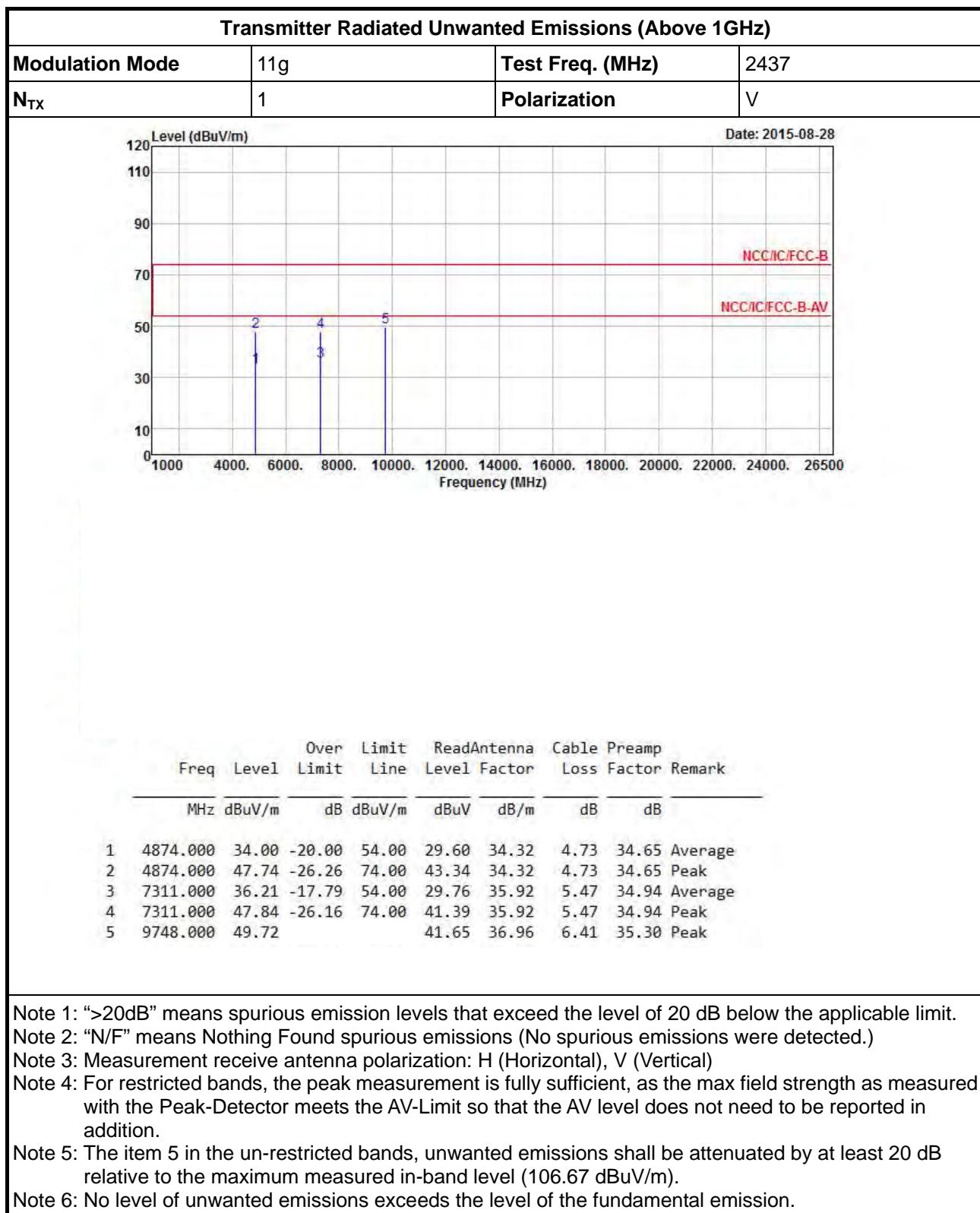
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

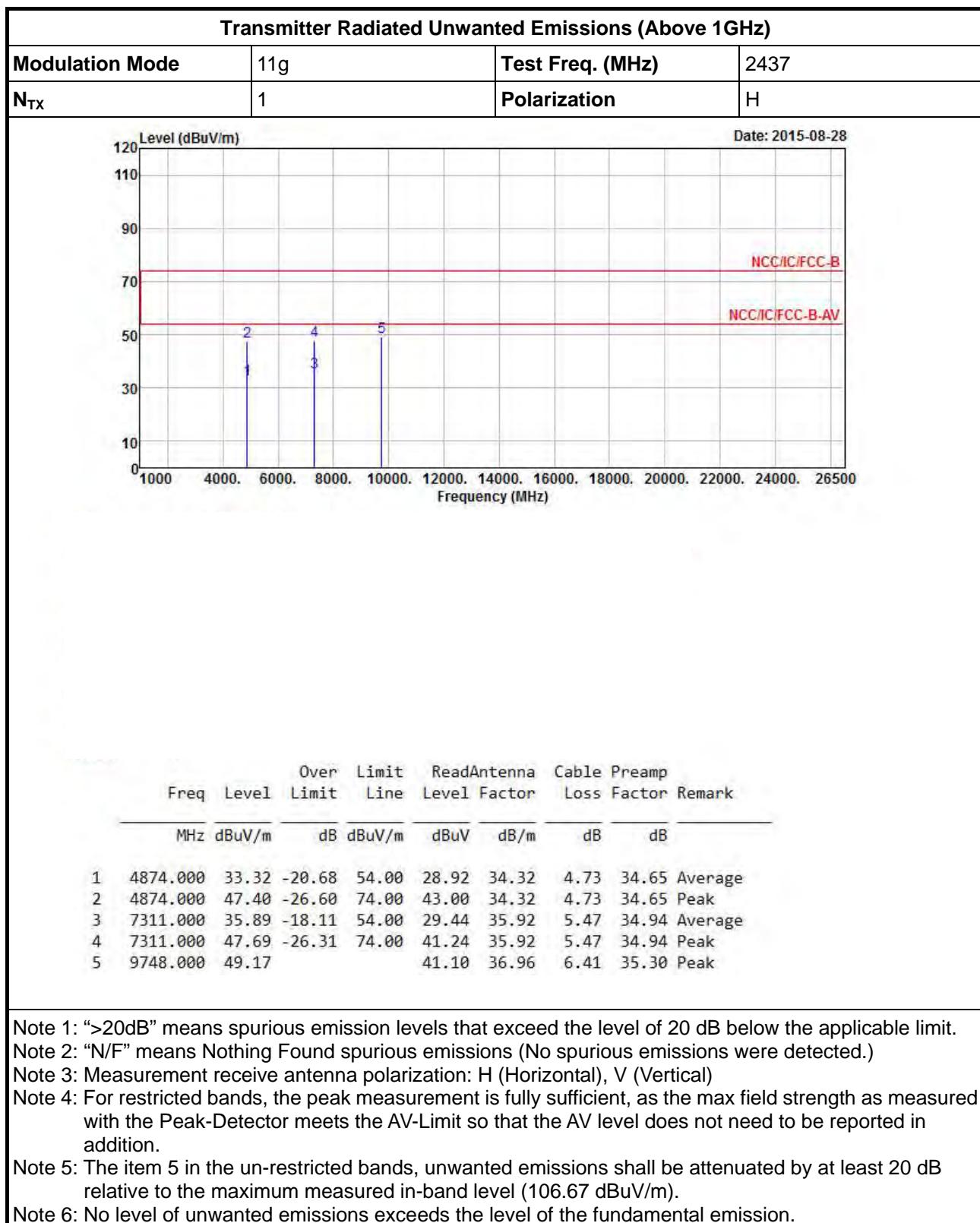
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

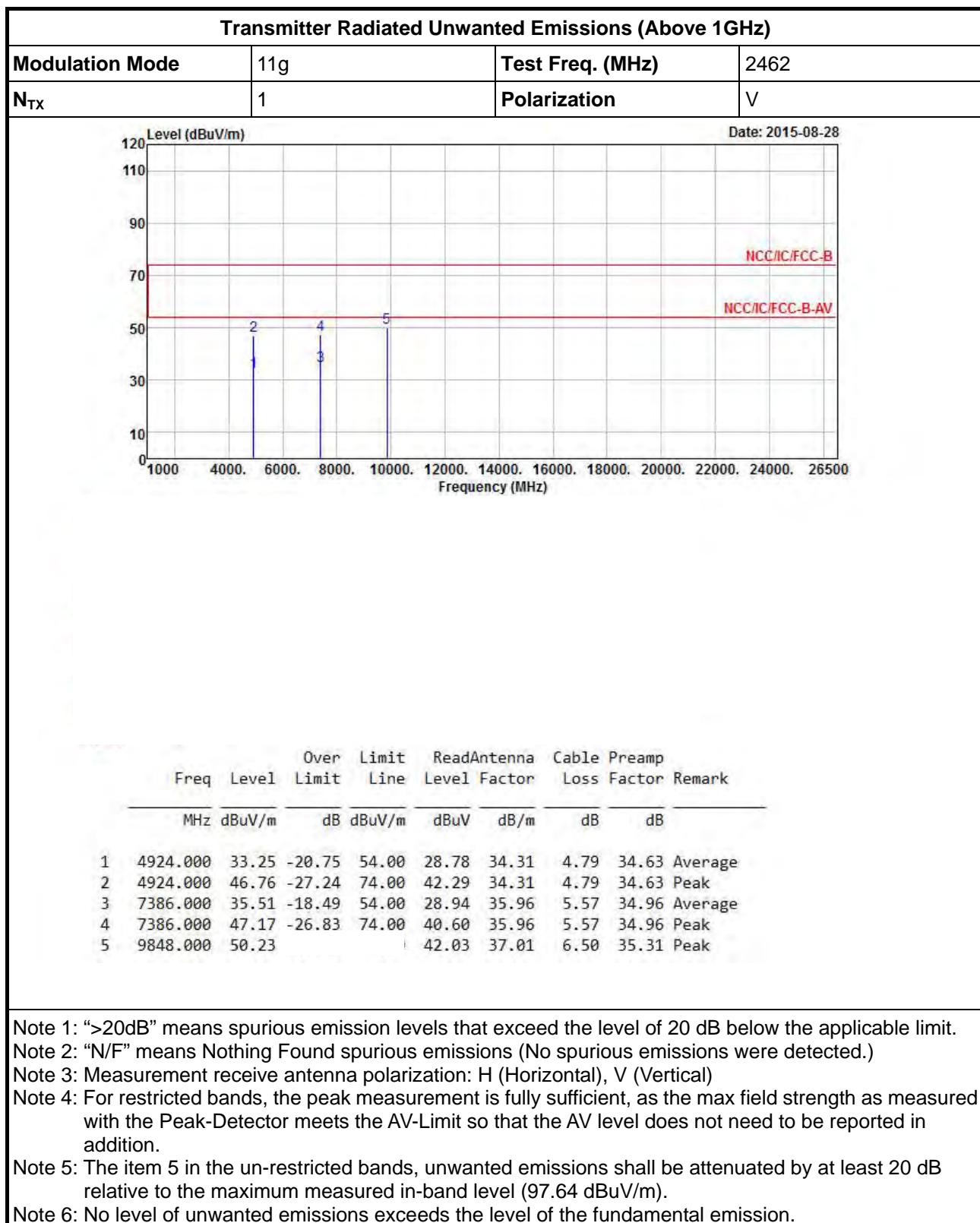
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

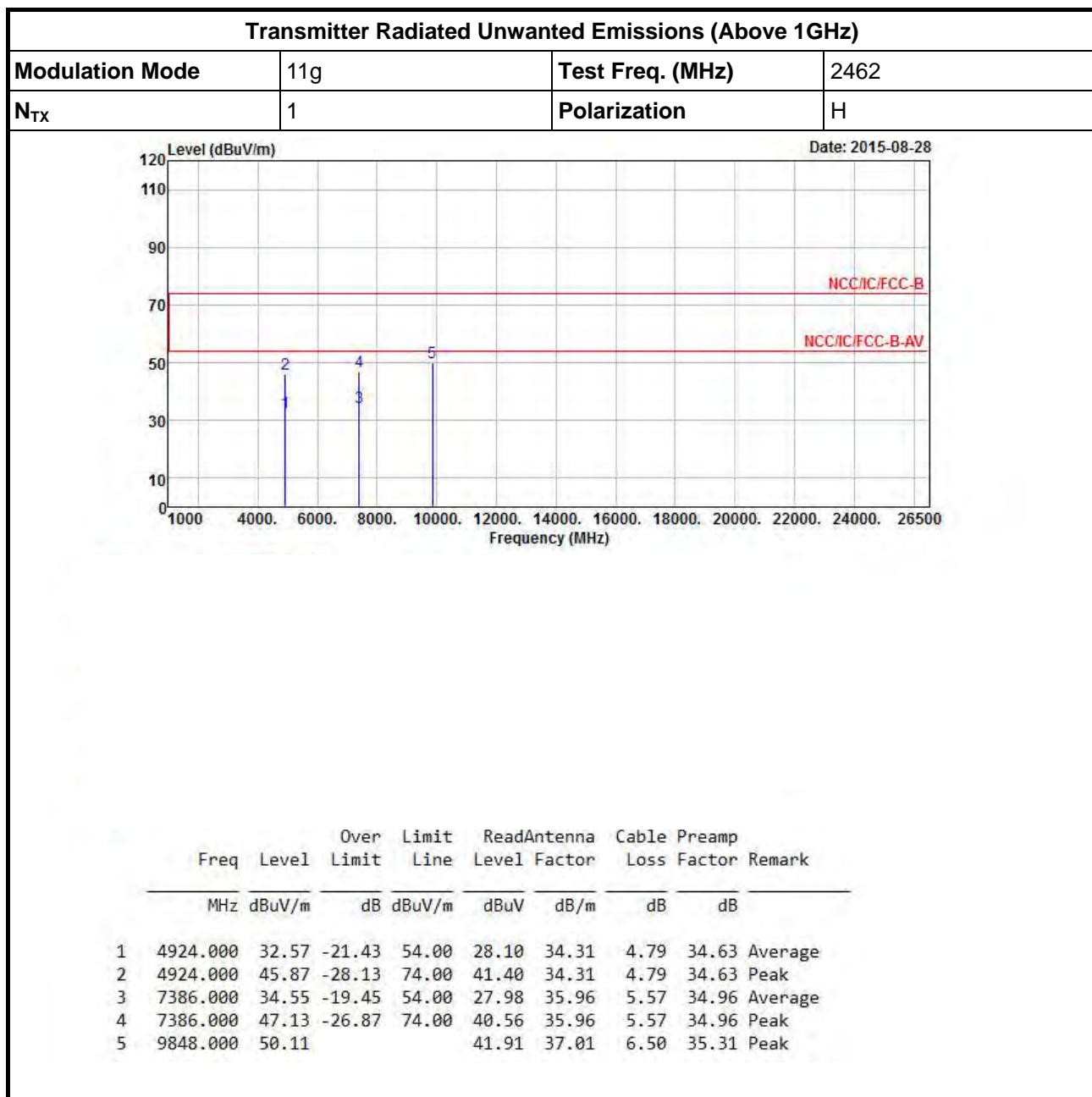
Note 5: The items 3 and 4 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (98.95 dB_{UV}/m).

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.

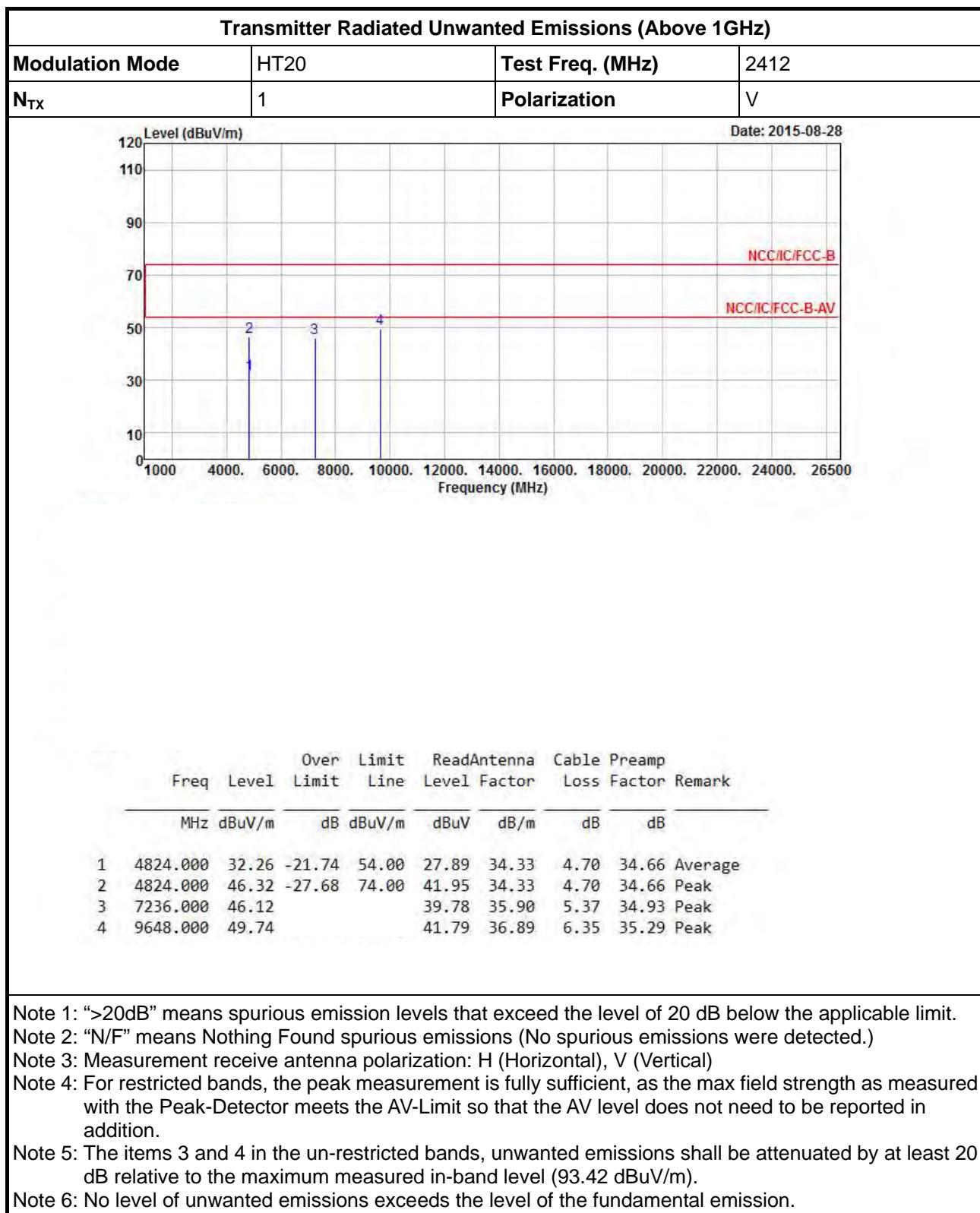
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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: The item 5 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (97.64 dBuV/m).

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.

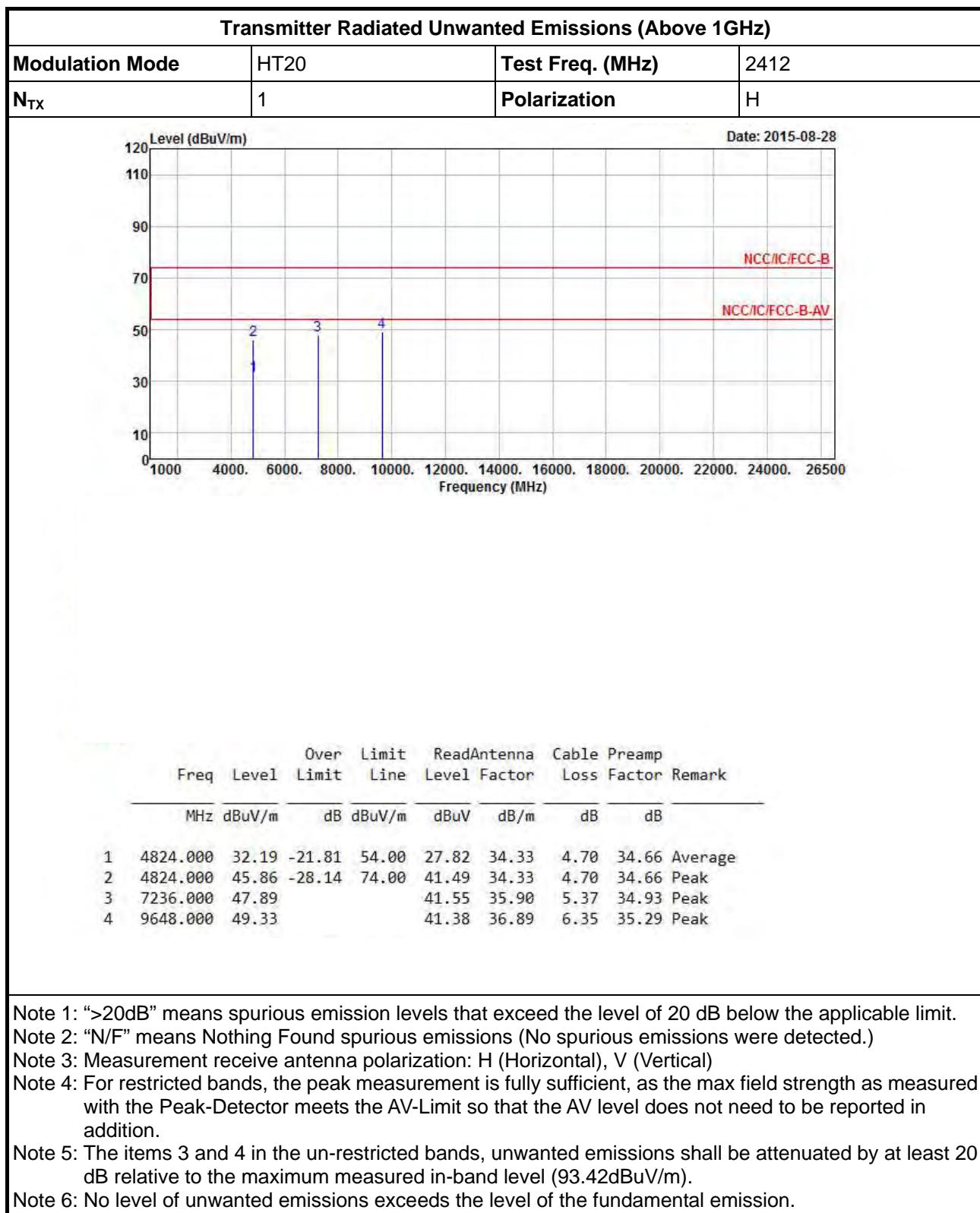
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

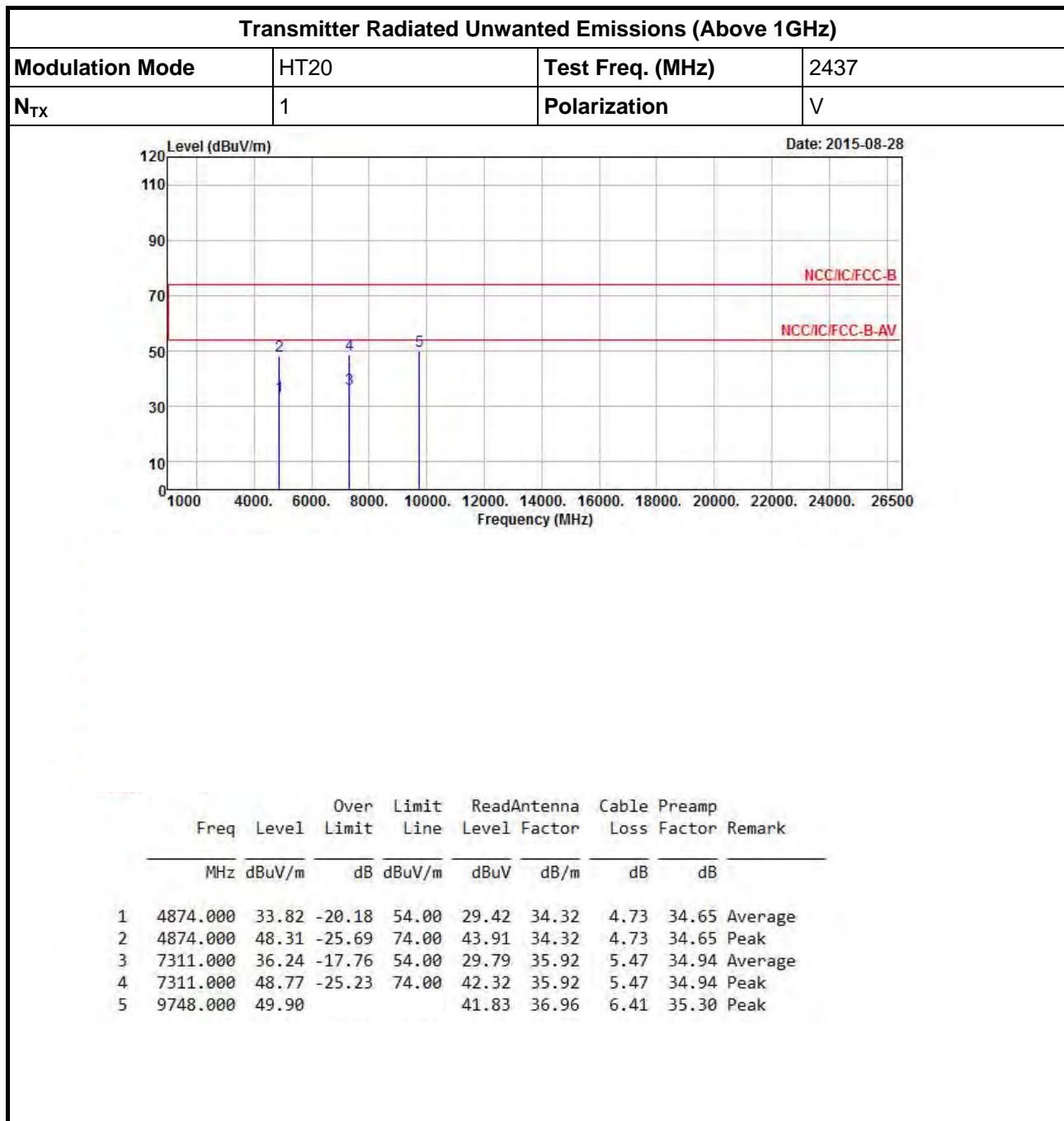
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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: The items 3 and 4 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (93.42 dBuV/m).

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.

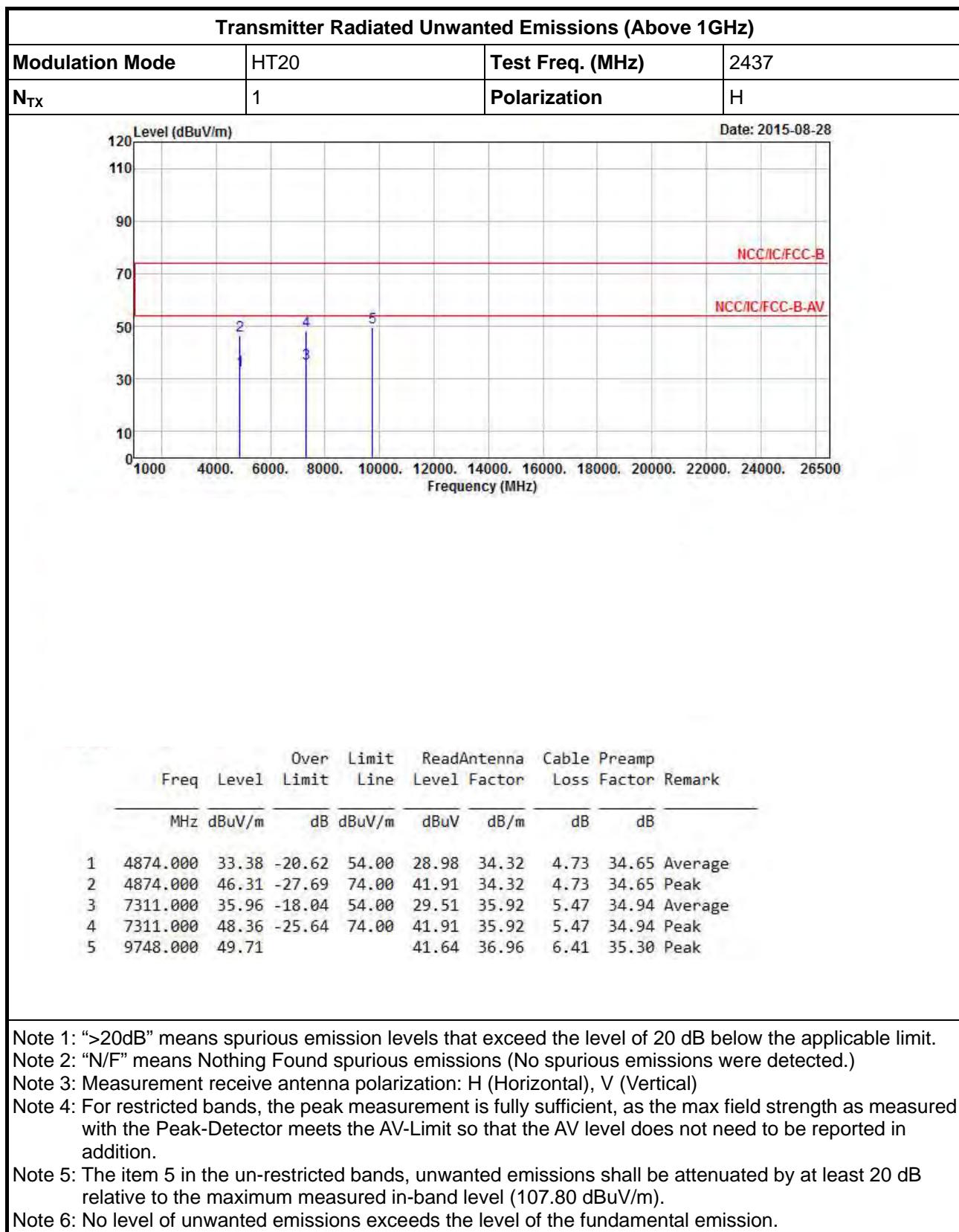
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

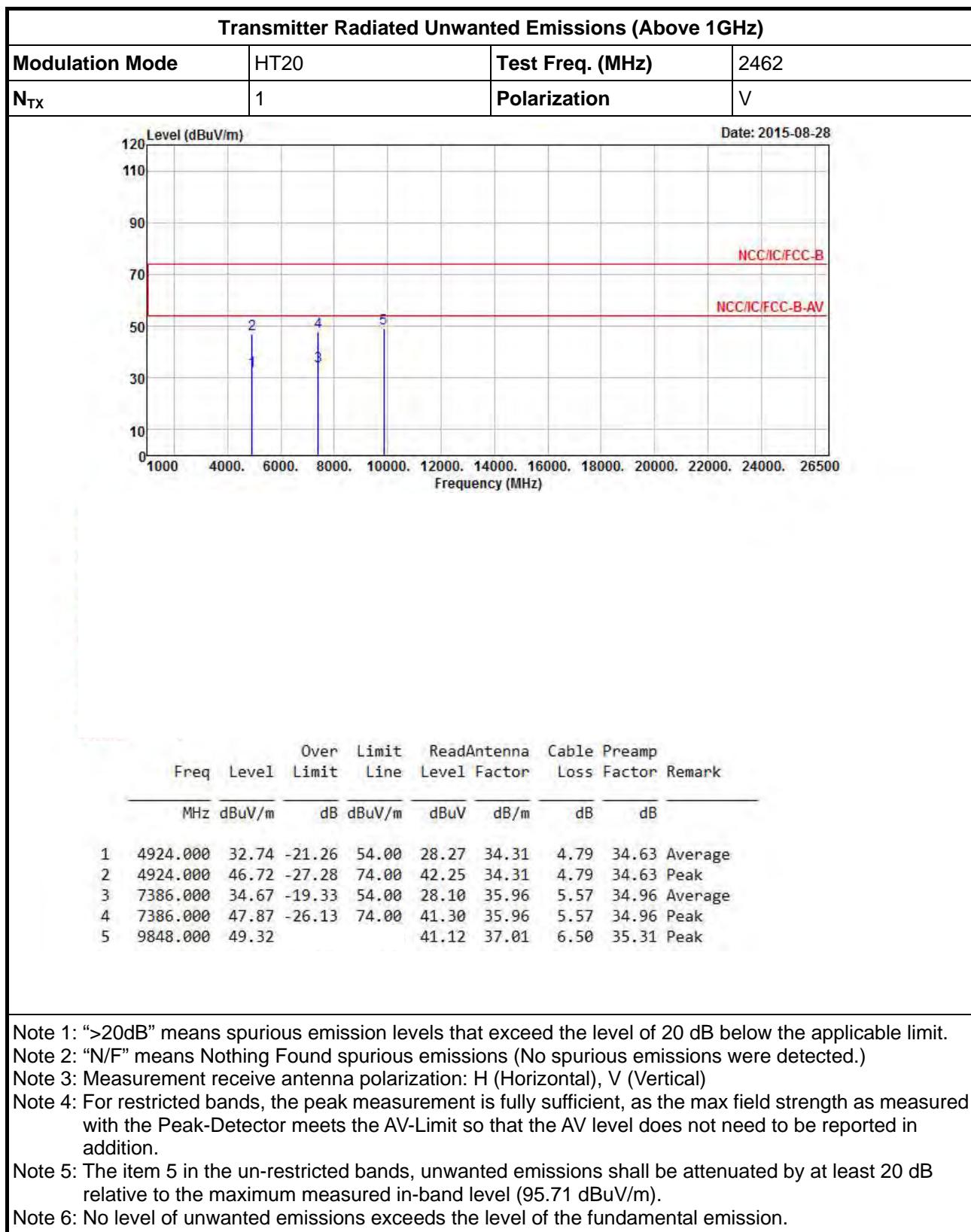
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

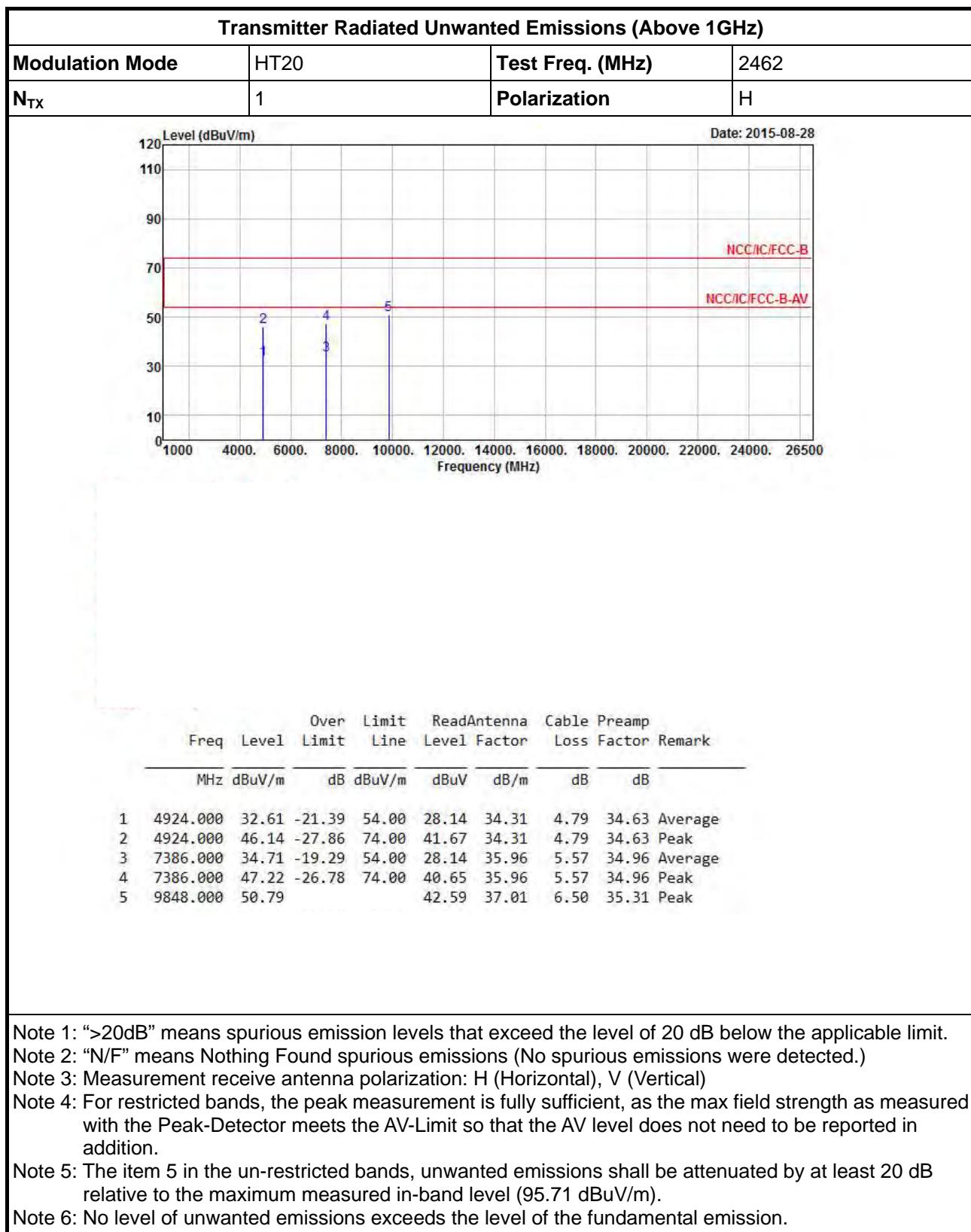
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 5: The item 5 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (107.80 dBuV/m).

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

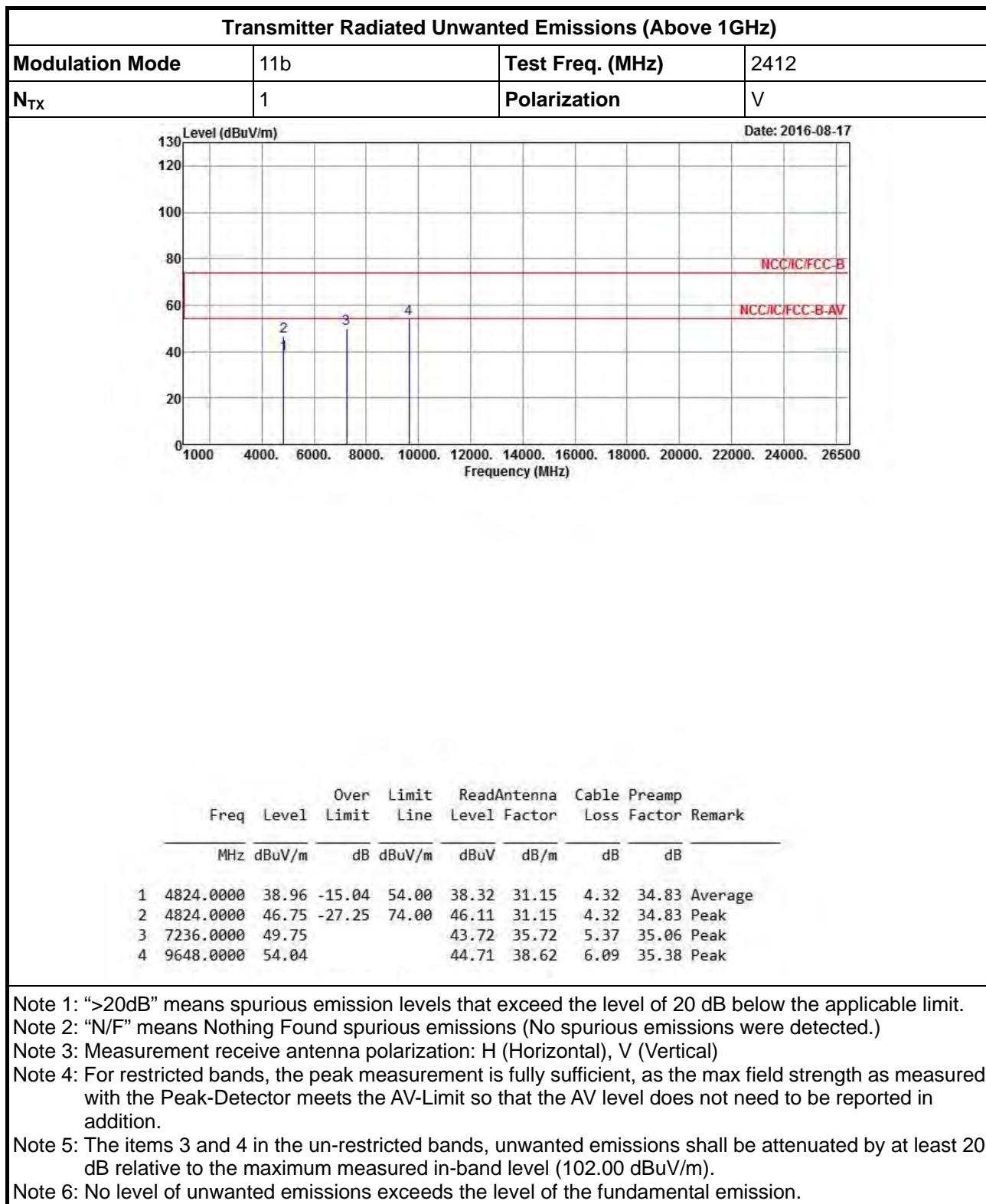


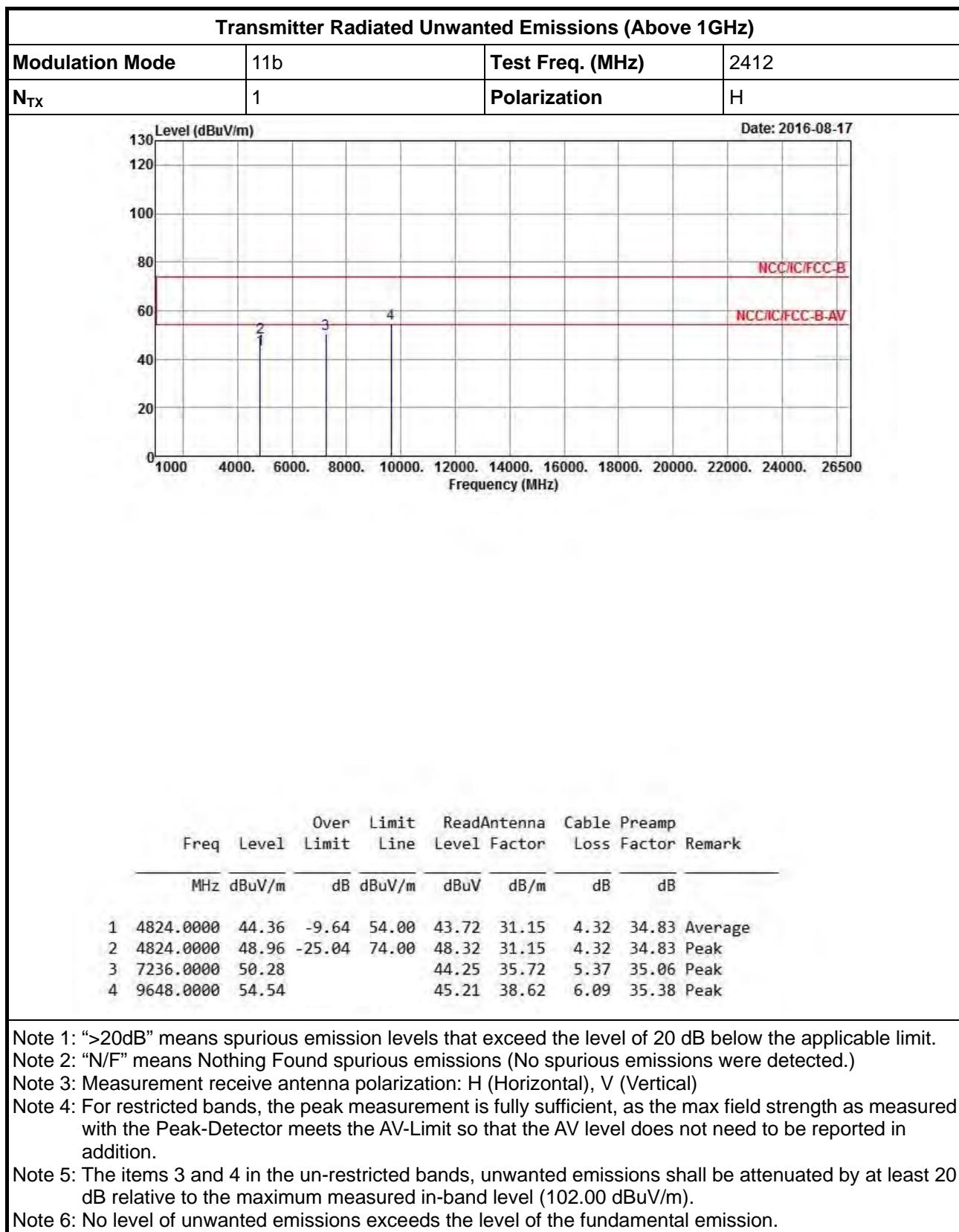


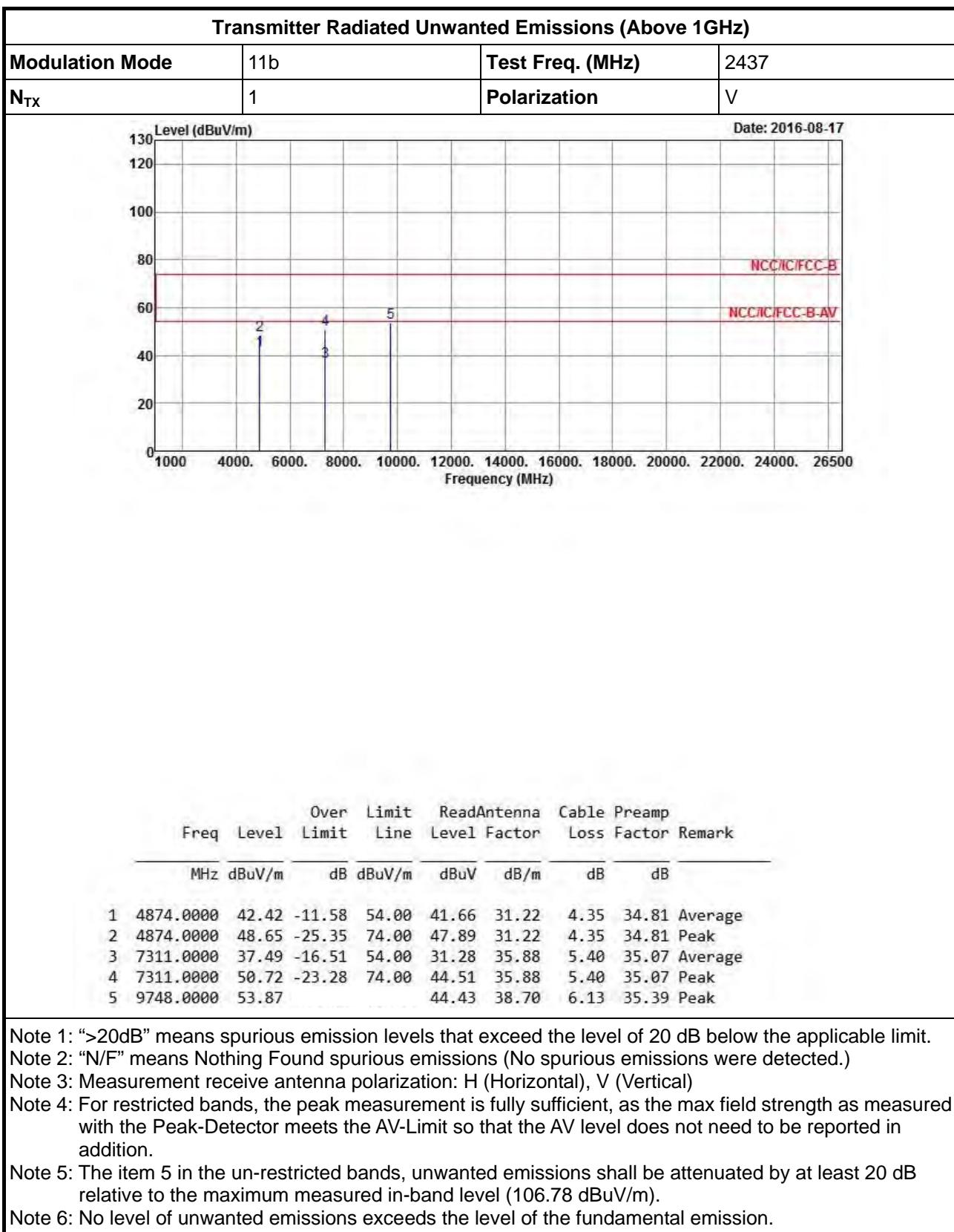


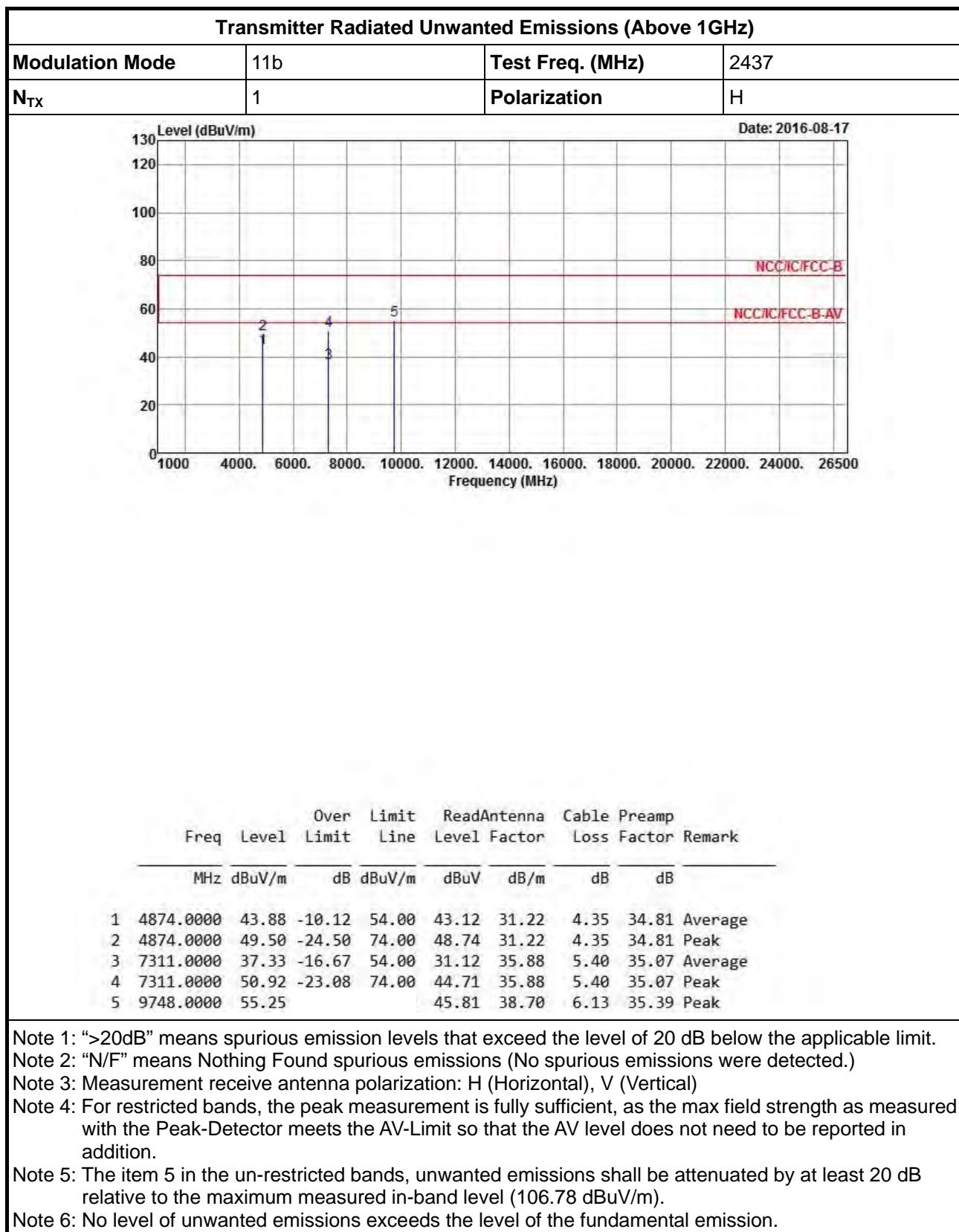


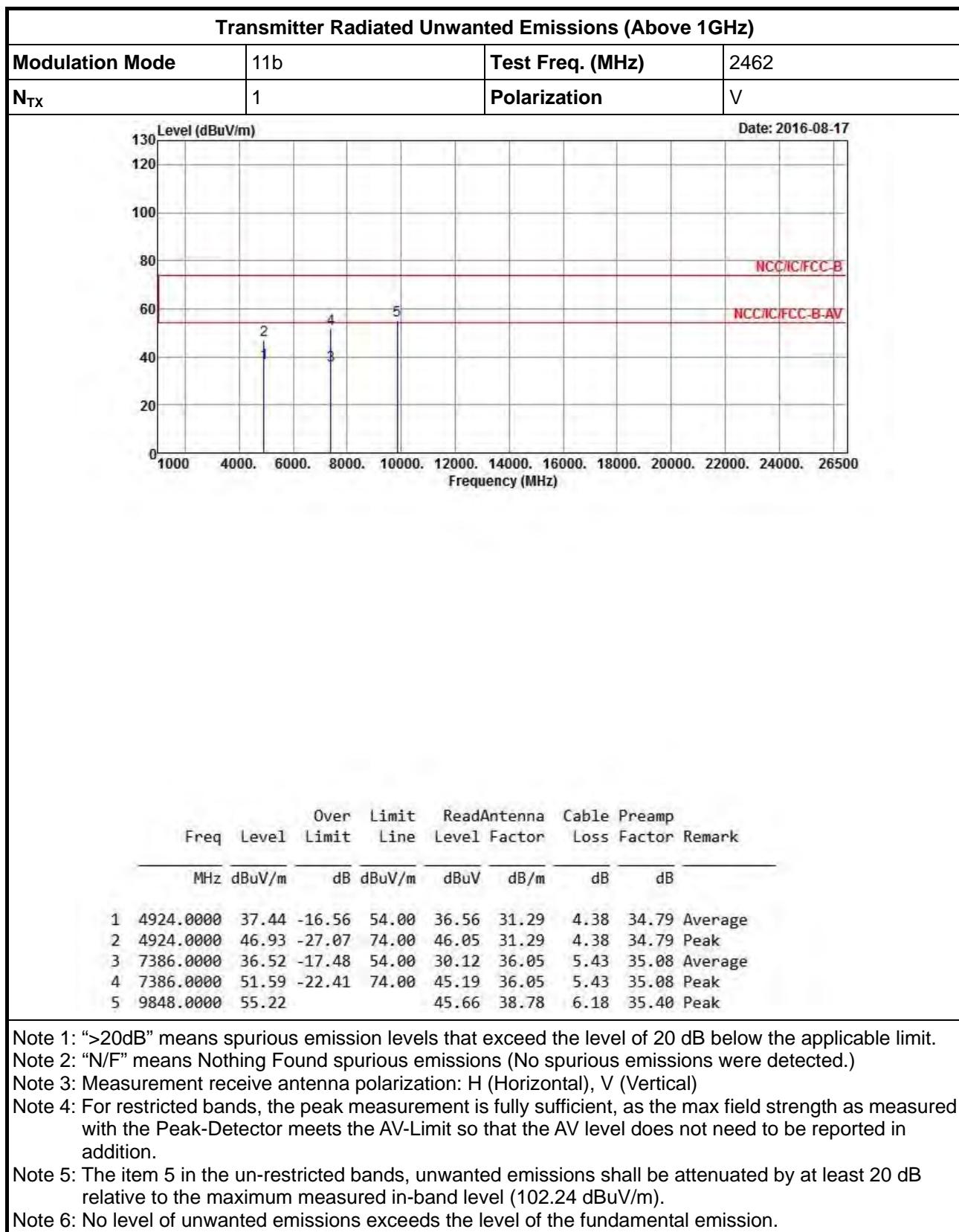
3.6.9 Transmitter Radiated Unwanted Emissions (Above 1GHz) – PIFA Antenna

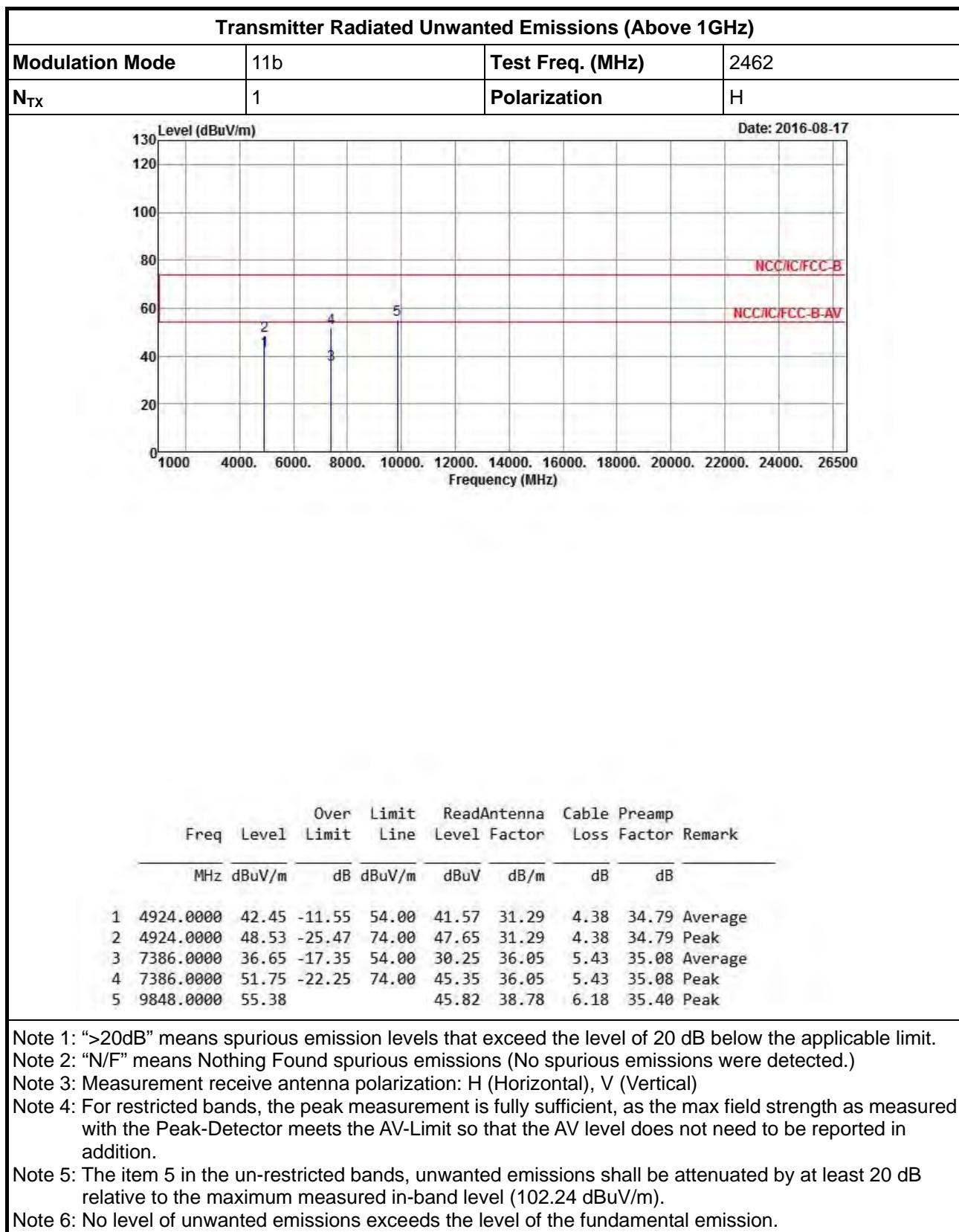


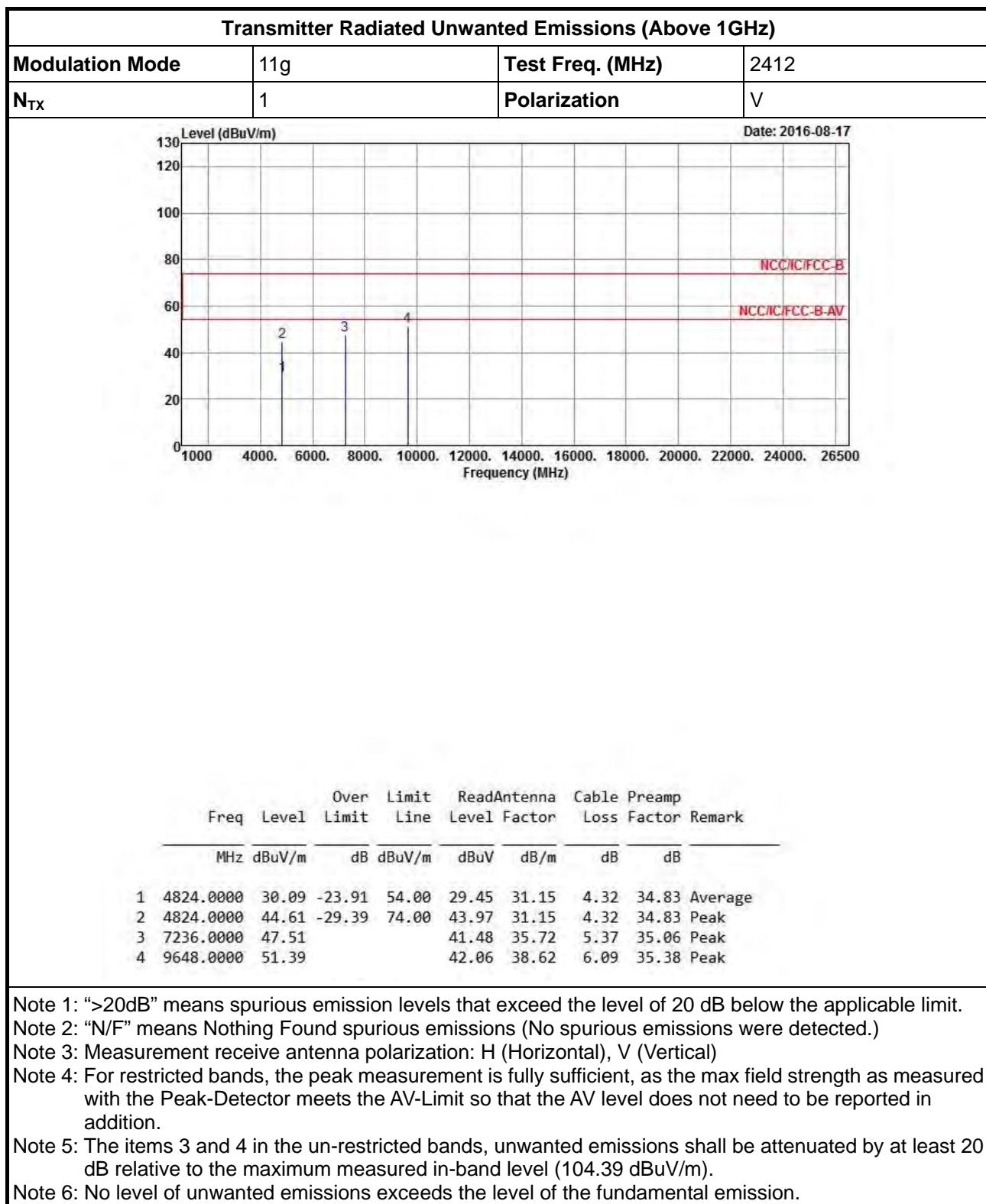








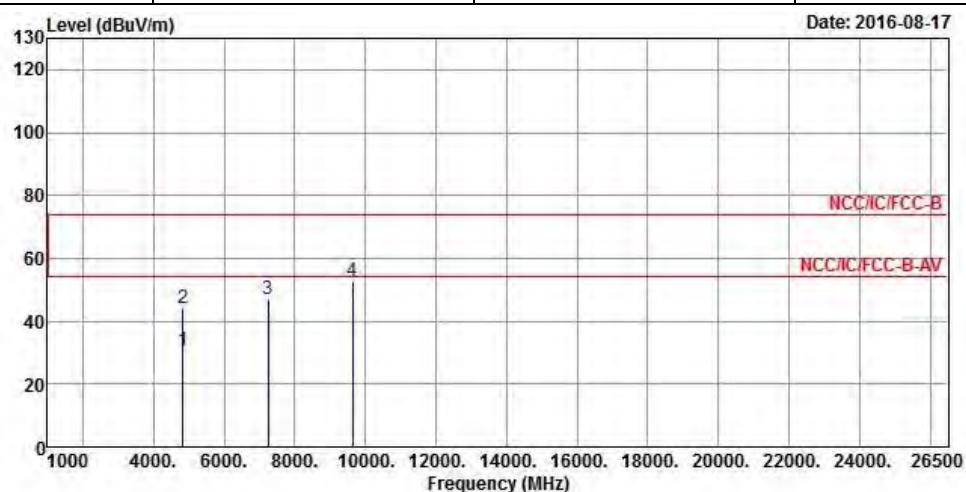






Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11g	Test Freq. (MHz)	2412
N _{TX}	1	Polarization	H



Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark
		Limit	Line	Level	Factor	Loss	Factor	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.0000	30.67	-23.33	54.00	30.03	31.15	4.32	34.83 Average
2	4824.0000	44.18	-29.82	74.00	43.54	31.15	4.32	34.83 Peak
3	7236.0000	47.16			41.13	35.72	5.37	35.06 Peak
4	9648.0000	52.70			43.37	38.62	6.09	35.38 Peak

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

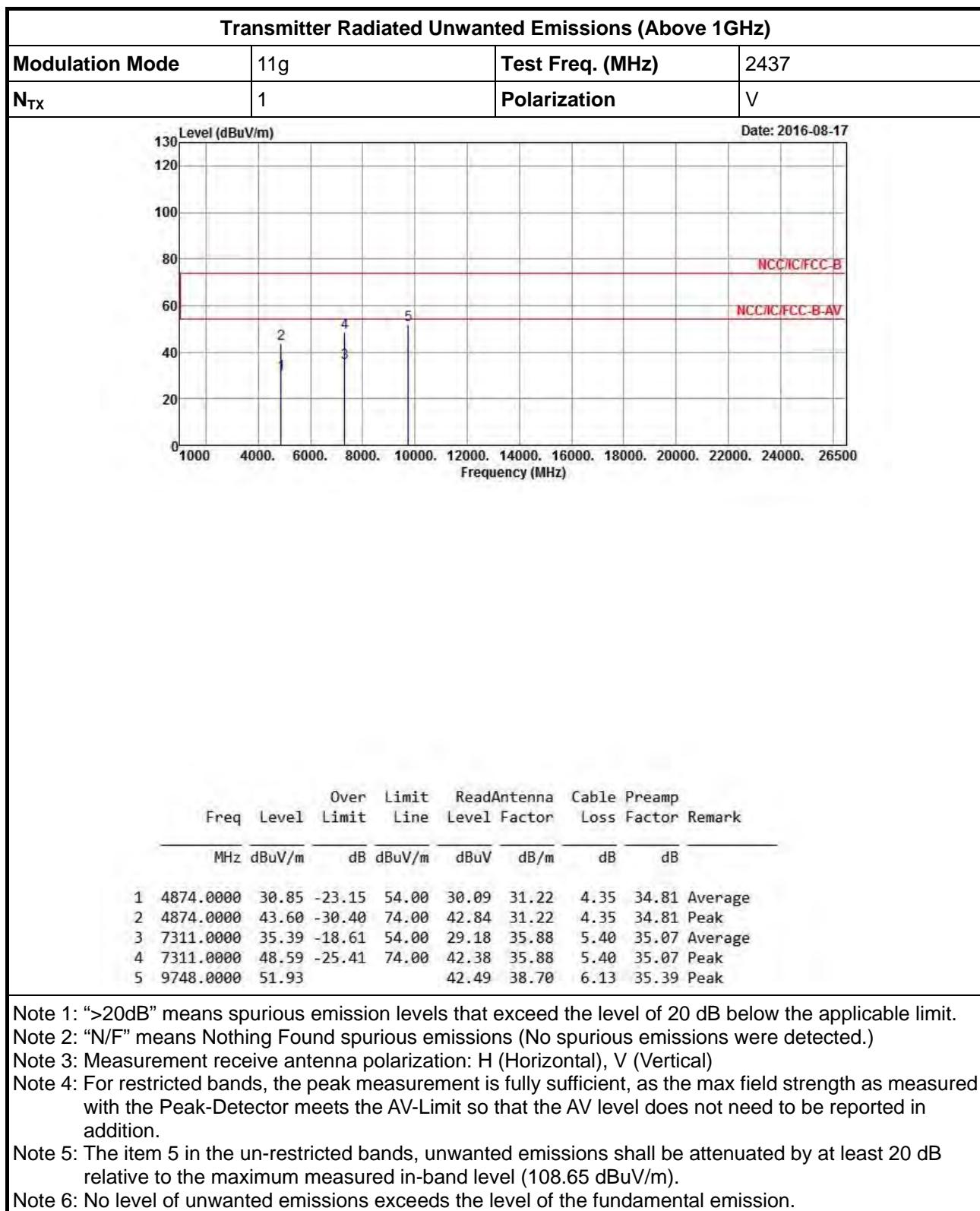
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

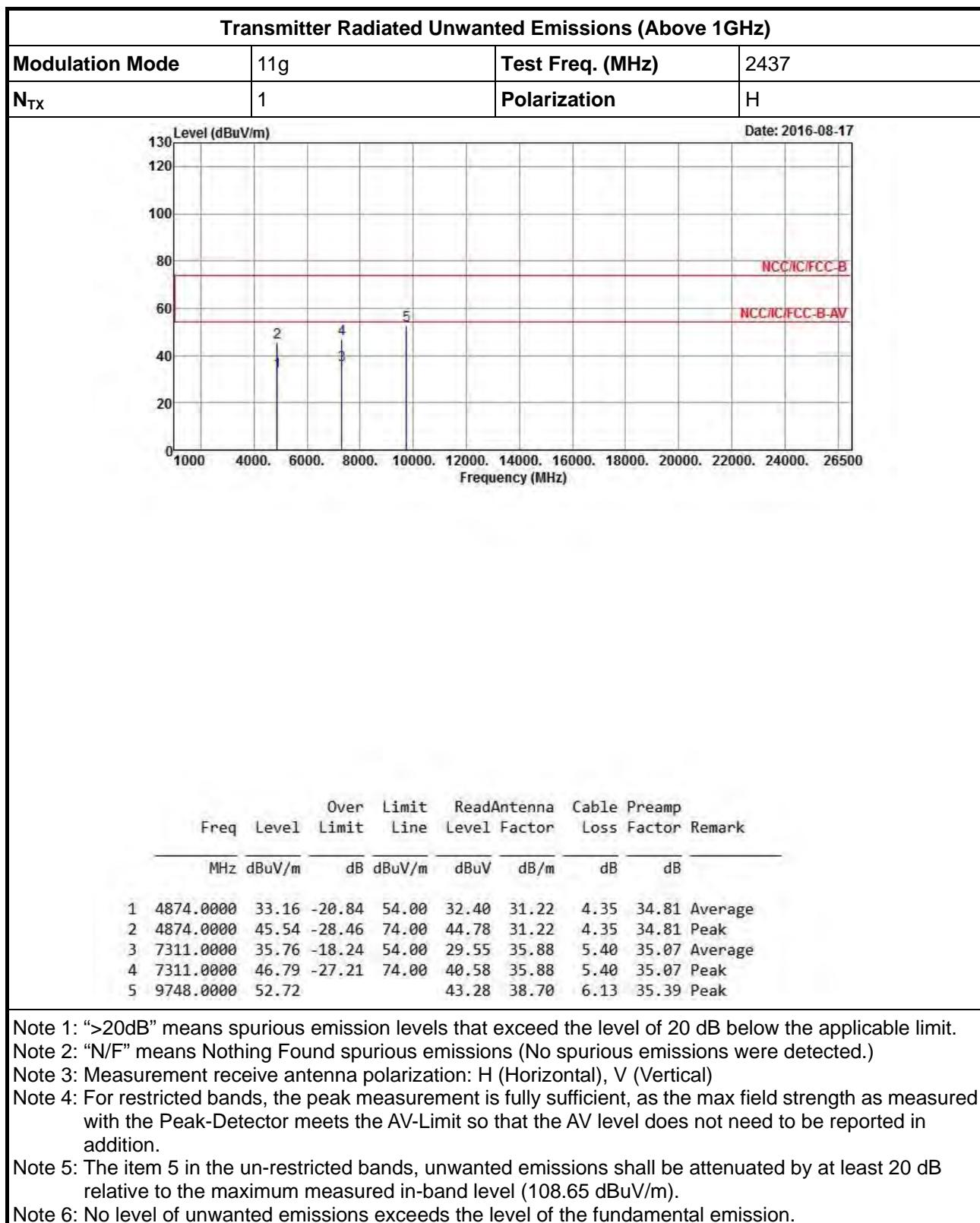
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

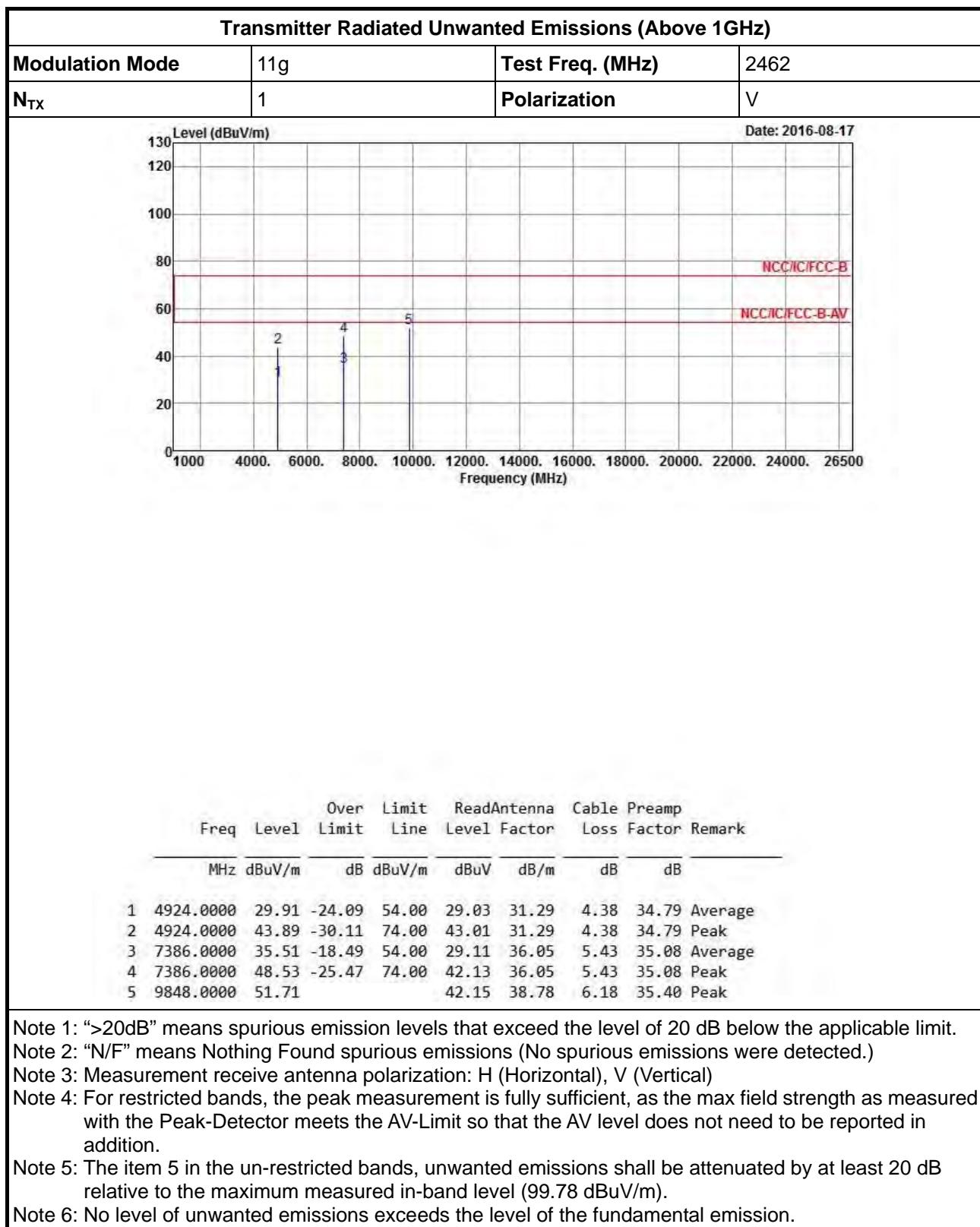
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 5: The items 3 and 4 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (104.39 dBuV/m).

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



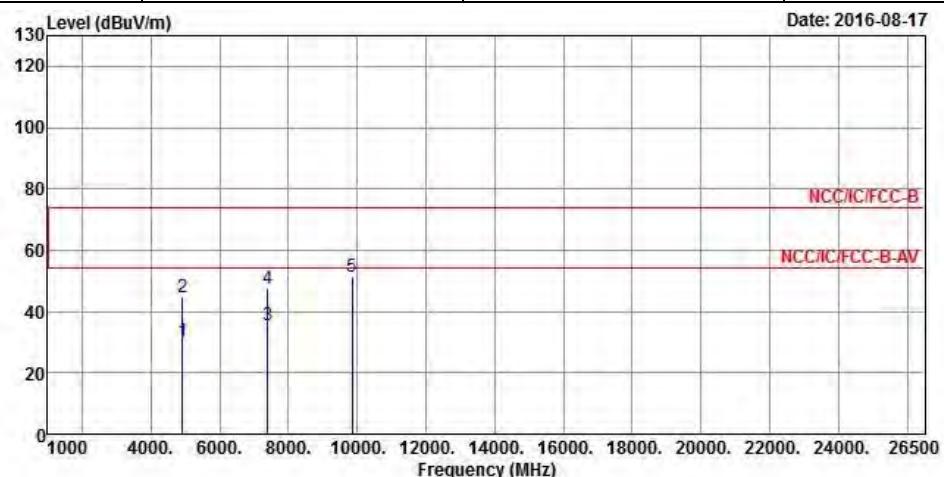






Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11g	Test Freq. (MHz)	2462
N _{TX}	1	Polarization	H



Freq	Level	Over Limit	Line	Read	Antenna	Cable	Preamp
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB

1	4924.0000	30.22	-23.78	54.00	29.34	31.29	4.38	34.79	Average
2	4924.0000	44.71	-29.29	74.00	43.83	31.29	4.38	34.79	Peak
3	7386.0000	35.40	-18.60	54.00	29.00	36.05	5.43	35.08	Average
4	7386.0000	47.38	-26.62	74.00	40.98	36.05	5.43	35.08	Peak
5	9848.0000	51.30			41.74	38.78	6.18	35.40	Peak

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

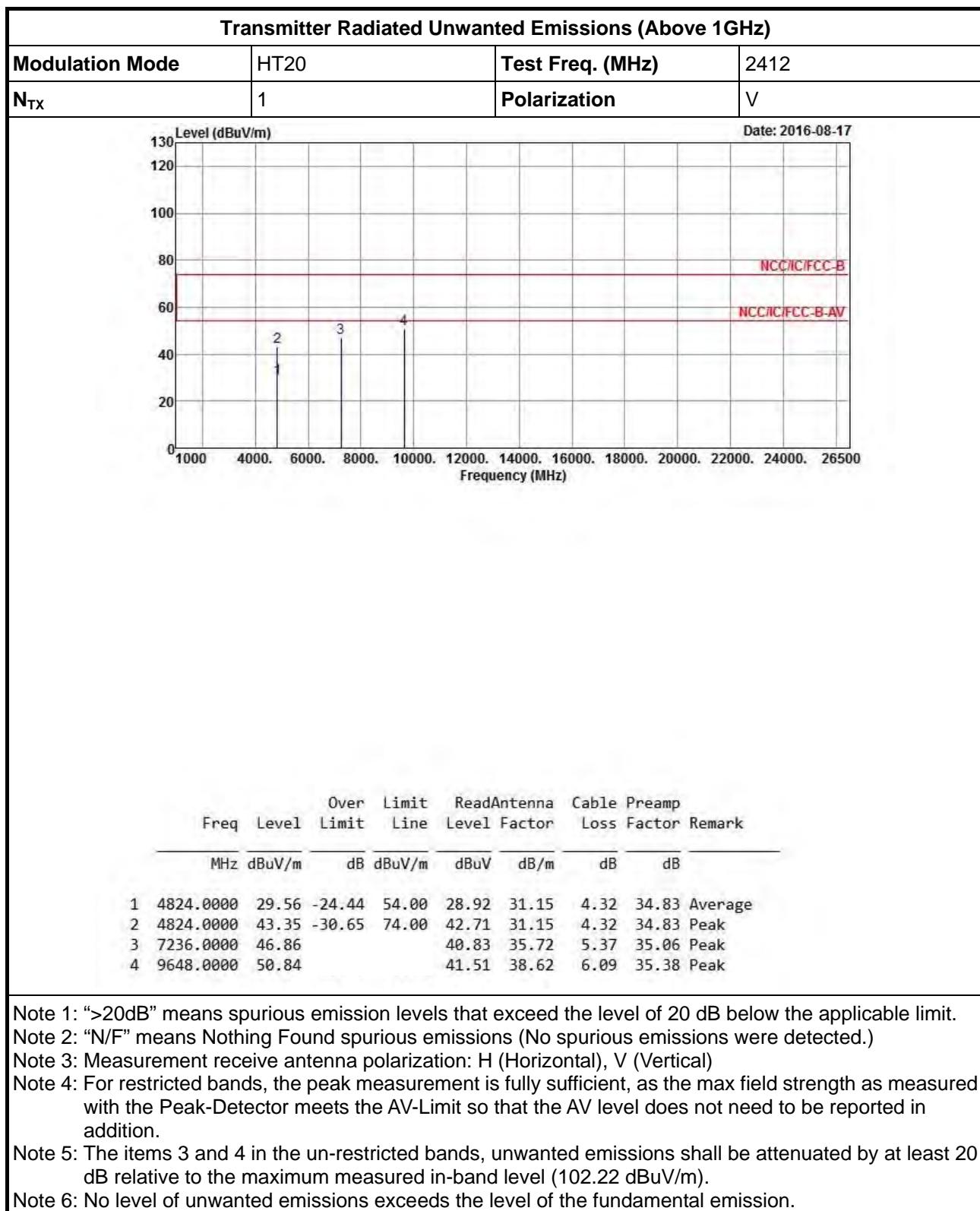
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

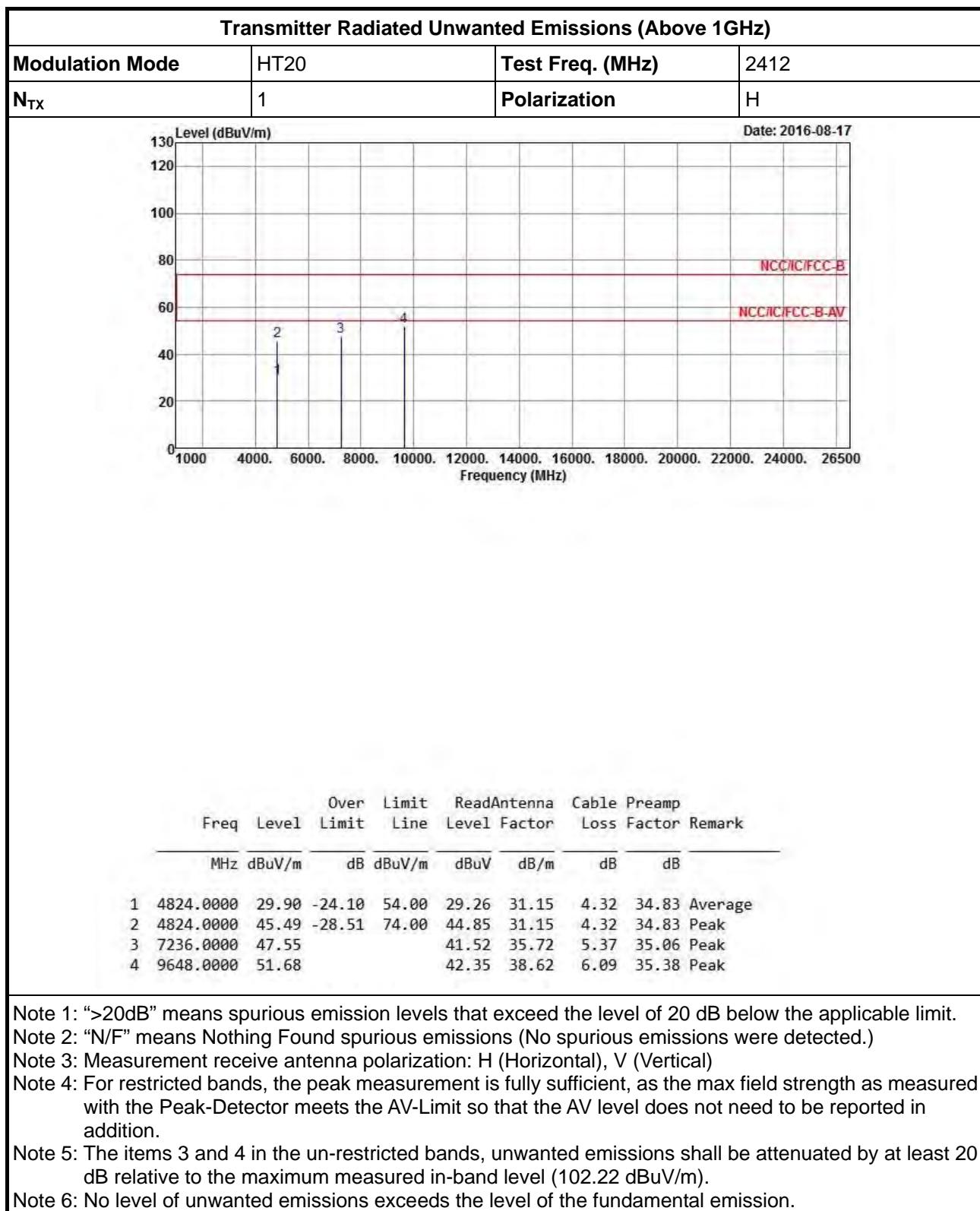
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

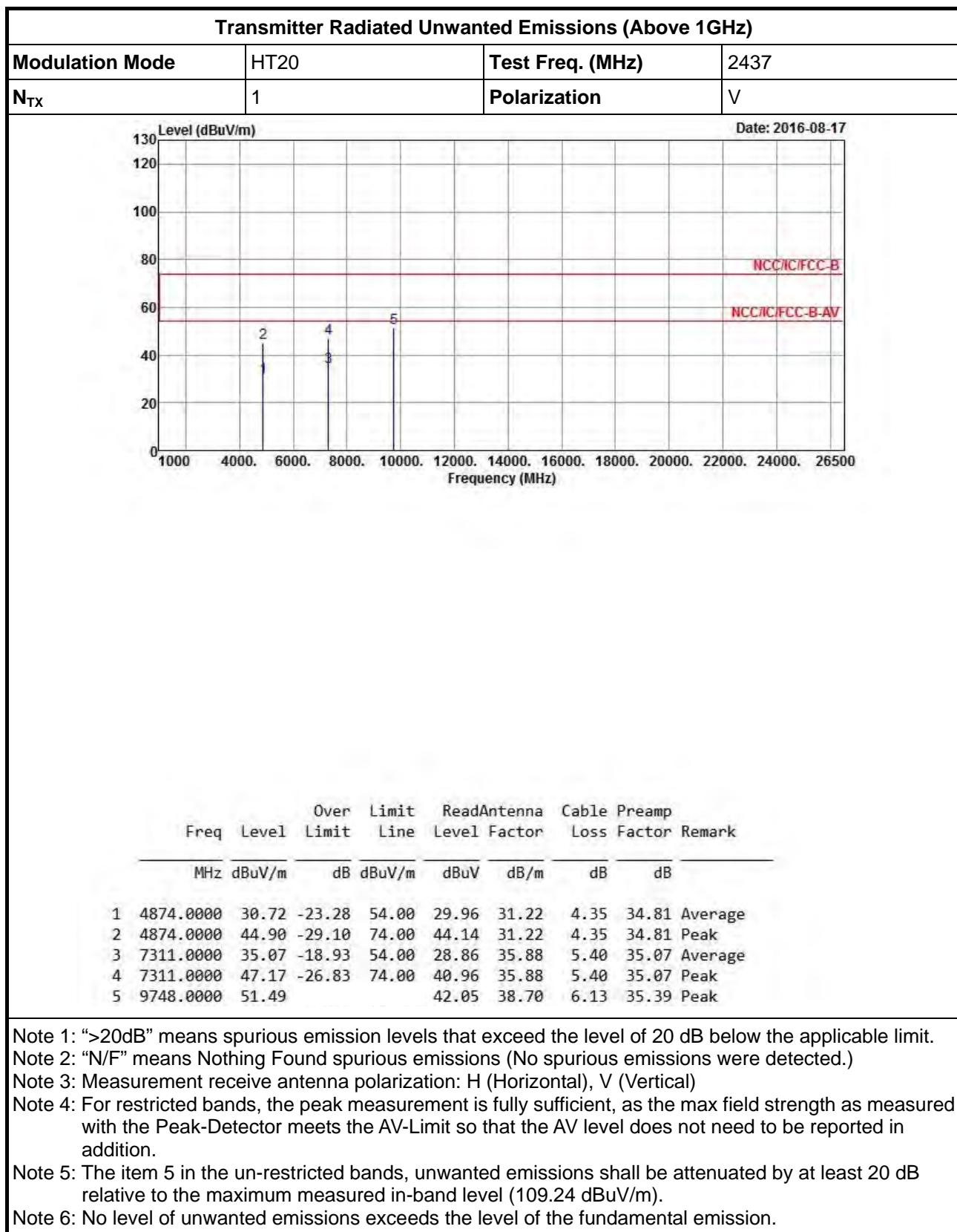
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

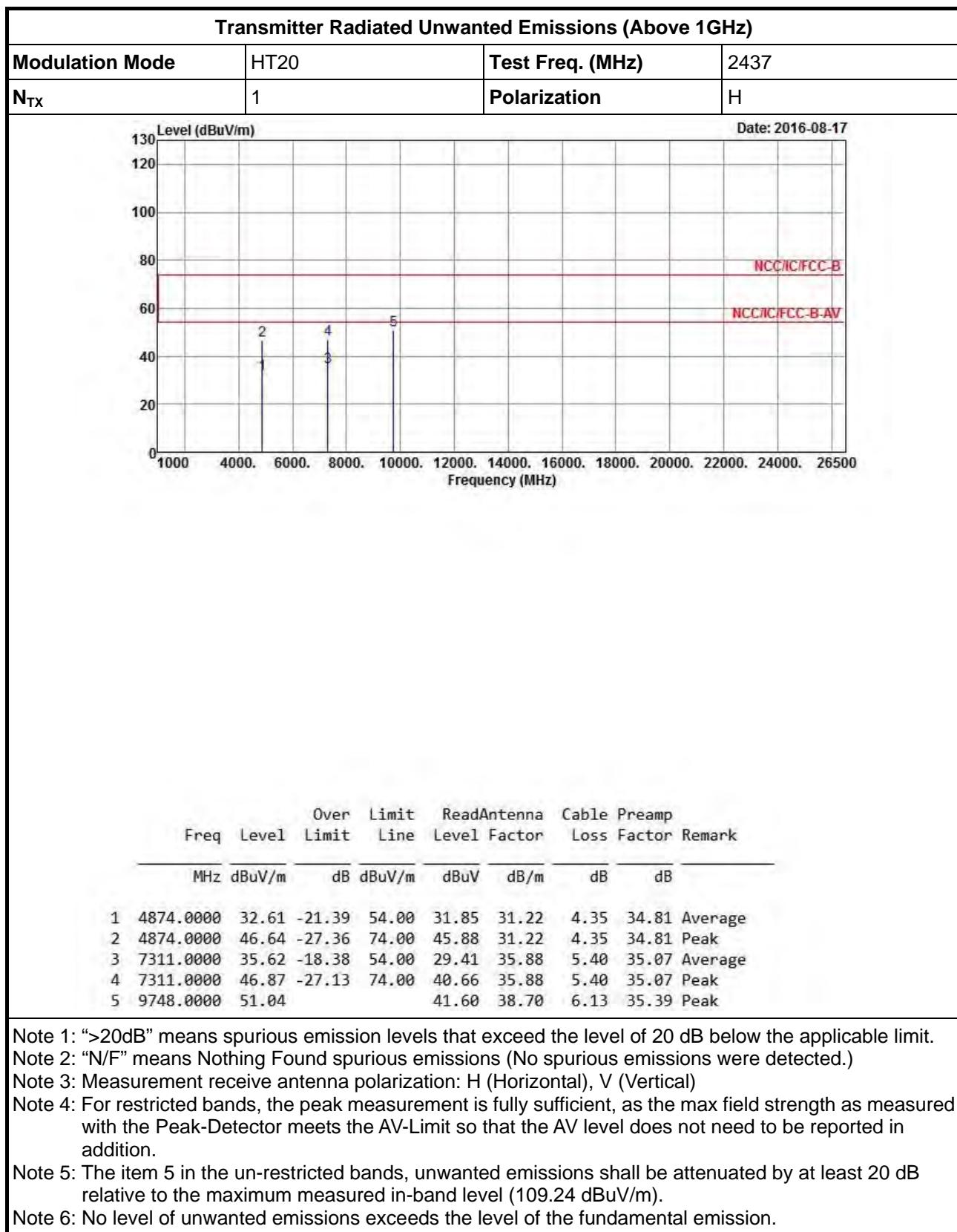
Note 5: The item 5 in the un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (99.78 dBuV/m).

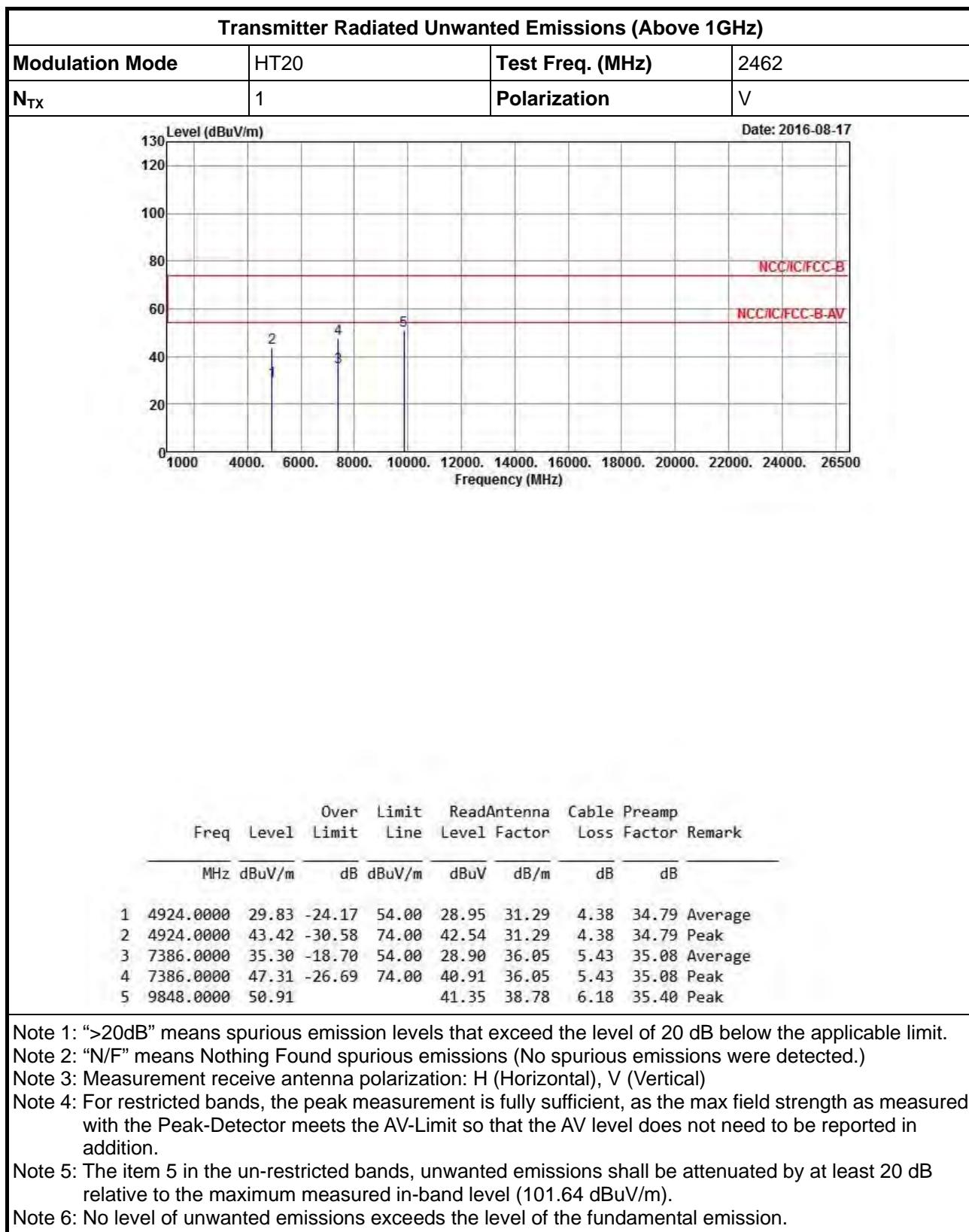
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

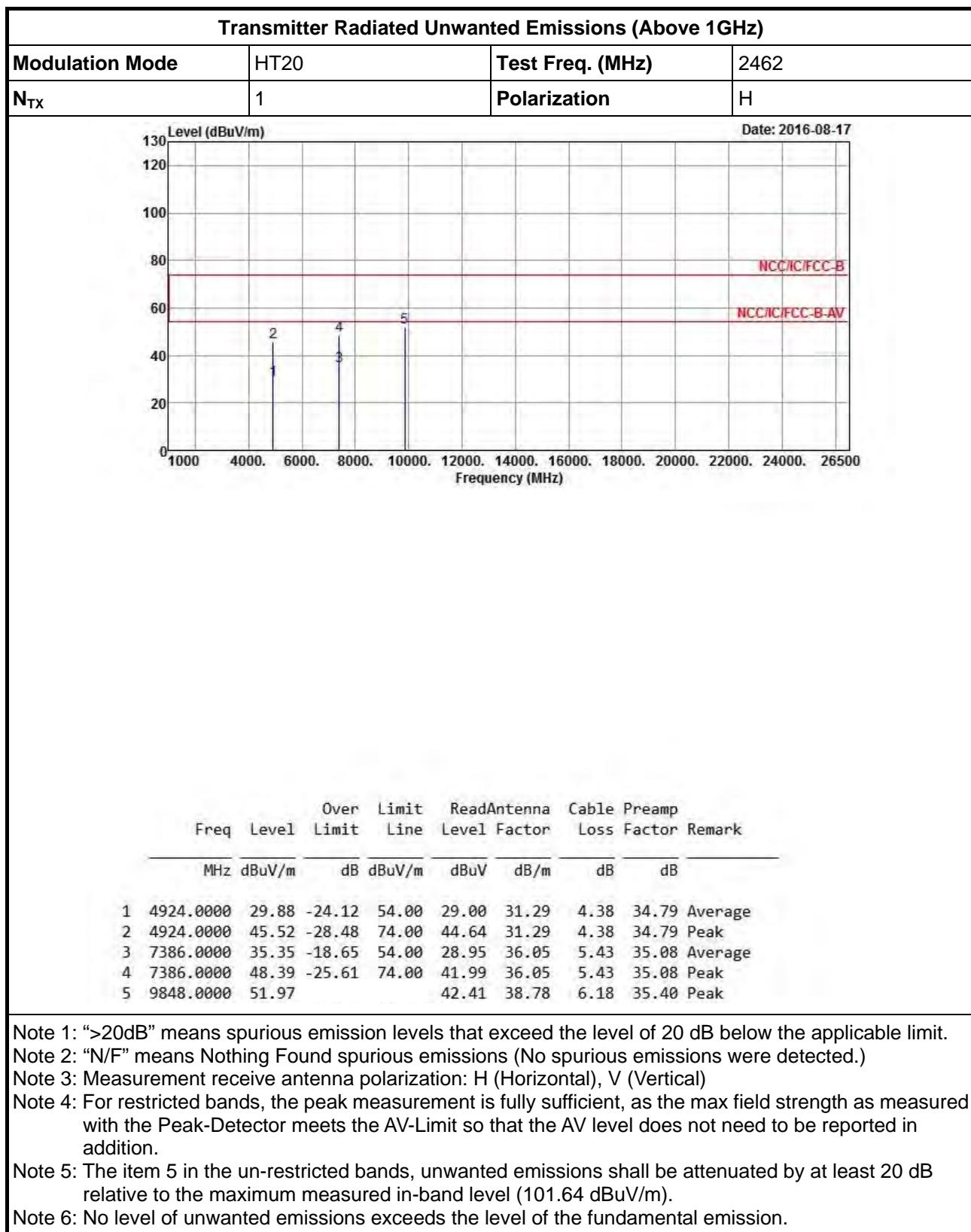














4 Test Equipment and Calibration Data

<AC Power-line Conducted Emissions>

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Last Cal.	Calibration Due Date
EMC Receiver	KEYSIGHT	N9038A	MY54130031	20Hz ~ 8.4GHz	14/04/2016	13/04/2017
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	26/01/2016	25/01/2017
LISN (Support Unit)	R&S	ENV216	101295	9kHz ~ 30MHz	04/11/2015	03/11/2016
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	30/10/2015	29/10/2016
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	NCR	NCR

NCR : Non-Calibration Require.

<RF Conducted>

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Last Cal.	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101500	9KHz~40GHz	06/05/2015	05/05/2016
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	28/07/2015	27/07/2016
Power Sensor	Anritsu	MA2411B	1027452	300MHz ~ 40GHz	29/01/2015	28/01/2016
Power Meter	Anritsu	ML2495A	1124009	300MHz ~ 40GHz	29/01/2015	28/01/2016
DC Power Source	G.W.	GPS-3030DD	GEN865896	DC 0V ~ 30V	26/01/2015	25/01/2016



<Radiated Emission>

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Last Cal.	Calibration Due Date
Spectrum Analyzer	R&S	FSP40	100593	9kHz ~ 40GHz	20/10/2014	19/10/2015
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	03/05/2015	02/05/2016
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 6GHz 3m	17/05/2015	16/05/2016
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	24/07/2015	23/07/2016
Amplifier	Agilent	8449B	3008A02602	1GHz ~ 26.5GHz	20/10/2014	19/10/2015
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz ~ 18GHz	28/11/2014	27/11/2015
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz ~ 40GHz	27/01/2015	26/01/2016
Bilog Antenna	SCHAFFNER	CBL 6112B	2723	30MHz ~ 1GHz	05/10/2015	04/10/2016
Amplifier	EMC INSTRUMENTS	EMC184045B	980192	18GHz ~ 40GHz	25/08/2014	24/08/2016
Loop Antenna	R&S	HFH2-Z2	100330	9 kHz~30 MHz	10/11/2014	09/11/2016

<Radiated Emission> <Add>

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Last Cal.	Calibration Due Date
Spectrum Analyzer	R&S	FSP 40	100593	9KHz~40GHz	19/10/2015	18/10/2016
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	03/06/2016	02/06/2017
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz 3m	03/06/2016	02/06/2017
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	01/07/2016	30/06/2017
Amplifier	Agilent	8449B	3008A02602	1GHz ~ 26.5GHz	04/11/2015	03/11/2016
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 01543	1GHz ~ 18GHz	22/04/2016	21/04/2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz ~ 40GHz	29/01/2016	28/01/2017
Bilog Antenna	SCHAFFNER	CBL 6112B	2723	30MHz ~ 1GHz	05/10/2015	04/10/2016
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	02/02/2015	01/02/2017