



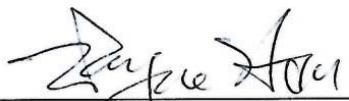
# FCC Test Report

**Equipment** : AC750 Wireless LAN Repeater  
**Brand Name** : EDIMAX  
**Model No.** : EW-7336RPC / GRP-336RPC / EW-7438AC  
**FCC ID** : NDD9573361403  
**Standard** : 47 CFR FCC Part 15.247  
**Operating Band** : 2400 MHz – 2483.5 MHz  
**FCC Classification** : DTS  
**Applicant** : EDIMAX TECHNOLOGY CO., LTD.  
**Manufacturer** : No.3,Wu-Chuan 3rd Road,  
Wu-Ku Industrial Park,  
New Taipei City, Taiwan

The product sample received on Apr. 04, 2014 and completely tested on May 07, 2014. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 and shown compliance with the applicable technical standards.

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

Reviewed by:

  
\_\_\_\_\_  
Wayne Hsu / 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]: 0.5551950MHz 25.36 (Margin 20.64dB) - AV 33.89 (Margin 22.11dB) - QP	FCC 15.207	Complied
3.2	15.247(a)	6dB Bandwidth	6dB Bandwidth Unit [MHz] 20M: 9.54 / 40M: 35.32	≥500kHz	Complied
3.3	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm]: 27.09	Power [dBm]:30	Complied
3.4	15.247(d)	Power Spectral Density	PSD [dBm/100kHz]: -7.64	PSD [dBm/3kHz]:8	Complied
3.5	15.247(c)	Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2397.70MHz: 28.92dB Restricted Bands [dBuV/m at 3m]: 2483.50MHz 68.16 (Margin 5.84dB) - PK 52.74 (Margin 1.26dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied
3.6	15.247(c)	Transmitter Radiated Unwanted Emissions	[dBuV/m at 3m]: 7311MHz 65.58 (Margin 8.42dB) - PK 52.96 (Margin 1.04dB) - AV	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 <sub>TX</sub> )	RF Output Power (dBm)	Co-location
2400-2483.5	b	2412-2462	1-11 [11]	1	21.16	Yes
2400-2483.5	g	2412-2462	1-11 [11]	1	23.65	Yes
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	27.09	Yes
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	22.72	Yes

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.  
Note 4: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other. (i.e., EUT has simultaneously co-transmitting that operating 2.4GHz and 5GHz.)

### 1.1.2 Antenna Information

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

Antenna General Information				
No.	Ant. Cat.	Ant. Type	Model name	Gain (dBi)
1	Integral	PIFA	C059-510273-A	3.03
2	Integral	PIFA	C059-510274-A	2.36

Remark: 11b/g only include 1TX and Port1 for emission. IEEE 802.11n has the CDD function.



### 1.1.3 Type of EUT

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

### 1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
<input type="checkbox"/> Operated normally 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"/> 98.69% - IEEE 802.11b	0.06
<input checked="" type="checkbox"/> 91.07% - IEEE 802.11g	0.41
<input checked="" type="checkbox"/> 91.43% - IEEE 802.11n (HT20)	0.39
<input checked="" type="checkbox"/> 81.36% - IEEE 802.11n (HT40)	0.90

### 1.1.5 EUT Operational Condition

Supply Voltage	<input checked="" type="checkbox"/> AC mains	<input type="checkbox"/> DC	<input type="checkbox"/> System
Type of DC Source	<input checked="" type="checkbox"/> Internal DC supply	<input type="checkbox"/> External DC from USB cable	<input type="checkbox"/> External DC adapter



## 1.2 Support Equipment

Support Equipment - RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5520	-

## 1.3 Testing Applied Standards

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

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2009
- ♦ FCC KDB 558074
- ♦ FCC KDB 662911

## 1.4 Testing Location Information

Testing Location				
<input checked="" type="checkbox"/>	HWA YA	ADD	: No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.	
		TEL	: 886-3-327-3456	FAX : 886-3-327-0973
Test Condition	Test Site No.	Test Engineer	Test Environment	
AC Conduction	CO04-HY	Zeus	25°C / 53%	
RF Conducted	TH01-HY	Cain	22.1°C / 61%	
Radiated Emission	03CH02-HY	Hunter	25°C / 53%	



## 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	±2.26 dB	
Emission bandwidth, 6dB bandwidth	±1.42 %	
RF output power, conducted	±0.63 dB	
Power density, conducted	±0.81 dB	
Unwanted emissions, conducted	9 – 150 kHz	±0.38 dB
	0.15 – 30 MHz	±0.42 dB
	30 – 1000 MHz	±0.51 dB
	1 – 18 GHz	±0.67 dB
	18 – 40 GHz	±0.83 dB
	40 – 200 GHz	N/A
All emissions, radiated	9 – 150 kHz	±2.49 dB
	0.15 – 30 MHz	±2.28 dB
	30 – 1000 MHz	±2.56 dB
	1 – 18 GHz	±3.59 dB
	18 – 40 GHz	±3.82 dB
	40 – 200 GHz	N/A
Temperature	±0.8 °C	
Humidity	±3 %	
DC and low frequency voltages	±3 %	
Time	±1.42 %	
Duty Cycle	±1.42 %	



## 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
11b,1-11Mbps	1	1-11 Mbps	1 Mbps
11g,6-54Mbps	1	6-54 Mbps	6 Mbps
HT20,M0-15	2	MCS 0-15	M 0
HT40,M0-15	2	MCS 0-15	M 0

### 2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (2400-2483.5MHz band)							
Test Software		Dos					
Modulation Mode	N <sub>TX</sub>	Test Frequency (MHz)					
		NCB: 20MHz			NCB: 40MHz		
		2412	2437	2462	2422	2437	2452
11b	1	33	30	30	-	-	-
11g	1	31	33	22	-	-	-
HT-20	2	22,22	35,35	18,18	-	-	-
HT-40	2	-	-	-	18,18	27,27	13,13



## 2.3 The Worst Case Measurement Configuration

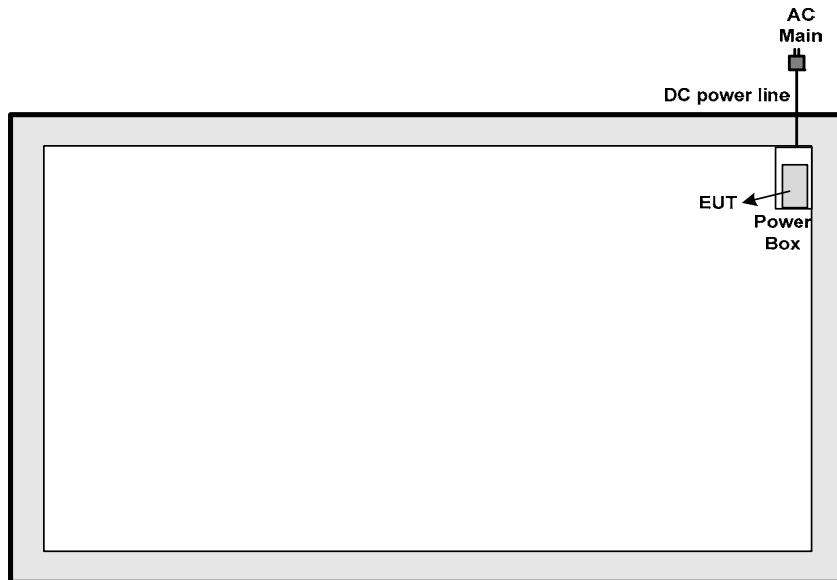
The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	AC power-line conducted emissions
<b>Condition</b>	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
<b>Operating Mode</b>	Operating Mode Description
1	AC power & Radio link

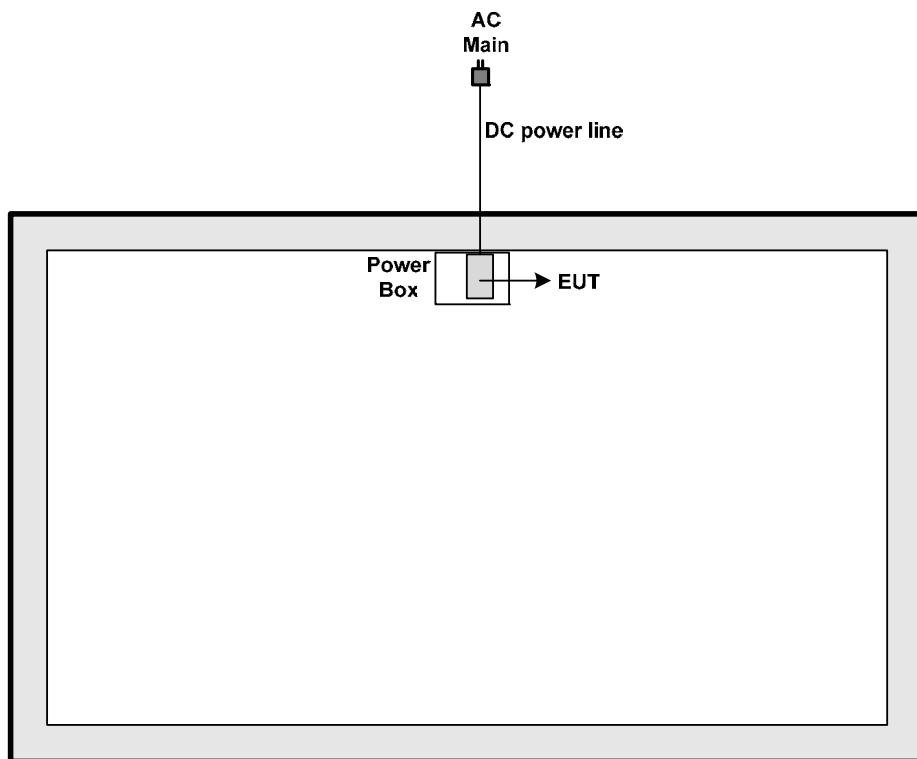
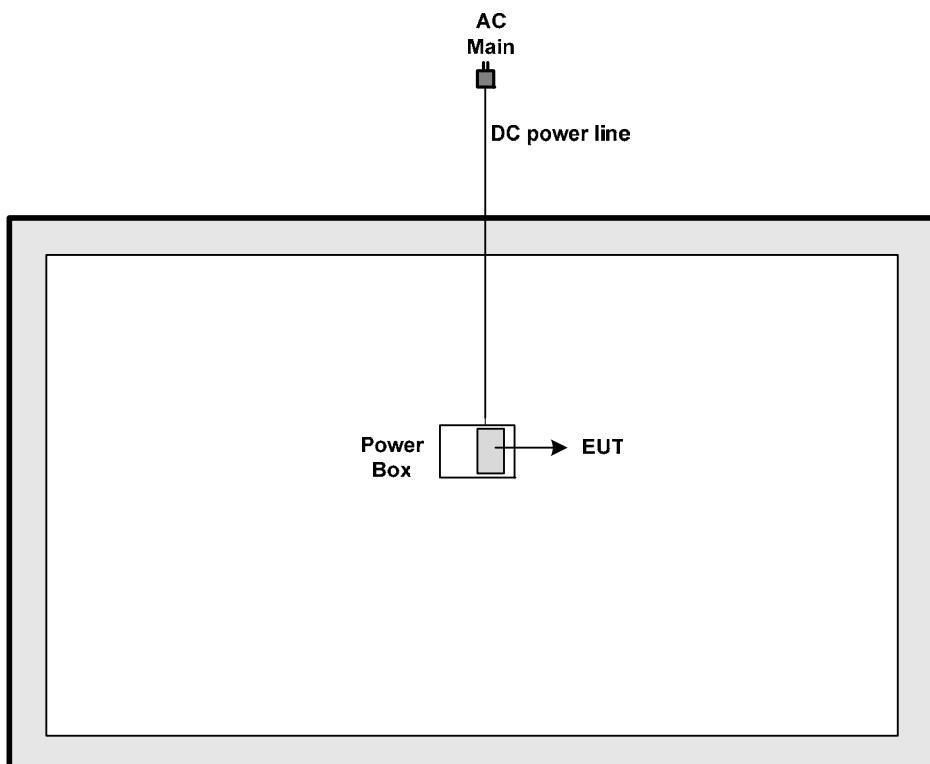
The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	RF Output Power, Power Spectral Density, 6 dB Bandwidth
<b>Test Condition</b>	Conducted measurement at transmit chains
<b>Modulation Mode</b>	11b, 11g, HT20, HT40

The Worst Case Mode for Following Conformance Tests							
<b>Tests Item</b>	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions						
<b>Test Condition</b>	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.						
<b>User Position</b>	<input type="checkbox"/> EUT will be placed in fixed position. <input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes. The worst plane is Z. <input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed two or three orthogonal planes.						
<b>Operating Mode</b>	<input checked="" type="checkbox"/> 2. AC power & Transmitter						
<b>Modulation Mode</b>	11b, 11g, HT20, HT40						
<b>Orthogonal Planes of EUT</b>	<table border="1"><thead><tr><th>X Plane</th><th>Y Plane</th><th>Z Plane</th></tr></thead><tbody><tr><td></td><td></td><td></td></tr></tbody></table>	X Plane	Y Plane	Z Plane			
X Plane	Y Plane	Z Plane					

## 2.4 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



**Test Setup Diagram - Radiated Emission (Below 1GHz)****Test Setup Diagram - Radiated Emission (Above 1GHz)**

### 3 Transmitter Test Result

#### 3.1 AC Power-line Conducted Emissions

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

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

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

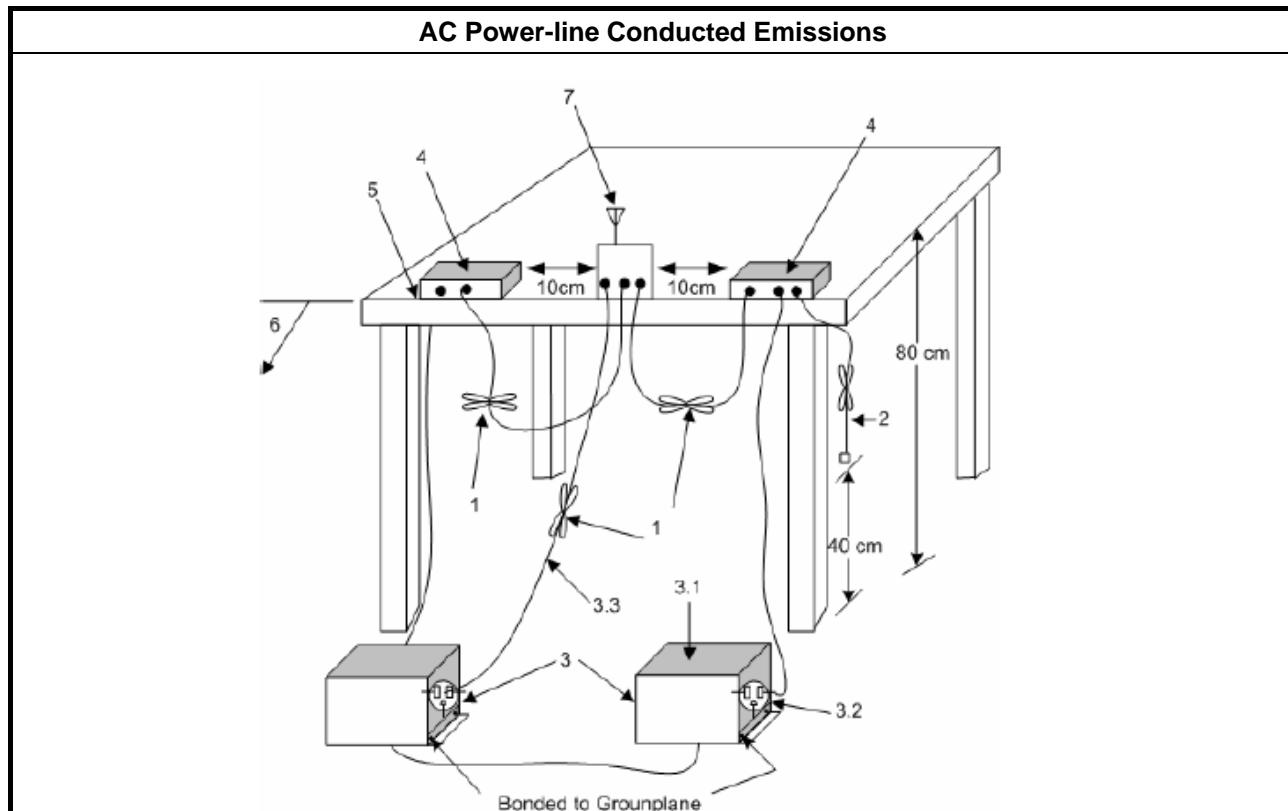
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

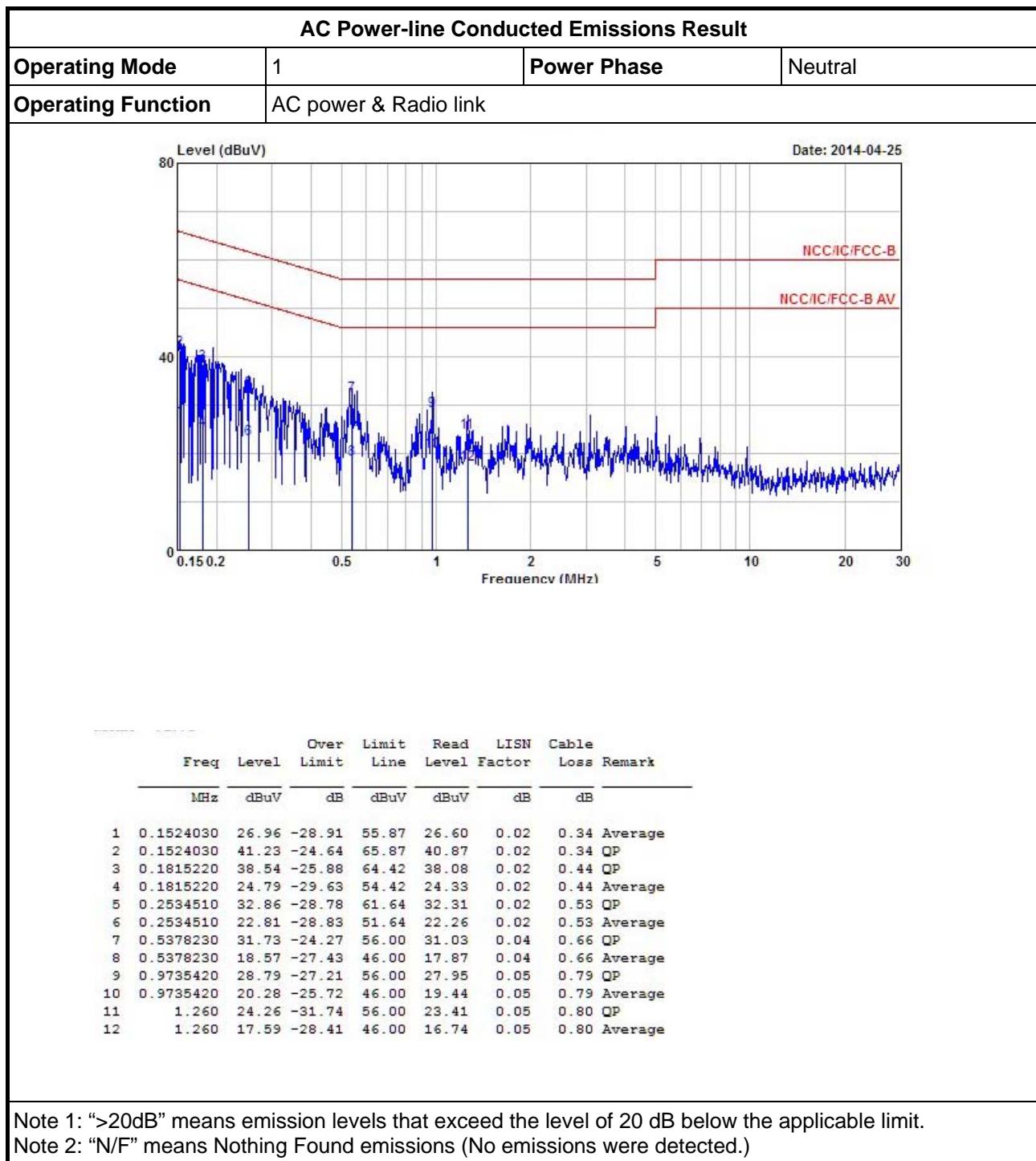
Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions.

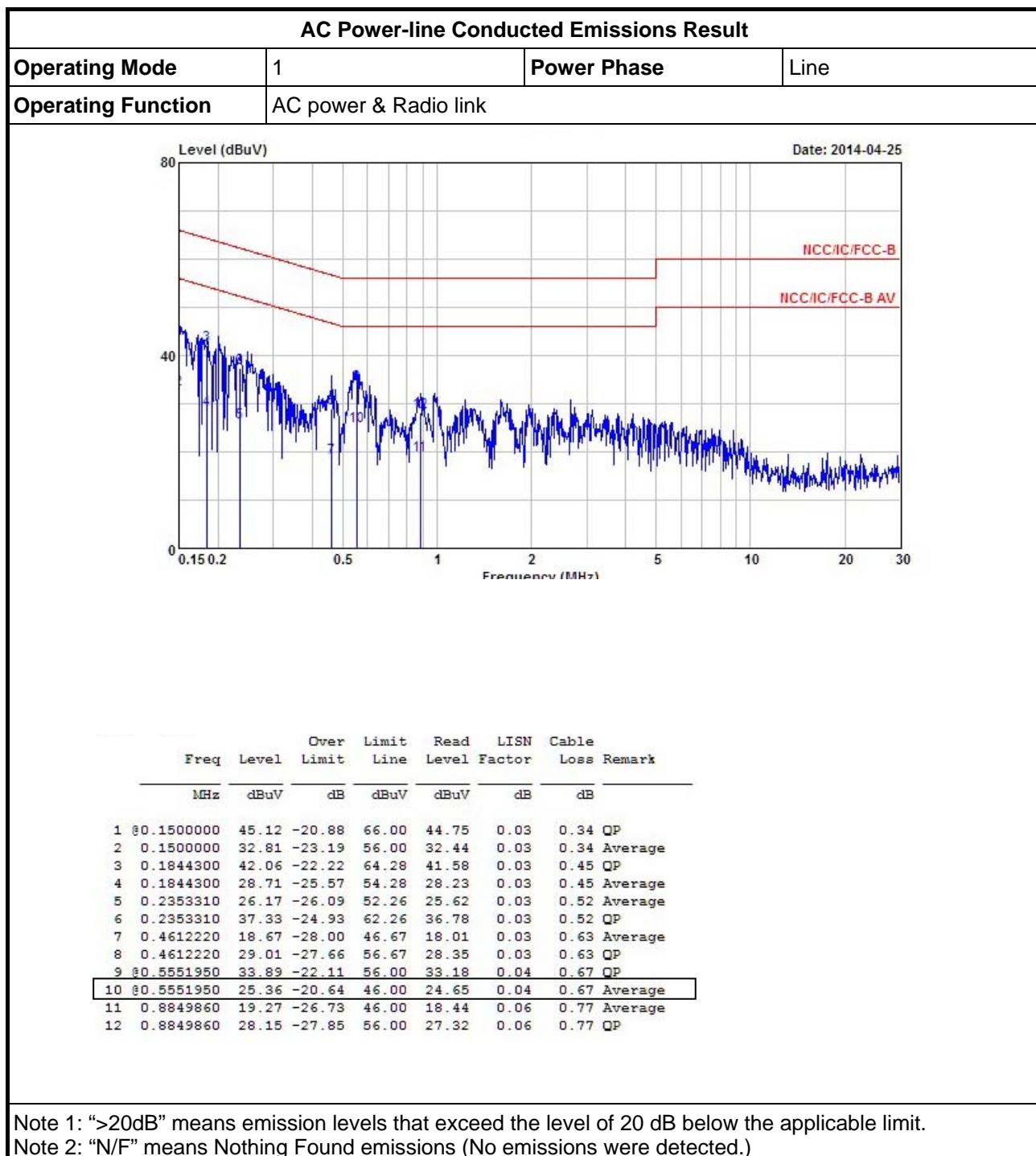
##### 3.1.4 Test Setup





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





## 3.2 6dB Bandwidth

### 3.2.1 6dB Bandwidth Limit

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

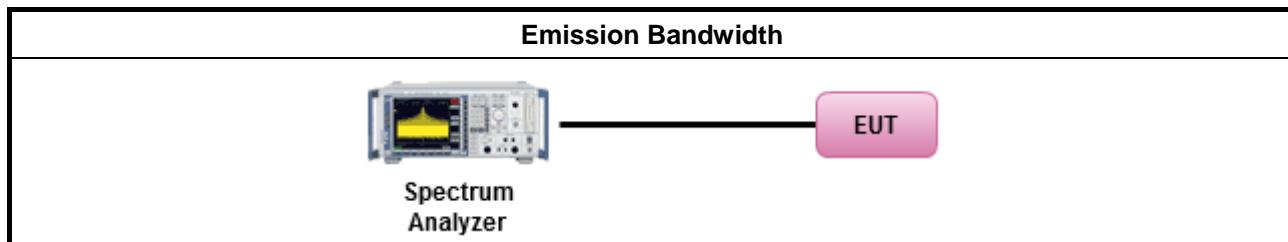
### 3.2.2 Measuring Instruments

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 FCC KDB 558074, clause 8.1 Option 1 for 6 dB bandwidth measurement.
<input type="checkbox"/> Refer as FCC 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 performance of this transmit chain port 1.
<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.

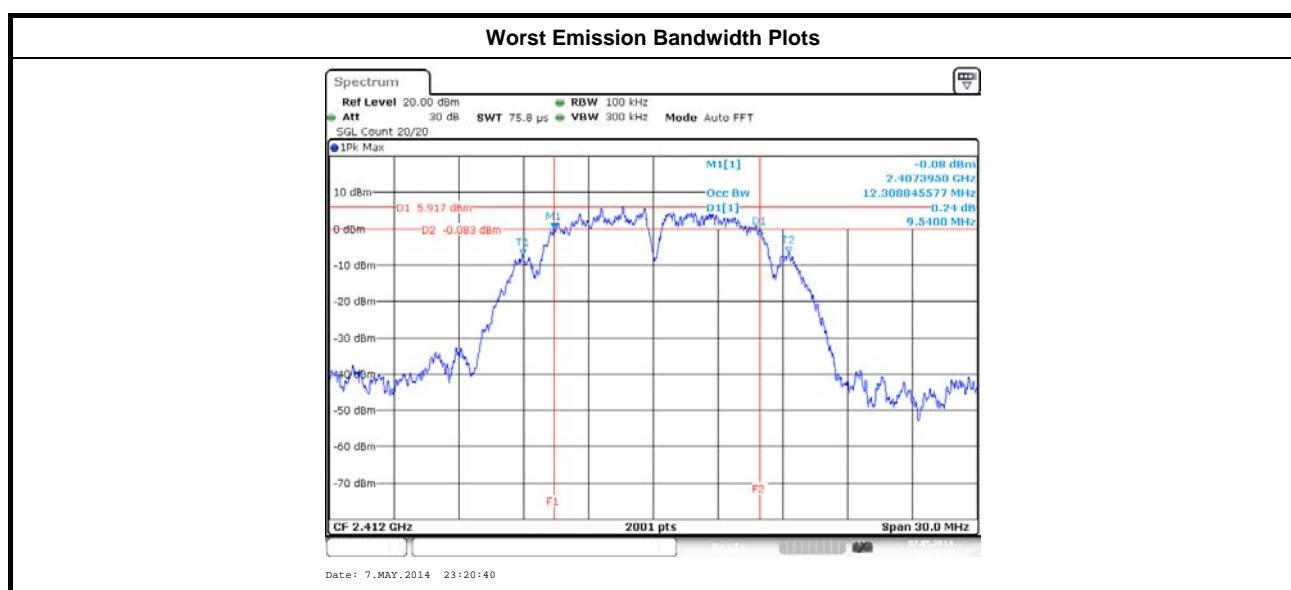
### 3.2.4 Test Setup





## 3.2.5 Test Result of Emission Bandwidth

Emission Bandwidth Result						
Condition			Emission Bandwidth (MHz)			
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	99% Bandwidth		6dB Bandwidth	
			Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2
11b	1	2412	12.30	-	9.54	-
11b	1	2437	12.26	-	9.87	-
11b	1	2462	12.24	-	9.85	-
11g	1	2412	16.44	-	16.56	-
11g	1	2437	16.52	-	16.56	-
11g	1	2462	16.43	-	16.50	-
HT20	2	2412	17.57	17.54	17.61	17.65
HT20	2	2437	17.67	17.66	17.73	17.74
HT20	2	2462	17.54	17.60	17.59	17.74
HT40	2	2422	36.22	36.18	35.32	35.72
HT40	2	2437	36.18	36.22	36.08	36.28
HT40	2	2452	36.22	36.18	36.32	35.92
Limit			N/A		≥500 kHz	
Result			Complied			

Note 1: N<sub>TX</sub> = Number of Transmit Chains



### 3.3 RF Output Power

#### 3.3.1 RF Output Power Limit

RF Output Power Limit	
<b>Maximum Peak Conducted Output Power or Maximum Conducted Output Power Limit</b>	
<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 checked="" type="checkbox"/> Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm	
<input 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
<b>e.i.r.p. Power Limit:</b>	
<input checked="" type="checkbox"/> 2400-2483.5 MHz Band	
<input checked="" type="checkbox"/> Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)	
<input 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.	

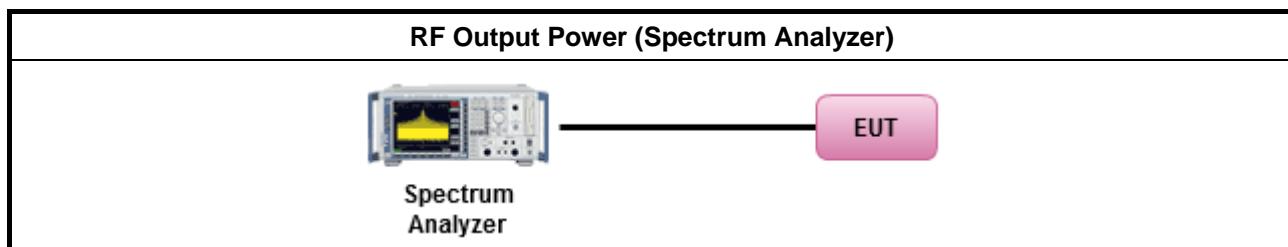
#### 3.3.2 Measuring Instruments

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 FCC KDB 558074, clause 9.1.1 Option 1 (RBW $\geq$ EBW method).
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 9.1.2 Option 2 (integrated band power method).
<input type="checkbox"/> Refer as FCC KDB 558074, clause 9.1.3 Option 2 (peak power meter for VBW $\geq$ DTS BW)
<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 558074, clause 9.2.2.2 Method AVGSA-1 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC KDB 558074, clause 9.2.2.3 Method AVGSA-1 Alt. (slow sweep speed)
duty cycle $<$ 98% and average over on/off periods with duty factor
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC KDB 558074, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed)
RF power meter and average over on/off periods with duty factor or gated trigger
<input type="checkbox"/> Refer as FCC KDB 558074, clause 9.2.3 Method AVGPM (using an RF average power meter).
<input checked="" type="checkbox"/> For conducted measurement.
<input checked="" type="checkbox"/> The EUT supports single transmit chain and measurements performance on this transmit chain port 1.
<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)		3.03	2.36	-	-
Modulation Mode	DG (dBi)	$N_{TX}$	$N_{SS}$ (Min.)	STBC	Array Gain (dB)
11b,1-11Mbps	3.03	1	1	-	-
11g,6-54Mbps	3.03	1	1	-	-
HT20,M0-15	2.71	2	1/2	-	0 (Note 4)
HT40,M0-15	2.71	2	1/2	-	0 (Note 4)

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

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

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

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

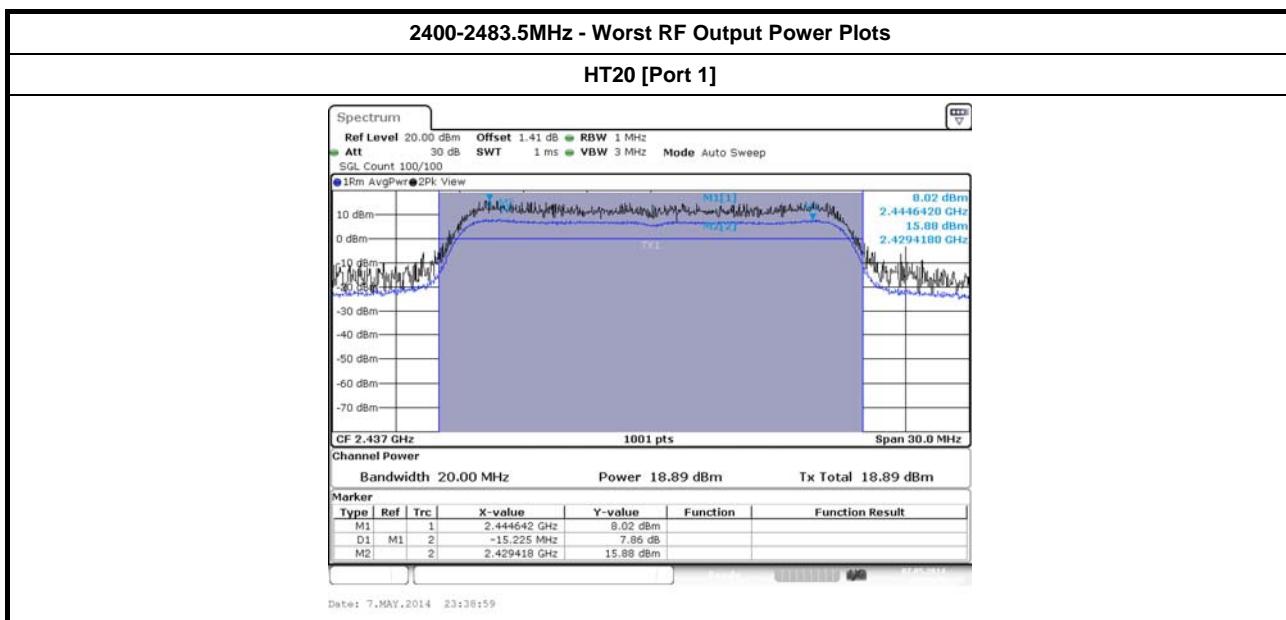


### 3.3.6 Test Result of Maximum Peak Conducted Output Power

Maximum Peak Conducted Output Power Result									
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)	EIRP Power	EIRP Limit
11b	1	2412	21.16	-	21.16	30.00	3.03	24.19	36.00
11b	1	2437	19.92	-	19.92	30.00	3.03	22.95	36.00
11b	1	2462	20.10	-	20.10	30.00	3.03	23.13	36.00
11g	1	2412	22.58	-	22.58	30.00	3.03	25.61	36.00
11g	1	2437	23.65	-	23.65	30.00	3.03	26.68	36.00
11g	1	2462	17.68	-	17.68	30.00	3.03	20.71	36.00
HT20	2	2412	18.01	18.13	21.08	30.00	2.71	23.79	36.00
HT20	2	2437	24.27	23.88	27.09	30.00	2.71	29.80	36.00
HT20	2	2462	16.39	16.18	19.30	30.00	2.71	22.00	36.00
HT40	2	2422	15.34	15.36	18.36	30.00	2.71	21.07	36.00
HT40	2	2437	20.03	19.36	22.72	30.00	2.71	25.43	36.00
HT40	2	2452	12.57	12.68	15.64	30.00	2.71	18.34	36.00
Result			Complied						
Note : IEEE 802.11 n have the CDD function, so the array gain is 0.									

### 3.3.7 Test Result of Maximum Conducted Output Power

Maximum Conducted Output Power Result									
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)	EIRP Power	EIRP Limit
11b	1	2412	18.33	-	18.33	30.00	3.03	21.36	36.00
11b	1	2437	17.08	-	17.08	30.00	3.03	20.11	36.00
11b	1	2462	17.27	-	17.27	30.00	3.03	20.30	36.00
11g	1	2412	17.79	-	17.79	30.00	3.03	20.82	36.00
11g	1	2437	18.79	-	18.79	30.00	3.03	21.82	36.00
11g	1	2462	12.96	-	12.96	30.00	3.03	15.99	36.00
HT20	2	2412	13.15	13.12	16.14	30.00	2.71	18.85	36.00
HT20	2	2437	19.28	19.02	22.16	30.00	2.71	24.87	36.00
HT20	2	2462	11.48	11.14	14.32	30.00	2.71	17.03	36.00
HT40	2	2422	10.73	10.85	13.80	30.00	2.71	16.50	36.00
HT40	2	2437	15.31	15.12	18.22	30.00	2.71	20.93	36.00
HT40	2	2452	8.03	8.22	11.13	30.00	2.71	13.84	36.00
Result			Complied						
Note : IEEE 802.11 n have the CDD function, so the array gain is 0.									



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



## 3.4 Power Spectral Density

### 3.4.1 Power Spectral Density Limit

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

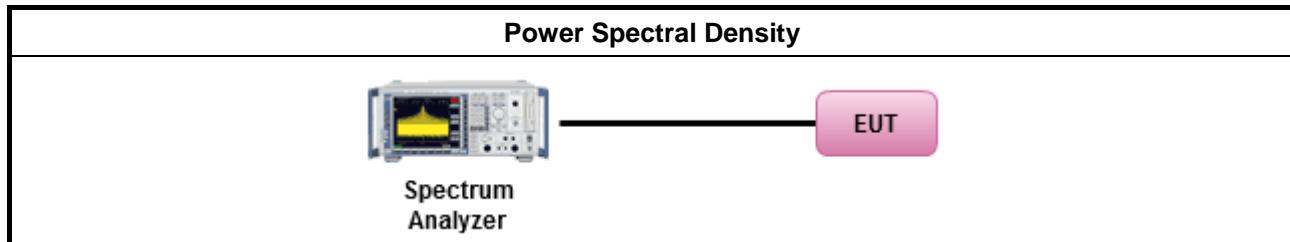
### 3.4.2 Measuring Instruments

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

### 3.4.3 Test Procedures

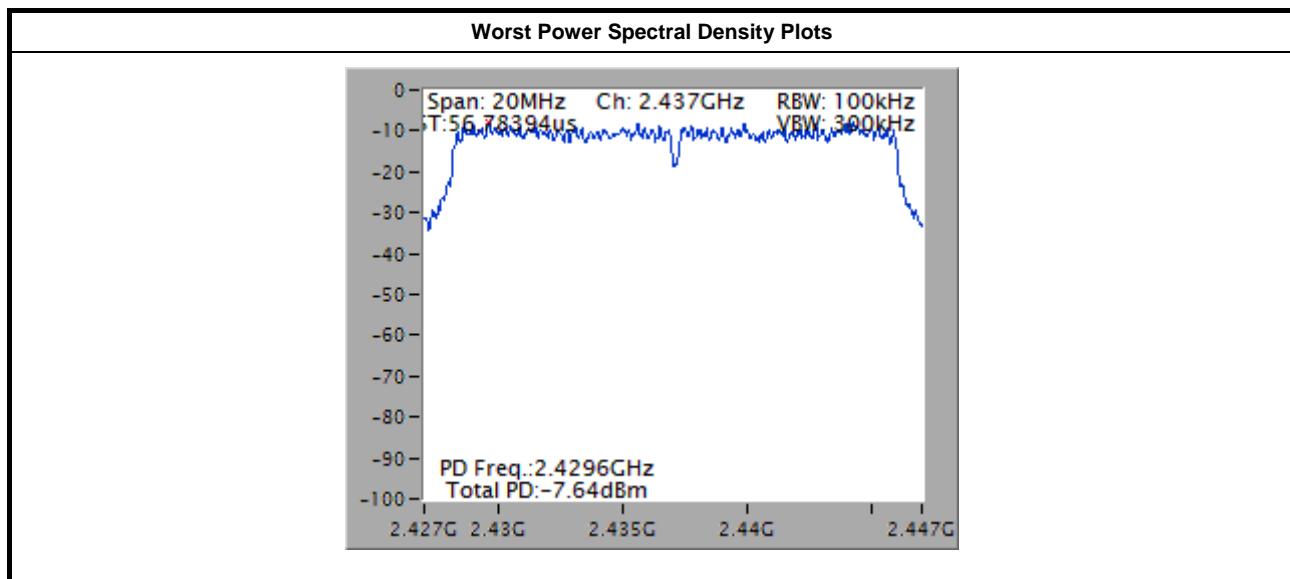
Test Method
<input checked="" type="checkbox"/> Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method 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 FCC KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz;detector=peak).. [duty cycle $\geq 98\%$ or external video / power trigger]
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 10.3 Method AVGPSD-1 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC 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 checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 10.5 Method AVGPSD-2 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC 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 port 1.
<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 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



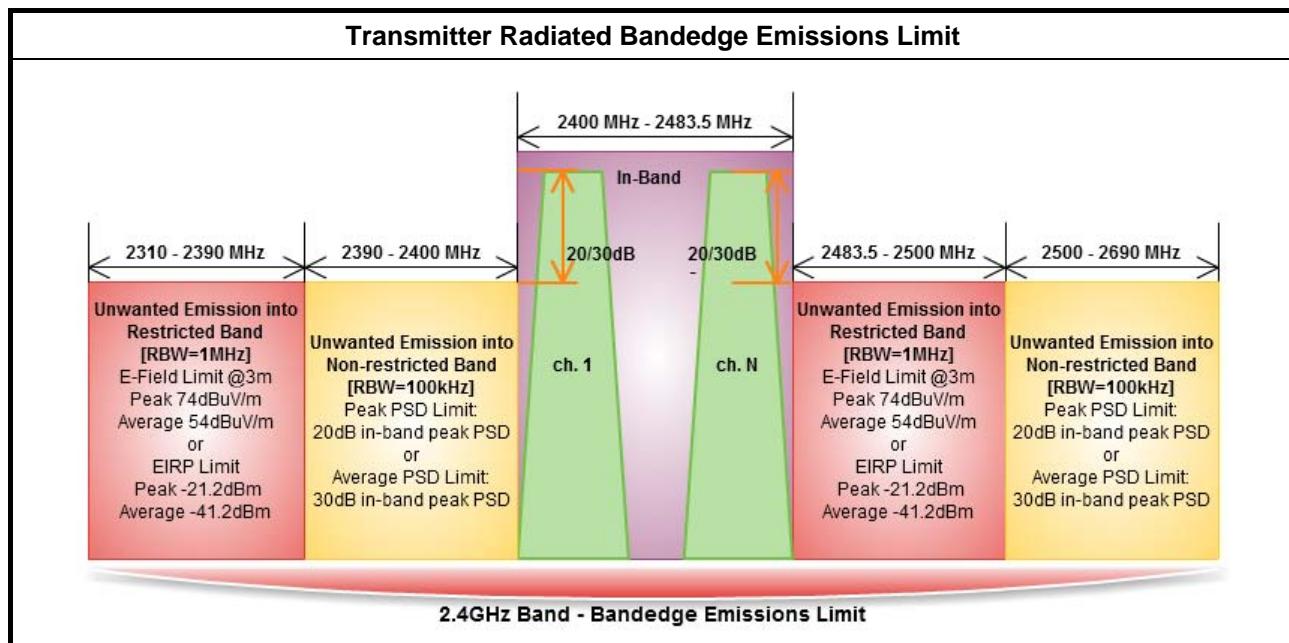
### 3.4.5 Test Result of Power Spectral Density

Condition			Power Spectral Density	
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Sum Chain (dBm/100kHz)	PSD Limit (dBm/3kHz)
11b	1	2412	-8.28	8
11b	1	2437	-10.48	8
11b	1	2462	-10.26	8
11g	1	2412	-12.65	8
11g	1	2437	-8.93	8
11g	1	2462	-17.10	8
HT20	2	2412	-12.04	8
HT20	2	2437	-7.64	8
HT20	2	2462	-16.30	8
HT40	2	2422	-18.56	8
HT40	2	2437	-12.39	8
HT40	2	2452	-20.50	8
Result		Complied		



## 3.5 Transmitter Bandedge Emissions

### 3.5.1 Transmitter Radiated Bandedge Emissions Limit



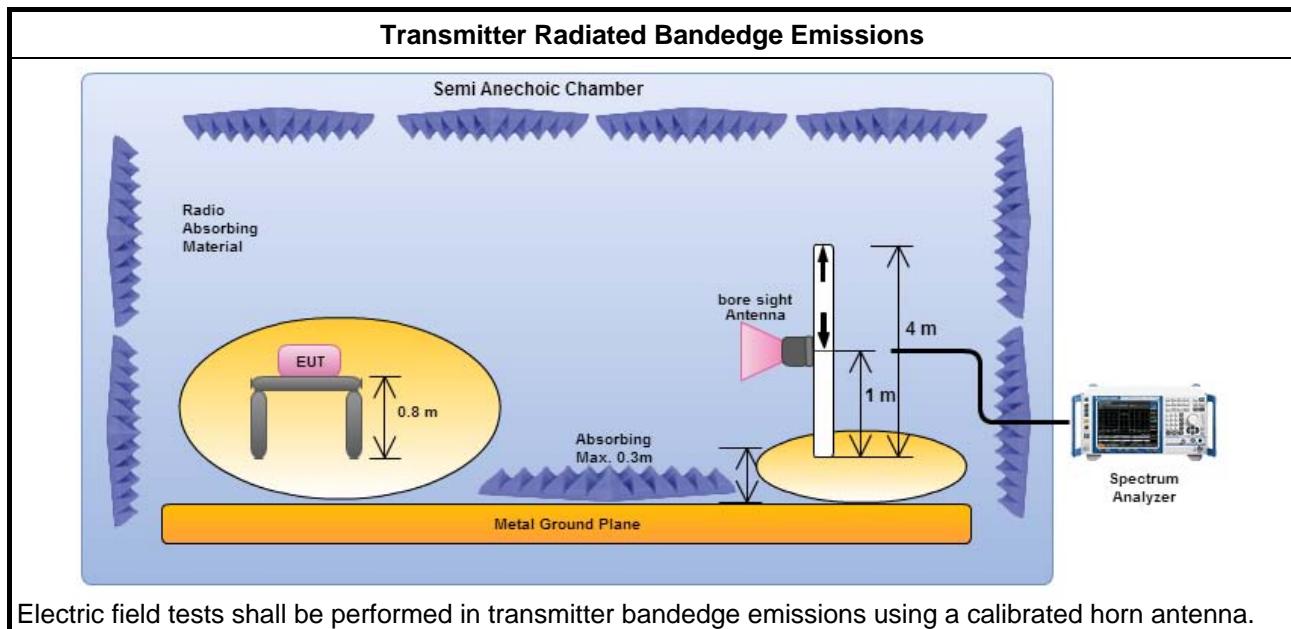
### 3.5.2 Measuring Instruments

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

### 3.5.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.9.2.2 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 FCC KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
<input type="checkbox"/> Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq 98\%$ )
<input type="checkbox"/> Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
<input type="checkbox"/> Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW $\geq 1/T$ ).
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq 1/T$ , where T is pulse time.
<input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/> Refer as FCC KDB 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 FCC 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 6.9.2 for band-edge testing and the test distance is 3m.
<input type="checkbox"/> Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements.
<input checked="" type="checkbox"/> For radiated measurement, refer as FCC KDB 558074, clause 12.2.7.

### 3.5.4 Test Setup





## 3.5.5 Transmitter Radiated Bandedge Emissions

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Non-restricted Band)								
Modulation	N <sub>TX</sub>	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	99.35	2399.04	55.61	43.74	20	H
11b	1	2462	99.48	2502.70	53.49	45.99	20	H
11g	1	2412	97.78	2397.70	68.86	28.92	20	H
11g	1	2462	96.49	2521.50	53.13	43.36	20	H
HT20	2	2412	101.48	2400.00	66.87	34.61	20	H
HT20	2	2462	100.25	2526.20	53.59	46.66	20	H
HT40	2	2422	97.15	2398.97	61.96	35.19	20	H
HT40	2	2452	98.31	2537.00	53.53	44.78	20	H

Note 1: Measurement worst emissions of receive antenna polarization

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band)										
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.
11b	1	2412	3	2317.95	62.80	74	2316.50	48.40	54	H
11b	1	2462	3	2489.50	63.30	74	2484.60	49.02	54	H
11g	1	2412	3	2390.00	70.78	74	2390.00	51.99	54	H
11g	1	2462	3	2483.90	69.04	74	2483.80	51.93	54	H
HT20	2	2412	3	2389.18	69.21	74	2389.97	52.66	54	H
HT20	2	2462	3	2484.30	71.50	74	2483.50	52.55	54	H
HT40	2	2422	3	2385.37	69.90	74	2389.46	52.21	54	H
HT40	2	2452	3	2484.56	68.16	74	2483.50	52.74	54	H

Note 1: Measurement worst emissions of receive antenna polarization.



## 3.6 Transmitter 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.

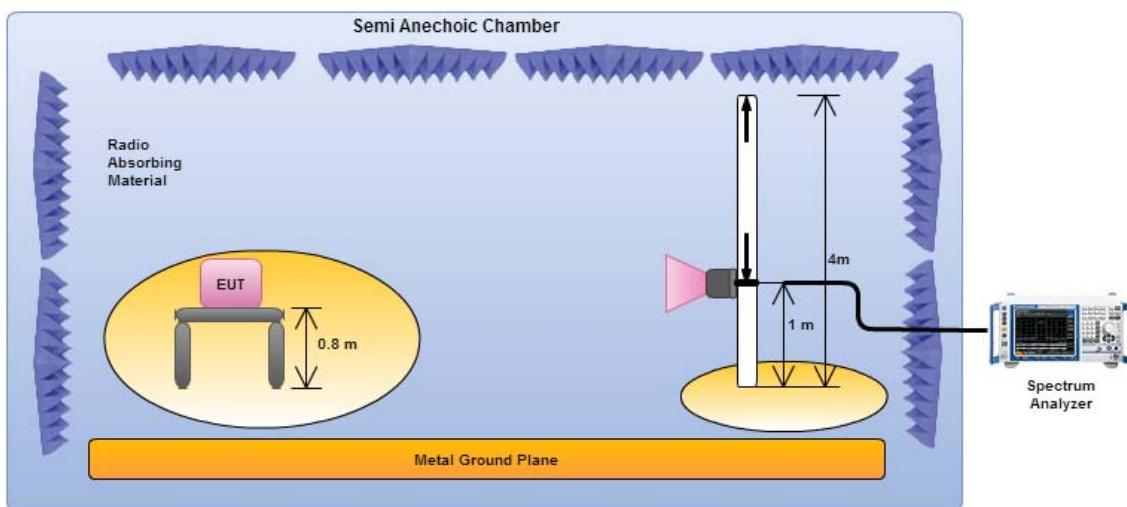


### 3.6.3 Test Procedures

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"/>	Measurements in the frequency range 10 GHz - 18GHz are typically made at a closer distance 1m, because the instrumentation noise floor is typically close to the radiated emission limit.
<input checked="" type="checkbox"/>	Measurements in the frequency range above 18 GHz - 25GHz are typically made at a closer distance 0.5m, because the instrumentation noise floor is typically close to the radiated emission limit.
<input checked="" type="checkbox"/>	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
<input checked="" type="checkbox"/>	For the transmitter unwanted emissions shall be measured using following options below:
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq$ 98%)
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced $VBW \geq 1/T$ ).
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced $VBW$ ). $VBW \geq 1/T$ , where $T$ is pulse time.
	<input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 12.2.3 measurement procedure Quasi-Peak limit.
<input checked="" type="checkbox"/>	For radiated measurement, refer as FCC 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.

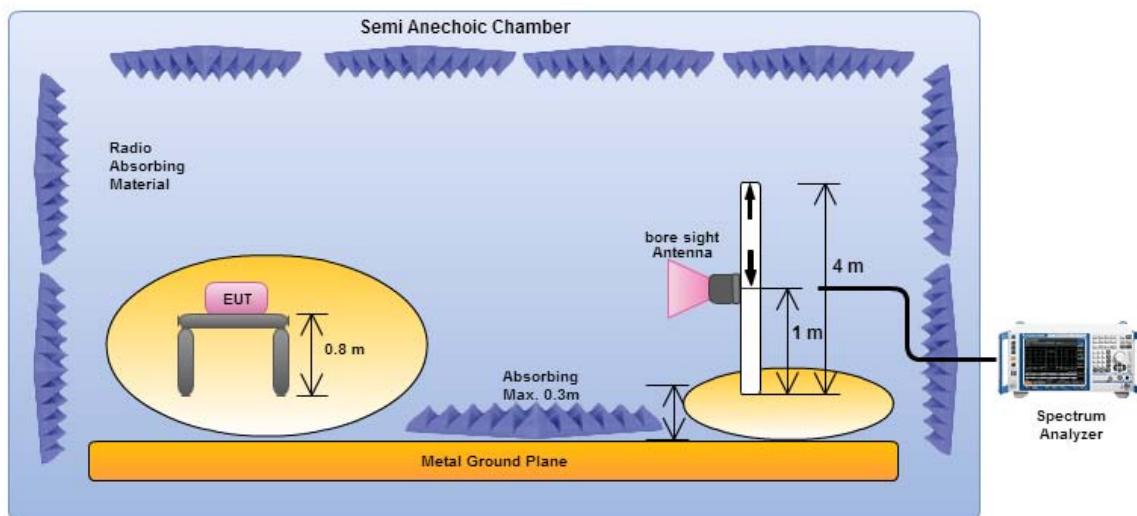
### 3.6.4 Test Setup

#### 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.

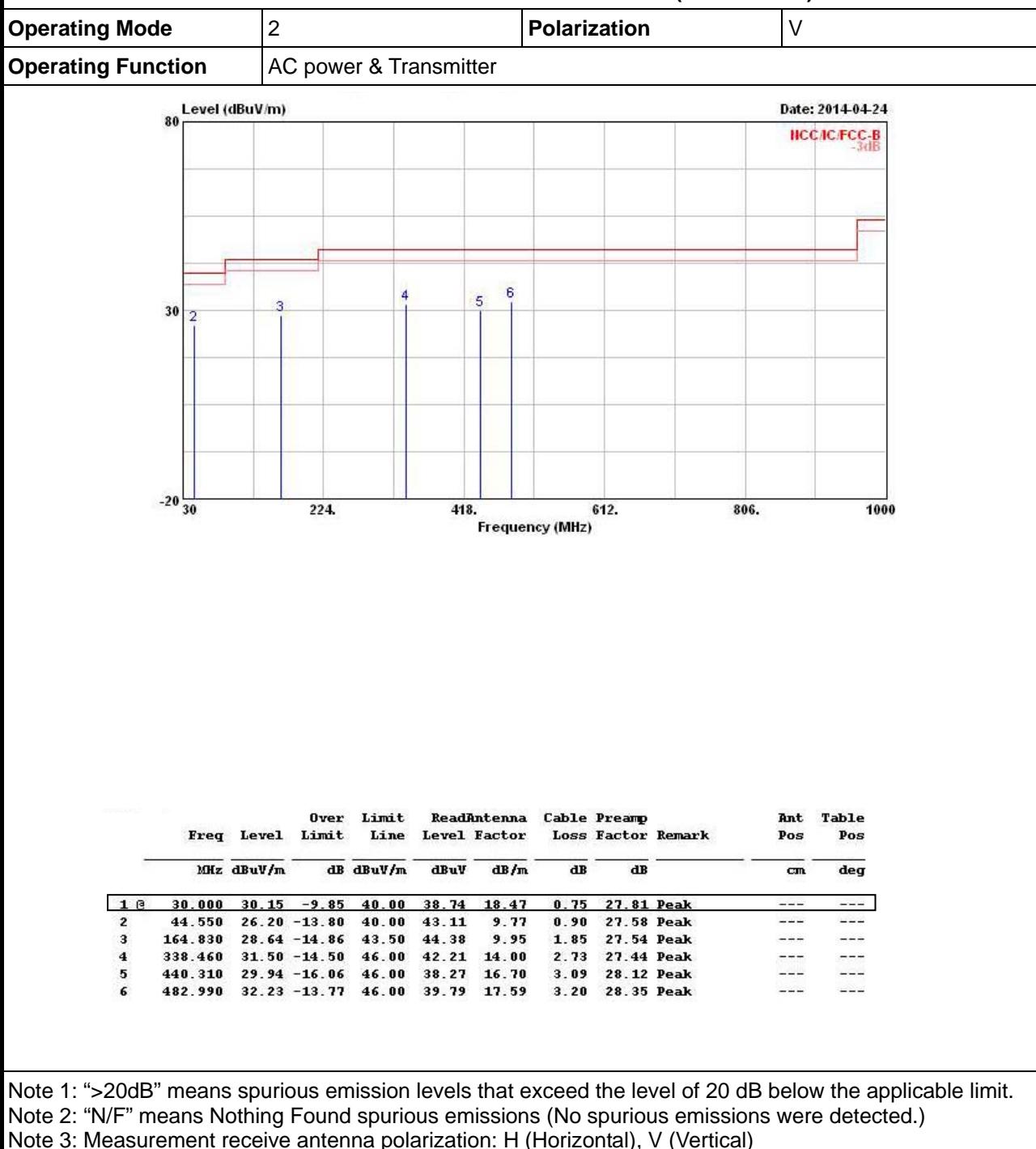
### 3.6.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

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)

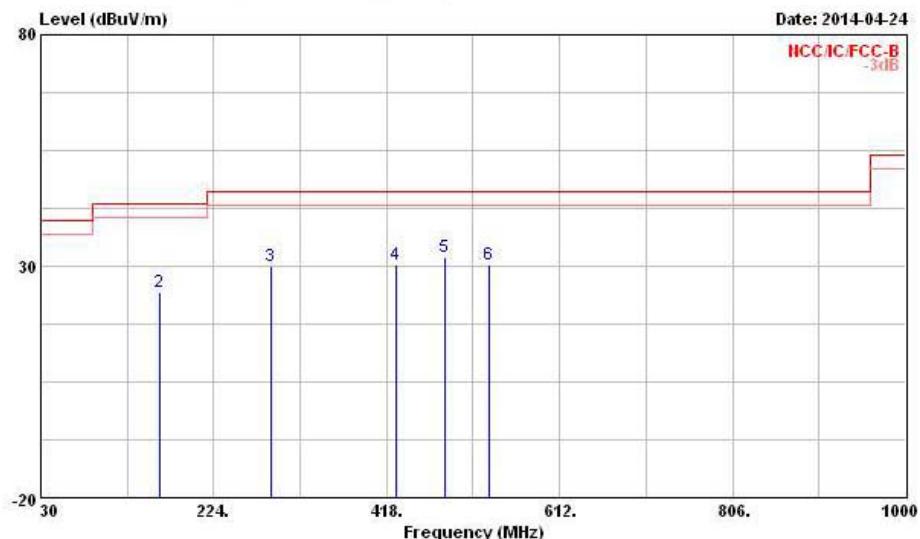
## Transmitter Radiated Unwanted Emissions (Below 1GHz)





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

<b>Operating Mode</b>	2	<b>Polarization</b>	H
<b>Operating Function</b>	AC power & Transmitter		



Freq	Level	Over Limit		ReadAntenna		Cable Preamp		Ant Pos	Table Pos		
		MHz	dBuV/m	dB	dBuV/m	Level	Factor	Loss	Factor	Remark	
1	30.000	25.70	-14.30	40.00	34.29	18.47	0.75	27.81	Peak	---	---
2	163.860	24.53	-18.97	43.50	40.24	9.99	1.85	27.55	Peak	---	---
3	288.990	30.06	-15.94	46.00	41.71	13.06	2.47	27.18	Peak	---	---
4	428.670	30.29	-15.71	46.00	38.56	16.74	3.04	28.05	Peak	---	---
5	482.990	32.10	-13.90	46.00	39.66	17.59	3.20	28.35	Peak	---	---
5	532.460	30.36	-15.64	46.00	37.51	17.88	3.52	28.46	Peak	---	---

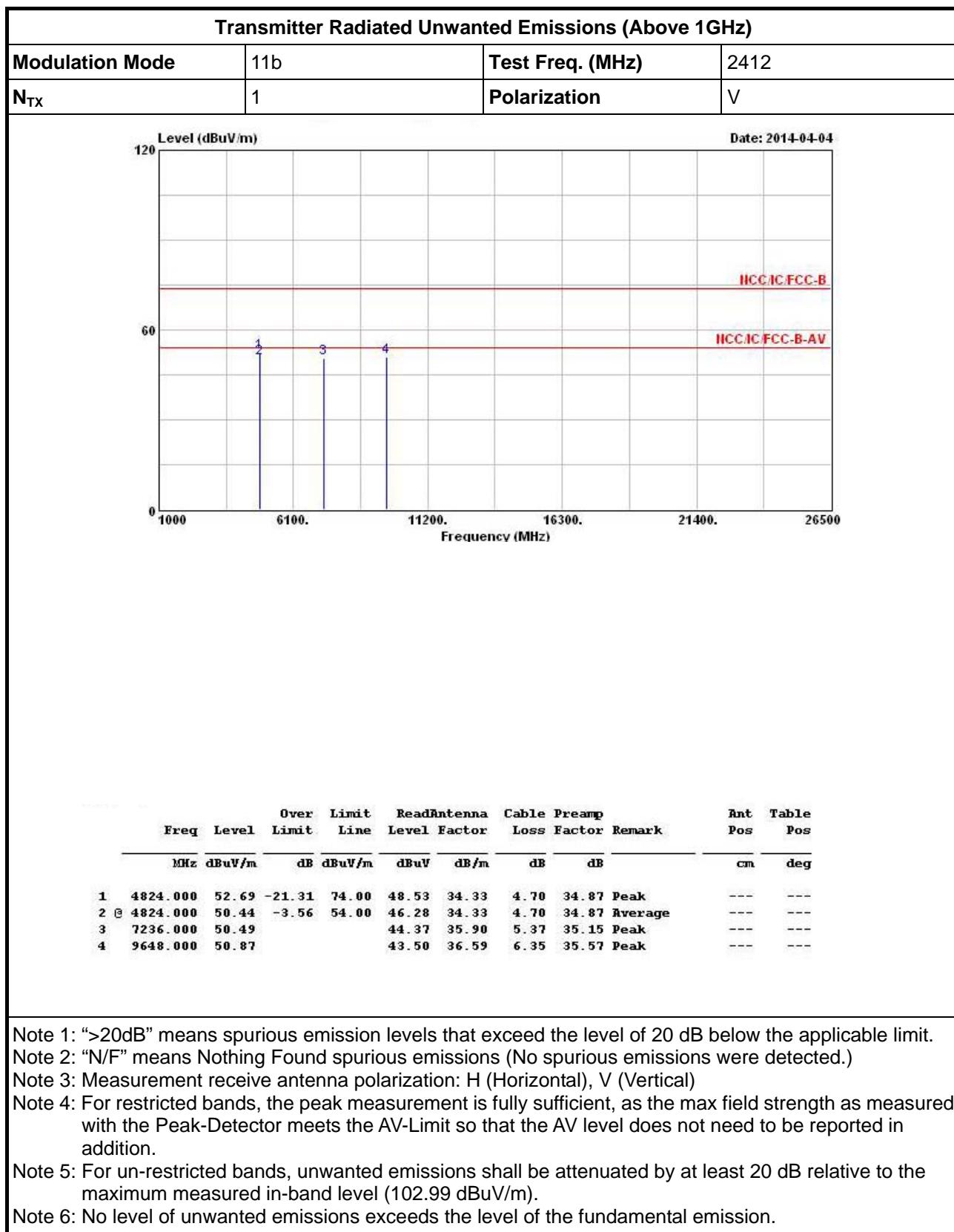
Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.

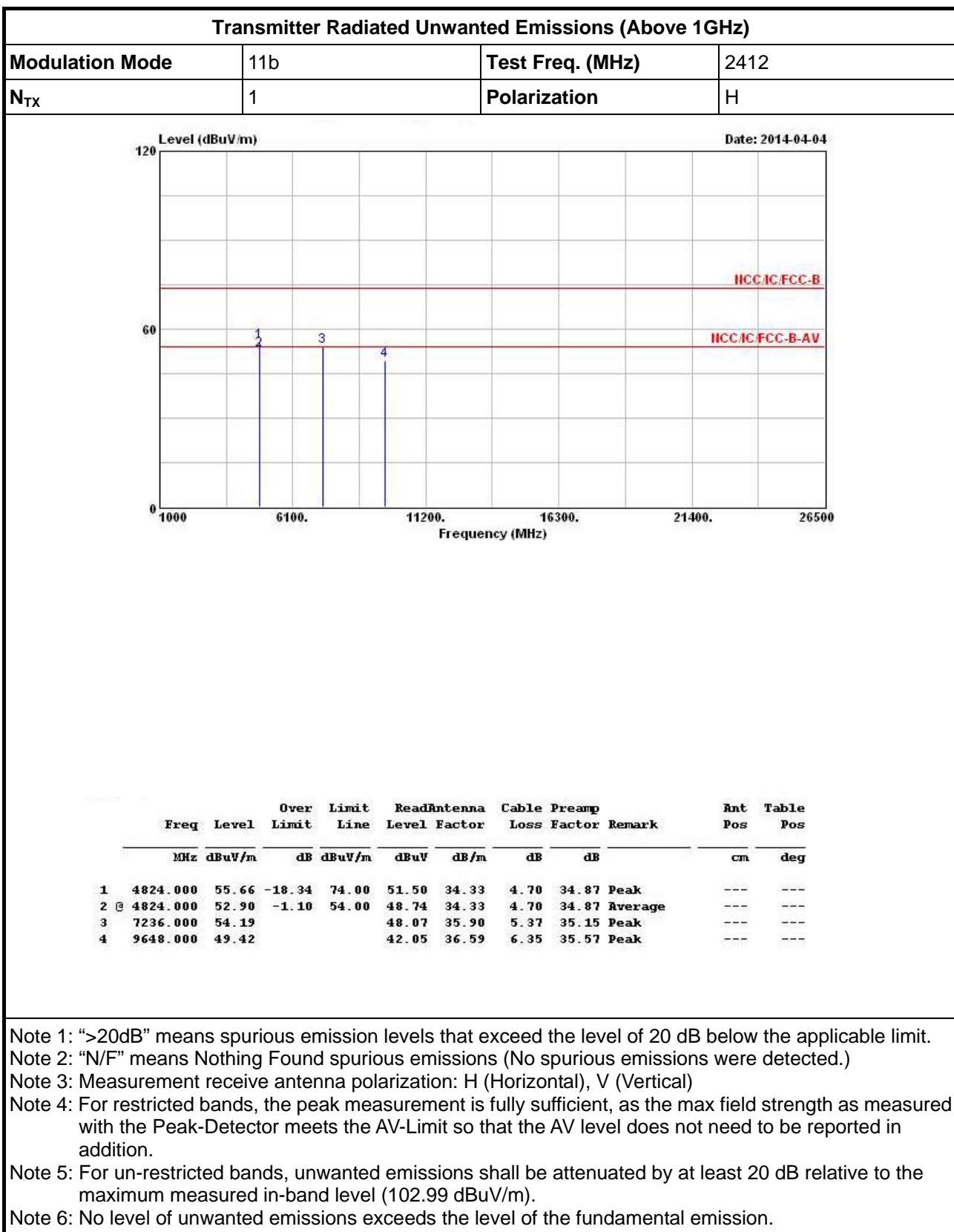
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

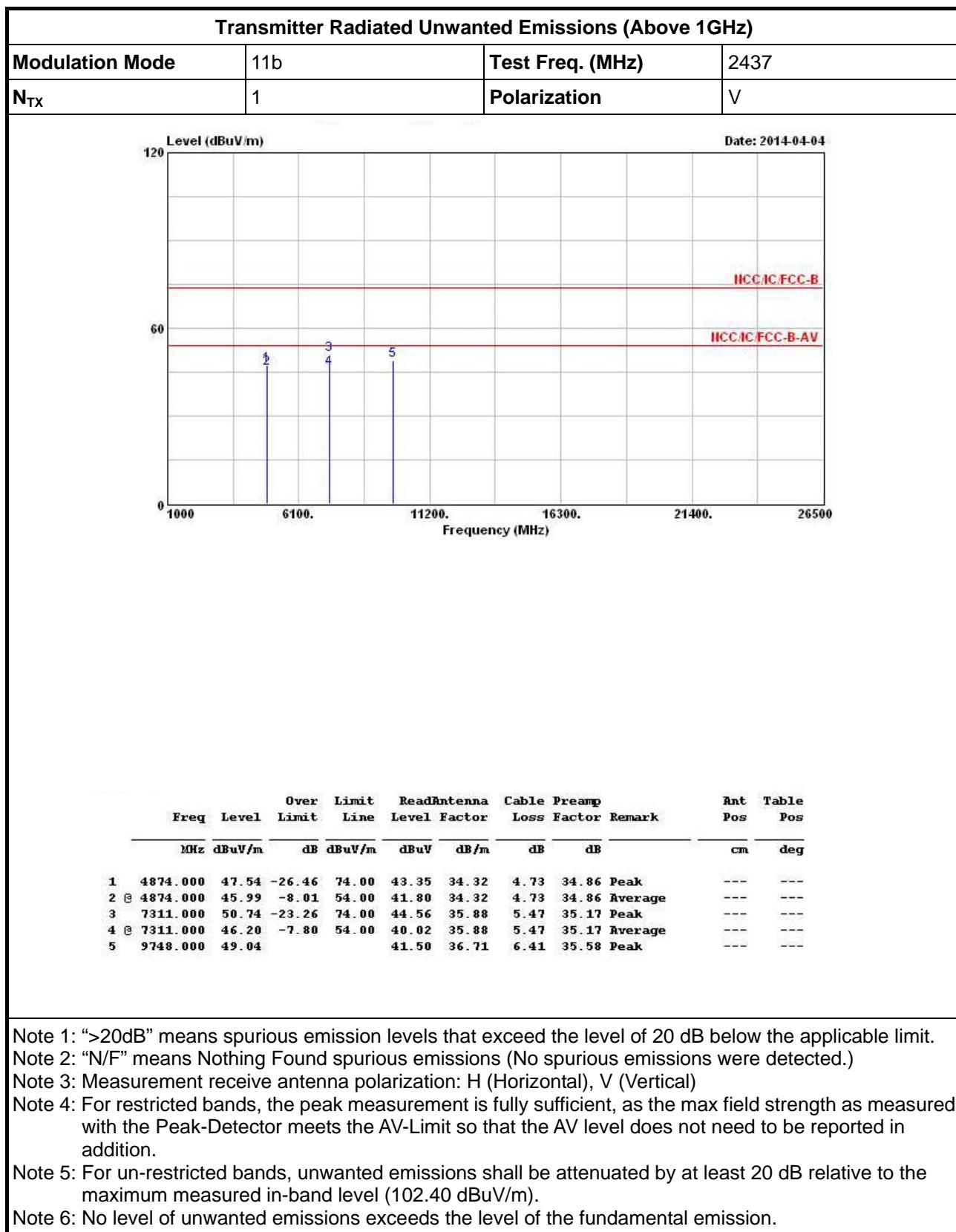
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

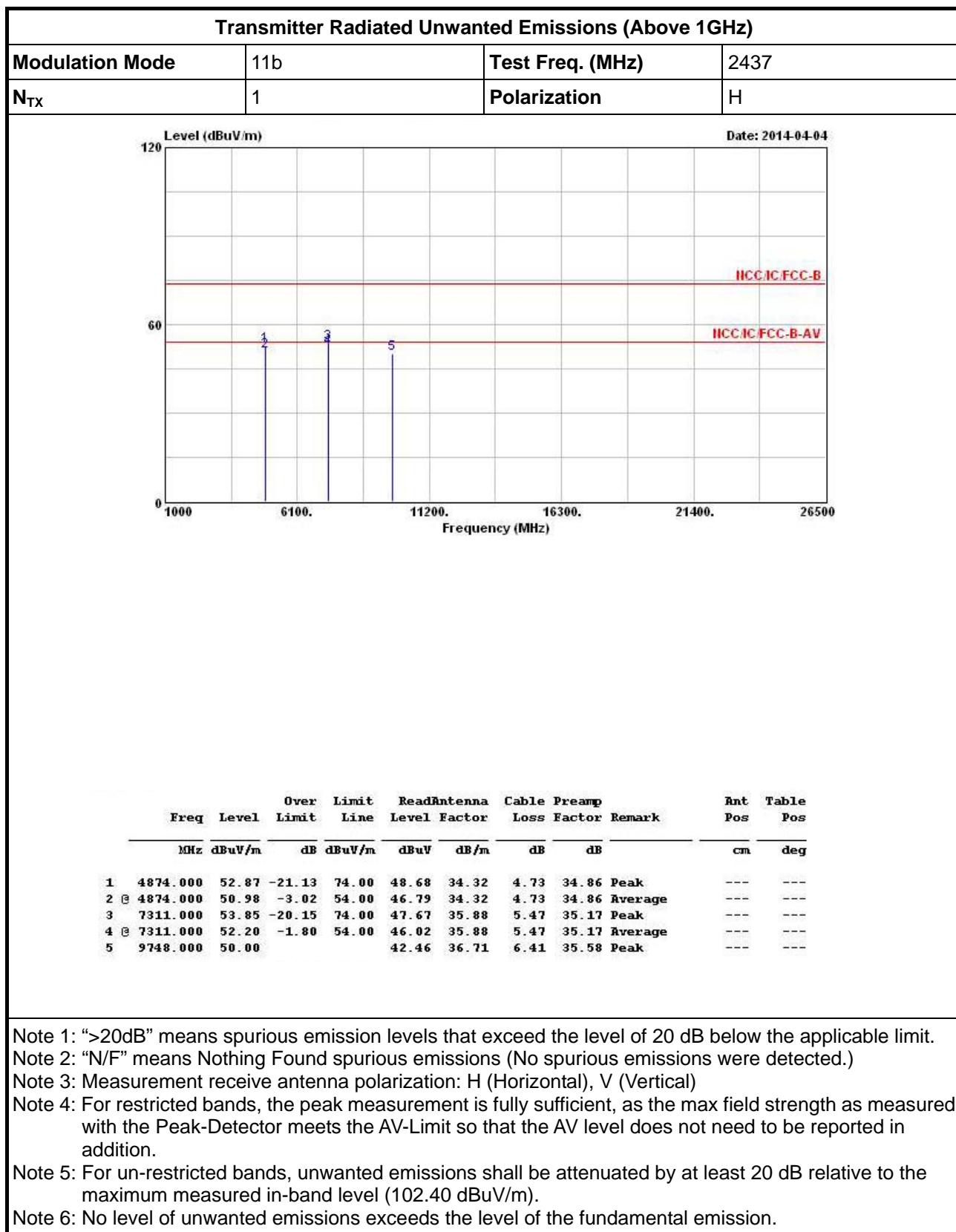


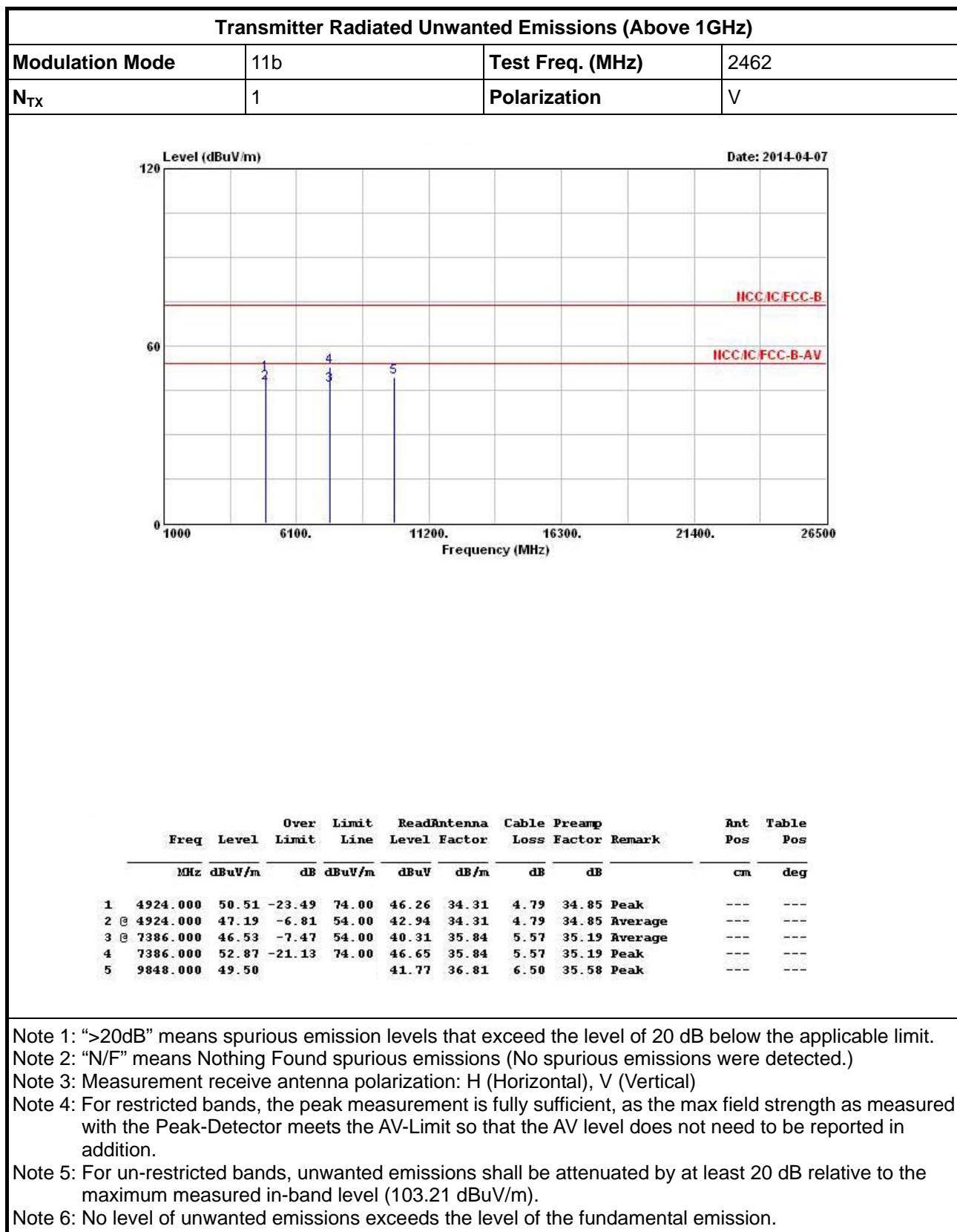
## 3.6.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)

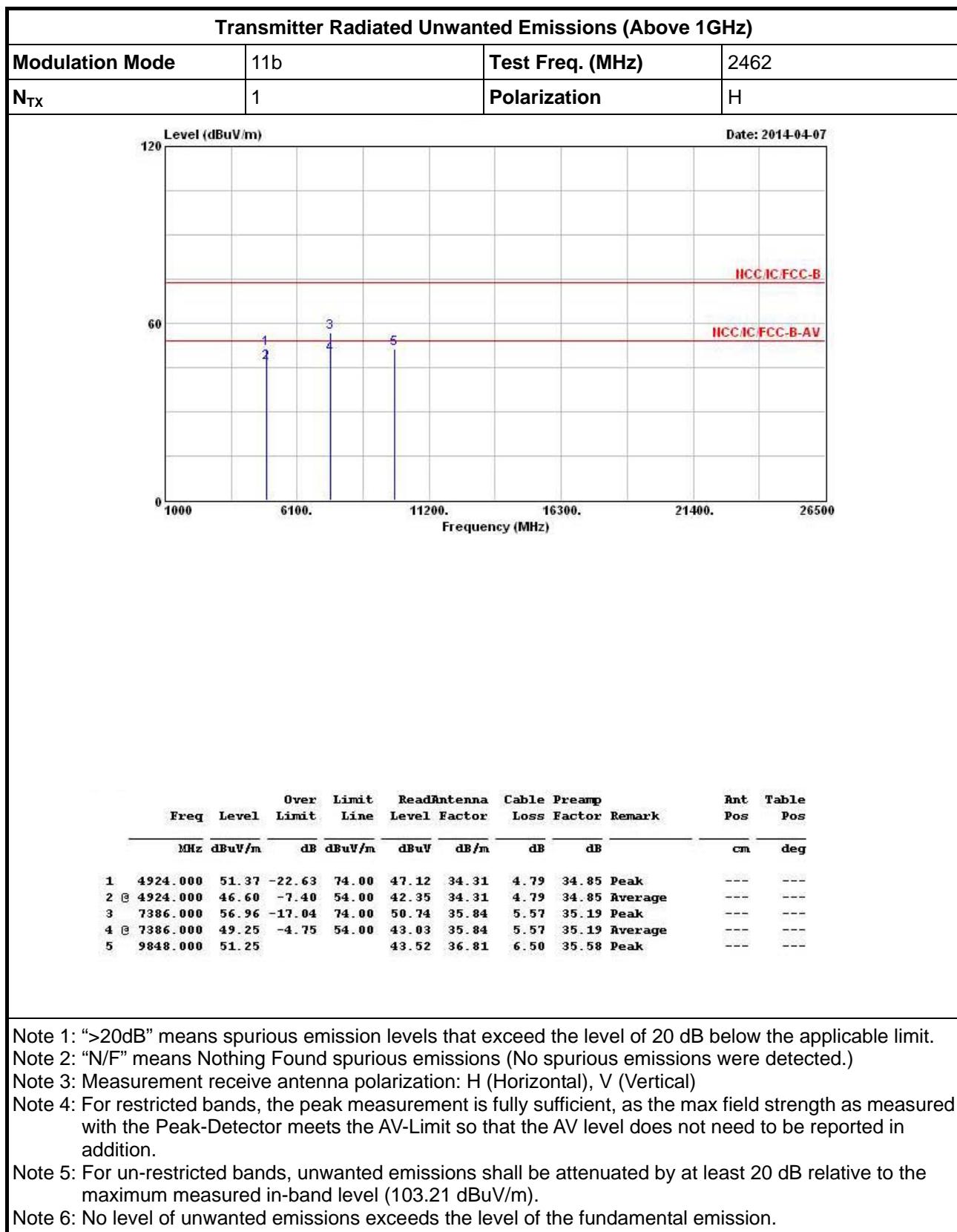


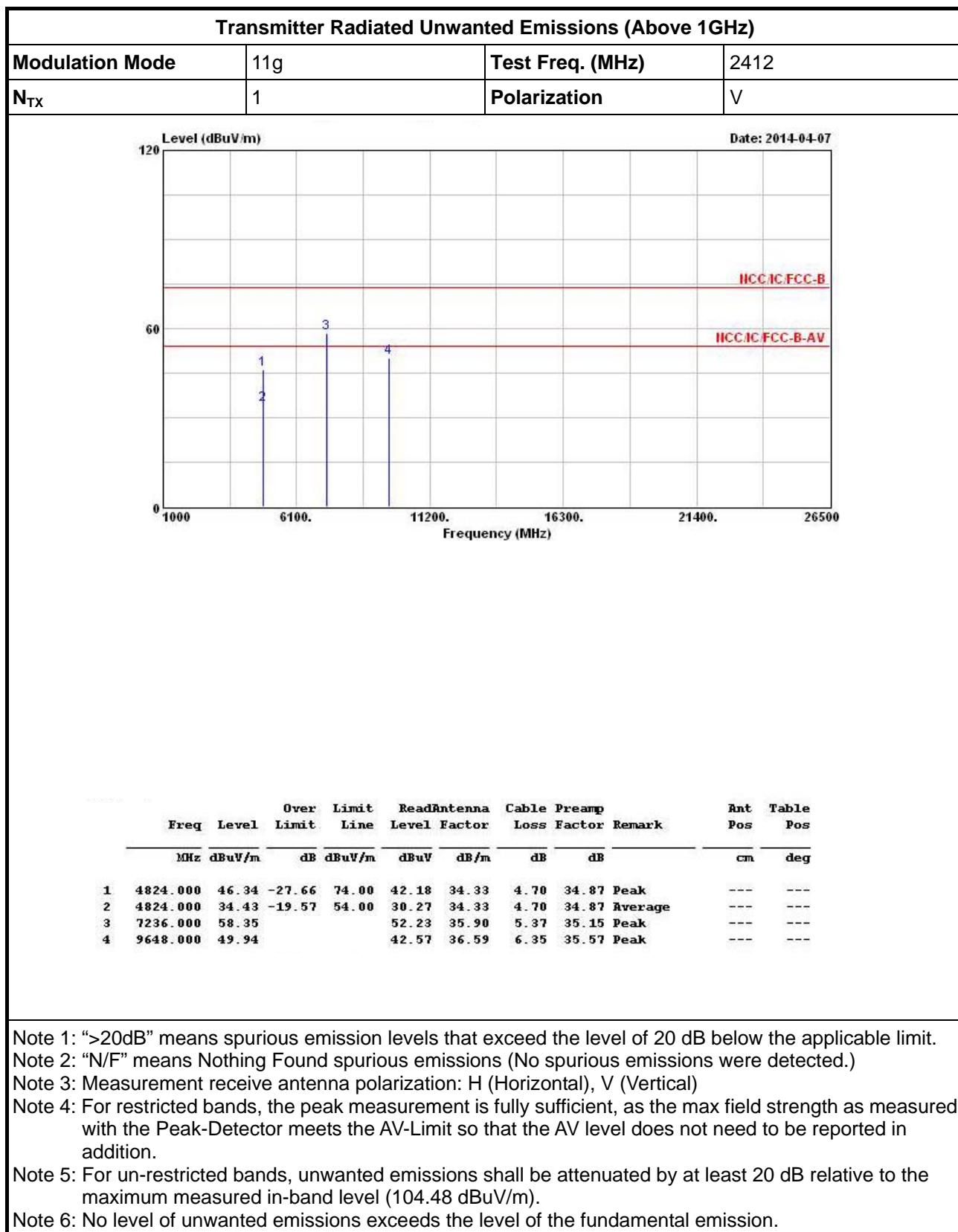


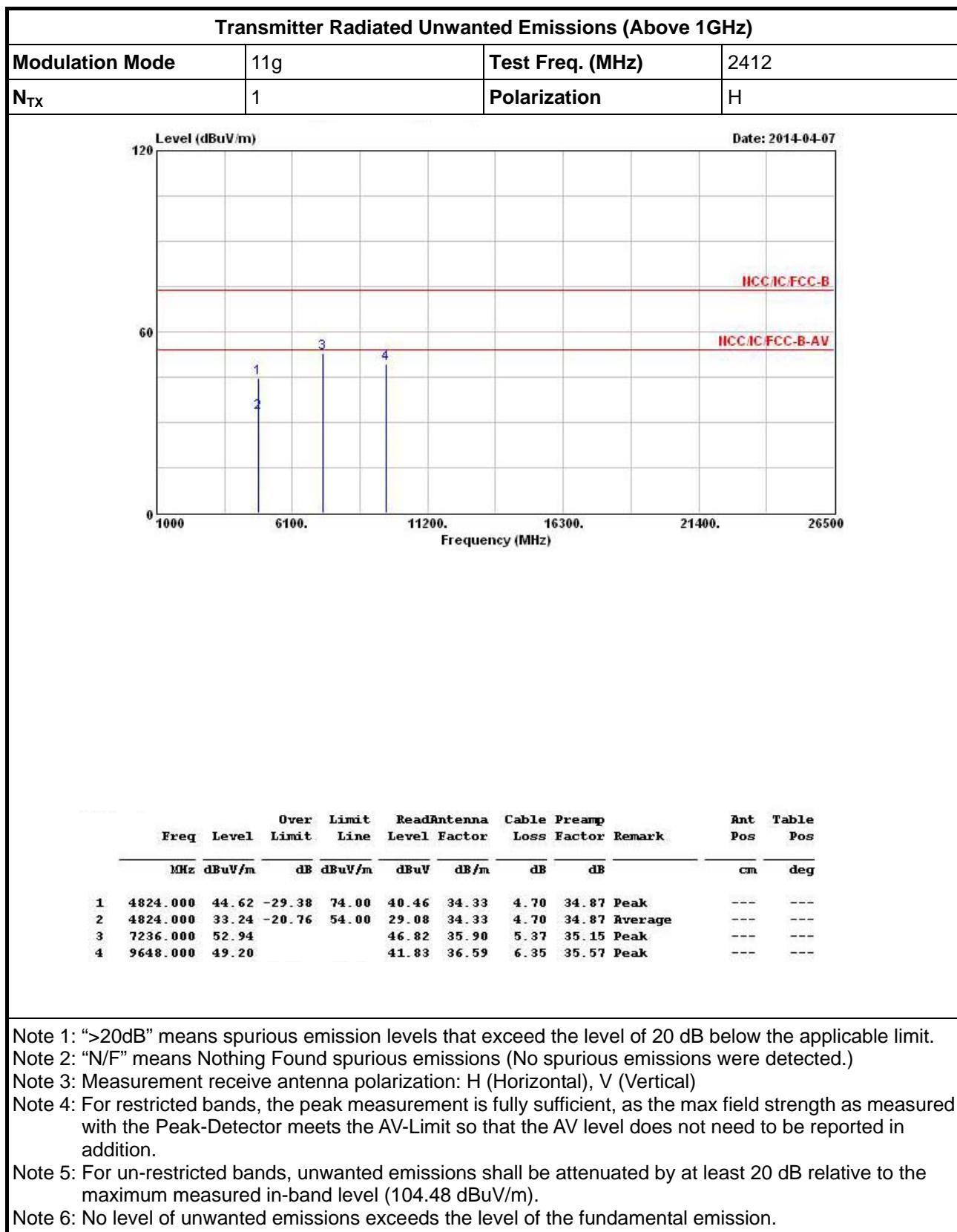


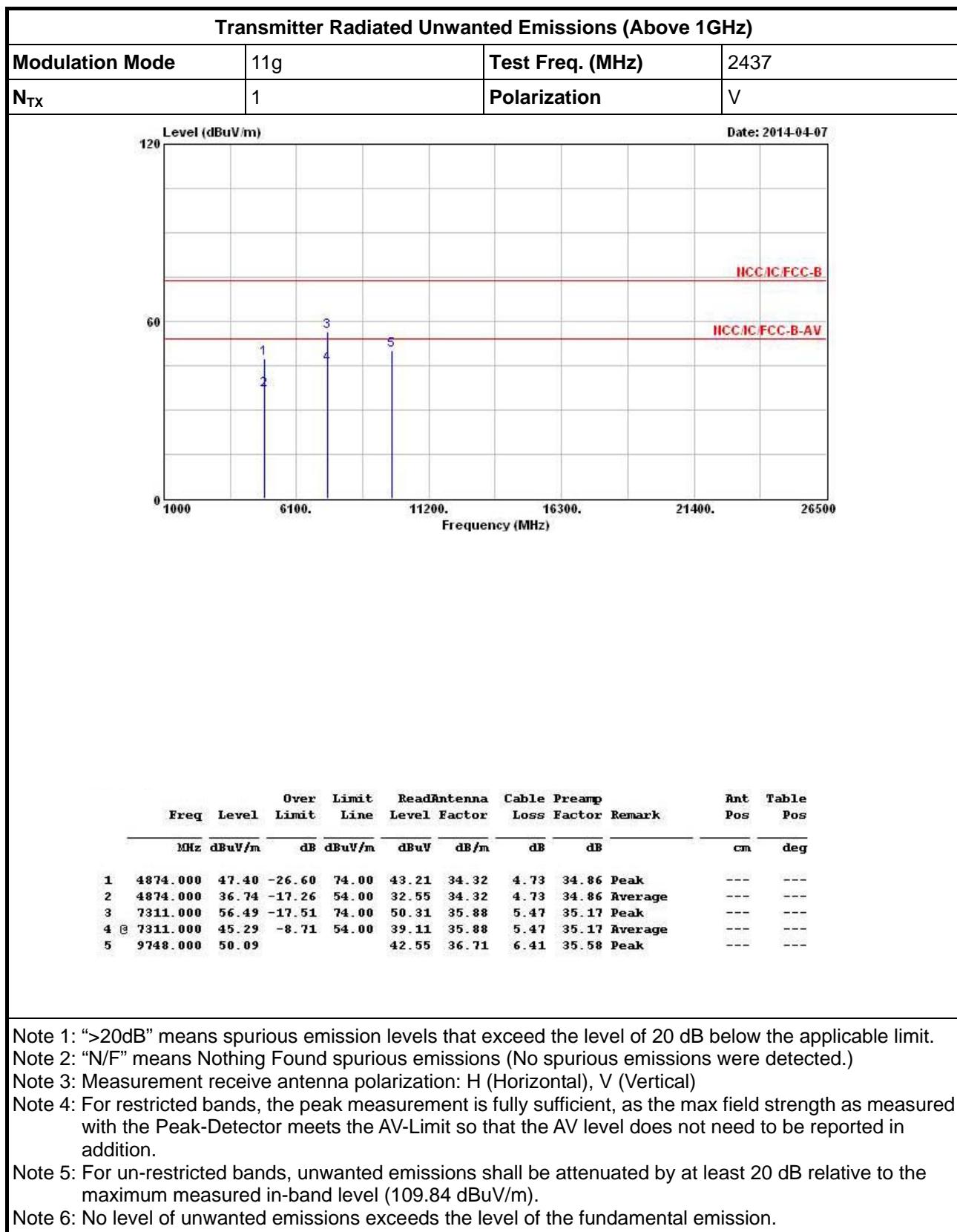


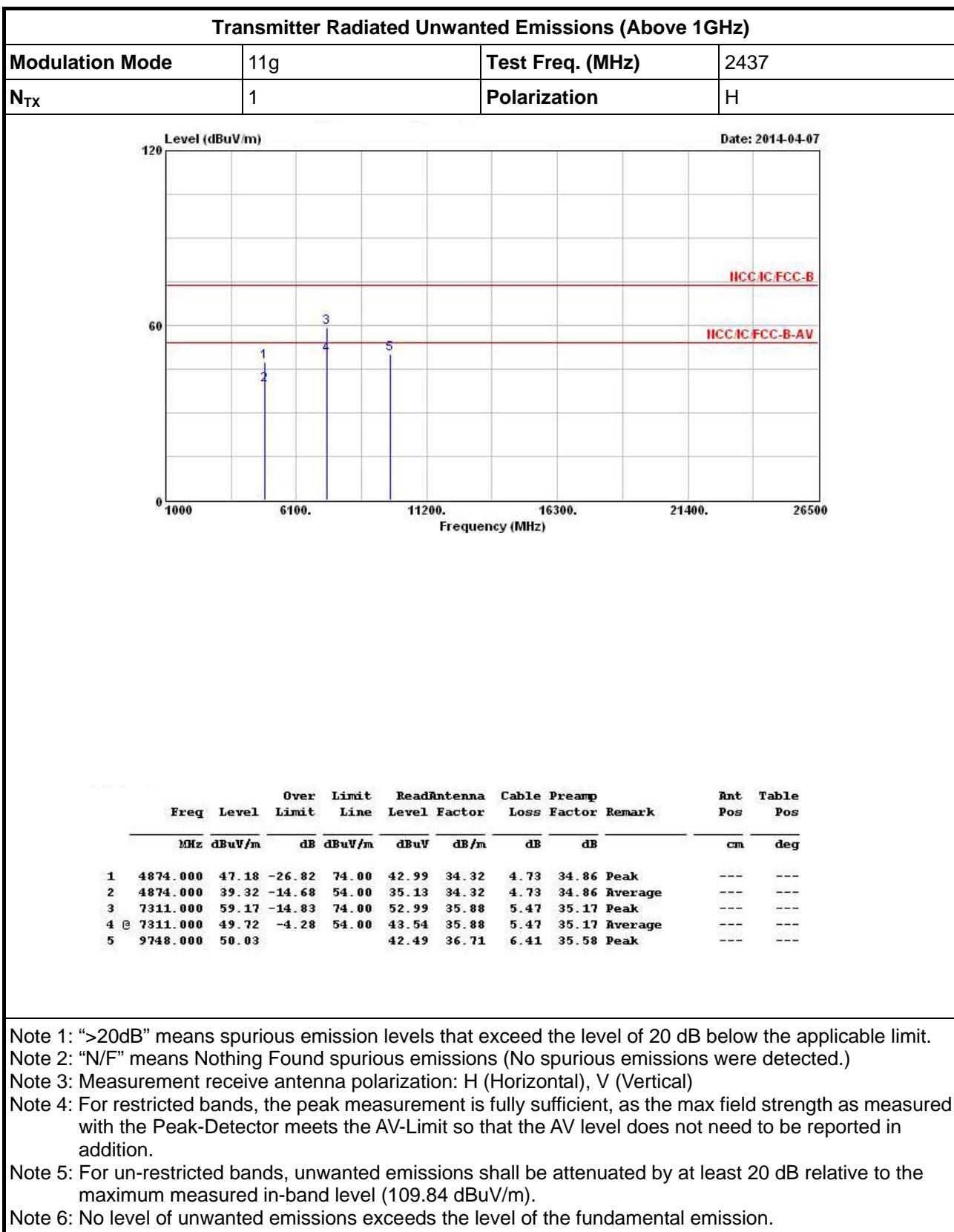


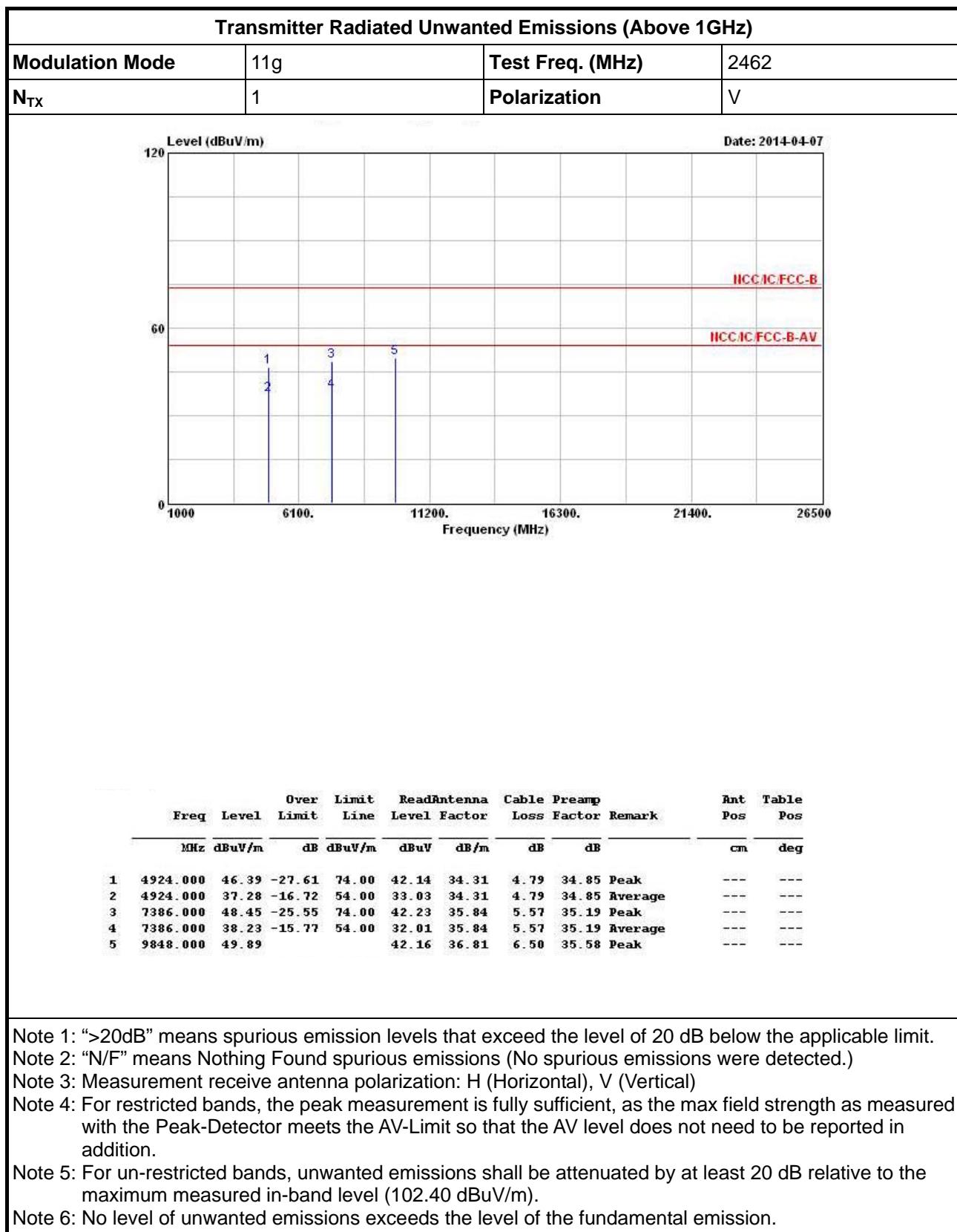


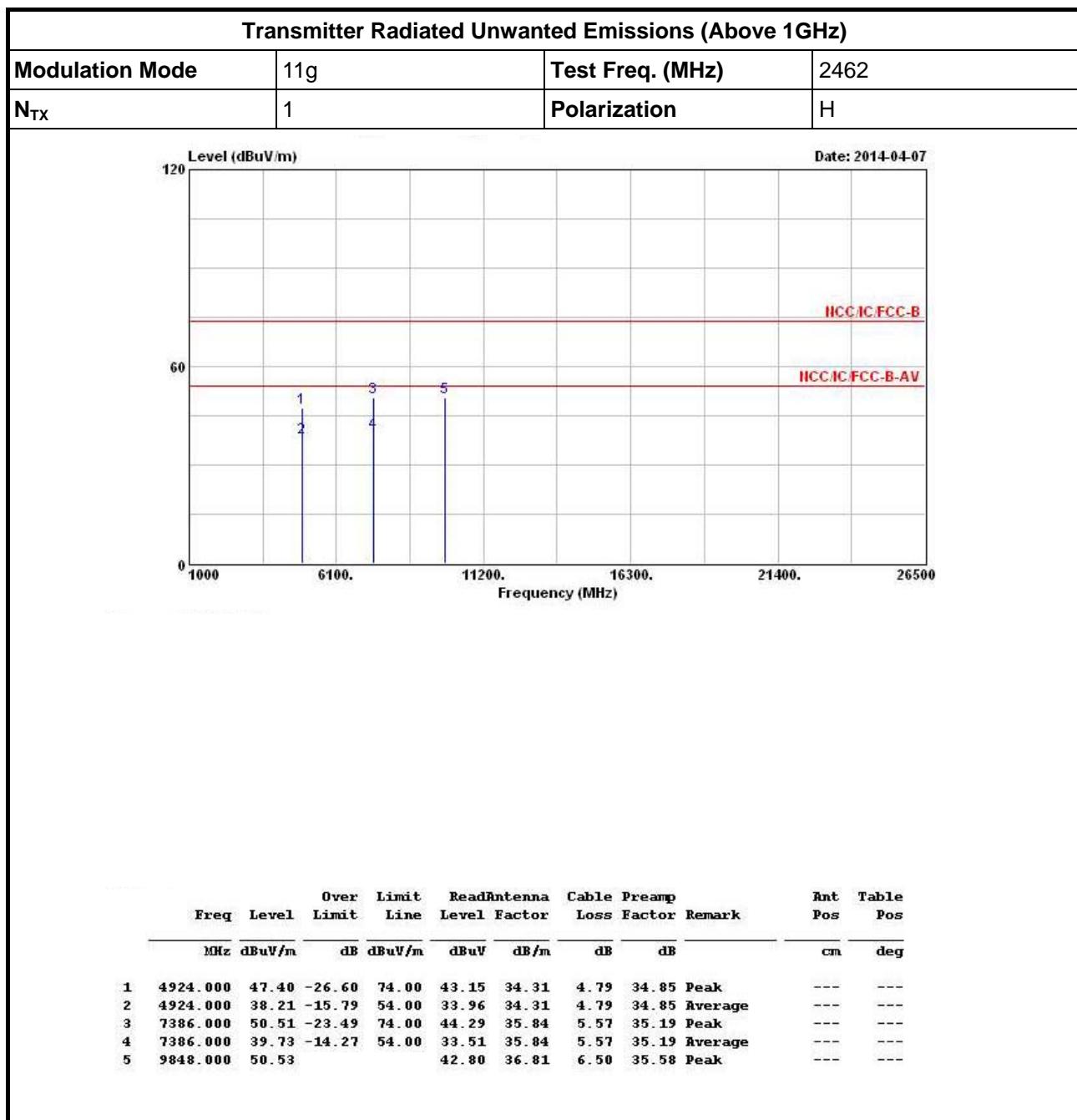












Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

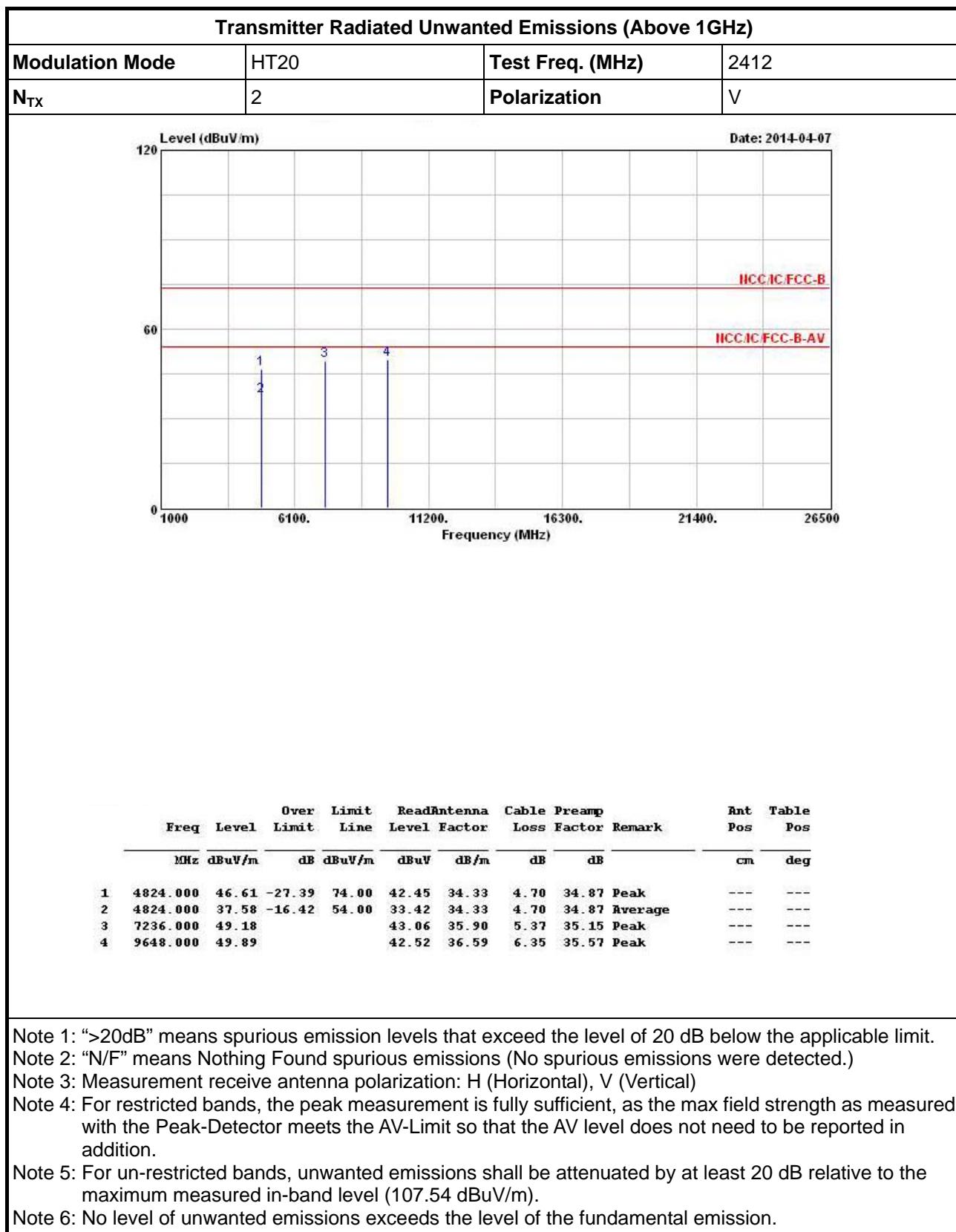
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

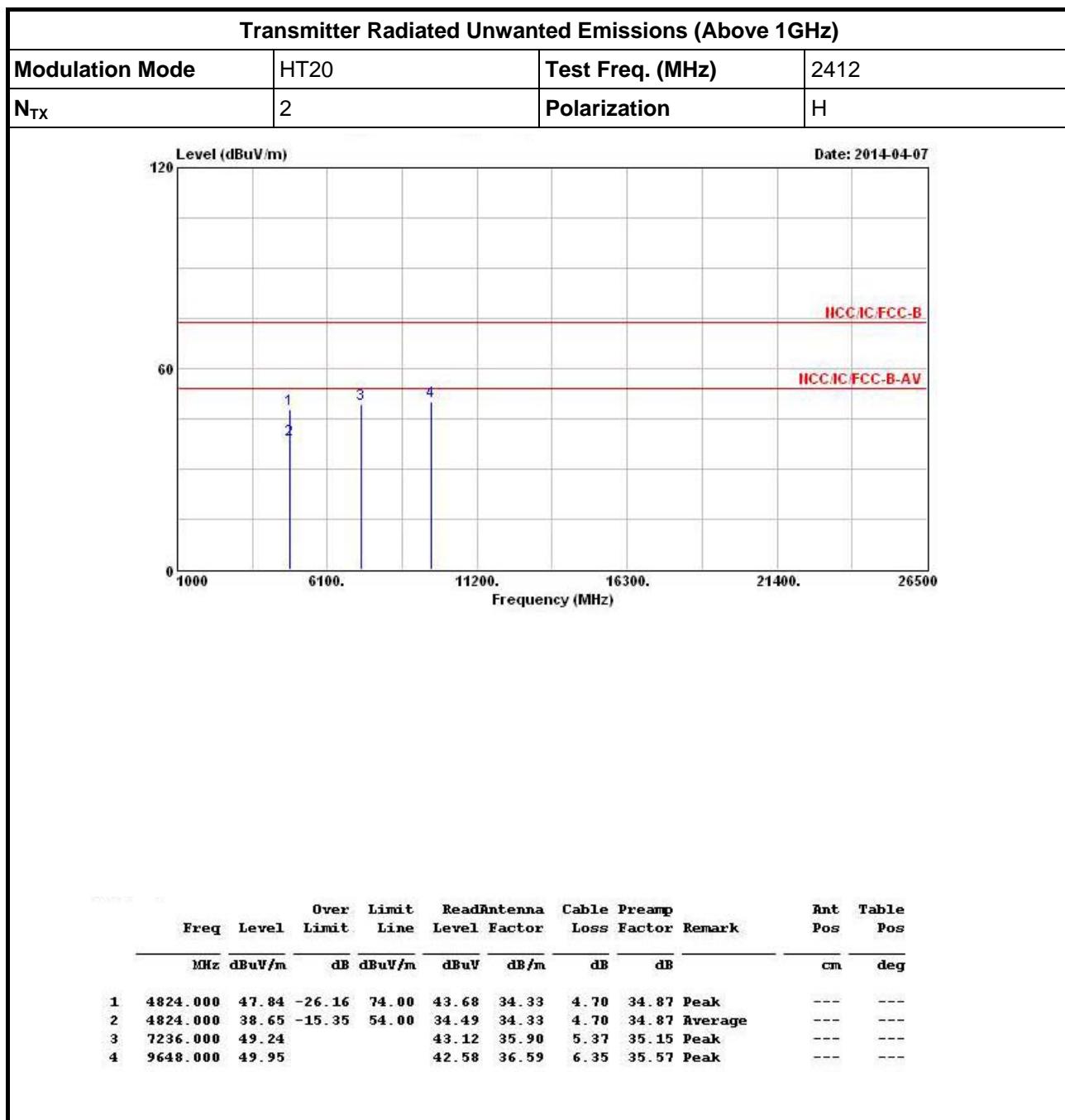
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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

Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (102.40 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.

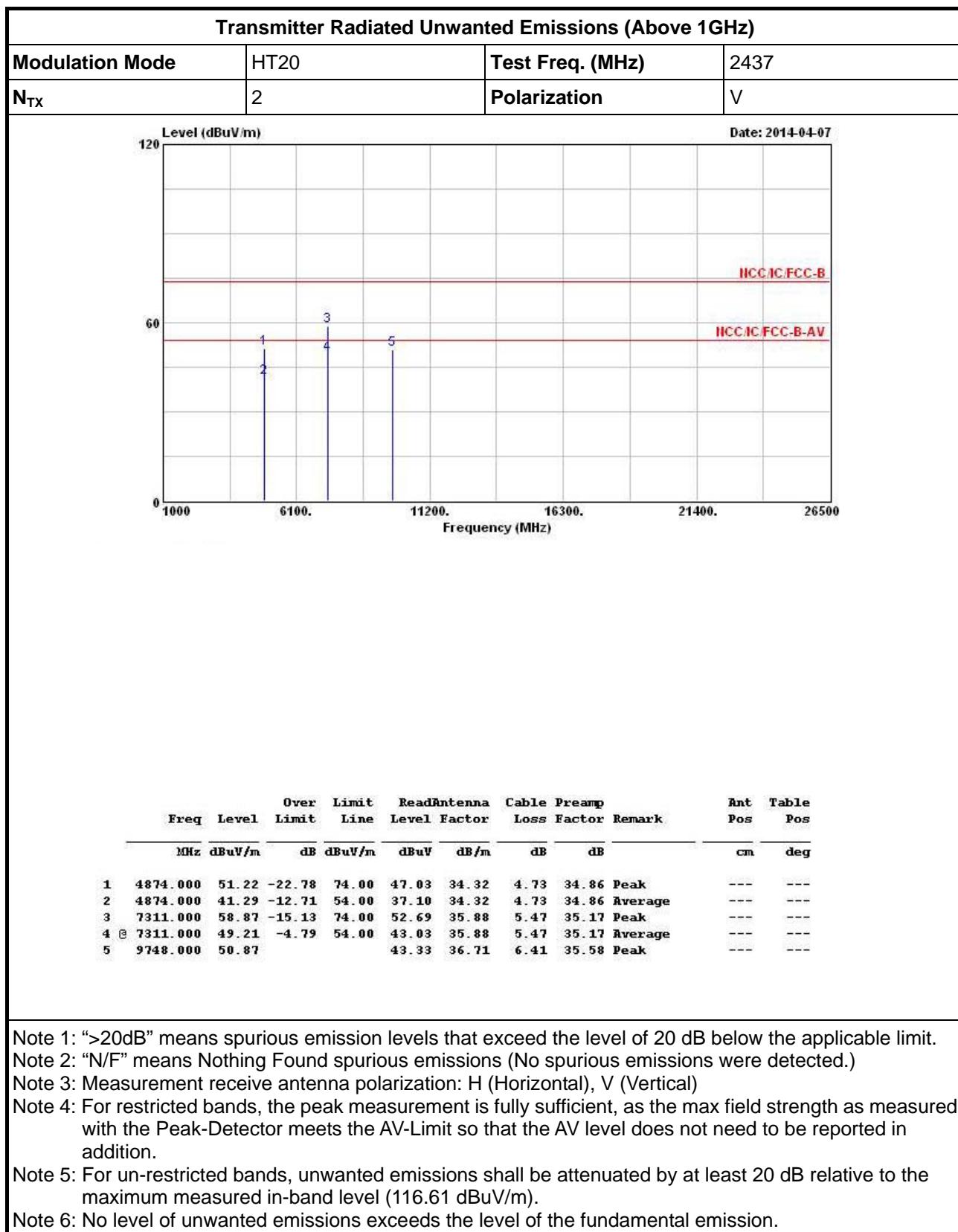
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

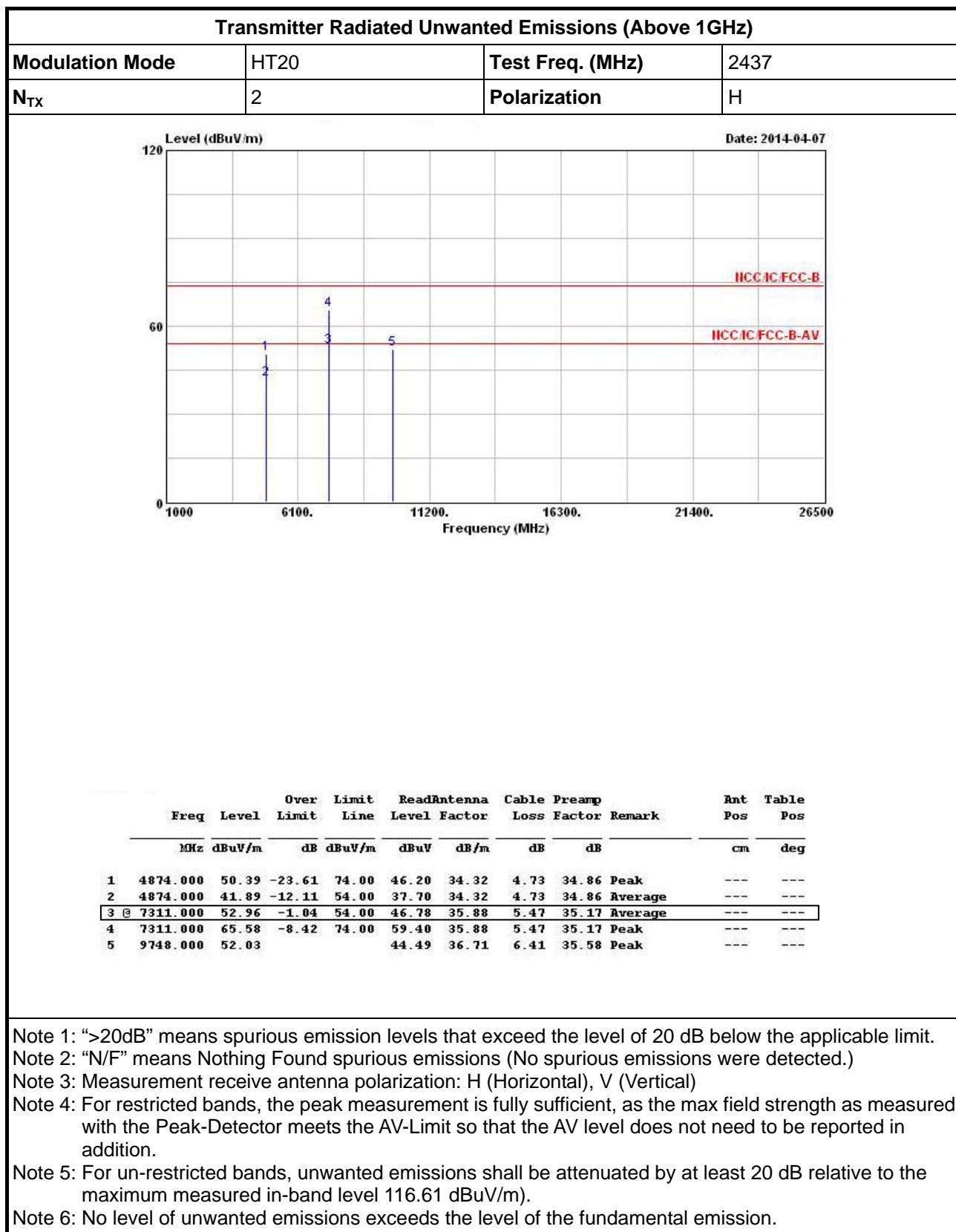
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

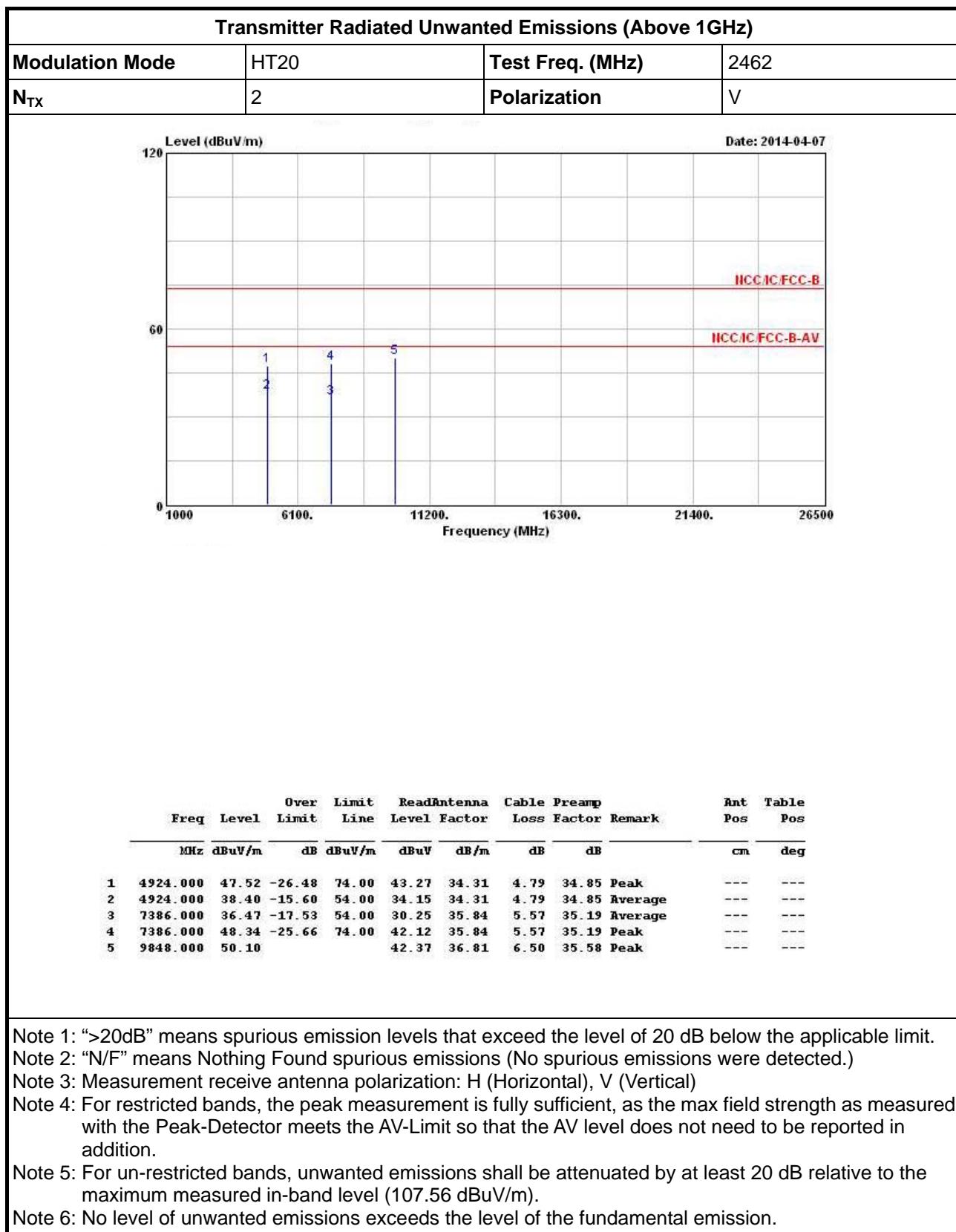
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

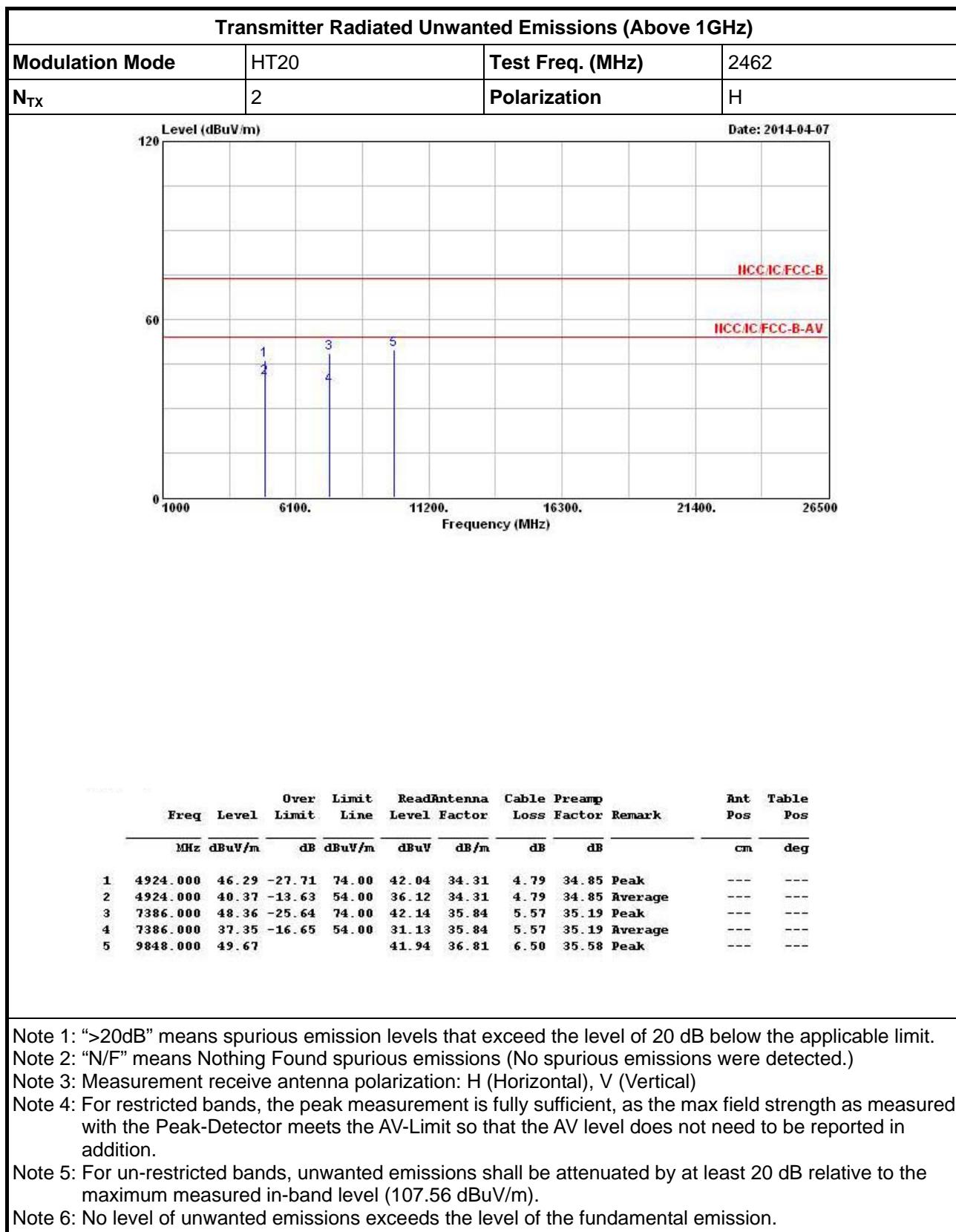
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (107.54 dB<sub>uV/m</sub>).

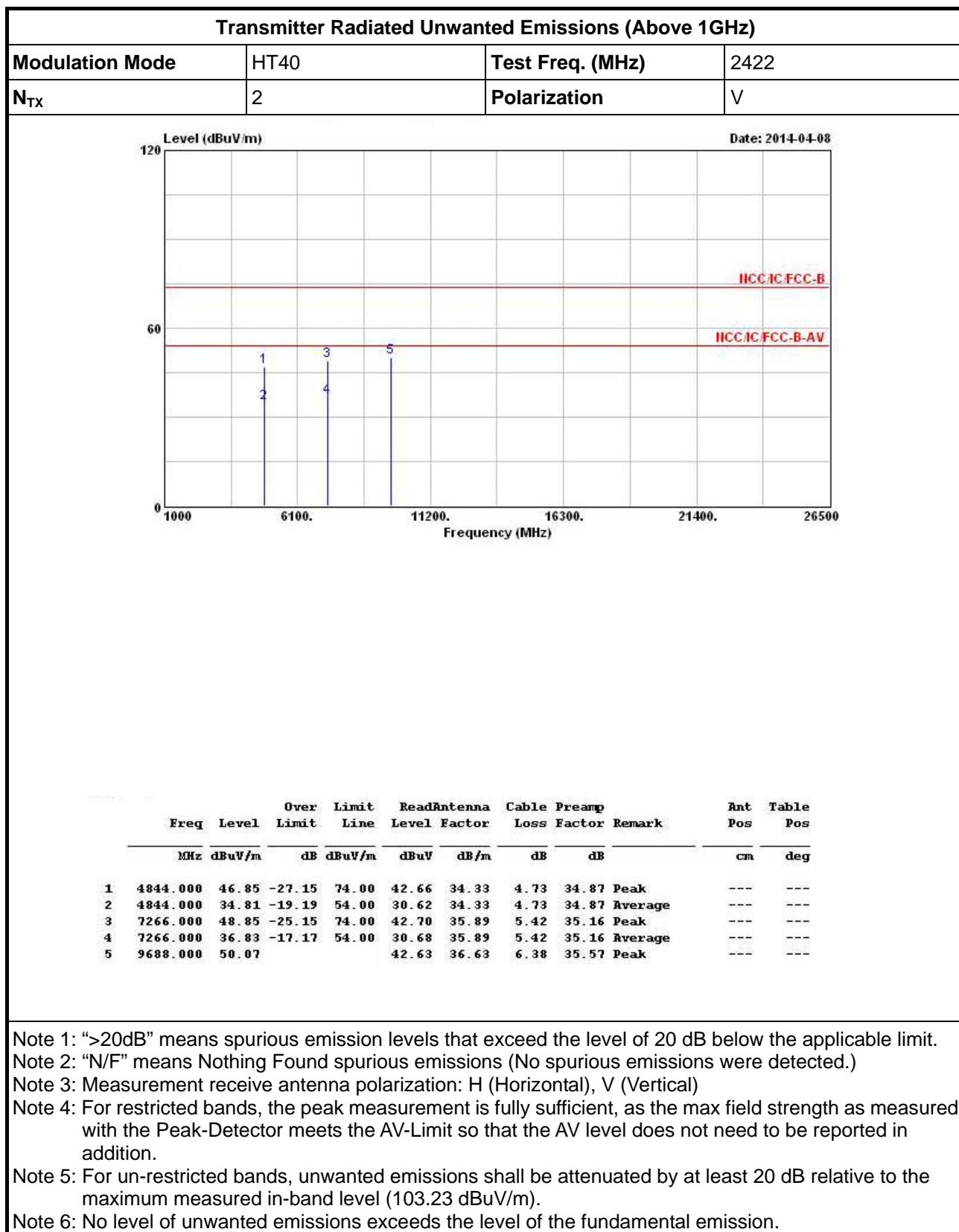
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.

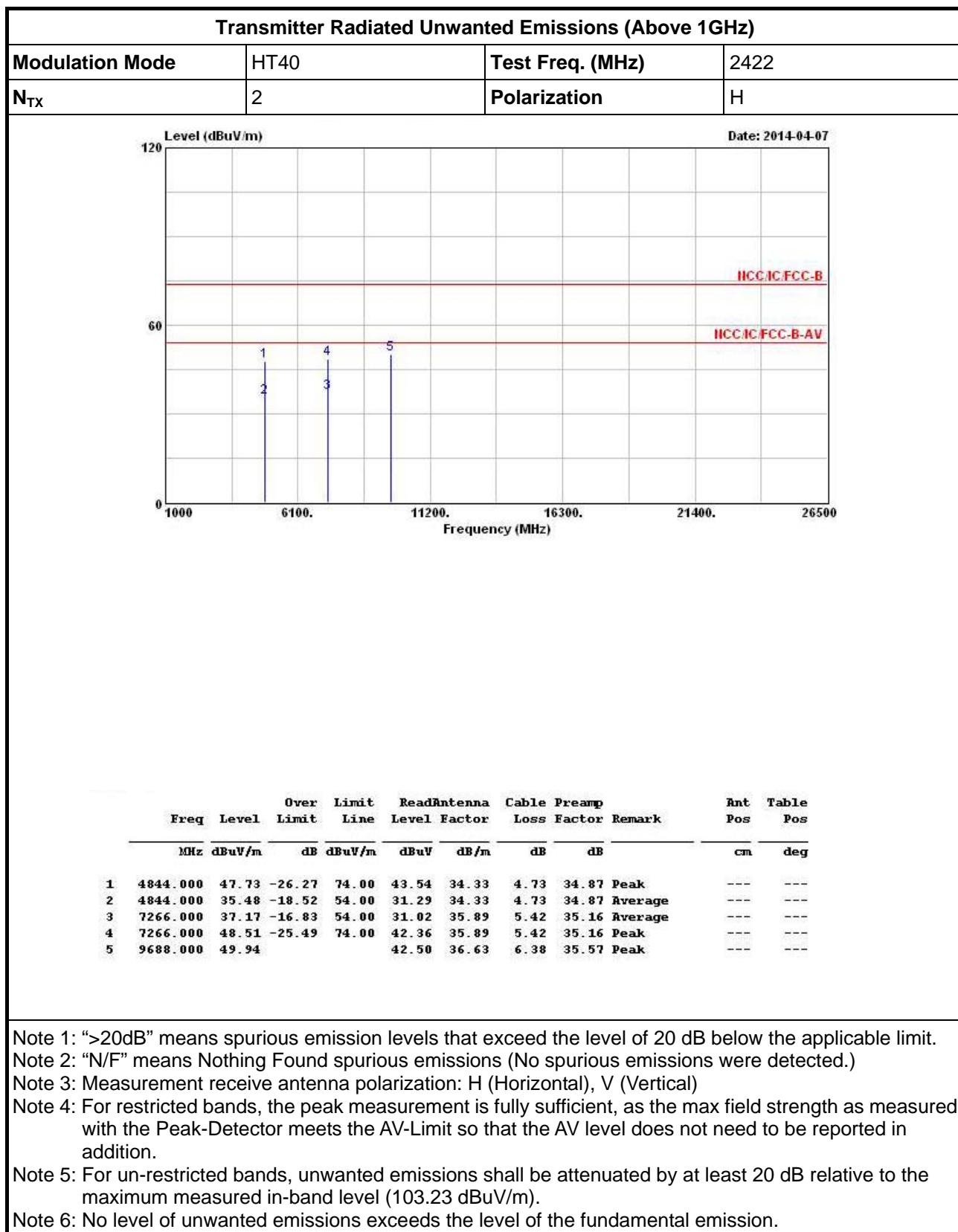


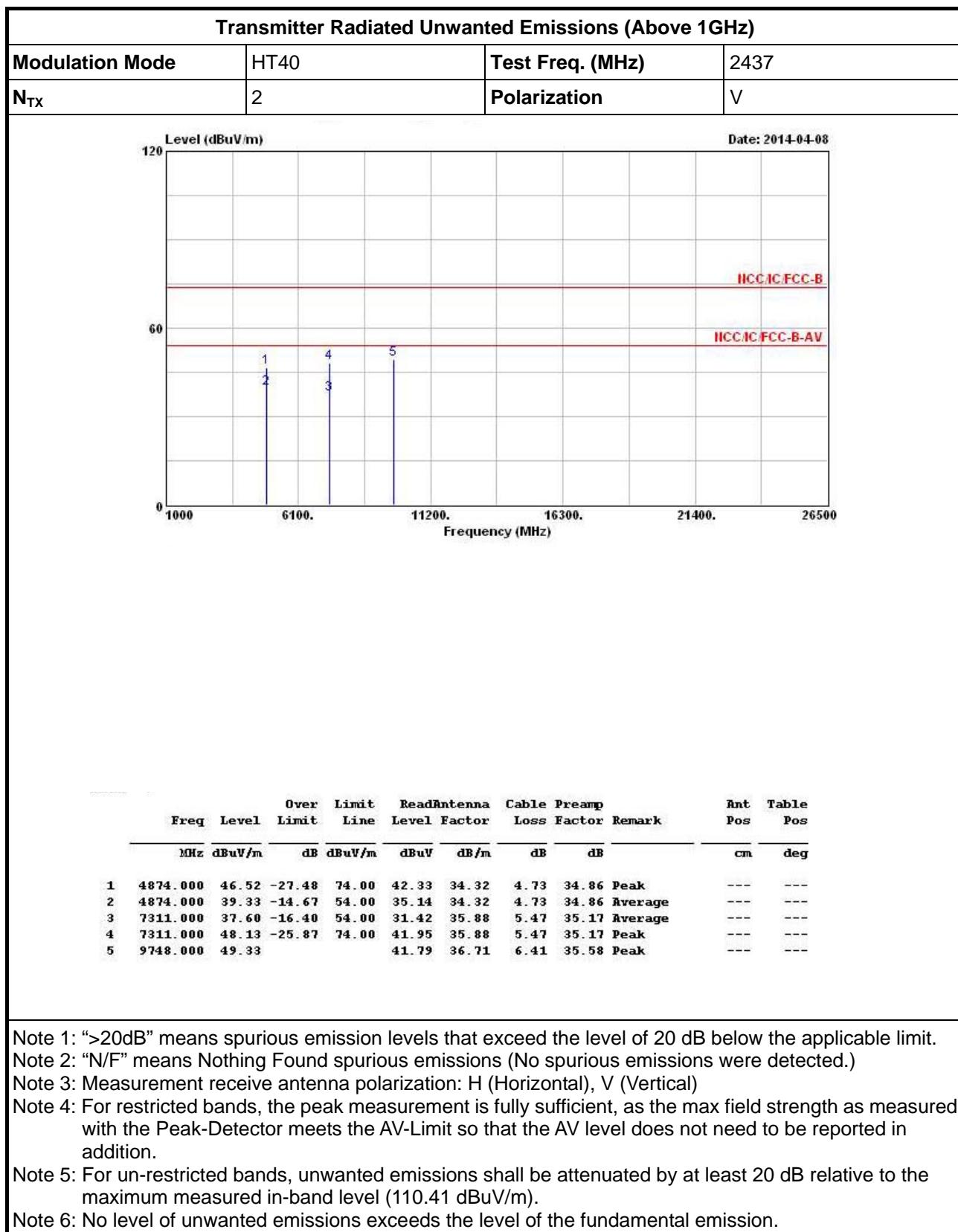


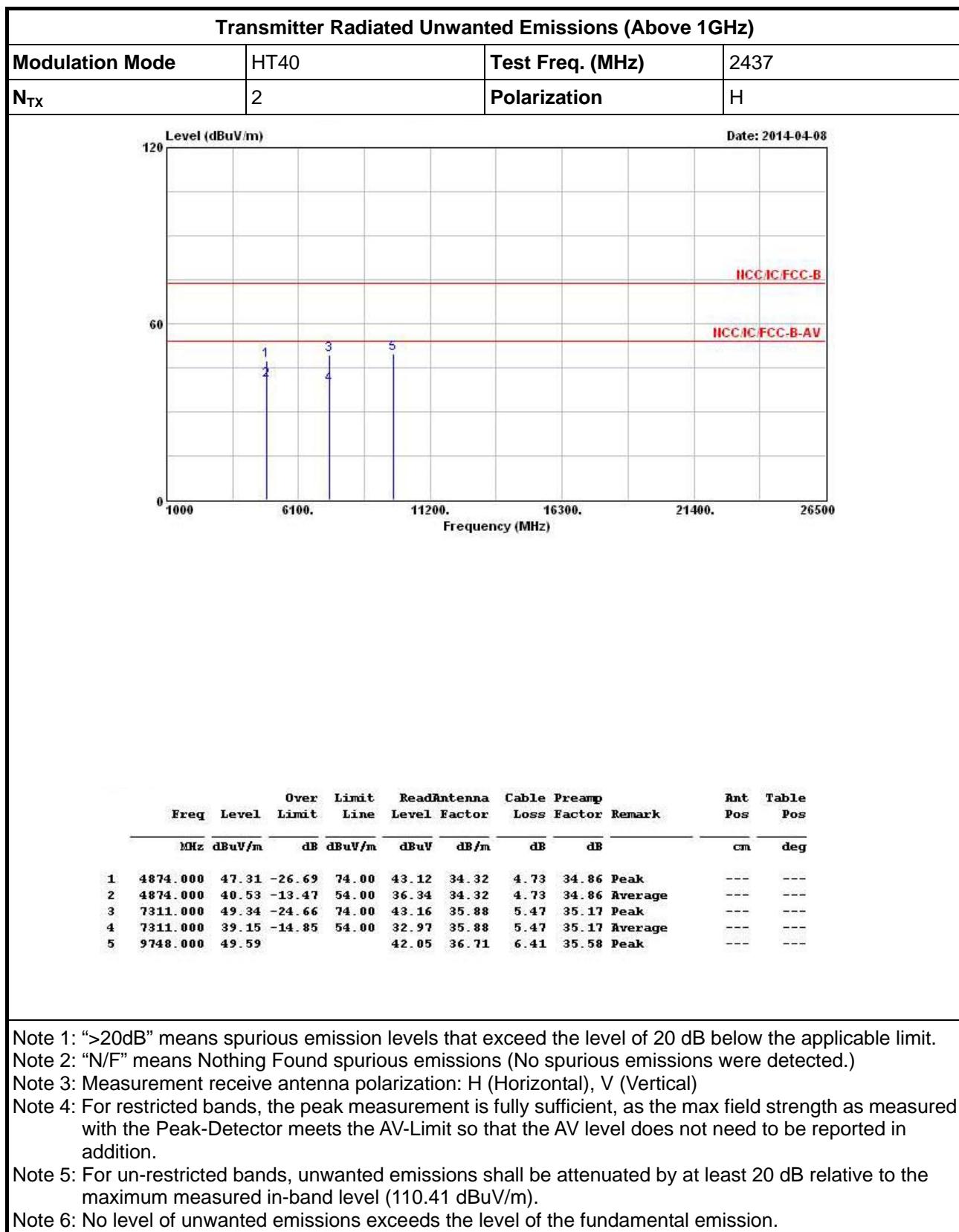


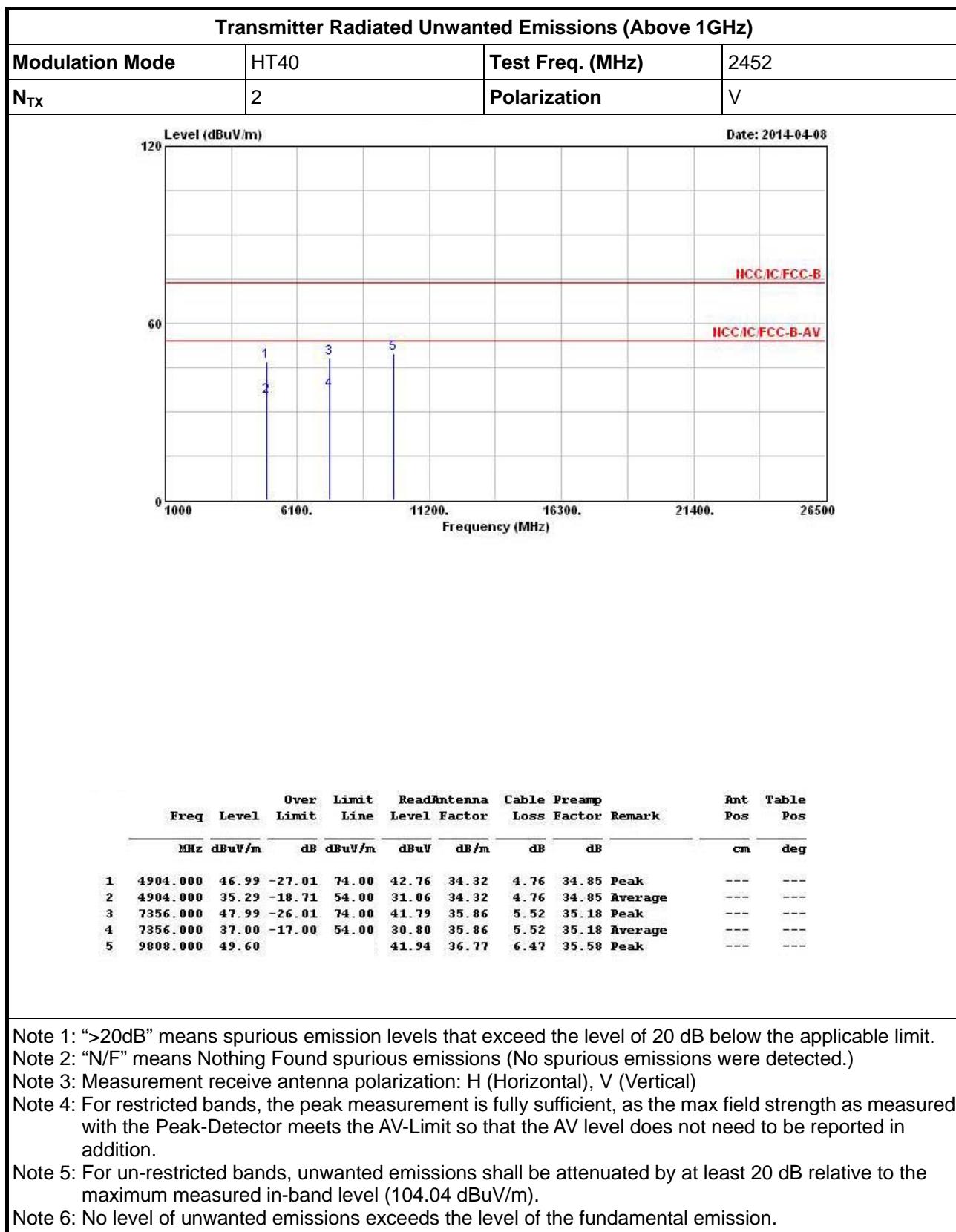


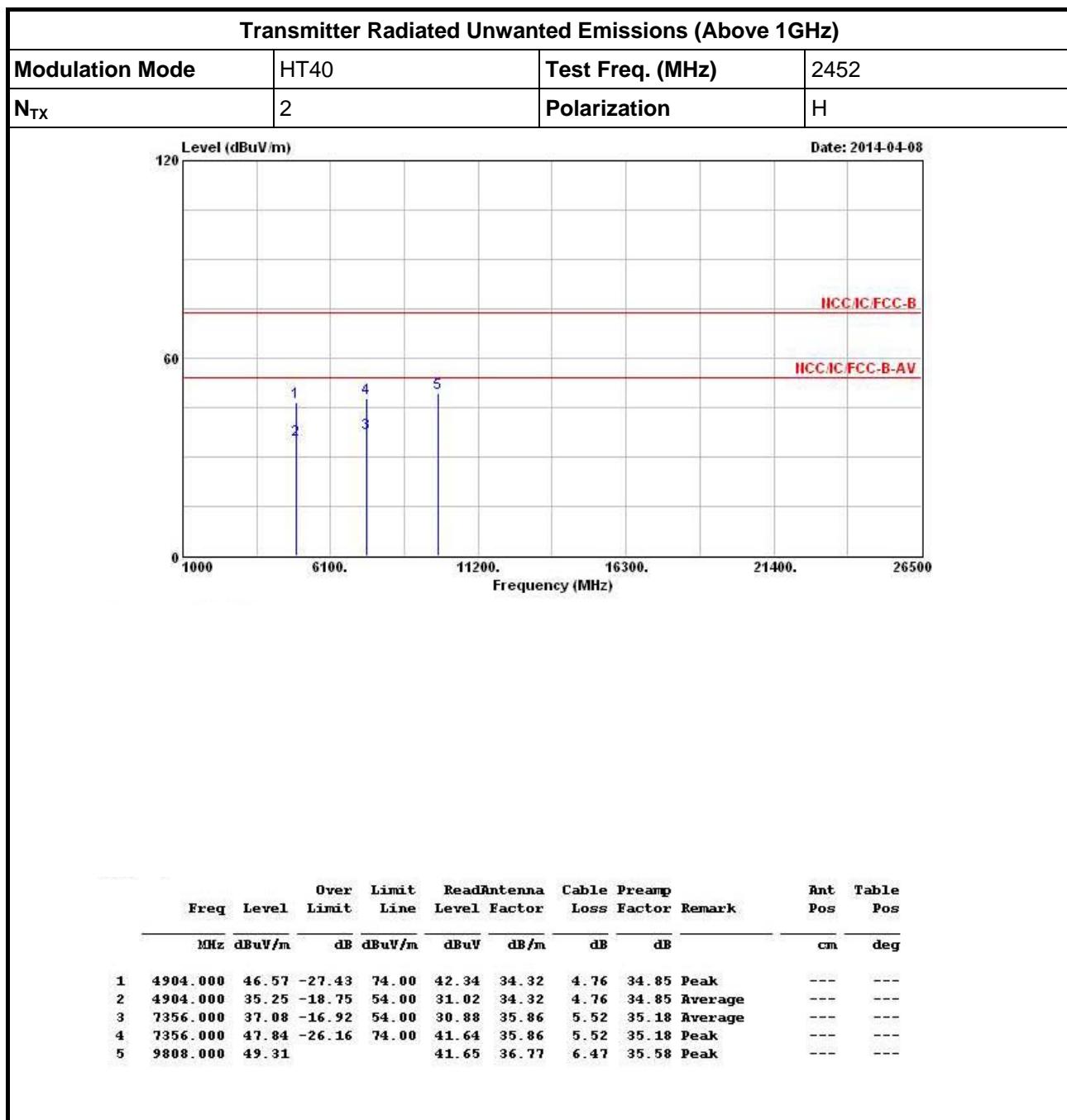












Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (104.04 dBuV/m).

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



## 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	Mar. 26, 2014	AC Conduction
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	Jan. 21, 2014	AC Conduction
RF Cable-CON	HUBER+SUHNER	RG213/U	7.61183201e+012	9kHz ~ 30MHz	Oct. 30, 2013	AC Conduction
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	AC Conduction

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101013	9KHz~40GHz	Jan. 25, 2014	RF Conducted
AC Power Source	G.W	APS-9102	EL920581	AC 0V ~ 300V	Jul. 16, 2013	RF Conducted
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20 ~ 100°C	Nov. 20, 2013	RF Conducted
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jun. 27, 2013	RF Conducted
RF Cable-2m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	30MHz ~ 26.5GHz	Dec. 02, 2013	RF Conducted

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



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100593	9kHz ~ 40GHz	Oct. 03, 2013	Radiated Emission
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	May 11, 2013	Radiated Emission
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	Jul. 18, 2013	Radiated Emission
Amplifier	Agilent	8449B	3008A02373	1GHz ~ 26.5GHz	Aug. 28, 2013	Radiated Emission
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz ~ 18GHz	Nov. 25, 2013	Radiated Emission
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz ~ 40GHz	Jan. 10, 2014	Radiated Emission
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 09, 2013	Radiated Emission
RF Cable-high	SUHNER	SUCOFLEX106	03CH02-HY	1GHz ~ 40GHz	Mar. 05, 2014	Radiated Emission
Bilog Antenna	SCHAFFNER	CBL61128	2723	30MHz ~ 2GHz	Oct. 10, 2013	Radiated Emission
Turn Table	Chaintek Instruments	3000	MF7802058	0~ 360 degree	N/A	Radiated Emission
Antenna Mast	MF	MF7802	MF780208205	1 ~ 4 m	N/A	Radiated Emission

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz - 30 MHz	Dec. 02, 2012	Radiated Emission

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