



FCC Test Report

Equipment : 11ac Dual Band Concurrent Wall-mount AP
Brand Name : EDIMAX
Model No. : EW-7679WAC / GAP-679WAC / WAP1750 / WAP1750H / WAP1750S / WAP1750L / WAP1750i
FCC ID : NDD9576791401
Standard : 47 CFR FCC Part 15.247
Operating Band : 5725 MHz – 5850 MHz
Equipment Class : DTS
Applicant Manufacturer : EDIMAX TECHNOLOGY CO., LTD.
No.3,Wu-Chuan 3rd Road,
Wu-Ku Industrial Park,
New Taipei City, Taiwan

The product sample received on Apr. 11, 2014 and completely tested on May 02, 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
1.1.3	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 0.4282480MHz 36.22 (Margin 11.07dB) - AV 47.77 (Margin 9.52dB) - QP	FCC 15.207	Complied
3.2	15.247(a)	Bandwidth	6dB Bandwidth [MHz] a/n(HT20):16.44 n(HT40):36.28 ac(VHT20):17.58 ac(VHT40):36.32 ac(VHT80): 73.60	≥500kHz	Complied
3.3	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm]:29.95	Power [dBm]:30	Complied
3.4	15.247(d)	Power Spectral Density	PSD [dBm/100kHz]: -4.27	PSD [dBm/MHz]:17 replace 8dBm/3kHz	Complied
3.5	15.247(c)	Transmitter Bandedge Emissions	Non-Restricted Bands: 5725.00MHz 25.09 dB	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied
3.6	15.247(c)	Transmitter Radiated Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 11490MHz 64.18 (Margin 9.82dB) - PK 52.93 (Margin 1.07dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied



Revision History



1 General Description

1.1 Information

This equipment contains two kinds of exterior features. For more detail and other information, please refer to user manual.

1.1.1 Multiple list

No.	Brand Name	Model Name
1	Edimax	EW-7679WAC,GAP-679WAC, WAP1750, WAP1750H, WAP1750S, WAP1750L,WAP1750i
2	Comtrend	WAP-5872u
3	Sophos	AP 100
4	4ipnet	EAP760,EAP767
5	SMAX	SWA1750H

1.1.2 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)	Co-location
5725-5850	a	5745-5825	149-165 [5]	1	29.95	Yes
5725-5850	n(HT20)	5745-5825	149-165 [5]	3	29.66	Yes
5725-5850	n(HT40)	5755-5795	151-159 [2]	3	29.91	Yes
5725-5850	ac(VHT20)	5745-5825	149-165 [5]	3	29.72	Yes
5725-5850	ac(VHT40)	5755-5795	151-159 [2]	3	29.79	Yes
5725-5850	ac(VHT80)	5775	155 [1]	3	29.78	Yes

Note 1: RF output power specifies that Maximum Peak Conducted Output Power.
Note 2: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
Note 3: 802.11ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.
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.)



1.1.3 Antenna Information

Antenna Category	
<input type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	<input type="checkbox"/> Temporary RF connector provided
<input type="checkbox"/>	<input type="checkbox"/> No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.
<input checked="" type="checkbox"/>	External antenna (dedicated antennas)
<input checked="" type="checkbox"/>	<input 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	Gain (dBi)
1	External	DIPOLE	2.58
Remark: 11a only include 1TX and Port1 for emission. IEEE 802.11 n/ac have the CDD function.			



1.1.4 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:	

1.1.5 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle		
Test Signal Duty Cycle (x)	N _{TX}	Power Duty Factor [dB] – (10 log 1/x)
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11a	1	0.00
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11n (HT20)	3	0.00
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11n (HT40)	3	0.00
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11ac (VHT20)	3	0.00
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11ac (VHT40)	3	0.00
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11ac (VHT80)	3	0.00

1.1.6 EUT Operational Condition

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



1.2 Accessories And Support Equipment

Accessories				
AC Adapter 1	Brand Name	APD	Model Name	WA30B12
	Power Rating	I/P: 100-240Vac 0.8A ; O/P: 12V---2.5A		
	Power cord	1.8m, non-shielded cable, w/o ferrite core		
AC Adapter 2	Brand Name	APD	Model Name	DA-48T12
	Power Rating	I/P: 100-240Vac 1.2A ; O/P: 12V---4A		
	Power Cord	AC: 1.4m, non-shielded cable, w/o ferrite core DC: 1.5m, non-shielded cable, with one ferrite core		

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

Support Equipment - AC Conduction and Radiated Emission				
Remote				
No.	Equipment	Brand Name	Model Name	FCC ID
1	PoE	Acelink	PI-1000PT	DoC

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 789033
- ◆ FCC KDB 644545 D01
- ◆ FCC KDB 644545 D02
- ◆ FCC KDB 662911

1.4 Testing Location Information

Testing Location				
Test Condition		Test Site No.	Test Engineer	Test Environment
AC Conduction		CO04-HY	Zeus	24.4°C / 53%
RF Conducted		TH06-HY	Wei	24.2°C / 63%
Radiated Emission		03CH03-HY	Leo	24.4°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 _{TX})	Data Rate / MCS	Worst Data Rate / MCS
11a,6-54Mbps	1	6-54Mbps	6 Mbps
HT20,M0-23	3	M0-23	MCS 0
HT40,M0-23	3	M0-23	MCS 0
VHT20,M0-8	3	M0-8	MCS 0
VHT40,M0-9	3	M0-9	MCS 0
VHT80,M0-9	3	M0-9	MCS 0

2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (5725-5850MHz band)							
Test Software	DOS						
Modulation Mode	N _{TX}	Test Frequency (MHz)					
		NCB: 20MHz		NCB: 40MHz		NCB: 80MHz	
		5745	5785	5825	5755	5795	5775
11a,6-54Mbps	1	29	29.5	30	-	-	-
HT20,M0-23	3	20.5	20	19	-	-	-
HT40,M0-23	3	-	-	-	21	21	-
VHT20,M0-8	3	20.5	19.5	18.5	-	-	-
VHT40,M0-9	3	-	-	-	21	21	-
VHT80,M0-9	3	-	-	-	-	-	21



2.3 The Worst Case Measurement Configuration

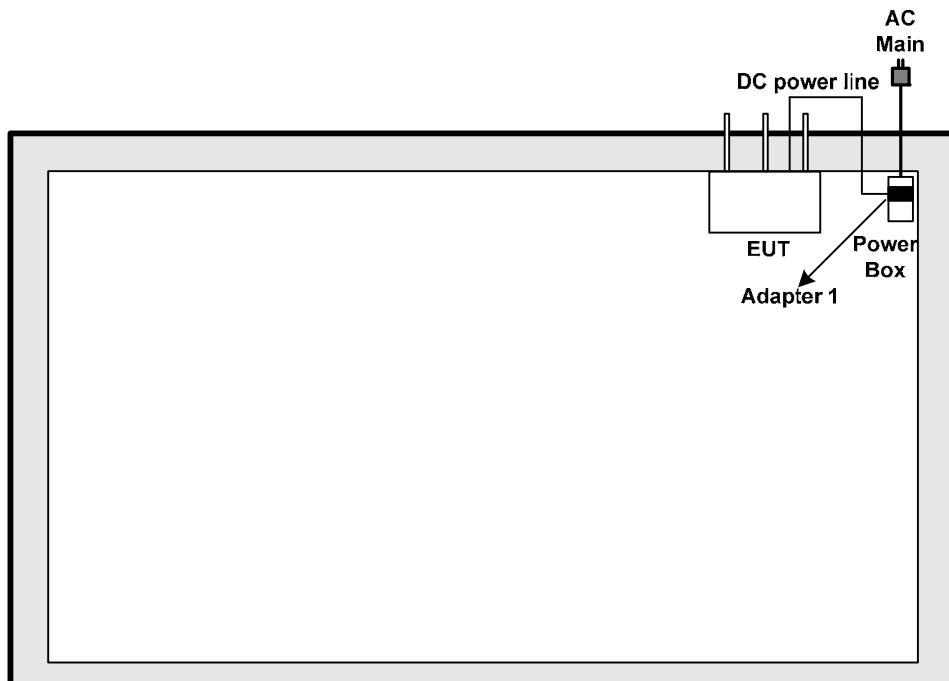
The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	EUT with adapter 1
2	EUT with adapter 2
3	EUT with PoE
	Operating mode 1 was the worst case and it was recorded in this test report.

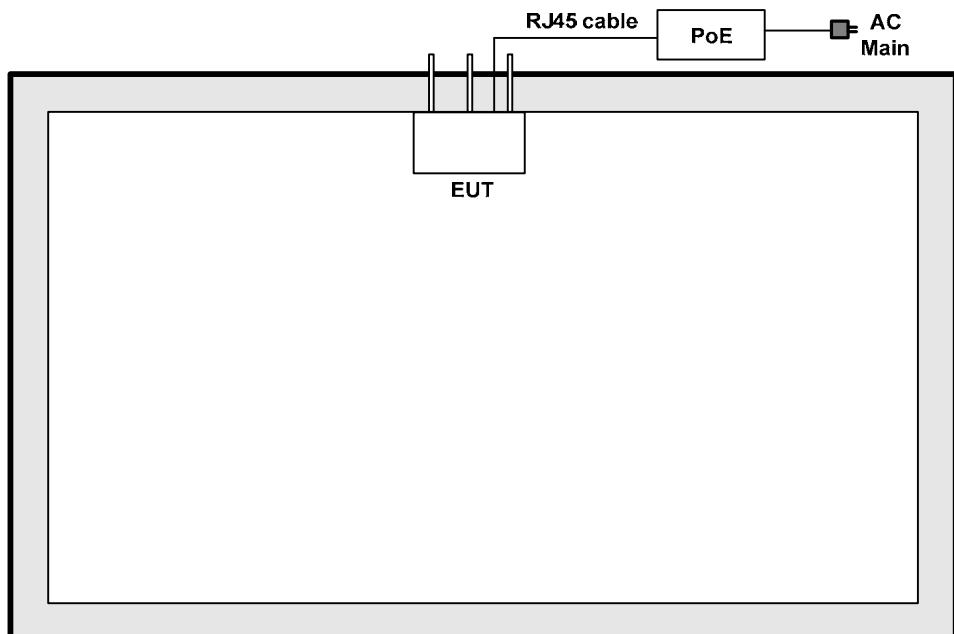
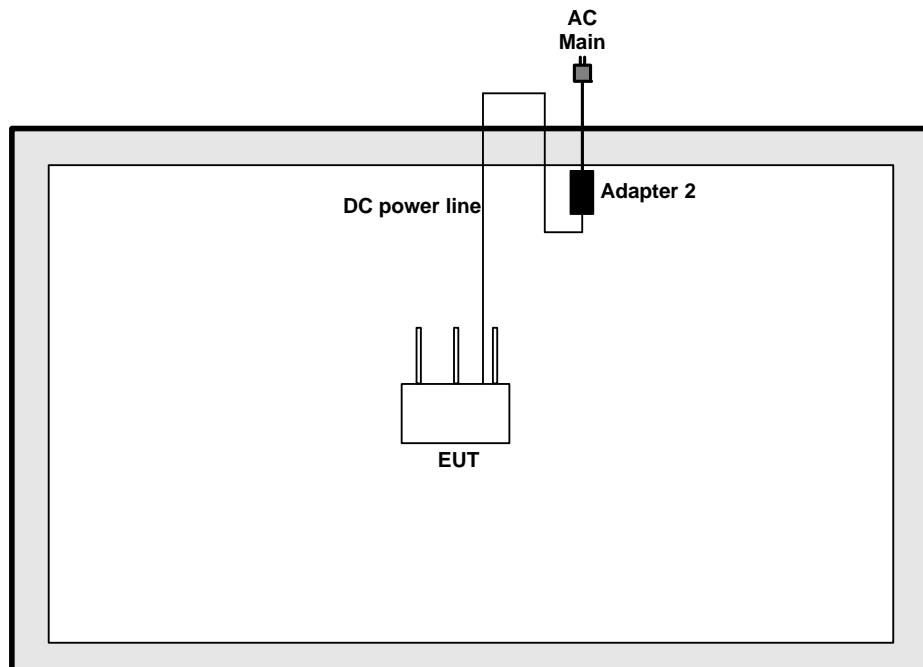
The Worst Case Mode for Following Conformance Tests	
Tests Item	RF Output Power, Power Spectral Density, 6 dB Bandwidth
Test Condition	Conducted measurement at transmit chains
Modulation Mode	11a, HT20, HT40, VHT20, VHT40, VHT80

The Worst Case Mode for Following Conformance Tests							
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions						
Test Condition	Radiated measurement						
User Position	<input type="checkbox"/> EUT will be placed in fixed position. <input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. EUT shall be performed 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 three orthogonal planes.						
Operating Mode < 1GHz	<input checked="" type="checkbox"/> 1. EUT with adapter 1 <input checked="" type="checkbox"/> 2. EUT with adapter 2 <input checked="" type="checkbox"/> 3. EUT with PoE Operating mode 3 was the worst case and it was recorded in this test report.						
Operating Mode > 1GHz	<input checked="" type="checkbox"/> 2. EUT with adapter 2						
Modulation Mode	11a, HT20, HT40, VHT20, VHT40, VHT80						
Orthogonal Planes of EUT	<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 (Mode 1)



Test Setup Diagram - Radiated Emission mode 3 (Below 1GHz)**Test Setup Diagram - Radiated Emission mode 2 (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.

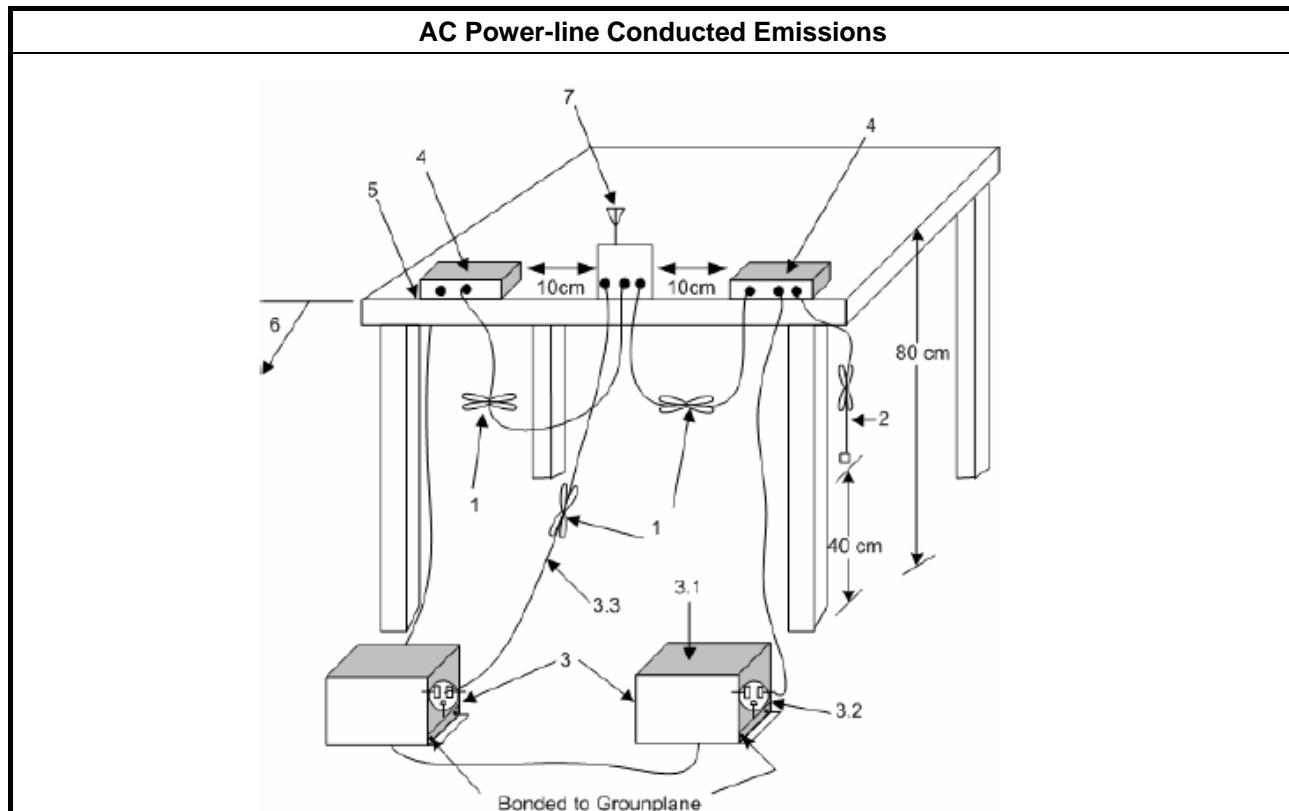
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

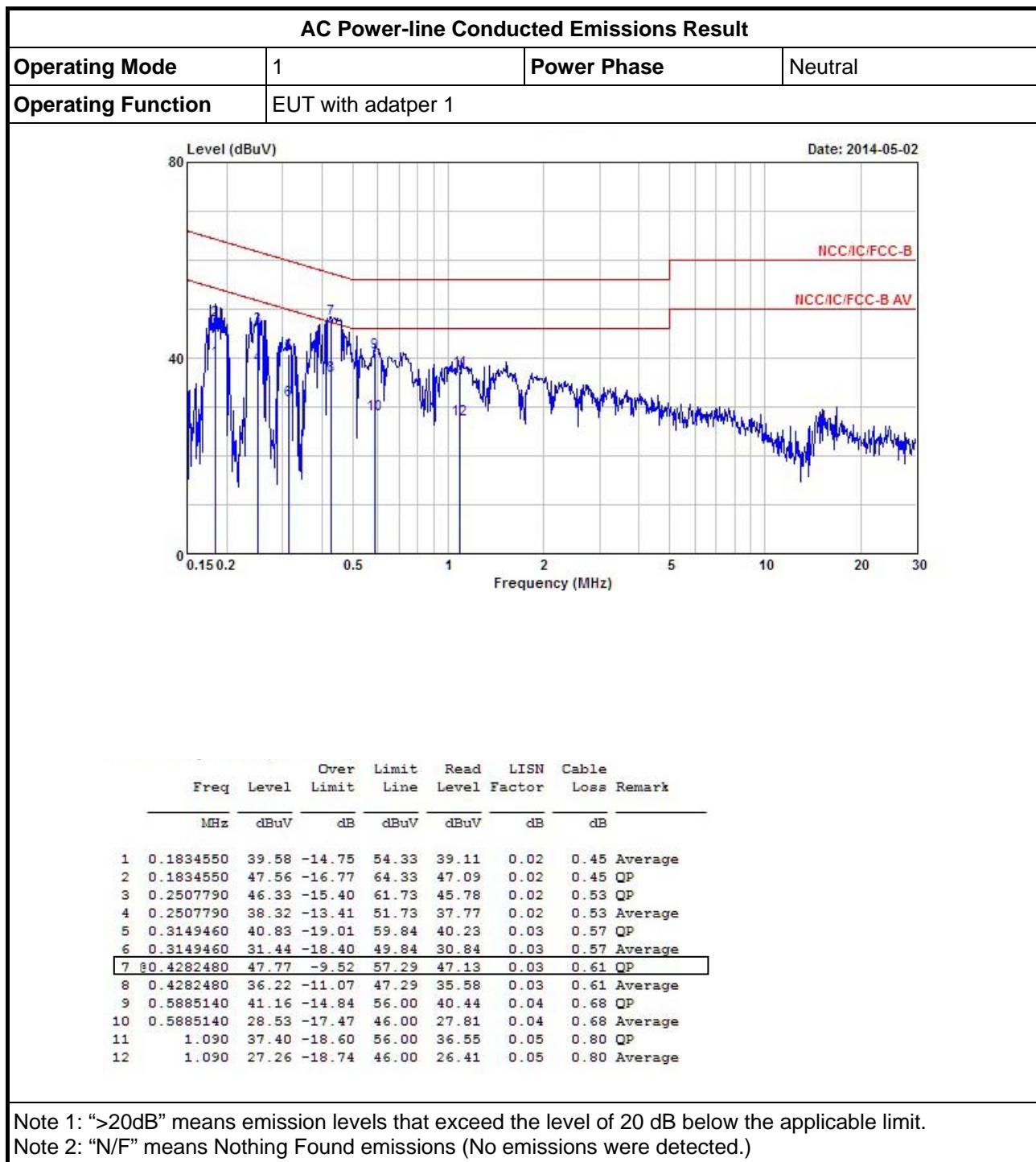
Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions.

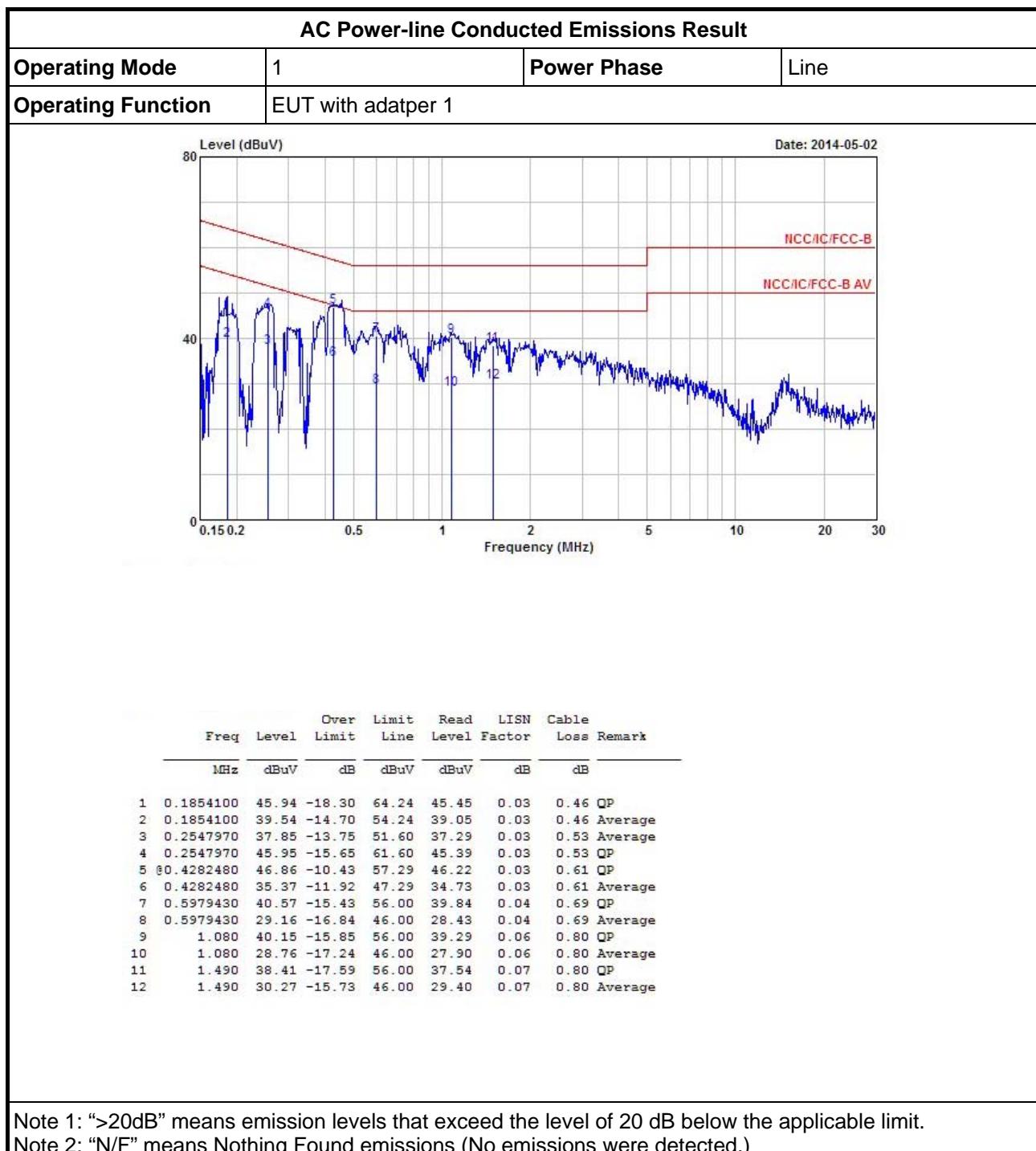
3.1.4 Test Setup





3.1.5 Test Result of AC Power-line Conducted Emissions





3.2 6dB Bandwidth

3.2.1 6dB Bandwidth Limit

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

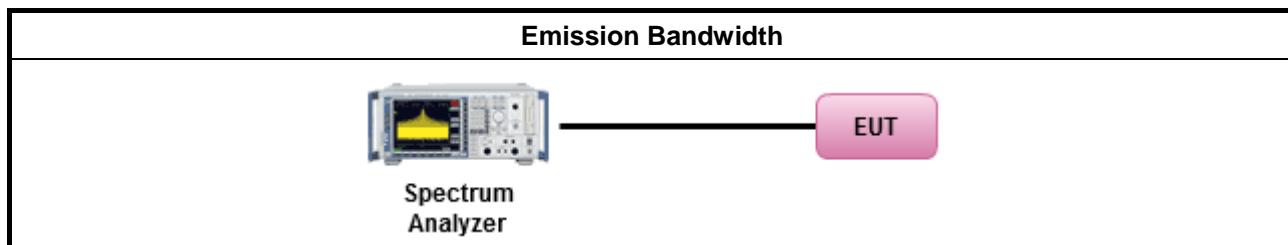
3.2.2 Measuring Instruments

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 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 performed on this transmit chain1.
<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.

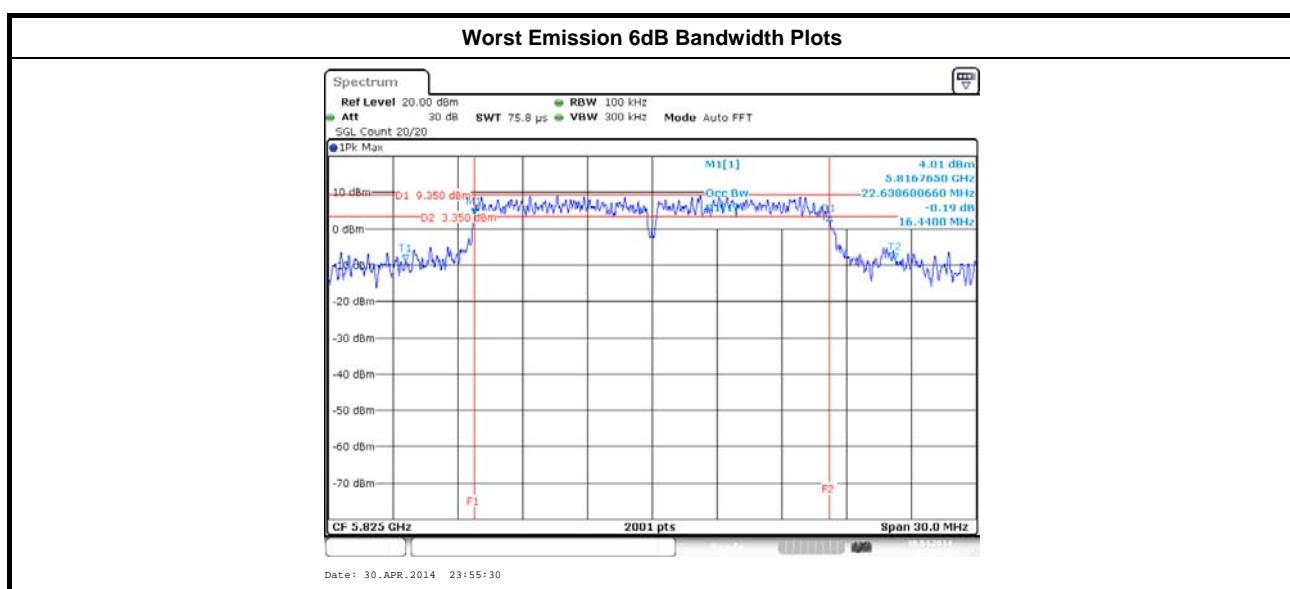
3.2.4 Test Setup





3.2.5 Test Result of Emission Bandwidth

Emission Bandwidth Result								
Condition			Emission Bandwidth (MHz)					
Modulation Mode	N _{TX}	Freq. (MHz)	99% Bandwidth			6dB Bandwidth		
			Chain Port 1	Chain Port 2	Chain Port 3	Chain Port 1	Chain Port 2	Chain Port 3
11a	1	5745	20.73	-	-	16.47	-	-
11a	1	5785	20.41	-	-	16.48	-	-
11a	1	5825	22.63	-	-	16.44	-	-
HT20	3	5745	17.63	17.61	17.69	17.67	17.67	17.70
HT20	3	5785	17.66	17.67	17.61	17.76	17.79	17.70
HT20	3	5825	17.66	17.66	17.64	17.74	17.67	17.71
HT40	3	5755	36.22	36.10	36.18	36.28	36.36	36.36
HT40	3	5795	36.18	36.18	36.22	36.44	36.36	36.40
VHT20	3	5745	17.63	17.64	17.66	17.68	17.58	17.65
VHT20	3	5785	17.64	17.61	17.67	17.70	17.65	17.73
VHT20	3	5825	17.73	17.61	17.63	17.77	17.62	17.70
VHT40	3	5755	36.22	36.18	36.22	36.52	36.32	36.44
VHT40	3	5795	36.22	36.18	36.18	36.48	36.36	36.36
VHT80	3	5775	75.40	75.32	75.40	73.60	75.76	76.00
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"/> 5725-5850 MHz Band:	
<input checked="" type="checkbox"/> If $G_{TX} \leq 6 \text{ dBi}$, then $P_{Out} \leq 30 \text{ dBm}$ (1 W)	
<input checked="" type="checkbox"/> Point-to-multipoint systems (P2M): If $G_{TX} > 6 \text{ dBi}$, then $P_{Out} = 30 - (G_{TX} - 6) \text{ dBm}$	
<input type="checkbox"/> Point-to-point systems (P2P): If $G_{TX} > 6 \text{ dBi}$, then $P_{Out} = 30 \text{ dBm}$	
e.i.r.p. Power Limit:	
<input checked="" type="checkbox"/> 5725-5850 MHz Band	
<input checked="" type="checkbox"/> Point-to-multipoint systems (P2M): $P_{eirp} \leq 36 \text{ dBm}$ (4 W)	
<input type="checkbox"/> Point-to-point systems (P2P): N/A	
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.	

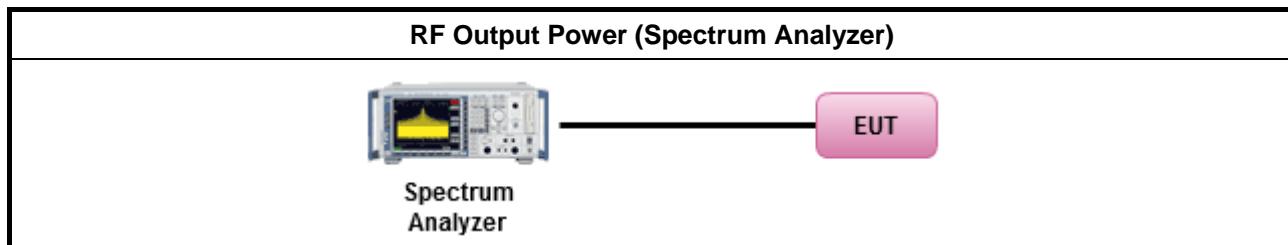
3.3.2 Measuring Instruments

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 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 performed on this transmit chain1. <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 Test Result of Maximum Peak Conducted Output Power

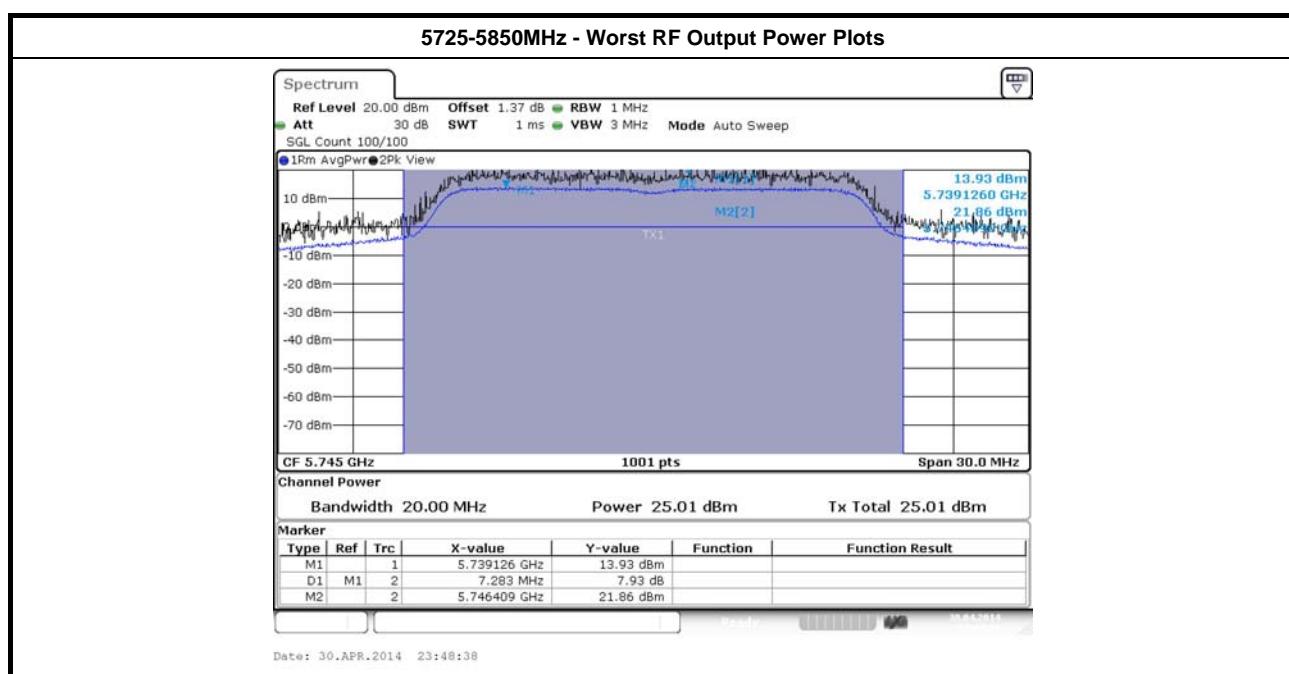
Maximum Peak Conducted Output Power Result										
Condition			RF Output Power (dBm)							
Modulation Mode	N _{TX}	Freq. (MHz)	RF Output Power (dBm)				Power Limit	Ant. gain (dBi)	EIRP Power	EIRP Limit
			Chain Port 1	Chain Port 2	Chain Port 3	Sum Chain				
11a	1	5745	29.95	-	-	29.95	30.00	2.58	32.53	36.00
11a	1	5785	29.92	-	-	29.92	30.00	2.58	32.50	36.00
11a	1	5825	29.86	-	-	29.86	30.00	2.58	32.44	36.00
HT20	3	5745	22.69	26.87	24.02	29.66	30.00	2.58	32.24	36.00
HT20	3	5785	22.27	25.61	24.55	29.13	30.00	2.58	31.71	36.00
HT20	3	5825	22.32	24.93	22.74	28.26	30.00	2.58	30.84	36.00
HT40	3	5755	23.32	26.86	24.47	29.91	30.00	2.58	32.49	36.00
HT40	3	5795	23.60	26.41	24.82	29.87	30.00	2.58	32.45	36.00
VHT20	3	5745	22.73	26.99	23.98	29.72	30.00	2.58	32.30	36.00
VHT20	3	5785	22.25	25.46	24.03	28.88	30.00	2.58	31.46	36.00
VHT20	3	5825	21.38	24.46	22.01	27.60	30.00	2.58	30.18	36.00
VHT40	3	5755	23.30	26.67	24.38	29.79	30.00	2.58	32.37	36.00
VHT40	3	5795	23.44	26.44	24.55	29.76	30.00	2.58	32.34	36.00
VHT80	3	5775	23.33	26.51	24.59	29.78	30.00	2.58	32.36	36.00
Result			Complied							
Note : IEEE 802.11 n and ac have the CDD function, so the array gain is 0.										



3.3.6 Test Result of Maximum Conducted Output Power

Maximum Conducted Output Power Result										
Condition			RF Output Power (dBm)							
Modulation Mode	N _{TX}	Freq. (MHz)	RF Output Power (dBm)				Power Limit	Ant. gain (dBi)	EIRP Power	EIRP Limit
			Chain Port 1	Chain Port 2	Chain Port 3	Sum Chain				
11a	1	5745	25.01	-	-	25.01	30.00	2.58	27.59	36.00
11a	1	5785	24.96	-	-	24.96	30.00	2.58	27.54	36.00
11a	1	5825	24.85	-	-	24.85	30.00	2.58	27.43	36.00
HT20	3	5745	17.74	21.59	18.86	24.48	30.00	2.58	27.06	36.00
HT20	3	5785	17.36	20.55	19.29	24.03	30.00	2.58	26.61	36.00
HT20	3	5825	17.53	19.89	17.79	23.31	30.00	2.58	25.89	36.00
HT40	3	5755	18.40	21.64	19.38	24.80	30.00	2.58	27.38	36.00
HT40	3	5795	18.70	21.56	19.72	24.93	30.00	2.58	27.51	36.00
VHT20	3	5745	17.88	21.67	18.91	24.56	30.00	2.58	27.14	36.00
VHT20	3	5785	17.40	20.54	19.02	23.94	30.00	2.58	26.52	36.00
VHT20	3	5825	16.47	19.31	17.04	22.56	30.00	2.58	25.14	36.00
VHT40	3	5755	18.28	21.66	19.38	24.78	30.00	2.58	27.36	36.00
VHT40	3	5795	18.44	21.24	19.47	24.64	30.00	2.58	27.22	36.00
VHT80	3	5775	18.38	21.37	19.53	24.71	30.00	2.58	27.29	36.00
Result			Complied							

Note : IEEE 802.11 n and ac have the CDD function, so the array gain is 0.





3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

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

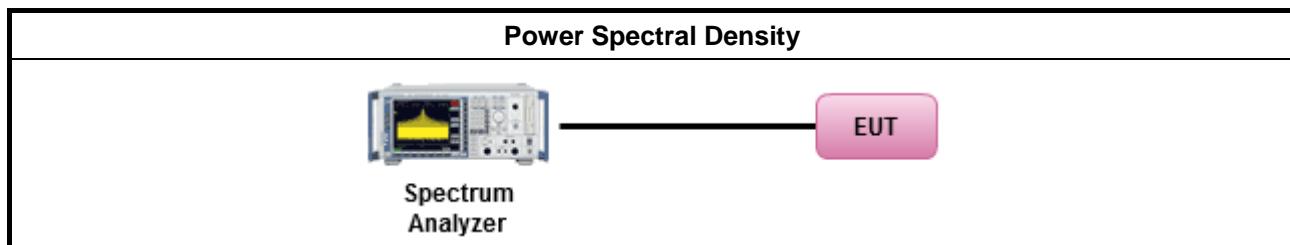
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

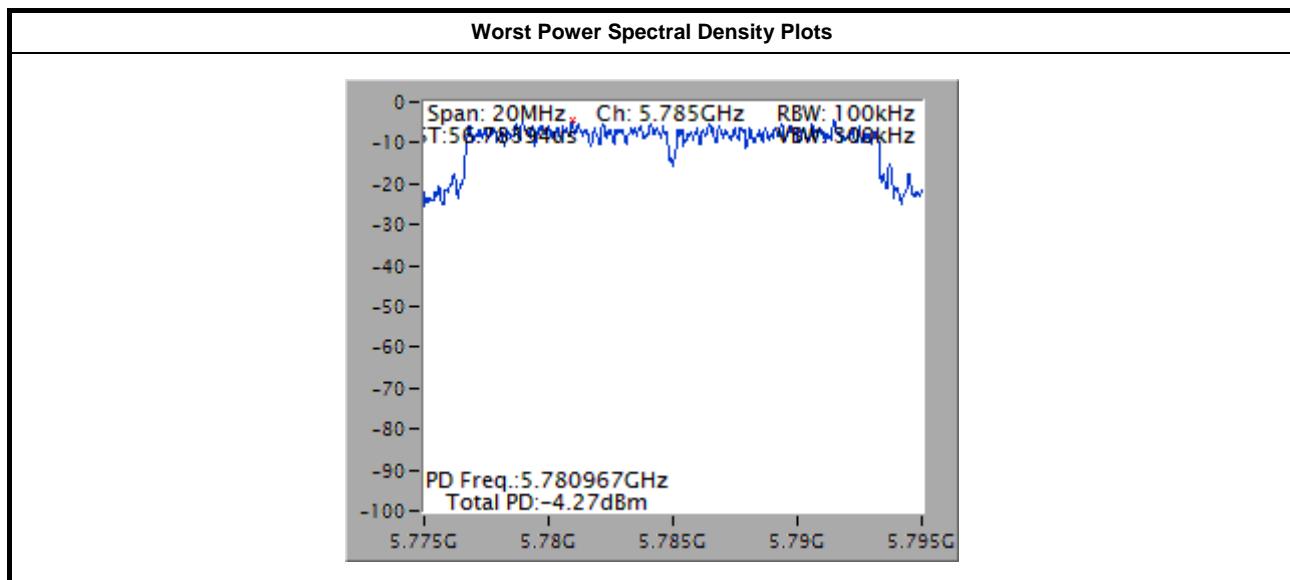
Test Method
<input checked="" type="checkbox"/> Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method 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 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.
<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 $10 \log(N) \text{ dB}$, 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



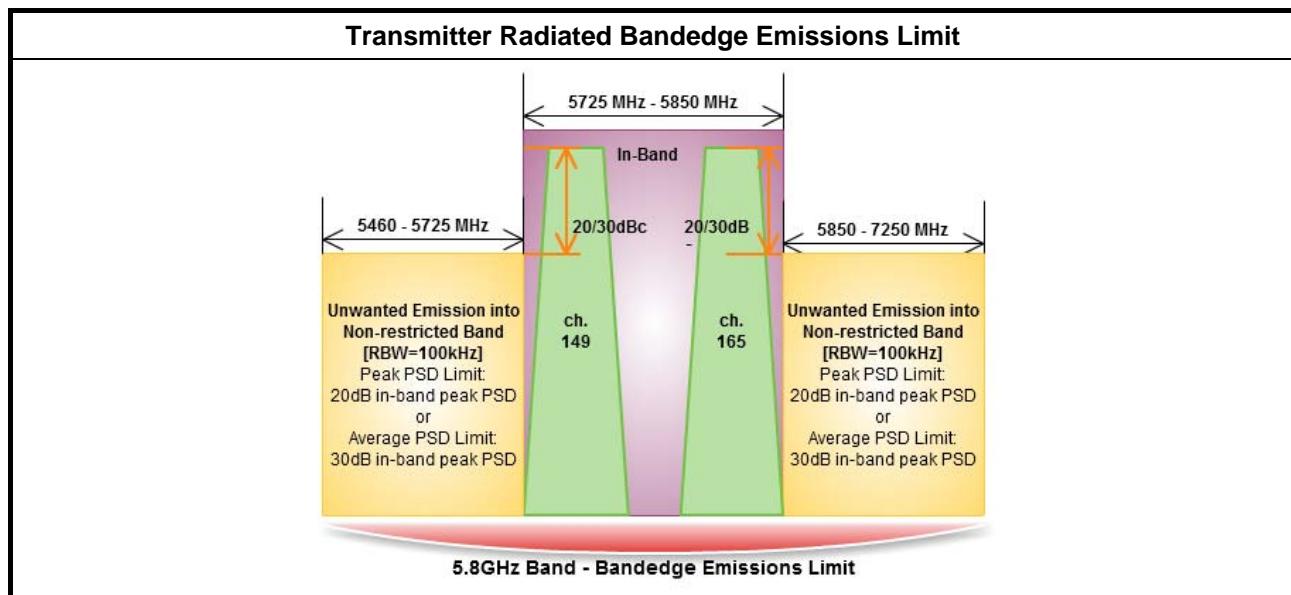
3.4.5 Test Result of Power Spectral Density

Condition			Power Spectral Density	
Modulation Mode	N _{TX}	Freq. (MHz)	Power Spectral Density (dBm/100kHz)	Power Limit (dBm/3kHz)
11a	1	5745	-5.31	8.00
11a	1	5785	-4.27	8.00
11a	1	5825	-4.30	8.00
HT20,M0	3	5745	-5.54	8.00
HT20,M0	3	5785	-5.58	8.00
HT20,M0	3	5825	-6.72	8.00
HT40,M0	3	5755	-8.41	8.00
HT40,M0	3	5795	-6.45	8.00
VHT20,M0	3	5745	-5.62	8.00
VHT20,M0	3	5785	-6.54	8.00
VHT20,M0	3	5825	-7.75	8.00
VHT40,M0	3	5755	-7.92	8.00
VHT40,M0	3	5795	-8.31	8.00
VHT80,M0	3	5775	-10.01	8.00
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.

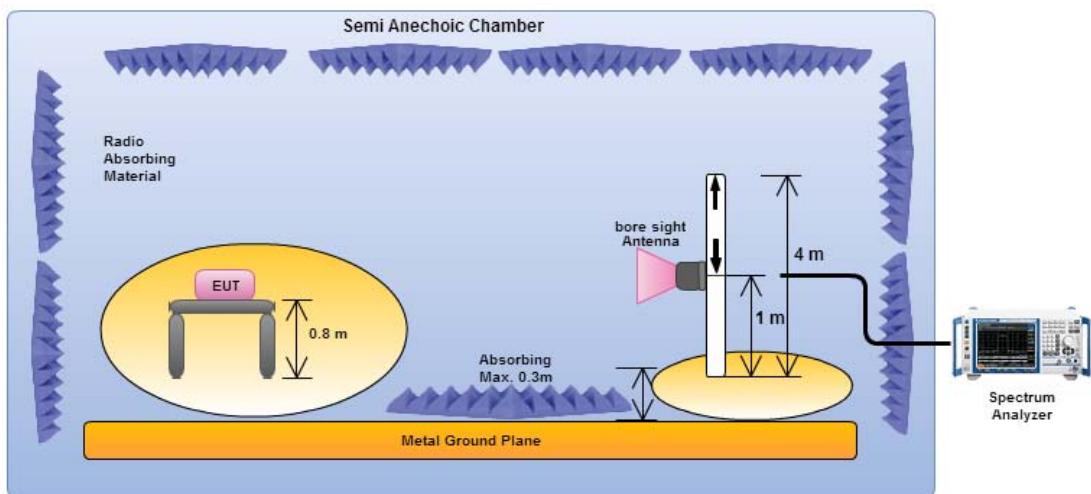


3.5.3 Test Procedures

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 checked="" 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 checked="" 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.
<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 and ANSI C63.10, clause 6.6. Test distance is 3m.
<input checked="" type="checkbox"/> Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements). Measurements in the bandedge are typically made at a closer distance 1m, because the instrumentation noise floor is typically close to the radiated emission limit.

3.5.4 Test Setup

Transmitter Radiated Bandedge Emissions



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

3.5.5 Transmitter Radiated Bandedge Emissions

5725-5850MHz Transmitter Radiated Bandedge Emissions

Modulation	N _{TX}	Test Freq. (MHz)	In-band PSD [i] (dB _{uV} /100kHz)	Freq. (MHz)	Out-band PSD [o] (dB _{uV} /100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
11a	1	5745	111.06	5725.00	85.97	25.09	20	V
11a	1	5825	112.24	5850.59	80.64	31.60	20	V
HT20	3	5745	111.85	5724.34	71.60	40.25	20	V
HT20	3	5825	108.28	5850.97	64.48	43.80	20	V
HT40	3	5755	107.58	5724.30	81.75	25.83	20	V
HT40	3	5795	108.24	5853.10	63.78	44.46	20	V
VHT20	3	5745	110.74	5724.34	72.65	38.09	20	V
VHT20	3	5825	110.83	5852.13	64.57	46.26	20	V
VHT40	3	5755	110.03	5723.80	81.96	28.07	20	V
VHT40	3	5795	108.14	5853.80	66.43	41.71	20	V
VHT80	3	5775	108.05	5850.62	82.79	25.26	20	V

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.

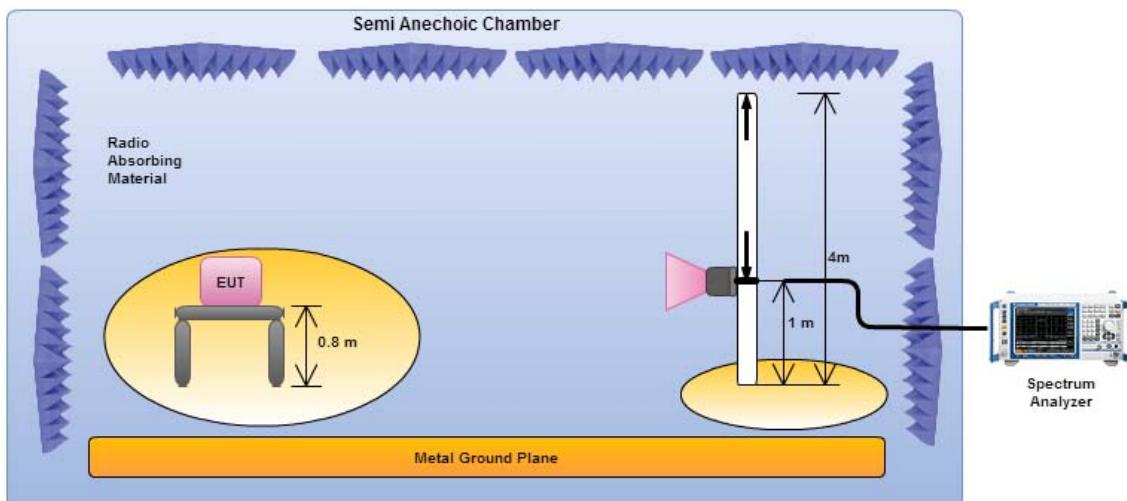


3.6.3 Test Procedures

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"/> 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 checked="" 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 checked="" 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 1GHz. For 1 GHz to 5 GHz, test distance is 3m; For 5 GHz to 40 GHz, test distance is 1m.
<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.

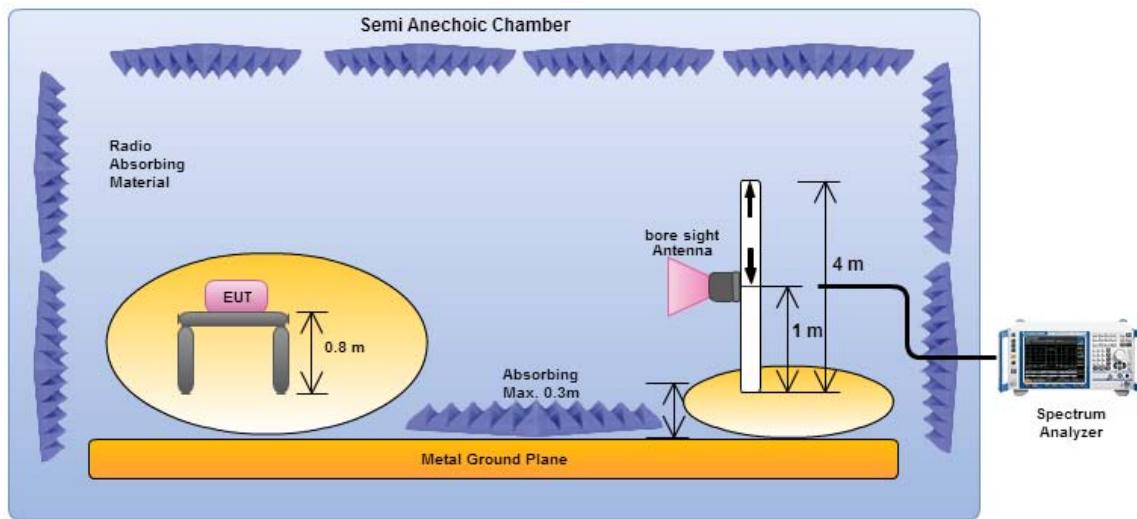
3.6.4 Test Setup

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)

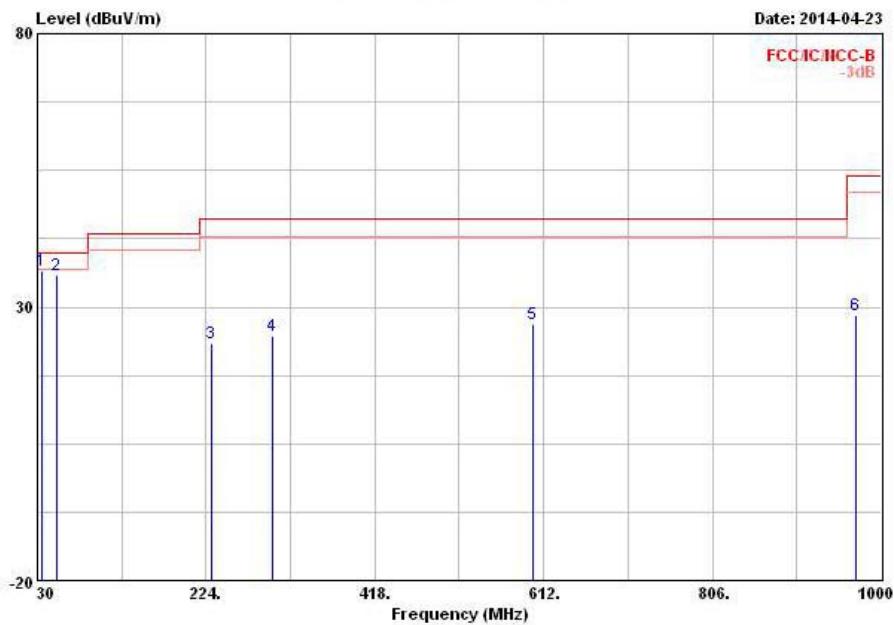
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.



3.6.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Transmitter Radiated Unwanted Emissions (Below 1GHz)

Operating Mode	1	Polarization	V
Operating Function	EUT with PoE		



Freq	Level	Over Limit	Read	Antenna	Cable Preamp			Ant Pos	Table Pos
					Line	Antenna	Preamp		
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @ 35.820	36.71	-3.29	40.00	47.83	15.52	0.96	27.60 QP	---	---
2 @ 52.310	35.77	-4.23	40.00	54.34	7.84	1.16	27.57 Peak	---	---
3 @ 229.820	23.29	-22.71	46.00	37.21	10.48	2.50	26.90 Peak	---	---
4 @ 299.660	24.60	-21.40	46.00	35.12	13.23	2.90	26.65 Peak	---	---
5 @ 599.390	26.80	-19.20	46.00	32.20	18.44	4.15	27.99 Peak	---	---
6 @ 970.900	28.47	-25.53	54.00	29.26	21.15	5.41	27.35 Peak	---	---

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

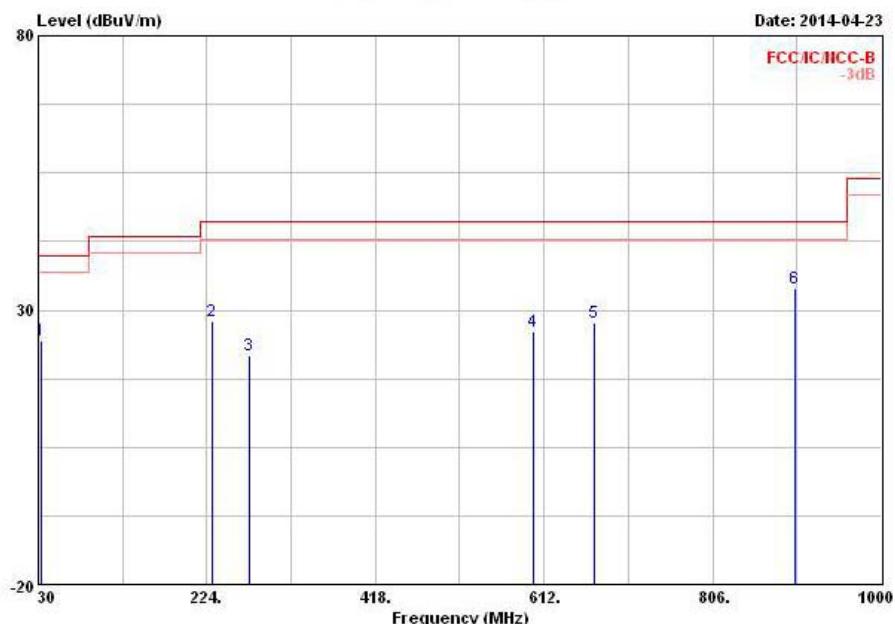
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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



Transmitter Radiated Unwanted Emissions (Below 1GHz)

Operating Mode	1	Polarization	H
Operating Function	EUT with PoE		



Freq	Level	Over Limit	Line	Read		Ant	Table		
				Antenna Factor	Cable Loss			Pos	Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	32.910	24.37	-15.63	40.00	33.86	17.22	0.90	27.61	Peak
2	229.820	27.96	-18.04	46.00	41.88	10.48	2.50	26.90	Peak
3	273.470	21.83	-24.17	46.00	32.92	12.92	2.74	26.75	Peak
4	599.390	26.07	-19.93	46.00	31.47	18.44	4.15	27.99	Peak
5	669.230	27.69	-18.31	46.00	32.48	18.73	4.43	27.95	Peak
6	901.060	34.06	-11.94	46.00	35.89	20.53	5.19	27.55	Peak

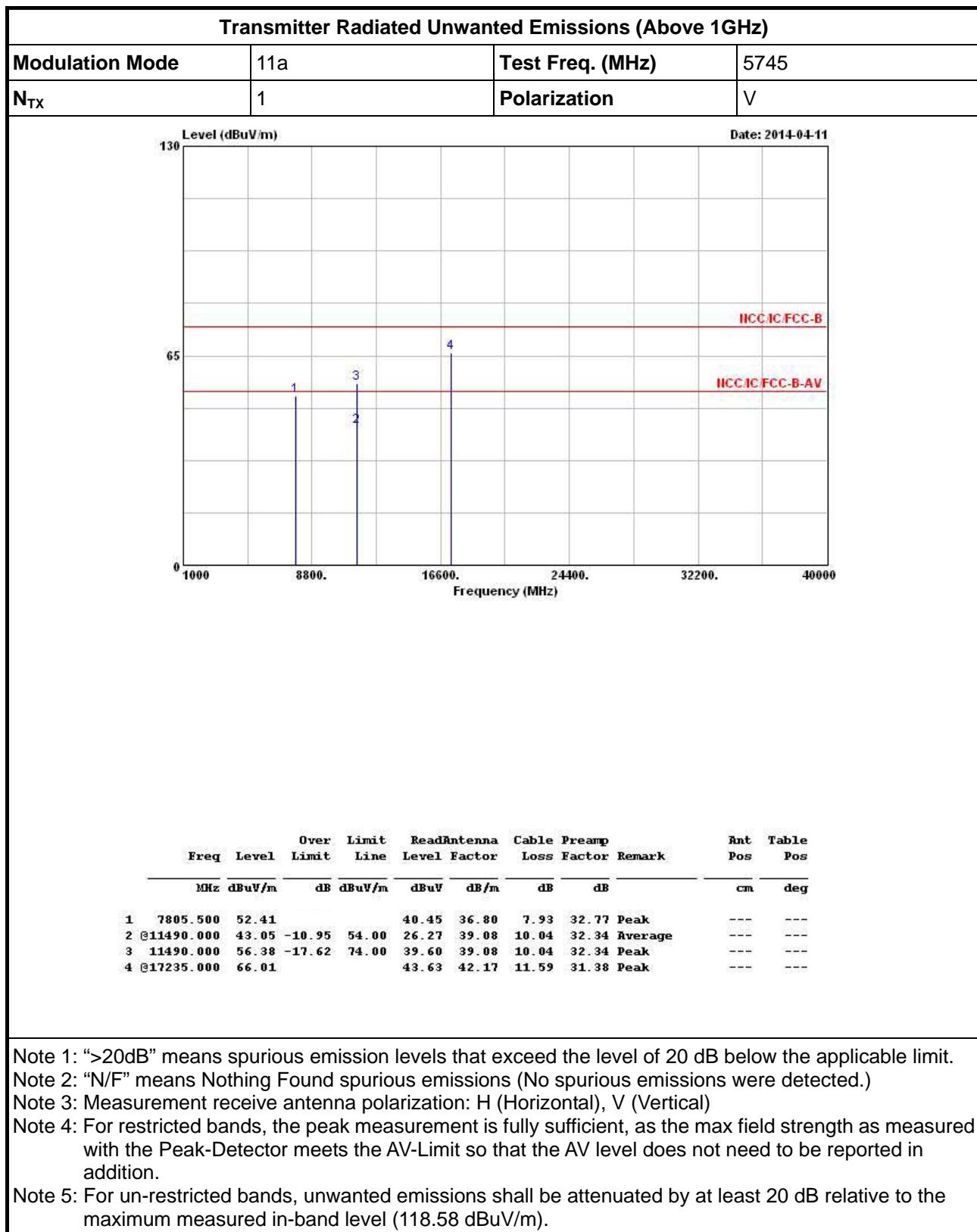
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

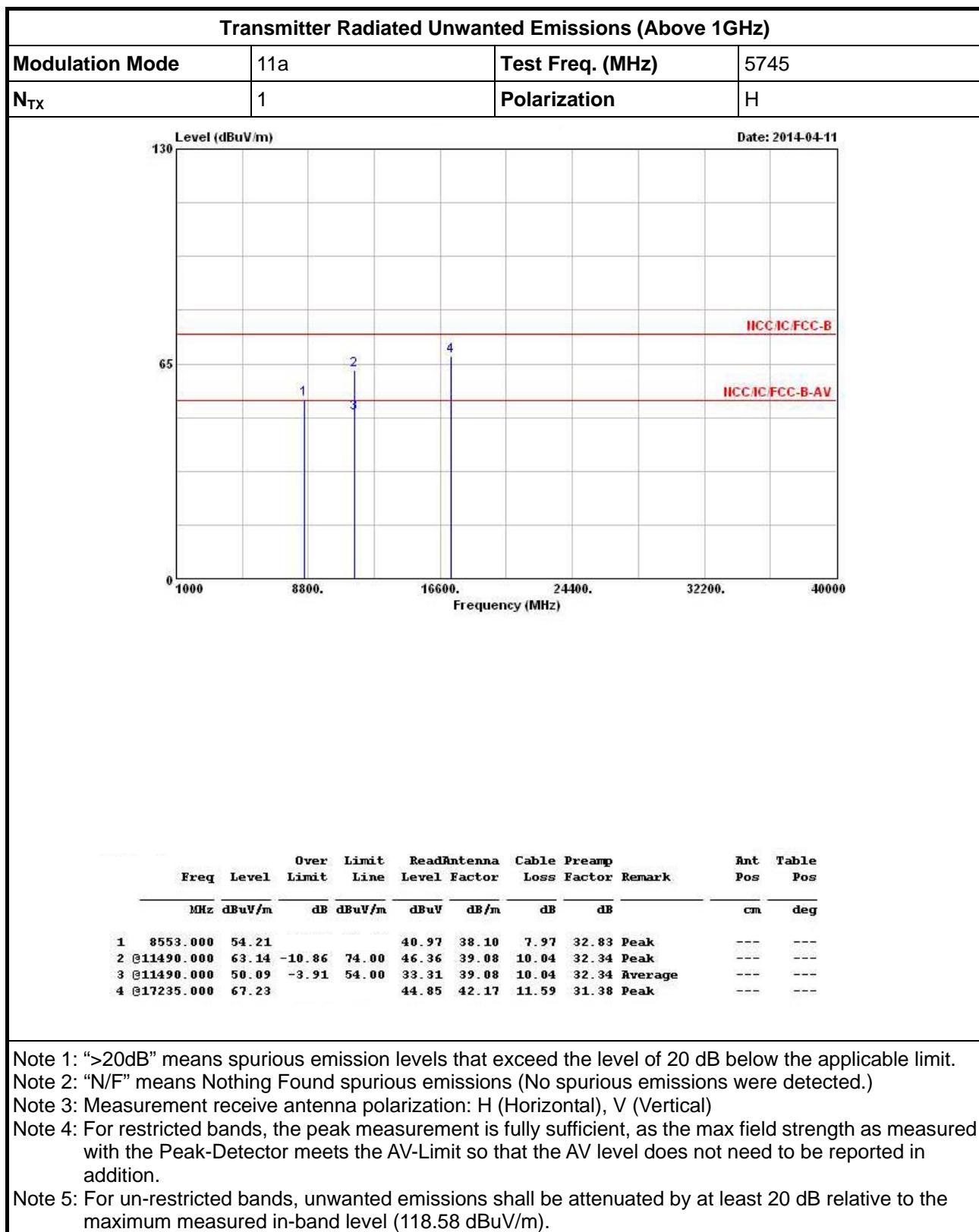
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

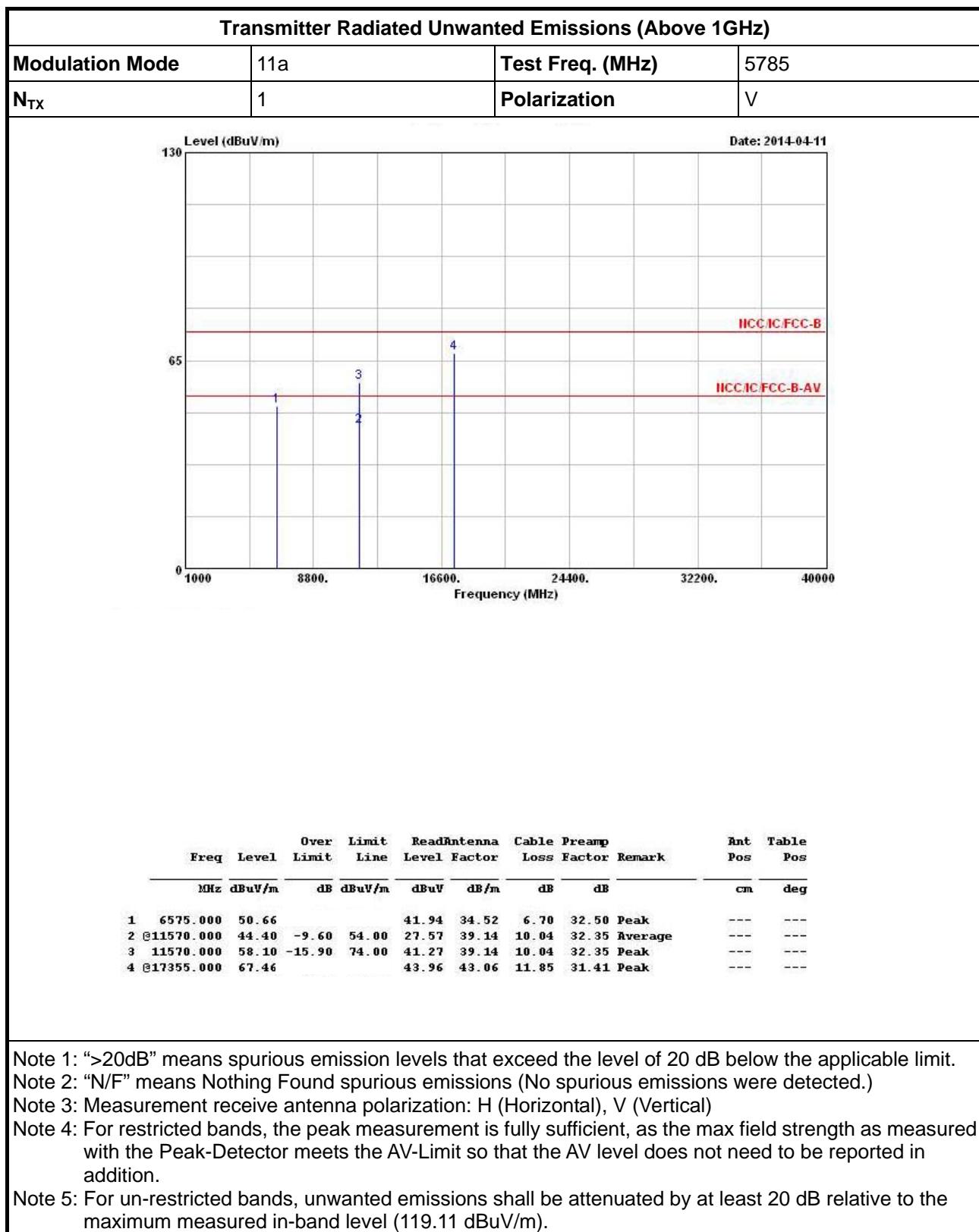
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

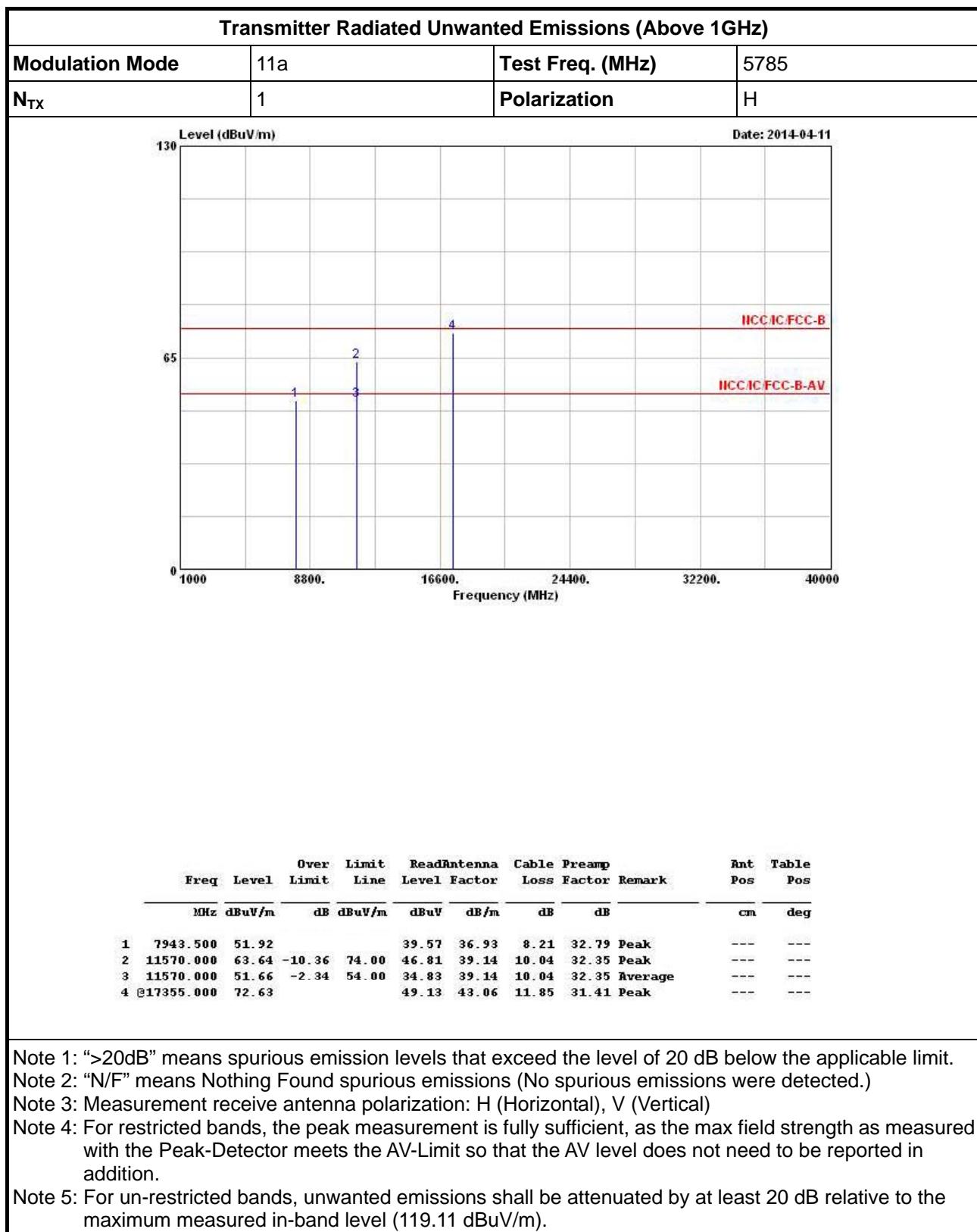


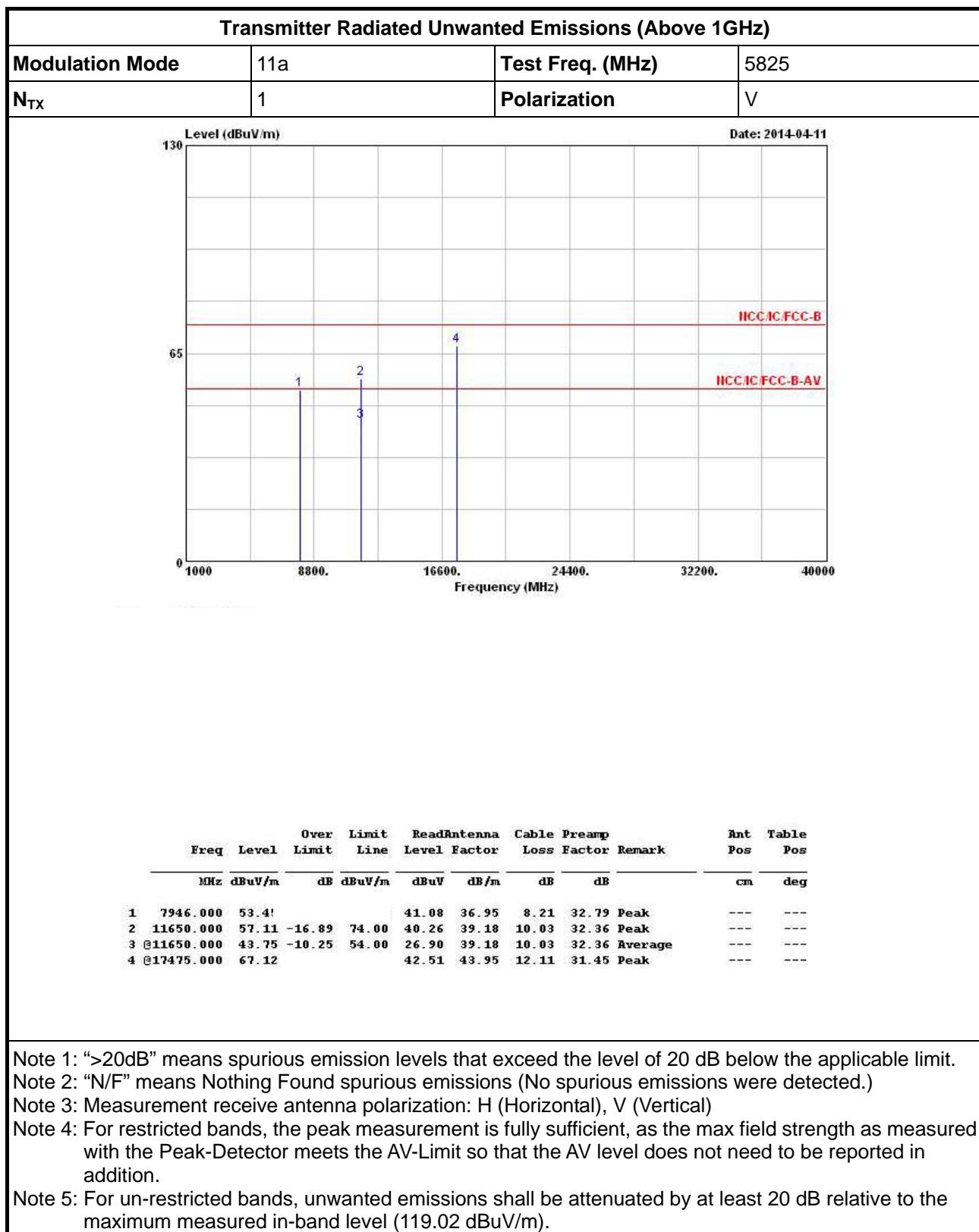
3.6.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)

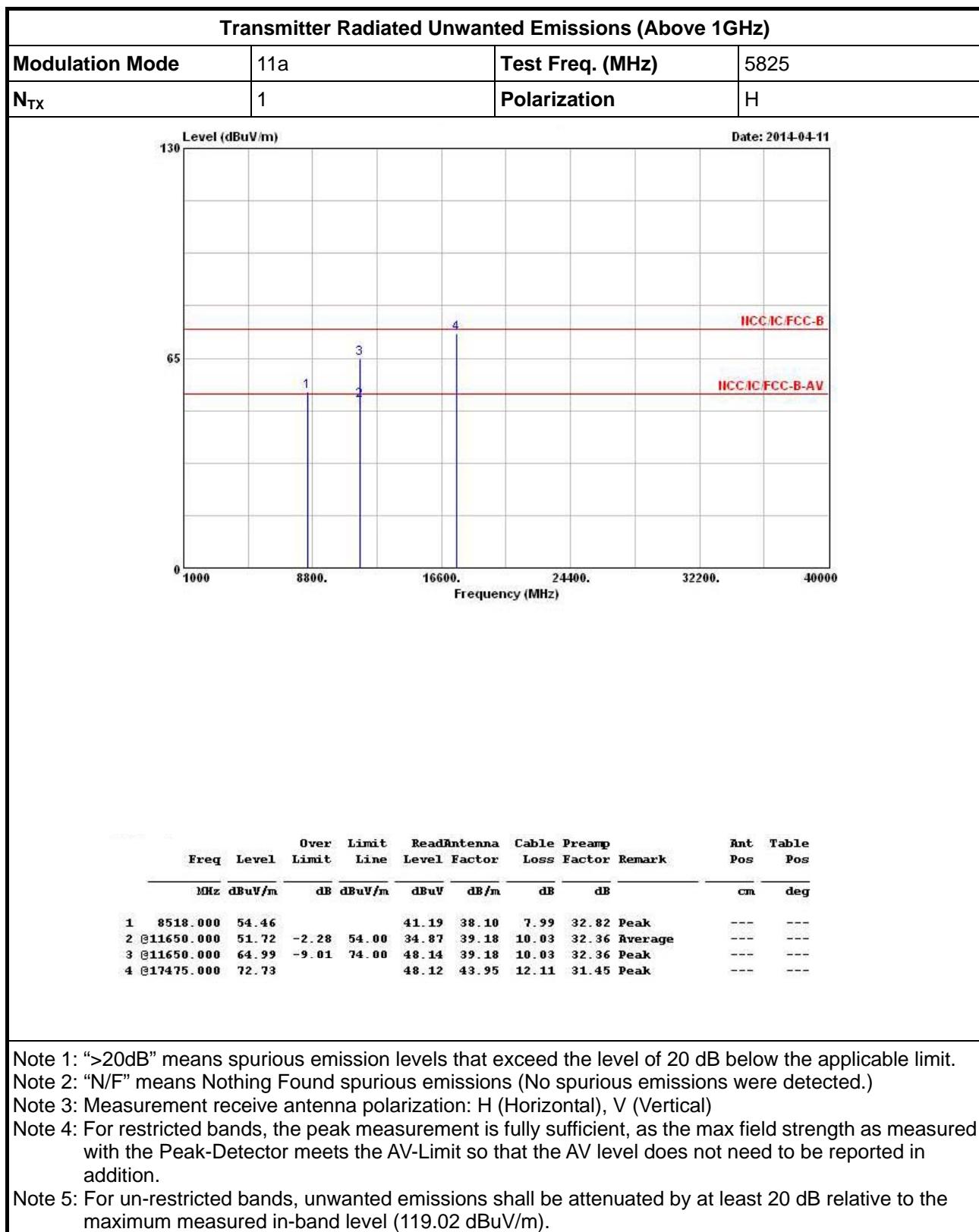


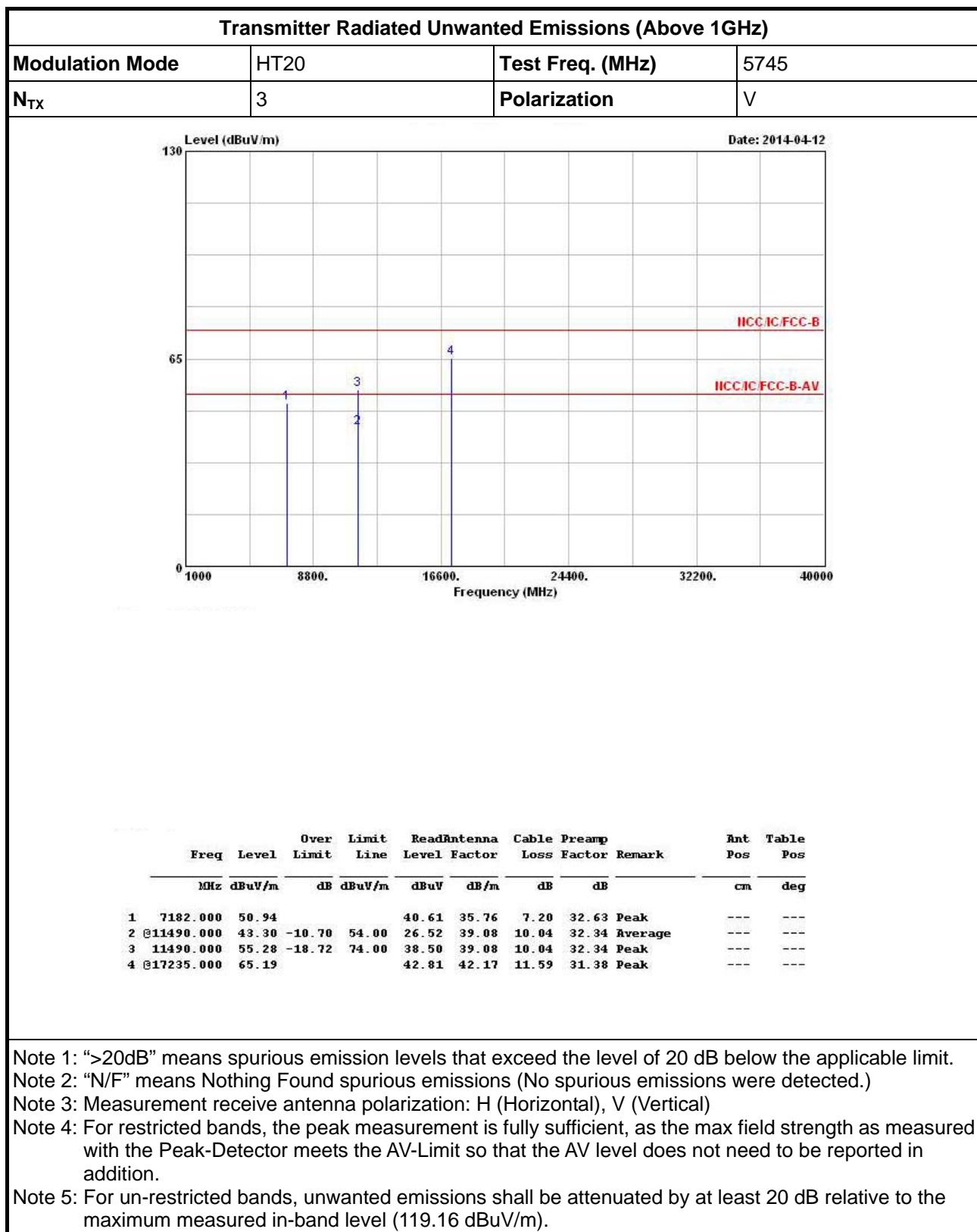


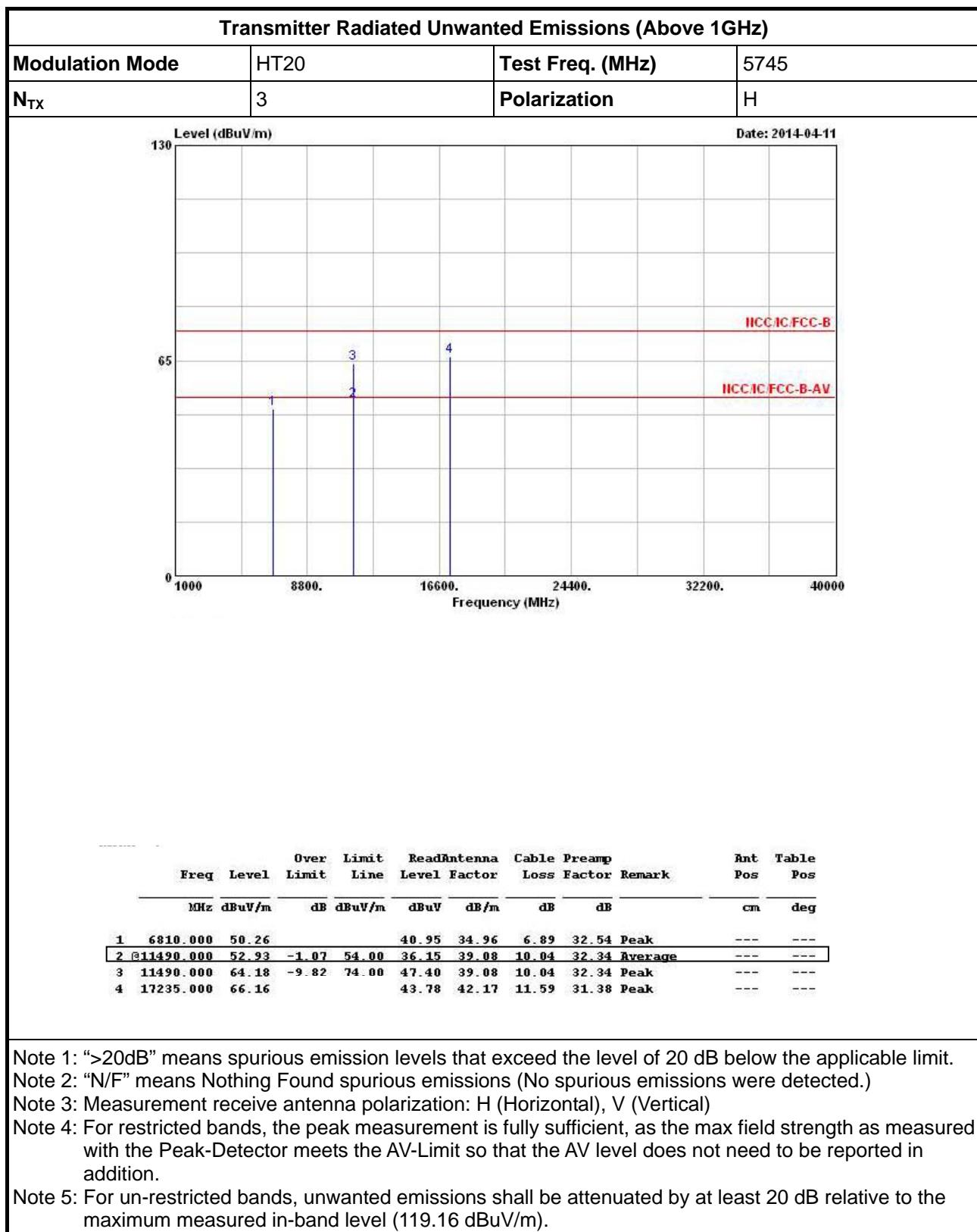


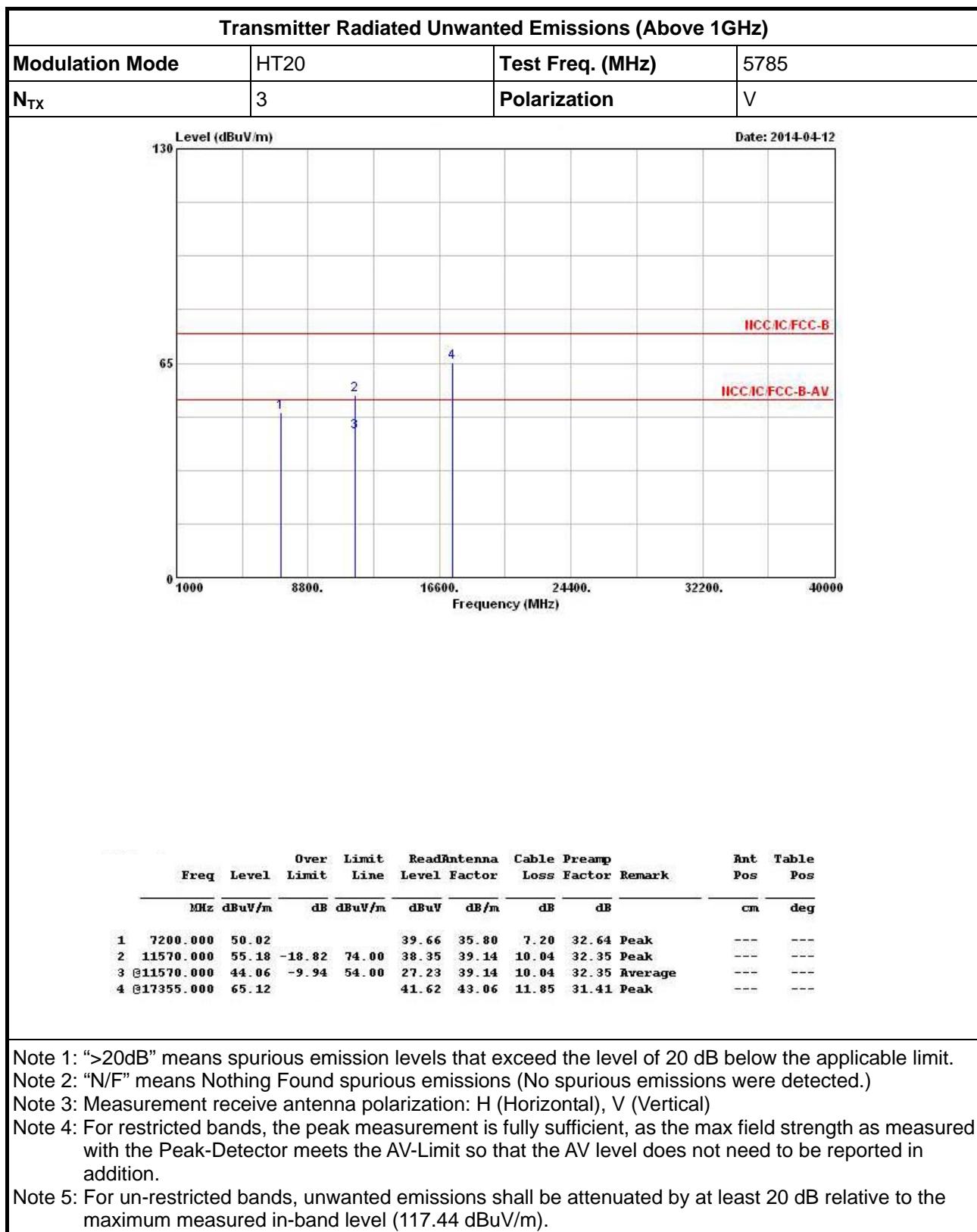


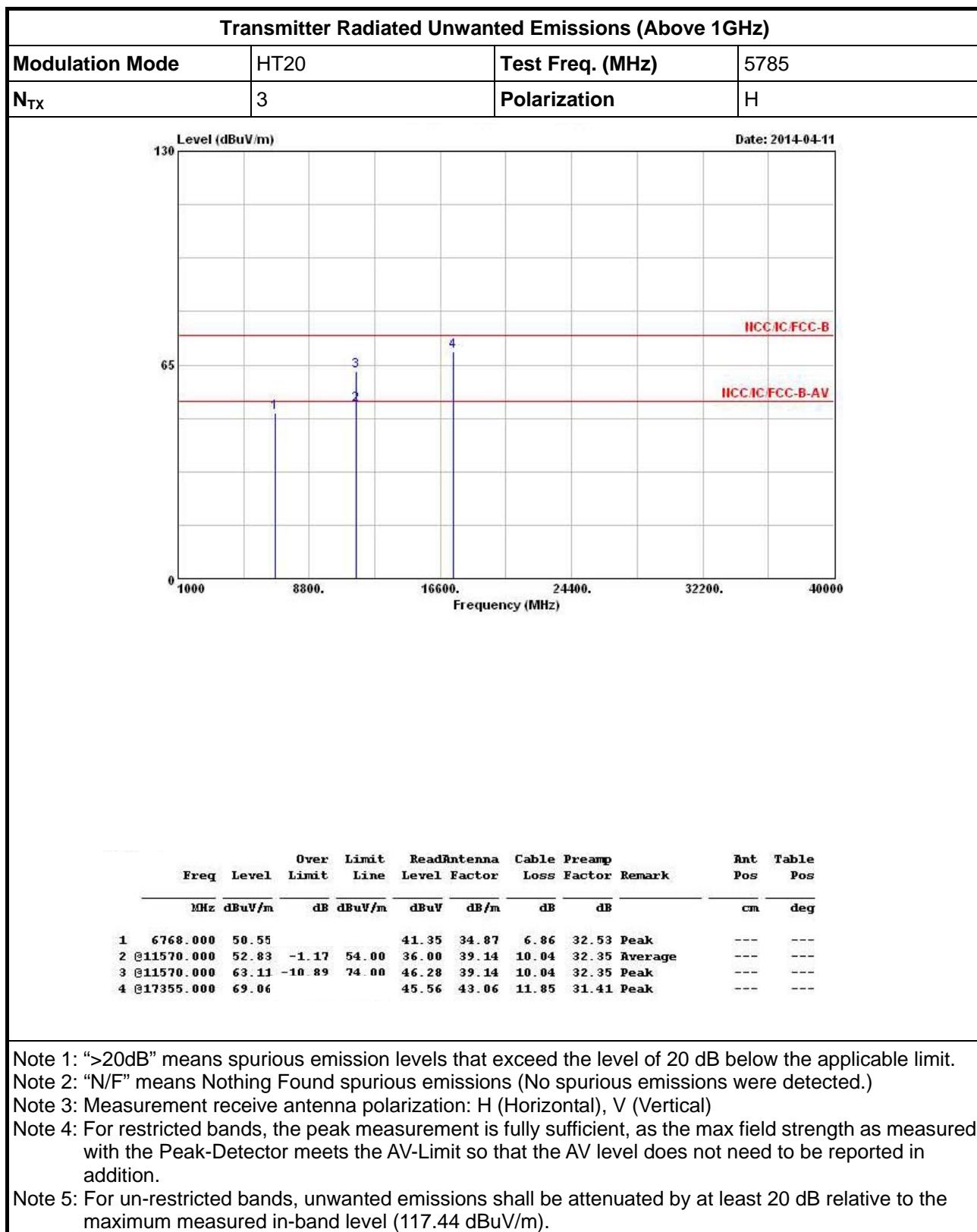








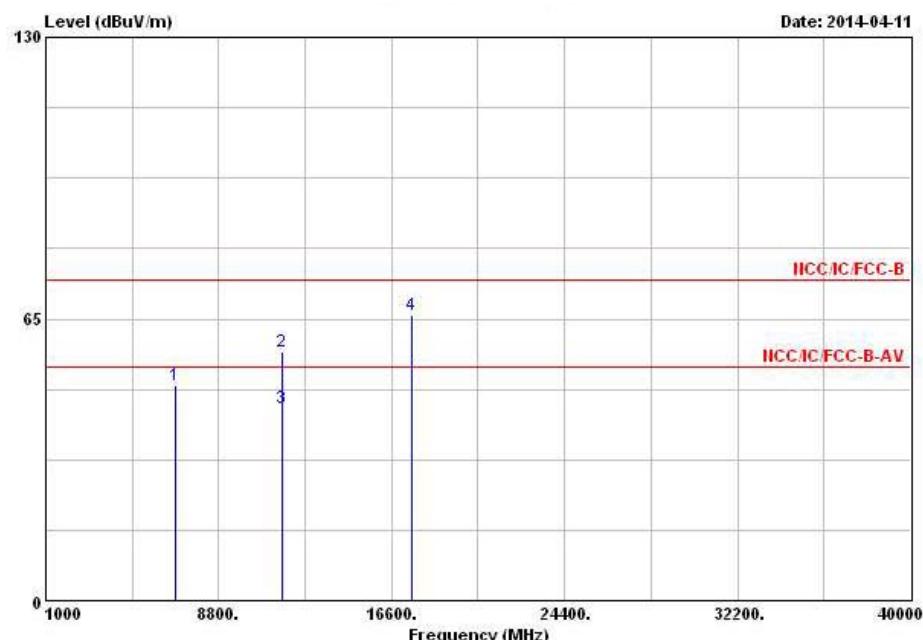






Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	HT20	Test Freq. (MHz)	5825
N _{TX}	3	Polarization	V



Freq	Level	Over Limit	Line	Read Antenna		Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
				MHz	dBuV/m	dB	dBuV/m	dB		
1 6851.000	49.68			40.29	35.02	6.92	32.55	Peak	---	---
2 11650.000	57.39	-16.61	74.00	40.54	39.18	10.03	32.36	Peak	---	---
3 11650.000	44.39	-9.61	54.00	27.54	39.18	10.03	32.36	Average	---	---
4 17475.000	65.80			41.19	43.95	12.11	31.45	Peak	---	---

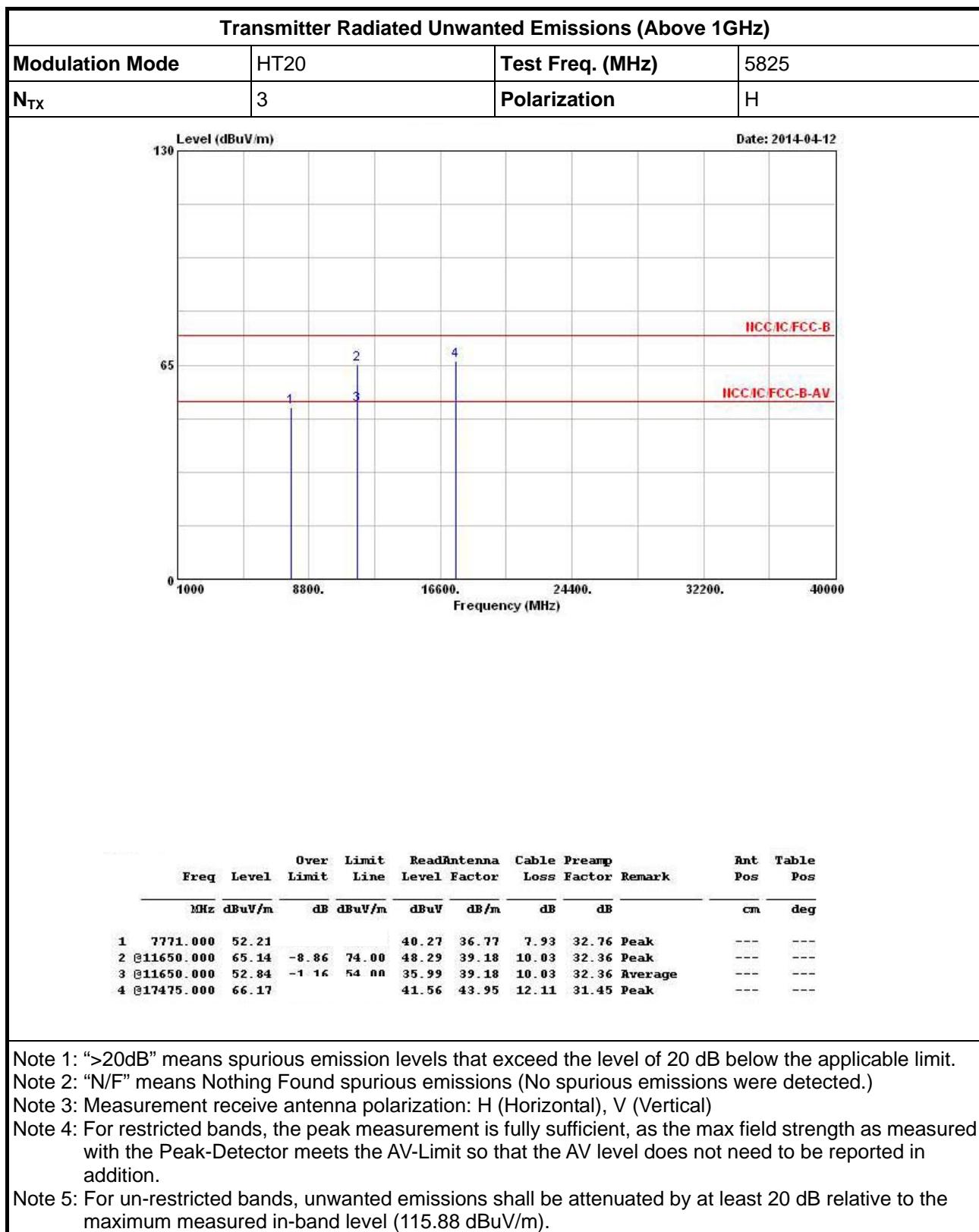
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

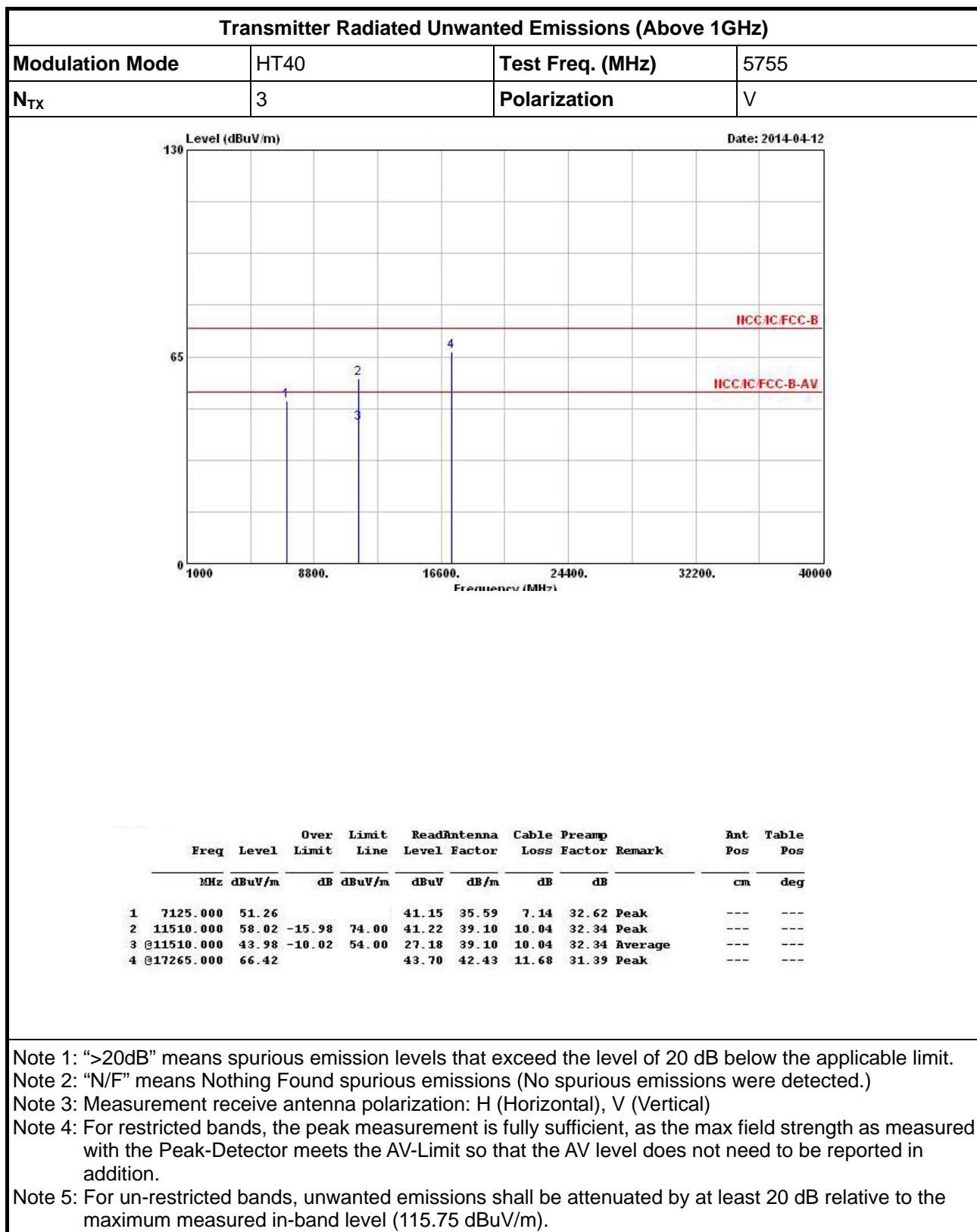
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

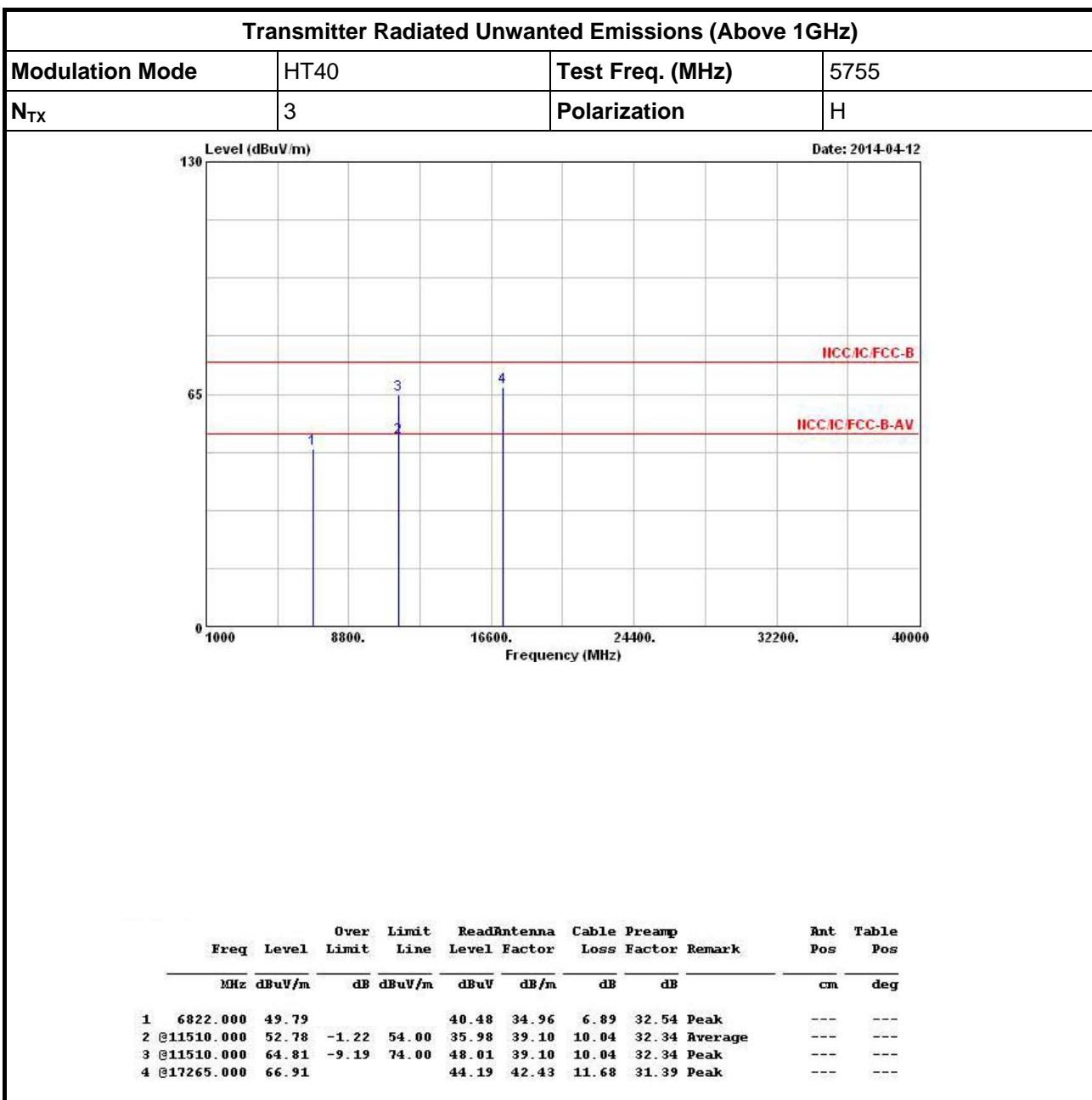
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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

Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (115.88 dBuV/m).







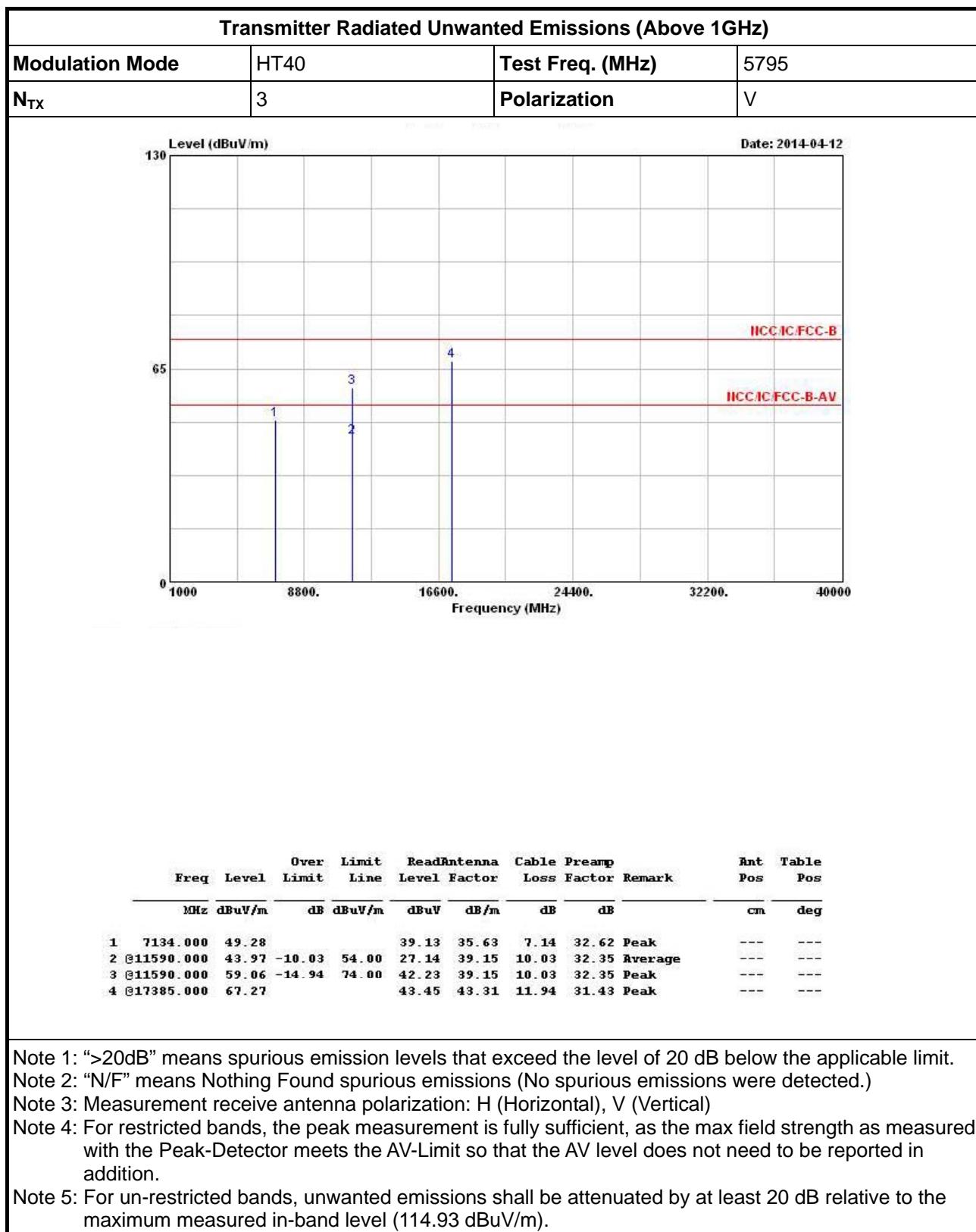
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

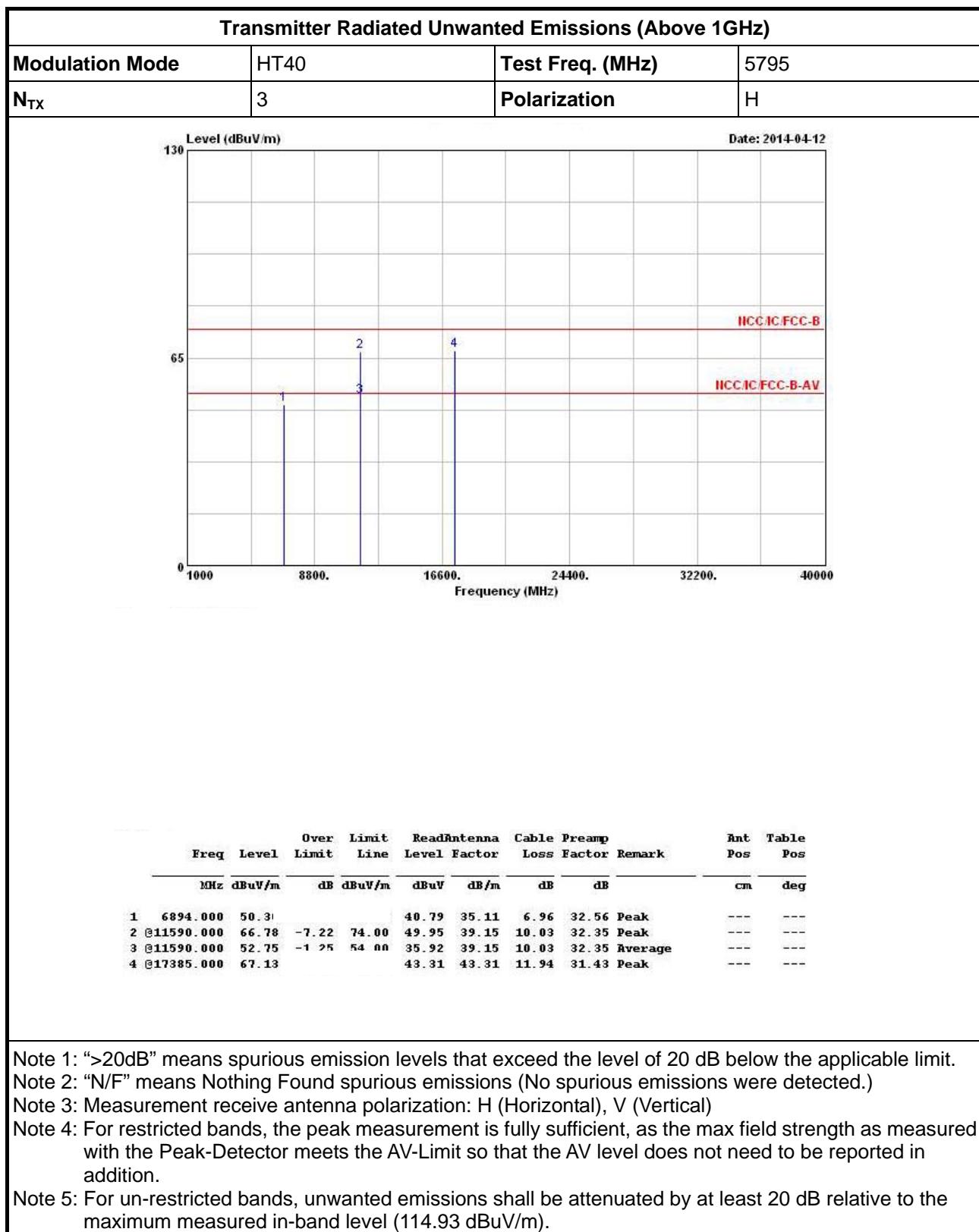
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

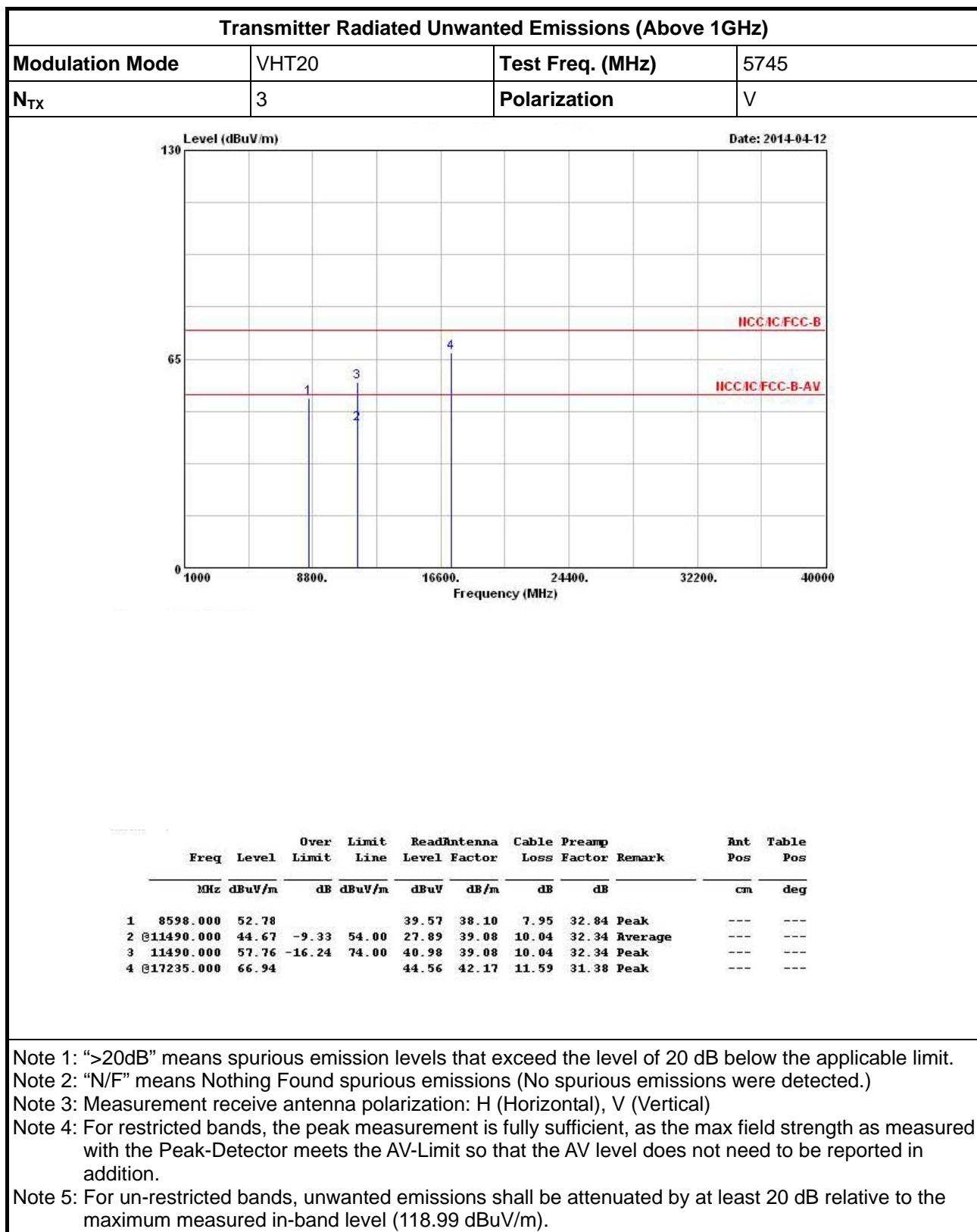
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

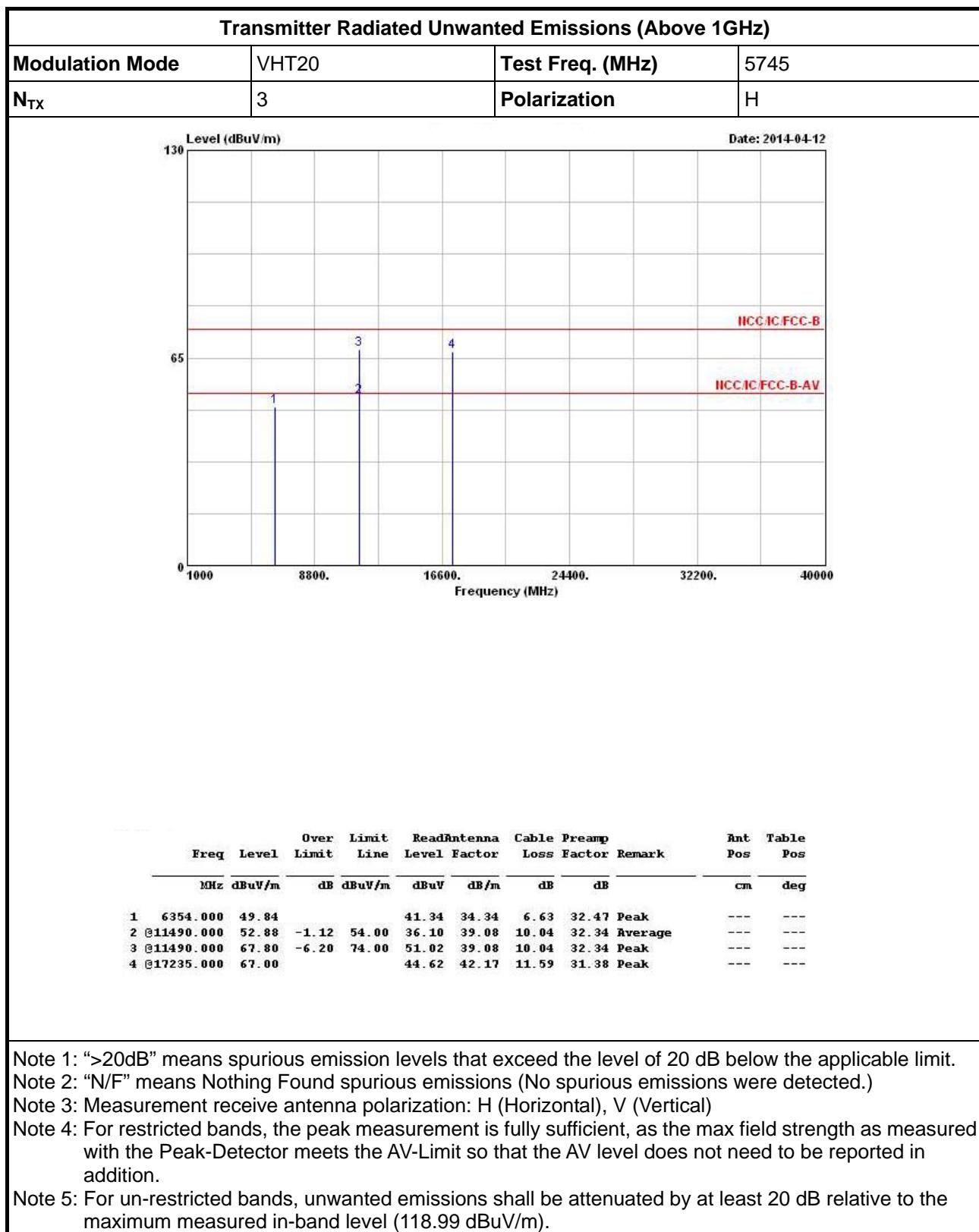
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

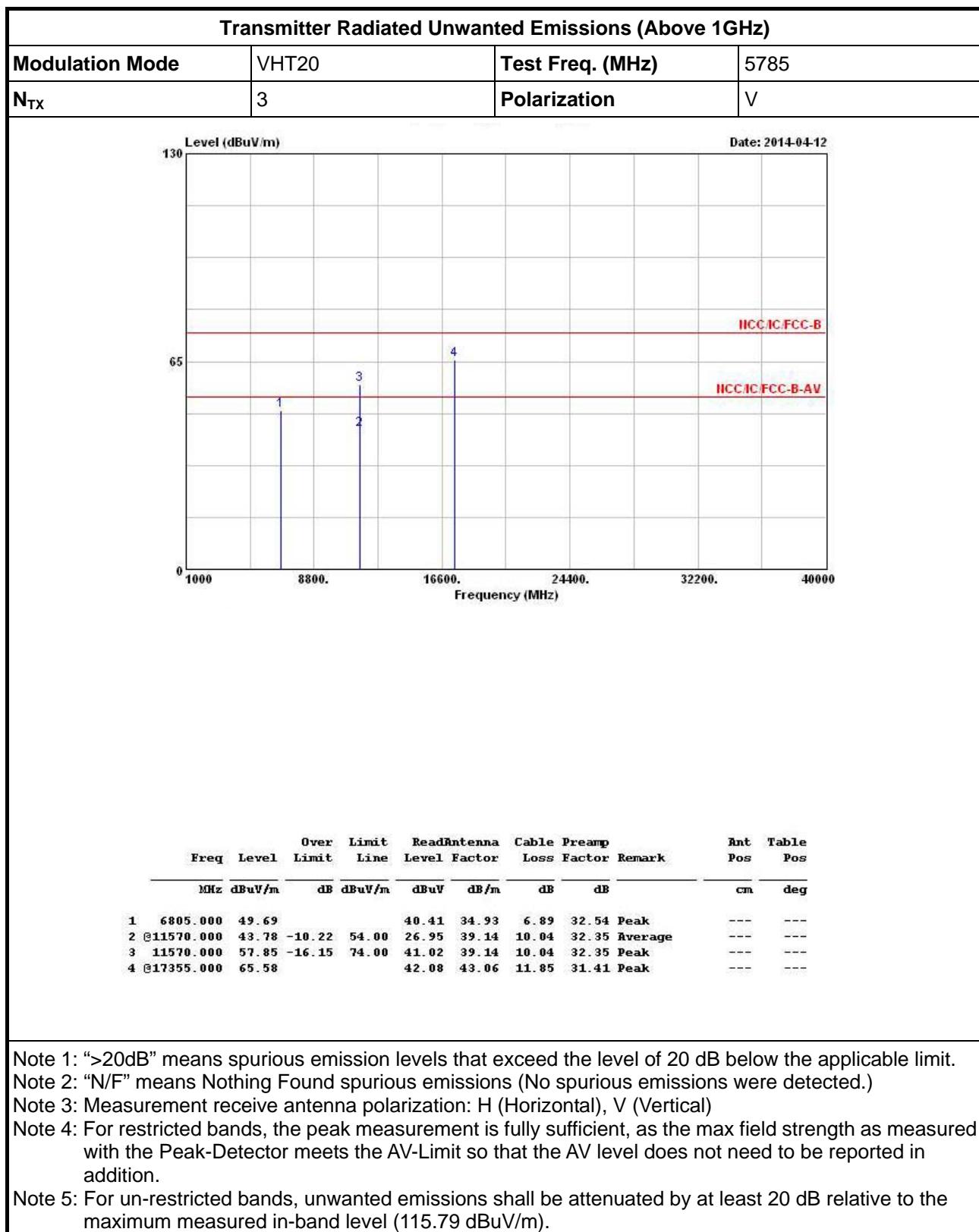
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (115.75 dBuV/m).

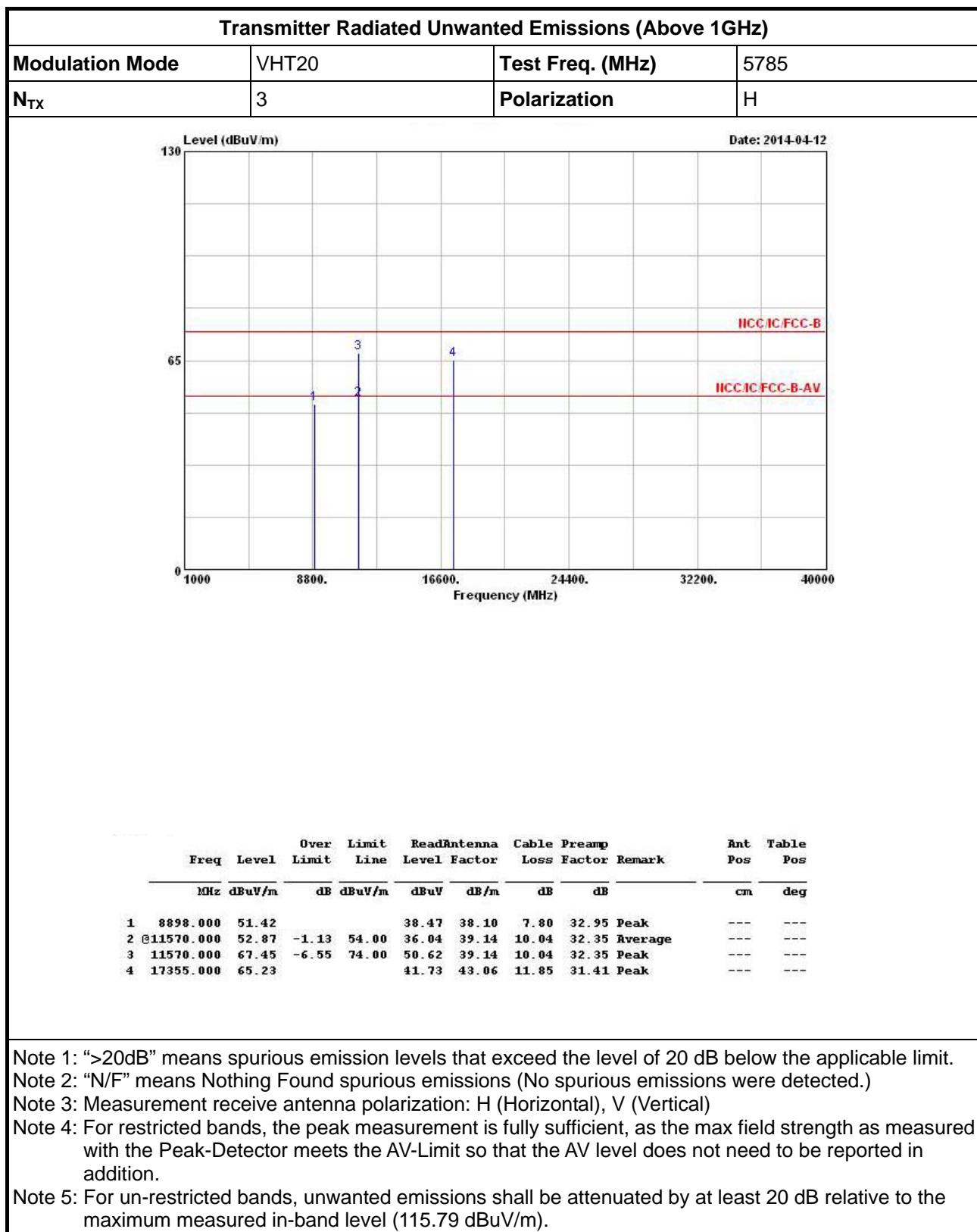


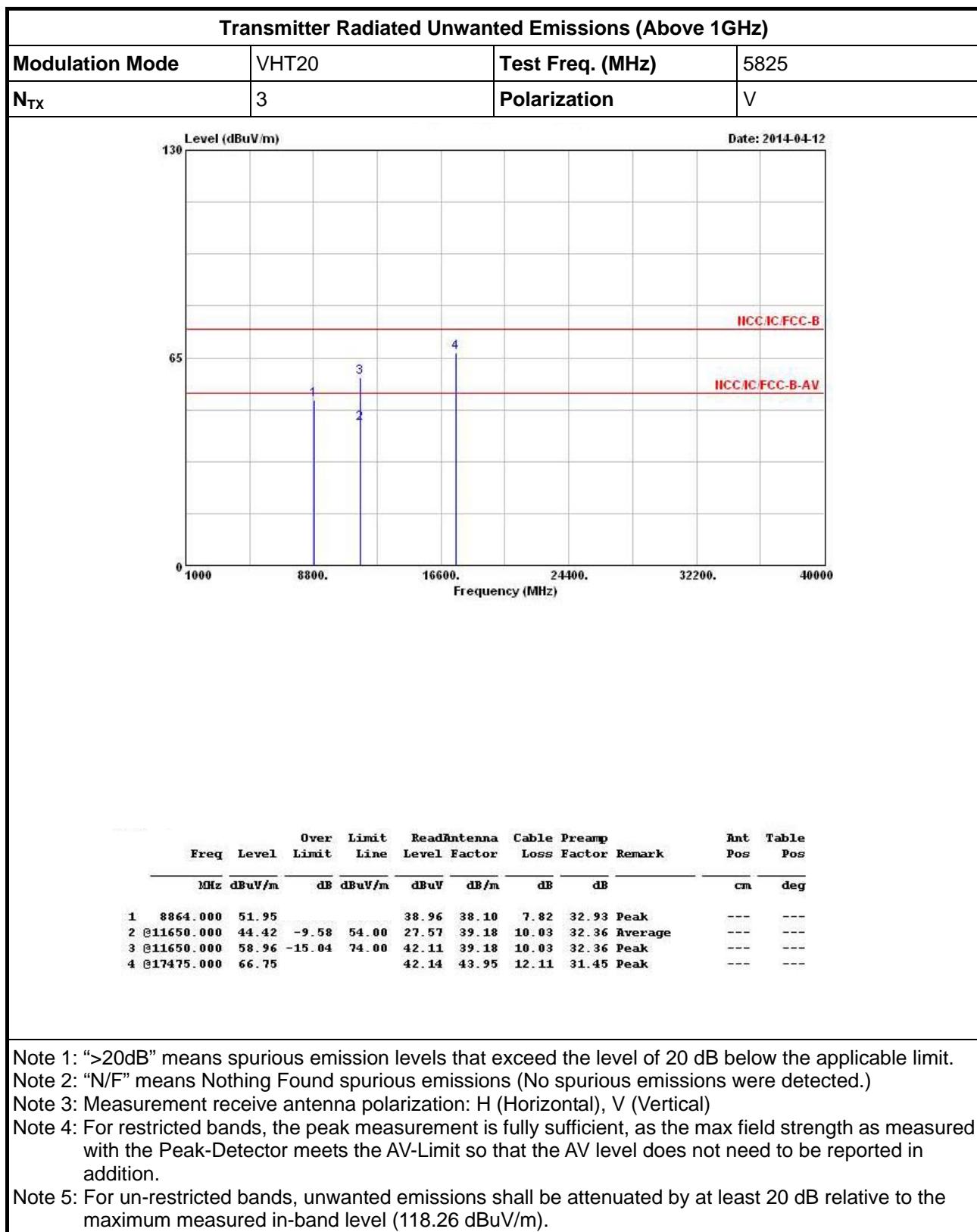


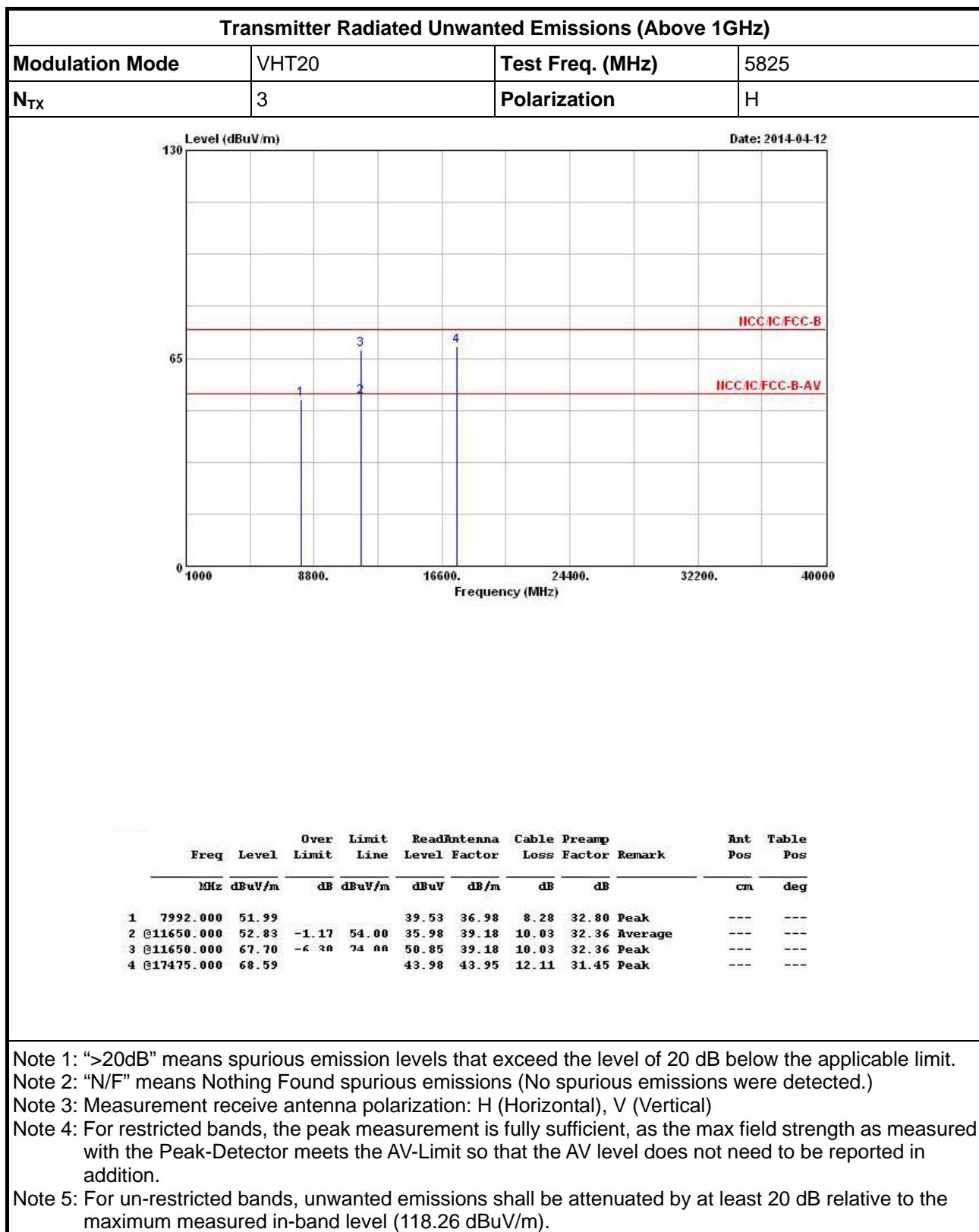


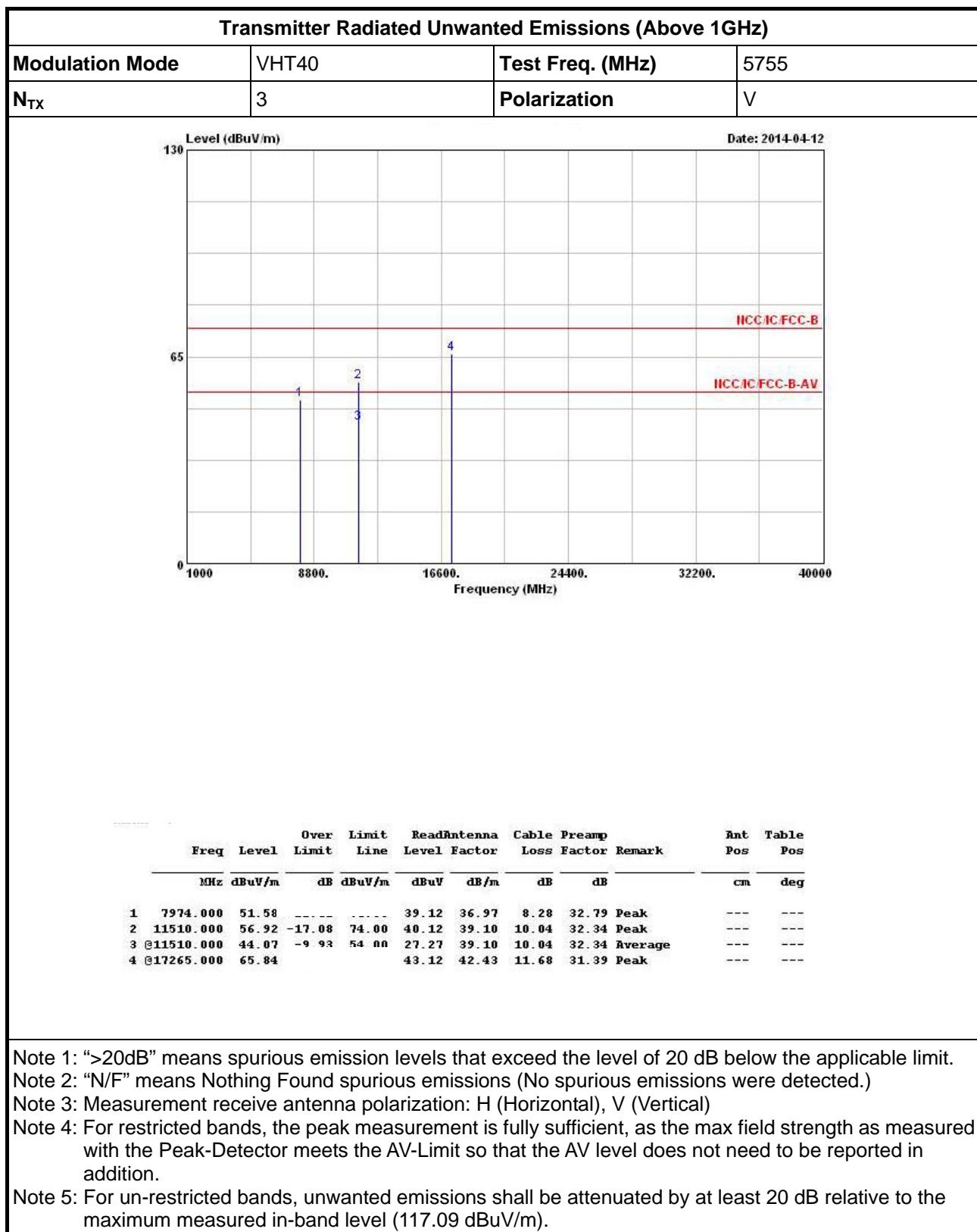


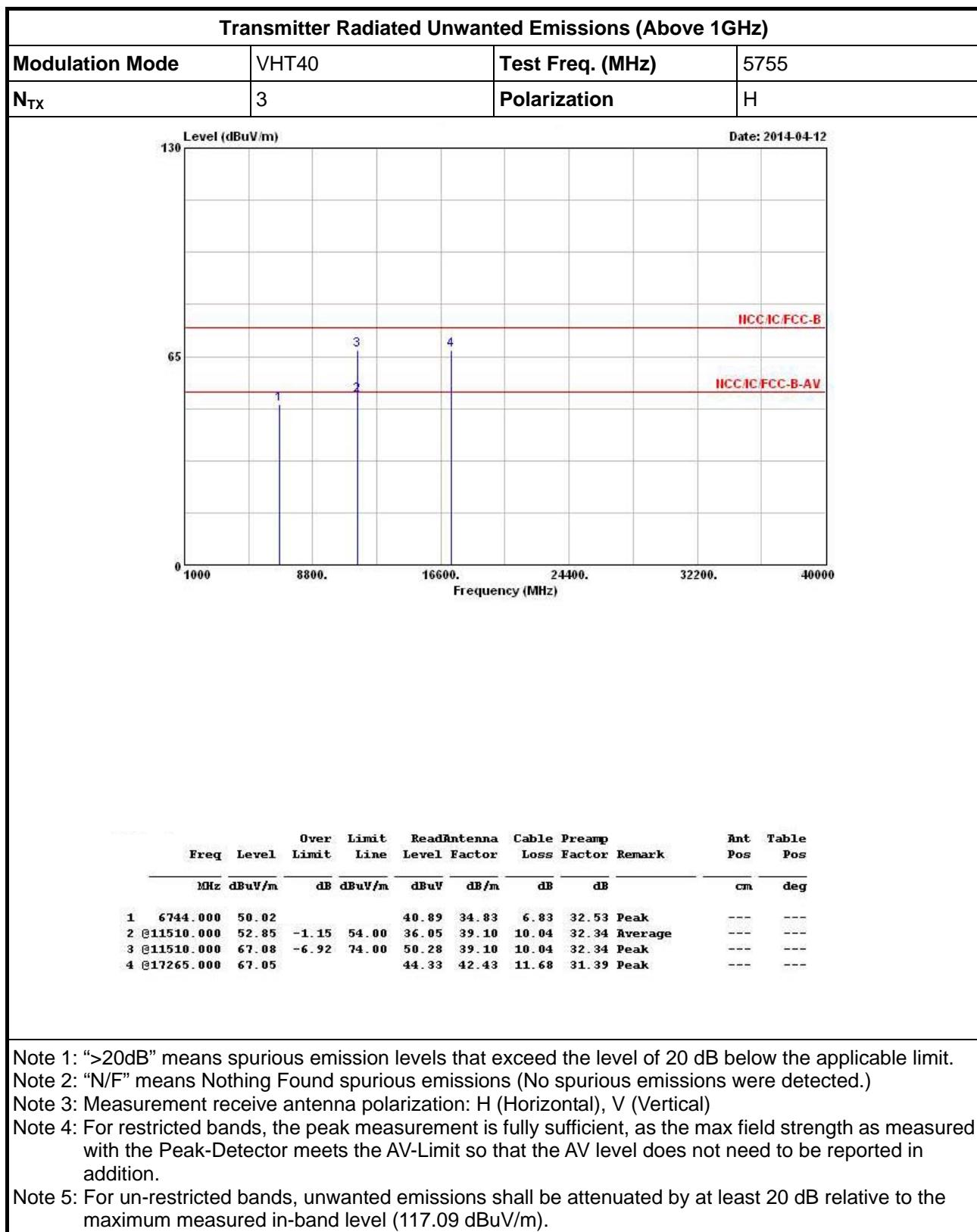


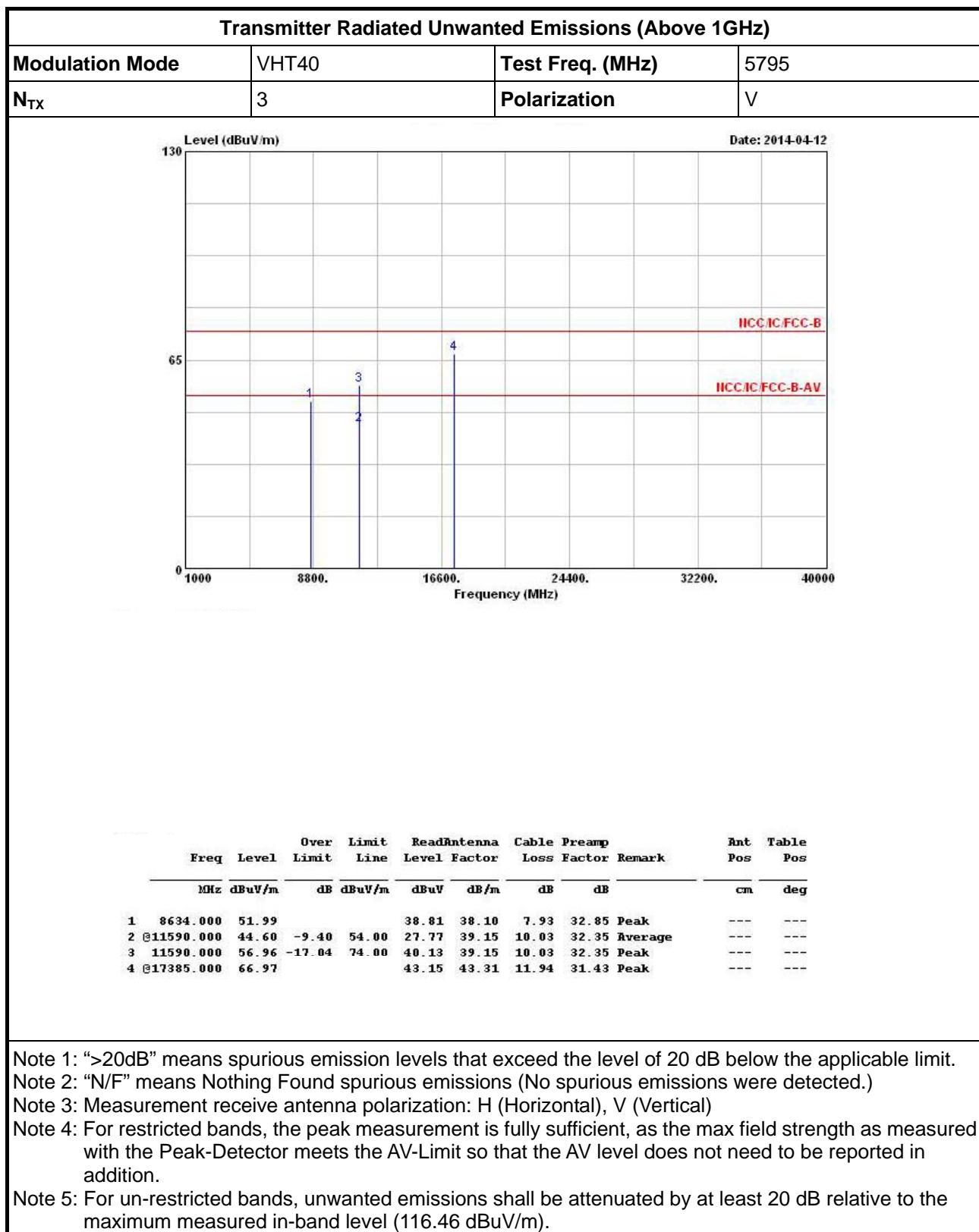


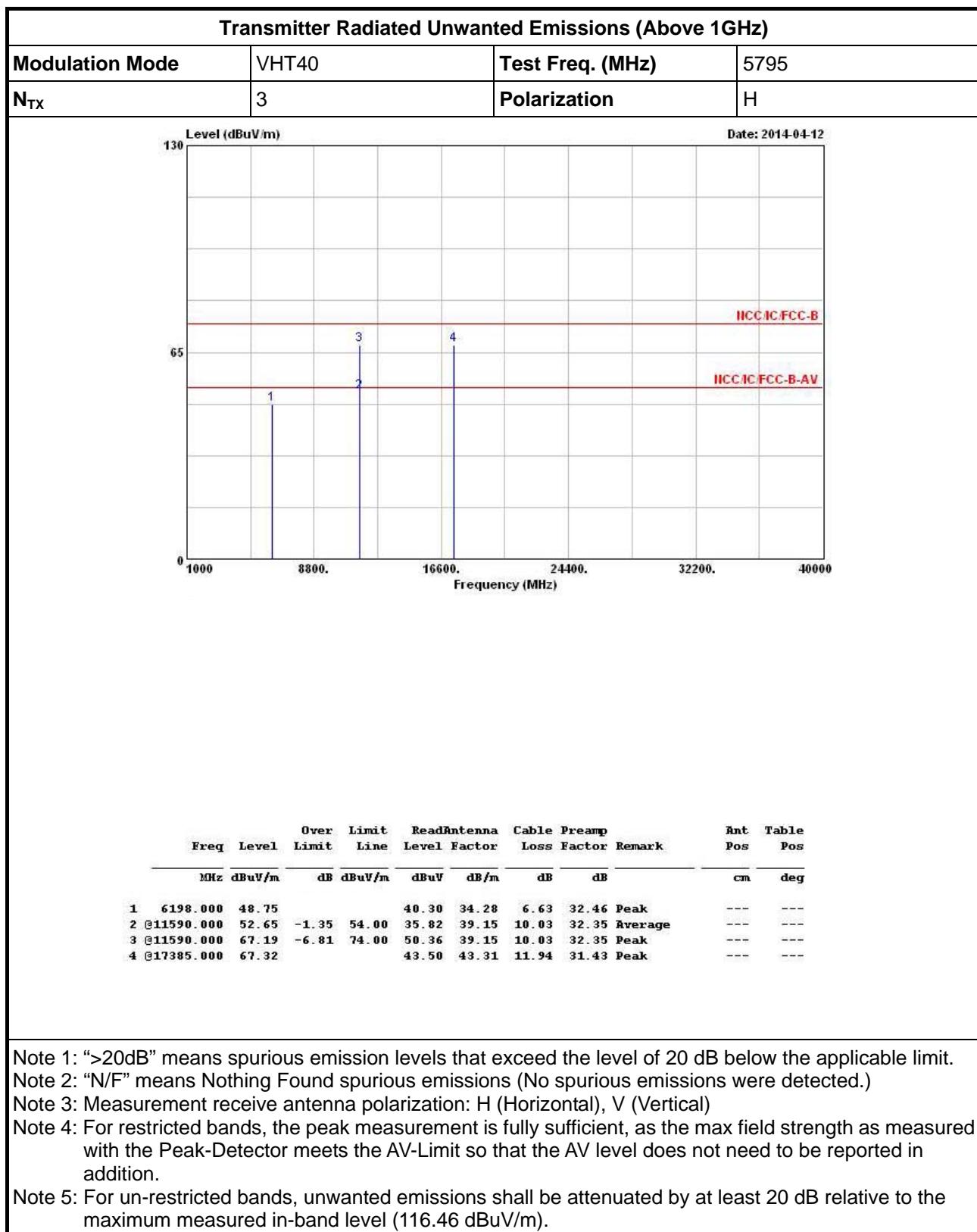


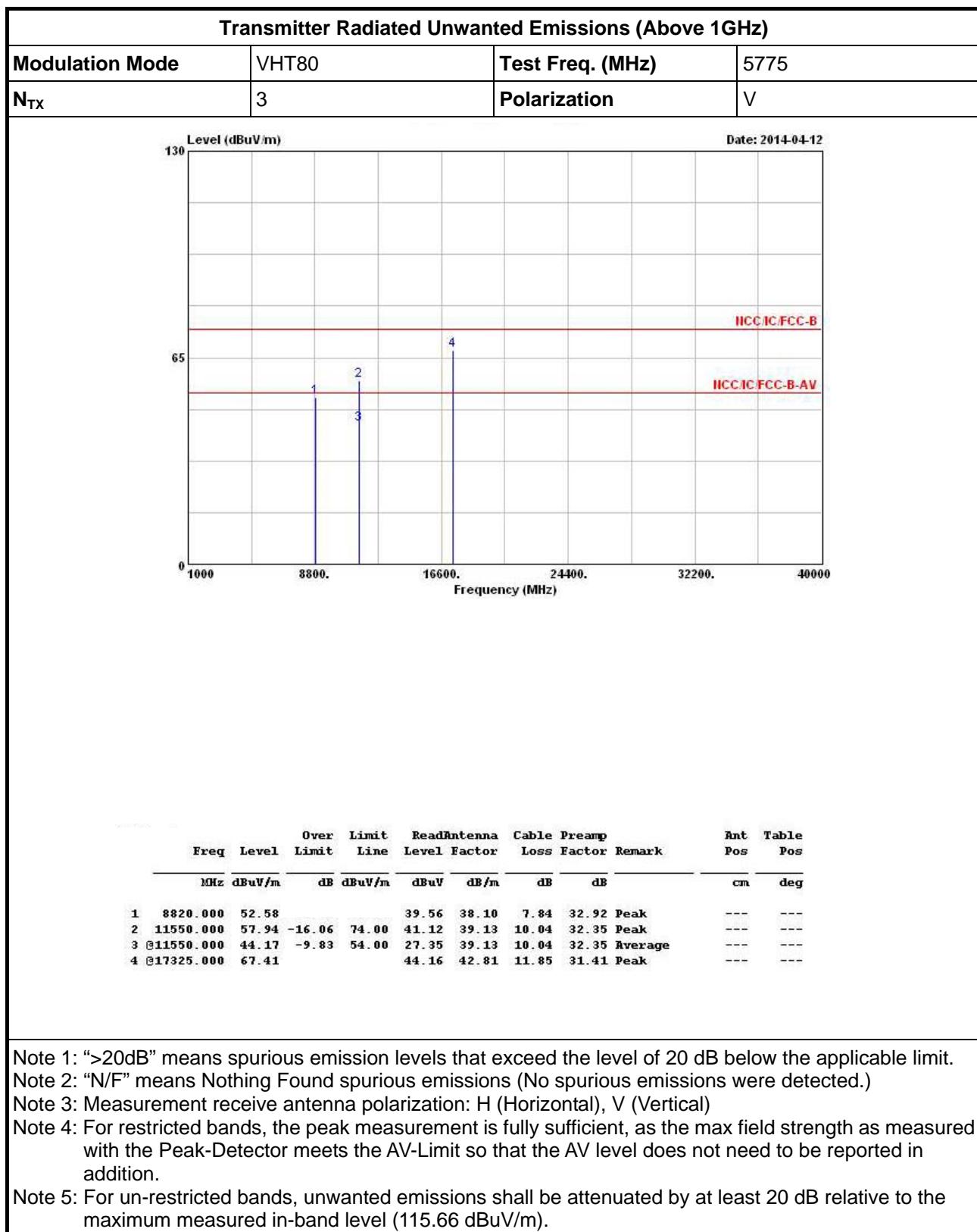


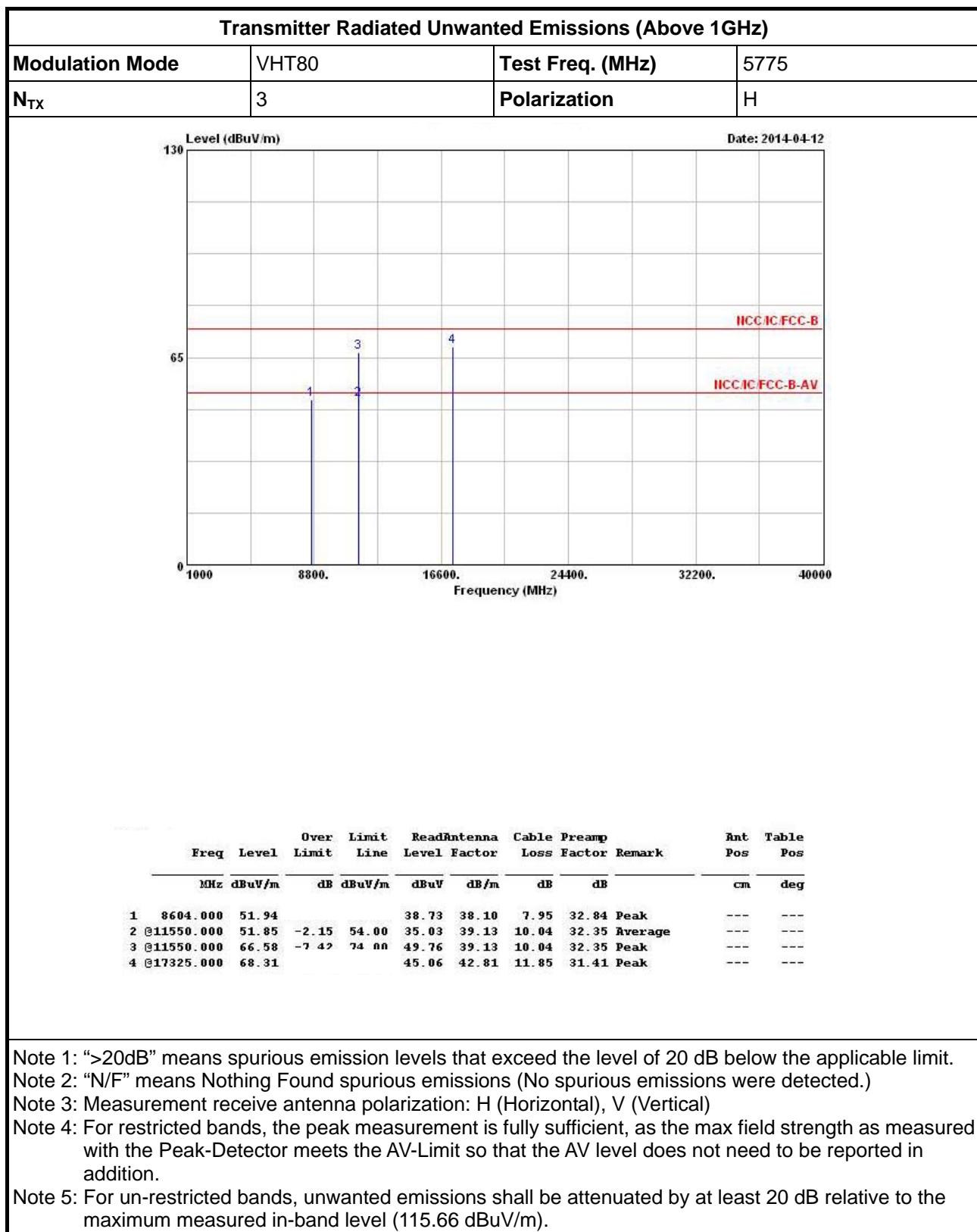














4 Test Equipment and Calibration Data

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
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jun. 27, 2013	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-S	MAB0103-001	-20 ~ 100°C	Nov. 21, 2013	RF Conducted
RF Cable-2m	HUBER+SUHNER	SUCOFLEX_104	SN 345673/4	30MHz ~ 26.5GHz	Dec. 02, 2013	RF Conducted
RF Cable-0.5m	HUBER+SUHNER	SUCOFLEX_103	10715/4 10716/4	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
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Nov. 30, 2013	Radiated Emission
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May 03, 2013	Radiated Emission
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Aug. 20, 2013	Radiated Emission
Spectrum	R&S	FSP40	100004	9kHz ~ 40GHz	Mar. 27, 2014	Radiated Emission
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 21, 2013	Radiated Emission
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	May 31, 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. 16, 2013	Radiated Emission
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec. 11, 2013	Radiated Emission
Turn Table	EM Electronics	EM Electronics	060615	0 ~ 360 degree	N/A	Radiated Emission
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiated Emission

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Amplifier	EM	EM18G40G	060604	18GHz ~ 40GHz	Oct. 17.2013	Radiated Emission
Loop Antenna	TESEQ	HLA 6120	31244	9kHz ~ 30MHz	Dec. 02, 2012	Radiated Emission

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