

# FCC Test Report

Equipment	:	ASUS Tablet
Brand Name	t.	ASUS
Model No.	4	K01G
FCC ID	:	MSQK01G
Standard	:	47 CFR FCC Part 15.407
Operating Band	•	5150 MHz – 5250 MHz 5250 MHz – 5350 MHz 5470 MHz – 5725 MHz 5725 MHz – 5850 MHz
FCC Classification	1	NII
Applicant Manufacturer	:	ASUSTeK COMPUTER INC. 4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN
RF Module	:	BROADCOM / BCM43340
Function	:	<ul> <li>☐ Outdoor AP; ☐ Indoor AP; ☐ Fixed P2P AP</li> <li>☑ Portable Client</li> </ul>

The product sample received on Aug. 08, 2014 and completely tested on Aug. 22, 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





## **Table of Contents**

1	GENERAL DESCRIPTION	5
1.1	Information	5
1.2	Accessories and Support Equipment	8
1.3	Testing Applied Standards	8
1.4	Testing Location Information	9
1.5	Measurement Uncertainty	10
2	TEST CONFIGURATION OF EUT	11
2.1	The Worst Case Modulation Configuration	11
2.2	The Worst Case Power Setting Parameter	11
2.3	The Worst Case Measurement Configuration	13
2.4	Test Setup Diagram	14
3	TRANSMITTER TEST RESULT	16
3.1	AC Power-line Conducted Emissions	16
3.2	Emission Bandwidth	19
3.3	RF Output Power	24
3.4	Peak Power Spectral Density	
3.5	Transmitter Bandedge Emissions	
3.6	Transmitter Unwanted Emissions	42
3.7	Frequency Stability	113
4	TEST EQUIPMENT AND CALIBRATION DATA	115



## Summary of Test Result

Conformance Test Specifications				
ReportRef. Std.ClauseDescription				
1.1.3	15.203	Antenna Requirement	Complied	
3.1	15.207	AC Power-line Conducted Emissions	Complied	
3.2	15.407(a)	Emission Bandwidth	Complied	
3.3	15.407(a)	RF Output Power (Maximum Conducted Output Power)	Complied	
3.4	15.407(a)	Peak Power Spectral Density	Complied	
3.5	15.407(b)	Transmitter Bandedge Emissions	Complied	
3.6	15.407(b)	Transmitter Unwanted Emissions	Complied	
3.7	15.407(g)	Frequency Stability	Complied	



## **Revision History**

Report No.	Version	Description	Issued Date
FR473113AN	Rev. 01	Initial issue of report	Sep. 09, 2014



### **1** General Description

### 1.1 Information

#### 1.1.1 Manufacturer and Factory Information

Manufacturer :	ASUSTeK COMPUTER INC. 4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN	
Factory 1.	COTEK ELECTRONICS (SUZHOU) CO LTD 288 MAYUN RD NEW DISTRICT SUZHOU JIANGSU CHINA	

#### 1.1.2 RF General Information

RF General Information						
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N <sub>⊺x</sub> )	RF Output Power (dBm)	
5150-5250		5180-5240	36-48 [4]	1	13.71	
5250-5350		5260-5320	52-64 [4]	1	15.21	
5470-5725	а	5500-5700	100-140 [8]	1	14.41	
5725-5850		5745-5825	149-165 [5]	1	15.00	
5150-5250		5180-5240	36-48 [4]	1	12.32	
5250-5350		5260-5320	52-64 [4]	1	13.29	
5470-5725	n (HT20)	5500-5700	100-140 [8]	1	12.33	
5725-5850	•	5745-5825	149-165 [5]	1	13.81	
5150-5250		5190-5230	38-46 [2]	1	12.98	
5250-5350		5270-5310	54-62 [2]	1	14.37	
5470-5725	n (HT40)	5510-5670	102-134 [3]	1	12.70	
5725-5850		5755-5795	151-159 [2]	1	14.11	
Note 1: RF output power specifies that Maximum Conducted Output Power. Note 2: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.						



#### 1.1.3 Antenna Information

	Antenna Category				
$\square$	Integral antenna (antenna permanently attached)				
	Temporary RF connector provided				
	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connect measurement. In case of conducted measurements the transmitter shall be connected to t measuring equipment via a suitable attenuator and correct for all losses in the RF path.				

	Antenna General Information				
No.	No. Ant. Cat. Ant. Type Gain (dBi)				
1	Integral	PIFA	-3.76		

### 1.1.4 Type of EUT

	Identify EUT			
EUT	EUT Serial Number N/A			
Pres	sentation of Equipment	Production ;  Pre-Production ;  Prototype		
	Type of EUT			
$\boxtimes$	Stand-alone			
	Combined (EUT where the radio part is fully integrated within another device)			
	Combined Equipment - Brand Name / Model No.:			
	Plug-in radio (EUT intended for a variety of host systems)			
	Host System - Brand Name / Model No.:			
	Other:			

#### 1.1.5 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle				
Operated normally mode for worst duty cycle	Operated normally mode for worst duty cycle			
Operated test mode for worst duty cycle				
Test Signal Duty Cycle (x)Power Duty Factor [dB] - (10 log 1/x)				
⊠ 97.33% - IEEE 802.11a	0.12			
⊠ 97.14% - IEEE 802.11n (HT20)	0.13			
⊠ 91.89% - IEEE 802.11n (HT40)	0.37			



### 1.1.6 EUT Operational Condition

Supply Voltage	AC mains	DC DC	
Type of DC Source	External DC adapter	From system	Li-ion Battery
Test Voltage	🛛 Vnom (3.80 V)	🛛 Vmax (4.18 V)	🛛 Vmin (3.42 V)
Test Climatic	Tnom (20°C)	🖾 Tmax (50°C)	⊠ Tmin (-20°C)



### **1.2 Accessories and Support Equipment**

	Accessories Information				
Brand Name	ASUS	Madal Nama	W12-010N3A		
Vendor	Chicony	woder Name			
Power Rating	I/P: 100-240V~50/60Hz 0.3A; O/P:	5V <b></b> 2A			
Brand Name	ASUS	Madal Nama	AD897320		
Vendor	PI	Nouel Name	AD091320		
Power Rating I/P: 100-240V~50/60Hz 0.3A; O/P: 5V 2A					
Brand Name	ASUS	Madal Nama	C11P1329		
Vendor	SMP	woder name			
Power Rating 3.8V 3948mAh, 15.2Wh					
Brand Name	ASUS	Madal Nama			
Vendor	FOXCONN		CUHD003B-Y11EF		
	Vendor Power Rating Brand Name Vendor Power Rating Brand Name Vendor Power Rating Brand Name Vendor	VendorChiconyPower RatingI/P: 100-240V~50/60Hz 0.3A; O/P:Brand NameASUSVendorPIPower RatingI/P: 100-240V~50/60Hz 0.3A; O/P:Brand NameASUSVendorSMPPower Rating3.8V==3948mAh, 15.2WhBrand NameASUSVendorFOXCONN	VendorChiconyModel NamePower RatingI/P: 100-240V~50/60Hz 0.3A; O/P: 5V2ABrand NameASUSVendorPIPower RatingI/P: 100-240V~50/60Hz 0.3A; O/P: 5V2ABrand NameASUSVendorSMPPower Rating3.8V3948mAh, 15.2WhBrand NameASUSModel NameModel Name		

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

	Support Equipment - AC Conducted and Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID	
1	Notebook	DELL	E5530	-	

### 1.3 Testing Applied Standards

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

- 47 CFR FCC Part 15
- ANSI C63.10-2009
- FCC KDB 789033 D02 v01
- FCC KDB 644545 D03 v01
- FCC KDB 662911 D01 v02r01
- FCC-14-30A1-UNII



### **1.4 Testing Location Information**

	Testing Location						
$\boxtimes$	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 / 45%		
RF Conducted TH01H		TH01HY	lan	23.5°C / 64%			
I	Radiated Err	Radiated Emission 03CH03-HY			Hunter	26.1°C / 45%	



### **1.5 Measurement Uncertainty**

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

Measurement Uncertainty					
Test Item		Uncertainty			
AC power-line conducted emissions		±2.3 dB			
Emission bandwidth, 26dB bandwidth		±1.4 %			
RF output power, conducted		±0.6 dB			
Power density, conducted		±0.8 dB			
Unwanted emissions, conducted	9 – 150 kHz	±0.4 dB			
	0.15 – 30 MHz	±0.4 dB			
	30 – 1000 MHz	±0.5 dB			
	1 – 18 GHz	±0.7 dB			
	18 – 40 GHz	±0.8 dB			
	40 – 200 GHz	N/A			
All emissions, radiated	9 – 150 kHz	±2.5 dB			
	0.15 – 30 MHz	±2.3 dB			
	30 – 1000 MHz	±2.6 dB			
	1 – 18 GHz	±3.6 dB			
	18 – 40 GHz	±3.8 dB			
	40 – 200 GHz	N/A			
Temperature		±0.8 °C			
Humidity		±3 %			
DC and low frequency voltages		±3 %			
Time		±1.4 %			
Duty Cycle		±1.4 %			



## 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 / MC						
11a	1	6-54Mbps	6 Mbps			
HT20	1	MCS 0-7	MCS 0			
HT40	1	MCS 0-7	MCS 0			

### 2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (5150-5250MHz band)						
Test Software Version			ChipC	ontrol_V1.0.0.	6	
			Tes	t Frequency (N	/IHz)	
Modulation Mode	N <sub>TX</sub>	NCB: 20MHz			NCB: 40MHz	
		5180	5200	5240	5190	5230
11a	1	12.5	12.5	14	-	-
HT20	1	10.5	10.5	11	-	-
HT40	1	-	-	-	11.5	11.5

The Worst Case Power Setting Parameter (5250-5350MHz band)							
Test Software Version			ChipC	control_V1.0.0.6	6		
			Tes	t Frequency (N	IHz)		
Modulation Mode	Ν <sub>τx</sub>		NCB: 20MHz			NCB: 40MHz	
		5260	5300	5320	5270	5310	
11a	1	14	14	14	-	-	
HT20	1	12	12	11.5	-	-	
HT40	1	-	-	-	12	13	

The Worst Case Power Setting Parameter (5470-5725MHz band)								
Test Software Version			(	ChipControl_	V1.0.0.6			
				Test Frequ	iency (MHz)			
Modulation Mode	N <sub>TX</sub>		NCB: 20MHz			NCB: 40MHz		
		5500	5580	5700	5510	5550	5670	
11a	1	13.5	13.5	11	-	-	-	
HT20	1	11.5	11.5	10.5	-	-	-	
HT40	1	-	-	-	11.5	11.5	12	



The Worst Case Power Setting Parameter (5725-5850MHz band)						
<b>Test Software Version</b>			ChipC	ontrol_V1.0.0.6	6	
		Test Frequency (MHz)				
Modulation Mode	Ντχ	NCB: 20MHz			NCB: 40MHz	
		5745	5785	5825	5755	5795
11a	1	13	14	14	-	-
HT20	1	13	13	13	-	-
HT40	1	-	-	-	13	13



### 2.3 The Worst Case Measurement Configuration

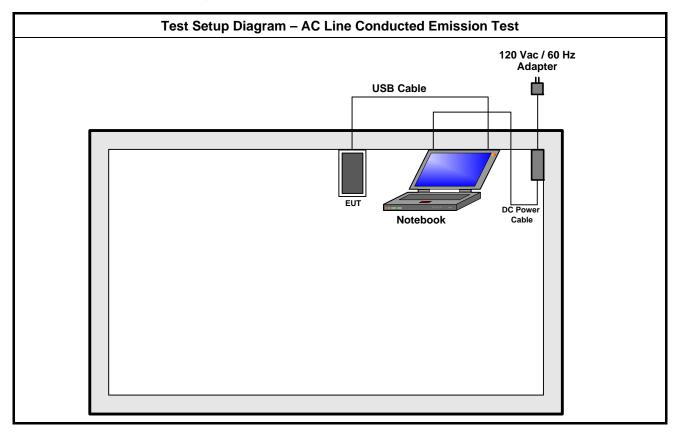
Th	The Worst Case Mode for Following Conformance Tests				
Tests Item         AC power-line conducted emissions					
Condition         AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz					
Operating Mode	Operating Mode Description				
1	USB mode and transmit				
2	2 Adapter mode and transmit				
For operating mode 1 is th	e worst case and it was record in this test report.				

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

Th	e Worst Case Mode for Fo	ollowing Conformance Te	sts	
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions			
Test Condition	regardless of spatial multi	antenna assembly (multiple plexing MIMO configuratior antenna gain of each anten	n), the radiated test should	
	EUT will be placed in	fixed position.		
User Position	EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes. The worst planes is X.			
	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.			
Operating Mode	Operating Mode Description	n		
1	USB mode and transmit			
2	Adapter mode and transm	it		
For operating mode 1 is th	e worst case and it was rec	ord in this test report.		
Modulation Mode	11a, HT20, HT40			
	X Plane	Y Plane	Z Plane	
Orthogonal Planes of EUT				

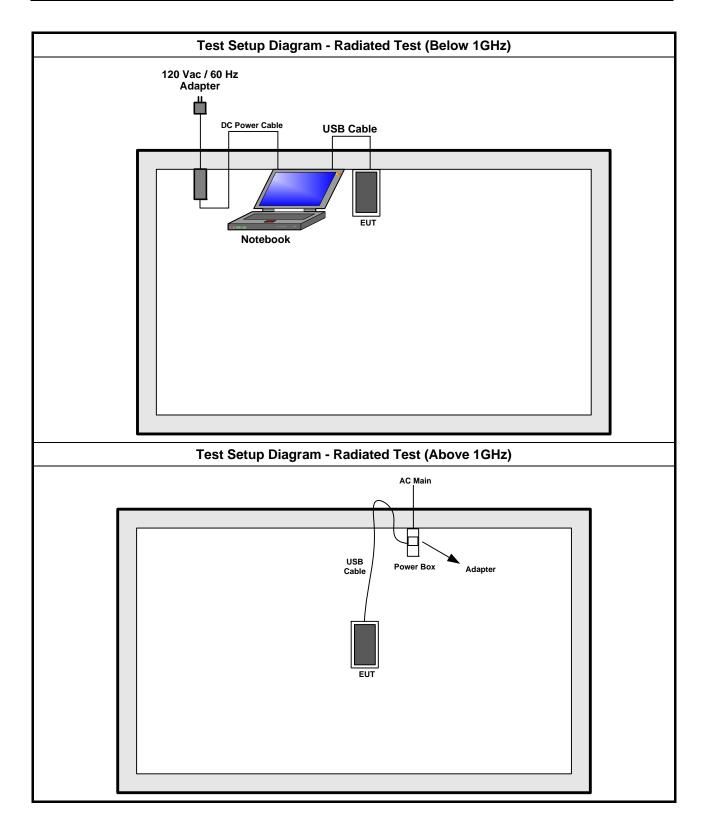


### 2.4 Test Setup Diagram











#### **Transmitter Test Result** 3

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

creases with the logarithm of the frequency

#### 3.1.2 Measuring Instruments

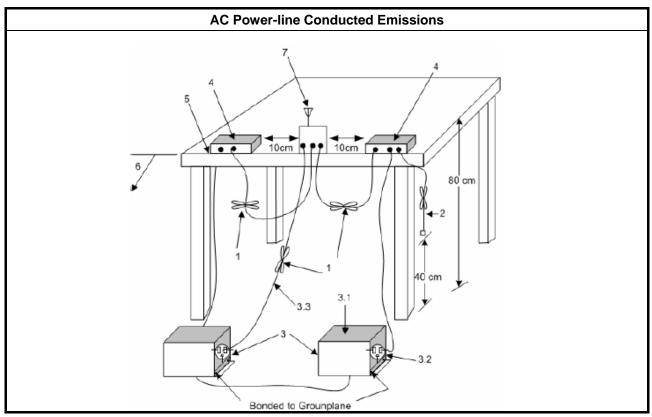
Refer a test equipment and calibration data table in this test report.

#### 3.1.3 Test Procedures

**Test Method** 

Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions.

#### 3.1.4 **Test Setup**



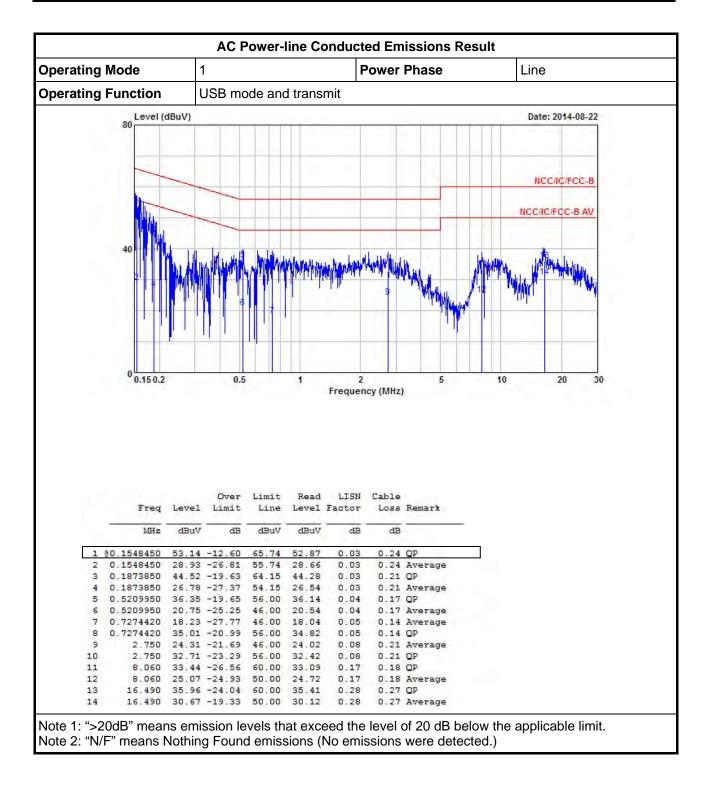


perating Mode		1			P	ower F	Phase		Neutr	al	
erating Function	ι	JSB mo	de and	transı	nit						
Level (	dBuV)			· · · · ·					Dat	e: 2014-08	3-22
00											
		_							N	CC/IC/FCC	:-B
			-						in	and a	
		~					-		NCC/	IC/FCC-B	AV
						-					
40						L I				alte	_
	W. ale	n MAA	A MAN	A worthwest	howwith	AL ALLAND	Mbra.	MAN	MAL N	Marken	
	- WAAR	an chird	14. W. H.	1.1.1	1 defie alt		THAT	J T	P WWW	12	44
	- 4		8		3	•	TMANUL		1		1
								¶"		-	_
					_						
											_
0											
0 0.15 0.2		0.5		1	2 Frequen	cv (MHz)	5		10	20	30
0.150.2		0.5		1	2 Frequen	cy (MHz)			10	20	30
0 0.15 0.2		0.5		1		cy (MHz)			10	20	30
0.150.2		0.5		1		cy (MHz)			10	20	30
0 0.150.2		0.5		1		cy (MHz)			10	20	30
0.150.2		0.5		1		cy (MHz)			10	20	30
0.150.2		0.5		1		cy (MHz)			10	20	30
0 0.150.2		0.5 Over	Limit	1 Read	Frequen	cy (MHz) Cable			10	20	30
0 0.150.2 Freq	Level		Limit Line	Read	Frequen	Cable			10	20	30
	Level	Over		Read	Frequen	Cable			10	20	30
Freq	dBuV	Over Limit	Line dBuV	Read Level dBuV	LISN Factor dB	Cable Loss dB	Remark		10	20	30
Freq MHz	dBuV	Over Limit dB	Line	Read Level dBuV 52.08	Frequen LISN Factor	Cable Loss dB 0.24	Remark		10	20	30
Freq MHz 1 0.1540270 2 0.1540270 3 0.2061360	dBuV 52.34 30.15 27.78	Over Limit dB -13.44 -25.63 -25.58	Line dBuV 65.78 55.78 53.36	Read Level dBuV 52.08 29.89 27.56	LISN Factor dB 0.02 0.02 0.02	Cable Loss dB 0.24 0.24 0.20	Remark OP Average Average		10	20	30
Freq MHz 1 0.1540270 2 0.1540270 3 0.2061360 4 0.2061360	dBuV 52.34 30.15 27.78 44.99	Over Limit dB -13.44 -25.63 -25.58 -18.37	Line dBuV 65.78 55.78 53.36 63.36	Read Level dBuV 52.08 29.89 27.56 44.77	LISN Factor dB 0.02 0.02 0.02 0.02	Cable Loss dB 0.24 0.24 0.20 0.20	Remark OP Average Average OP		10	20	30
Freq MHz 1 0.1540270 2 0.1540270 3 0.2061360 4 0.2061360 5 0.5182420	dBuV 52.34 30.15 27.78 44.99 21.21	Over Limit dB -13.44 -25.63 -25.58 -18.37 -24.79	Line dBuV 65.78 55.78 53.36 63.36 46.00	Read Level dBuV 52.08 29.89 27.56 44.77 21.00	ELISN Factor dB 0.02 0.02 0.02 0.02 0.02 0.02 0.04	Cable Loss dB 0.24 0.24 0.20 0.20 0.20	Remark OP Average Average OP Average		10	20	30
Freq MHz 1 0.1540270 2 0.1540270 3 0.2061360 4 0.2061360 5 0.5182420 6 0.5182420	dBuV 52.34 30.15 27.78 44.99 21.21 36.53	Over Limit dB -13.44 -25.53 -25.58 -18.37 -24.79 -19.47	Line dBuV 65.78 55.78 53.36 63.36 46.00 56.00	Read Level dBuV 52.08 29.89 27.56 44.77 21.00 36.32	LISN Factor dB 0.02 0.02 0.02 0.02 0.02 0.04 0.04	Cable Loss dB 0.24 0.20 0.20 0.20 0.17 0.17	Remark OP Average OP Average OP		10	20	30
Freq MHz 1 0.1540270 2 0.1540270 3 0.2061360 4 0.2061360 5 0.5182420	dBuV 52.34 30.15 27.78 44.99 21.21 36.53 34.77	Over Limit dB -13.44 -25.63 -25.58 -18.37 -24.79 -19.47 -21.23	Line dBuV 65.78 55.78 53.36 63.36 46.00 56.00 56.00	Read Level dBuV 52.08 29.89 27.56 44.77 21.00 36.32	LISN Factor dB 0.02 0.02 0.02 0.02 0.02 0.02 0.04 0.04	Cable Loss dB 0.24 0.20 0.20 0.20 0.17 0.17 0.13	Remark OP Average OP Average OP QP QP		10	20	30
Freq MHz 1 0.1540270 2 0.1540270 3 0.2061360 4 0.2061360 5 0.5182420 6 0.5182420 7 0.7430230 8 0.7430230	dBuV 52.34 30.15 27.78 44.99 21.21 36.53 34.77 23.87	Over Limit dB -13.44 -25.63 -25.58 -18.37 -24.79 -19.47 -21.23	Line dBuV 65.78 55.78 53.36 63.36 46.00 56.00 56.00 46.00	Read Level dBuV 52.08 29.89 27.56 44.77 21.00 36.32 34.60 23.70	LISN Factor dB 0.02 0.02 0.02 0.02 0.02 0.02 0.02 0.0	Cable Loss dB 0.24 0.20 0.20 0.20 0.20 0.17 0.13 0.13	Remark OP Average OP Average OP		10	20	30
Freq MHz 1 0.1540270 2 0.1540270 3 0.2061360 4 0.2061360 5 0.5182420 6 0.5182420 6 0.5182420 7 0.7430230 8 0.7430230 9 2.200 10 2.200	dBuV 52.34 30.15 27.78 44.99 21.21 36.53 34.77 23.87 24.12 35.02	Over Limit dB -13.44 -25.63 -25.58 -18.37 -24.79 -19.47 -21.23 -22.13 -22.13 -22.88 -20.98	Line dBuV 65.78 55.78 53.36 63.36 46.00 56.00 46.00 46.00 56.00	Read Level dBuV 52.08 29.89 27.56 44.77 21.00 36.32 34.60 23.79 34.69	LISN Factor dB 0.02 0.02 0.02 0.02 0.02 0.02 0.02 0.0	Cable Loss dB 0.24 0.20 0.20 0.17 0.17 0.13 0.13 0.27 0.27	Remark OP Average Average OP Average OP Average OP		10	20	30
Freq MHz 1 0.1540270 2 0.1540270 3 0.2061360 4 0.2061360 5 0.5182420 6 0.5182420 7 0.7430230 8 0.7430230 9 2.200 10 2.200 11 16.930	dBuV 52.34 30.15 27.78 44.99 21.21 36.53 34.77 23.87 24.12 35.02 34.58	Over Limit dB -13.44 -25.63 -25.58 -18.37 -24.79 -19.47 -21.23 -22.13 -21.88	Line dBuV 65.78 55.78 53.36 63.36 46.00 56.00 46.00 46.00 46.00 56.00 60.00	Read Level dBuV 52.08 29.89 27.56 44.77 21.00 36.32 34.60 23.70 34.69 34.03	LISN Factor dB 0.02 0.02 0.02 0.02 0.02 0.02 0.02 0.0	Cable Loss dB 0.24 0.20 0.20 0.17 0.17 0.13 0.13 0.27 0.27 0.26	Remark OP Average Average OP Average OP Average OP		10	20	30

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









### 3.2 Emission Bandwidth

#### 3.2.1 Emission Bandwidth Limit

Emission Bandwidth Limit							
UNII Devices							
For the 5.15-5.25 GHz band, N/A							
For the 5.25-5.35 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.							
For the 5.47-5.725 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.							
For the 5.725-5.85 GHz band, 6 dB emission bandwidth $\geq$ 500kHz.							

#### **3.2.2 Measuring Instruments**

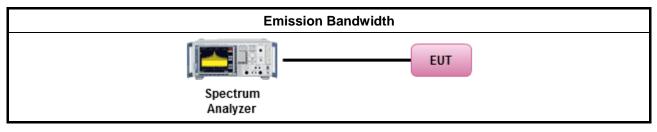
Refer a test equipment and calibration data table in this test report.

#### 3.2.3 Test Procedures

	Test Method										
$\square$	For the emission bandwidth shall be measured using one of the options below:										
	$\boxtimes$	Refer as FCC KDB 789033 D02 v01, clause C for EBW and clause D for OBW measurement.									
		Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.									
		Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.									
$\square$	For	conducted measurement.									
	$\boxtimes$	The EUT supports single transmit chain and measurements performed on this transmit chain.									
		The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.									
		The EUT supports multiple transmit chains using options given below:									
		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.									
		Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.									



#### 3.2.4 Test Setup



#### 3.2.5 Test Result of Emission Bandwidth

UNII Emission Bandwidth Result (5150-5250MHz band)							
Condit	ion		Emission Bandwidth (MHz)				
Modulation Mode	Ντχ	Freq. (MHz)	99% Bandwidth	26dB Bandwidth			
11a	1	5180	16.36	18.62			
11a	1	5200	16.44	18.62			
11a	1	5240	16.46	18.62			
HT20	1	5180	17.51	18.95			
HT20	1	5200	17.51	18.85			
HT20	1	5240	17.61	19.05			
HT40	1	5190	36.14	40.04			
HT40	1	5230	36.10	39.92			
Resu	lt		Co	mplied			

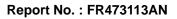
	UNII Emission Bandwidth Result (5250-5350MHz band)							
Condit	ion		Emission Bandwidth (MHz)					
Modulation Mode	Ντχ	Freq. (MHz)	99% Bandwidth	26dB Bandwidth				
11a	1	5260	16.36	18.35				
11a	1	5300	16.49	19.25				
11a	1	5320	16.44	19.35				
HT20	1	5260	17.54	18.85				
HT20	1	5300	17.61	19.02				
HT20	1	5320	17.49	18.90				
HT40	1	5270	36.18	40.52				
HT40	1	5310	36.18	40.28				
Resu	ılt		Co	mplied				



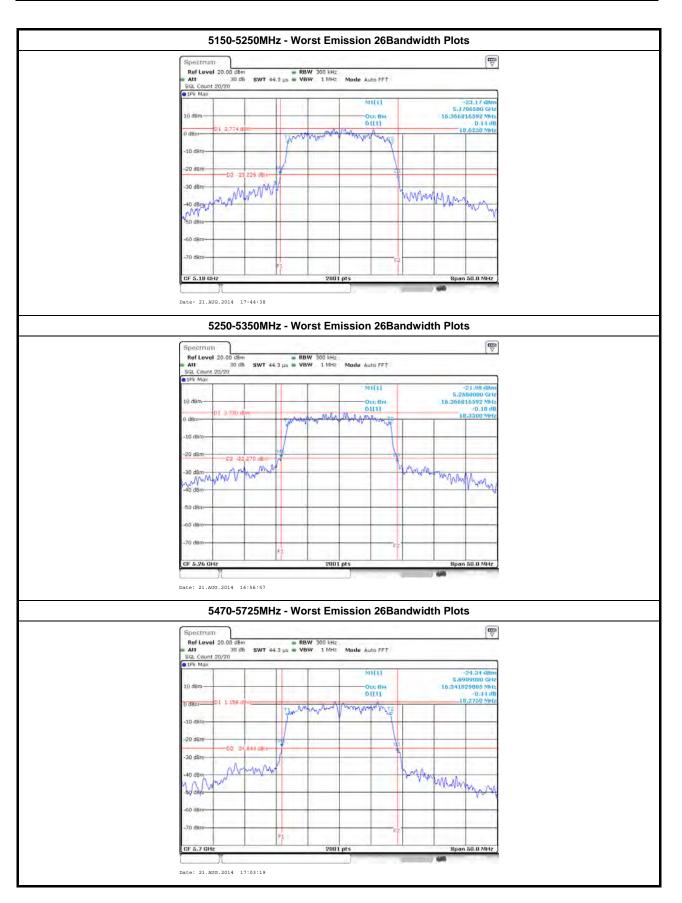
SPORTON LAB.

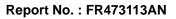
	UNII Emission Bandwidth Result (5470-5725MHz band)							
Condit	ion		Emission Bandwidth (MHz)					
Modulation Mode	Ντχ	Freq. (MHz)	99% Bandwidth	26dB Bandwidth				
11a	1	5500	16.46	18.80				
11a	1	5580	16.41	18.55				
11a	1	5700	16.34	18.27				
HT20	1	5500	17.51	19.10				
HT20	1	5580	17.49	18.95				
HT20	1	5700	17.51	18.95				
HT40	1	5510	36.14	40.24				
HT40	1	5550	36.10	39.88				
HT40	1	5670	36.10	39.96				
Resu	lt		Com	plied				

	UNII Emission Bandwidth Result (5725-5850MHz band)							
Condit	ion		Emission Bandwidth (MHz)					
Modulation Mode	Ντχ	Freq. (MHz)	99% Bandwidth	6dB Bandwidth				
11a	1	5745	16.40	16.32				
11a	1	5785	16.32	16.32				
11a	1	5825	16.35	16.30				
HT20	1	5745	17.54	17.59				
HT20	1	5785	17.51	17.35				
HT20	1	5825	17.52	17.56				
HT40	1	5755	36.06	36.28				
HT40	1	5795	36.06	36.32				
Limi	t		-	≥ 500 kHz				
Resu	lt		Con	nplied				

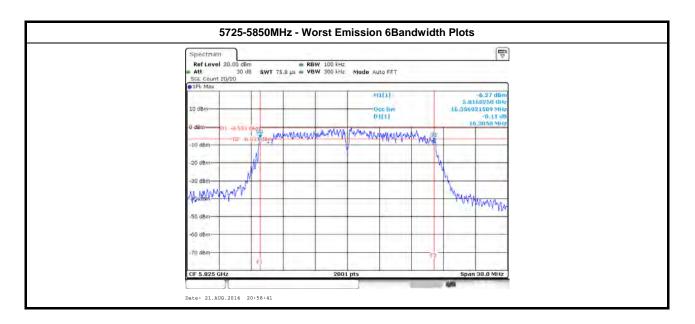














### 3.3 **RF Output Power**

#### 3.3.1 RF Output Power Limit

		Maximum Conducted Output Power Limit									
UN	UNII Devices										
$\square$	For the 5.15-5.25 GHz band:										
		Outdoor AP: the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W. If $G_{TX}$ > 6 dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ . e.i.r.p. at any elevation angle above 30 degrees $\leq 125$ mW [21dBm]									
		Indoor AP: the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W. If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$									
		Point-to-point AP: the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W If $G_{TX} > 23$ dBi, then $P_{Out} = 30 - (G_{TX} - 23)$ .									
	$\boxtimes$	Mobile or Portable Client: the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 250 mW. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$ .									
$\boxtimes$	250	the 5.25-5.35 GHz band, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then = 24 - ( $G_{TX} - 6$ ).									
$\boxtimes$	of 2	the 5.47-5.725 GHz band, the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser 50 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then = 24 - ( $G_{TX} - 6$ ).									
$\square$	For	the 5.725-5.85 GHz band:									
		Point-to-multipoint systems (P2M): the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W. If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ .									
		Point-to-point systems (P2P): the maximum conducted output power ( $P_{Out}$ ) shall not exceed the lesser of 1 W.									
		aximum conducted output power in dBm, e maximum transmitting antenna directional gain in dBi.									

#### 3.3.2 Measuring Instruments

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

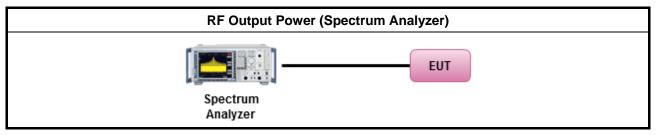
#### 3.3.3 Test Procedures

		Test Method
$\boxtimes$	Мах	imum Conducted Output Power
	[dut	y cycle ≥ 98% or external video / power trigger]
		Refer as FCC KDB 789033 D02 v01, clause E Method SA-1 (spectral trace averaging).
		Refer as FCC KDB 789033 D02 v01, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)
	duty	r cycle < 98% and average over on/off periods with duty factor
	$\boxtimes$	Refer as FCC KDB 789033 D02 v01, clause E Method SA-2 (spectral trace averaging).
		Refer as FCC KDB 789033 D02 v01, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)



	Wid	eband RF power meter and average over on/off periods with duty factor
		Refer as FCC KDB 789033 D02 v01, clause E Method PM (using an RF average power meter).
$\boxtimes$	For	conducted measurement.
	$\boxtimes$	The EUT supports single transmit chain and measurements performed on this transmit chain.
		The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
		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.
		If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP <sub>total</sub> = P <sub>total</sub> + DG

### 3.3.4 Test Setup





Maximum Conducted Output Power (5150-5250MHz band)								
Modulation Mode	Ντχ	Freq. (MHz)	Output Power (dBm)	Antenna Gain (dBi)	Power Limit			
11a	1	5180	13.30	-3.76	24.00			
11a	1	5200	13.61	-3.76	24.00			
11a	1	5240	13.71	-3.76	24.00			
HT20	1	5180	11.81	-3.76	24.00			
HT20	1	5200	11.68	-3.76	24.00			
HT20	1	5240	12.32	-3.76	24.00			
HT40	1	5190	12.68	-3.76	24.00			
HT40	1	5230	12.98	-3.76	24.00			
Resu	ılt			Complied				

### 3.3.5 Test Result of Maximum Conducted Output Power

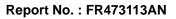
Maximum Conducted Output Power (5250-5350MHz band)								
Modulation Mode	Ντχ	Freq. (MHz)	Output Power (dBm)	Antenna Gain (dBi)	Power Limit			
11a	1	5260	15.21	-3.76	21.00			
11a	1	5300	15.10	-3.76	21.00			
11a	1	5320	15.04	-3.76	21.00			
HT20	1	5260	13.13	-3.76	21.00			
HT20	1	5300	13.29	-3.76	21.00			
HT20	1	5320	12.27	-3.76	21.00			
HT40	1	5270	13.38	-3.76	21.00			
HT40	1	5310	14.37	-3.76	21.00			
Result				Complied				



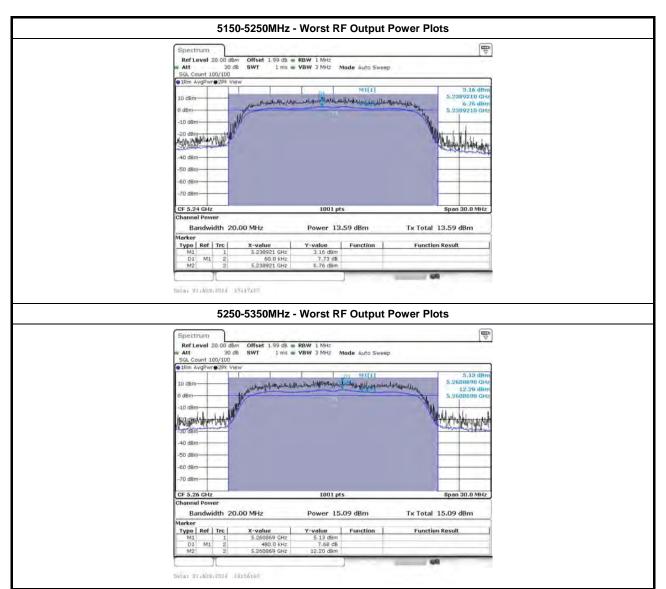


Maximum Conducted Output Power (5470-5725MHz band)					
Modulation Mode	Ντχ	Freq. (MHz)	Output Power (dBm)	Antenna Gain (dBi)	Power Limit
11a	1	5500	14.35	-3.76	21.00
11a	1	5580	14.41	-3.76	21.00
11a	1	5700	12.70	-3.76	21.00
HT20	1	5500	12.33	-3.76	21.00
HT20	1	5580	12.29	-3.76	21.00
HT20	1	5700	11.55	-3.76	21.00
HT40	1	5510	12.67	-3.76	21.00
HT40	1	5550	12.70	-3.76	21.00
HT40	1	5670	12.64	-3.76	21.00
Result				Complied	

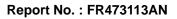
Maximum Conducted Output Power (5725-5850MHz band)						
Modulation Mode	Ντχ	Freq. (MHz)	Output Power (dBm)	Antenna Gain (dBi)	Power Limit	
11a	1	5745	13.92	-3.76	30.00	
11a	1	5785	15.00	-3.76	30.00	
11a	1	5825	14.90	-3.76	30.00	
HT20	1	5745	13.81	-3.76	30.00	
HT20	1	5785	13.80	-3.76	30.00	
HT20	1	5825	13.79	-3.76	30.00	
HT40	1	5755	14.06	-3.76	30.00	
HT40	1	5795	14.11	-3.76	30.00	
Resu	ılt			Complied		







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







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



### 3.4 Peak Power Spectral Density

#### 3.4.1 Peak Power Spectral Density Limit

	Peak Power Spectral Density Limit							
UN	UNII Devices							
$\boxtimes$	For the 5.15-5.25 GHz band:							
	Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. I $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .							
	Indoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. I $G_{TX} > 6$ dBi, then $P_{Out} = 17 - (G_{TX} - 6)$ .							
	Point-to-point AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 23$ dBi, then $P_{Out} = 17 - (G_{TX} - 23)$ .							
	Mobile or Portable Client: the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If G <sub>TX</sub> > 6 dBi then PPSD= 11 - (G <sub>TX</sub> - 6).							
$\square$	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If G <sub>TX</sub> > 6 dBi then PPSD= 11 – (G <sub>TX</sub> – 6).							
	For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) $\leq$ 11 dBm/MHz. If G <sub>TX</sub> > 6 dBi then PPSD= 11 - (G <sub>TX</sub> - 6).							
$\square$	For the 5.725-5.85 GHz band:							
	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) $\leq$ 30 dBm/500kHz. I $G_{TX} > 6$ dBi, then PPSD= 30 – ( $G_{TX} - 6$ ).							
	Point-to-point systems (P2P): the peak power spectral density (PPSD) $\leq$ 30 dBm/500kHz.							
pov	<b>PPSD</b> = peak power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz $G_{Tx}$ = the maximum transmitting antenna directional gain in dBi.							

#### 3.4.2 Measuring Instruments

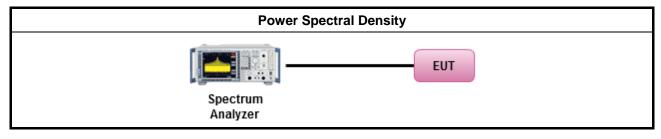
Refer a test equipment and calibration data table in this test report.



#### 3.4.3 Test Procedures

		Test Method
$\boxtimes$	outp func	a power spectral density procedures that the same method as used to determine the conducted ut power shall be used to determine the peak power spectral density and use the peak search ion on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density be measured using below options:
		Refer as FCC KDB 789033 D02 v01, F)5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth
	[duty	cycle ≥ 98% or external video / power trigger]
		Refer as FCC KDB 789033 D02 v01, clause E Method SA-1 (spectral trace averaging).
		Refer as FCC KDB 789033 D02 v01, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)
	duty	cycle < 98% and average over on/off periods with duty factor
	$\square$	Refer as FCC KDB 789033 D02 v01, clause E Method SA-2 (spectral trace averaging).
		Refer as FCC KDB 789033 D02 v01, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
$\square$	For	conducted measurement.
	$\boxtimes$	The EUT supports single transmit chain and measurements performed on this transmit chain.
		The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
		The EUT supports multiple transmit chains using options given below:
		Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
		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.
		If multiple transmit chains, EIRP PPSD calculation could be following as methods: $PPSD_{total} = PPSD_1 + PPSD_2 + + PPSD_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = PPSD_{total} + DG$
		Each individually PPSD plots refer as test report clause 3.3.5 with each individually PPSD plots.

### 3.4.4 Test Setup





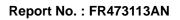
	Peak Power Spectral Density Result (5150-5250MHz band)						
Modulation Mode	Ντχ	Freq. (MHz)	Peak Power Spectral Density (dBm)	PSD Limit	Antenna Gain (dBi)		
11a	1	5180	3.12	11.00	-3.76		
11a	1	5200	3.58	11.00	-3.76		
11a	1	5240	3.79	11.00	-3.76		
HT20	1	5180	1.63	11.00	-3.76		
HT20	1	5200	1.53	11.00	-3.76		
HT20	1	5240	2.05	11.00	-3.76		
HT40	1	5190	-0.64	11.00	-3.76		
HT40	1	5230	-0.55	11.00	-3.76		
Result				Complied			

	Peak Power Spectral Density Result (5250-5350MHz band)						
Modulation Mode	Ντχ	Freq. (MHz)	Peak Power Spectral Density (dBm)	PSD Limit	Antenna Gain (dBi)		
11a	1	5260	4.41	11.00	-3.76		
11a	1	5300	4.29	11.00	-3.76		
11a	1	5320	4.21	11.00	-3.76		
HT20	1	5260	3.08	11.00	-3.76		
HT20	1	5300	3.23	11.00	-3.76		
HT20	1	5320	2.18	11.00	-3.76		
HT40	1	5270	0.86	11.00	-3.76		
HT40	1	5310	1.61	11.00	-3.76		
Resu	Result			Complied			

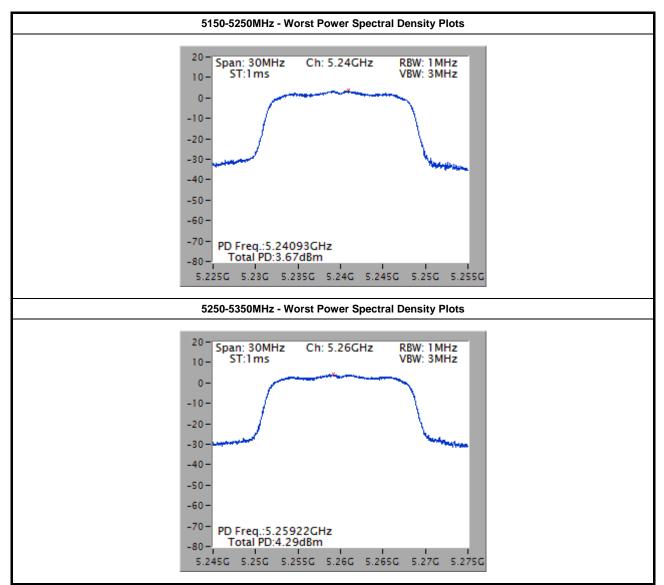


Peak Power Spectral Density Result (5470-5725MHz band)						
Modulation Mode	Ντχ	Freq. (MHz)	Peak Power Spectral Density (dBm)	PSD Limit	Antenna Gain (dBi)	
11a	1	5500	4.45	11.00	-3.76	
11a	1	5580	4.51	11.00	-3.76	
11a	1	5700	2.71	11.00	-3.76	
HT20	1	5500	2.14	11.00	-3.76	
HT20	1	5580	2.31	11.00	-3.76	
HT20	1	5700	1.40	11.00	-3.76	
HT40	1	5510	-0.18	11.00	-3.76	
HT40	1	5550	0.11	11.00	-3.76	
HT40	1	5670	-0.20	11.00	-3.76	
Result				Complied	·	

Peak Power Spectral Density Result (5725-5850MHz band)						
Modulation Mode	Ντχ	Freq. (MHz)	Peak Power Spectral Density (dBm)	PSD Limit (500kHz)	Antenna Gain (dBi)	
11a	1	5745	8.26	30.00	-3.76	
11a	1	5785	9.36	30.00	-3.76	
11a	1	5825	8.62	30.00	-3.76	
HT20	1	5745	7.84	30.00	-3.76	
HT20	1	5785	7.32	30.00	-3.76	
HT20	1	5825	6.89	30.00	-3.76	
HT40	1	5755	5.29	30.00	-3.76	
HT40	1	5795	5.37	30.00	-3.76	
Result				Complied		



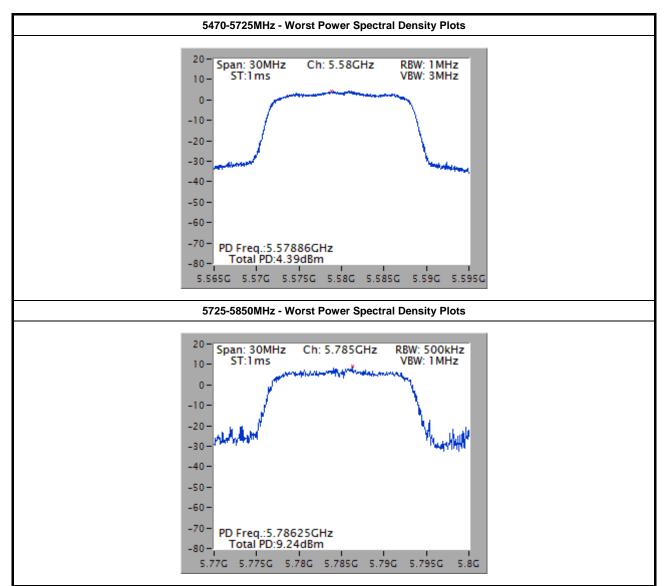




Note 1: Power Density Plots w/o Duty Factor





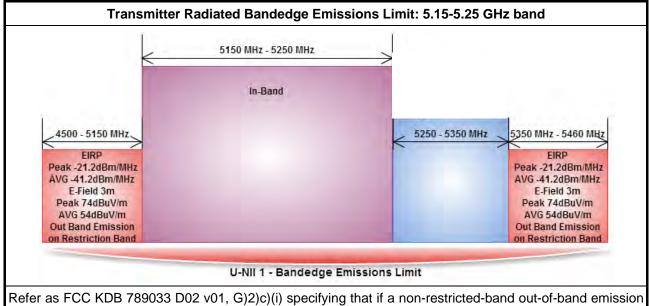


Note 1: Power Density Plots w/o Duty Factor

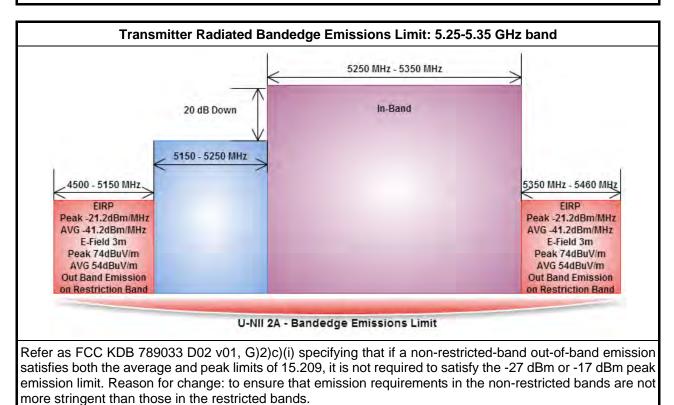


### 3.5 Transmitter Bandedge Emissions

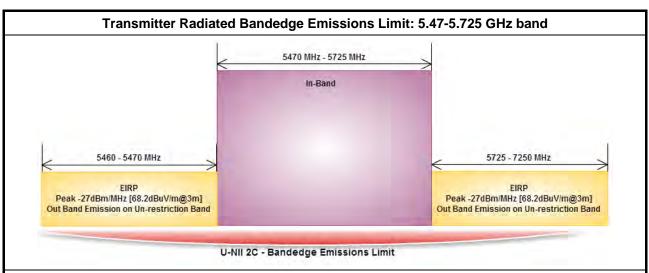
#### 3.5.1 Transmitter Radiated Bandedge Emissions Limit



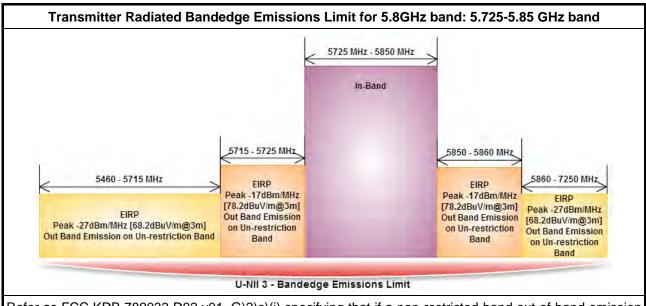
Refer as FCC KDB 789033 D02 v01, G)2)c)(i) specifying that if a non-restricted-band out-of-band emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm or -17 dBm peak emission limit. Reason for change: to ensure that emission requirements in the non-restricted bands are not more stringent than those in the restricted bands.







Refer as FCC KDB 789033 D02 v01, G)2)c)(i) specifying that if a non-restricted-band out-of-band emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm or -17 dBm peak emission limit. Reason for change: to ensure that emission requirements in the non-restricted bands are not more stringent than those in the restricted bands.



Refer as FCC KDB 789033 D02 v01, G)2)c)(i) specifying that if a non-restricted-band out-of-band emission satisfies both the average and peak limits of 15.209, it is not required to satisfy the -27 dBm or -17 dBm peak emission limit. Reason for change: to ensure that emission requirements in the non-restricted bands are not more stringent than those in the restricted bands.

## 3.5.2 Measuring Instruments

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

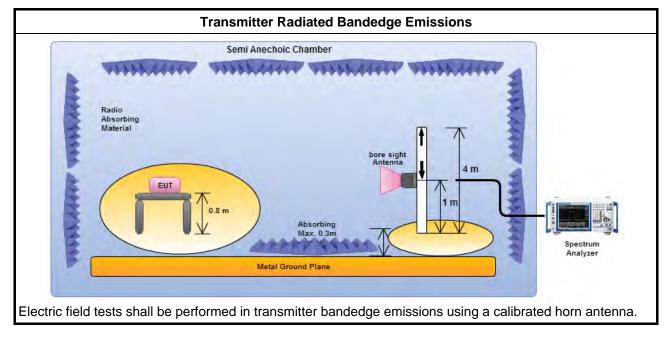


## 3.5.3 Test Procedures

	Test Method
$\square$	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
$\boxtimes$	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.
	If EUT operate in adjacent contiguous bands, bandedge testing performed at the lowest frequency channel at lower-band and highest frequency channel at higher-band. Transmitter in-band emissions will consist of adjacent contiguous bands (e.g., IEEE 802.11ac VHT160 The lowest frequency channel at lower-band and highest frequency channel at higher-band in-band emissions will consist of two adjacent contiguous bands.)
	Operating in 5.15-5.25 GHz band (lower-band) and 5.25-5.35 GHz band (higher-band).
	Operating in 5.47-5.725 GHz band (lower-band) and 5.725-5.85 GHz band (higher-band).
	If EUT operate in individual non-contiguous bands, bandedge testing performed at the lowest frequency channel and highest frequency channel within lower-band and higher-band. (e.g., (e.g., IEEE 802.11ac VHT160)
	Operating in 5.25-5.35 GHz band (lower-band) and 5.47-5.725 GHz band (higher-band).
	Operating in 5.15-5.25 GHz band (lower-band) and 5.725-5.85 GHz band (higher-band).
$\square$	For the transmitter unwanted emissions shall be measured using following options below:
	Refer as FCC KDB 789033 D02 v01, clause G)2) for unwanted emissions into non-restricted bands.
	Refer as FCC KDB 789033 D02 v01, clause G)1) for unwanted emissions into restricted bands.
	Refer as FCC KDB 789033 D02 v01, G)6) Method AD (Trace Averaging).
	Refer as FCC KDB 789033 D02 v01, G)6) Method VB (Reduced VBW).
	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq$ 1/T, where T is pulse time.
	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
	Refer as FCC KDB 789033 D02 v01, clause G)5) measurement procedure peak limit.
	Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.
$\square$	For the transmitter bandedge emissions shall be measured using following options below:
	Refer as FCC KDB 789033 D02 v01, clause G)3)d) for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
	Refer as ANSI C63.10, clause 6.9.2 for band-edge testing.
	Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements.
$\square$	For radiated measurement, refer as ANSI C63.10, clause 6.6. Test distance is 3m.
	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements). Measurements in the bandedge are typically made at a closer distance 3m, because the instrumentation noise floor is typically close to the radiated emission limit.



#### 3.5.4 Test Setup





# 3.5.5 Transmitter Radiated Bandedge Emissions (with Antenna)

Modulation Mode	Ντχ	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Freq. (MHz) AV	Level (dBuV/m) AV	Limit (dBuV/m) AV	Pol.
11a	1	5180	3	5149.40	64.01	74	5150.00	48.62	54	Н
11a	1	5240	3	5373.60	60.56	74	5397.60	47.48	54	Н
HT20	1	5180	3	5149.80	64.41	74	5150.00	48.96	54	Н
HT20	1	5240	3	5379.00	60.80	74	5380.20	47.43	54	Н
HT40	1	5190	3	5150.02	60.26	74	5147.74	46.62	54	Н
HT40	1	5230	3	5372.40	61.29	74	5368.20	47.06	54	Н

		U-NII	5250-5350M	Hz Transmi	tter Radiate	d Bandedge	e (with Ante	enna)		
Modulation Mode	Ντχ	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Freq. (MHz) AV	Level (dBuV/m) AV	Limit (dBuV/m) AV	Pol.
11a	1	5260	3	5101.80	60.19	74	5134.80	46.52	54	Н
11a	1	5320	3	5350.60	68.71	74	5350.04	50.36	54	Н
HT20	1	5260	3	5112.60	59.96	74	5128.80	46.85	54	Н
HT20	1	5320	3	5351.44	64.72	74	5350.04	48.35	54	Н
HT40	1	5270	3	5105.40	60.16	74	5127.00	46.53	54	Н
HT40	1	5310	3	5350.03	62.77	74	5350.03	47.70	54	Н
HT40 Note 1: Measure	-					74	5350.03	47.70	54	н





Modulation Mode	Ντχ	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Pol.
11a	1	5500	3	5469.20	69.88	74	Н
11a	1	5700	3	5726.36	65.10	74	Н
HT20	1	5500	3	5469.84	65.25	74	Н
HT20	1	5700	3	5725.04	67.03	74	Н
HT40	1	5510	3	5465.80	61.52	74	Н
HT40	1	5670	3	5743.80	61.33	74	Н

Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Pol.
11a	1	5745	3	5724.76	67.75	78.2	Н
11a	1	5825	3	5881.33	63.62	78.2	Н
HT20	1	5745	3	5724.97	69.12	78.2	Н
HT20	1	5825	3	5850.28	64.64	78.2	Н
HT40	1	5755	3	5724.62	68.47	78.2	Н
HT40	1	5795	3	5858.50	62.18	78.2	н



# 3.6 Transmitter Unwanted Emissions

#### 3.6.1 Transmitter Radiated Unwanted Emissions Limit

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

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

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

	Un-restricted band emissions above 1GHz Limit
Operating Band	Limit
5.15 - 5.25 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]
5.25 - 5.35 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]
5.47 - 5.725 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]
5.725 - 5.85 GHz	5.715 5.725 GHz: e.i.r.p17 dBm [78.2 dBuV/m@3m] 5.85 5.86 GHz: e.i.r.p17 dBm [78.2 dBuV/m@3m] Other un-restricted band: e.i.r.p27 dBm [68.2 dBuV/m@3m]
performed in the n equipment. When be extrapolated to	by be performed at a distance other than the limit distance provided they are not ear field and the emissions to be measured can be detected by the measurement performing measurements at a distance other than that specified, the results shall the specified distance using an extrapolation factor of 20 dB/decade (inverse of field-strength measurements, inverse of linear distance-squared for power-density

measurements).

#### 3.6.2 Measuring Instruments

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

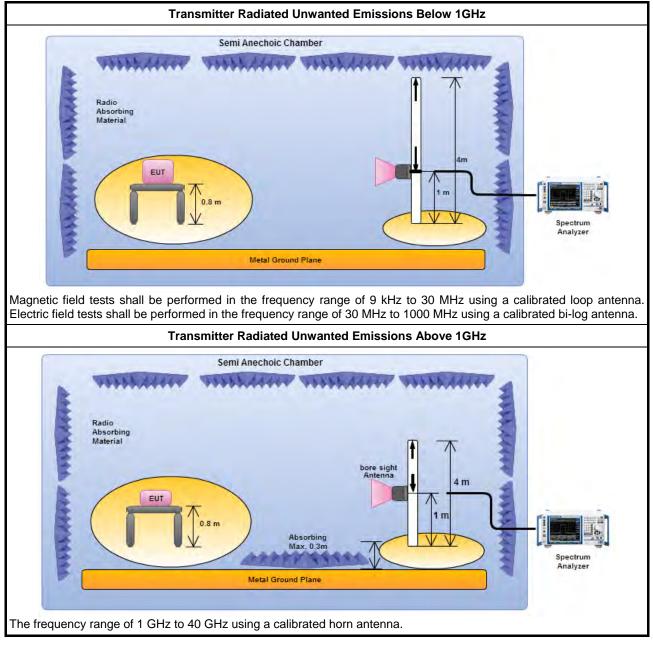


## 3.6.3 Test Procedures

		Test Method
	perfe equi abov are i be e dista	surements may be performed at a distance other than the limit distance provided they are not ormed in the near field and the emissions to be measured can be detected by the measurement pment. Measurements shall not be performed at a distance greater than 30 m for frequencies ve 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less mpractical. When performing measurements at a distance other than that specified, the results shall xtrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear ance for field-strength measurements, inverse of linear distance-squared for power-density surements).
$\square$	The	average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
$\boxtimes$	For	the transmitter unwanted emissions shall be measured using following options below:
		Refer as FCC KDB 789033 D02 v01, clause G)2) for unwanted emissions into non-restricted bands.
	$\square$	Refer as FCC KDB 789033 D02 v01, clause G)1) for unwanted emissions into restricted bands.
		Refer as FCC KDB 789033 D02 v01, G)6) Method AD (Trace Averaging).
		Refer as FCC KDB 789033 D02 v01, G)6) Method VB (Reduced VBW).
		Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq$ 1/T, where T is pulse time.
		Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
		Refer as FCC KDB 789033 D02 v01, clause G)5) measurement procedure peak limit.
		Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.
$\boxtimes$	For	radiated measurement.
	$\boxtimes$	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
	$\boxtimes$	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
	$\boxtimes$	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz. For 1 GHz to 5 GHz, test distance is 3m; For 5 GHz to 40 GHz, test distance is 3m.
$\bowtie$	The	any unwanted emissions level shall not exceed the fundamental emission level.
		mplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value no need to be reported.



#### 3.6.4 Test Setup



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

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

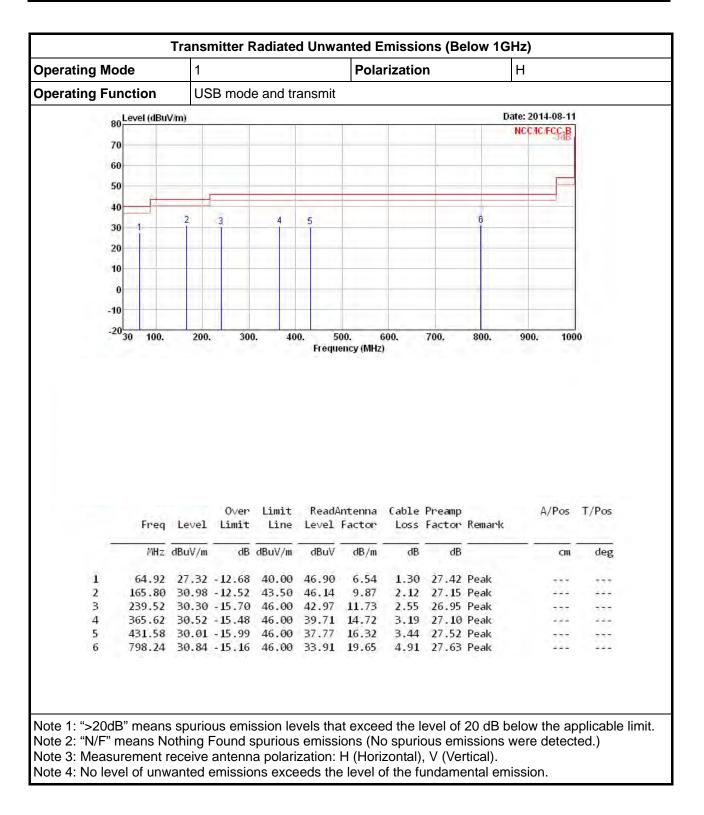


	Mode	1				1 014	rizatio			V		
ting F	unction	US	SB mod	e and tr	ansmit	•				•		
1.0	80 Level (dBu	V/m)	e —						I	Date: 20	14-08-11	
					1 - 11	1.2			11	NCCA	FCC	
	70						-					
	60						-	_				
	50											
			_							_		
	40	2					1		6			
	30	1	3		_	4	5	-		_	_	
	20		-			1.1		_	_			
				_			1					
	10											
	0		1.								_	
	10											
	-10						1					
	-20 <mark>30 100.</mark>	200.	300	0. 40		00. C ency (MHz)	600.	700.	800.	900.	100	0
	-20 30 100.		Over	Limit	Frequ ReadA	ency (MHz) Antenna	Cable	Preamp				0 T/Pos
	-20 30 100.	200. Level	Over	Limit	Frequ ReadA	ency (MHz)	Cable	Preamp				
	-20 <mark>30 100.</mark> Freq		Over Limit	Limit	Frequ ReadA	ency (MHz) Antenna	Cable	Preamp	Remark			
	-20 30 100. Freq	Level dBuV/m	Over Limit dB	Limit Line	Frequ ReadA Level dBuV	ency (MHz) Antenna Factor	Cable Loss dB	Preamp Factor	Remark		A/Pos	T/Pos
1 2	-20 30 100. Freq MHz 30.00 165.80	Level dBuV/m 27.85 32.13	0ver Limit dB -12.15 -11.37	Limit Line dBuV/m 40.00 43.50	ReadA Level dBuV 35.57 47.29	ency (MHz) Antenna Factor dB/m 18.85 9.87	Cable Loss dB 0.82 2.12	Preamp Factor dB 27.39 27.15	Remark  Peak Peak		A/Pos	T/Pos
1 2 3	-20 30 100. Freq MHz 30.00 165.80 239.52	Level dBuV/m 27.85 32.13 26.92	Over Limit dB -12.15 -11.37 -19.08	Limit Line dBuV/m 40.00 43.50 46.00	Freque ReadA Level dBuV 35.57 47.29 39.59	ency (MHz) Antenna Factor dB/m 18.85 9.87 11.73	Cable Loss dB 0.82 2.12 2.55	Preamp Factor dB 27.39 27.15 26.95	Remark Peak Peak Peak Peak		A/Pos	T/Pos
1 2 3 4	-20 30 100. Freq MHz 30.00 165.80 239.52 528.58	Level dBuV/m 27.85 32.13 26.92 27.21	Over Limit dB -12.15 -11.37 -19.08 -18.79	Limit Line dBuV/m 40.00 43.50 46.00 46.00	Freque ReadA Level dBuV 35.57 47.29 39.59 33.61	ency (MHz) Antenna Factor dB/m 18.85 9.87 11.73 17.65	Cable Loss dB 0.82 2.12 2.55 3.86	Preamp Factor dB 27.39 27.15 26.95 27.91	Remark Peak Peak Peak Peak Peak		A/Pos	T/Pos deg
1 2 3	-20 30 100. Freq MHz 30.00 165.80 239.52 528.58 658.56	Level dBuV/m 27.85 32.13 26.92 27.21 28.44	0ver Limit dB -12.15 -11.37 -19.08 -18.79 -17.56	Limit Line dBuV/m 40.00 43.50 46.00	Freque Read/ Level dBuV 35.57 47.29 39.59 33.61 33.03	ency (MHz) antenna Factor dB/m 18.85 9.87 11.73 17.65 18.80	Cable Loss dB 0.82 2.12 2.55 3.86	Preamp Factor dB 27.39 27.15 26.95 27.91	Remark Peak Peak Peak Peak Peak Peak		A/Pos	T/Pos

# 3.6.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)



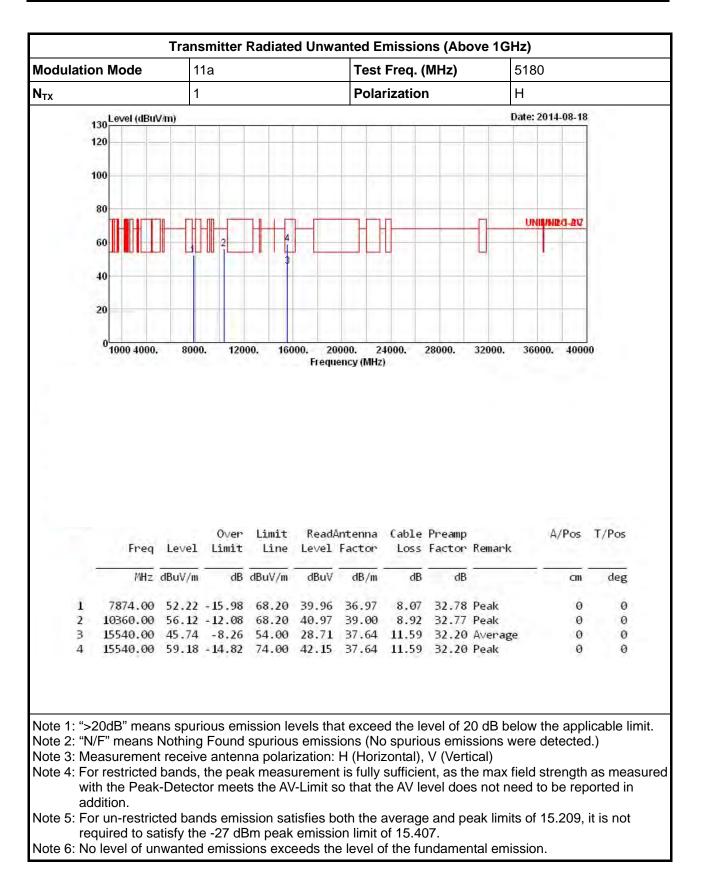




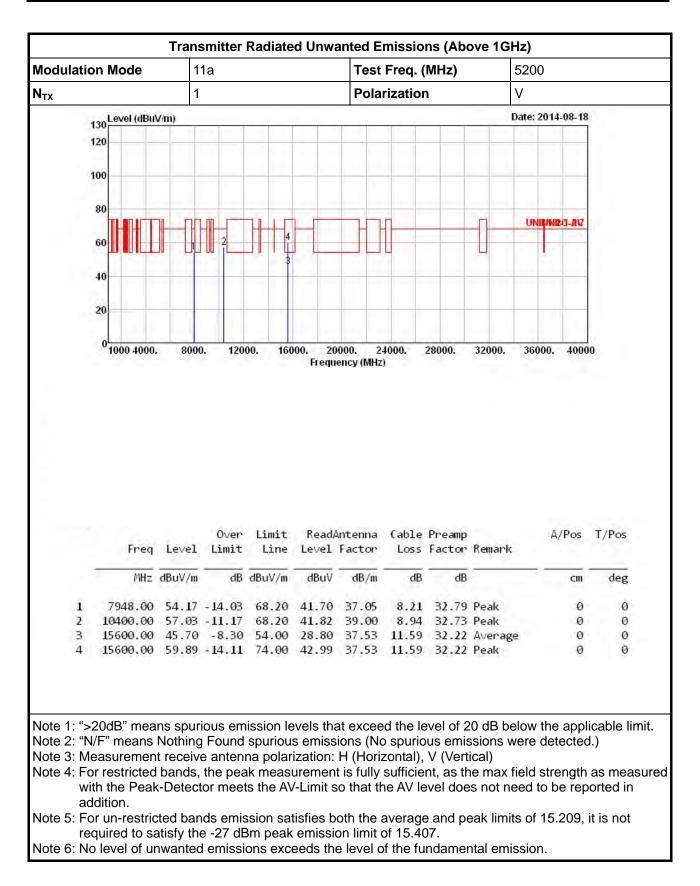


			1a			163	t Freq. (	(WITTZ)		5180		
N <sub>TX</sub>		1				Pola	arizatio	n	Ņ	V		
1.0	130 Level (dBu	V/m)							D	ate: 20	14-08-1	8
	120											_
	100	_						_		_	_	-
	80						4		-		MR.G.RQ	
				4	-	-	-			UNI	VM-CPMM	-
	60	u uu		JII					U			
	40			3							1.1	
	40											
	20		_								_	
	0 1000 4000	8000	0. 120	00 160	00. 20	0000.	24000.	28000.	32000.	3600	0. 400	
						iency (MH						
					nequ		2)					
			0ver	Limit				Preamp			A/Pos	T/Pos
	Freq	Level			Read		Cable	Preamp Factor	Remark		A/Pos	T/Pos
		Level dBuV/m	Limit		Read	Antenna Factor	Cable Loss	Factor	Remark		A/Pos cm	T/Pos 
1		dBuV/m	Limit 	Line dBuV/m	Read, Level dBuV	Antenna Factor dB/m	Cable Loss dB	Factor				deg
1 2 3	MHz	dBuV/m 52.67 56.71	Limit dB -15.53 -11.49	Line dBuV/m 68.20 68.20	Read/ Level dBuV 40.11 41.56	Antenna Factor dB/m 37.08 39.00	Cable Loss dB 8.28 8.92	Factor dB 32.80 32.77	Peak Peak		cm	deg 0 0

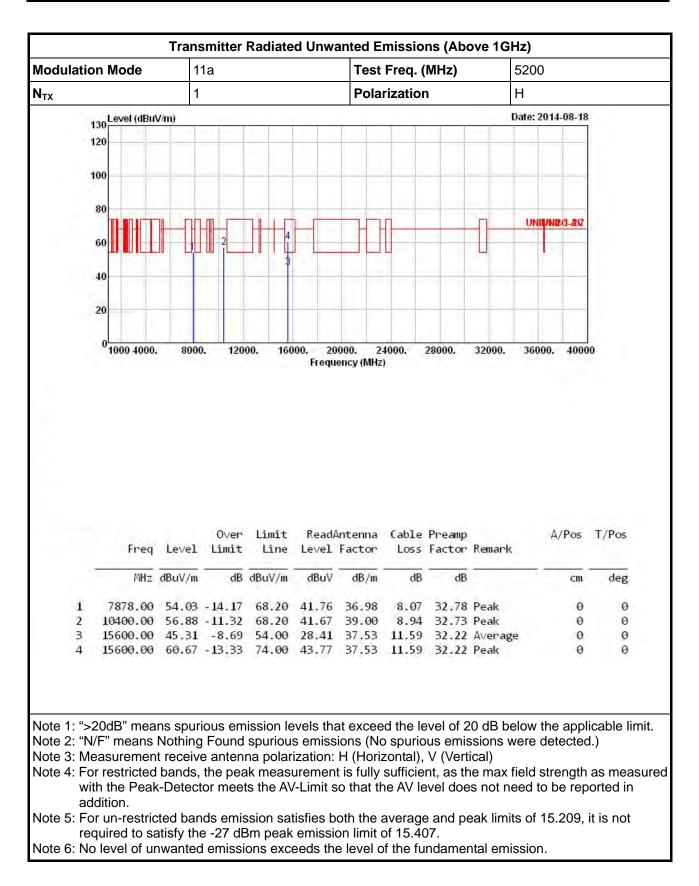




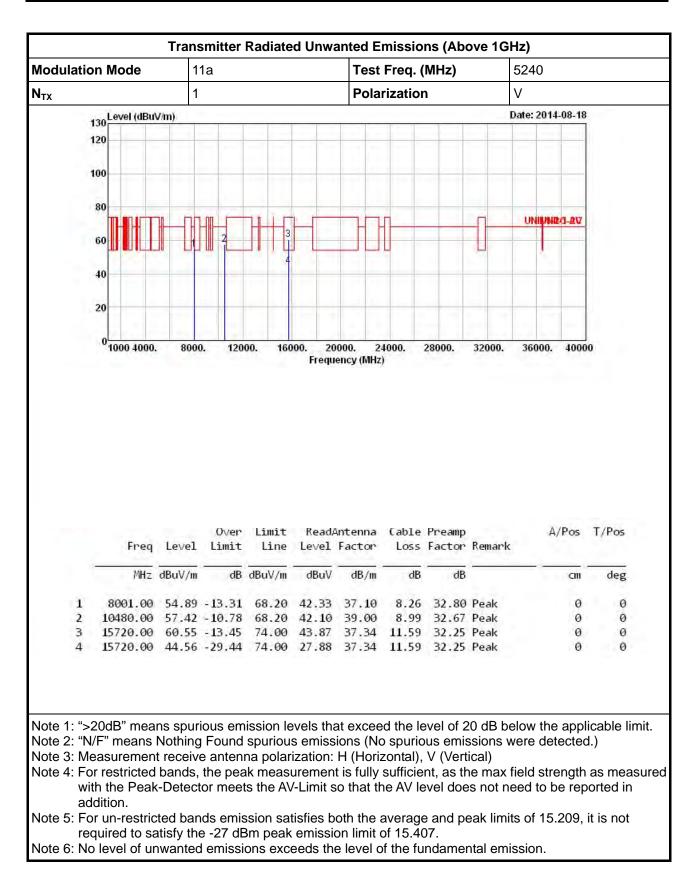




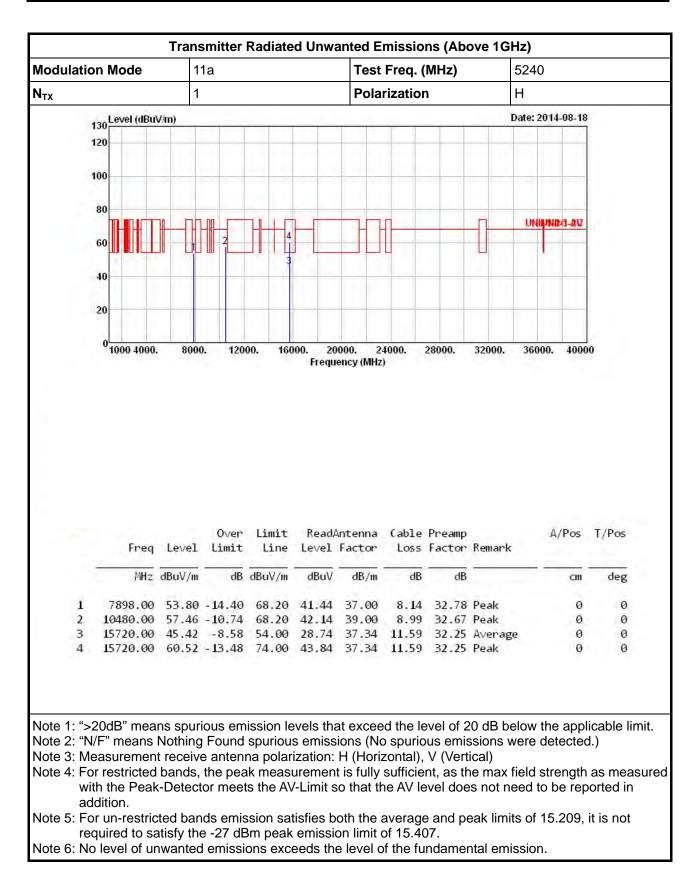




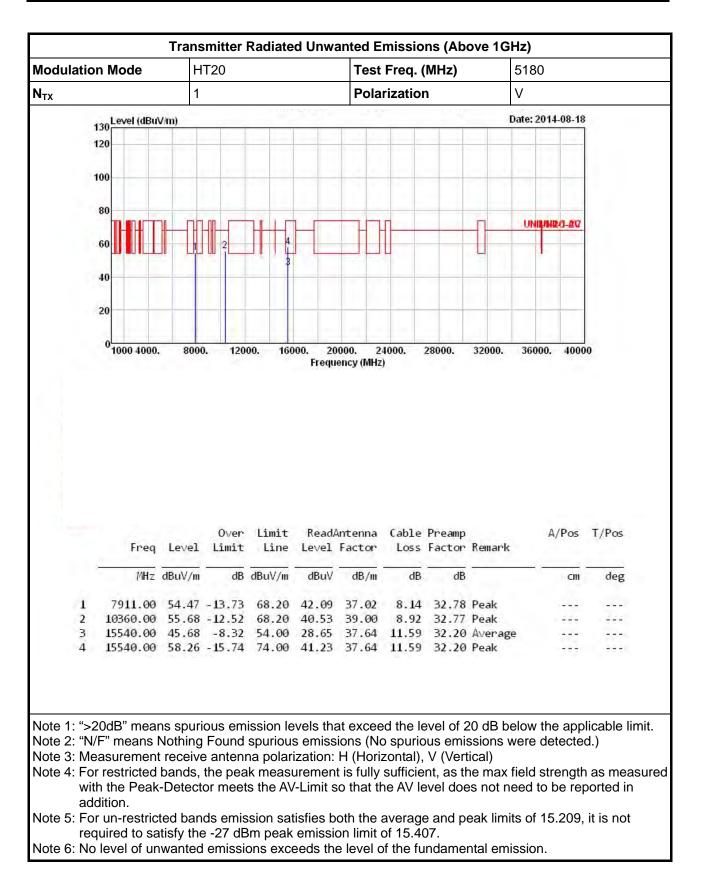




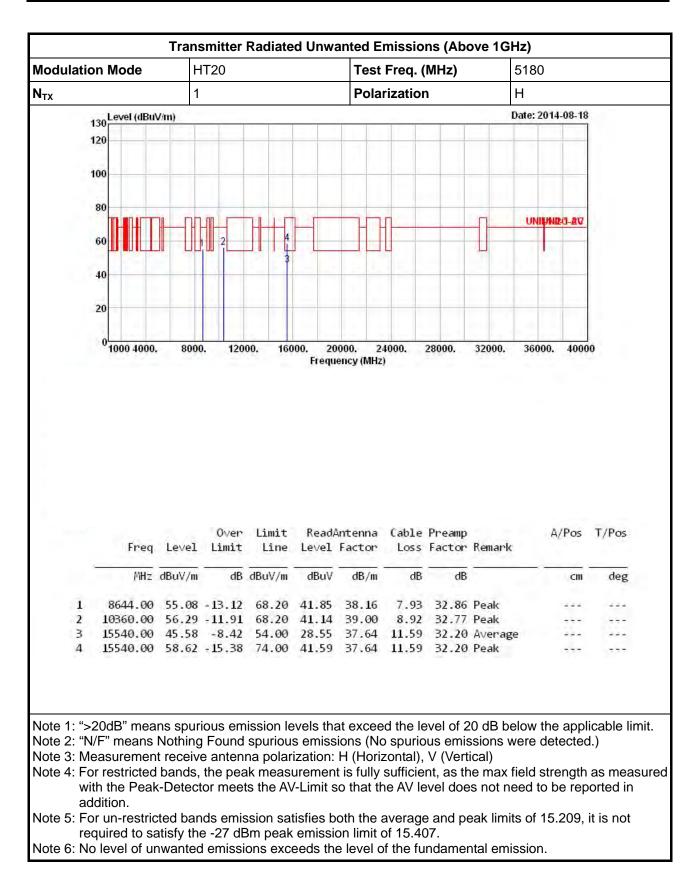




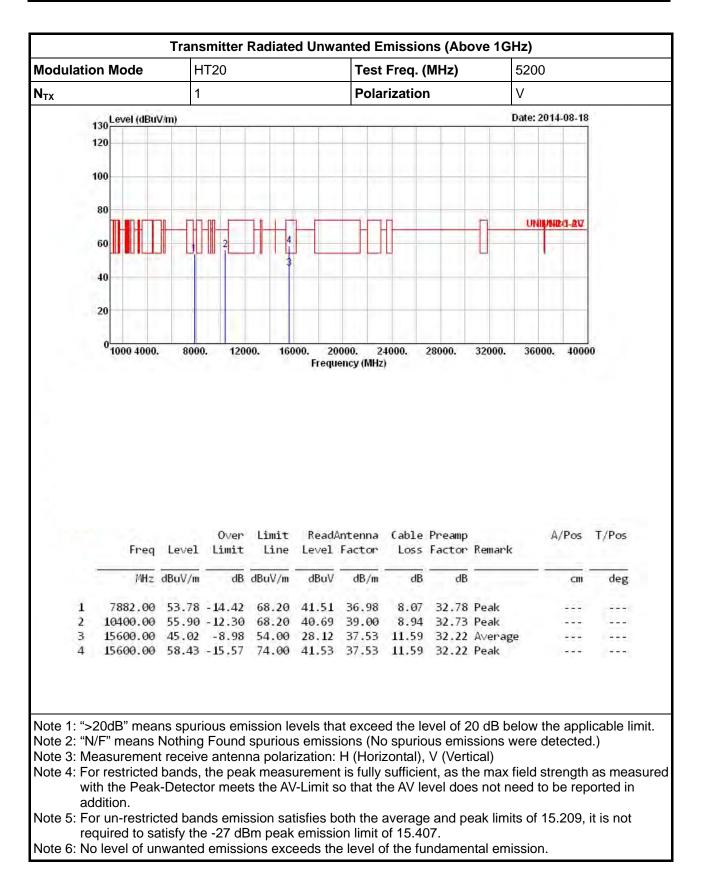




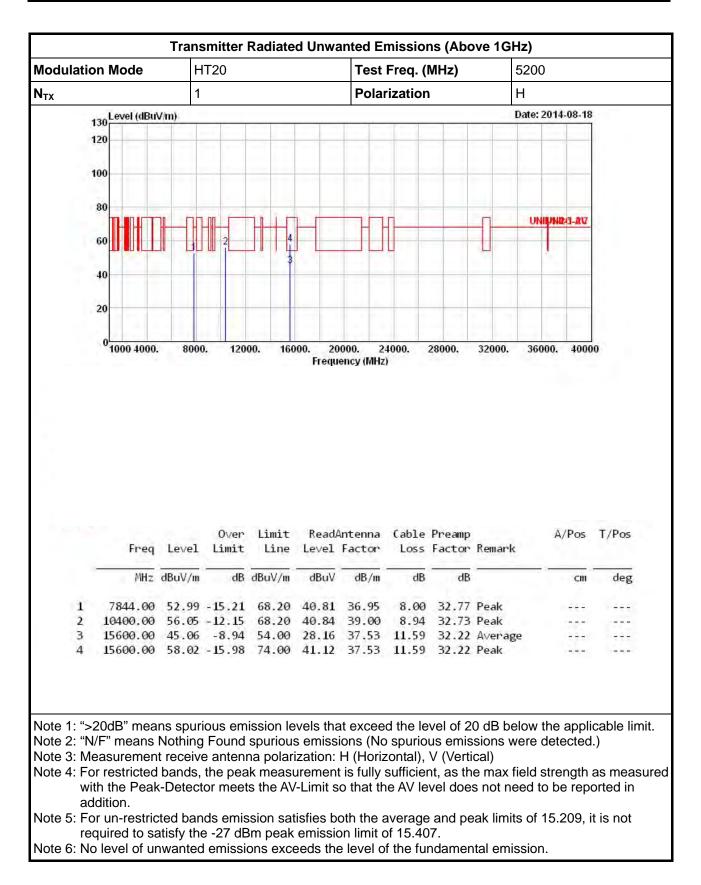




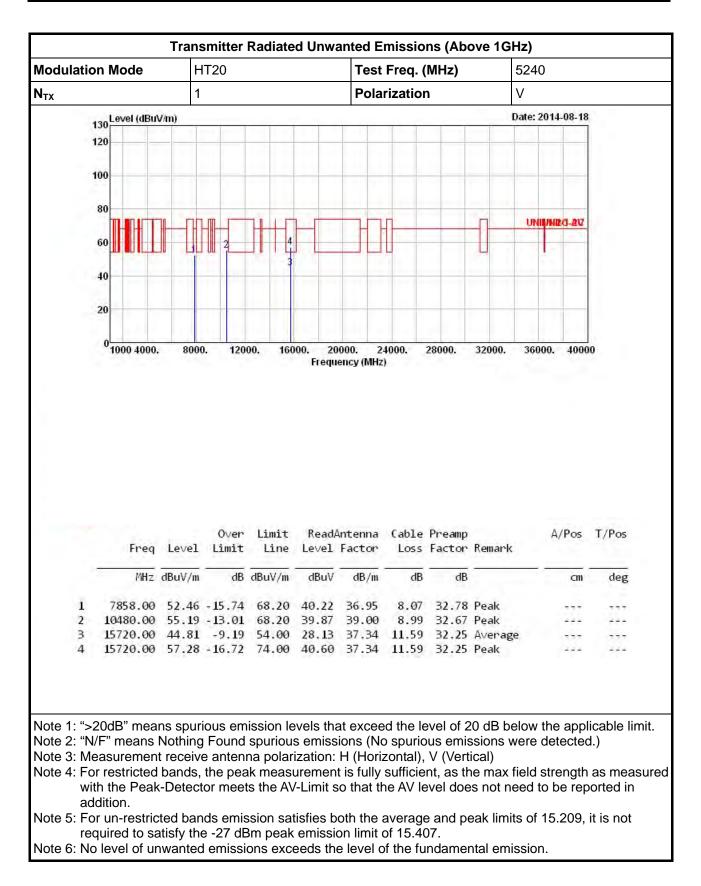




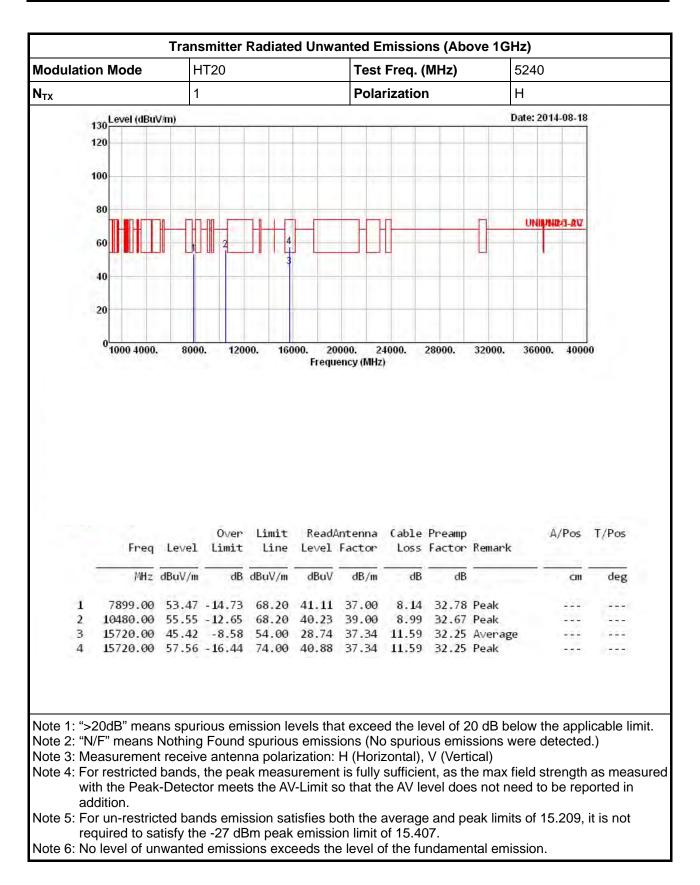




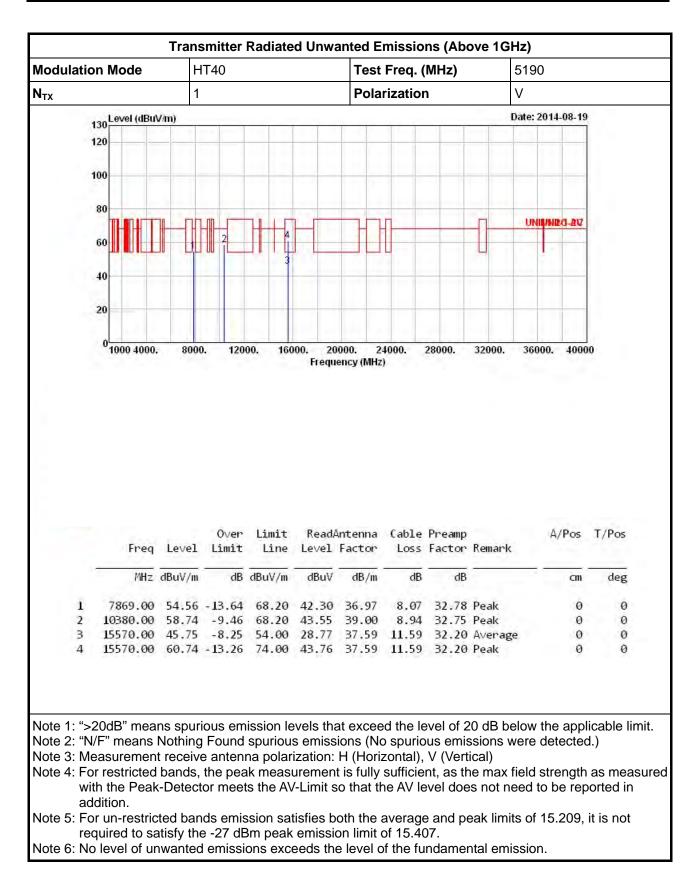




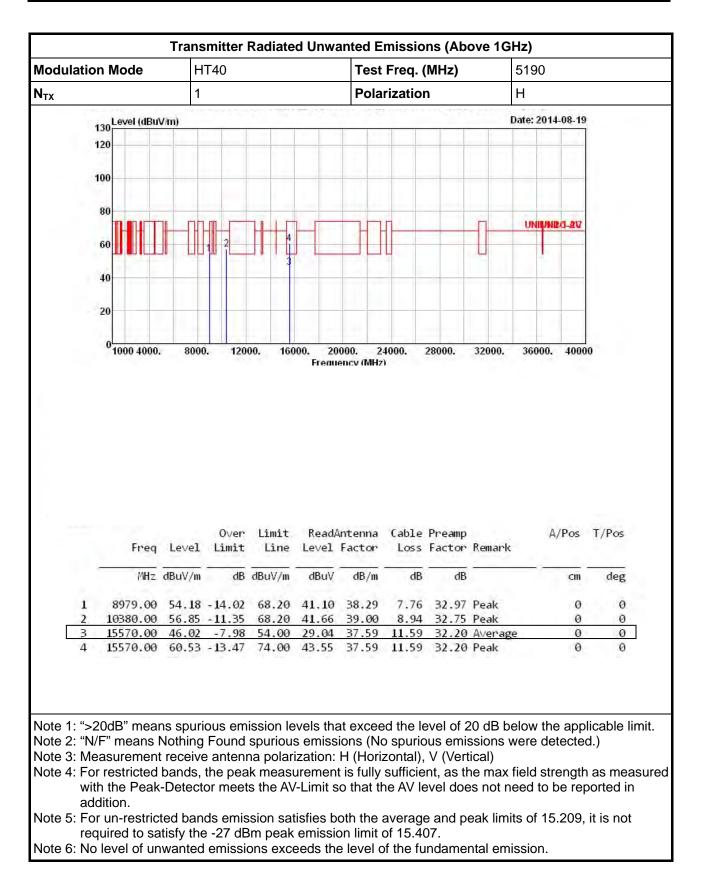




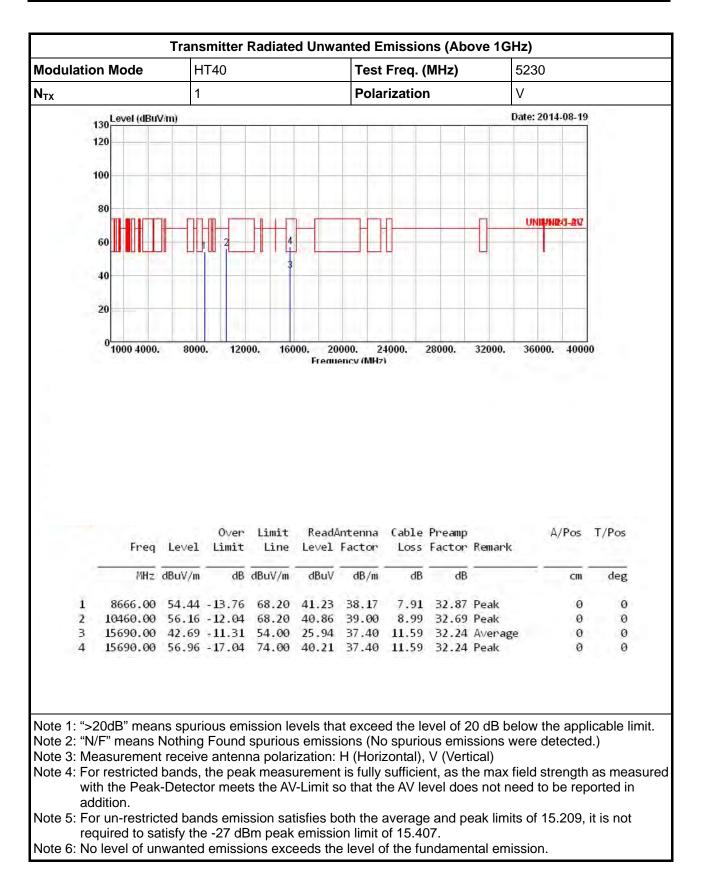




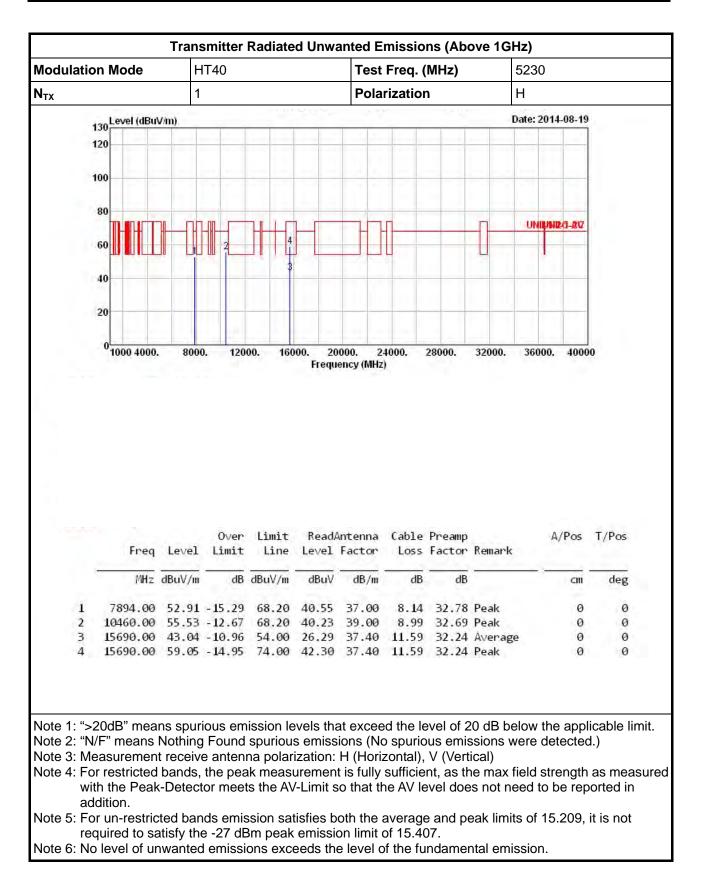










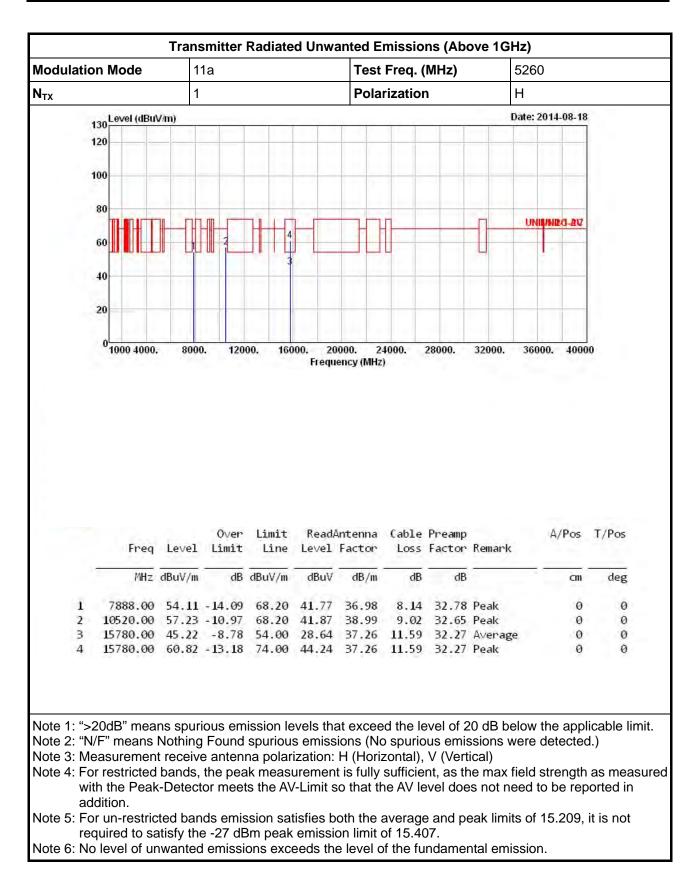




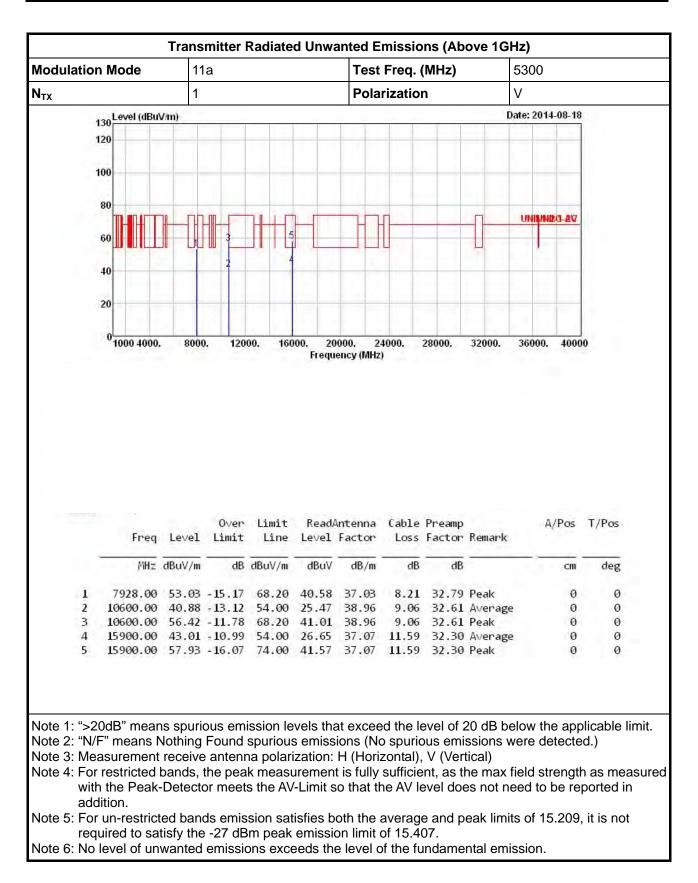
3.6.8	Transmitter Radiated Unwanted Emissions	(Above 1GHz	) for 5250-5350MHz
-------	---	-------------	--------------------

	on Mode		1a			lest	⊢req. (	(MHz)		5260		
I <sub>TX</sub>		1				Pola	izatior	า		V		
	130 Level (dBu	V/m)				-				Date: 2	014-08-18	8
	120										-	
	100										-	
	80									10.0	MR-0-AV	-
	60		2	4						Gitt	THE G-EV	-
				лпц					Ц			
	40	-										
											1111	
	20							_				
	0 1000 4000.	. 800	0. 120	00. 160		0000. 2: ency (MHz		28000,	32000.	3600	0. 400	00
			0ver	Limit	Frequ Read/	ency (MHz Antenna	Cable	Preamp				J 00 T/Pos
	Freq	Level	0ver Limit	Limit Line	Frequ Read/ Level	ency (MHz Antenna Factor	Cable	Preamp				
	Freq		0ver Limit	Limit	Frequ Read/	ency (MHz Antenna	Cable	Preamp Factor				
1	Freq 	Level dBuV/m 53.82	Over Limit dB -14.38	Limit Line dBuV/m 68.20	Read/ Level dBuV 41.24	Antenna Factor dB/m 37.10	Cable Loss dB 8.28	Preamp Factor dB 32.80	Remark Peak		A/Pos cm 0	T/Pos deg 0
1 2 3	Freq 	Level dBuV/m 53.82 58.10	0∨er Limit dB -14.38 -10.10	Limit Line dBuV/m 68.20 68.20	Frequ Read/ Level dBuV 41.24 42.74	Antenna Factor dB/m 37.10 38.99	Cable Loss dB 8.28 9.02	Preamp Factor dB 32.80 32.65	Remark Peak Peak		A/Pos 	T/Pos deg 0 0

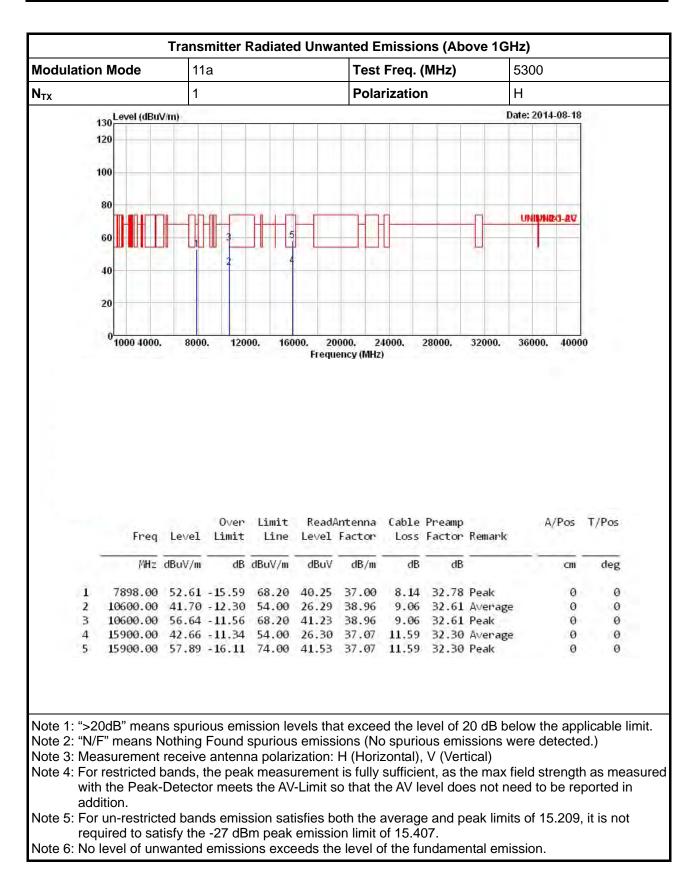




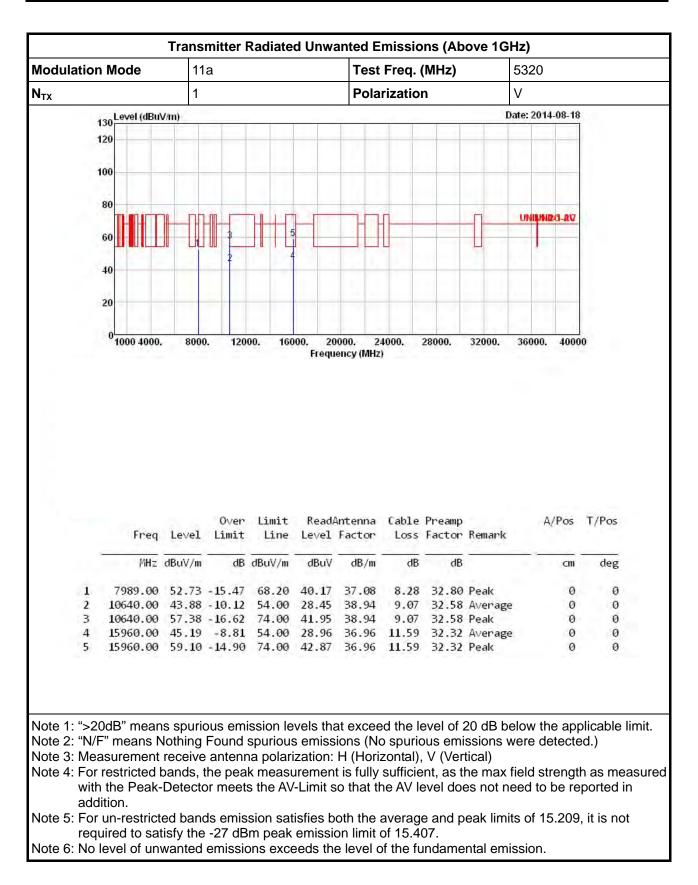




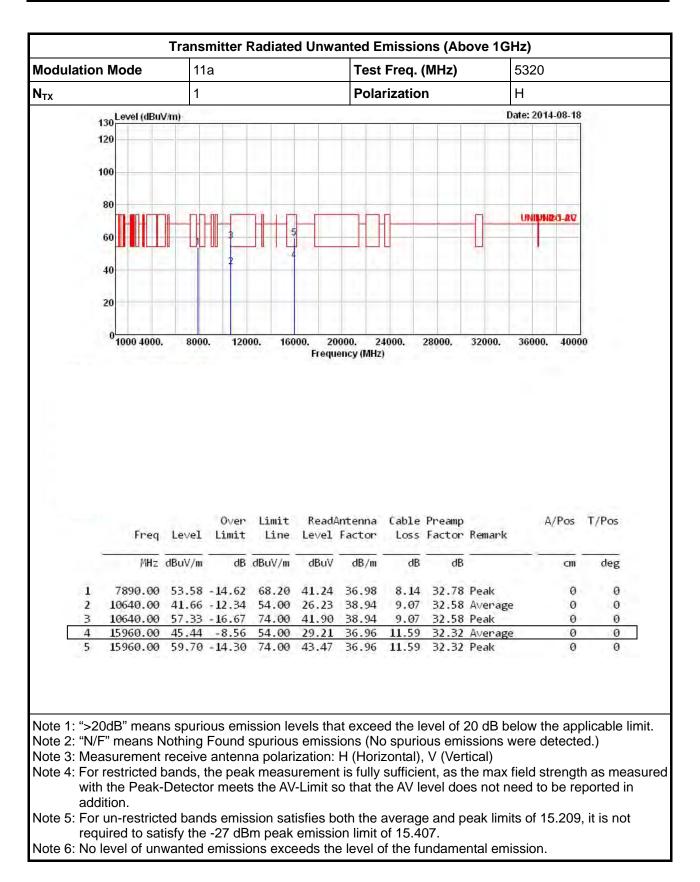




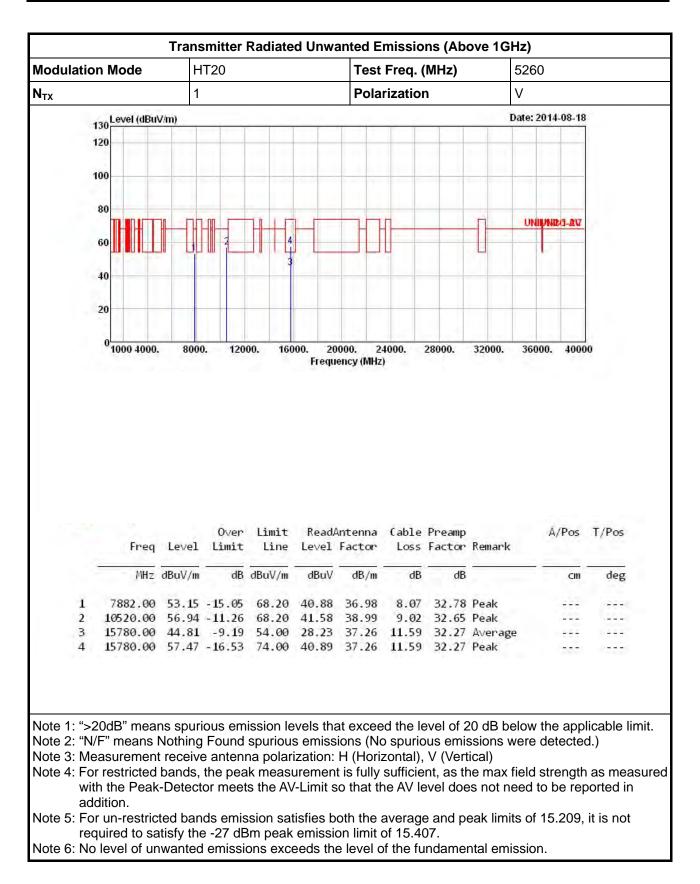




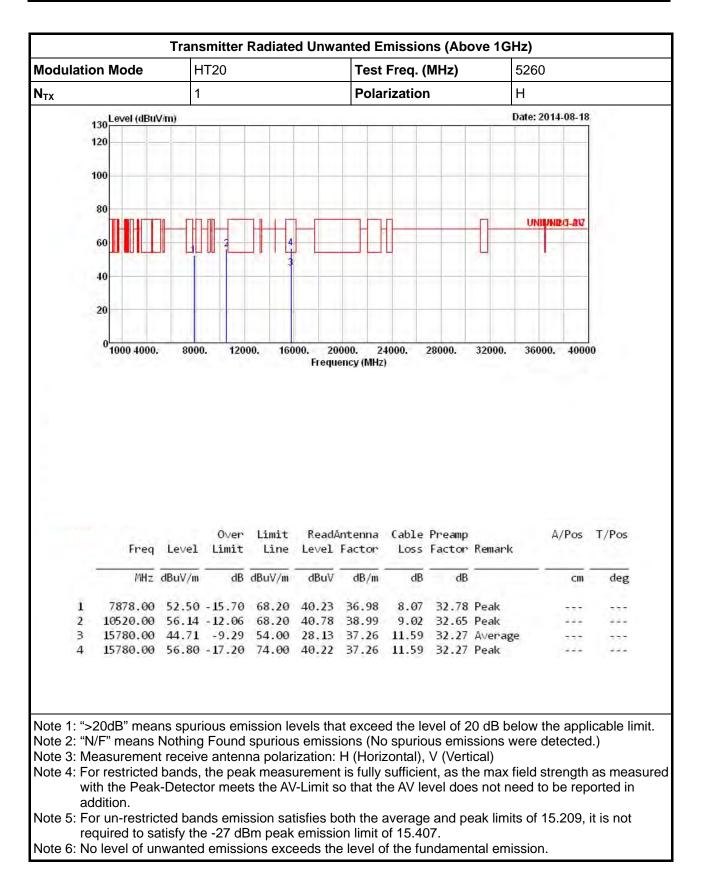




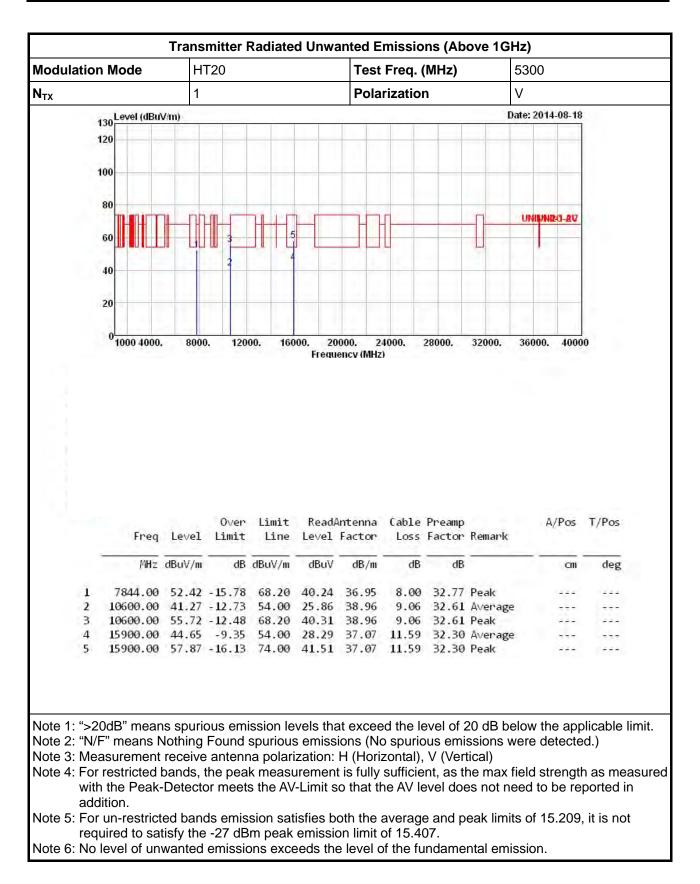




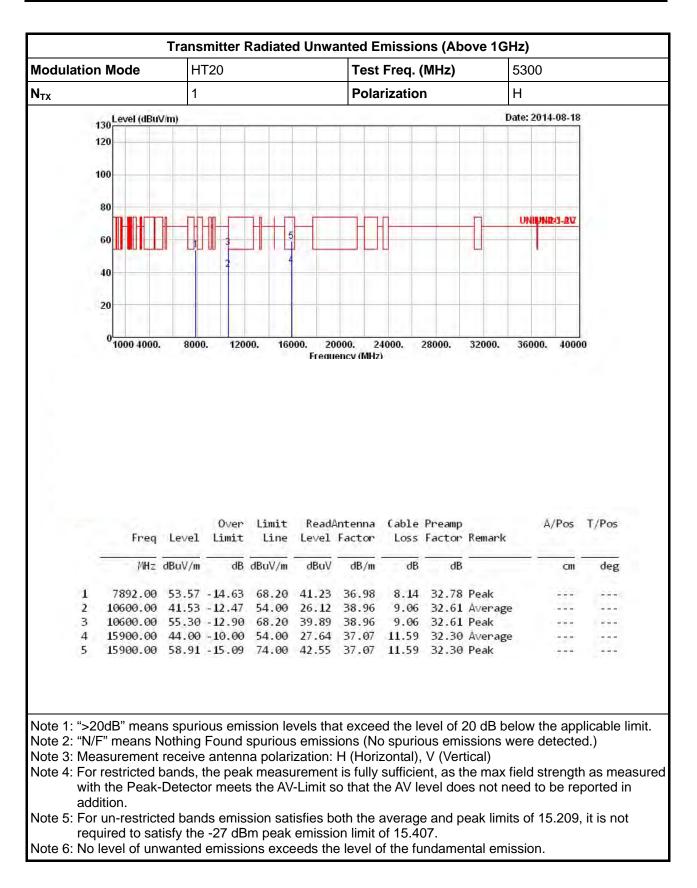




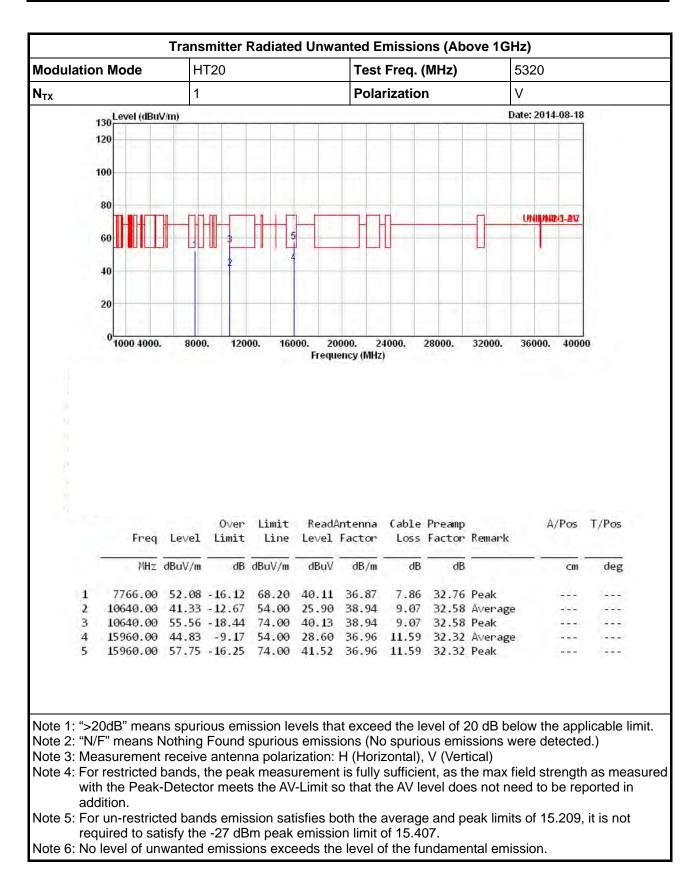




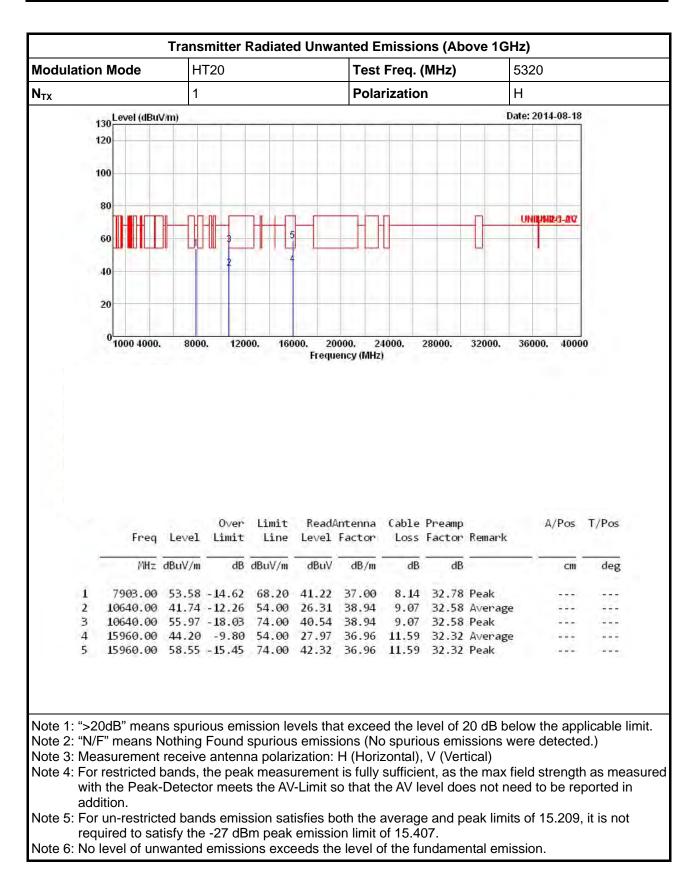




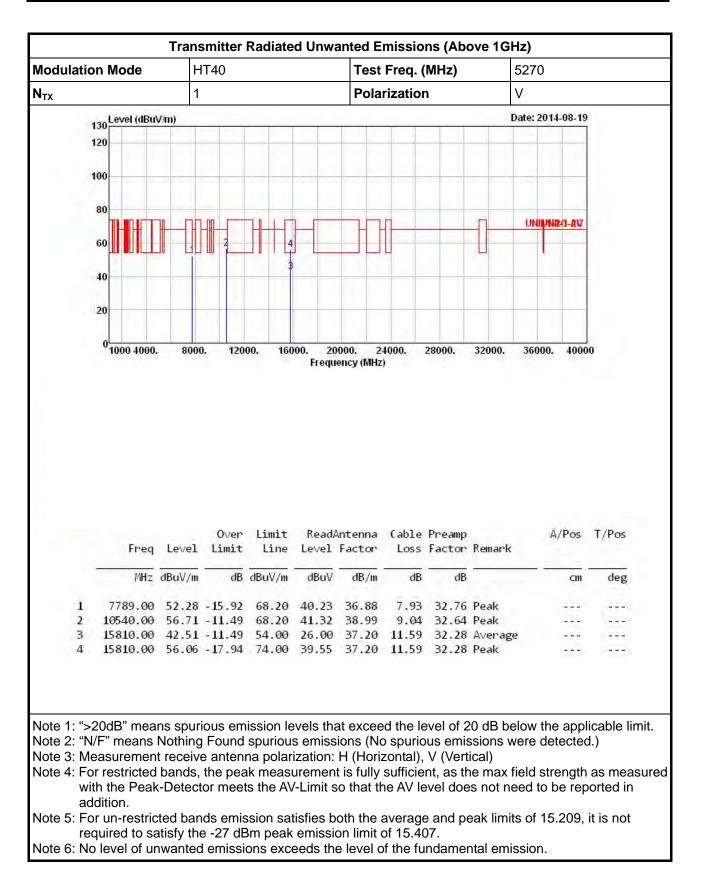




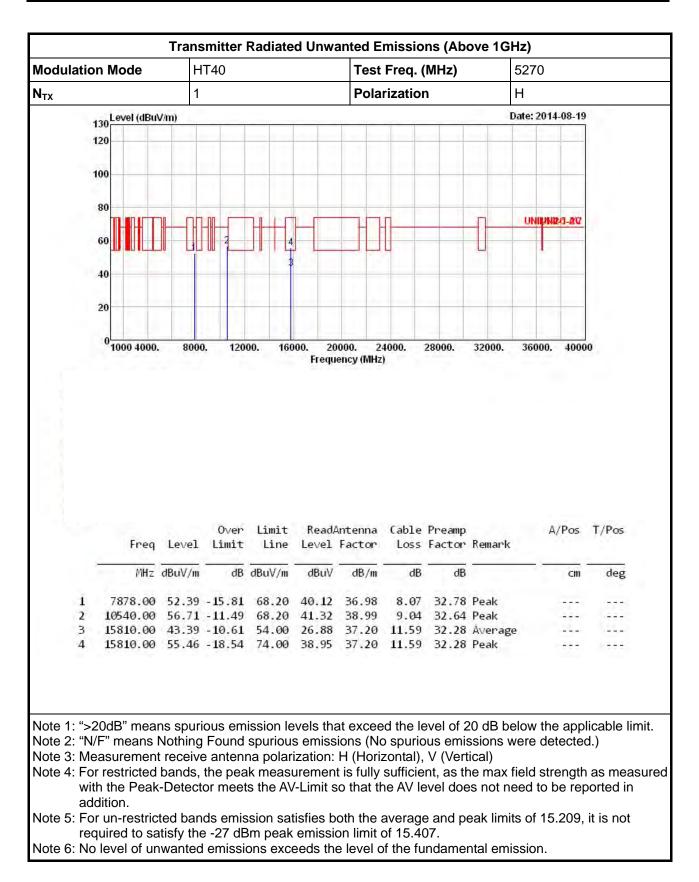




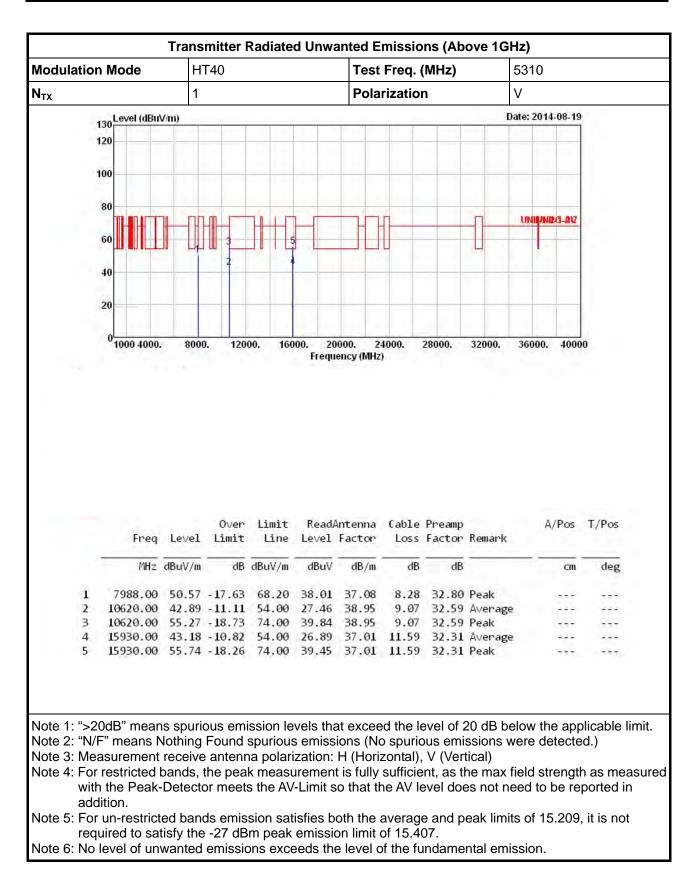




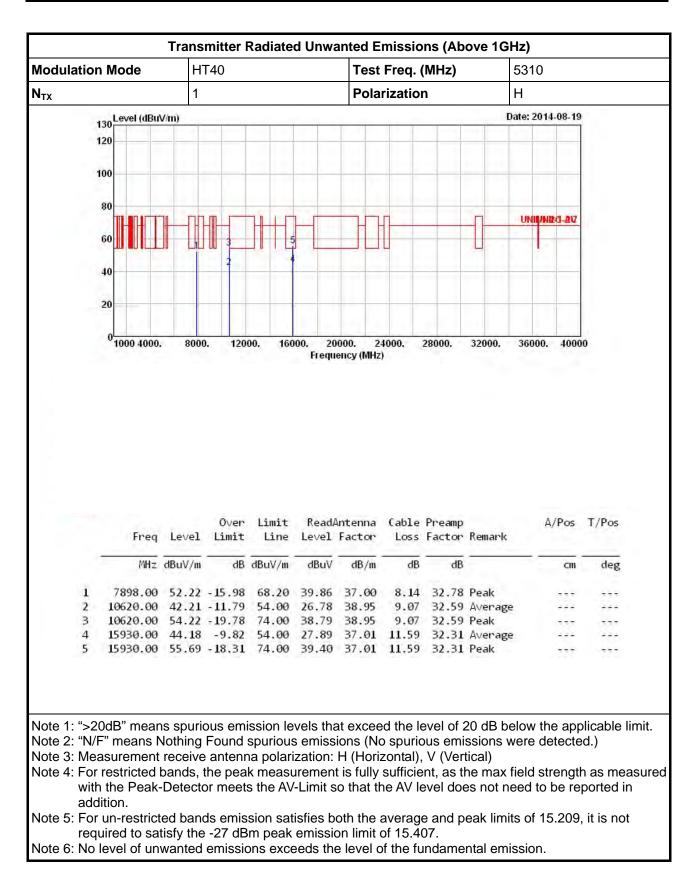










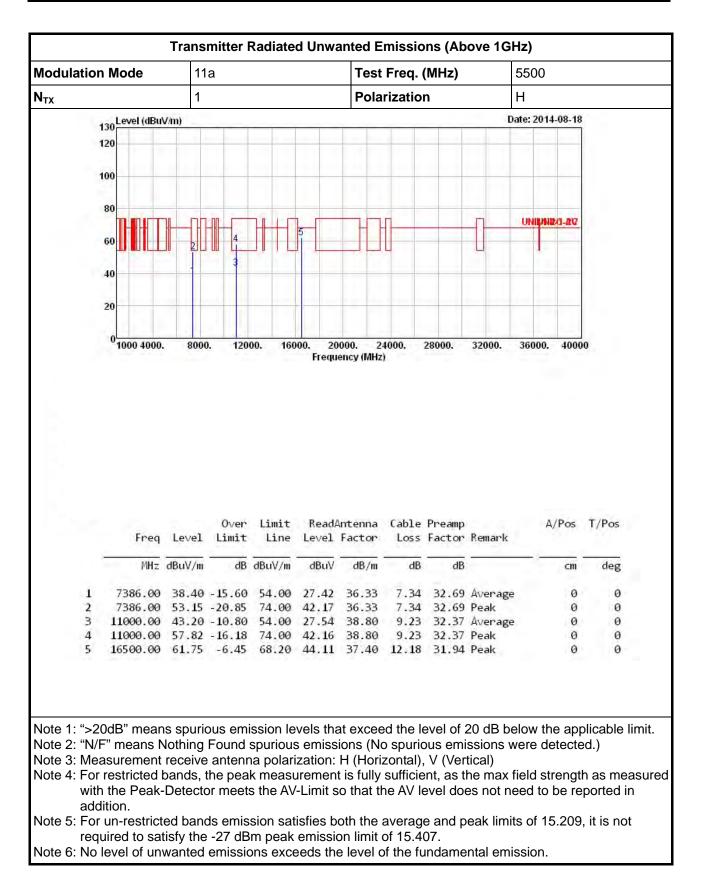




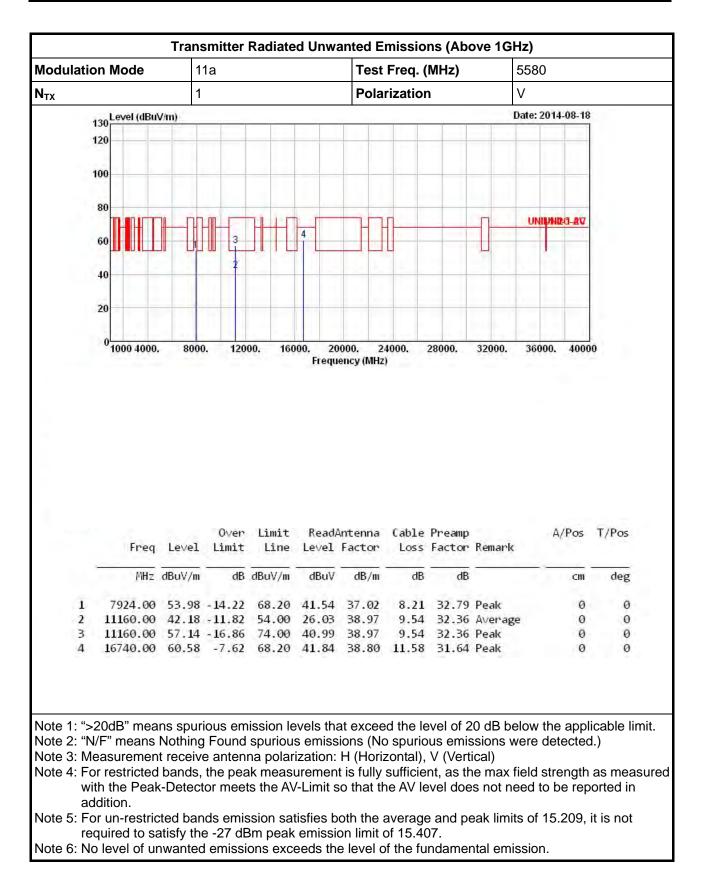
3.6.9	Transmitter Radiated	<b>Unwanted Emissions</b>	Above 1GHz	) for 5470-5725MHz
-------	----------------------	---------------------------	------------	--------------------

	on Mode		1a			les	Freq. (	(IVIHZ)	:	5500			
N <sub>TX</sub>			1			Pola	Polarization			V			
170	130 Level (dBu)	√/m)							D	ate: 201	4-08-18	3	
	120												
	100	_	_					_			_		
	80								-				
					4	-				UNIP	12-0-20	10	
	60	li lil	III G				L		U	1			
	10		2	1011									
	40				1								
	20		_								-		
	0 1000 4000.	8000	). 120	00. 160	00. 20	000. 3	4000.	28000.	32000.	36000	. 4000	00	
	0 1000 4000.	8000	). 120	00. 160		0000. : ency (MH		28000.	32000.	36000	. 4000	00	
			0ver	Limit	Frequ Read/	ency (MH	) Cable	Preamp				T/Pos	
		8000	0ver	Limit	Frequ Read/	ency (MH	) Cable						
	Freq		0ver Limit	Limit	Frequ Read/	ency (MH	) Cable	Preamp Factor					
1	Freq	Level dBuV/m	Over Limit dB	Limit Line dBuV/m	Frequ Read/ Level dBuV	Antenna Factor dB/m	Cable Loss dB	Preamp Factor	Remark		A/Pos	T/Pos	
1 2	Freq MHz	Level dBuV/m 53.44	Over Limit dB -14.76	Limit Line dBuV/m 68.20	Freque Read/ Level dBuV 41.10	Antenna Factor dB/m 36.98	Cable Loss dB 8.14	Preamp Factor dB 32.78	Remark		A/Pos	T/Pos 	
	Freq 	Level dBuV/m 53.44 42.14 57.54	Over Limit dB -14.76 -11.86 -16.46	Limit Line dBuV/m 68.20 54.00 74.00	Frequ Read/ Level dBuV 41.10 26.48 41.88	Antenna Factor dB/m 36.98 38.80 38.80	Cable Loss dB 8.14 9.23 9.23	Preamp Factor dB 32.78 32.37 32.37	Remark Peak Average Peak		A/Pos  0	T/Pos deg 0 0 0	

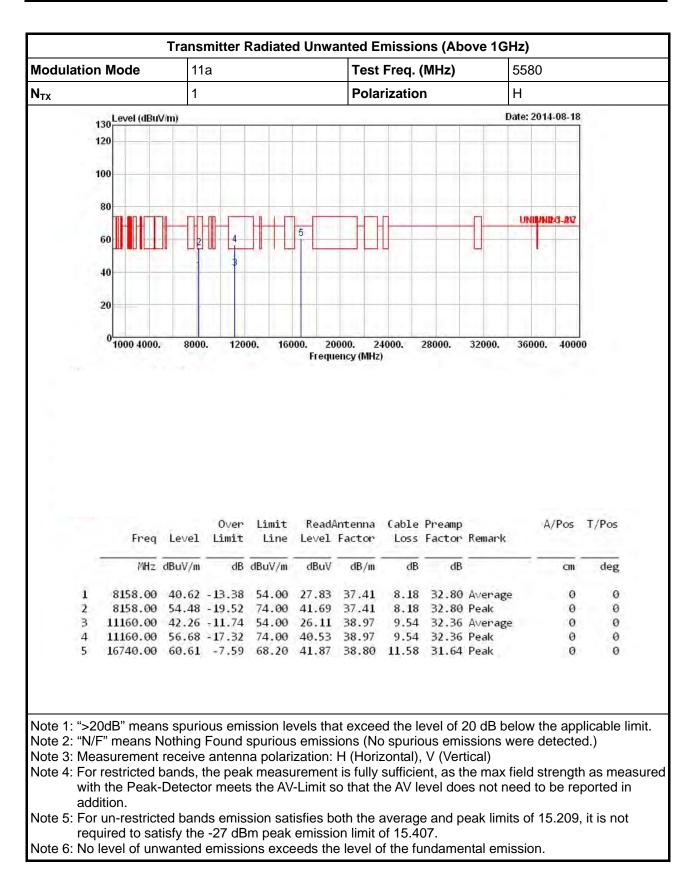




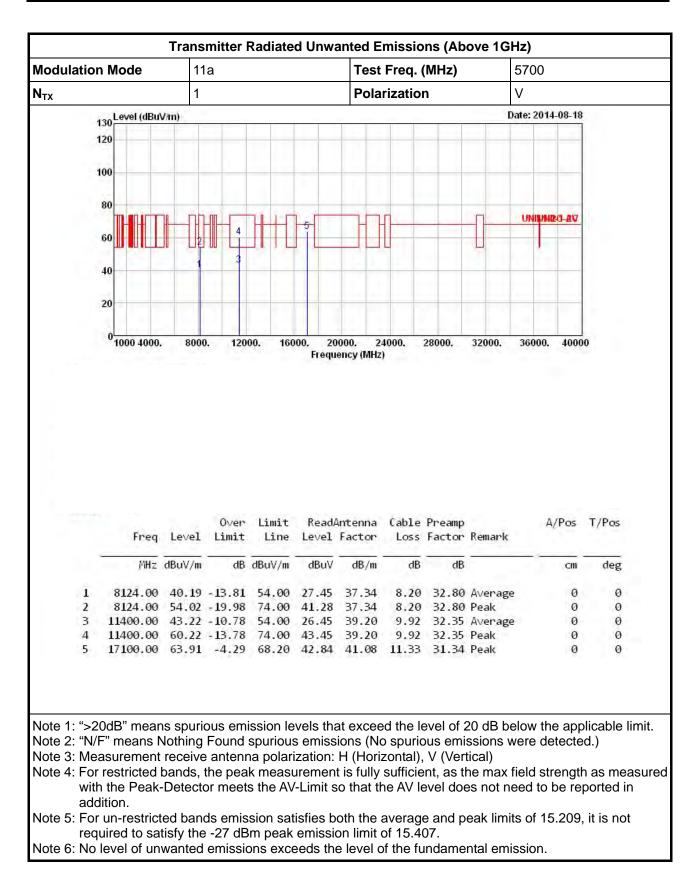




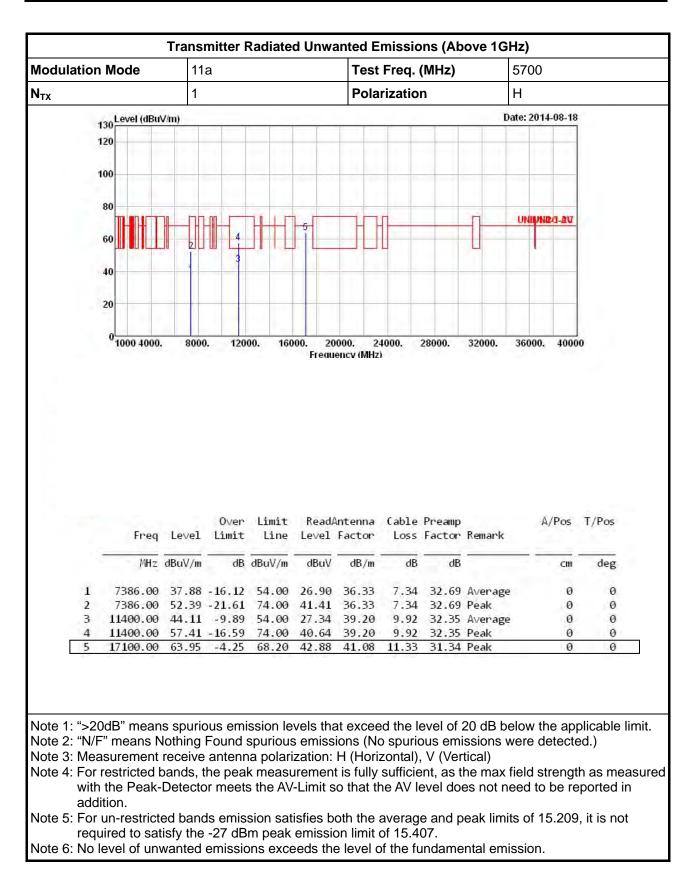




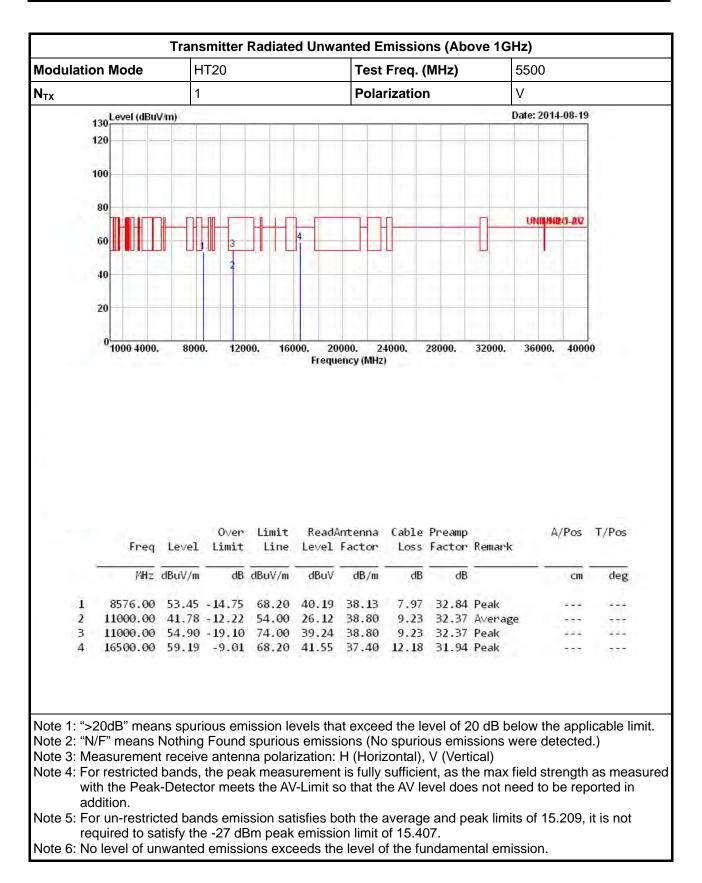




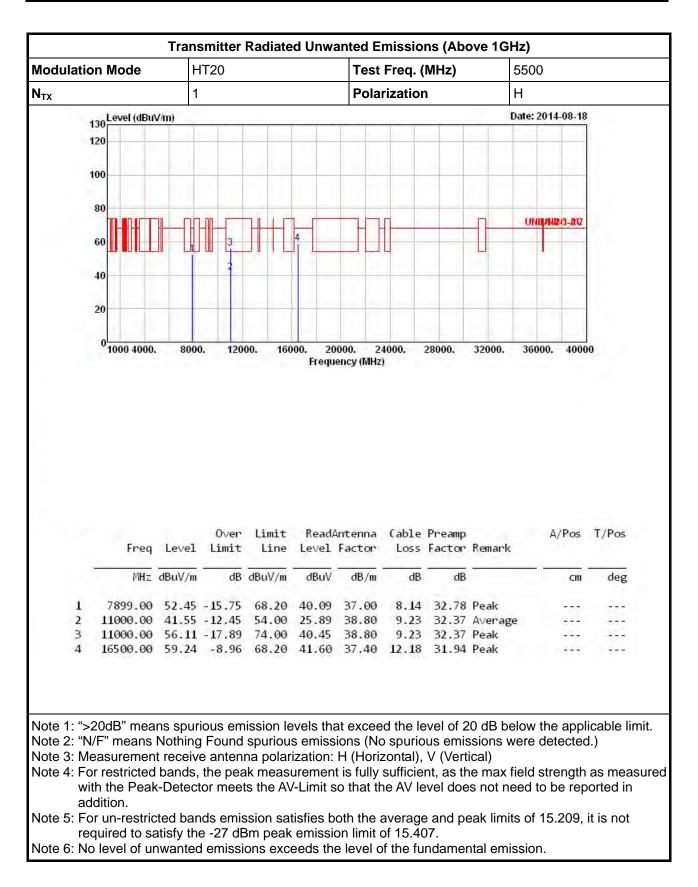




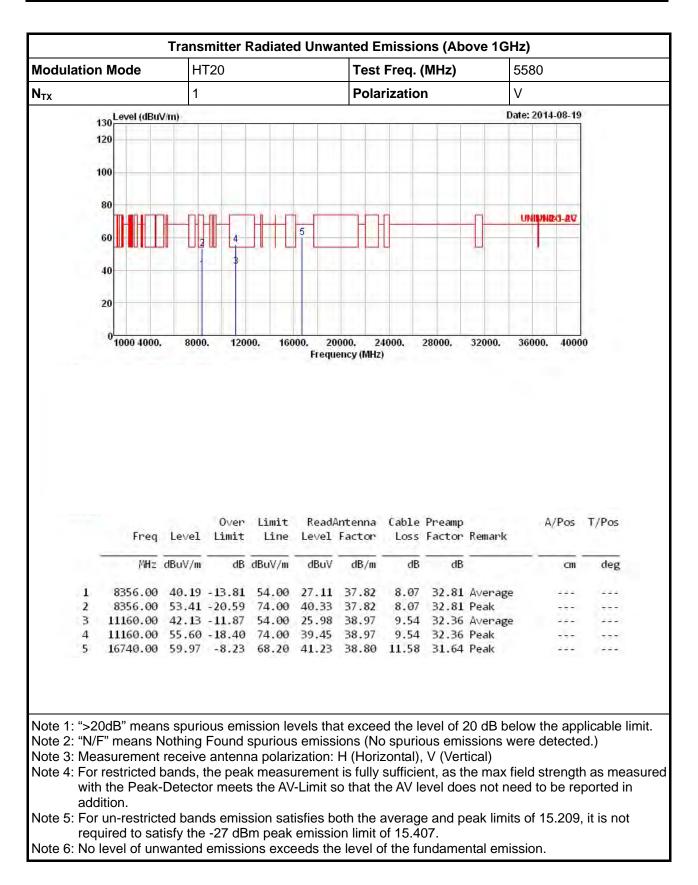




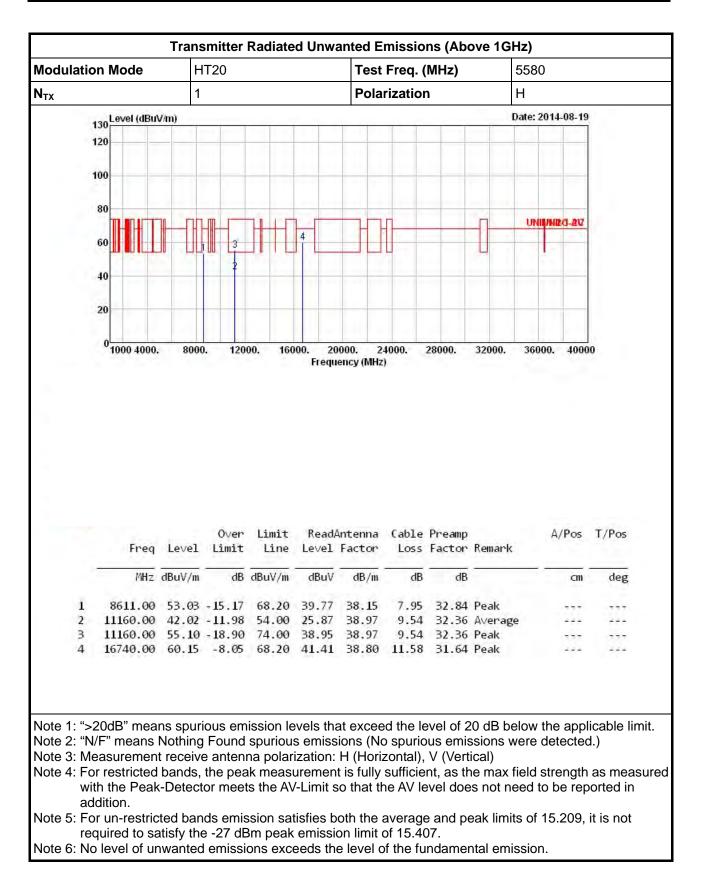




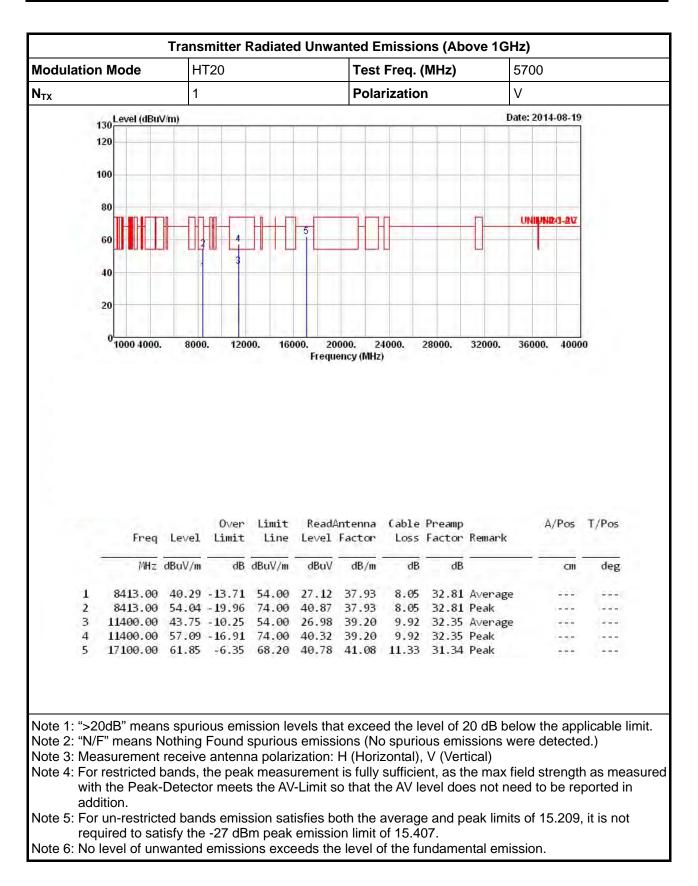




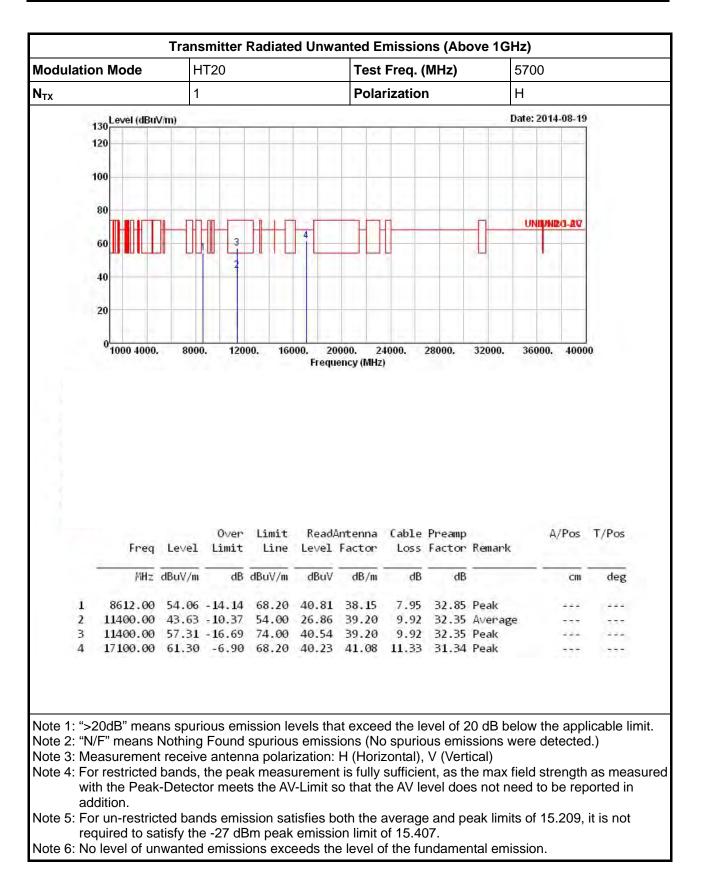




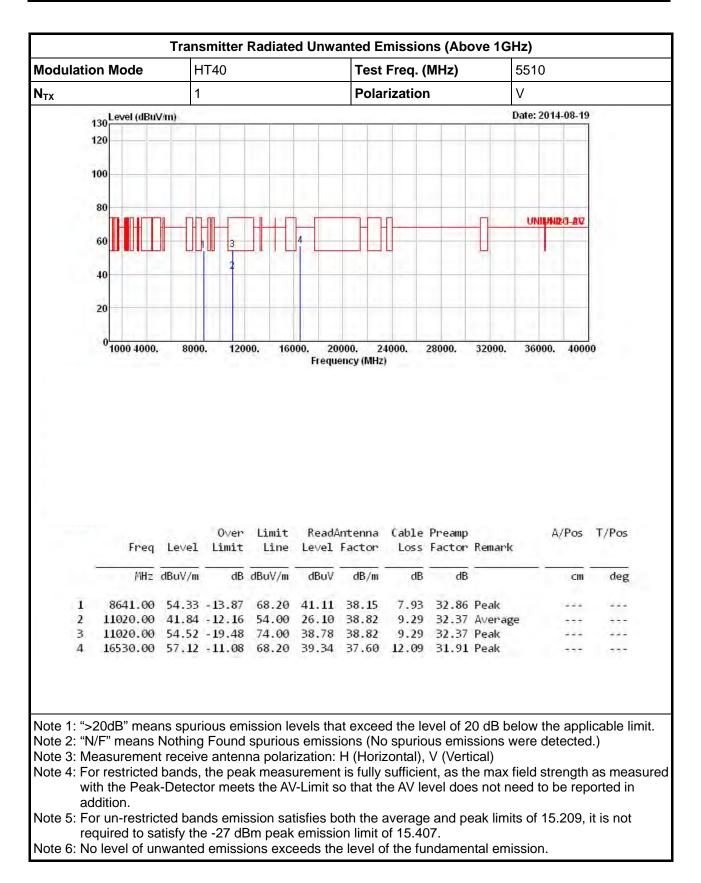




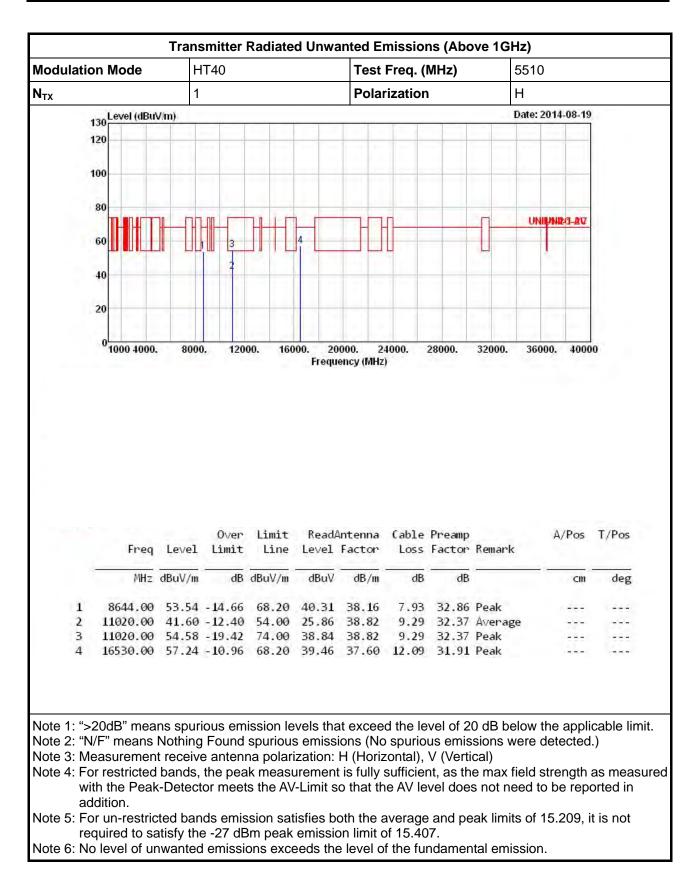




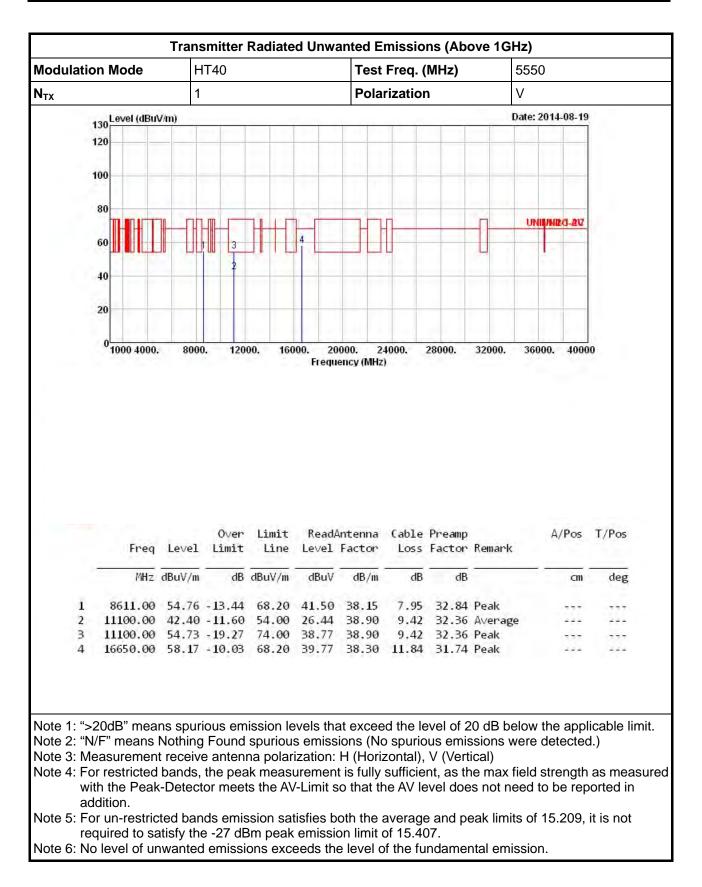




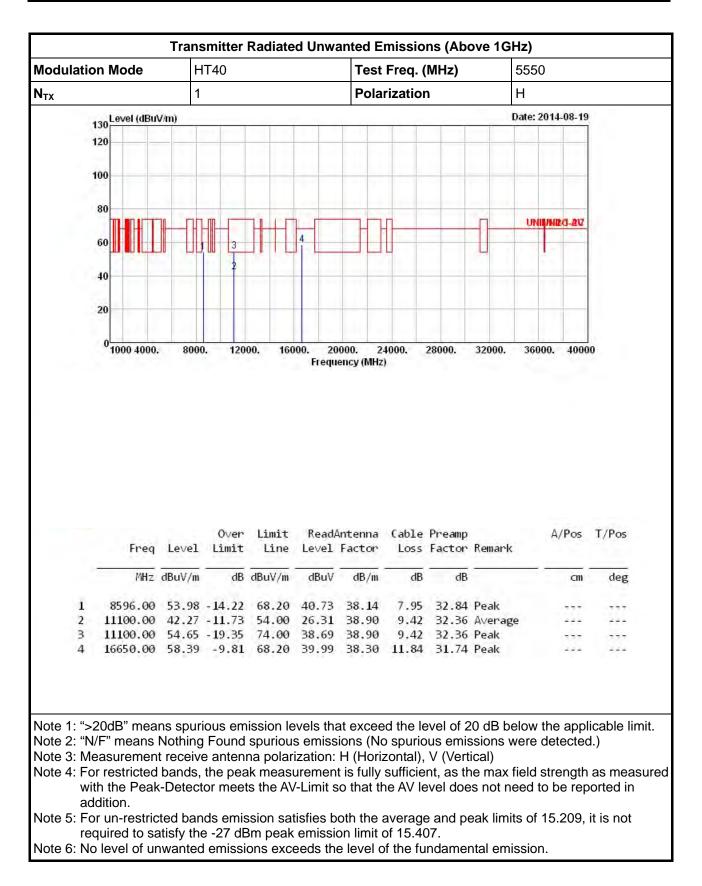




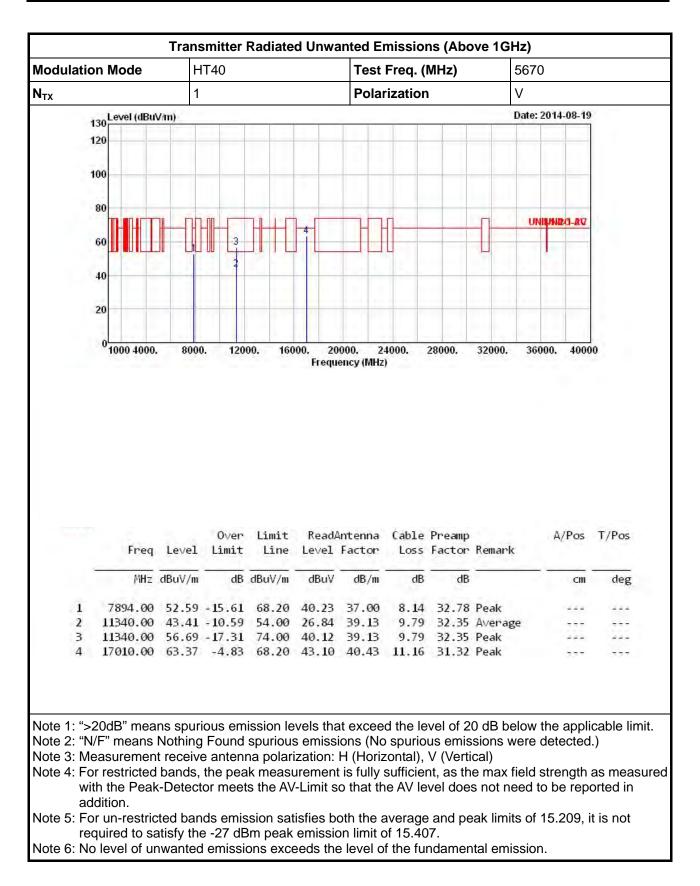




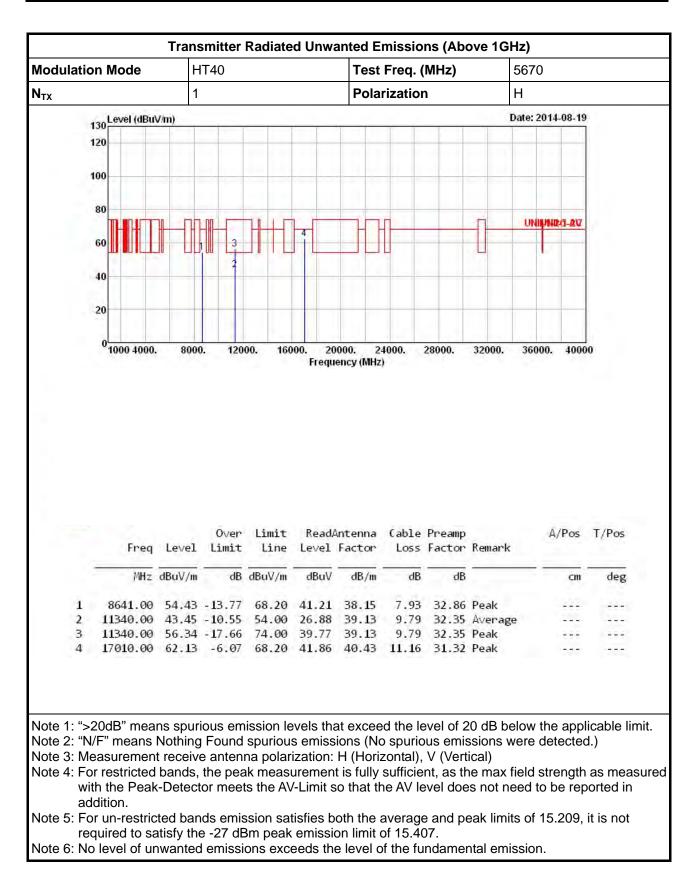










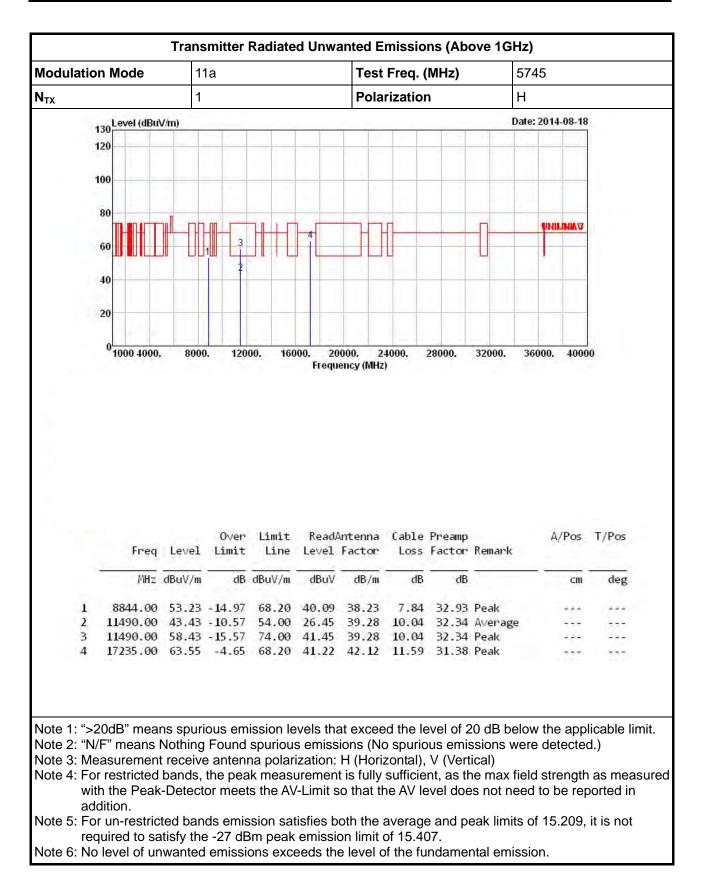




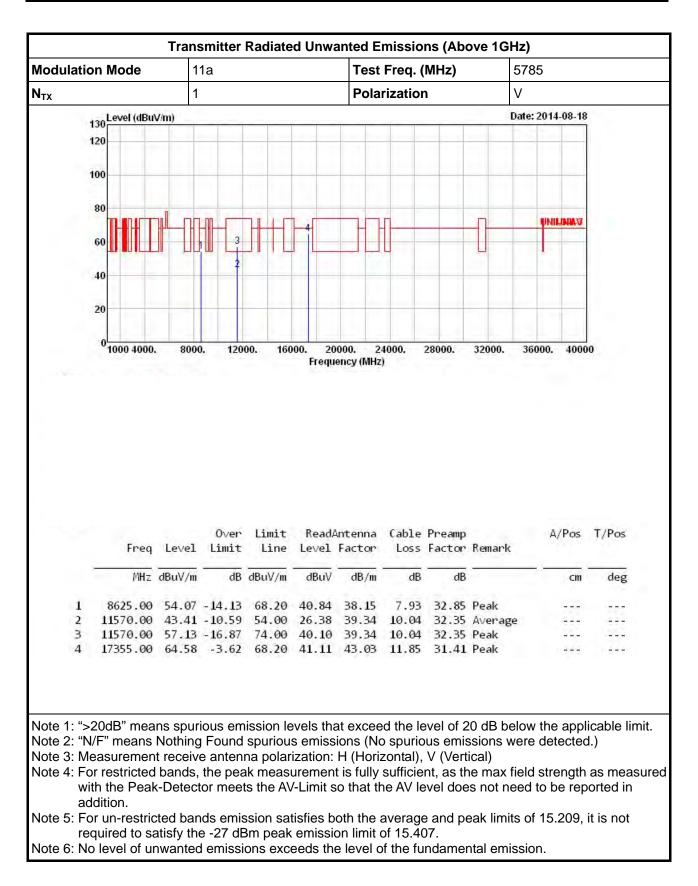
	n Mode		1a			les	Freq. (	(MHZ)		5745	)		
N <sub>TX</sub>		1	1		Pola	Polarization			V				
4	30 Level (dBu	V/m)				~ ~			D	ate: 2	014-08-1	8	
	20												
10	00	_					_	_					
1	80							_		-		-	
					4	-		-			INITOMYA	- 11	
	60		3									-	
			2					-					
4	10												
2	20												
	0												
	0 1000 4000	. 8000	0. 120	00. 160		ency (MH		28000.	32000.	360(	00. 400	_ 00	
	0 1000 4000	. 800	0. 120 Over		Frequ	ency (MH	Ð	28000. Preamp		3600		] 00 T/Pos	
		. 8000	0ver		Frequ Read/	ency (MH	Cable	Preamp		3600			
	Freq		0ver Limit	Limit	Frequ Read/	ency (MH	Cable	Preamp		3600			
1	Freq	Le∨el dBuV/m	Over Limit d₿	Limit Line dBuV/m	Frequ Read/ Le∨el dBuV	Antenna Factor dB/m	Cable Loss dB	Preamp Factor	Remark	3600	A/Pos	T/Pos	
2	Freq MHz 7712.00 11490.00	Level dBuV/m 53.51 43.82	Over Limit dB -20.49 -10.18	Limit Line dBuV/m 74.00 54.00	Read/ Level dBuV 41.66 26.84	Antenna Factor dB/m 36.82 39.28	Cable Loss dB 7.78 10.04	Preamp Factor dB 32.75 32.34	Remark Peak Average		A/Pos	T/Pos	
	Freq MHz 7712.00	Level dBuV/m 53.51 43.82 57.54	Over Limit dB -20.49 -10.18 -16.46	Limit Line dBuV/m 74.00 54.00 74.00	Frequ Read/ Level dBuV 41.66 26.84 40.56	Antenna Factor dB/m 36.82 39.28 39.28	Cable Loss dB 7.78 10.04 10.04	Preamp Factor dB 32.75 32.34 32.34	Remark Peak Average Peak		A/Pos	T/Pos	

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

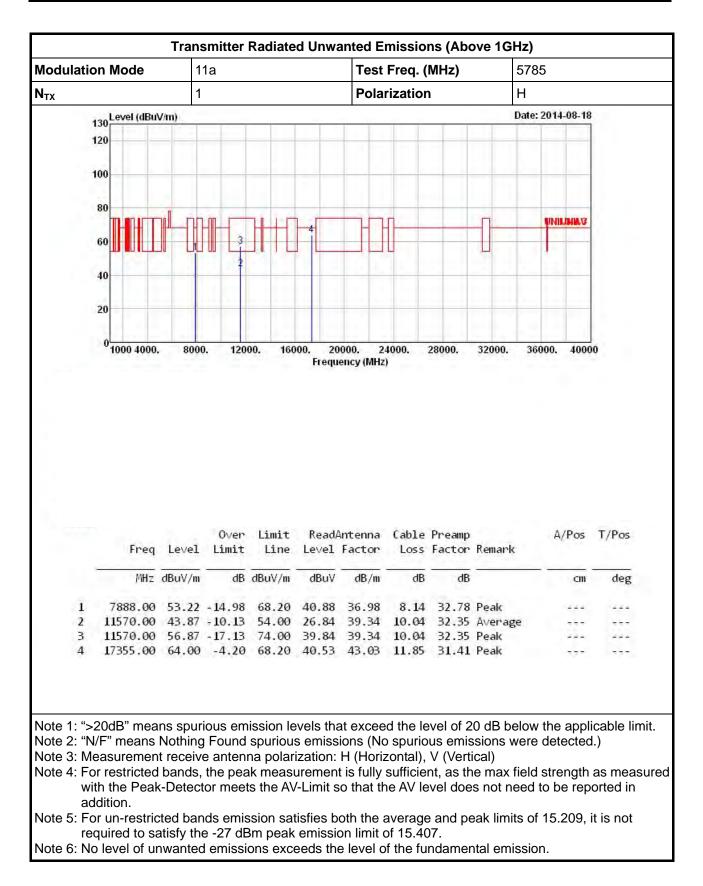




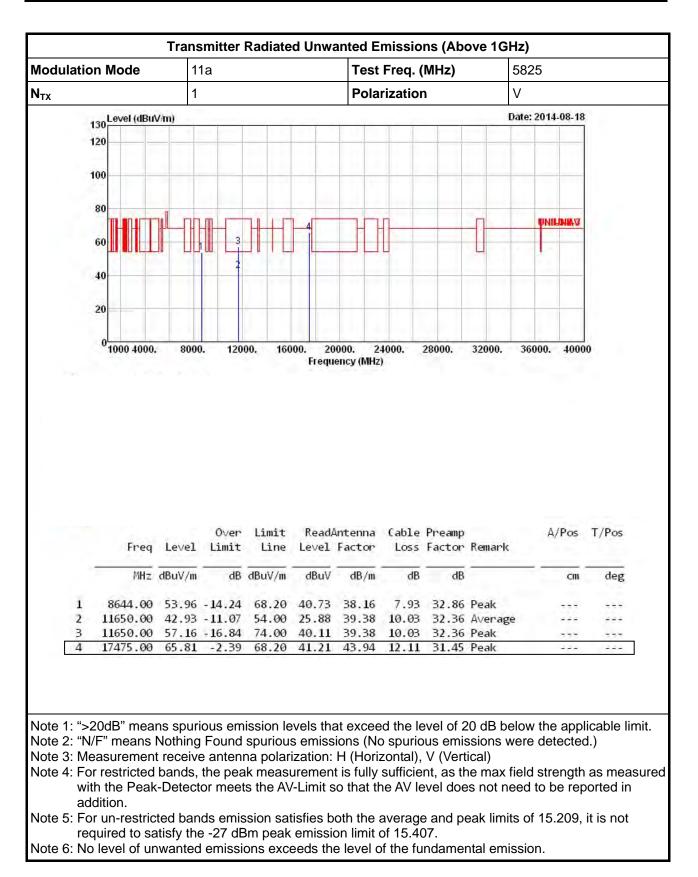




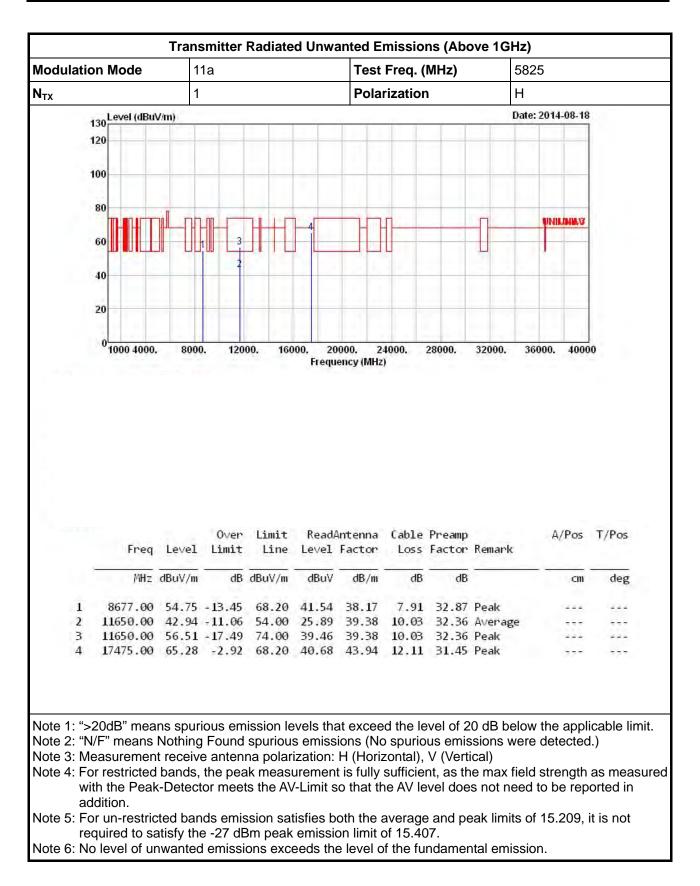




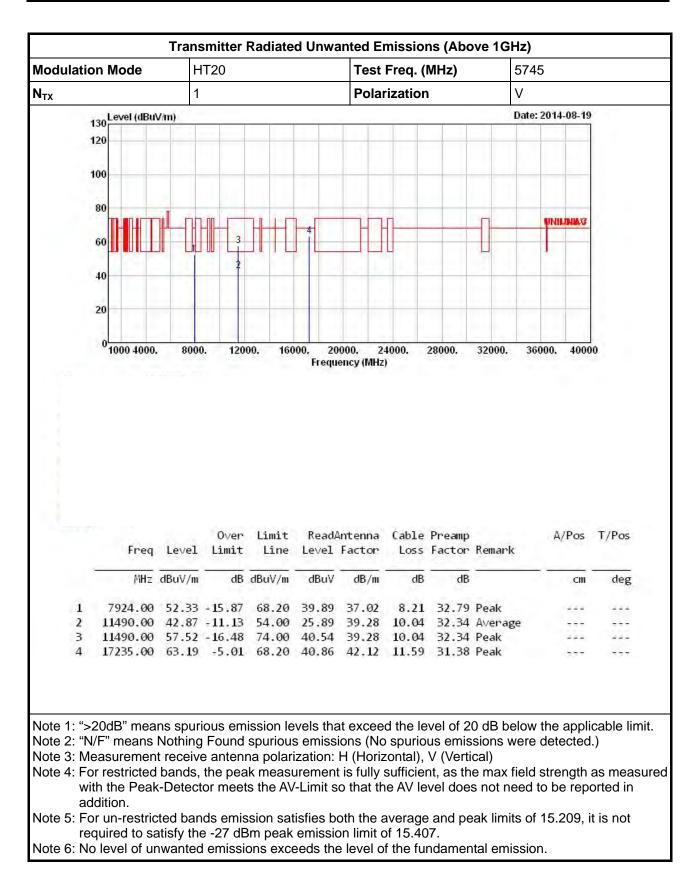




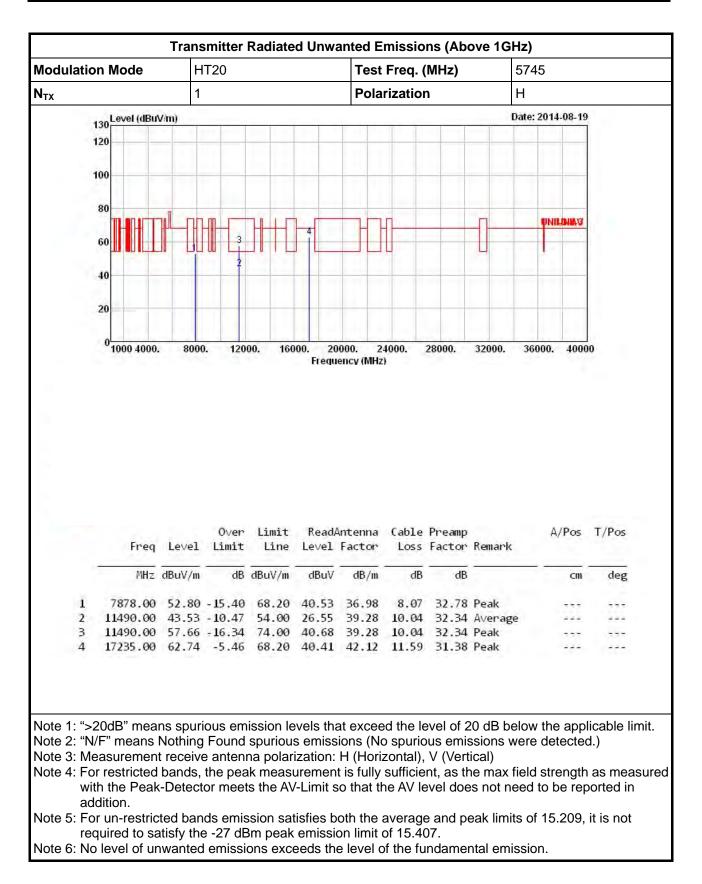




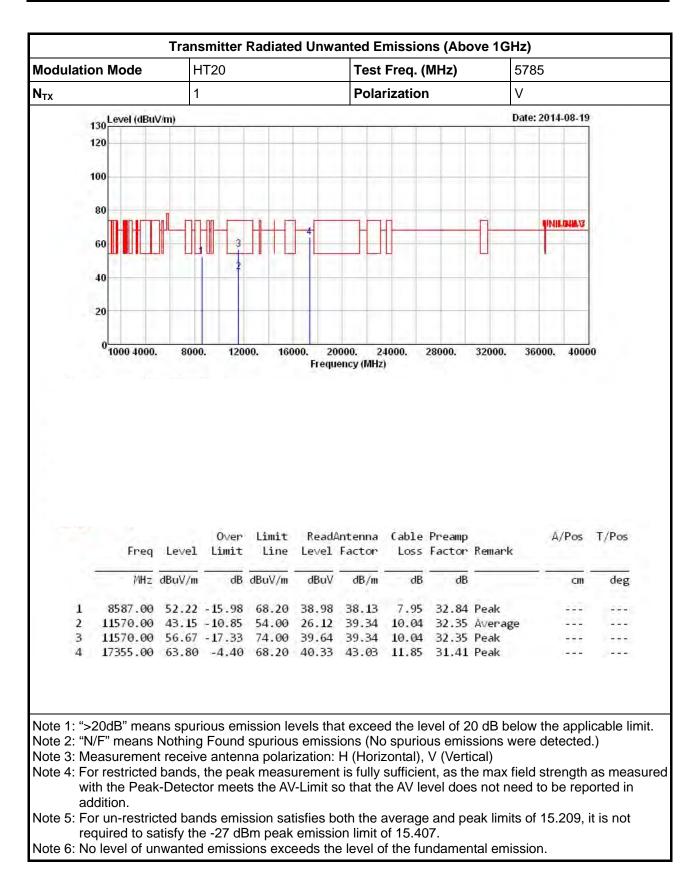




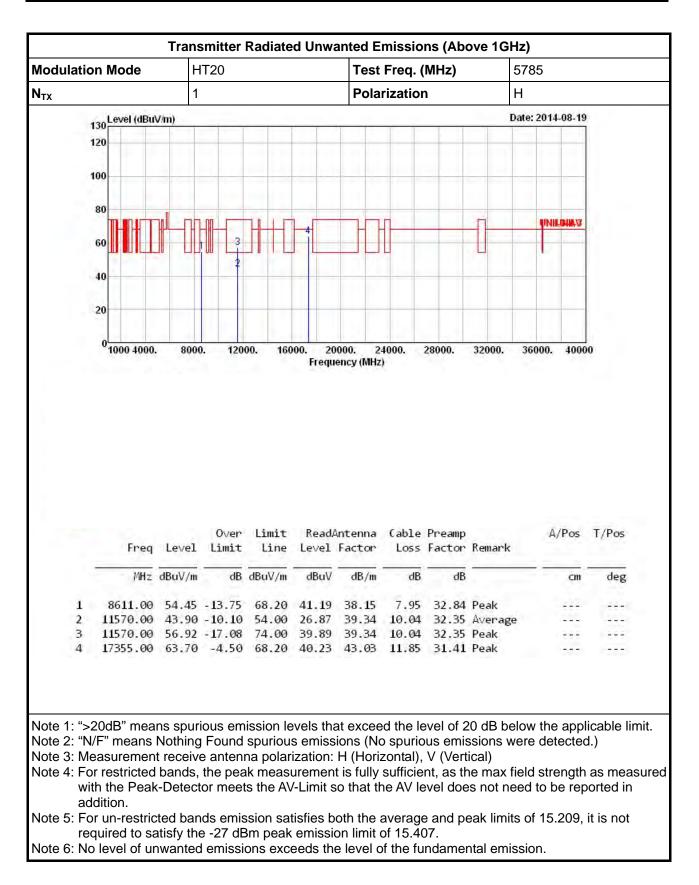




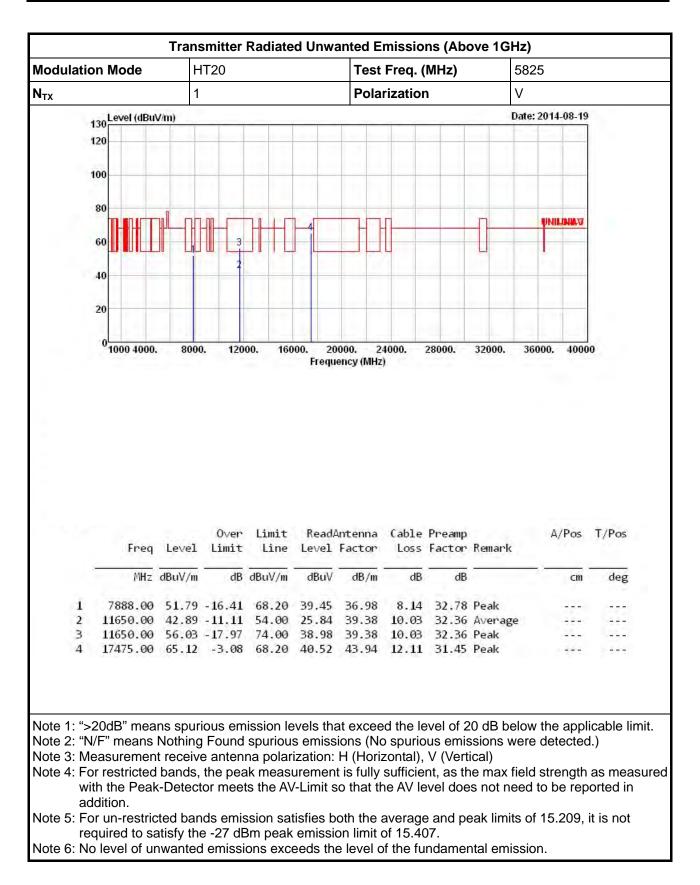




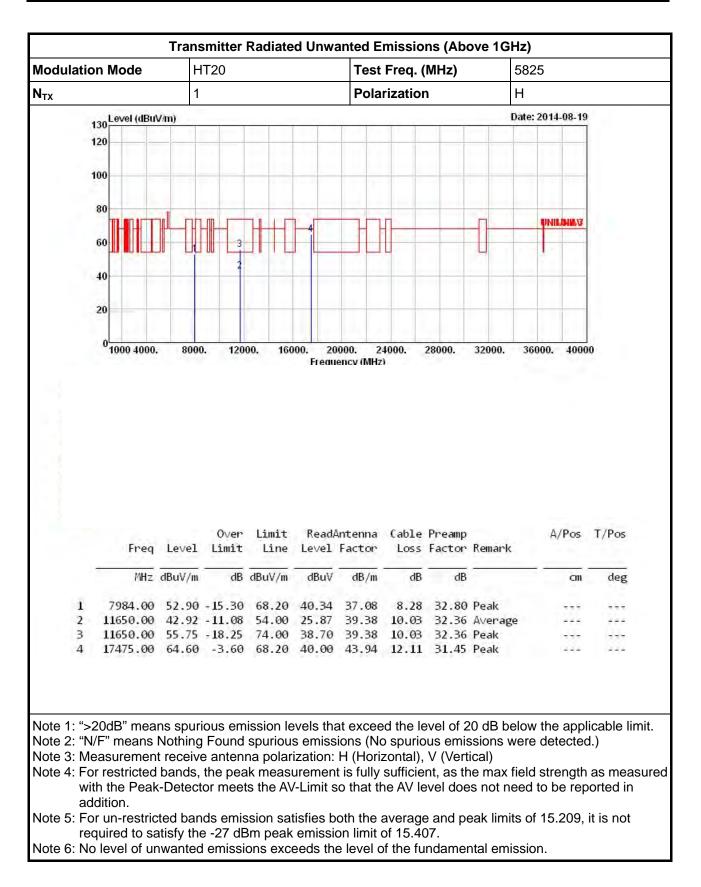




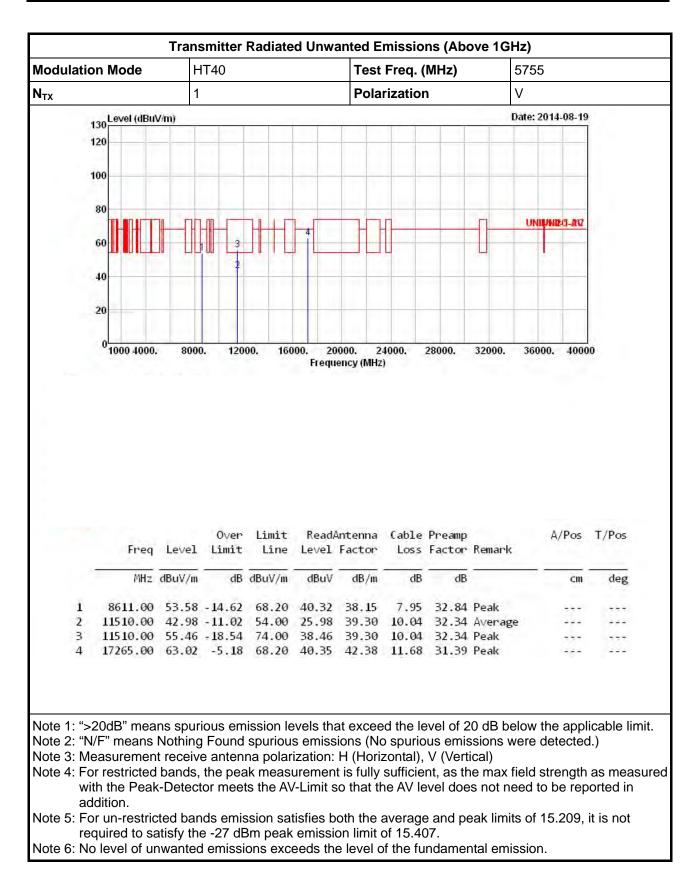




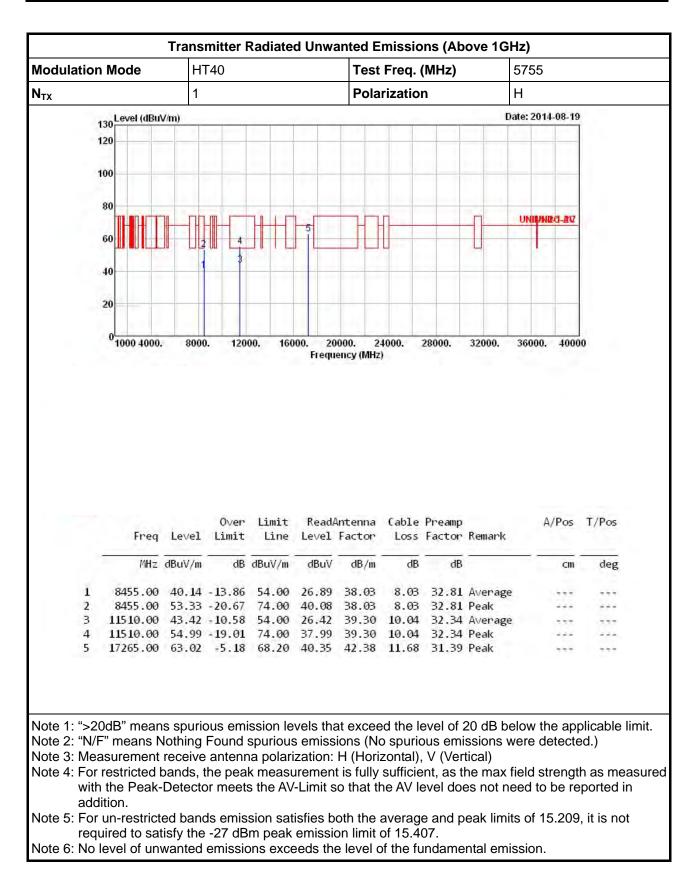




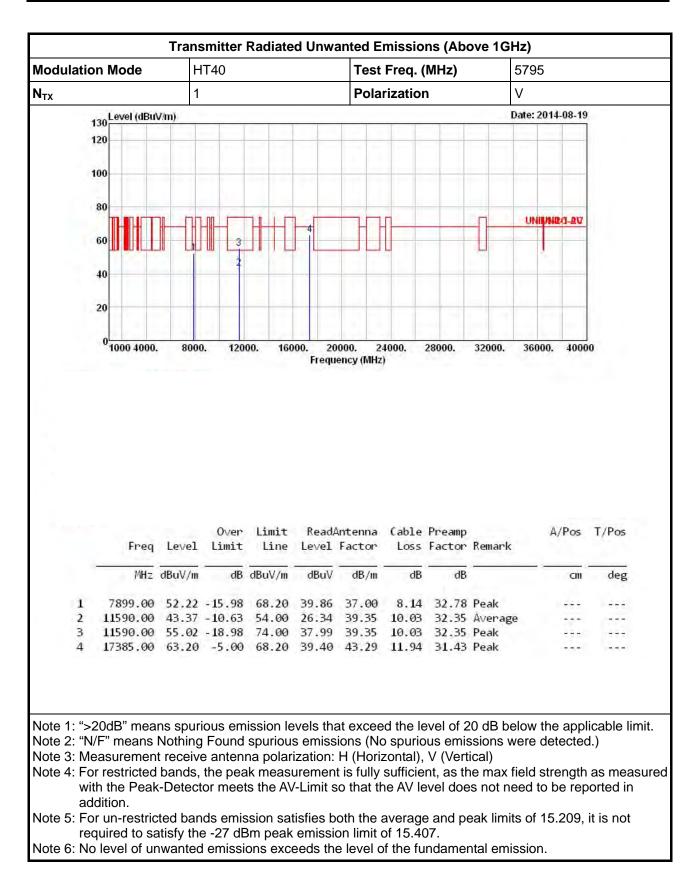




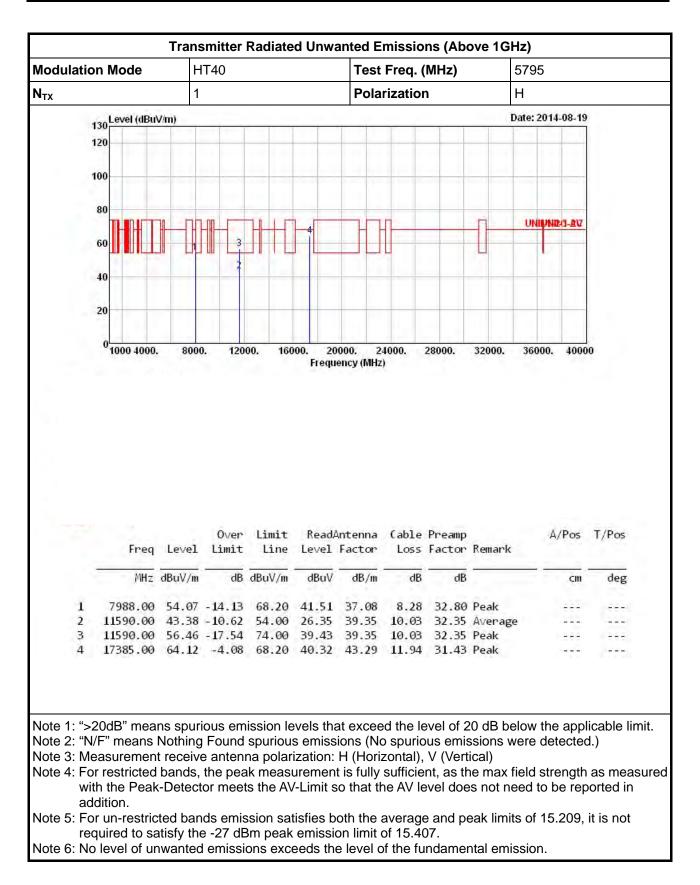














# 3.7 Frequency Stability

## 3.7.1 Frequency Stability Limit

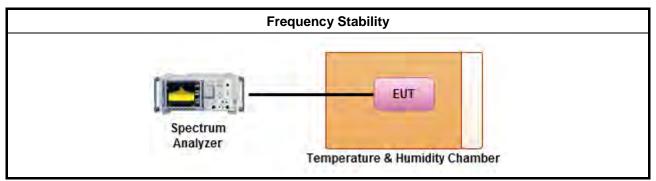
Frequency Stability Limit							
UNII Devices							
In-band emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.							
IEEE Std. 802.11n-2009							
The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band and ± 25 ppm maximum for the 2.4 GHz band.							
3.7.2 Measuring Instruments							

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

#### 3.7.3 Test Procedures

	Test Method								
$\boxtimes$	Refer as ANSI C63.10, clause 6.8 for frequency stability tests								
	$\square$	Frequency stability with respect to ambient temperature							
	$\boxtimes$	Frequency stability when varying supply voltage							
$\boxtimes$	For	conducted measurement.							
	$\boxtimes$	For conducted measurements on devices with multiple transmit chains: Measurements need only to be performed on one of the active transmit chains (antenna outputs)							
		radiated measurement. The equipment to be measured and the test antenna shall be oriented to an the maximum emitted power level.							

## 3.7.4 Test Setup





3.7.5	Test Result of Frequency Stability
-------	------------------------------------

		Frequency Stability Result				
Mod	le	Frequency Stability (ppm)				
Condition	Freq. (MHz)	Test Frequency (MHz)	Frequency Stability (ppm)			
T <sub>20°C</sub> Vmax	5300	5299.99305	-1.3113			
$T_{20^{\circ}C}Vmin$	5300	5299.99309	-1.3038			
T <sub>50°C</sub> Vnom	5300	5299.96093	-7.3717			
T <sub>40°C</sub> Vnom	5300	5299.96527	-6.5528			
T <sub>30°C</sub> Vnom	5300	5299.97959	-3.8509			
T <sub>20°C</sub> Vnom	5300	5299.99132	-1.6377			
T <sub>10°C</sub> Vnom	5300	5300.00955	1.8019			
$T_{0^{\circ}C}Vnom$	5300	5300.01042	1.9660			
T <sub>-10°C</sub> Vnom	5300	5300.02475	4.6698			
T <sub>-20°C</sub> Vnom	5300	5300.03951	7.4547			
Limit (p	opm)	20				
Resu	ult	Con	nplied			



# 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
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-00 7	-20 ~ 100℃	Nov. 20, 2013	RF Conducted
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jul. 31, 2014	RF Conducted
RF Cable-2m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	30MHz ~ 26.5GHz	Dec. 02, 2013	RF Conducted
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Jul. 26, 2014	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	Radiation
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May. 05, 2014	Radiation
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Aug. 20, 2013	Radiation
Spectrum	R&S	FSP40	100004	9kHz ~ 40GHz	Mar. 27, 2014	Radiation
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 21, 2013	Radiation
Horn Antenna	ETS · LINDGREN	3115	6741	1GHz ~ 18GHz	Jun. 11, 2014	Radiation
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz ~ 40GHz	Jan. 10, 2014	Radiation
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 16, 2013	Radiation
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec. 11, 2013	Radiation
Turn Table	EM Electronics	EM Electronics	060615	0 ~ 360 degree	N/A	Radiation
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiation

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

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

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