

# **FCC Test Report**

Equipment	:	11bgn USB module,2T2R
Brand Name	•	CC&C
Model No.	:	WM-8192EU
FCC ID	;	PANWM8192EU
Standard	ł.	47 CFR FCC Part 15.247
<b>Operating Band</b>	:	2400 MHz – 2483.5 MHz
FCC Classification	\$	DTS
Applicant		CC&C Technologies, Inc. 8F, No.150, Jian Yi Rd, Zhonghe District, New Taipei City, 235, Taiwan
Manufacturer	ł	Kunshan CC&C Technologies,Co.,LTD. No.9 Building, 3rd Main Street, Kunshan Free Trade Zone, Jiangsu Province, P.R. China

The product sample received on Aug. 18, 2014 and completely tested on Aug. 27, 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	Support Equipment	7
1.3	Testing Applied Standards	7
1.4	Testing Location Information	7
1.5	Measurement Uncertainty	8
2	TEST CONFIGURATION OF EUT	9
2.1	The Worst Case Modulation Configuration	9
2.2	The Worst Case Power Setting Parameter	9
2.3	The Worst Case Measurement Configuration	10
2.4	Test Setup Diagram	12
3	TRANSMITTER TEST RESULT	14
3.1	AC Power-line Conducted Emissions	14
3.2	6dB Bandwidth	17
3.3	RF Output Power	19
3.4	Power Spectral Density	23
3.5	Transmitter Bandedge Emissions	25
3.6	Transmitter Unwanted Emissions	30
4	TEST EQUIPMENT AND CALIBRATION DATA	111

#### 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			
0	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied			
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 0.194465MHz 44.73 (Margin 9.11dB) - AV 52.72 (Margin 11.12dB) - QP	FCC 15.207	Complied			
3.2	15.247(a)	6dB Bandwidth	6dB Bandwidth Unit [MHz] 20M: 9.10 / 40M: 36.36	≥500kHz	Complied			
3.3	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm]: 20.14	Power [dBm]:30	Complied			
3.4	15.247(d)	Power Spectral Density	PSD [dBm/100kHz]: -8.58	PSD [dBm/3kHz]:8	Complied			
3.5	15.247(c)	Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2522.48MHz: 20.02dB Restricted Bands [dBuV/m at 3m]: 2390.00MHz 70.04 (Margin 3.96dB) - PK 52.98 (Margin 1.02dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied			
3.6	15.247(c)	Transmitter Radiated Unwanted Emissions	[dBuV/m at 3m]: 4924MHz 52.42 (Margin 21.58dB) – PK 48.13 (Margin 5.87dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied			



# **Revision History**

Report No.	Version	Description	Issued Date
FR472267	Rev. 01	Initial issue of report	Sep. 24, 2014



# **1** General Description

# 1.1 Information

## 1.1.1 RF General Information

RF General Information						
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N <sub>TX</sub> )	RF Output Power (dBm)	
2400-2483.5	b	2412-2462	1-11 [11]	1	19.87	
2400-2483.5	g	2412-2462	1-11 [11]	1	20.14	
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	18.65	
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	17.29	

Note 1: RF output power specifies that Maximum Peak Conducted Output Power.

Note 2: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.

Note 3: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

# 1.1.2 Antenna Information

	Antenna Category					
$\boxtimes$	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 connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.					

	Antenna General Information						
Ant.	Port.	Ant. Cat.	Ant. Type	Model Name	Gain (dBi)		
۸	1	Integral	PIFA	AL 0140 052020	3		
A	2	Integral		ALO140-052030	3		
B 1 2	1	Integral	Print	ALC140-051021-A	3		
	2				3		
1	1	Integral	PIFA	ALC140-052030-A	3		
С	2				3		
		supports 1TX and Port 2 UT supports 2TX.	2 for transmitting in Mc	odulation Mode 11b and	11g. In Modulation		



## 1.1.3 Type of EUT

	Identify 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:				

# 1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle				
Operated normally mode for worst duty cycle				
Operated test 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)				
🔀 100% - IEEE 802.11b	0.00			
⊠ 100% - IEEE 802.11g	0.00			
⊠ 100% - IEEE 802.11n (HT20)	0.00			
⊠ 100% - IEEE 802.11n (HT40)	0.00			

# 1.1.5 EUT Operational Condition

Supply Voltage	AC mains	DC DC	
Type of DC Source	External DC adapter	From system	Li-ion Battery

# **1.2 Support Equipment**

Support Equipment - RF Conducted						
No.	o. Equipment Brand Name Model Name FCC ID					
1	Notebook	DELL	E5500	-		

	Support Equipment - Radiated Emission & AC Conduction					
No.	No. Equipment Brand Name Model Name FCC ID					
1	Notebook	DELL	E5530	R33002		
2	Test Fixture	-	-	-		

# **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 D01 v03r02
- FCC KDB 662911 D01 v02r01

# **1.4 Testing Location Information**

	Testing Location								
	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	86-3-327-3456 FAX : 886-3-327-0973				
	Test Condition			Test Site No. Test Engineer		Test Environment			
AC Conduction				CO04-HY	Zeus	24°C / 45%			
RF Conducted			TH01-HY	Leo	24.1°C / 61%				
Radiated Emission				03CH02-HY	Daniel	24.6°C / 62%			



# **1.5 Measurement Uncertainty**

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

Measurement Uncertainty						
Test Item		Uncertainty				
AC power-line conducted emissions		±2.3 dB				
Emission bandwidth, 6dB bandwidth		±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						
11b	1	1-11 Mbps	1 Mbps			
11g	1	6-54 Mbps	6 Mbps			
HT20	2	MCS 0-15	MCS 0			
HT40	2	MCS 0-15	MCS 0			

# 2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (2400-2483.5MHz band)							
Test Software		Realtek 11n 8192E WLAN MP Diagnotic Program_0.0020.3.20130924					
		Test Frequency (MHz)					
Modulation Mode	N <sub>TX</sub>	NCB: 20MHz		NCB: 40MHz			
		2412	2437	2462	2422	2437	2452
11b	1	38	37	37	-	-	-
11g	1	43	42	42	-	-	-
HT-20	2	35,35	35,33	35,33	-	-	-
HT-40	2	-	-	-	37,36	37,36	37,35



# 2.3 The Worst Case Measurement Configuration

Tł	The Worst Case Mode for Following Conformance Tests				
Tests Item	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 Ant. A: EUT with Notebook via Test Fixture and transmit					
2 Ant. B: EUT with Notebook via Test Fixture and transmit					
3 Ant. C: EUT with Notebook via Test Fixture and transmit					
	Mode 2 was the worst case, so it was recorded in this report.				

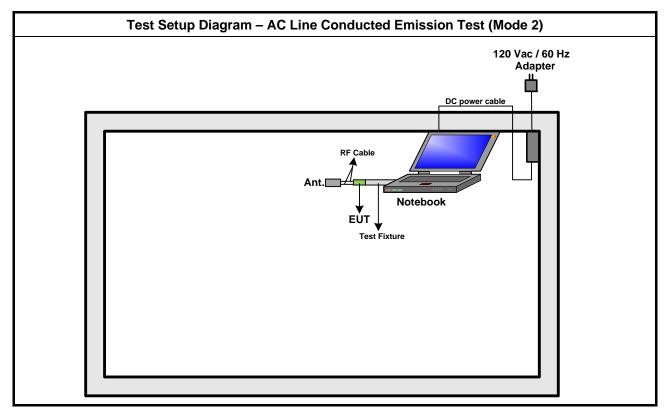
The Worst Case Mode for Following Conformance Tests			
Tests Item RF Output Power, Power Spectral Density, 6 dB Bandwidth			
Test Condition	Conducted measurement at transmit chains		
Modulation Mode 11b, 11g, HT20, HT40			



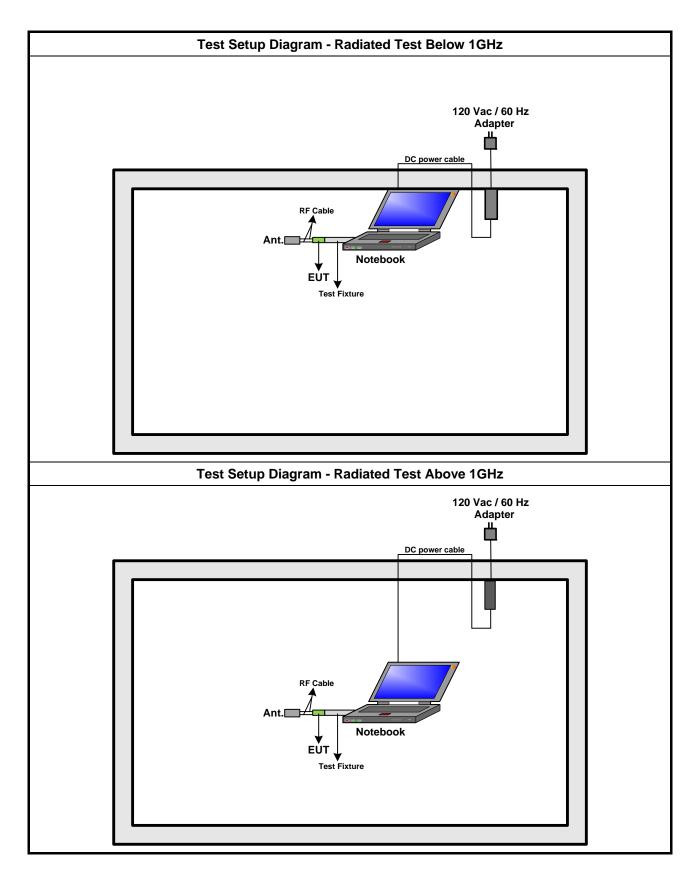
Th	The Worst Case Mode for Following Conformance Tests					
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions					
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.					
	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 plane is X for Ant. B The worst plane is Z for Ant. A, C.					
	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	Operating Mode Description					
1	Ant. A: EUT with Notebook	via Test Fixture and transn	nit			
2	Ant. B: EUT with Notebook	via Test Fixture and transm	nit			
3	Ant. C: EUT with Notebook	via Test Fixture and transr	nit			
Modulation Mode	11b, 11g, 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 the frequency.					

creases with the logarithm of the frequency

#### 3.1.2 Measuring Instruments

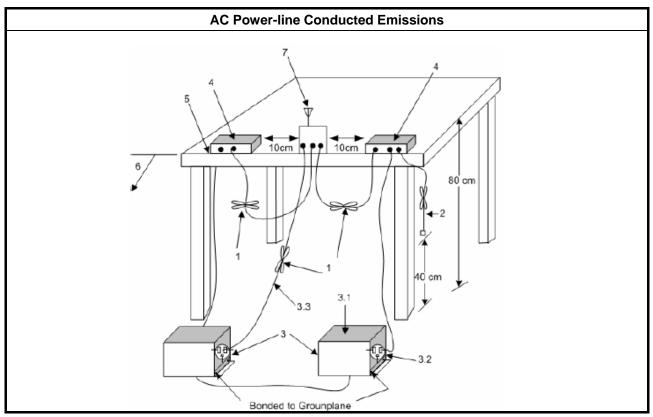
Refer a test equipment and calibration data table in this test report.

#### 3.1.3 Test Procedures

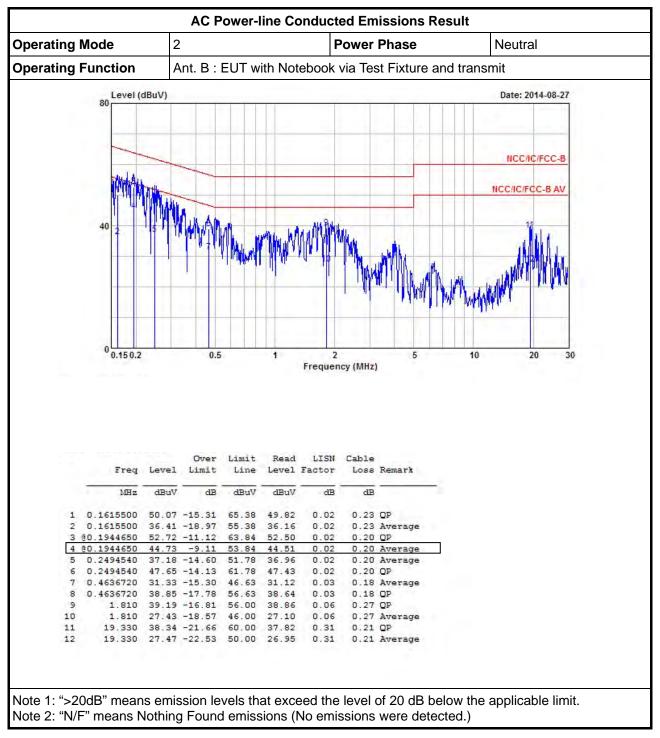
**Test Method** 

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

## 3.1.4 Test Setup



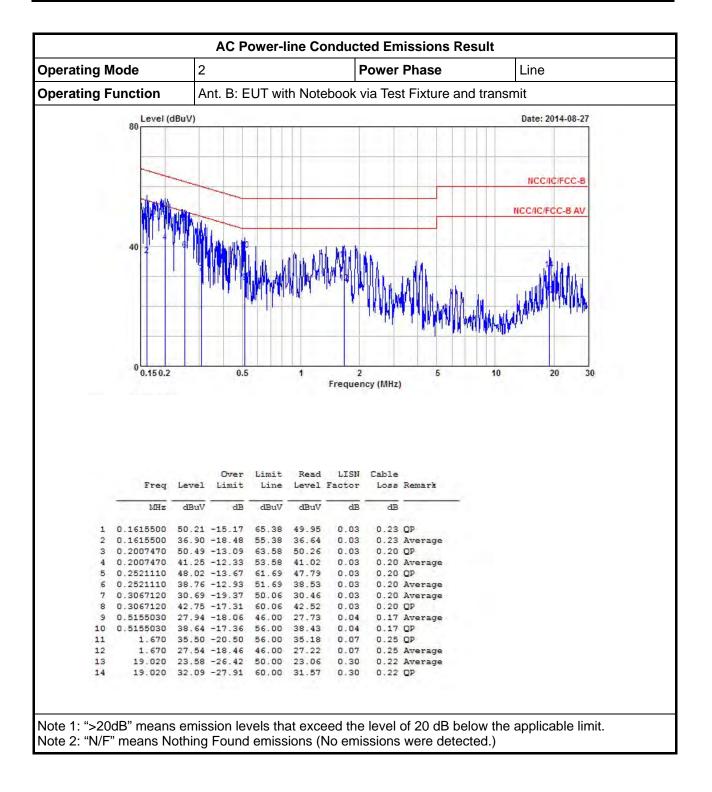




## 3.1.5 Test Result of AC Power-line Conducted Emissions









# 3.2 6dB Bandwidth

#### 3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit					
Systems using digital modulation techniques:					
$\square$ 6 dB bandwidth ≥ 500 kHz.					

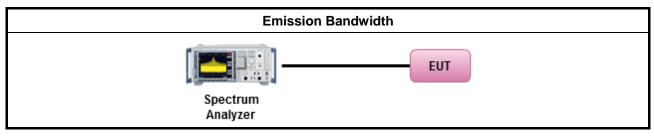
# 3.2.2 Measuring Instruments

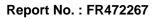
Refer a test equipment and calibration data table in this test report.

#### 3.2.3 Test Procedures

	Test Method								
$\boxtimes$	For	For the emission bandwidth shall be measured using one of the options below:							
	$\boxtimes$	Refer as FCC KDB 558074, clause 8.1 Option 1 for 6 dB bandwidth measurement.							
		Refer as FCC KDB 558074, clause 8.2 Option 2 for 6 dB bandwidth measurement.							
		Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.							
$\boxtimes$	For	conducted measurement.							
	$\boxtimes$	The EUT supports single transmit chain and measurements performance of this transmit chain port 2.							
		The EUT supports diversity transmitting and the results on transmit chain port 2 is the worst case.							
	$\square$	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 2.							
		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

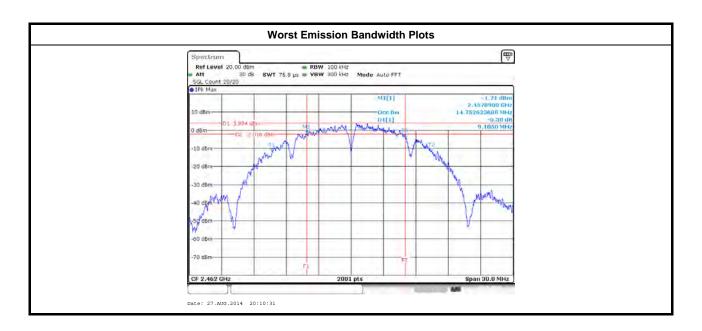






# 3.2.5 Test Result of Emission Bandwidth

Emission Bandwidth Result						
Condi	tion		Emission Bandwidth (MHz)			
Modulation Mode	Ντχ	Freq.	99% Bandwidth		6dB Bandwidth	
		(MHz)	Port 1	Port 2	Port 1	Port 2
11b	1	2412	-	14.87	-	10.06
11b	1	2437	-	14.61	-	9.12
11b	1	2462	-	14.75	-	9.10
11g	1	2412	-	16.43	-	16.53
11g	1	2437	-	16.44	-	16.51
11g	1	2462	-	16.44	-	16.51
HT20	2	2412	17.70	17.70	17.79	17.77
HT20	2	2437	17.69	17.72	17.79	17.76
HT20	2	2462	17.64	17.63	17.76	17.73
HT40	2	2422	36.06	36.06	36.36	36.40
HT40	2	2437	36.02	36.02	36.36	36.36
HT40	2	2452	36.06	36.10	36.36	36.36
Limit			N/A ≥500 kHz			
Res	ult		Complied			





# 3.3 RF Output Power

## 3.3.1 RF Output Power Limit

		RF Output Power Limit							
Max	Maximum Peak Conducted Output Power or Maximum Conducted Output Power Limit								
$\boxtimes$	240	2400-2483.5 MHz Band:							
	$\boxtimes$	If $G_{TX} \le 6 \text{ dBi}$ , then $P_{Out} \le 30 \text{ dBm} (1 \text{ W})$							
	$\square$	Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm							
		Point-to-point systems (P2P): If $G_{TX} > 6 \text{ dBi}$ , then $P_{Out} = 30 - (G_{TX} - 6)/3 \text{ dBm}$							
		Smart antenna system (SAS):							
		Single beam: If $G_{TX} > 6 \text{ dBi}$ , then $P_{Out} = 30 - (G_{TX} - 6)/3 \text{ dBm}$							
		Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm							
		Aggregate power on all beams: If $G_{TX} > 6 \text{ dBi}$ , then $P_{Out} = 30 - (G_{TX} - 6)/3 + 8 \text{dBm}$							
e.i.r	.p. P	Power Limit:							
$\square$	240	0-2483.5 MHz Band							
	$\boxtimes$	Point-to-multipoint systems (P2M): $P_{eirp} \le 36 \text{ dBm} (4 \text{ W})$							
		Point-to-point systems (P2P): $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX}]) dBm$							
		Smart antenna system (SAS)							
		Single beam: $P_{eirp} \le MAX(36, P_{Out} + G_{TX}) dBm$							
		□ Overlap beam: $P_{eirp} \le MAX(36, P_{Out} + G_{TX}) dBm$							
		Aggregate power on all beams: $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX} + 8]) dBm$							
G <sub>TX</sub>	= the	aximum peak conducted output power or maximum conducted output power in dBm, e maximum transmitting antenna directional gain in dBi. 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
$\square$	Max	imum Peak Conducted Output Power
		Refer as FCC KDB 558074, clause 9.1.1 (RBW ≥ EBW method).
	$\square$	Refer as FCC KDB 558074, clause 9.1.2 (peak power meter for VBW $\geq$ DTS BW).
$\square$	Max	imum Conducted Output Power
	[dut	y cycle ≥ 98% or external video / power trigger]
	$\boxtimes$	Refer as FCC KDB 558074, clause 9.2.2.2 Method AVGSA-1 (spectral trace averaging).
		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
		Refer as FCC KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
		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
		Refer as FCC KDB 558074, clause 9.2.3 Method AVGPM (using an RF average power meter).
$\square$	For	conducted measurement.
	$\square$	The EUT supports single transmit chain and measurements performance on this transmit chain port 2.
		The EUT supports diversity transmitting and the results on transmit chain port 2 is the worst case.
	$\boxtimes$	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

RF Output Power (Power Meter)	
EUT Power Meter	



	Directiona	al Gain (DG) F	Result		
Transmit Chains	s No.	1	2		-
Maximum G <sub>ANT</sub>	(dBi)	3.00	3.00		-
Modulation Mode	DG (dBi)	N <sub>TX</sub>	N <sub>ss</sub> (Min.)	STBC	Array Gain (dB)
11b,1-11Mbps	3.00	1	1	-	-
11g,6-54Mbps	3.00	1	1	-	-
HT20,M 0-15	6.01	2	2	-	3.01(Note3)
HT40,M 0-15	6.01	2	2	-	3.01(Note3)
Note 1: For all transmitter outp Any transmit signals a All transmit signals are Note 2: For all transmitter outp Any transmit signals are All transmit signals are Note 3: For Spatial Multiplexin where Nss = the numb Note 4: For CDD transmission Directional Gain (DG) Array Gain = 0 dB (i.e. Array Gain = 0 dB (i.e.	re correlated, Direct e completely uncorr puts with unequal a re correlated, Direct e completely uncorr g, Directional Gain per of independent is, directional gain i = $G_{ANT}$ + Array Gai ., no array gain) for	tional Gain = 0 related, Direction tenna gains, o tional Gain =1 related, Direction (DG) = $G_{ANT}$ + spatial streams s calculated as n, where Array N <sub>TX</sub> ≤ 4;	$G_{ANT} + 10 \log(N_{c})$ onal Gain = $G_{AN}$ directional gain 0 log[( $10^{G1/20} + .$ onal Gain = 10 l $\cdot$ 10 log( $N_{TX}/N_{SS}$ s data. s power measur g Gain is as follo	Tx) is to be comp + 10 <sup>GN/20</sup> ) <sup>2</sup> / og[(10 <sup>G1/10</sup> + ), rements: ws:	uted as follows:

# 3.3.5 Directional Gain for Power Measurement



		N	laximum F	Peak Condu	ucted Out	put Power Res	ult				
Condit	ion		RF Output Power (dBm)								
		Freq.	C	Output Power							
Modulation Mode	Ντχ	(MHz)	Port 1	Port 2	Sum Chain	Power Limit	DG (dBi)	EIRP Power	EIRP Limit		
11b	1	2412	-	19.49	19.49	30.00	3.00	22.49	36.00		
11b	1	2437	-	19.71	19.71	30.00	3.00	22.71	36.00		
11b	1	2462	-	19.87	19.87	30.00	3.00	22.87	36.00		
11g	1	2412	-	19.72	19.72	30.00	3.00	22.72	36.00		
11g	1	2437	-	19.87	19.87	30.00	3.00	22.87	36.00		
11g	1	2462	-	20.14	20.14	30.00	3.00	23.14	36.00		
HT20	2	2412	15.64	15.63	18.65	29.99	6.01	24.66	36.00		
HT20	2	2437	14.77	14.50	17.65	29.99	6.01	23.66	36.00		
HT20	2	2462	14.87	14.87	17.88	29.99	6.01	23.89	36.00		
HT40	2	2422	13.97	13.81	16.90	29.99	6.01	22.91	36.00		
HT40	2	2437	14.26	14.30	17.29	29.99	6.01	23.30	36.00		
HT40	2	2452	14.37	14.19	17.29	29.99	6.01	23.30	36.00		
Resu	ılt					Comp	lied				

# 3.3.6 Test Result of Maximum Peak Conducted Output Power

# 3.3.7 Test Result of Maximum Conducted Output Power

			Maximu	m Conduct	ed Output	Power Result					
Condit	ion		RF Output Power (dBm)								
		Freq.	Output Power								
Modulation Mode	Ν <sub>τx</sub>	(MHz)	Port 1	Port 2	Sum Chain	Power Limit	DG (dBi)	EIRP Power	EIRP Limit		
11b	1	2412	-	17.28	17.28	30.00	3.00	20.28	36.00		
11b	1	2437	-	17.39	17.39	30.00	3.00	20.39	36.00		
11b	1	2462	-	17.45	17.45	30.00	3.00	20.45	36.00		
11g	1	2412	-	15.26	15.26	30.00	3.00	18.26	36.00		
11g	1	2437	-	15.19	15.19	30.00	3.00	18.19	36.00		
11g	1	2462	-	15.03	15.03	30.00	3.00	18.03	36.00		
HT20	2	2412	10.41	10.55	13.49	29.99	6.01	19.50	36.00		
HT20	2	2437	9.85	9.93	12.90	29.99	6.01	18.91	36.00		
HT20	2	2462	9.61	9.87	12.75	29.99	6.01	18.76	36.00		
HT40	2	2422	9.83	9.99	12.92	29.99	6.01	18.93	36.00		
HT40	2	2437	9.87	9.95	12.92	29.99	6.01	18.93	36.00		
HT40	2	2452	9.84	9.57	12.72	29.99	6.01	18.73	36.00		
Resu	ılt					Comp	lied				



#### **Power Spectral Density** 3.4

#### 3.4.1 **Power Spectral Density Limit**

**Power Spectral Density Limit** 

 $\boxtimes$ Power Spectral Density (PSD) ≤ 8 dBm/3kHz

#### 3.4.2 Measuring Instruments

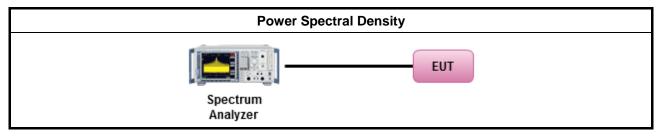
Refer a test equipment and calibration data table in this test report.

#### 3.4.3 Test Procedures

			Test Method
	outp the o cond of th	out po outpu ducte ne av	wer spectral density procedures that the same method as used to determine the conducted ower. If maximum peak conducted output power was measured to demonstrate compliance to it power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum d output power was measured to demonstrate compliance to the output power limit, then one erage PSD procedures shall be used, as applicable based on the following criteria (the peak cedure is also an acceptable option).
	$\boxtimes$	Refe	er as FCC KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz;detector=peak)
	[dut	у сус	le ≥ 98% or external video / power trigger]
	$\boxtimes$	Ref	er as FCC KDB 558074, clause 10.3 Method AVGPSD-1 (spectral trace averaging).
		Ref	er as FCC KDB 558074, clause 10.4 Method AVGPSD-1 Alt. (slow sweep speed)
	duty	v cycl	e < 98% and average over on/off periods with duty factor
		Ref	er as FCC KDB 558074, clause 10.5 Method AVGPSD-2 (spectral trace averaging).
		Ref	er as FCC KDB 558074, clause 10.6 Method AVGPSD-2 Alt. (slow sweep speed)
$\square$	For	cond	ucted measurement.
	$\boxtimes$	The port	EUT supports single transmit chain and measurements performed on this transmit chain 2.
		The	EUT supports diversity transmitting and the results on transmit chain port 2 is the worst case.
	$\boxtimes$	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 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 <sub>TX</sub> 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.
			Option 2: Measure and add 10 $\log(N)$ dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 $\log(N)$ . Or each transmit chains shall be add 10 $\log(N)$ to compared with the limit.

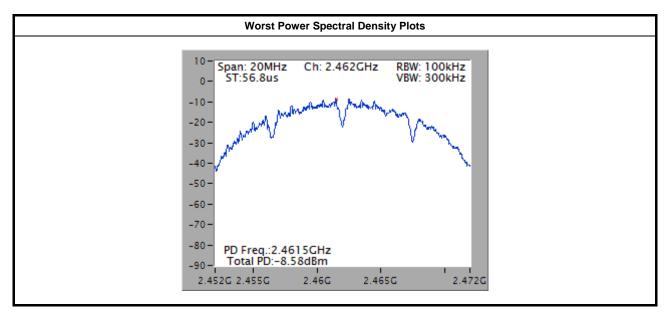


# 3.4.4 Test Setup



### 3.4.5 Test Result of Power Spectral Density

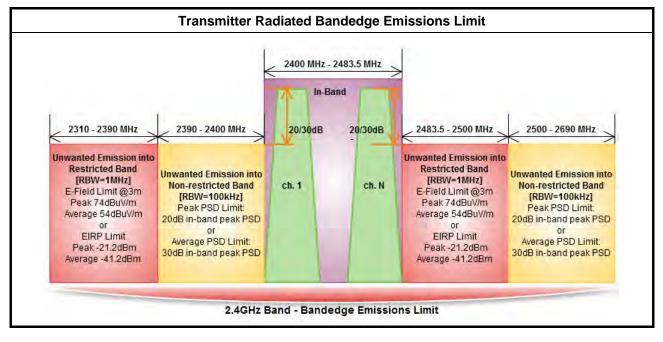
			Power Spectral Density Result	
Condi	tion		Power Spec	tral Density
Modulation Mode	Ντχ	Freq. (MHz)	Sum Chain (dBm/100kHz)	PSD Limit (dBm/3kHz)
11b	1	2412	-9.27	8
11b	1	2437	-8.71	8
11b	1	2462	-8.58	8
11g	1	2412	-15.47	8
11g	1	2437	-15.06	8
11g	1	2462	-14.83	8
HT20	2	2412	-18.67	8
HT20	2	2437	-18.72	8
HT20	2	2462	-18.03	8
HT40	2	2422	-21.71	8
HT40	2	2437	-21.32	8
HT40	2	2452	-21.72	8
Resu	ult		Com	plied





# 3.5 Transmitter Bandedge Emissions

### 3.5.1 Transmitter Radiated Bandedge Emissions Limit



#### 3.5.2 Measuring Instruments

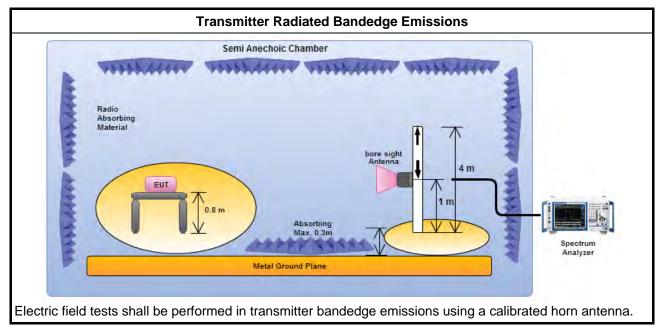
Refer a test equipment and calibration data table in this test report.



#### 3.5.3 Test Procedures

		Test Method
$\square$	The	verage emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
		as ANSI C63.10, clause 6.9.2.2 bandedge testing shall be performed at the lowest frequency nel and highest frequency channel within the allowed operating band.
$\square$	For	e transmitter unwanted emissions shall be measured using following options below:
	$\boxtimes$	Refer as FCC KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
	$\boxtimes$	Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
		Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle ≥98%)
		Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
		Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW≥1/T).
		⊠ Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW ≥ $1/T$ , 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 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
$\boxtimes$	For	e transmitter bandedge emissions shall be measured using following options below:
		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).
	$\square$	Refer as ANSI C63.10, clause 6.9.2 for band-edge testing and the test distance is 3m.
		Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements.
$\square$	For	diated measurement, refer as FCC KDB 558074, clause 12.2.7.

### 3.5.4 Test Setup





# 3.5.5 Transmitter Radiated Bandedge Emissions

Mode 1

Modulation	N <sub>TX</sub>	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
11b	1	2412	94.78	2399.94	64.22	30.56	20	V
11b	1	2462	94.46	2537.80	64.06	30.40	20	V
11g	1	2412	88.74	2394.56	63.32	25.42	20	V
11g	1	2462	87.23	2504.30	63.80	23.43	20	V
HT20	2	2412	87.79	2394.90	63.52	24.27	20	V
HT20	2	2462	90.84	2545.50	63.99	26.85	20	V
HT40	2	2422	84.47	2391.71	64.08	20.39	20	V
HT40	2	2452	83.58	2522.48	63.56	20.02	20	V

Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Freq. (MHz) AV	Level (dBuV/m) AV	Limit (dBuV/m) AV	Pol
11b	1	2412	3	2339.90	60.84	74	2321.87	47.87	54	V
11b	1	2462	3	2486.70	59.84	74	2490.30	47.88	54	V
11g	1	2412	3	2389.07	63.52	74	2389.63	49.21	54	V
11g	1	2462	3	2486.70	60.21	74	2484.30	48.04	54	V
HT20	2	2412	3	2334.86	60.44	74	2319.30	47.95	54	V
HT20	2	2462	3	2493.00	60.68	74	2498.70	48.13	54	V
HT40	2	2422	3	2321.35	60.08	74	2326.10	47.96	54	V
HT40	2	2452	3	2493.80	60.20	74	2483.60	48.02	54	V



#### Mode 2

Modulation	Ντχ	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
11b	1	2412	103.82	2399.94	68.50	35.32	20	Н
11b	1	2462	103.05	2503.10	63.93	39.12	20	Н
11g	1	2412	96.84	2398.59	67.35	29.49	20	Н
11g	1	2462	99.82	2504.70	63.70	36.12	20	Н
HT20	2	2412	95.89	2399.49	64.76	31.13	20	Н
HT20	2	2462	96.17	2518.70	64.05	32.12	20	Н
HT40	2	2422	93.10	2394.35	64.05	29.05	20	Н
HT40	2	2452	90.89	2534.60	63.96	26.93	20	Н

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.
11b	1	2412	3	2386.05	60.82	74	2386.05	49.05	54	Н
11b	1	2462	3	2483.50	59.89	74	2495.50	48.07	54	Н
11g	1	2412	3	2389.07	70.04	74	2390.00	52.98	54	Н
11g	1	2462	3	2483.90	67.95	74	2483.50	52.93	54	Н
HT20	2	2412	3	2378.43	60.41	74	2332.62	47.97	54	Н
HT20	2	2462	3	2495.90	60.43	74	2492.70	48.06	54	Н
HT40	2	2422	3	2378.90	60.59	74	2385.77	48.06	54	Н
HT40	2	2452	3	2489.00	60.67	74	2483.60	48.73	54	Н



#### Mode 3

Modulation	Ντχ	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
11b	1	2412	101.47	2399.04	65.72	35.75	20	V
11b	1	2462	101.91	2546.30	64.24	37.67	20	V
11g	1	2412	96.26	2399.04	65.57	30.69	20	V
11g	1	2462	97.58	2541.00	64.51	33.07	20	V
HT20	2	2412	90.87	2399.82	65.14	25.73	20	V
HT20	2	2462	93.80	2538.70	64.25	29.55	20	V
HT40	2	2422	88.45	2398.44	64.50	23.95	20	V
HT40	2	2452	91.22	2511.56	64.33	26.89	20	V

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.
11b	1	2412	3	2385.94	61.06	74	2386.94	49.67	54	V
11b	1	2462	3	2489.40	61.41	74	2488.60	49.62	54	V
11g	1	2412	3	2389.52	65.52	74	2390.00	51.47	54	V
11g	1	2462	3	2484.60	65.66	74	2483.50	51.17	54	V
HT20	2	2412	3	2389.41	62.18	74	2389.86	49.09	54	V
HT20	2	2462	3	2483.50	62.79	74	2483.50	49.35	54	V
HT40	2	2422	3	2388.54	64.13	74	2389.86	50.67	54	V
HT40	2	2452	3	2487.92	64.21	74	2483.60	51.07	54	V



# 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			
	o measure the fundamental emission power to en 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.

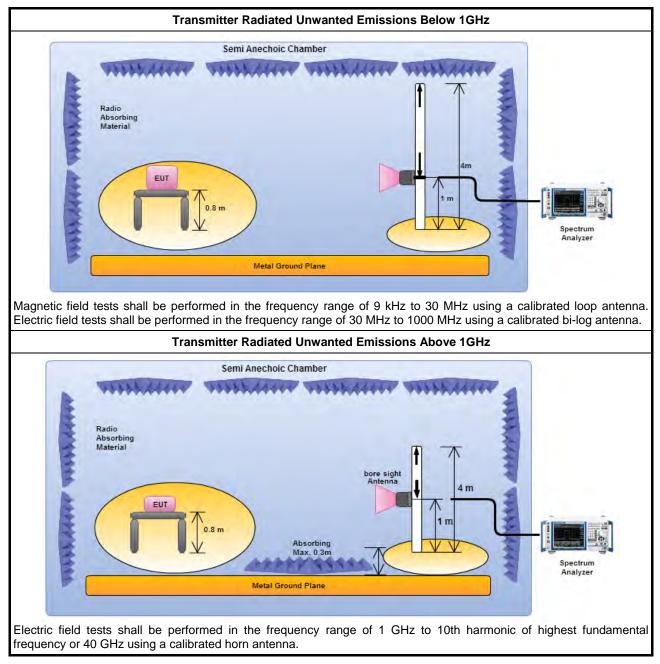


# 3.6.3 Test Procedures

		Test Method
$\boxtimes$	perfe equi extra 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. When performing measurements at a distance other than that specified, the results shall be apolated 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).
		Measurements in the frequency range 10 GHz - 18GHz are typically made at a closer distance 1m, because the instrumentation noise floor is typically close to the radiated emission limit.
		Measurements in the frequency range above 18 GHz - 25GHz are typically made at a closer distance 0.5m, because the instrumentation noise floor is typically close to the radiated emission limit.
$\boxtimes$	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:
	$\boxtimes$	Refer as FCC KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
	$\boxtimes$	Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
		□ Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle ≥98%)
		Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
		□ Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW≥1/T).
		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 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
		Refer as FCC KDB 558074, clause 12.2.3 measurement procedure Quasi-Peak limit.
$\boxtimes$	For	radiated measurement, refer as FCC KDB 558074, clause 12.2.7.
	$\square$	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.
	$\square$	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.



#### 3.6.4 Test Setup



# 3.6.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

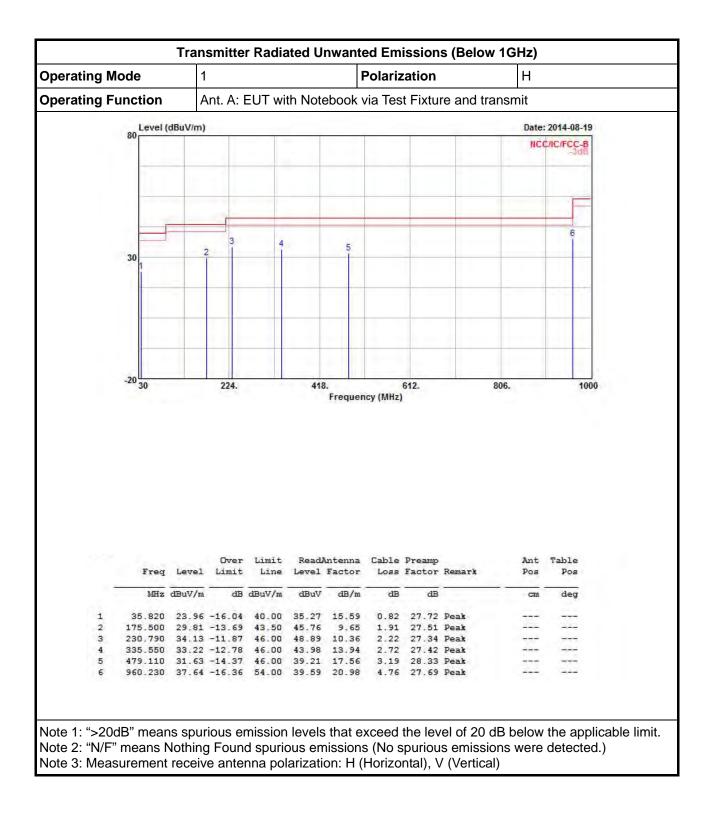
All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.



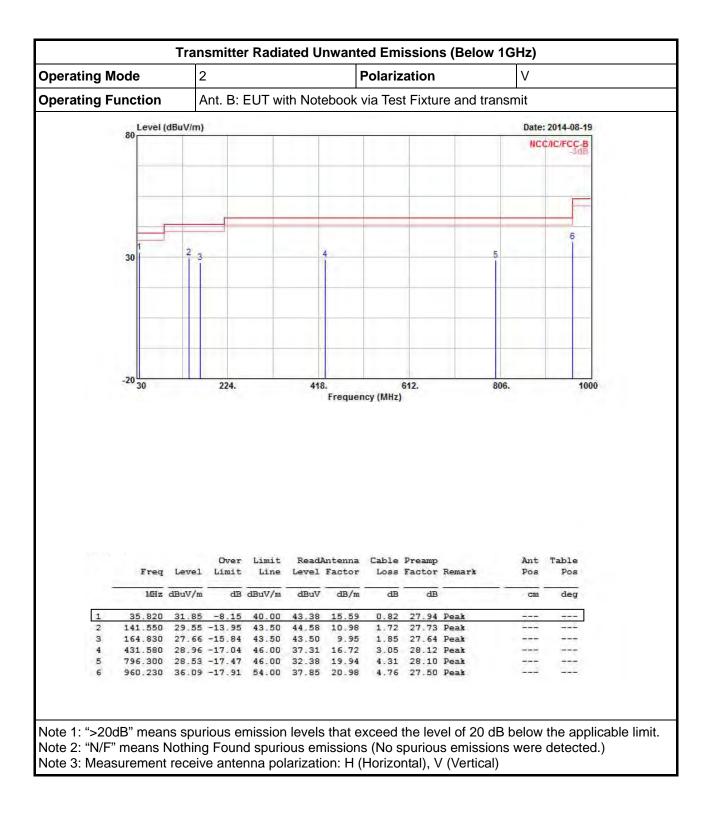


### 3.6.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

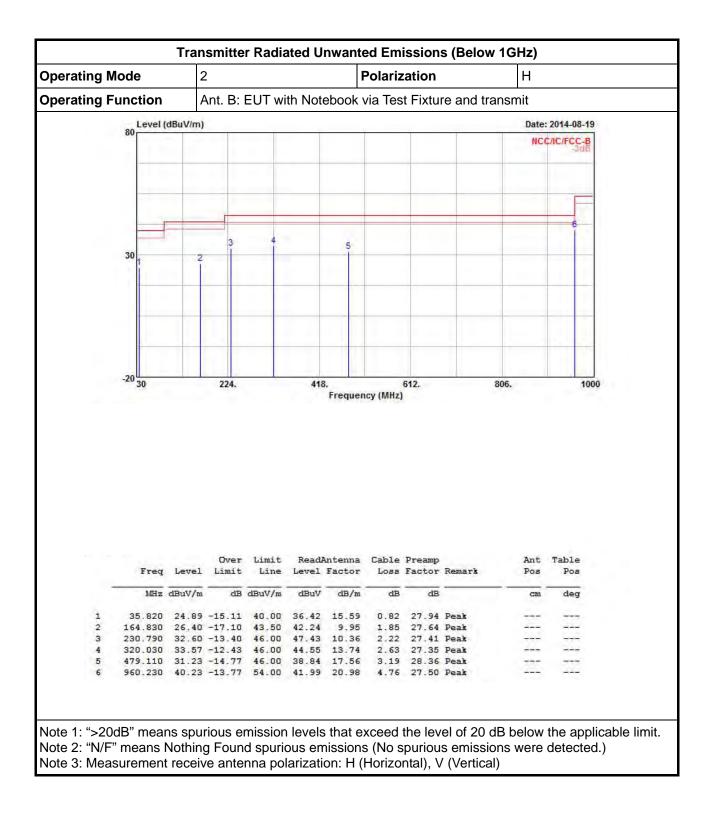


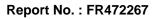




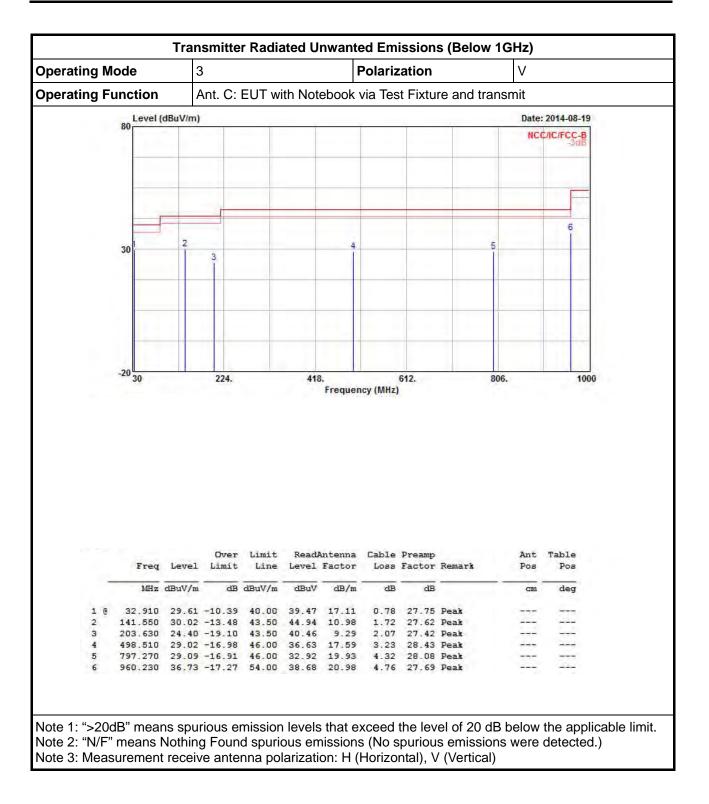




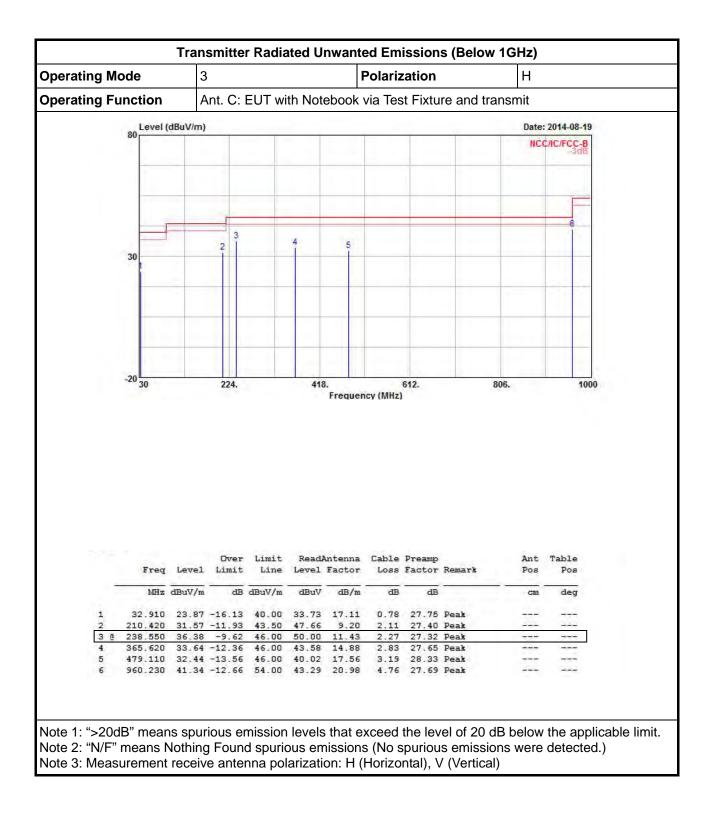








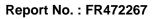




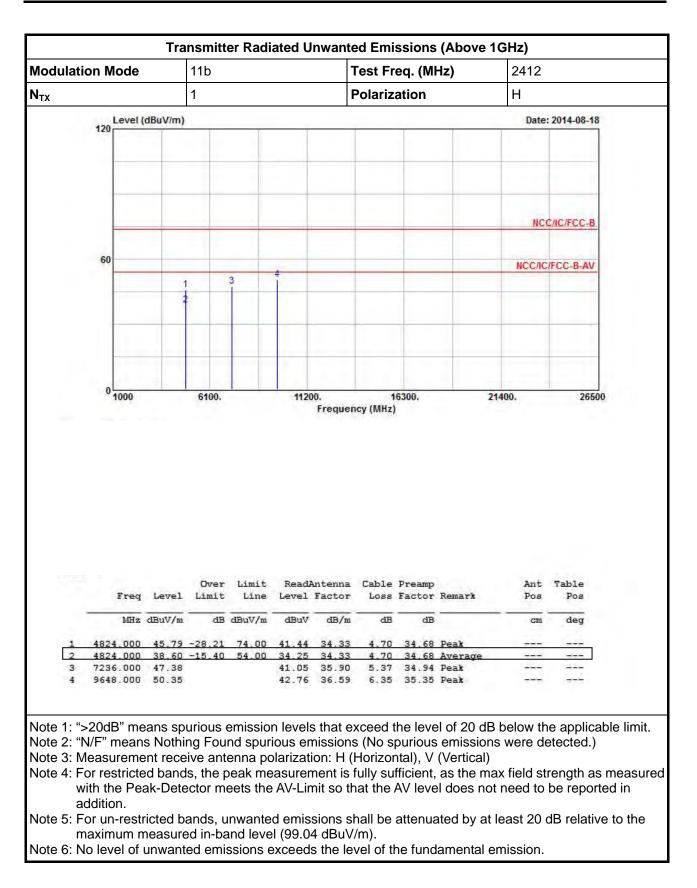


Modulatio	n Mode											
	milliouo		11b			T	est Fr	eq. (M	Hz)	2412		
N <sub>TX</sub>			1			F	Polariz	ation		V		
	Level (	dBuV/m)								Date	: 2014-08-18	
	120											
			_						_			
										1		
										NC	C/IC/FCC-B	
	60									NCC/IC	FCC-B-AV	
		1		3	4							
		2	6									
	-							-				
						_		-				
	0 1000		6100.		1120	0. Frequen		6300.	21	400.	26500	
	0 1000		6100.		1120				21	400.	26500	
		Level	Over	Limit Line		Frequen	cy (MHz) Cable			400. Ant Pos		
	Freq	Level dBuV/m	Over Limit		ReadA	Frequen	cy (MHz) Cable	Preamp		Ant	Table	
	Freq	dBuV/m	Over Limit dB	Line dBuV/m	ReadA Level dBuV	ntenna Factor dB/m	Cable Loss dB	Preamp Factor dB	Remark	Ant Pos	Table Pos	
1 2 3	Freq	dBuV/m 45.28 34.33	Over Limit dB -28.72	Line dBuV/m 74.00	ReadA Level dBuV 40.93 29.98	ntenna Factor dB/m 34.33	Cable Loss dB 4.70 4.70	Preamp Factor dB 34.68	Remark Peak Average	Ant Pos	Table Pos	

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

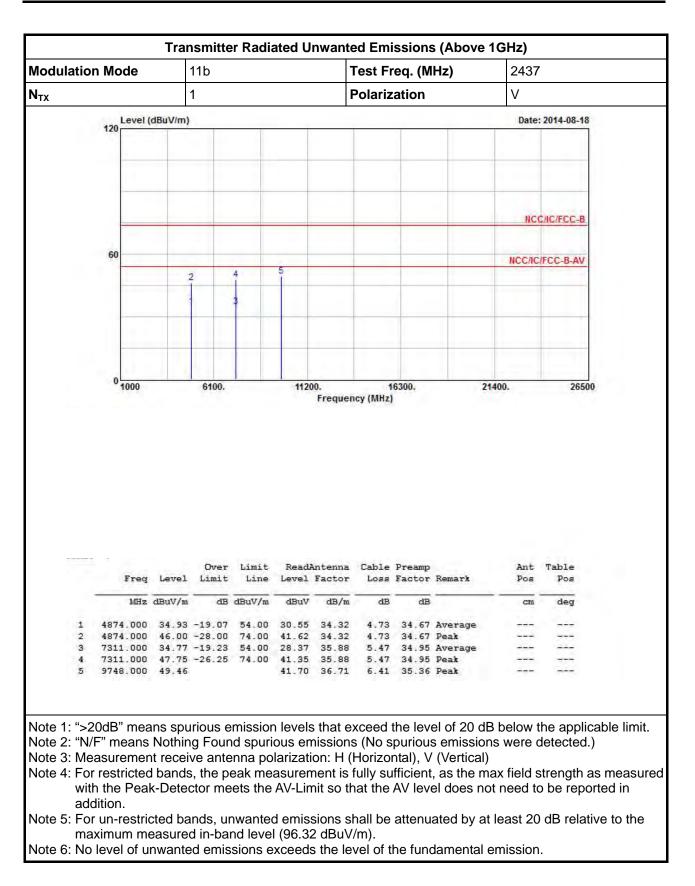






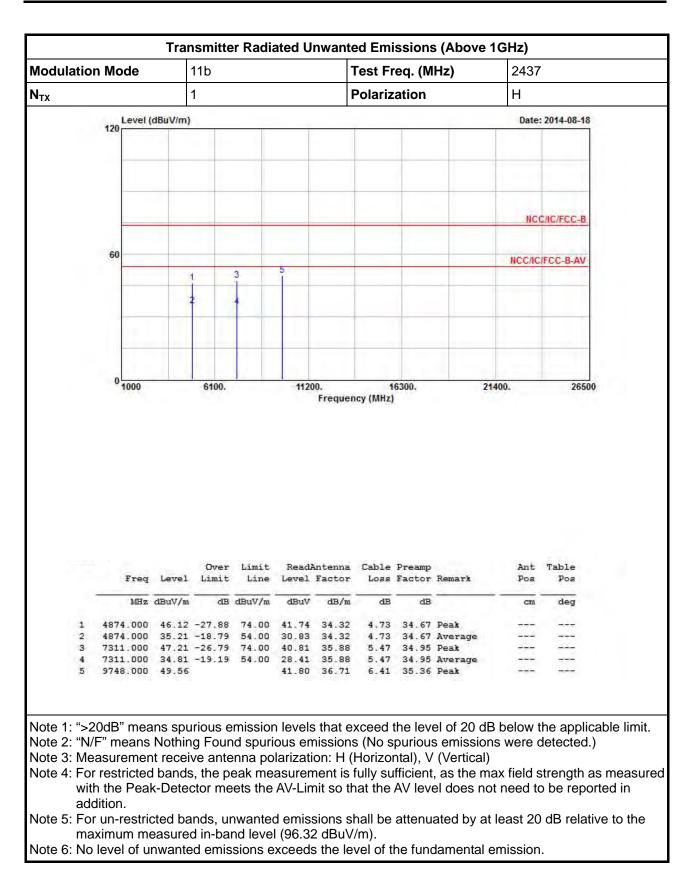






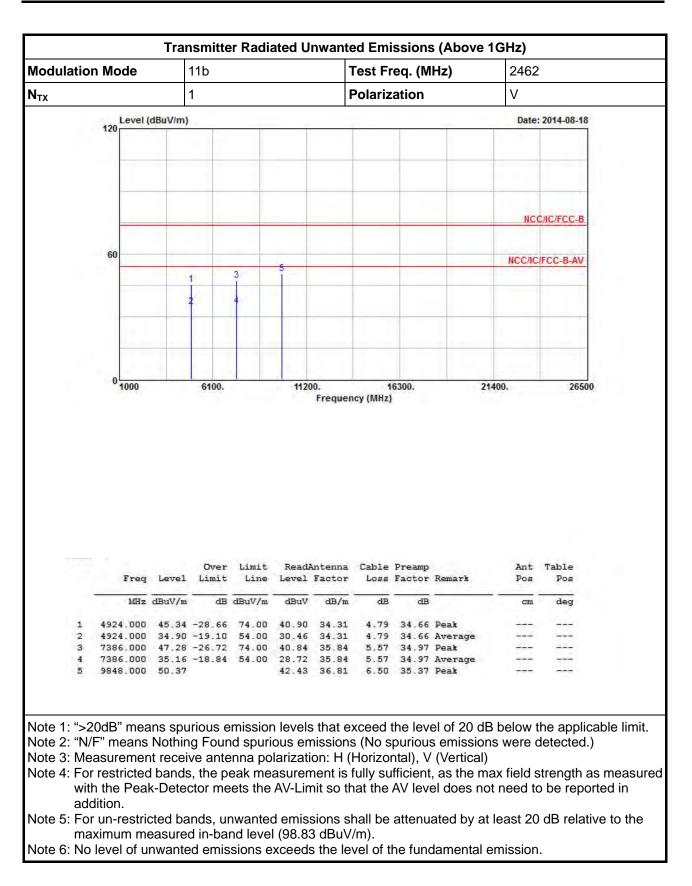






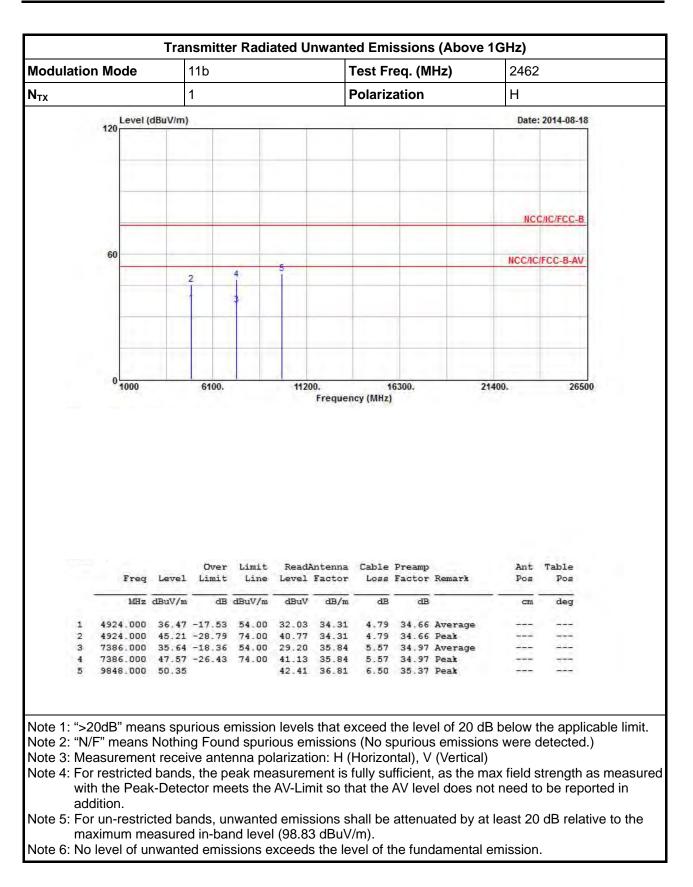


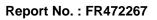




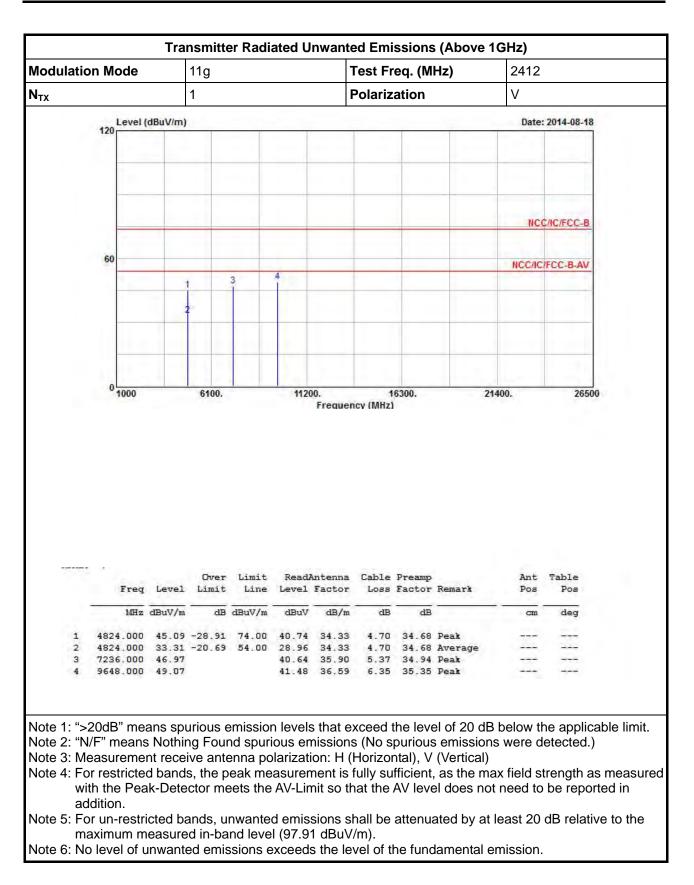


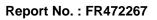




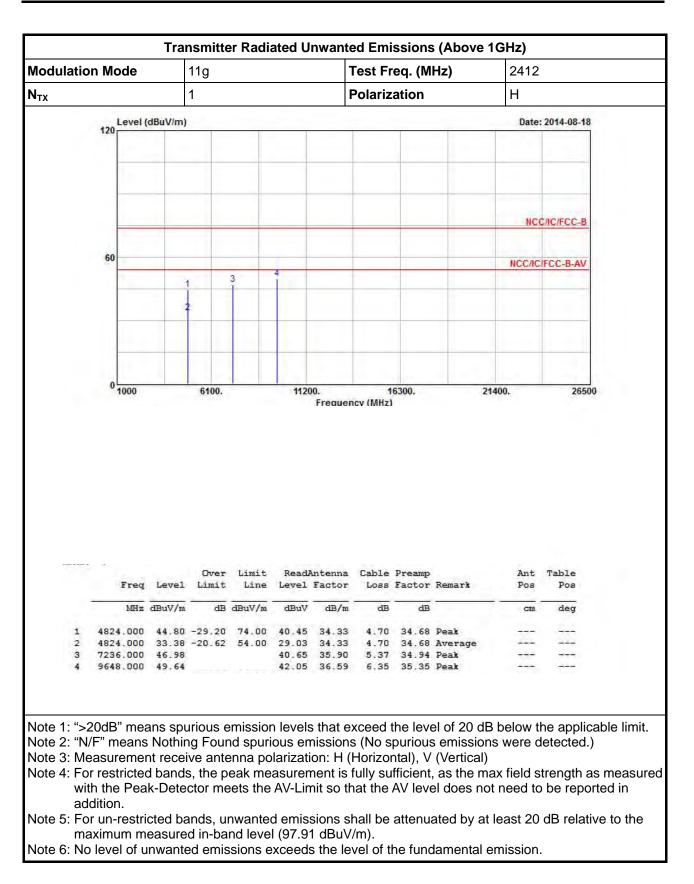


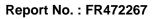




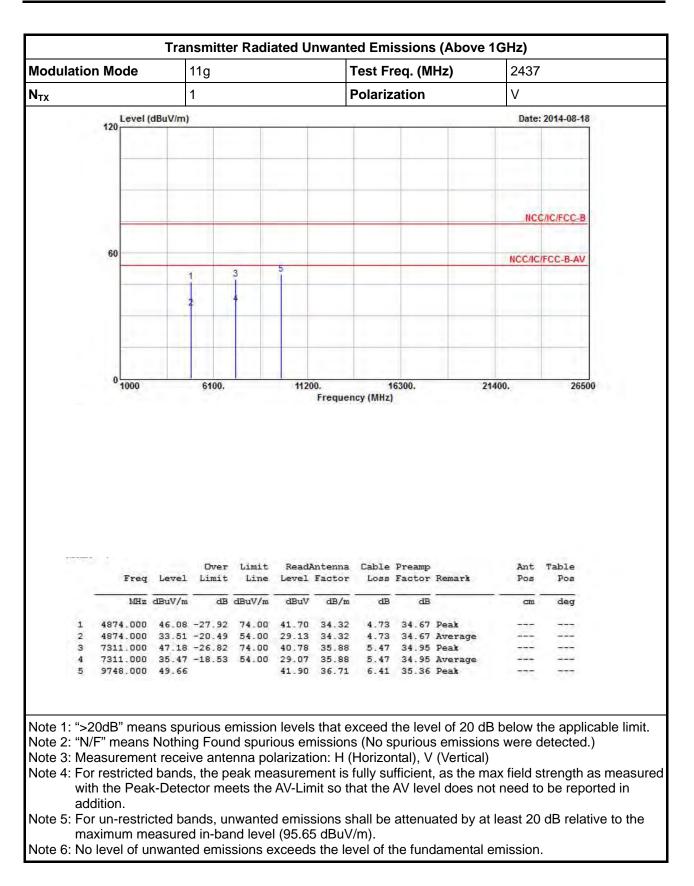






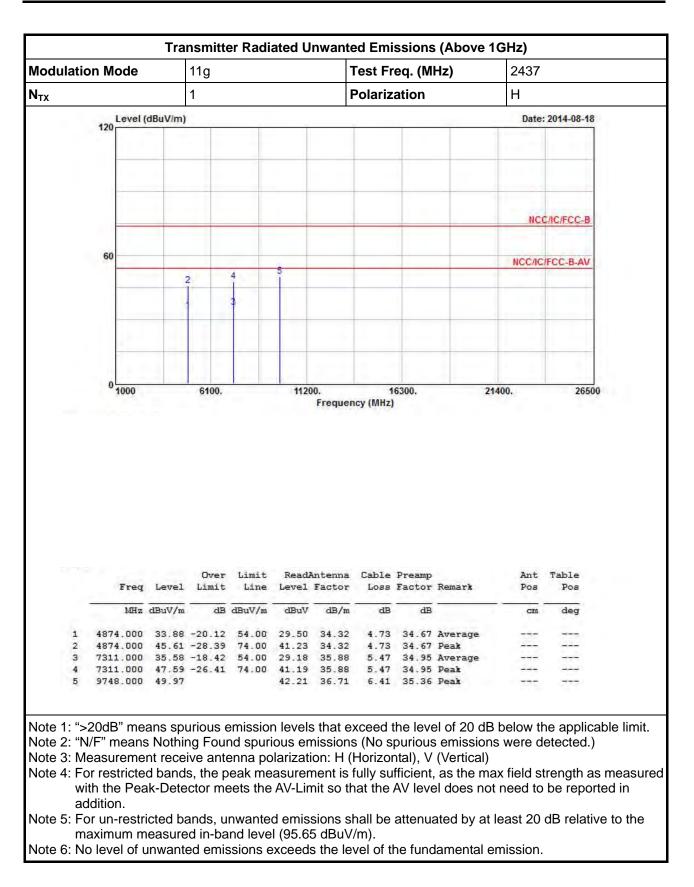






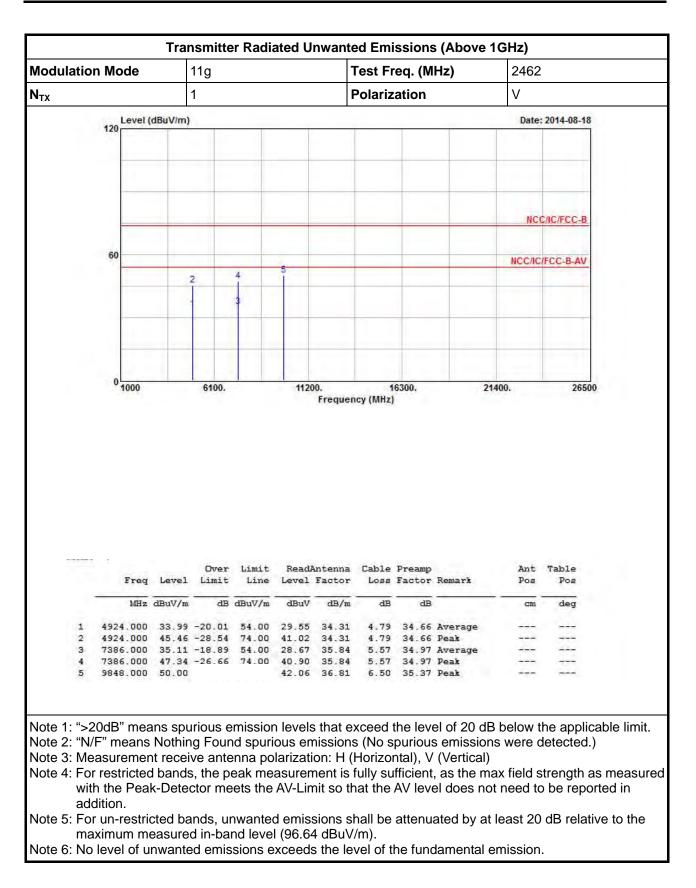






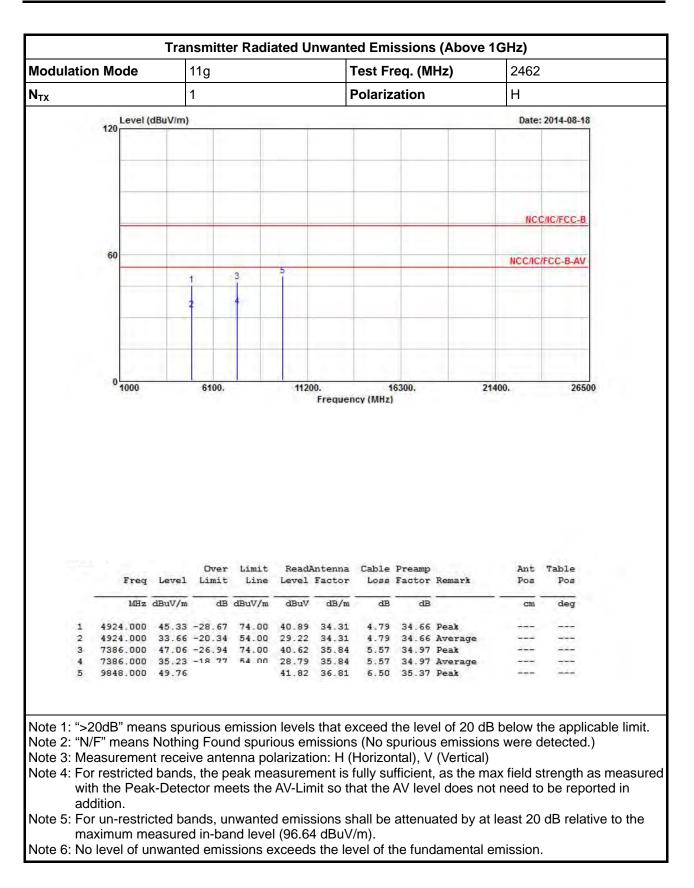


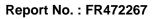




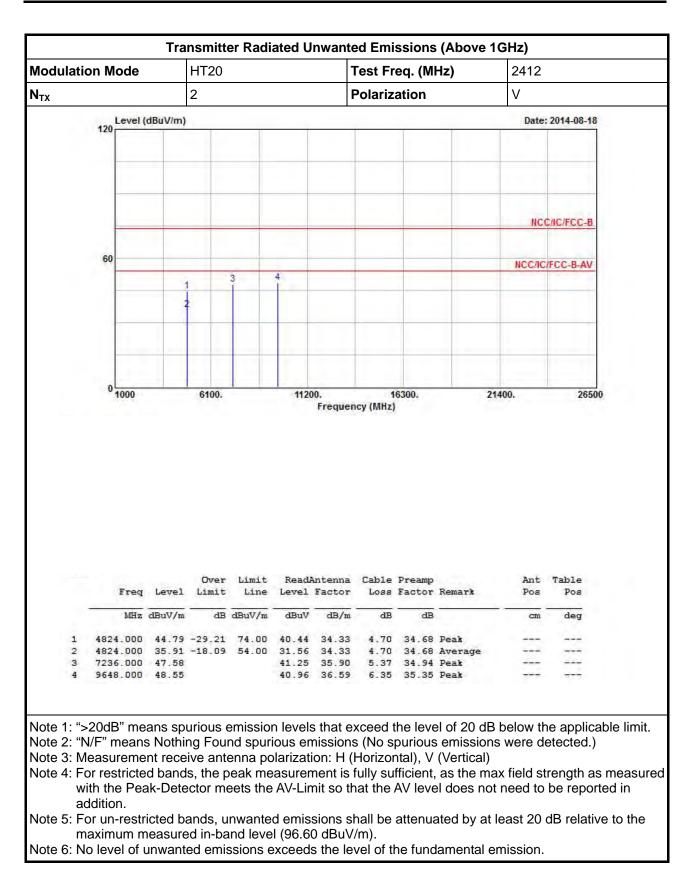






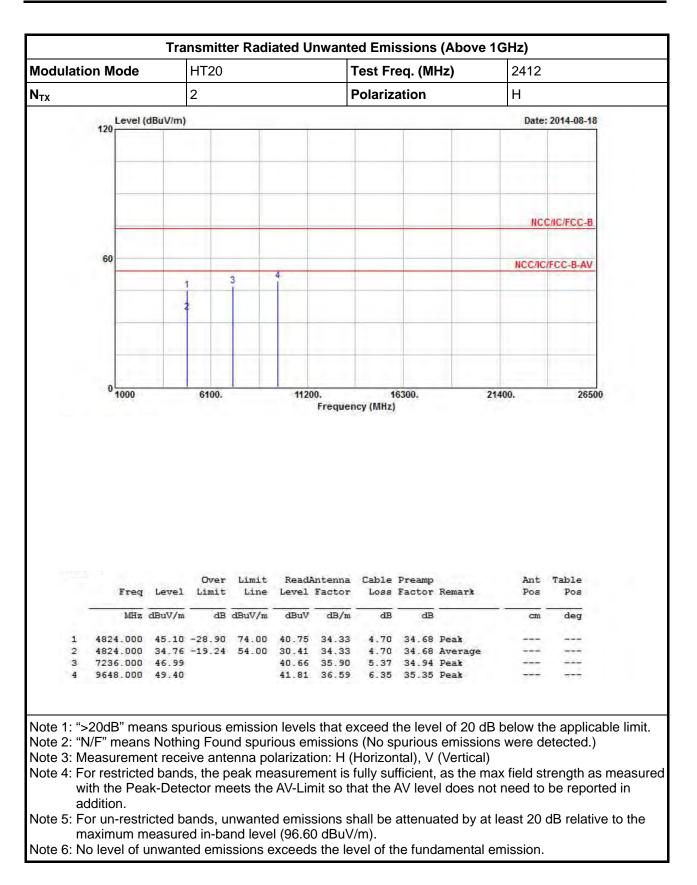


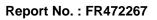




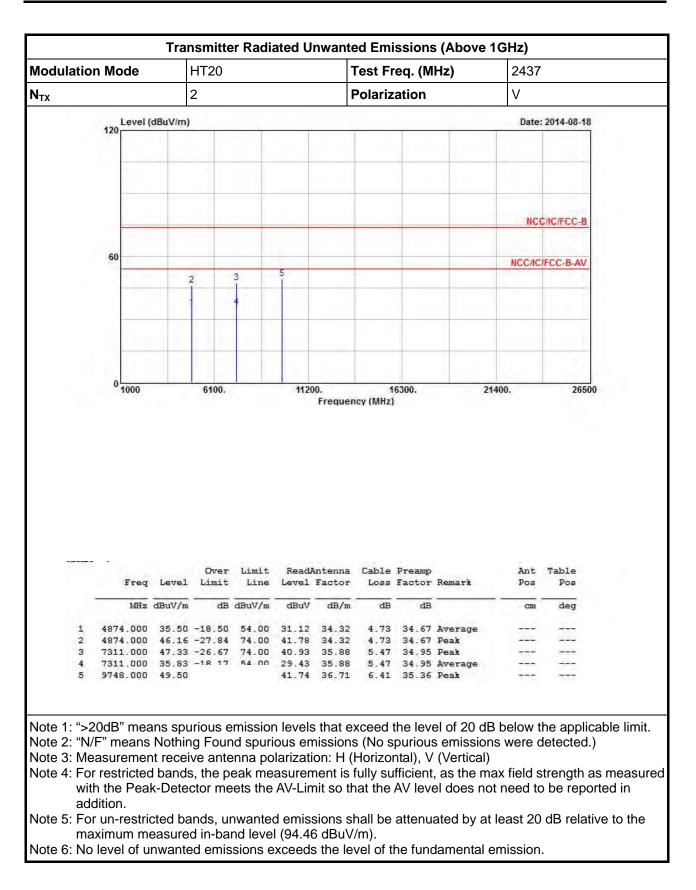


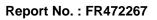




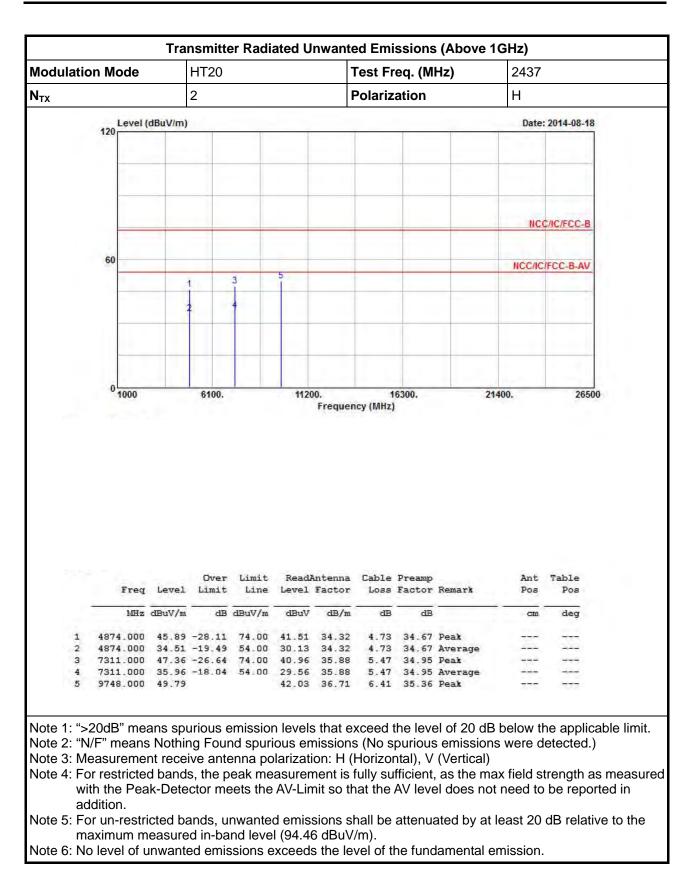






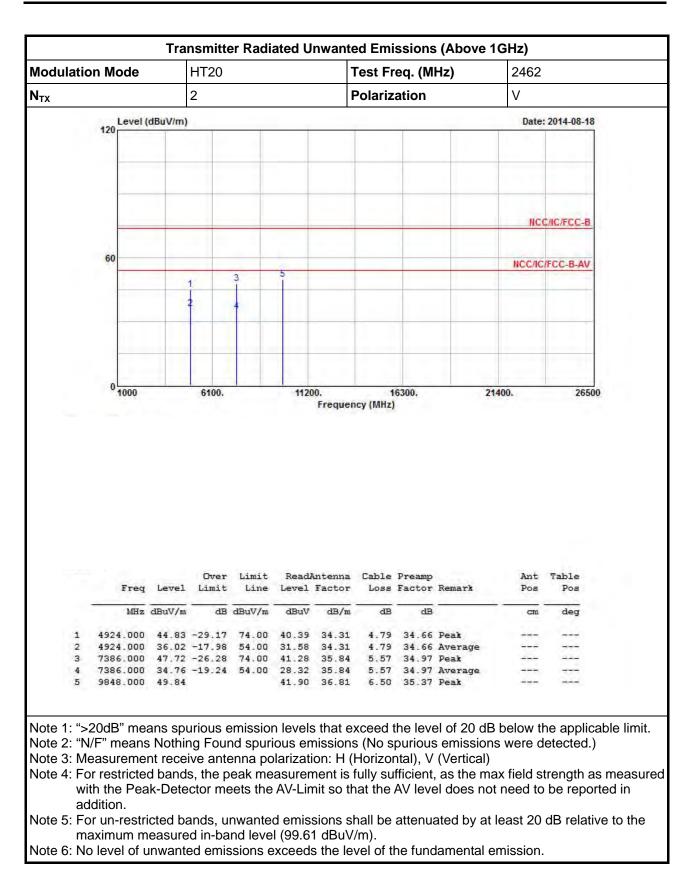






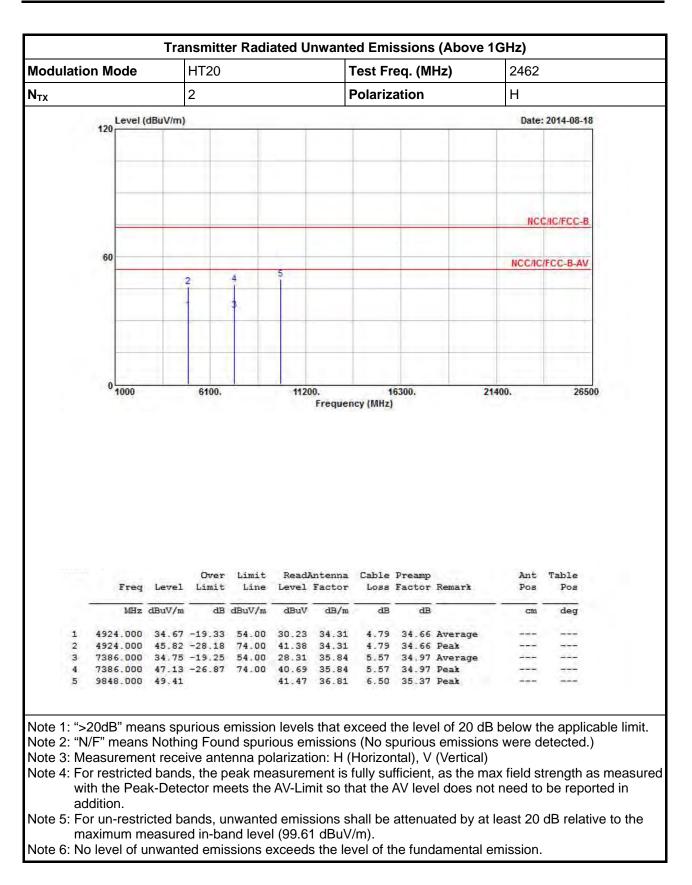


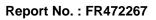




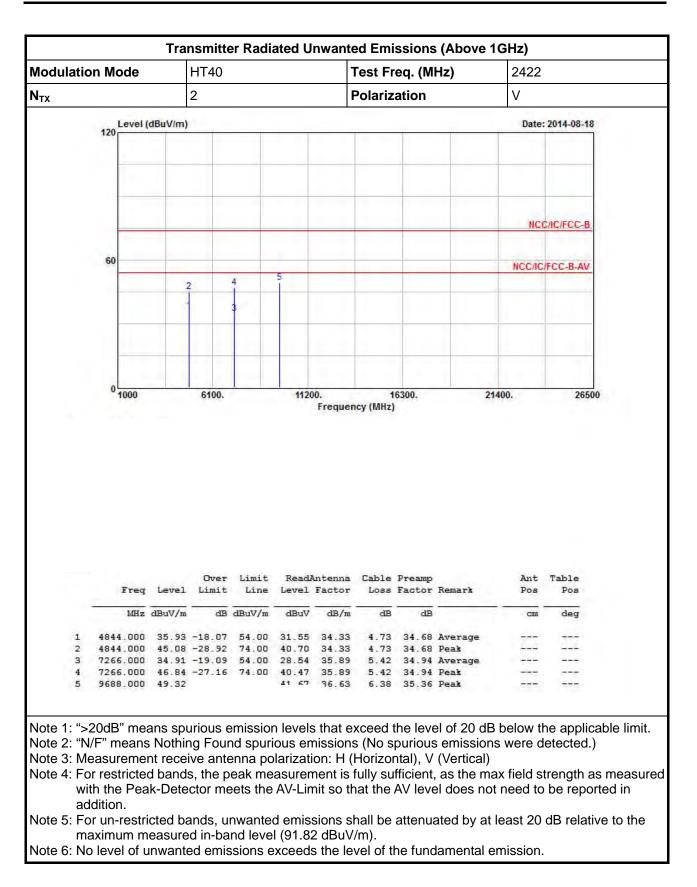






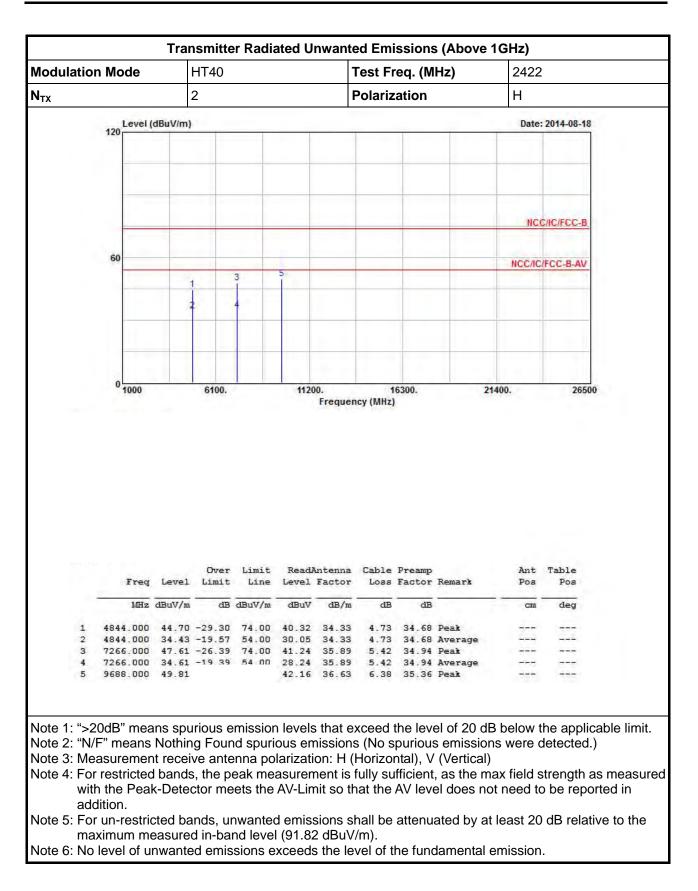






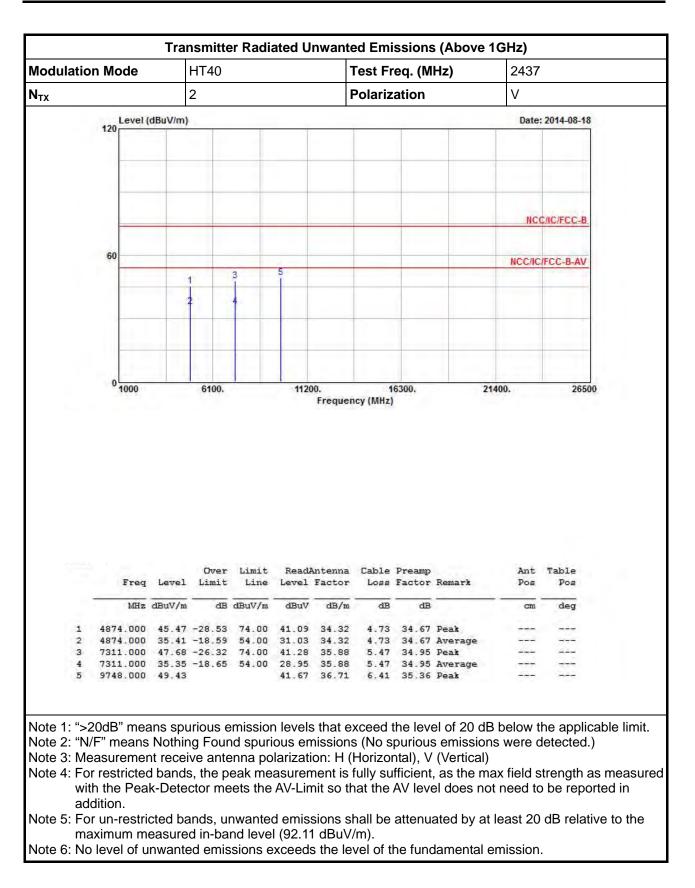






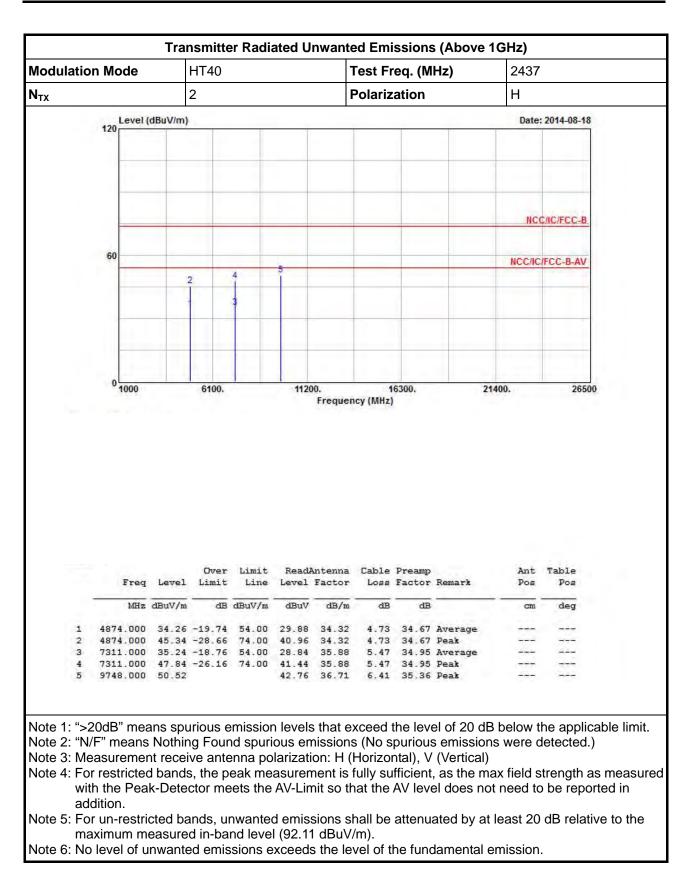






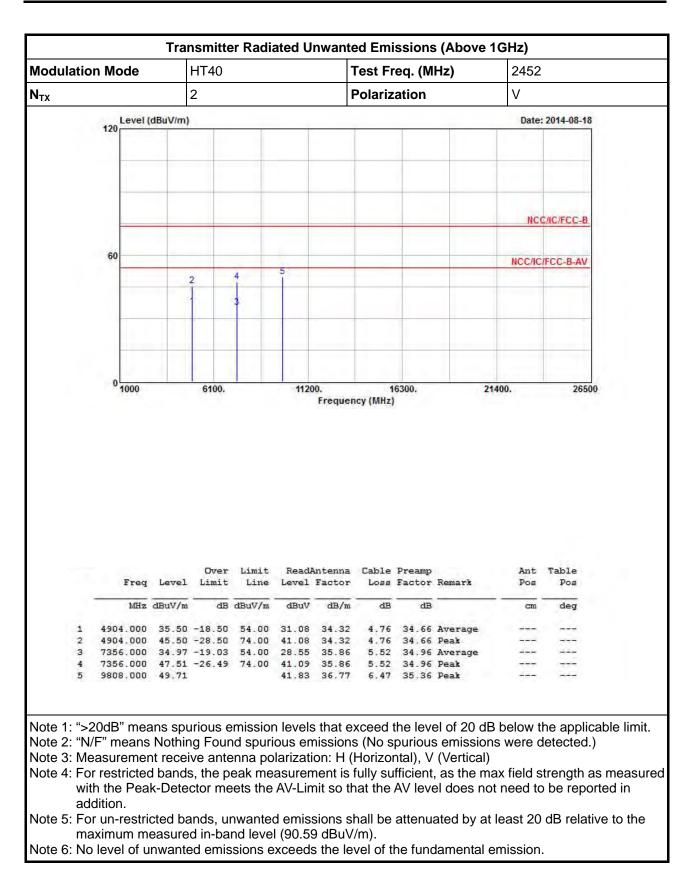






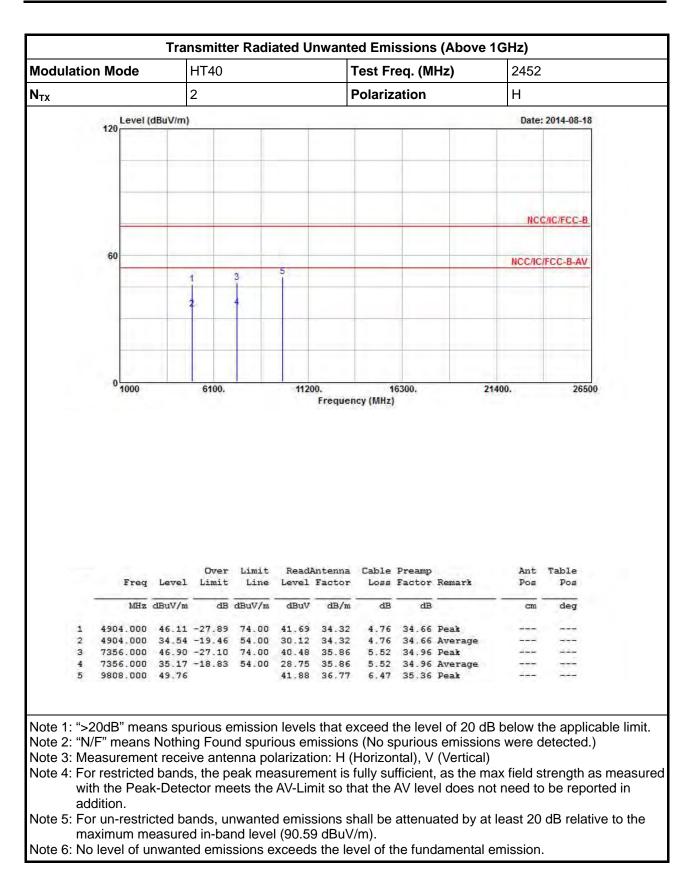






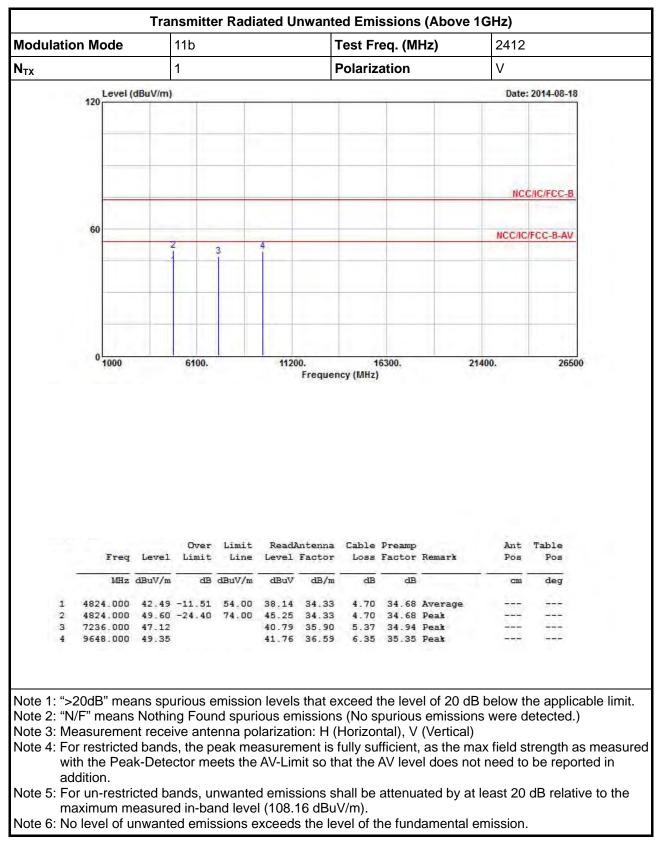


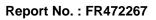




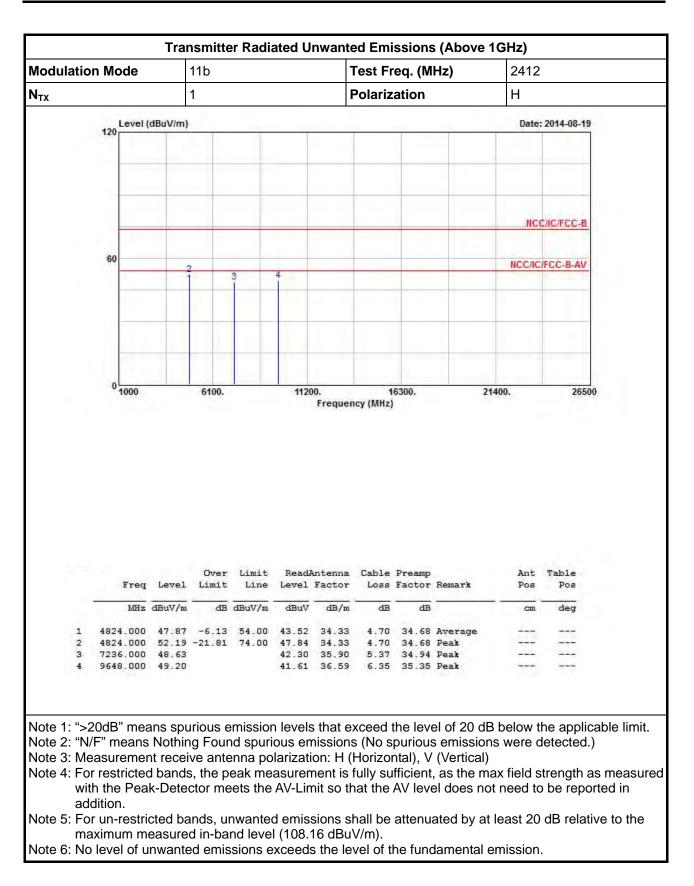


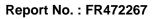
## 3.6.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for Mode 2



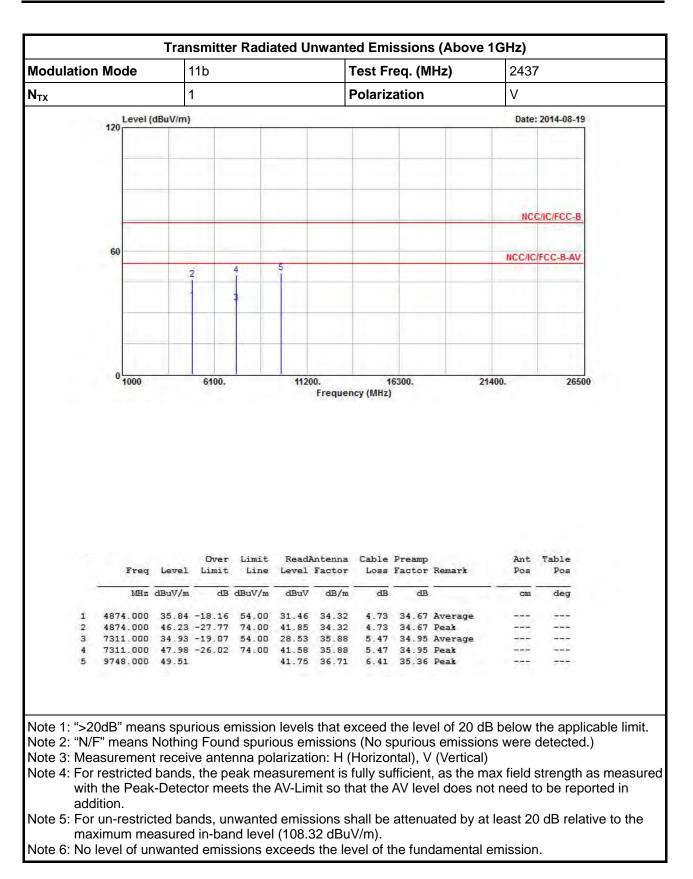






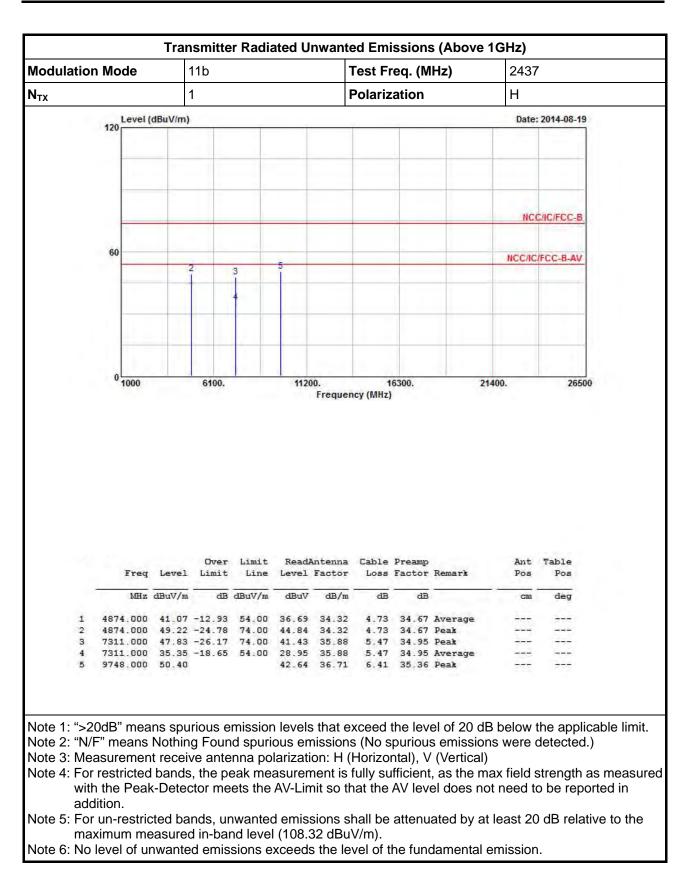






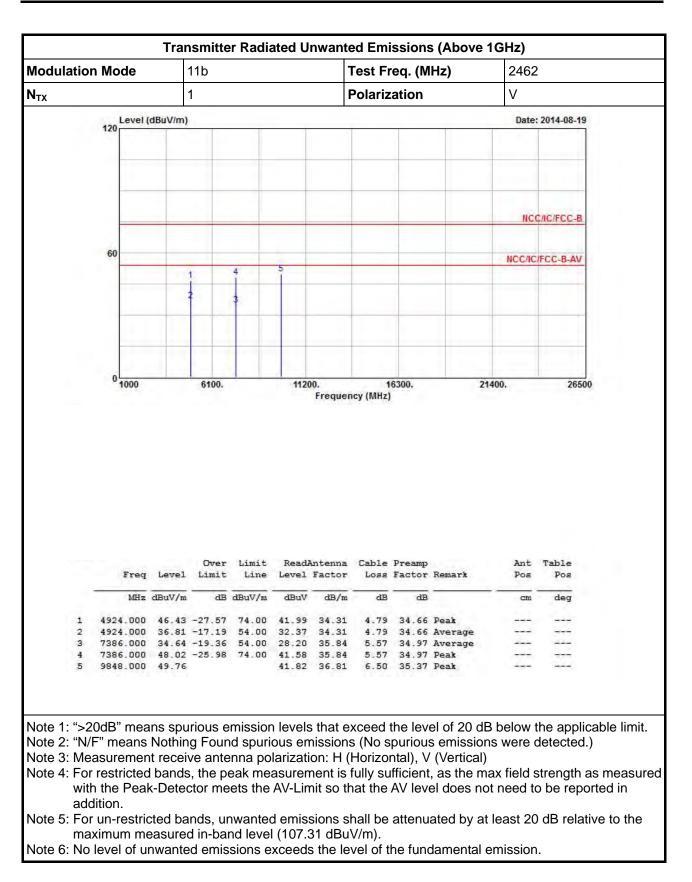






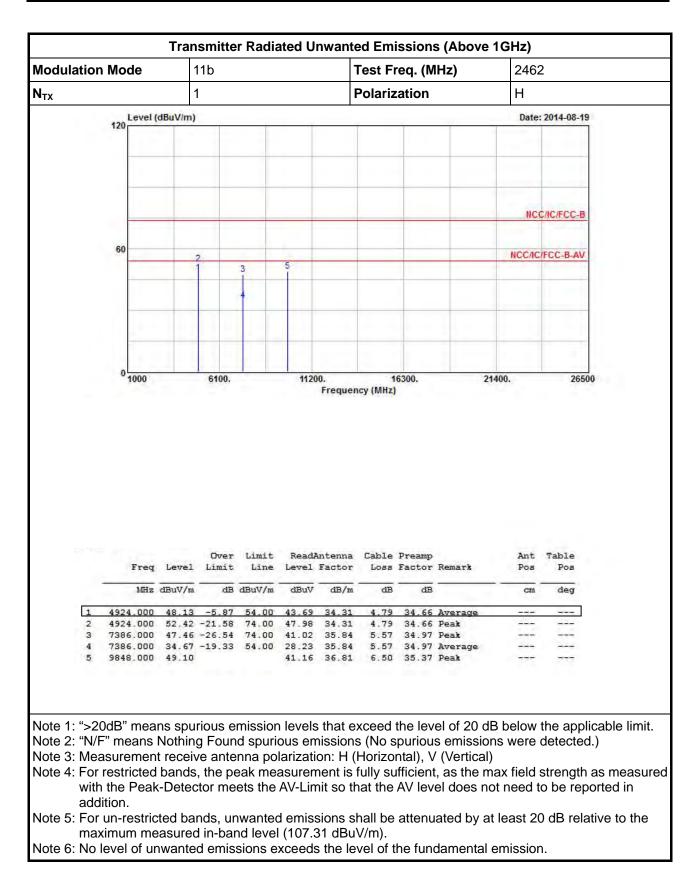


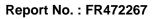




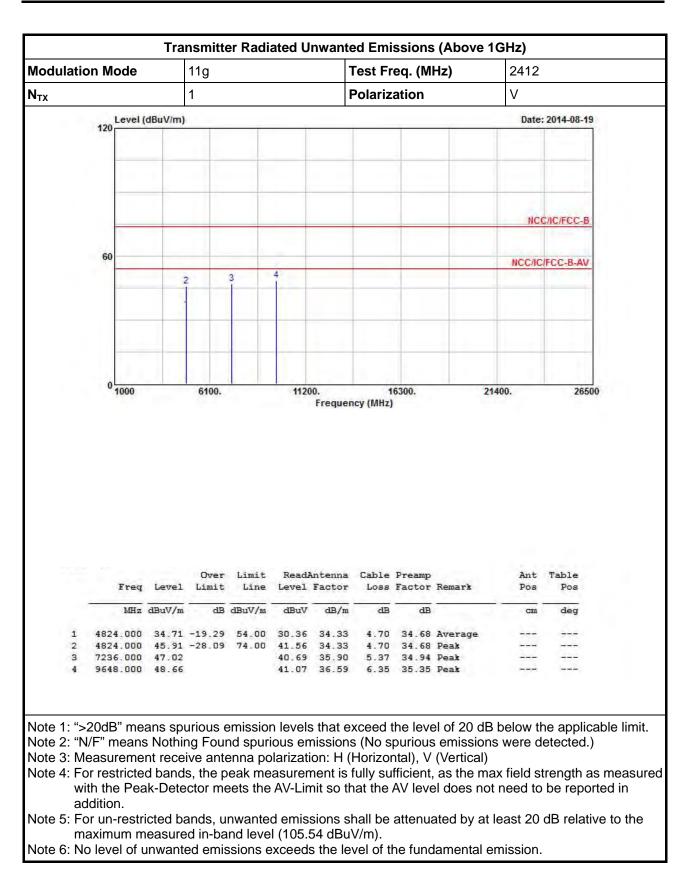


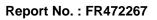




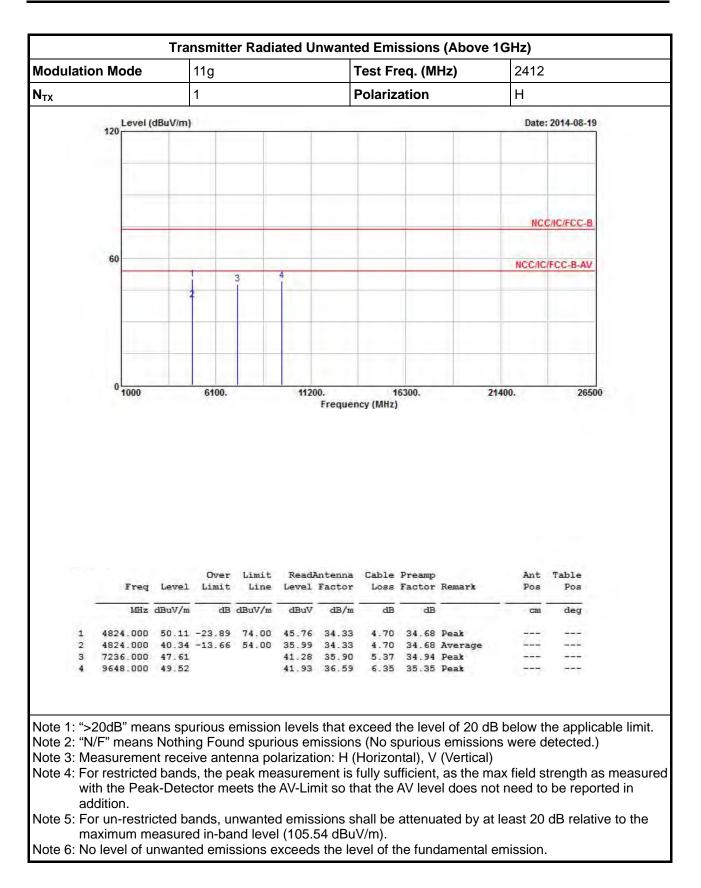


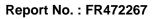




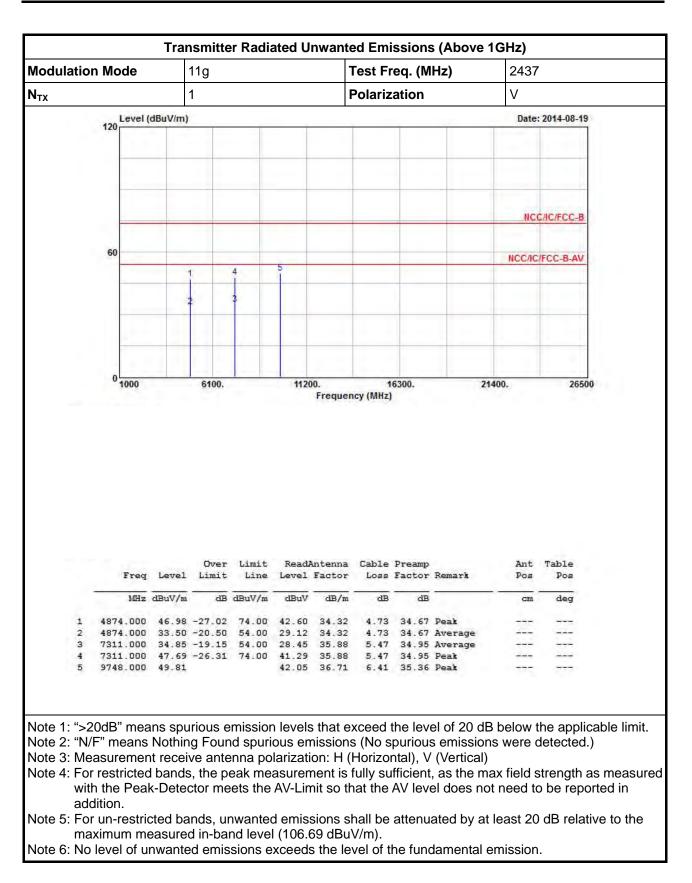


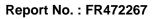




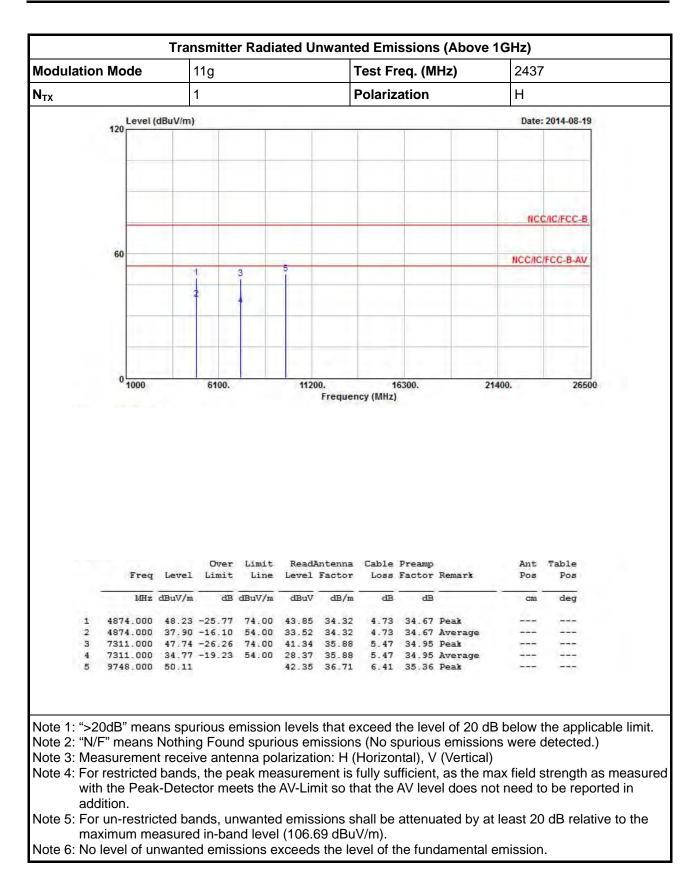






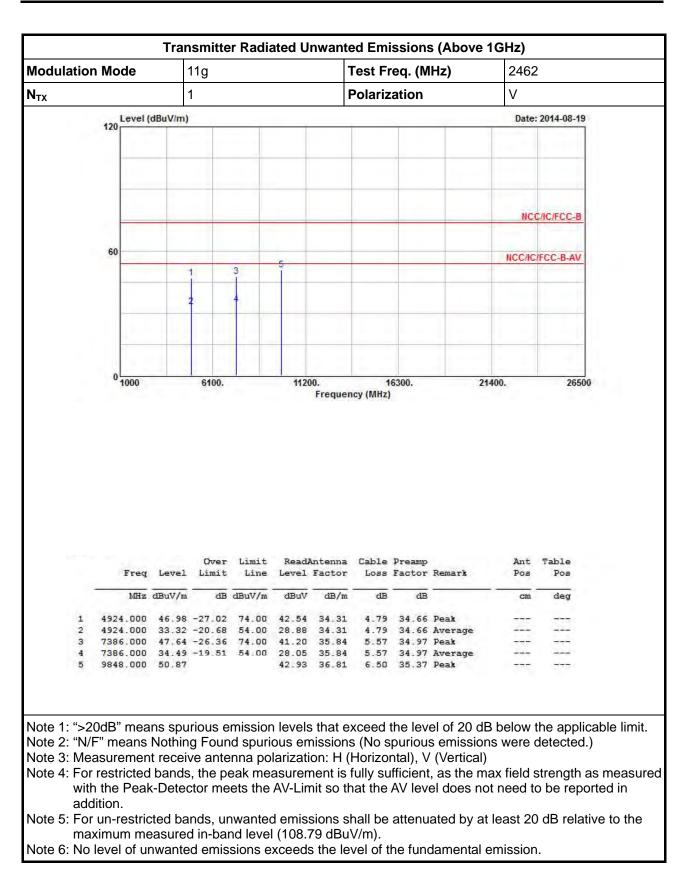






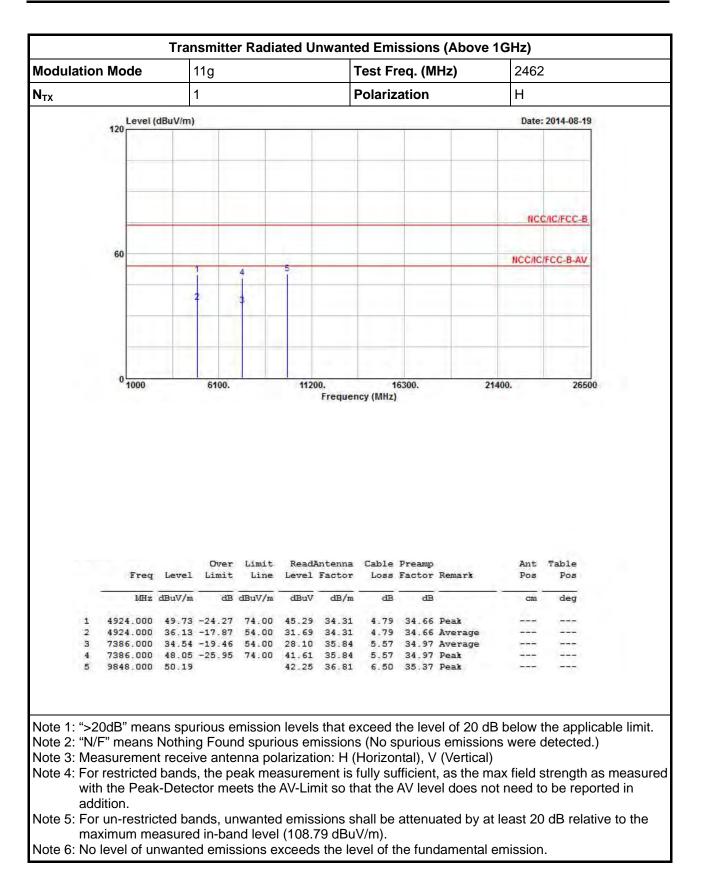






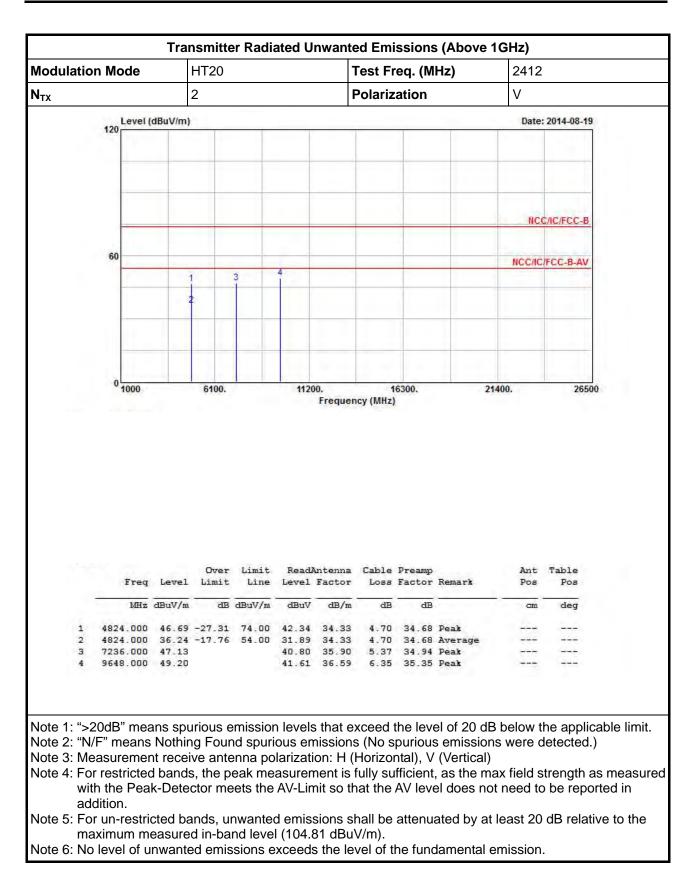


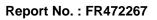




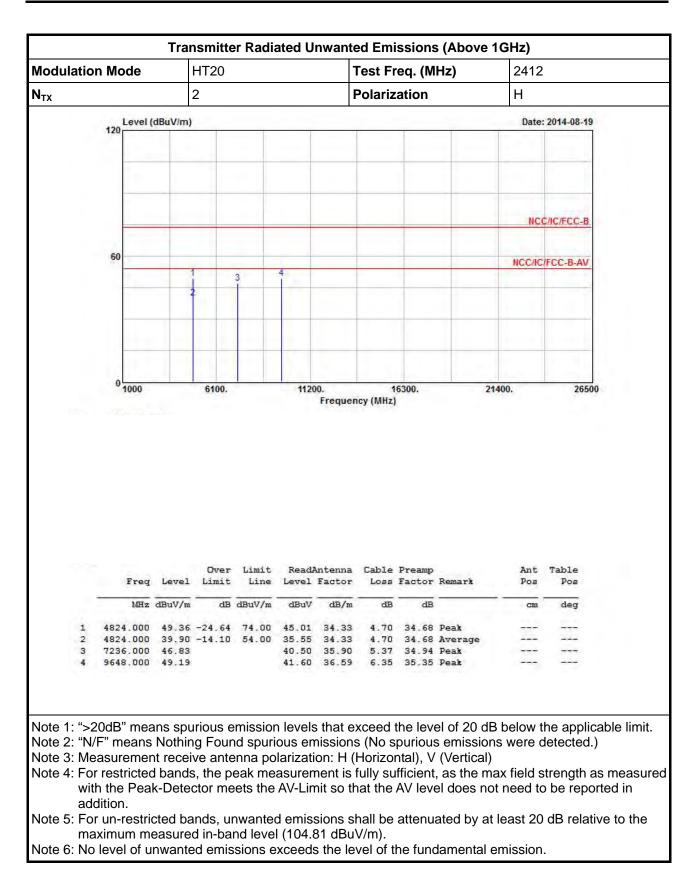






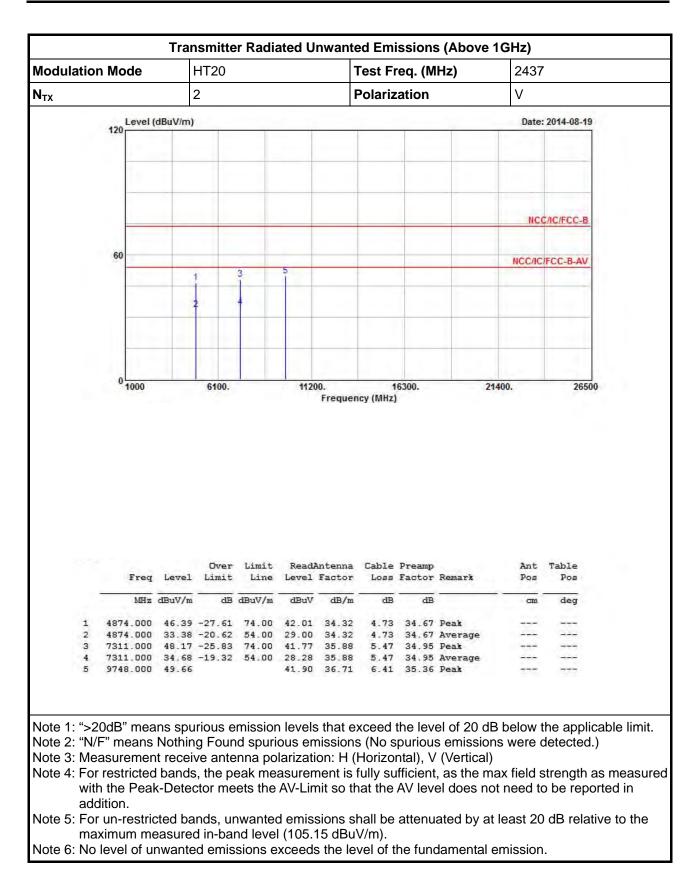


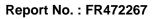




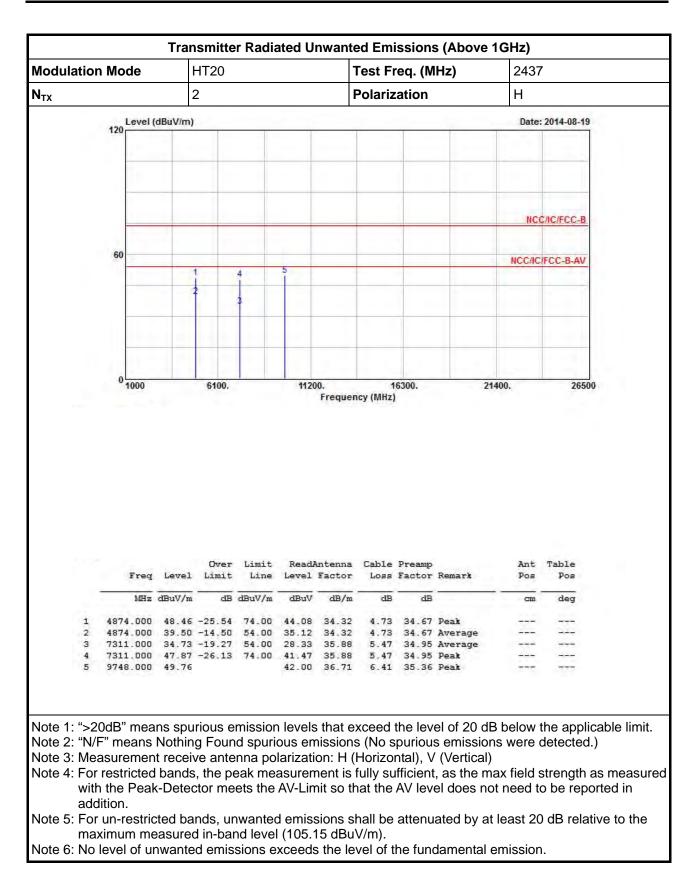






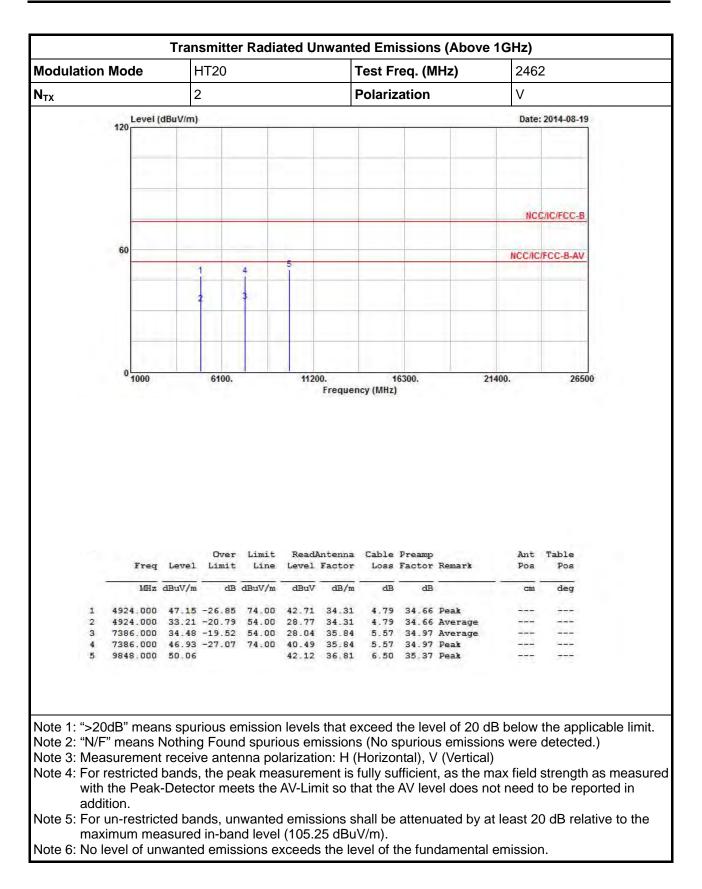






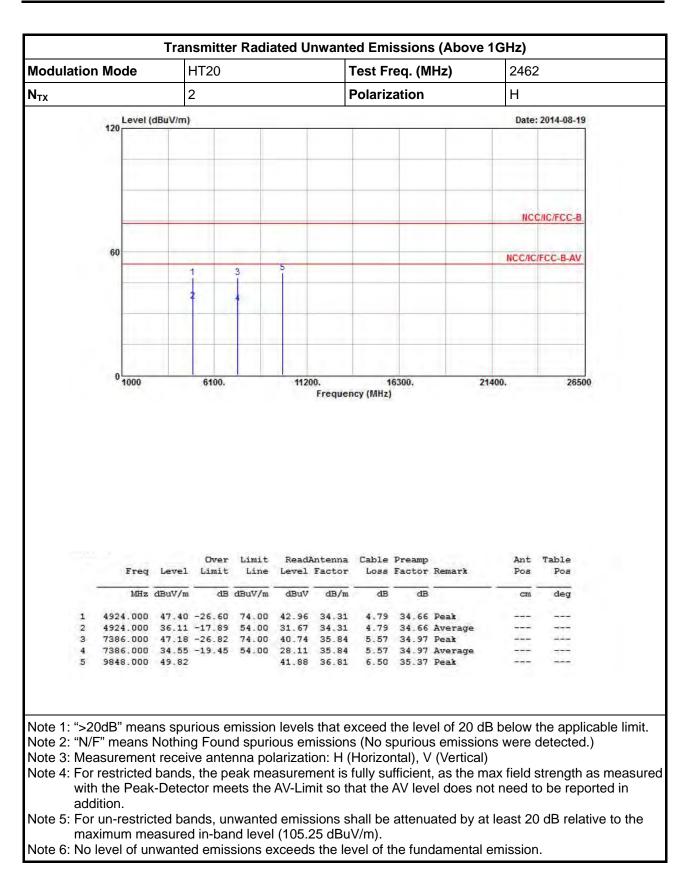






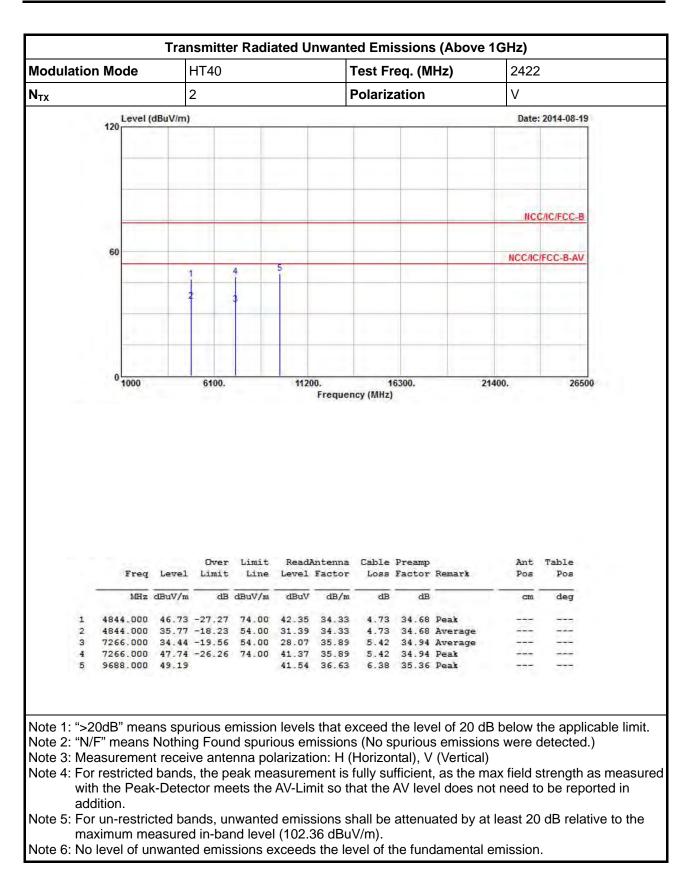






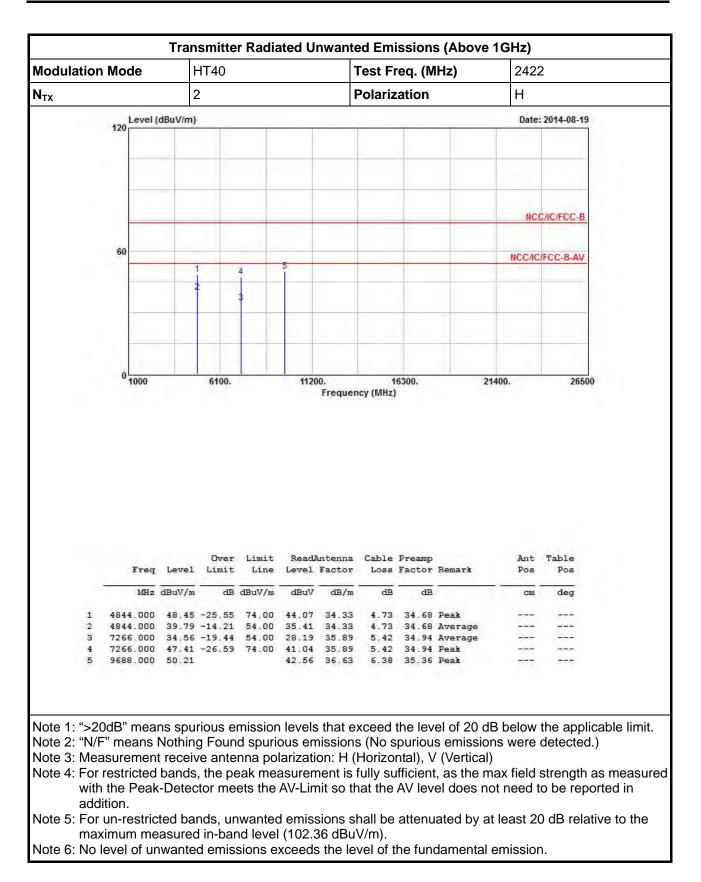


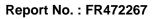




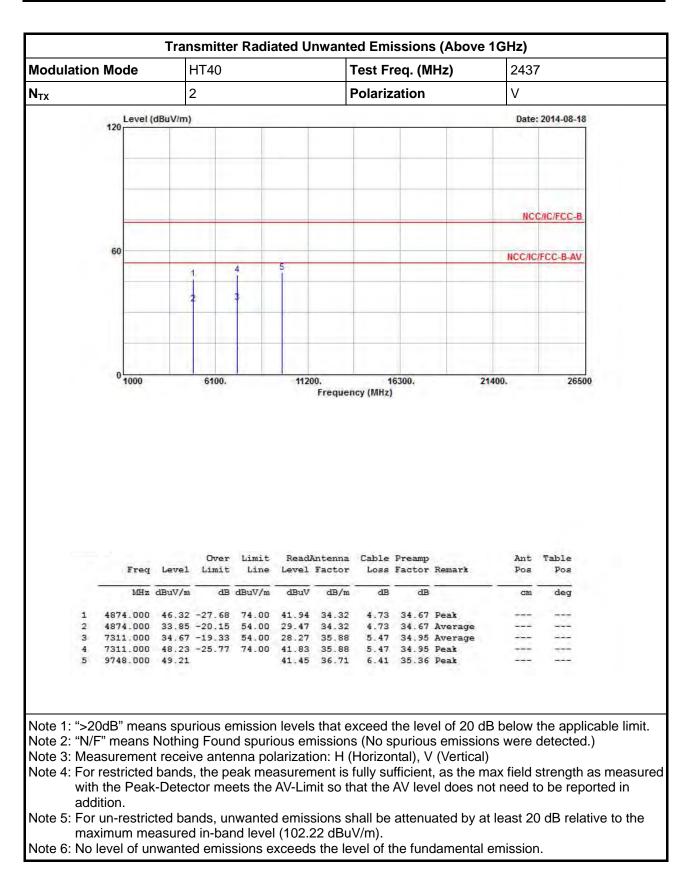


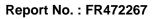




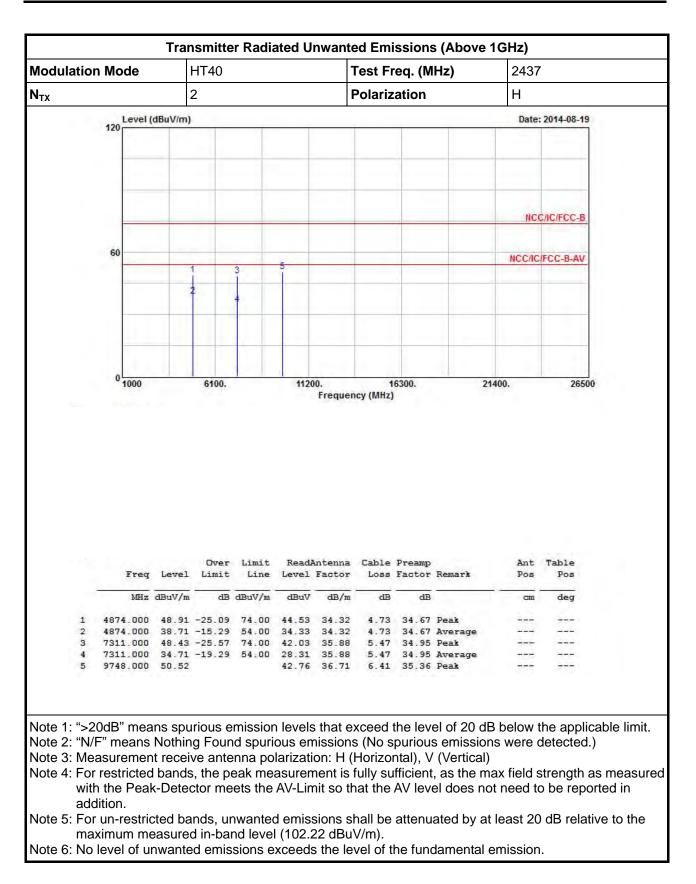






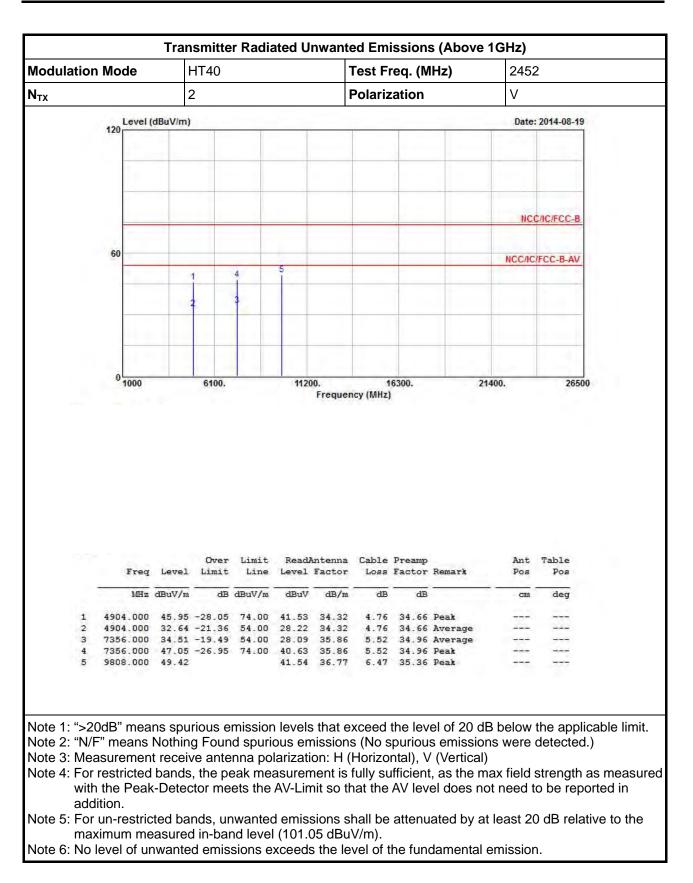






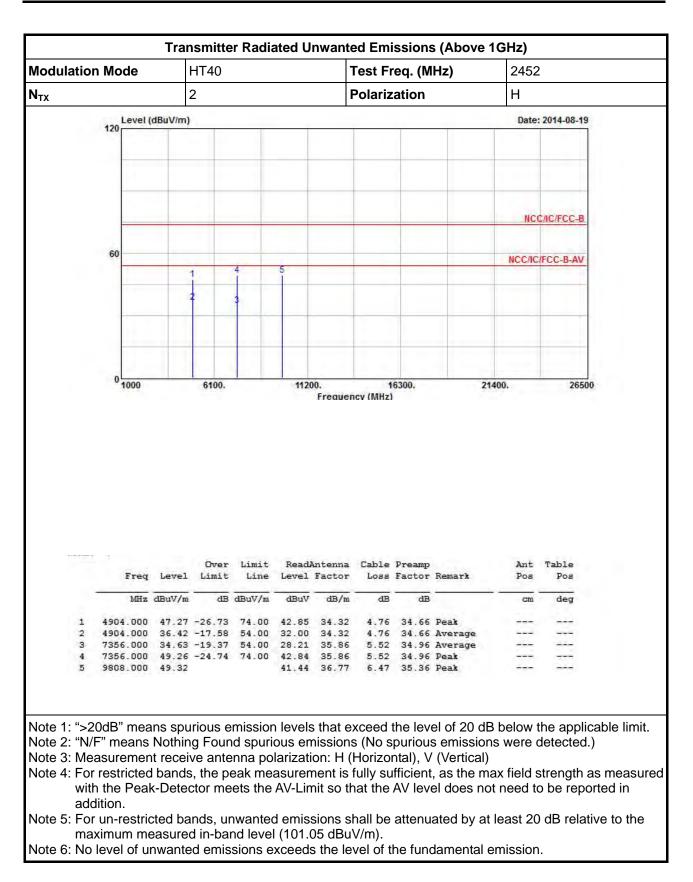




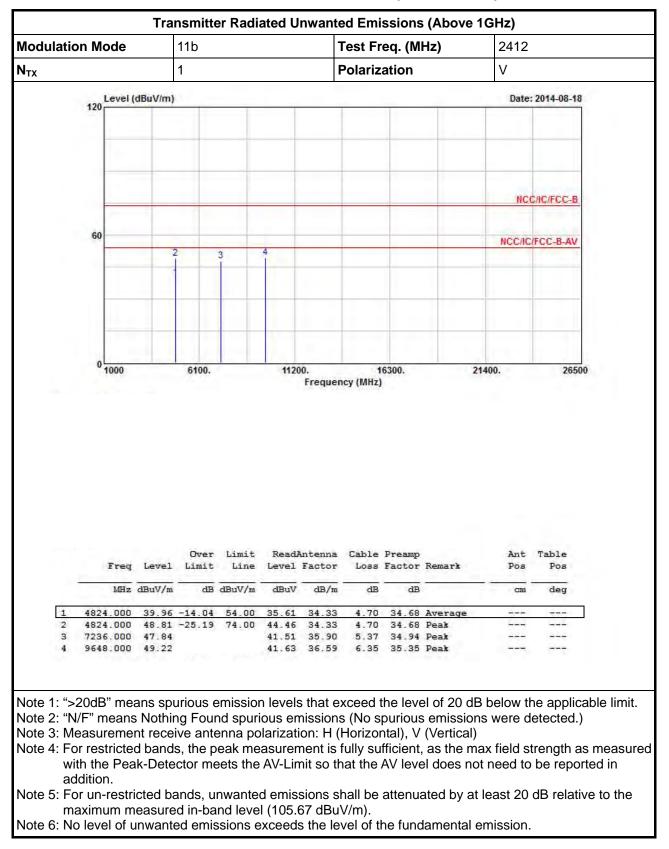


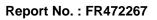




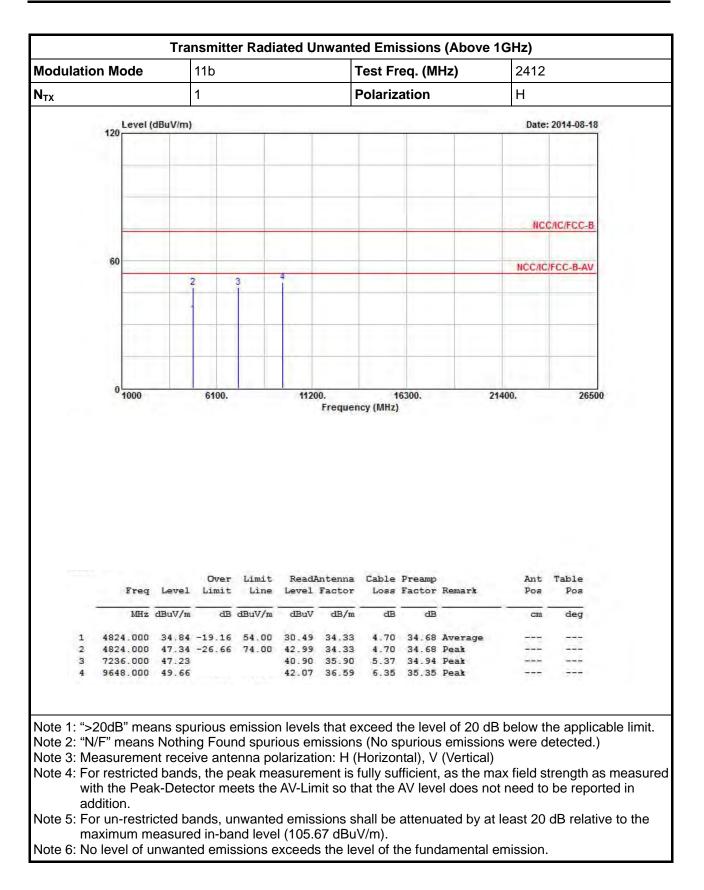


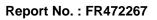




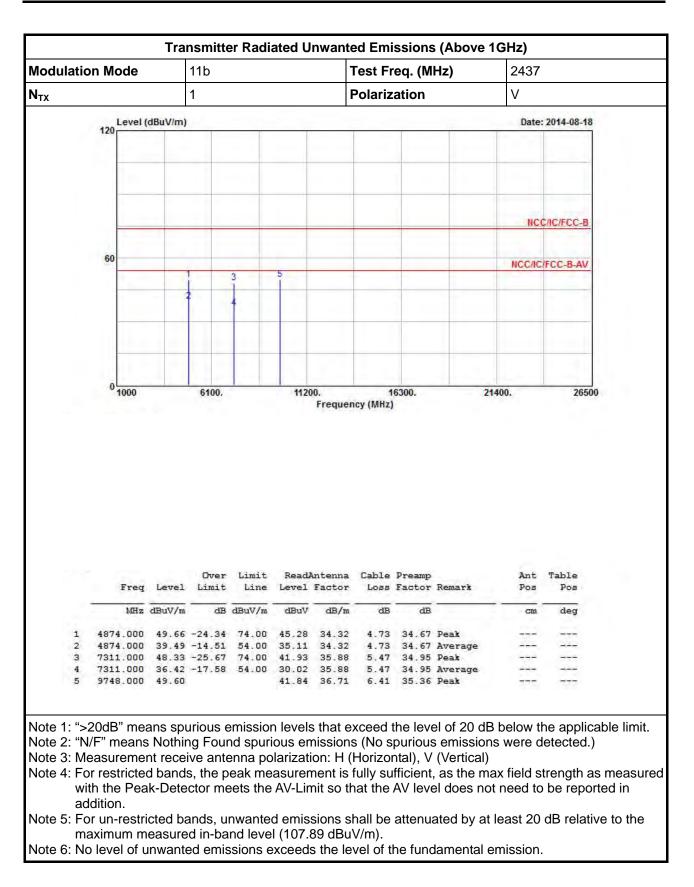


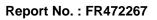




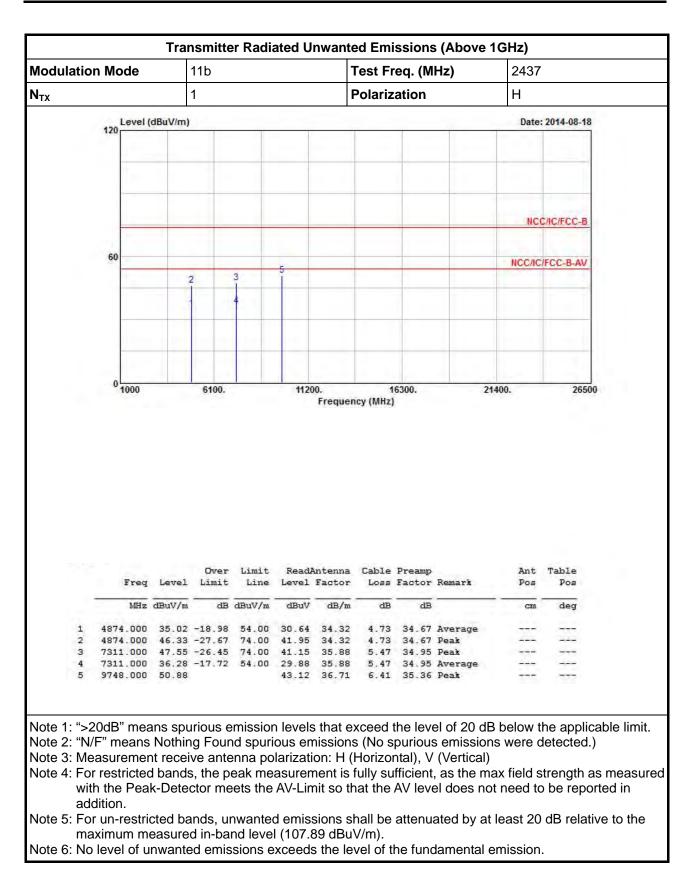


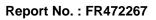




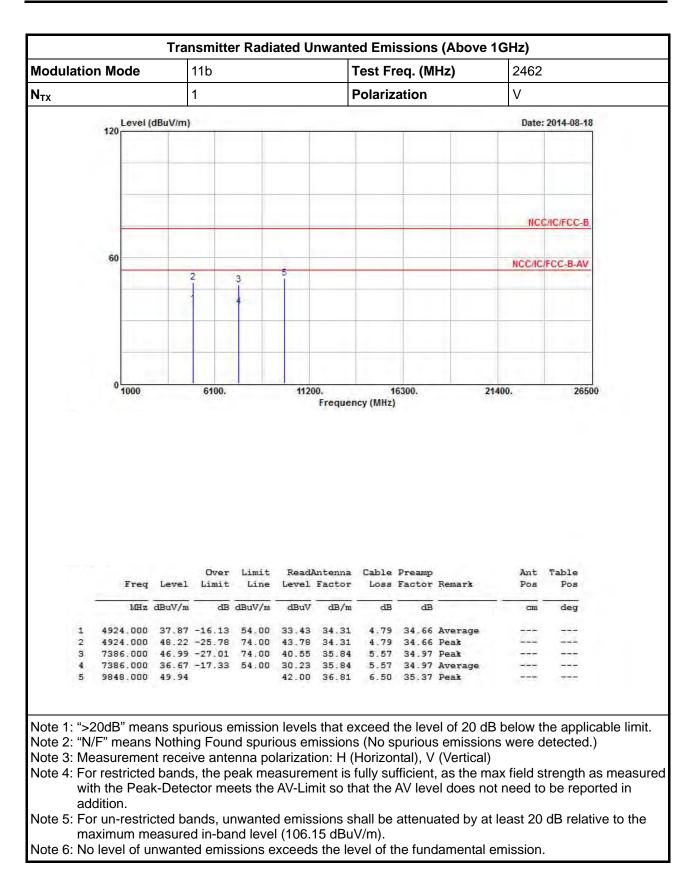


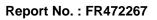




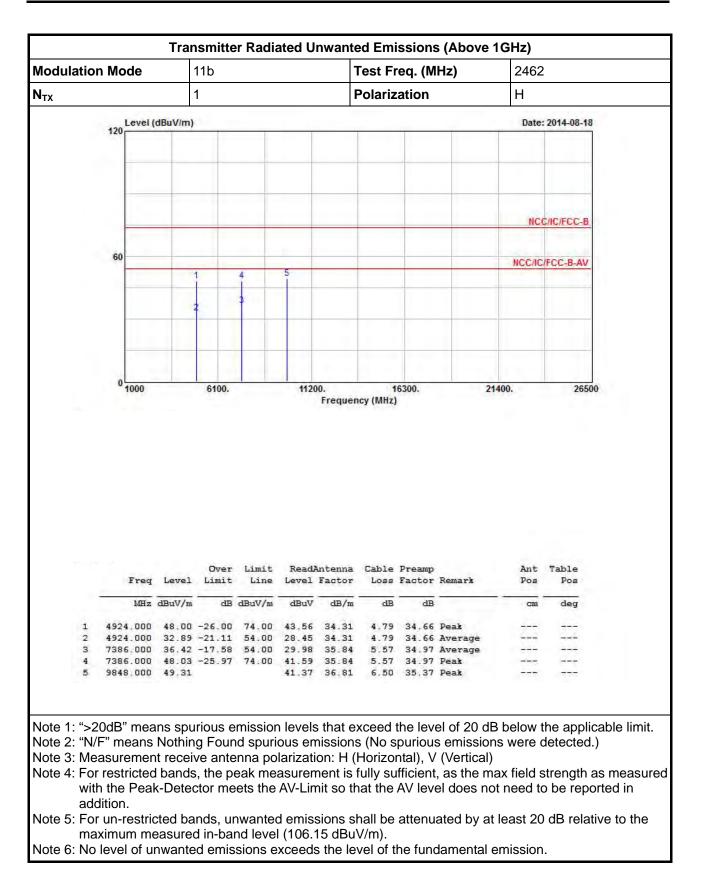


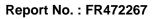




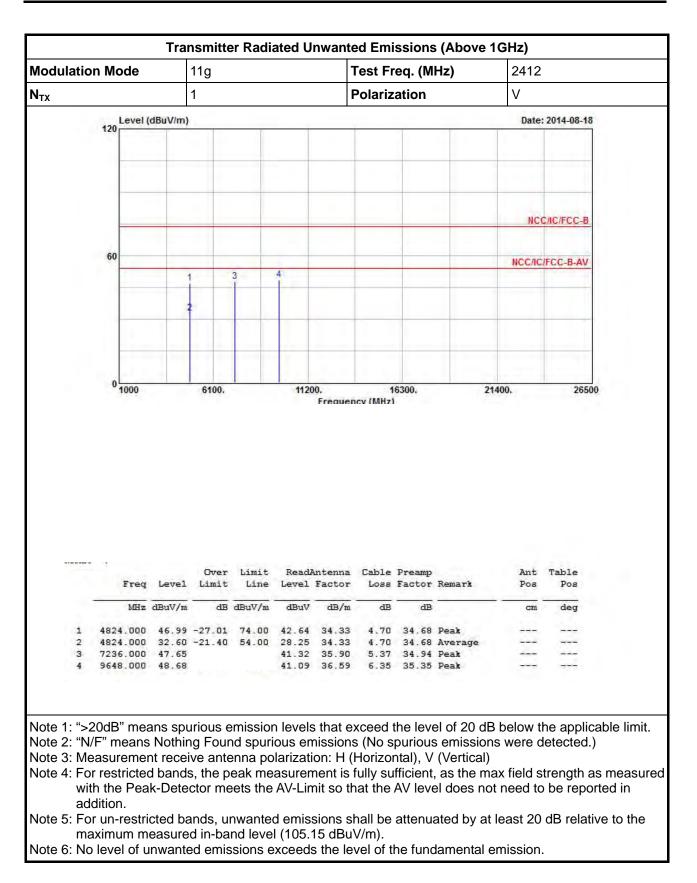


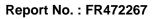




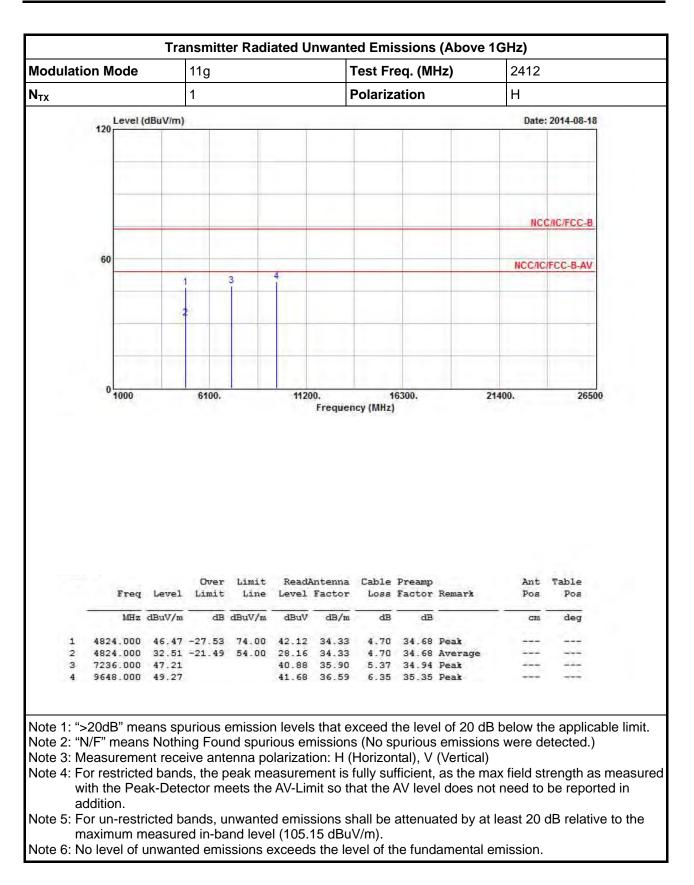






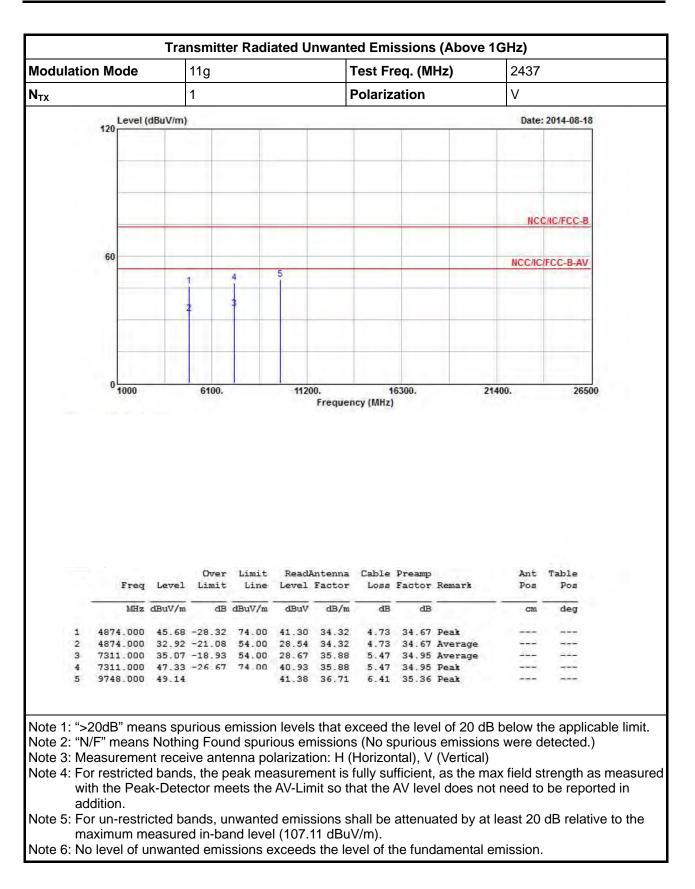


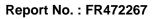




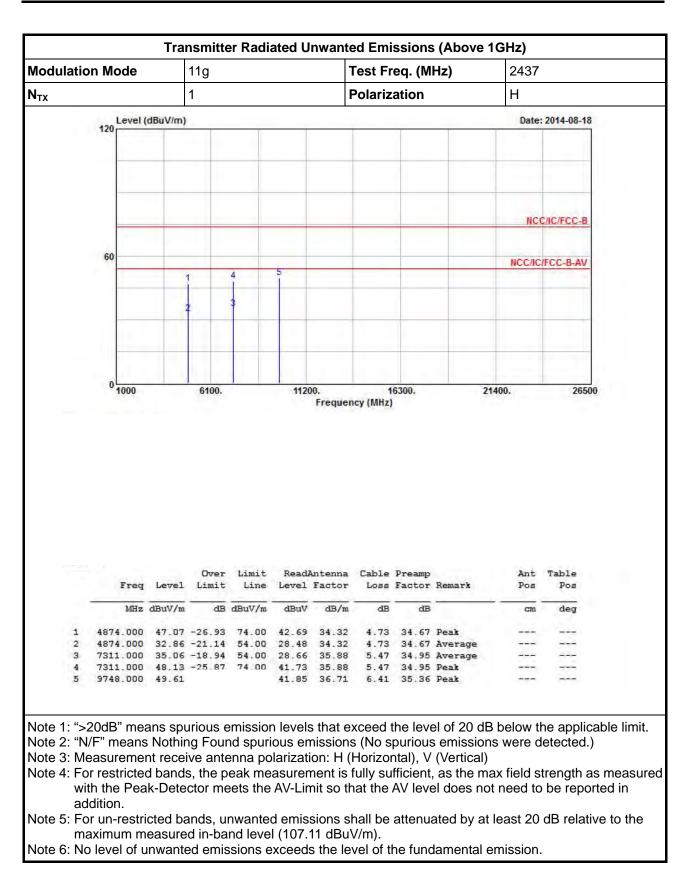


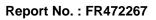




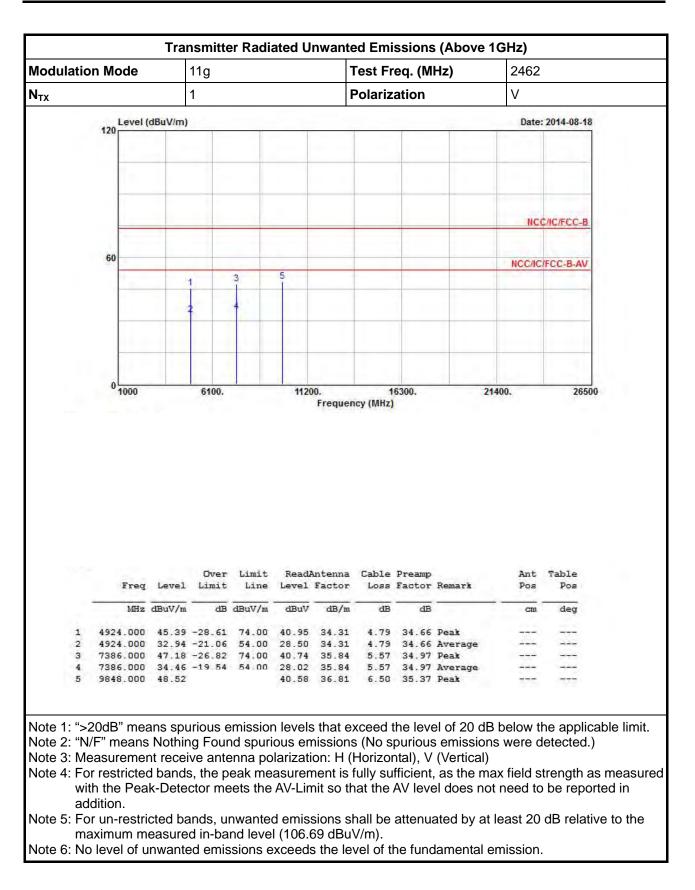


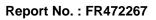




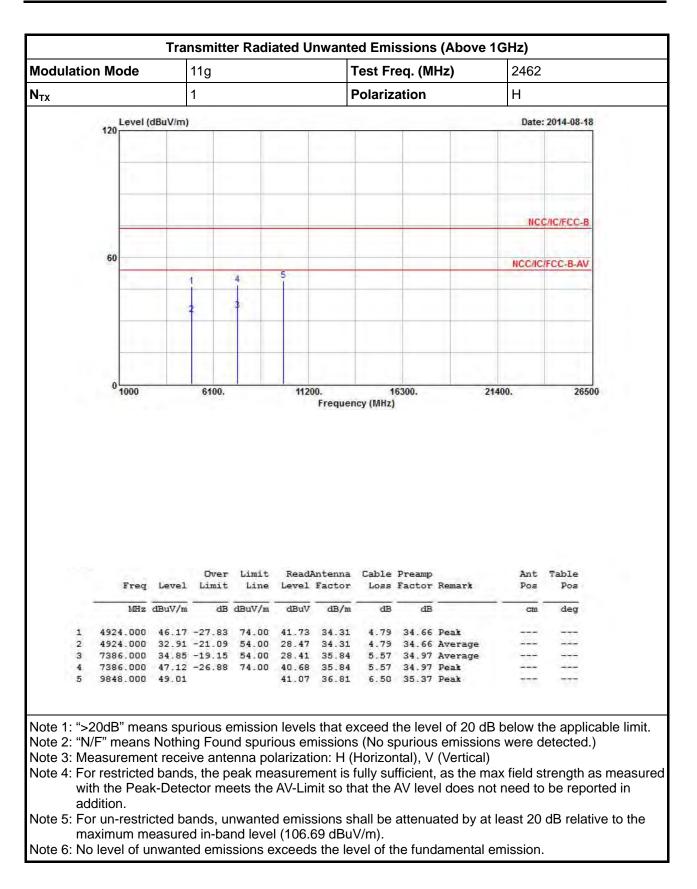


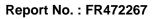




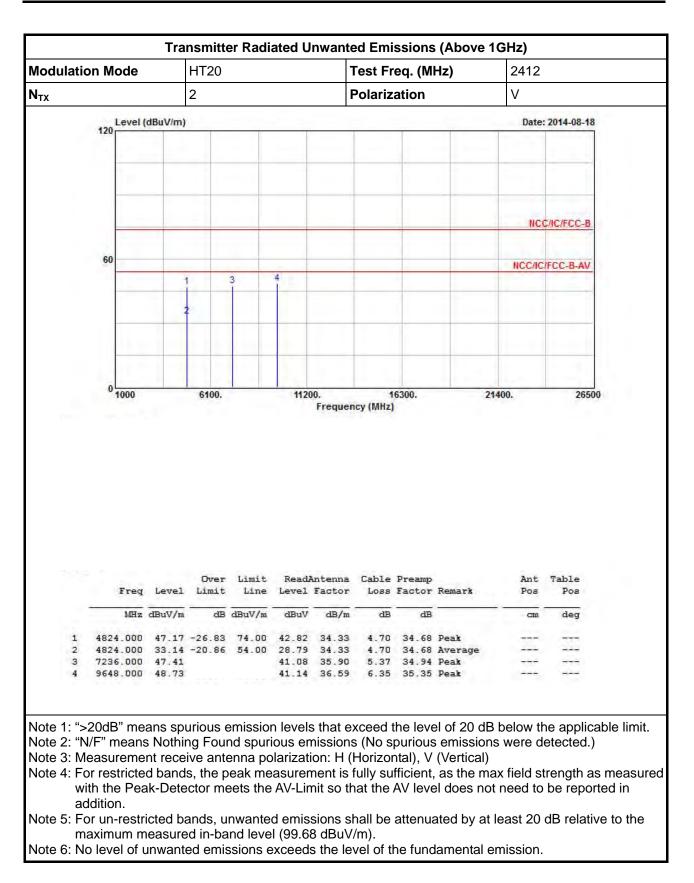


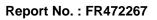




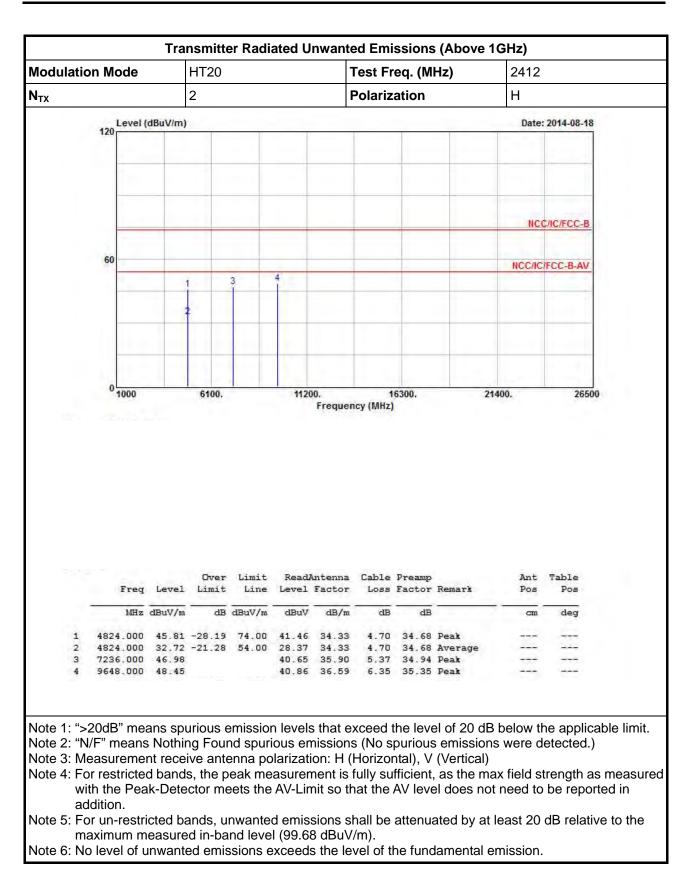


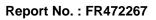




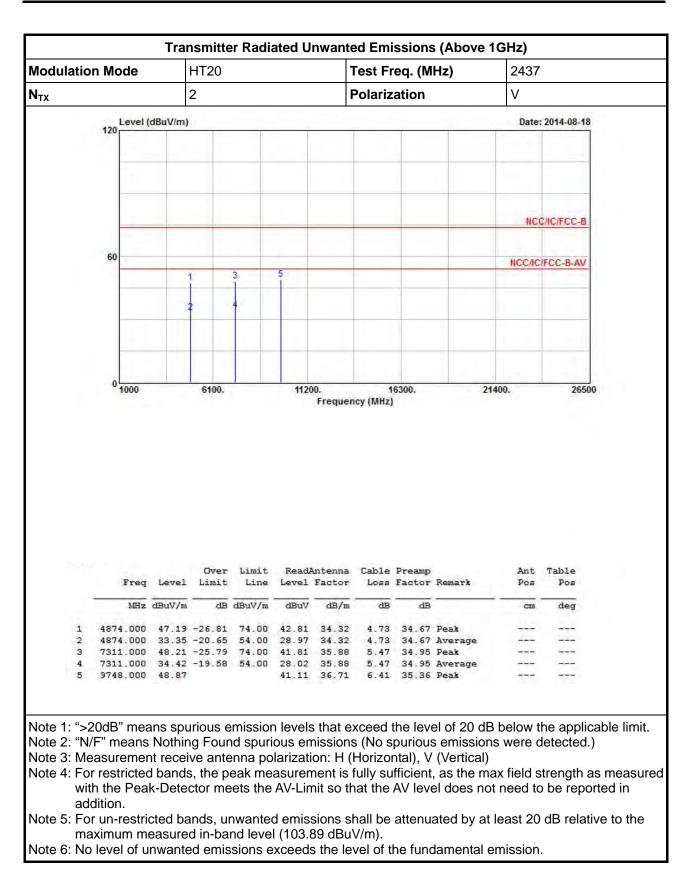


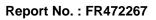




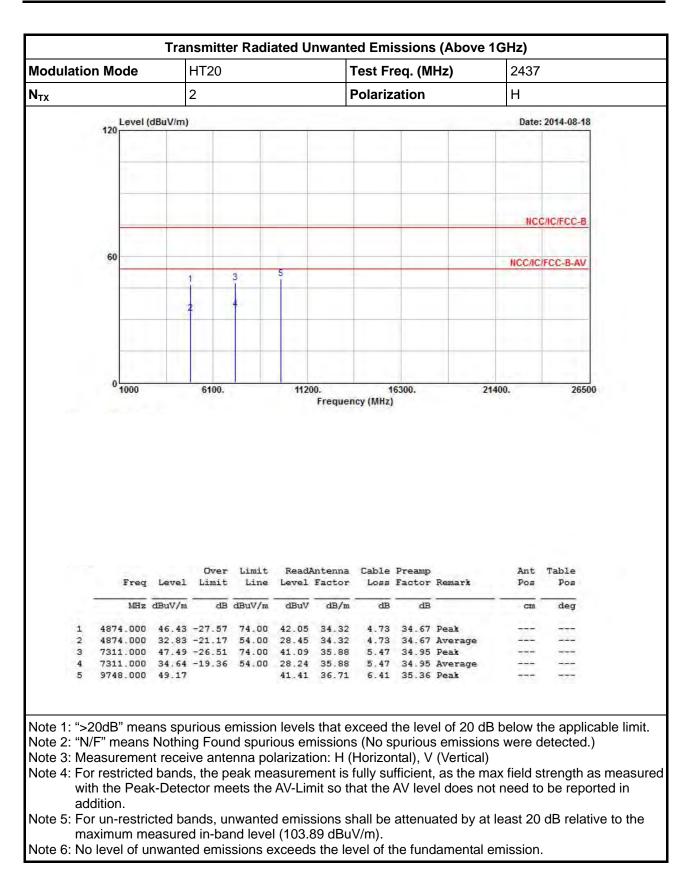






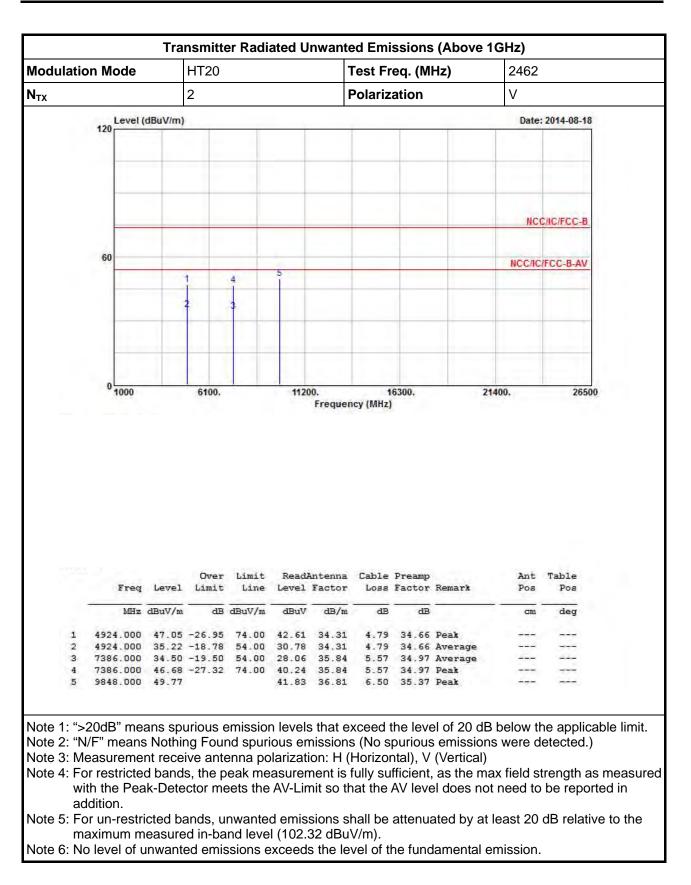






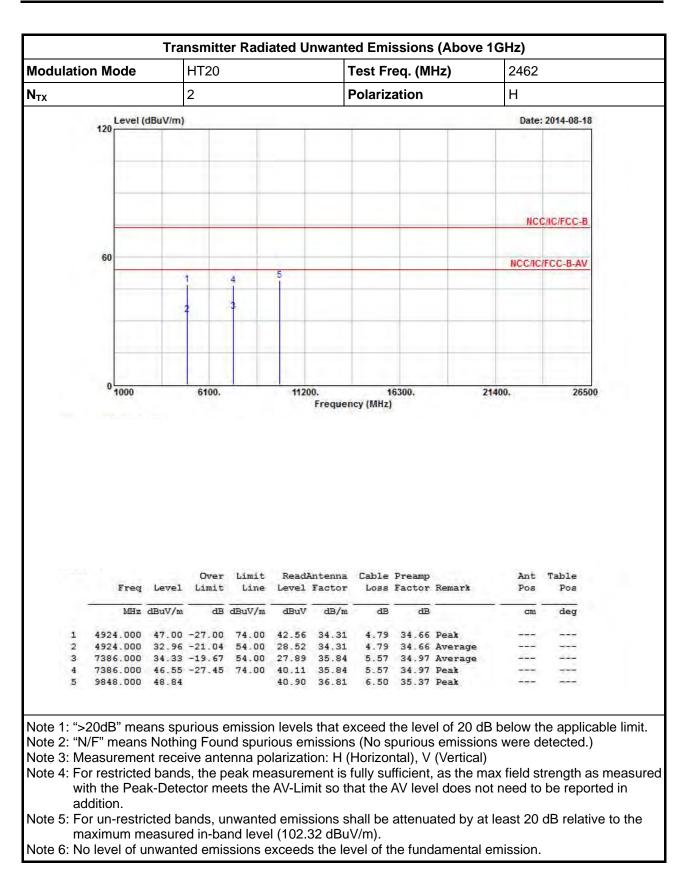






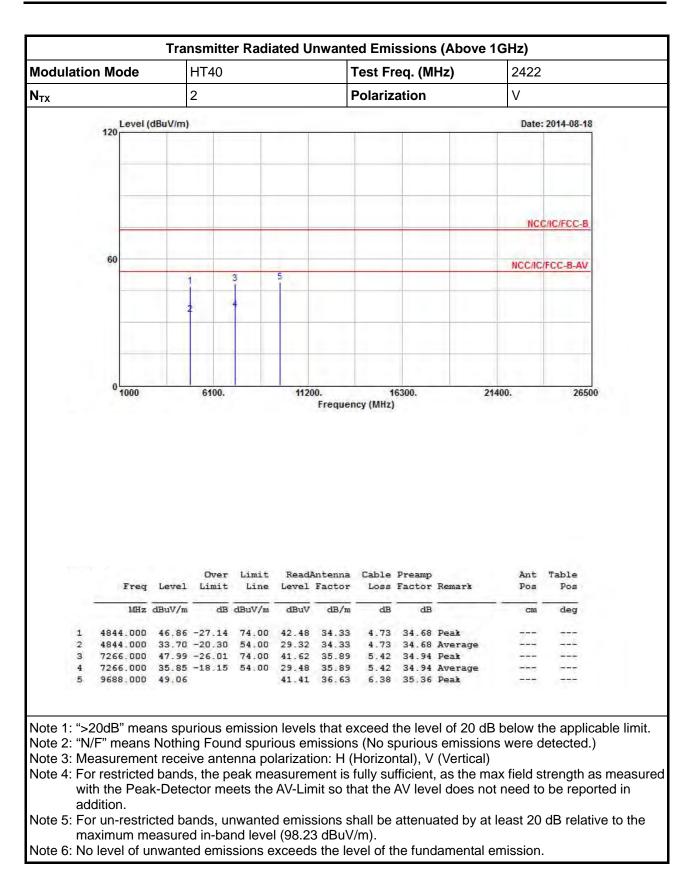






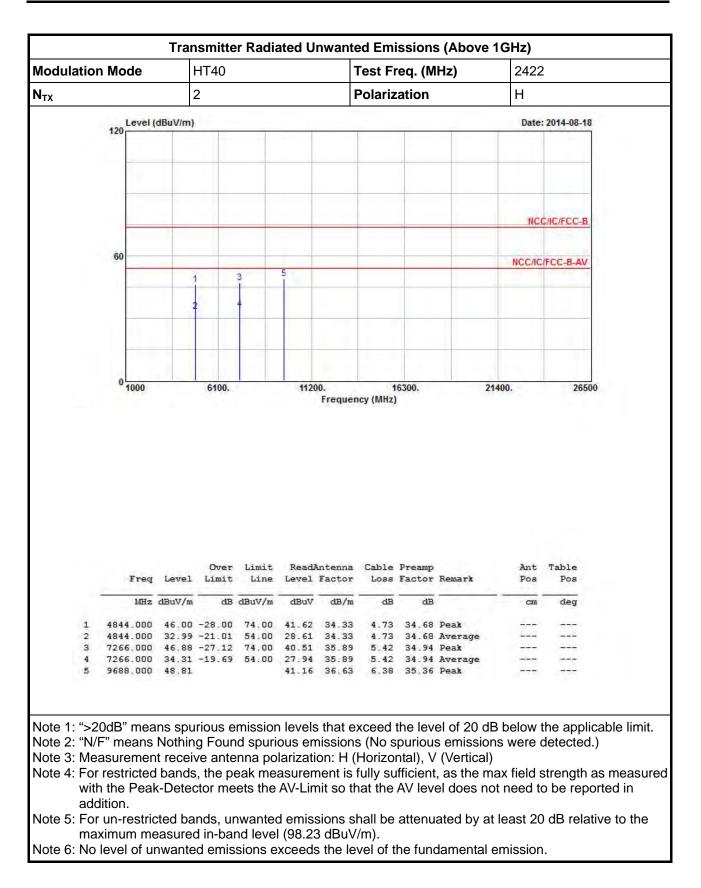


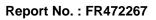




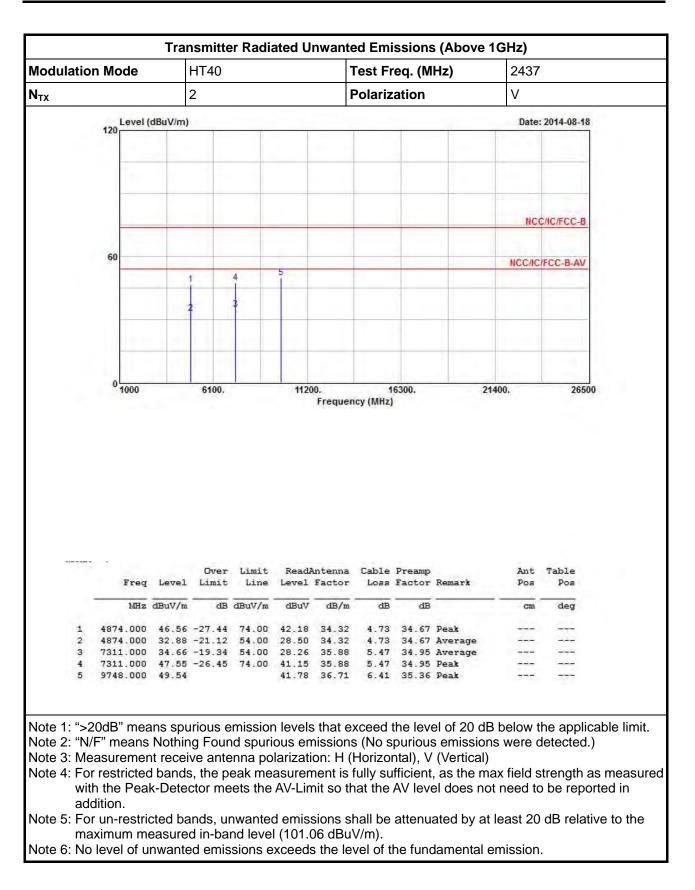


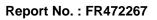




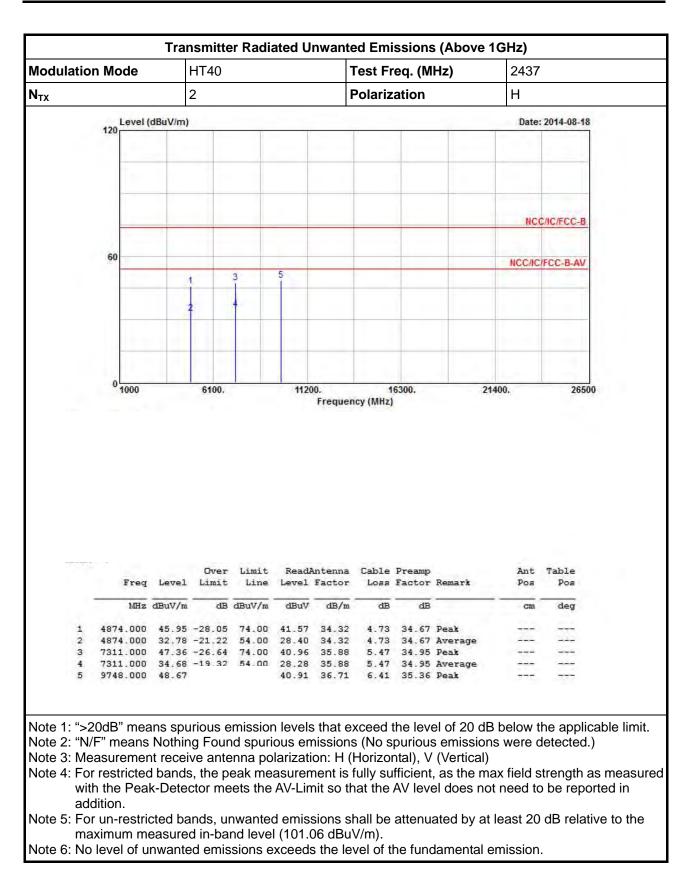






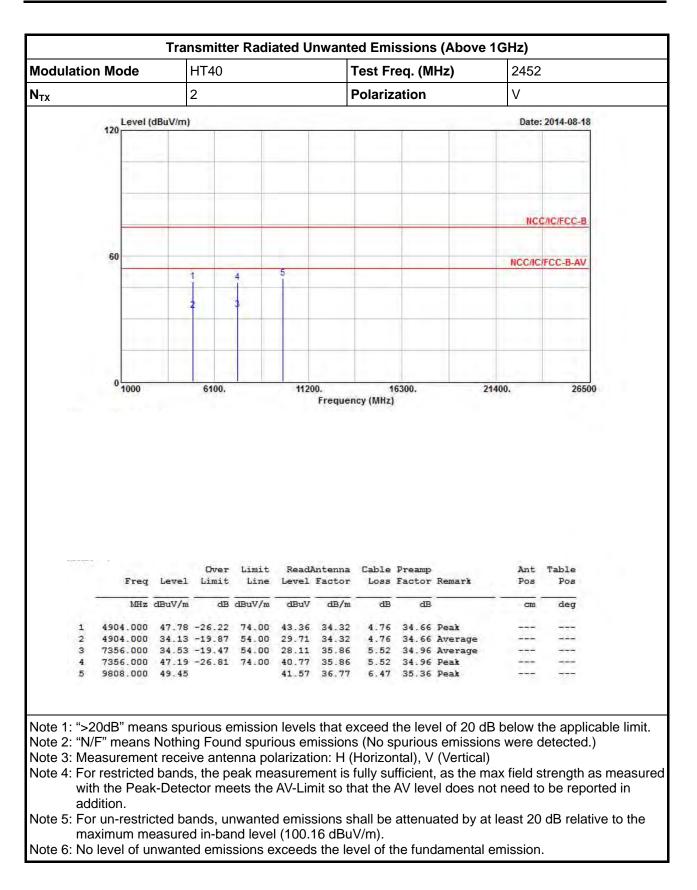


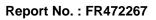




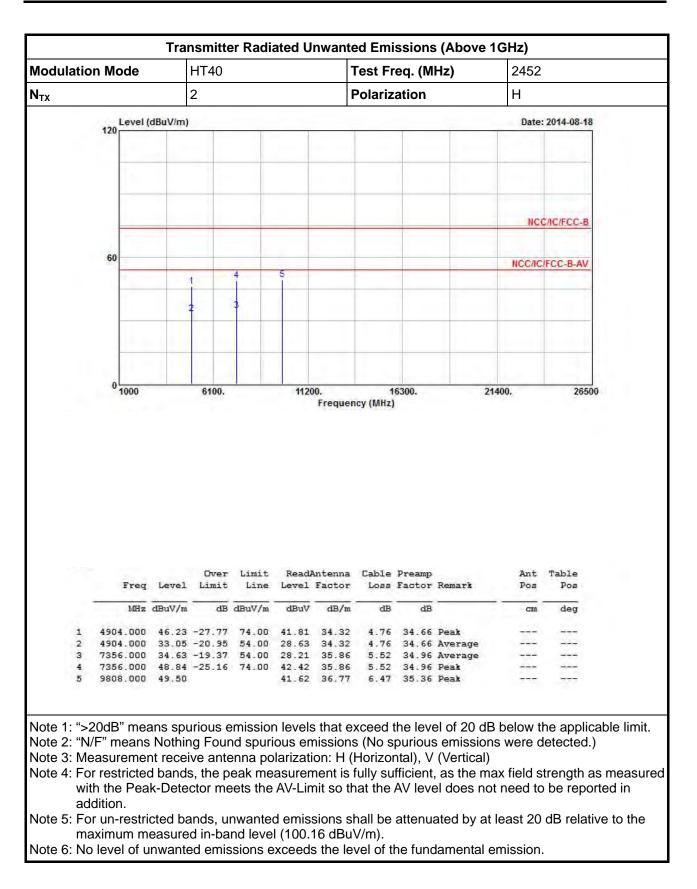














## 4 Test Equipment and Calibration Data

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	Jul. 31, 2014	RF Conducted
Power Sensor	Anritsu	MA2411B	1027452	300MHz ~ 40GHz	Sep. 11, 2013	RF Conducted
Power Meter	Anritsu	ML2495A	1124009	300MHz ~ 40GHz	Sep. 11, 2013	RF Conducted

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



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100593	9kHz ~ 40GHz	Oct. 03, 2013	Radiated Emission
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	May 11, 2014	Radiated Emission
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	Jul. 22, 2014	Radiated Emission
Amplifier	Agilent	8449B	3008A02373	1GHz ~ 26.5GHz	Aug. 28, 2013	Radiated Emission
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz ~ 18GHz	Nov. 25, 2013	Radiated Emission
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz ~ 40GHz	Jan. 10, 2014	Radiated Emission
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 09, 2013	Radiated Emission
RF Cable-high	SUHNER	SUCOFLEX106	03CH02-HY	1GHz ~ 40GHz	Mar. 05, 2014	Radiated Emission
Bilog Antenna	SCHAFFNER	CBL61128	2723	30MHz ~ 2GHz	Oct. 10, 2013	Radiated Emission
Turn Table	Chaintek Instruments	3000	MF7802058	0~ 360 degree	N/A	Radiated Emission
Antenna Mast	MF	MF7802	MF780208205	1 ~ 4 m	N/A	Radiated Emission

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

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

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