



FCC Test Report

Equipment : 802.11n,Dual Band, Wireless LAN PCI Express Half Mini Card
Brand Name : Sparklan
Model No. : WPEA-121N
FCC ID : RYK-WPEA-121N
Standard : 47 CFR FCC Part 15.247
Operating Band : 2400 MHz – 2483.5 MHz
Equipment Class : DTS
Applicant Manufacturer : SparkLAN Communications, Inc.
8F., No. 257, Sec. 2, Tiding Blvd., Neihu District,
Taipei City 11493, Taiwan

The product sample received on Oct. 26, 2015 and completely tested on Nov, 13, 2015. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

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

Reviewed by:



Kevin Liang / Assistant Manager





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APPENDIX A. TEST PHOTOS

APPENDIX B. PHOTOGRAPHS OF EUT



Summary of Test Result

Conformance Test Specifications					
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 0.1532130MHz 50.46 (Margin 15.36dB) - QP 31.82 (Margin 24.00dB) - AV	FCC 15.207	Complied
3.2	15.247(a)	6dB Bandwidth	6dB Bandwidth Unit [MHz] 20M: 9.48 / 40M: 36.20	\geq 500kHz	Complied
3.3	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm]: 21.70	Power [dBm]:30	Complied
3.4	15.247(e)	Power Spectral Density	PSD [dBm/100kHz]: - 8.72	PSD [dBm/3kHz]:8	Complied
3.5	15.247(d)	Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2399.496MHz: 27.02dB Restricted Bands [dBuV/m at 3m]: 2487.600MHz 60.98 (Margin 13.02dB) - PK 52.97 (Margin 1.03dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied
3.6	15.247(d)	Radiated Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 798.240MHz 41.60 (Margin 4.40dB) - PK	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied



Revision History



1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N _{TX})	RF Output Power (dBm)
2400-2483.5	b	2412-2462	1-11 [11]	2	20.98
2400-2483.5	g	2412-2462	1-11 [11]	2	21.61
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	21.70
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	19.66

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

1.1.2 Antenna Information

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

Antenna General Information						
Ant. Group	Port. No.	Ant. Cat.	Ant. Type	Ant. Connector	Model No.	Gain (dBi)
1	1/2	External	Dipole	Reverse SMA	C642-510049-A	2.0 / 2.0
2	1/2	External	Dipole	Reverse SMA	R3410110203	2.0 / 2.0
Remark: EUT was pre-tested Ant. Group 1 and 2 for using; the worst case was Ant. Group 2 and result of that was recorded as the final test result.						



1.1.3 Type of EUT

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

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
<input type="checkbox"/> Operated normally mode for worst duty cycle	
<input checked="" type="checkbox"/> Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	Power Duty Factor [dB] – (10 log 1/x)
<input checked="" type="checkbox"/> 100.00% - IEEE 802.11b	0.00
<input checked="" type="checkbox"/> 97.96% - IEEE 802.11g	0.09
<input checked="" type="checkbox"/> 97.82% - IEEE 802.11n (HT20)	0.10
<input checked="" type="checkbox"/> 97.87% - IEEE 802.11n (HT40)	0.09

1.1.5 EUT Operational Condition

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



1.2 Support Equipment

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

Note: The fixture provide by customer.

Support Equipment - AC Conduction and Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5530	DoC
2	Adapter for NB	DELL	LA65NS-01	DoC
3	Test Fixture	-	-	-

Note: The fixture provide by customer.

1.3 Testing Applied Standards

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

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2013
- ♦ FCC KDB 558074 D01 v03r02
- ♦ FCC KDB 662911 D01v02r01

1.4 Testing Location Information

Testing Location						
<input checked="" type="checkbox"/>	HWA YA	ADD	: No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.			
TEL : 886-3-327-3456 FAX : 886-3-327-0973						
Test site registered number [636805] with FCC.						
Test Condition	Test Site No.		Test Engineer	Test Environment		
AC Conduction	CO04-HY		Anthony	21°C / 59%		
RF Conducted	TH01-HY		Howard	23.5°C / 63%		
Radiated Emission	03CH03-HY		Allen	23.6°C / 57%		



1.5 Measurement Uncertainty

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

Measurement Uncertainty		
Test Item	Uncertainty	
AC power-line conducted emissions	±2.3 dB	
Emission bandwidth, 6dB bandwidth	±0.6 %	
RF output power, conducted	±0.1 dB	
Power density, conducted	±0.6 dB	
Unwanted emissions, conducted	9 – 150 kHz	±0.4 dB
	0.15 – 30 MHz	±0.4 dB
	30 – 1000 MHz	±0.6 dB
	1 – 18 GHz	±0.5 dB
	18 – 40 GHz	±0.5 dB
	40 – 200 GHz	N/A
All emissions, radiated	9 – 150 kHz	±2.5 dB
	0.15 – 30 MHz	±2.3 dB
	30 – 1000 MHz	±2.6 dB
	1 – 18 GHz	±3.6 dB
	18 – 40 GHz	±3.8 dB
	40 – 200 GHz	N/A
Temperature	±0.8 °C	
Humidity	±5 %	
DC and low frequency voltages	±0.9%	
Time	±1.4 %	
Duty Cycle	±0.6 %	



2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing			
Modulation Mode	Transmit Chains (N _{TX})	Data Rate / MCS	Worst Data Rate / MCS
11b	2	1-11 Mbps	1 Mbps
11g	2	6-54 Mbps	6 Mbps
HT20	2	MCS 0-15	MCS 0
HT40	2	MCS 0-15	MCS 0

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). The EUT supports HT20 and HT40. Worst modulation mode of Guard Interval (GI) is 800ns.

Note 2: Modulation modes consist below configuration:
11b: IEEE 802.11b, 11g: IEEE 802.11g, HT20/HT40: IEEE 802.11n

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

2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter (2400-2483.5MHz band)							
Test Software Version	Atheros Radio Test2 (ART2-GUI)_2.3						
Modulation Mode	N _{TX}	Test Frequency (MHz)					
		NCB: 20MHz			NCB: 40MHz		
		2412	2437	2462	2422	2437	2452
11b	2	15.5	15.5	13	-	-	-
11g	2	11.5	14	11	-	-	-
HT20	2	10.5	14	10	-	-	-
HT40	2	-	-	-	7.5	12	7.5



2.3 The Worst Case Measurement Configuration

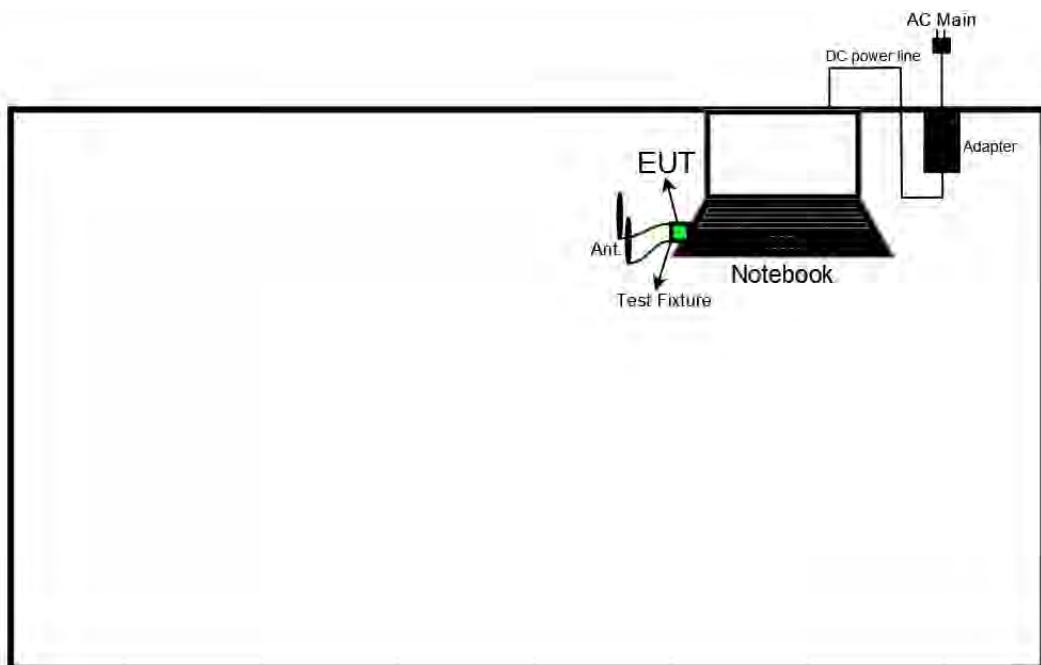
The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	Transmit Mode

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

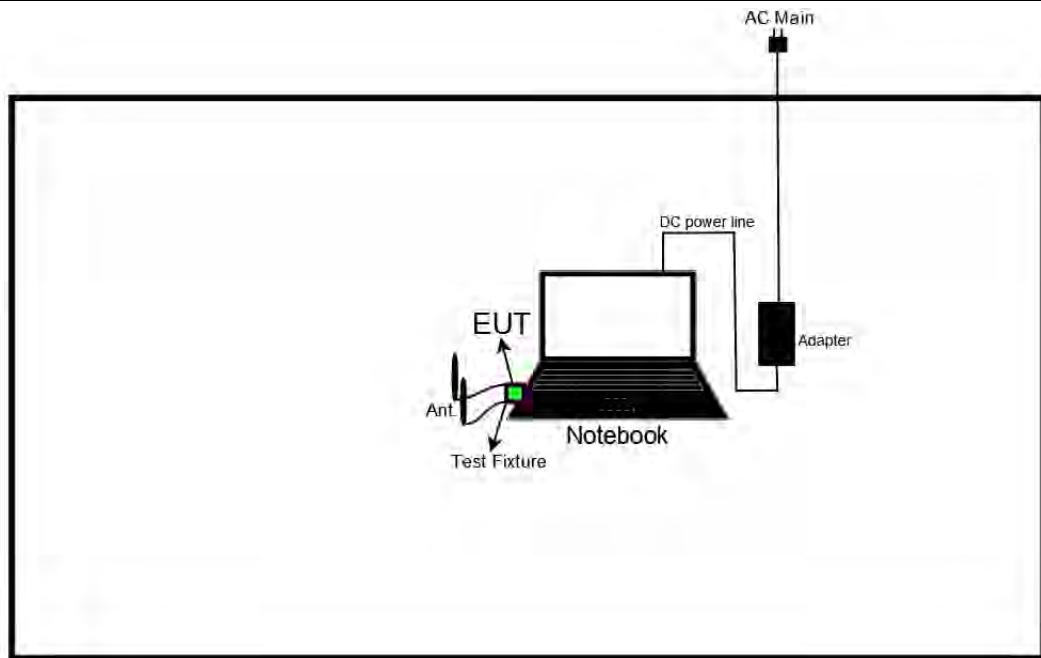
The Worst Case Mode for Following Conformance Tests	
Tests Item	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions
Test Condition	Radiated measurement
User Position	<input checked="" type="checkbox"/> EUT will be placed in fixed position. <input type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. <input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.
Operating Mode	Operating Mode Description
1	Transmit Mode
Modulation Mode	11b, 11g, HT20, HT40
Orthogonal Planes of EUT	X Plane 

2.4 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Test Setup Diagram - Radiated Test



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

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

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

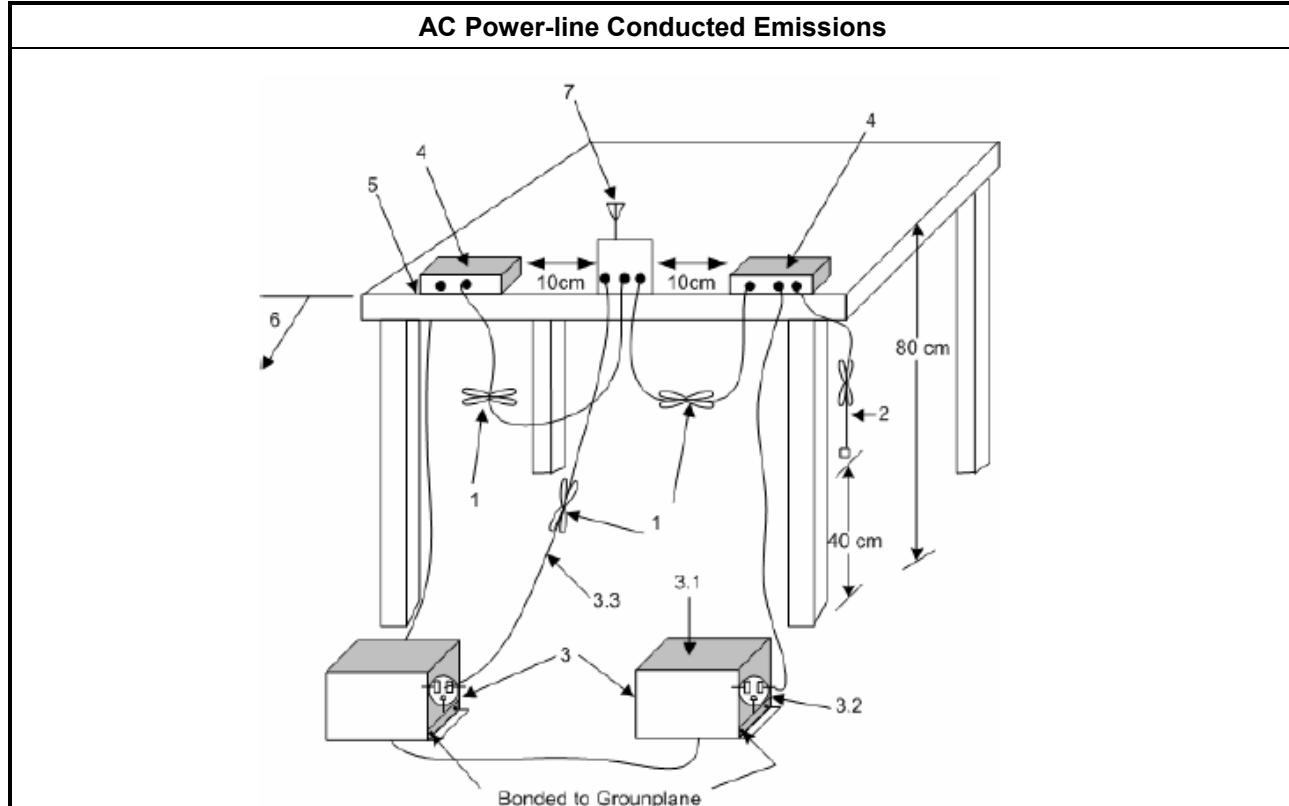
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

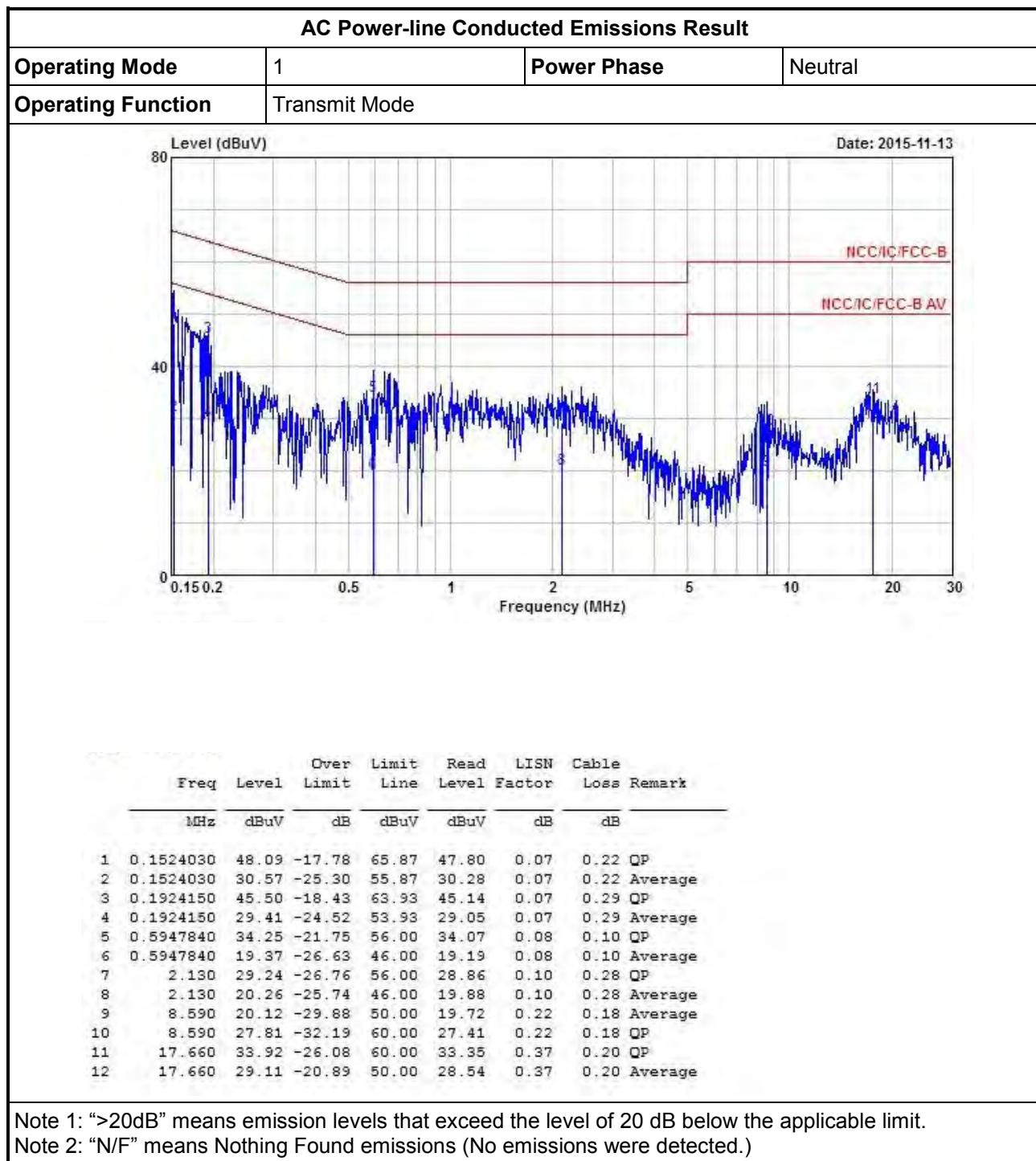
Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

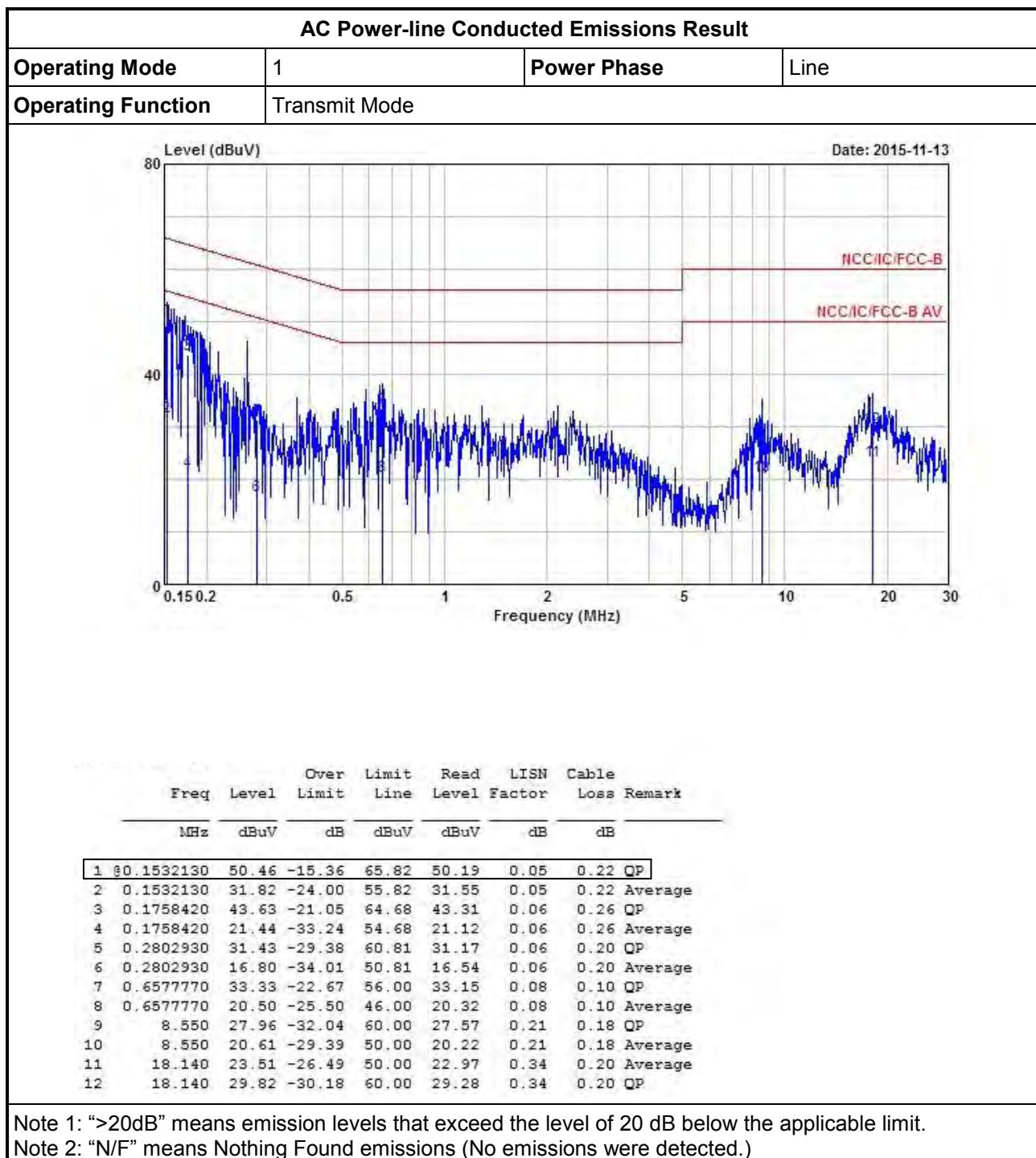
3.1.4 Test Setup





3.1.5 Test Result of AC Power-line Conducted Emissions





3.2 6dB Bandwidth

3.2.1 6dB Bandwidth Limit

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

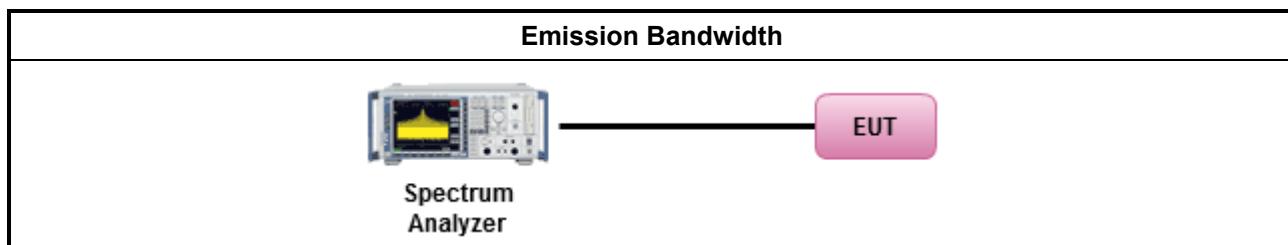
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> For the emission bandwidth shall be measured using one of the options below:
<input checked="" type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 8.1 Option 1 for 6 dB bandwidth measurement.
<input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 8.2 Option 2 for 6 dB bandwidth measurement.
<input type="checkbox"/> Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
<input checked="" type="checkbox"/> For conducted measurement.
<input type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
<input checked="" type="checkbox"/> The EUT supports multiple transmit chains using options given below:
<input checked="" type="checkbox"/> Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
<input type="checkbox"/> Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.

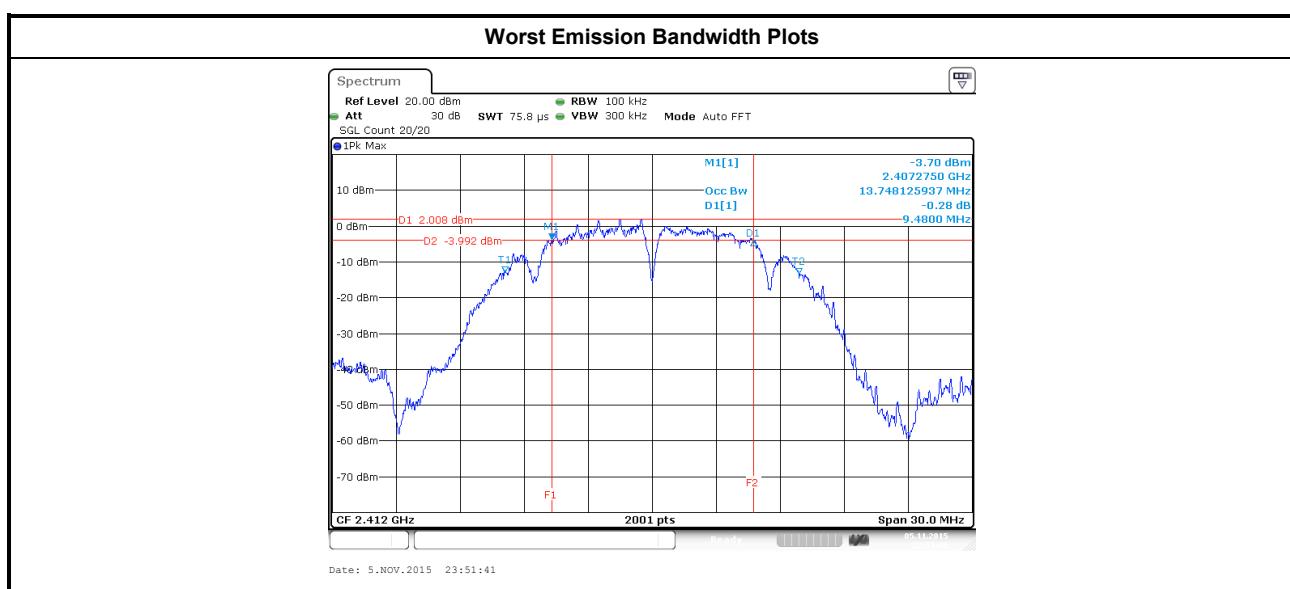
3.2.4 Test Setup





3.2.5 Test Result of Emission Bandwidth

Emission Bandwidth Result						
Condition			Emission Bandwidth (MHz)			
Modulation Mode	N _{TX}	Freq. (MHz)	99% Bandwidth		6dB Bandwidth	
			Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2
11b	2	2412	13.91	13.74	10.00	9.48
11b	2	2437	14.06	13.82	9.96	9.49
11b	2	2462	13.76	13.94	10.09	9.93
11g	2	2412	16.50	16.43	16.56	16.45
11g	2	2437	16.55	16.47	16.32	16.38
11g	2	2462	16.53	16.49	16.48	16.45
HT20	2	2412	17.69	17.69	17.70	17.73
HT20	2	2437	17.67	17.66	17.74	17.70
HT20	2	2462	17.66	17.63	17.71	17.70
HT40	2	2422	36.30	36.30	36.32	36.32
HT40	2	2437	36.34	36.34	36.32	36.20
HT40	2	2452	36.38	36.30	36.32	36.32
Limit			N/A		≥500 kHz	
Result			Complied			

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



3.3 RF Output Power

3.3.1 RF Output Power Limit

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

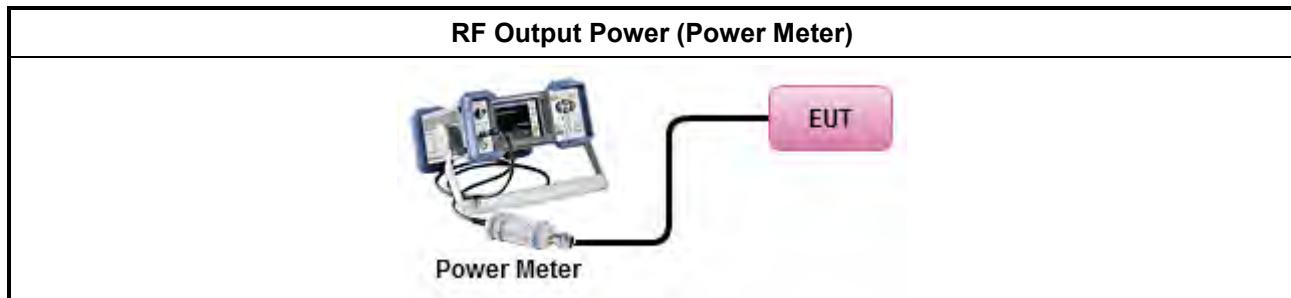
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/> Maximum Peak Conducted Output Power	<input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 9.1.1 (RBW \geq EBW method). <input checked="" type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 9.1.2 (peak power meter for VBW \geq DTS BW).
<input checked="" type="checkbox"/> Maximum Conducted Output Power	[duty cycle \geq 98% or external video / power trigger] <input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 9.2.2.2 Method AVGSA-1 (spectral trace averaging). <input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 9.2.2.3 Method AVGSA-1 Alt. (slow sweep speed) duty cycle < 98% and average over on/off periods with duty factor <input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging). <input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed) RF power meter and average over on/off periods with duty factor or gated trigger <input checked="" type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 9.2.3 Method AVGPM (using an RF average power meter).
<input checked="" type="checkbox"/> For conducted measurement.	<input type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain. <input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case. <input checked="" type="checkbox"/> The EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them. <input checked="" type="checkbox"/> If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

3.3.4 Test Setup





3.3.5 Directional Gain for Power Measurement

Directional Gain (DG) Result					
Transmit Chains No.		1	2	-	-
Maximum G_{ANT} (dBi)		2.0	2.0	-	-
Modulation Mode	DG (dBi)	N_{TX}	N_{SS} (Min.)	STBC	Array Gain (dB)
11b	5.01	2	1	-	3.01 (Note3)
11g	5.01	2	1	-	3.01 (Note3)
HT20	5.01	2	1	-	3.01 (Note3)
HT40	5.01	2	1	-	3.01 (Note3)

Note 1: For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows:
Any transmit signals are correlated, Directional Gain = $G_{ANT} + 10 \log(N_{TX}) = 2.0 + 10 \log(2) = 5.01$
All transmit signals are completely uncorrelated, Directional Gain = G_{ANT}

Note 2: For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows:
Any transmit signals are correlated, Directional Gain = $10 \log[(10^{G_{1/20}} + \dots + 10^{G_{N/20}})^2 / N_{TX}]$
All transmit signals are completely uncorrelated, Directional Gain = $10 \log[(10^{G_{1/10}} + \dots + 10^{G_{N/10}}) / N_{TX}]$

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

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



3.3.6 Test Result of Maximum Peak Conducted Output Power

Maximum Peak Conducted Output Power Result									
Condition			RF Output Power (dBm)						
Modulation Mode	N _{TX}	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)	EIRP Power	EIRP Limit
11b	2	2412	18.35	17.56	20.98	30.00	5.01	25.99	36.00
11b	2	2437	18.05	16.74	20.45	30.00	5.01	25.46	36.00
11b	2	2462	16.60	15.49	19.09	30.00	5.01	24.10	36.00
11g	2	2412	17.26	16.83	20.06	30.00	5.01	25.07	36.00
11g	2	2437	19.40	17.63	21.61	30.00	5.01	26.62	36.00
11g	2	2462	16.54	15.80	19.20	30.00	5.01	24.21	36.00
HT20	2	2412	16.06	14.82	18.49	30.00	5.01	23.50	36.00
HT20	2	2437	19.38	17.88	21.70	30.00	5.01	26.71	36.00
HT20	2	2462	15.59	14.81	18.23	30.00	5.01	23.24	36.00
HT40	2	2422	13.48	11.99	15.81	30.00	5.01	20.82	36.00
HT40	2	2437	17.36	15.79	19.66	30.00	5.01	24.67	36.00
HT40	2	2452	13.13	11.49	15.40	30.00	5.01	20.41	36.00
Result			Complied						

3.3.7 Test Result of Maximum Conducted Output Power

Maximum Conducted Output Power Result									
Condition			RF Output Power (dBm)						
Modulation Mode	N _{TX}	Freq. (MHz)	Chain Port 1	Chain Port 2	Sum Chain	Power Limit	DG (dBi)	EIRP Power	EIRP Limit
11b	2	2412	15.43	14.64	18.06	30.00	5.01	23.07	36.00
11b	2	2437	15.15	13.84	17.55	30.00	5.01	22.56	36.00
11b	2	2462	13.70	12.56	16.18	30.00	5.01	21.19	36.00
11g	2	2412	12.42	11.66	15.07	30.00	5.01	20.08	36.00
11g	2	2437	14.55	13.06	16.88	30.00	5.01	21.89	36.00
11g	2	2462	11.60	10.62	14.15	30.00	5.01	19.16	36.00
HT20	2	2412	11.14	9.79	13.52	30.00	5.01	18.53	36.00
HT20	2	2437	14.37	12.85	16.68	30.00	5.01	21.69	36.00
HT20	2	2462	10.69	9.84	13.29	30.00	5.01	18.30	36.00
HT40	2	2422	8.44	6.91	10.76	30.00	5.01	15.77	36.00
HT40	2	2437	12.30	10.72	14.60	30.00	5.01	19.61	36.00
HT40	2	2452	8.04	6.53	10.36	30.00	5.01	15.37	36.00
Result			Complied						



3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

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

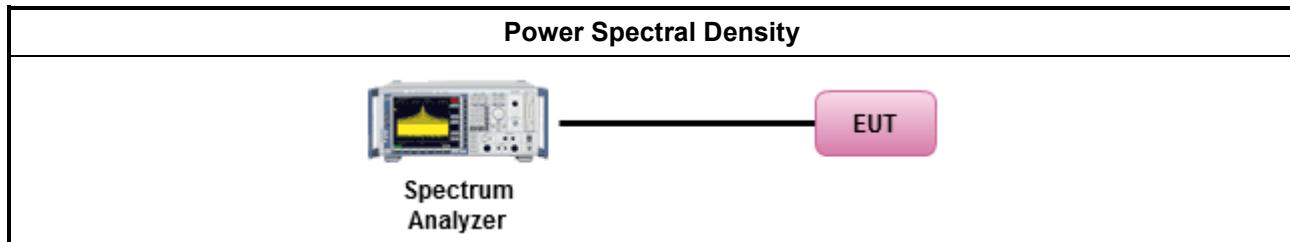
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

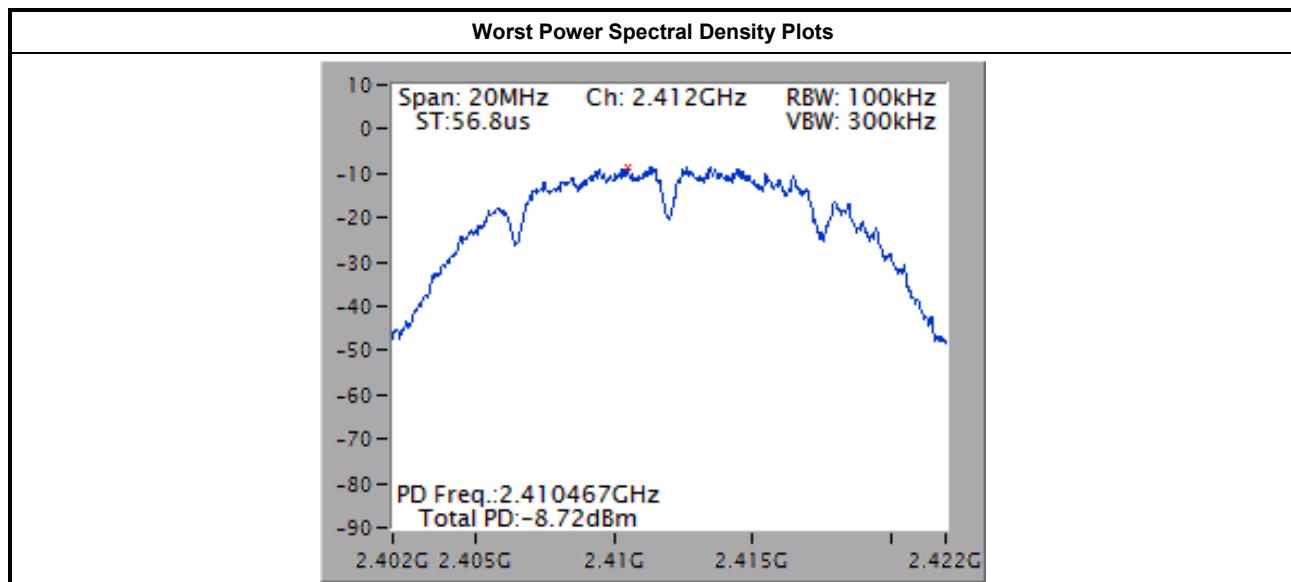
Test Method
<input checked="" type="checkbox"/> Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).
<input checked="" type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 10.2 Method PKPSD (RBW=3-100kHz;detector=peak). [duty cycle $\geq 98\%$ or external video / power trigger]
<input checked="" type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 10.3 Method AVGPSD-1 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 10.4 Method AVGPSD-1 Alt. (slow sweep speed) duty cycle $< 98\%$ and average over on/off periods with duty factor
<input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 10.5 Method AVGPSD-2 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 10.6 Method AVGPSD-2 Alt. (slow sweep speed)
<input checked="" type="checkbox"/> For conducted measurement.
<input type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
<input checked="" type="checkbox"/> The EUT supports multiple transmit chains using options given below:
<input checked="" type="checkbox"/> Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the N_{TX} output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.
<input type="checkbox"/> Option 2: Measure and add $10 \log(N) \text{ dB}$, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with $10 \log(N)$. Or each transmit chains shall be add $10 \log(N)$ to compared with the limit.

3.4.4 Test Setup



3.4.5 Test Result of Power Spectral Density

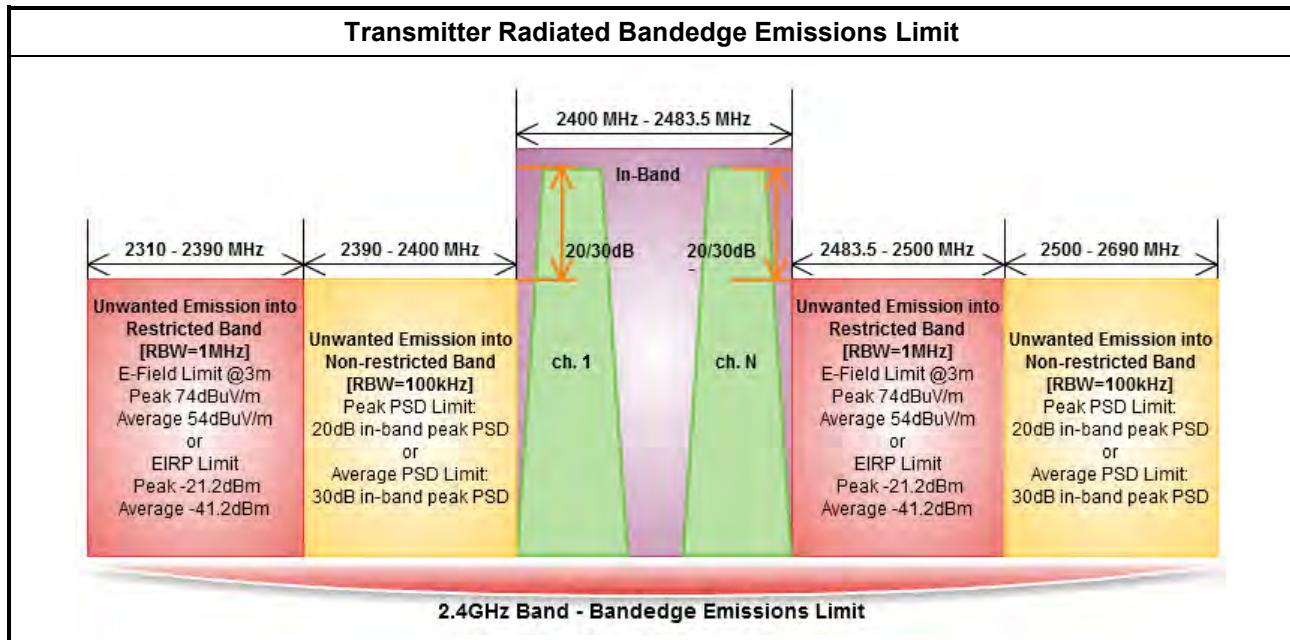
Condition			Power Spectral Density	
Modulation Mode	N _{TX}	Freq. (MHz)	Sum Chain (dBm/100kHz)	PSD Limit (dBm/3kHz)
11b	2	2412	-8.72	8.00
11b	2	2437	-9.66	8.00
11b	2	2462	-11.73	8.00
11g	2	2412	-13.75	8.00
11g	2	2437	-10.64	8.00
11g	2	2462	-14.09	8.00
HT20	2	2412	-16.93	8.00
HT20	2	2437	-13.66	8.00
HT20	2	2462	-17.44	8.00
HT40	2	2422	-19.07	8.00
HT40	2	2437	-15.90	8.00
HT40	2	2452	-19.07	8.00
Result		Complied		



Note: 15.2dBm has been offset for 3kHz data.

3.5 Transmitter Radiated Bandedge Emissions

3.5.1 Transmitter Radiated Bandedge Emissions Limit



3.5.2 Measuring Instruments

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

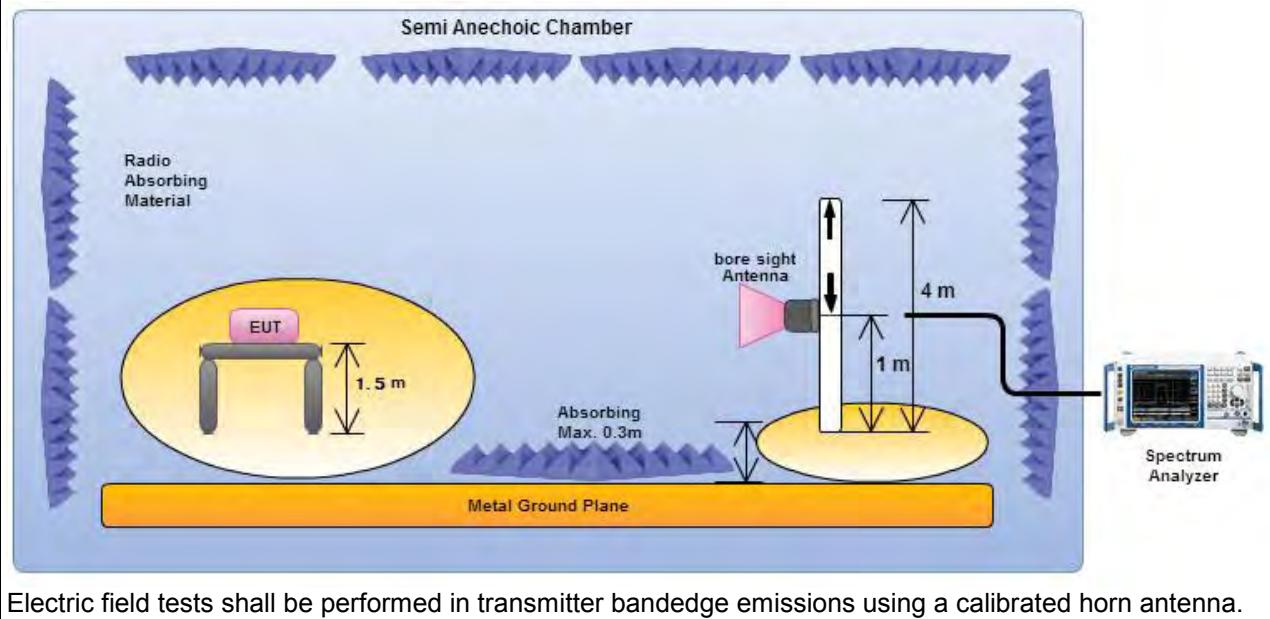


3.5.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	The average emission levels shall be measured in [duty cycle \geq 98 or duty factor].
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.10 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
<input checked="" type="checkbox"/>	For the transmitter unwanted emissions shall be measured using following options below:
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074 D01 v03r02, clause 11 for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074 D01 v03r02, clause 12 for unwanted emissions into restricted bands.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074 D01 v03r02, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq 98\%$)
<input type="checkbox"/>	Refer as FCC KDB 558074 D01 v03r02, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
<input type="checkbox"/>	Refer as FCC KDB 558074 D01 v03r02, clause 12.2.5.3 Option 3 (Reduced $VBW \geq 1/T$).
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). $VBW \geq 1/T$, where T is pulse time.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074 D01 v03r02, clause 11.3 and 12.2.4 measurement procedure peak limit.
<input checked="" type="checkbox"/>	For the transmitter bandedge emissions shall be measured using following options below:
<input type="checkbox"/>	Refer as FCC KDB 558074 D01 v03r02, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.10.6.2 for marker-delta method for band-edge measurements.
<input checked="" type="checkbox"/>	For radiated measurement, refer as FCC KDB 558074 D01 v03r02, clause 12.2.7 and ANSI C63.10, clause 6.6. Test distance is 3m.

3.5.4 Test Setup

Transmitter Radiated Bandedge Emissions



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



3.5.5 Test Result of Transmitter Radiated Bandedge Emissions

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Non-restricted Band)								
Modulation	N _{TX}	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
11b	2	2412	99.55	2397.136	68.57	30.98	20	V
11b	2	2462	101.18	2533.400	60.27	40.91	20	V
11g	2	2412	99.43	2399.600	70.69	28.74	20	V
11g	2	2462	96.70	2532.400	60.20	36.50	20	V
HT20	2	2412	98.14	2397.136	66.66	31.48	20	V
HT20	2	2462	94.88	2523.800	60.23	34.65	20	V
HT40	2	2422	92.20	2399.496	65.18	27.02	20	V
HT40	2	2452	91.55	2533.760	59.97	31.58	20	V

Note 1: Measurement worst emissions of receive antenna polarization

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band)										
Modulation Mode	N _{TX}	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Freq. (MHz) AV	Level (dBuV/m) AV	Limit (dBuV/m) AV	Pol.
11b	2	2412	3	2385.936	60.50	74	2386.384	52.57	54	V
11b	2	2462	3	2487.600	60.98	74	2487.600	52.97	54	V
11g	2	2412	3	2389.968	72.39	74	2389.968	52.92	54	V
11g	2	2462	3	2483.500	70.89	74	2483.500	52.92	54	V
HT20	2	2412	3	2389.968	71.74	74	2389.968	52.63	54	V
HT20	2	2462	3	2483.500	71.17	74	2483.500	52.96	54	V
HT40	2	2422	3	2389.992	68.61	74	2389.992	52.85	54	V
HT40	2	2452	3	2484.320	68.76	74	2483.840	52.76	54	V

Note 1: Measurement worst emissions of receive antenna polarization.



3.6 Radiated Unwanted Emissions

3.6.1 Radiated Unwanted Emissions Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

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

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

Un-restricted Band Emissions Limit	
RF output power procedure	Limit (dB)
Peak output power procedure	20
Average output power procedure	30

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

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

3.6.2 Measuring Instruments

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

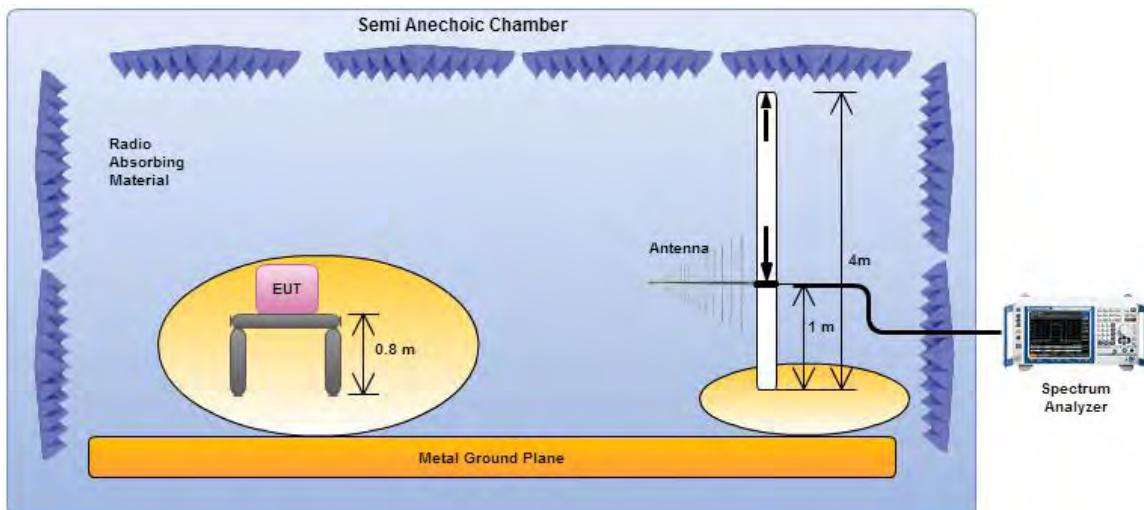


3.6.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/> Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).	
<input checked="" type="checkbox"/> The average emission levels shall be measured in [duty cycle \geq 98 or duty factor].	
<input checked="" type="checkbox"/> For the transmitter unwanted emissions shall be measured using following options below:	
<input checked="" type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 11 for unwanted emissions into non-restricted bands.	
<input checked="" type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 12 for unwanted emissions into restricted bands.	
	<input checked="" type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq 98\%$)
	<input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
	<input type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 12.2.5.3 Option 3 (Reduced $VBW \geq 1/T$).
	<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). $VBW \geq 1/T$, where T is pulse time.
	<input type="checkbox"/> Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.
	<input checked="" type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 11.3 and 12.2.4 measurement procedure peak limit.
	<input checked="" type="checkbox"/> Refer as FCC KDB 558074 D01 v03r02, clause 12.2.3 measurement procedure Quasi-Peak limit.
<input checked="" type="checkbox"/> For radiated measurement, refer as FCC KDB 558074 D01 v03r02, clause 12.2.7.	
	<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
	<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
	<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.
<input checked="" type="checkbox"/> The any unwanted emissions level shall not exceed the fundamental emission level.	
<input checked="" type="checkbox"/> All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.	

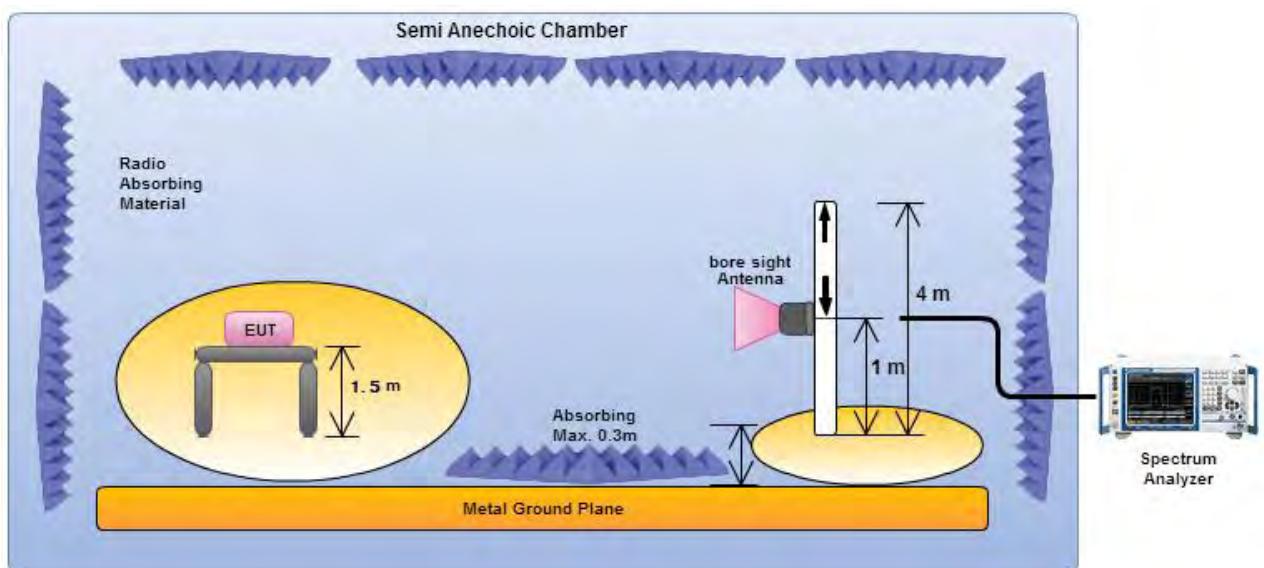
3.6.4 Test Setup

Transmitter Radiated Unwanted Emissions (below 1GHz)



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

Transmitter Radiated Unwanted Emissions (Above 1GHz)



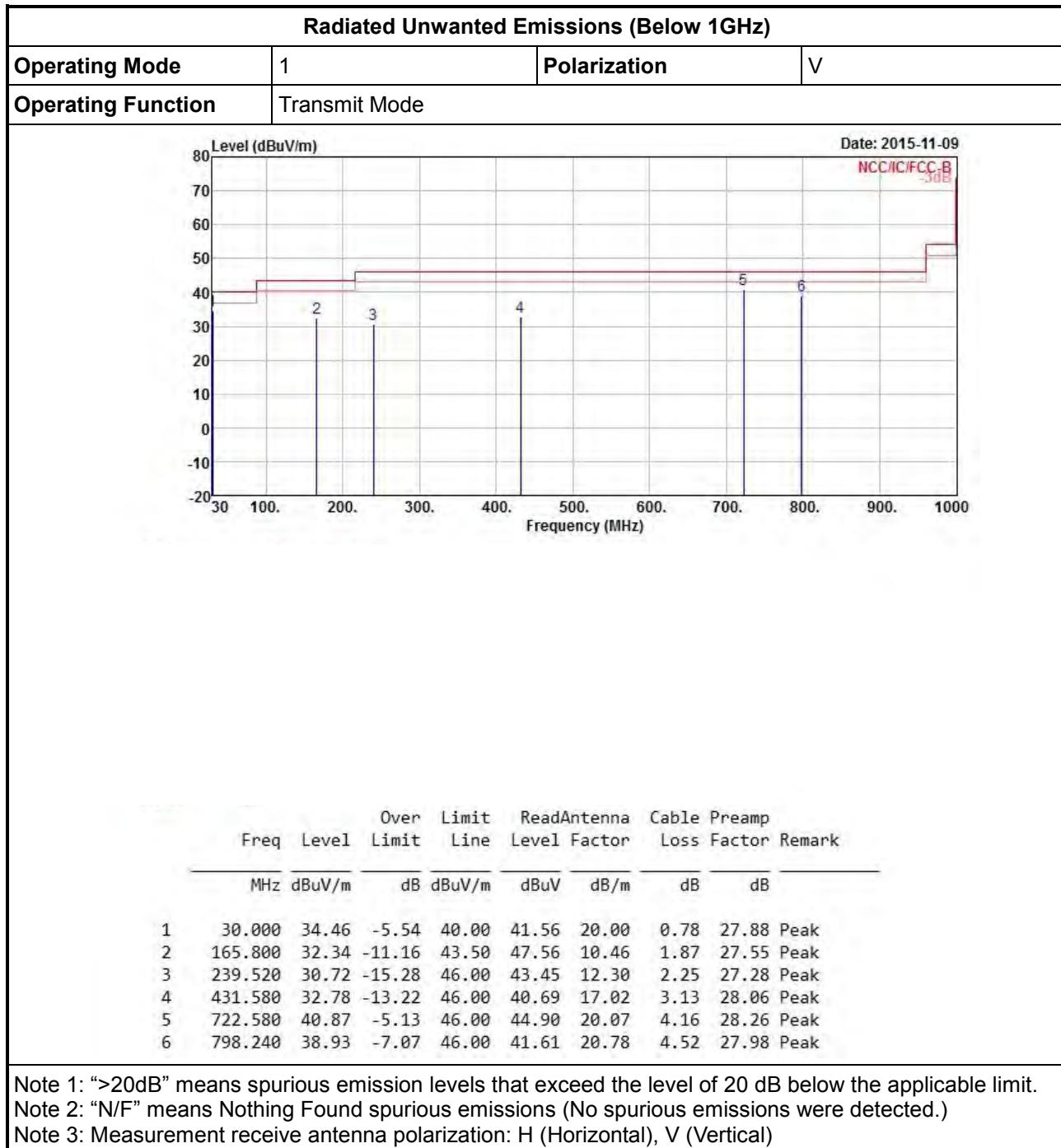
- Electric field tests shall be performed in the frequency range of 1 GHz to 10th harmonic of highest fundamental frequency or 40 GHz using a calibrated horn antenna.

3.6.5 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.

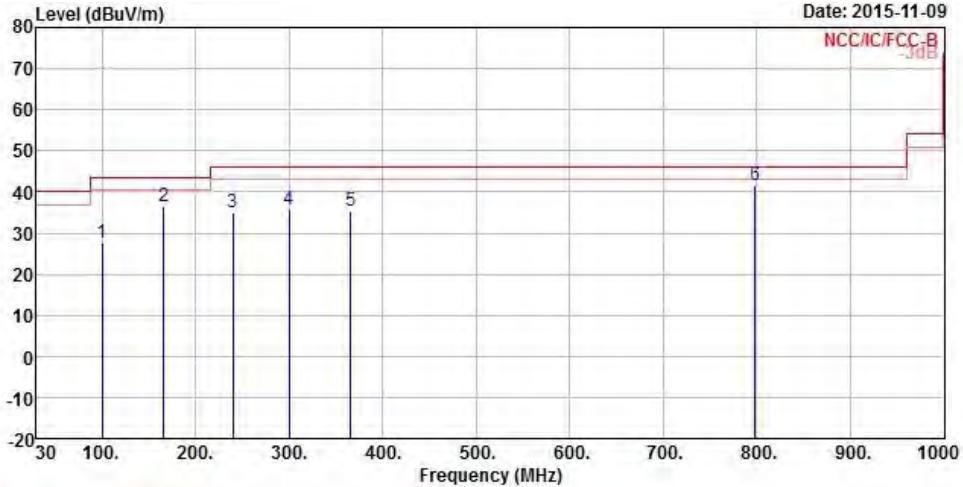


3.6.6 Radiated Unwanted Emissions (Below 1GHz)



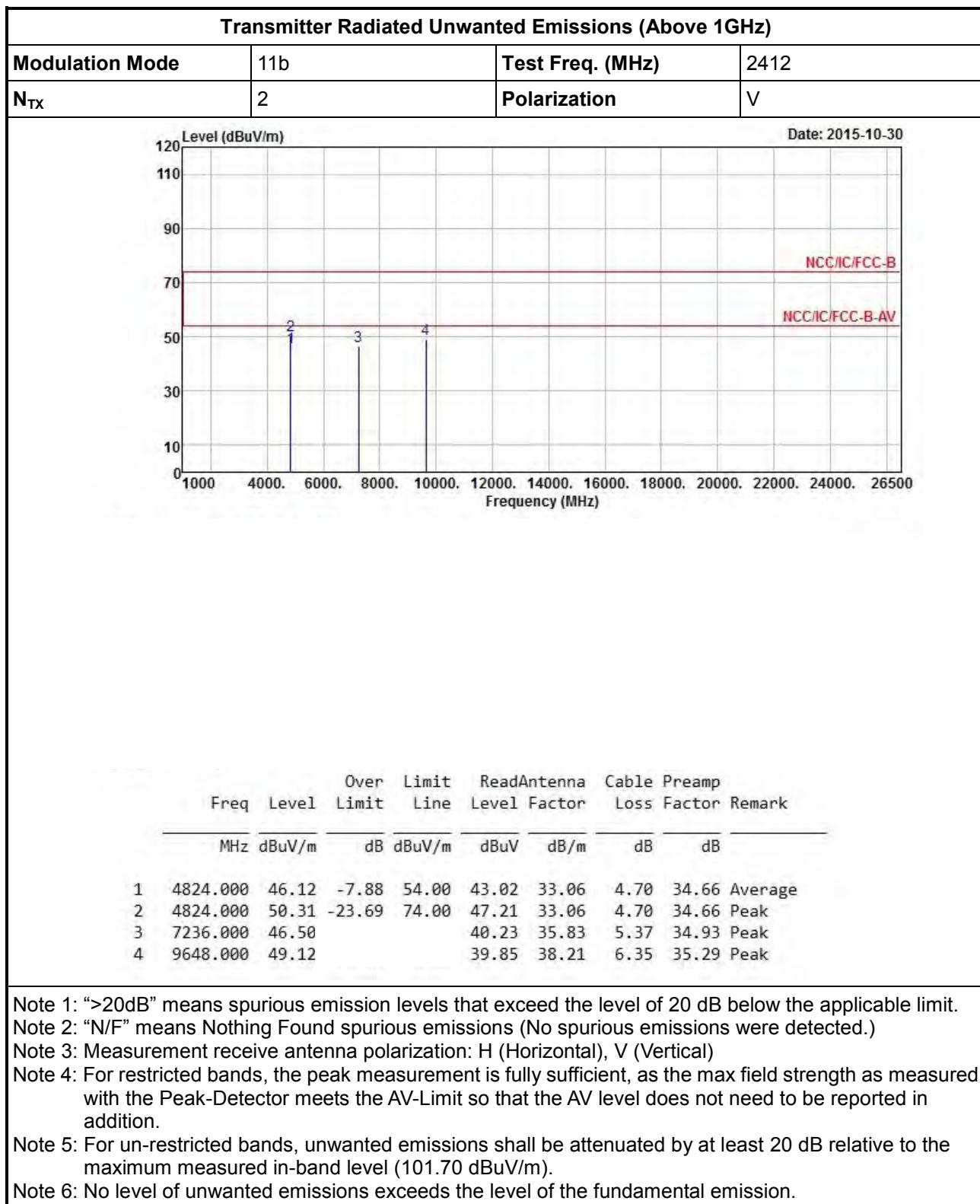


Radiated Unwanted Emissions (Below 1GHz)

Operating Mode	1	Polarization	H																																																																
Operating Function	Transmit Mode																																																																		
																																																																			
<table><thead><tr><th>Freq</th><th>Level</th><th>Over Limit</th><th>Limit</th><th>ReadAntenna</th><th>Cable</th><th>Preamp</th><th>Remark</th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dB</th><th>dBuV/m</th><th>Level</th><th>Factor</th><th>Loss</th><th>Factor</th></tr></thead><tbody><tr><td>1</td><td>99.840</td><td>27.43</td><td>-16.07</td><td>43.50</td><td>42.29</td><td>11.40</td><td>1.50 27.76 Peak</td></tr><tr><td>2</td><td>165.800</td><td>36.60</td><td>-6.90</td><td>43.50</td><td>51.82</td><td>10.46</td><td>1.87 27.55 Peak</td></tr><tr><td>3</td><td>239.520</td><td>35.09</td><td>-10.91</td><td>46.00</td><td>47.82</td><td>12.30</td><td>2.25 27.28 Peak</td></tr><tr><td>4</td><td>299.660</td><td>35.67</td><td>-10.33</td><td>46.00</td><td>46.11</td><td>14.00</td><td>2.60 27.04 Peak</td></tr><tr><td>5</td><td>365.620</td><td>35.37</td><td>-10.63</td><td>46.00</td><td>44.30</td><td>15.81</td><td>2.85 27.59 Peak</td></tr><tr><td>6</td><td>798.240</td><td>41.60</td><td>-4.40</td><td>46.00</td><td>44.28</td><td>20.78</td><td>4.52 27.98 Peak</td></tr></tbody></table>				Freq	Level	Over Limit	Limit	ReadAntenna	Cable	Preamp	Remark	MHz	dBuV/m	dB	dBuV/m	Level	Factor	Loss	Factor	1	99.840	27.43	-16.07	43.50	42.29	11.40	1.50 27.76 Peak	2	165.800	36.60	-6.90	43.50	51.82	10.46	1.87 27.55 Peak	3	239.520	35.09	-10.91	46.00	47.82	12.30	2.25 27.28 Peak	4	299.660	35.67	-10.33	46.00	46.11	14.00	2.60 27.04 Peak	5	365.620	35.37	-10.63	46.00	44.30	15.81	2.85 27.59 Peak	6	798.240	41.60	-4.40	46.00	44.28	20.78	4.52 27.98 Peak
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3.6.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)





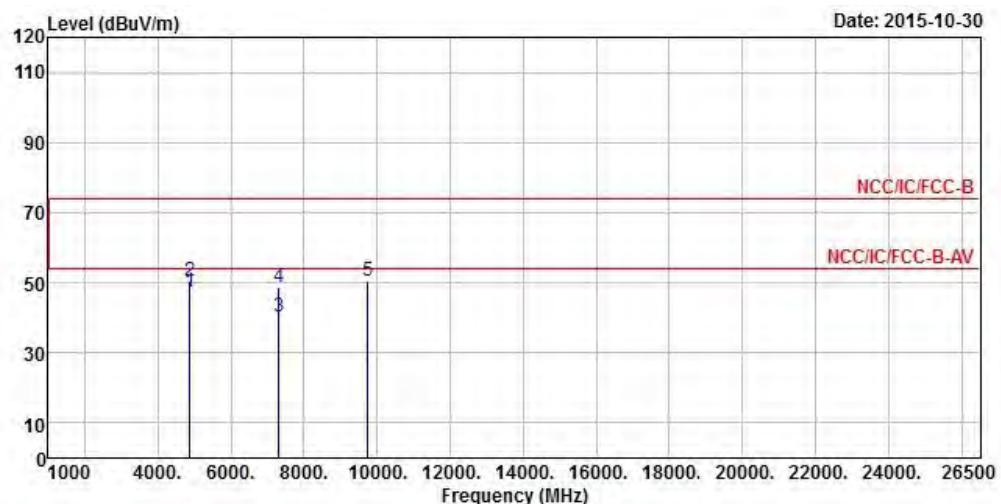
Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11b	Test Freq. (MHz)	2412																																																
N _{TX}	2	Polarization	H																																																
Level (dB _{UV} /m)			Date: 2015-10-30																																																
<table border="1"> <thead> <tr> <th>Freq</th> <th>Level</th> <th>Over Limit</th> <th>Line</th> <th>ReadAntenna</th> <th>Cable</th> <th>Preamp</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>MHz</td> <td>dB_{UV}/m</td> <td>dB</td> <td>dB_{UV}/m</td> <td>dB_{UV}</td> <td>dB/m</td> <td>dB</td> <td></td> </tr> <tr> <td>1</td> <td>4824.000</td> <td>37.14</td> <td>-16.86</td> <td>54.00</td> <td>34.04</td> <td>33.06</td> <td>4.70 34.66 Average</td> </tr> <tr> <td>2</td> <td>4824.000</td> <td>45.79</td> <td>-28.21</td> <td>74.00</td> <td>42.69</td> <td>33.06</td> <td>4.70 34.66 Peak</td> </tr> <tr> <td>3</td> <td>7236.000</td> <td>46.03</td> <td></td> <td></td> <td>39.76</td> <td>35.83</td> <td>5.37 34.93 Peak</td> </tr> <tr> <td>4</td> <td>9648.000</td> <td>49.66</td> <td></td> <td></td> <td>40.39</td> <td>38.21</td> <td>6.35 35.29 Peak</td> </tr> </tbody> </table>				Freq	Level	Over Limit	Line	ReadAntenna	Cable	Preamp	Remark	MHz	dB _{UV} /m	dB	dB _{UV} /m	dB _{UV}	dB/m	dB		1	4824.000	37.14	-16.86	54.00	34.04	33.06	4.70 34.66 Average	2	4824.000	45.79	-28.21	74.00	42.69	33.06	4.70 34.66 Peak	3	7236.000	46.03			39.76	35.83	5.37 34.93 Peak	4	9648.000	49.66			40.39	38.21	6.35 35.29 Peak
Freq	Level	Over Limit	Line	ReadAntenna	Cable	Preamp	Remark																																												
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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit. Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.) Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical) Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition. Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (101.70 dB _{UV} /m). Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.																																																			



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11b	Test Freq. (MHz)	2437
N _{TX}	2	Polarization	V



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

1	4874.000	47.42	-6.58	54.00	44.18	33.16	4.73	34.65	Average
2	4874.000	50.68	-23.32	74.00	47.44	33.16	4.73	34.65	Peak
3	7311.000	40.13	-13.87	54.00	33.59	36.01	5.47	34.94	Average
4	7311.000	48.67	-25.33	74.00	42.13	36.01	5.47	34.94	Peak
5	9748.000	50.52			40.99	38.42	6.41	35.30	Peak

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

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

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

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

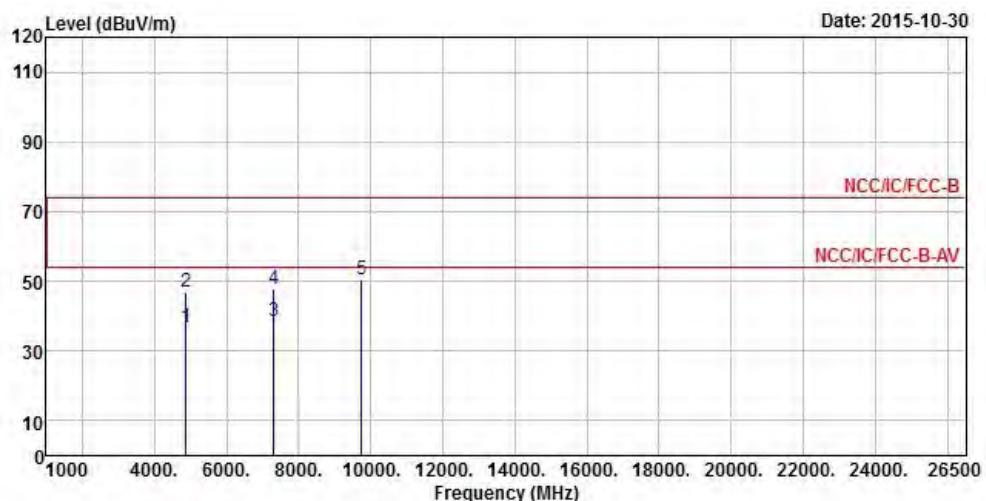
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (108.41 dBuV/m).

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



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11b	Test Freq. (MHz)	2437
N_{TX}	2	Polarization	H



Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark
		Limit	Line	Level	Factor	Loss	Factor	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	36.62	-17.38	54.00	33.38	33.16	4.73	34.65 Average
2	4874.000	46.93	-27.07	74.00	43.69	33.16	4.73	34.65 Peak
3	7311.000	38.45	-15.55	54.00	31.91	36.01	5.47	34.94 Average
4	7311.000	48.03	-25.97	74.00	41.49	36.01	5.47	34.94 Peak
5	9748.000	50.48			40.95	38.42	6.41	35.30 Peak

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

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

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

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

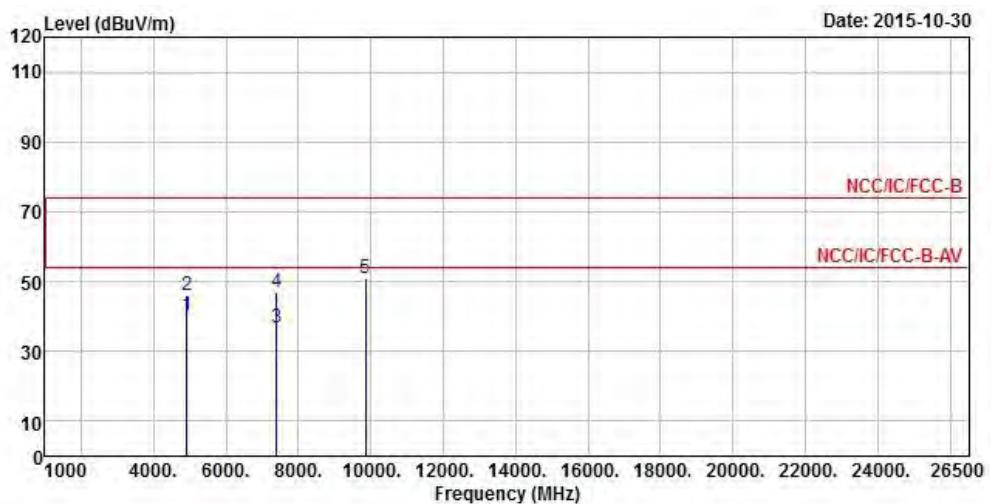
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (108.41 dBuV/m).

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



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11b	Test Freq. (MHz)	2462
N _{TX}	2	Polarization	V



Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark
		Limit	Line	Level	Factor	Loss	Factor	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.000	40.18	-13.82	54.00	36.76	33.26	4.79	34.63 Average
2	4924.000	45.96	-28.04	74.00	42.54	33.26	4.79	34.63 Peak
3	7386.000	36.79	-17.21	54.00	29.95	36.23	5.57	34.96 Average
4	7386.000	46.99	-27.01	74.00	40.15	36.23	5.57	34.96 Peak
5	9848.000	50.72			40.94	38.59	6.50	35.31 Peak

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

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

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

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

Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (103.34 dBuV/m).

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



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11b	Test Freq. (MHz)	2462																																																															
N _{TX}	2	Polarization	H																																																															
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Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

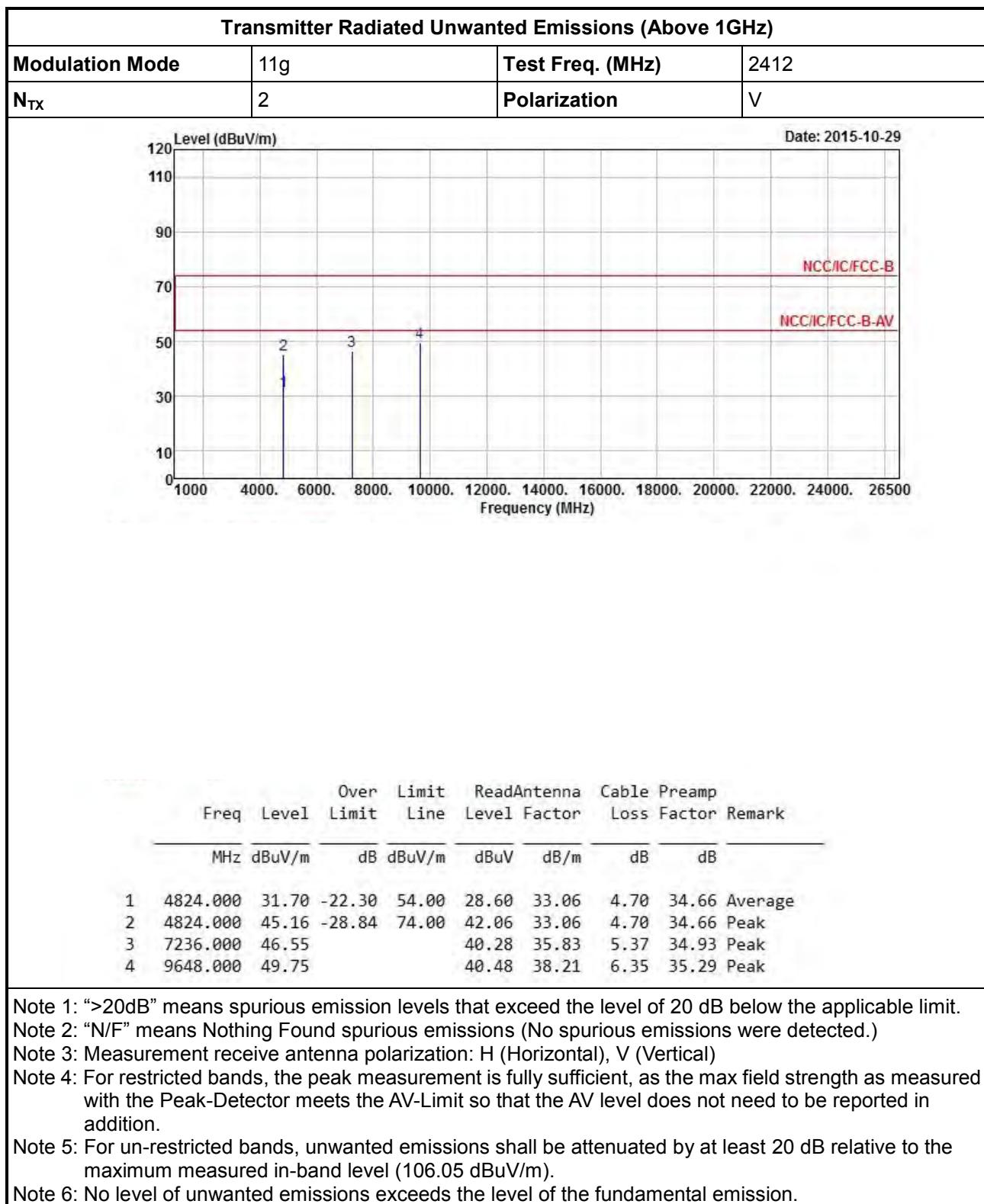
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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

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

Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (103.34 dBuV/m).

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





Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11g	Test Freq. (MHz)	2412		
N_{TX}	2	Polarization	H		
			Date: 2015-10-29		
			NCC/IC/FCC-B		
			NCC/IC/FCC-B-AV		
Freq					
	Level	Over Limit	Line		
MHz	dBuV/m	dB	dBuV/m		
1	4824.000	30.14	-23.86		
2	4824.000	43.36	-30.64		
3	7236.000	46.27			
4	9648.000	50.08			
Read	Antenna	Cable	Preamp		
Level	Factor	Loss	Factor		
		dB	dB		
1	27.04	33.06	4.70	34.66	Average
2	40.26	33.06	4.70	34.66	Peak
3	40.00	35.83	5.37	34.93	Peak
4	40.81	38.21	6.35	35.29	Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (106.05 dBuV/m).
Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.



Transmitter Radiated Unwanted Emissions (Above 1GHz)																																	
Modulation Mode		11g		Test Freq. (MHz)		2437																											
N _{TX}		2		Polarization		V																											
Level (dB _{uV/m})									Date: 2015-10-29																								
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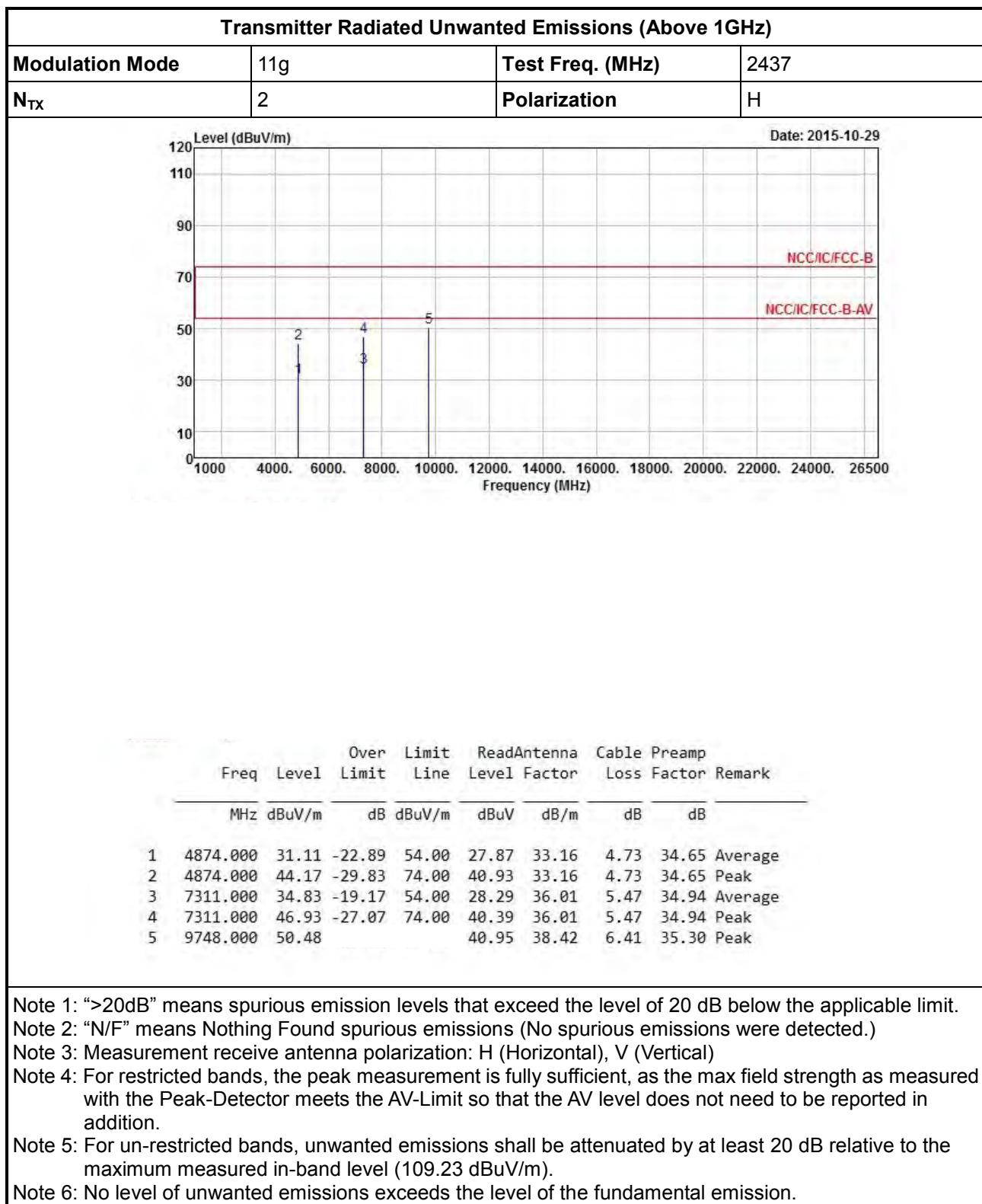
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Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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

Note 5: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (109.23dB_{uV/m}).

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





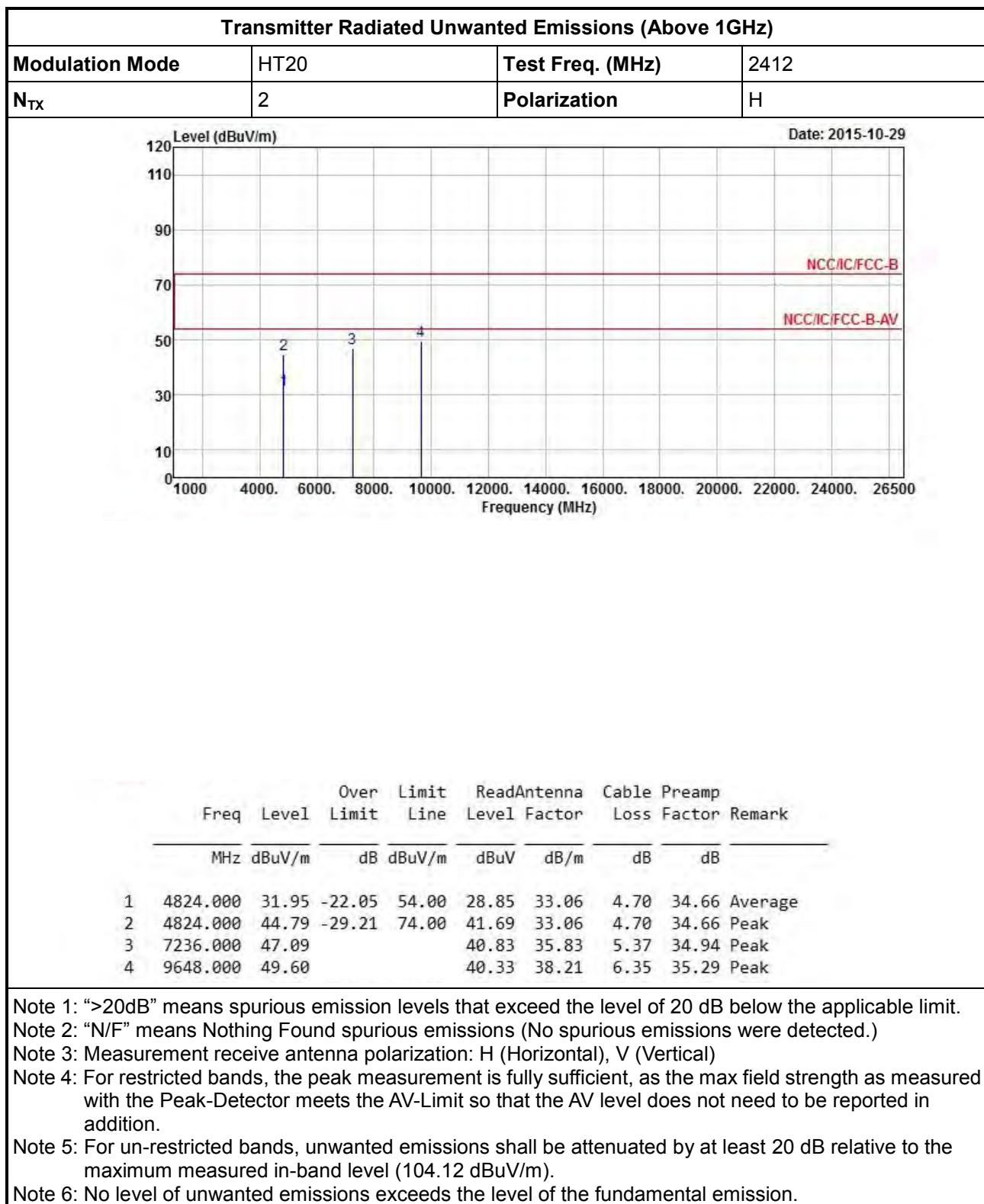
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Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																																							
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N _{TX}		2		Polarization		H																																																																																	
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120	110	100	90	80	70	60	50	40	30	20																																																																													
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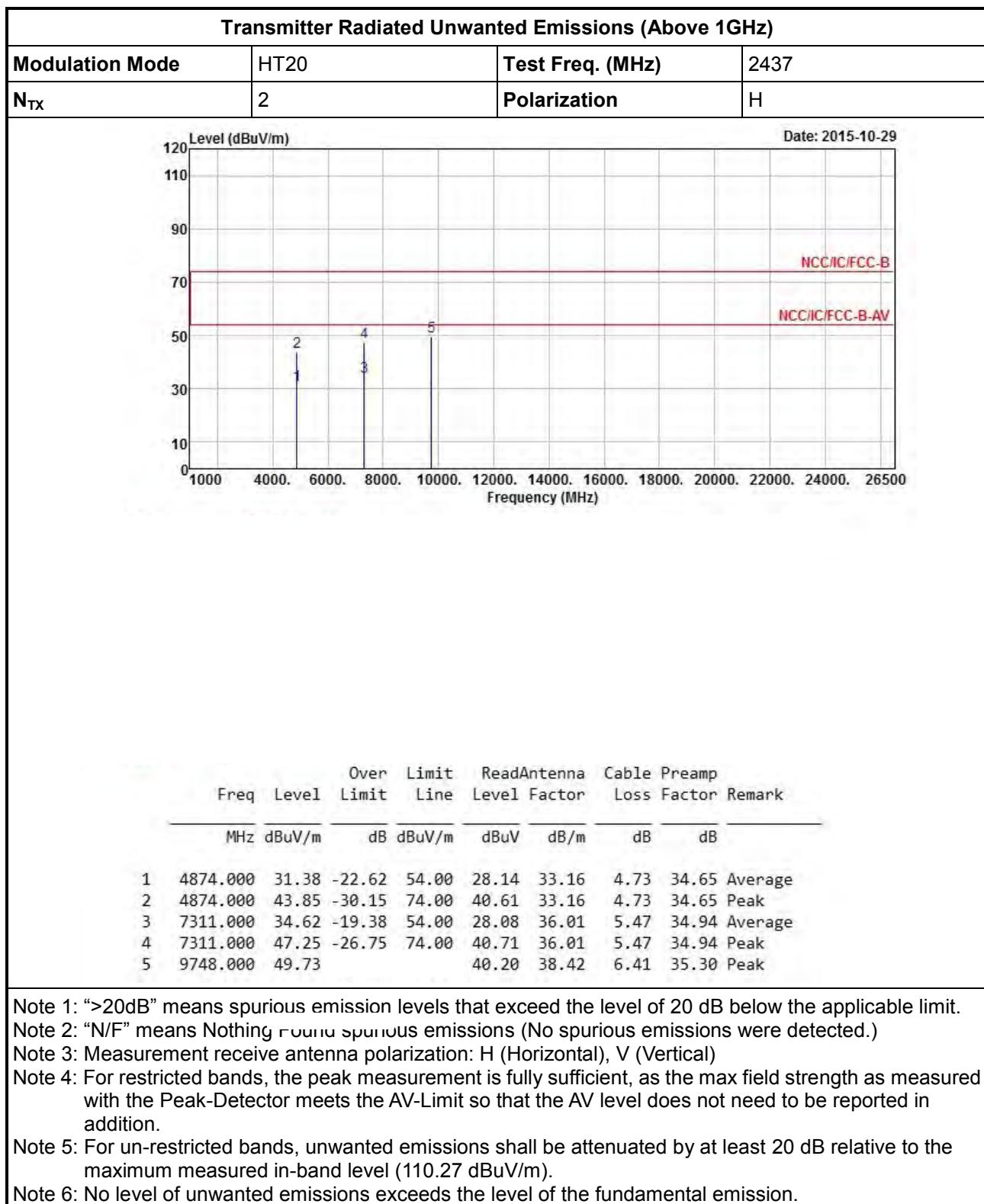


Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																															
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N _{TX}	2		Polarization		V																																																																										
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Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																															
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Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																													
Modulation Mode		HT20			Test Freq. (MHz)		2462																																																																						
N _{TX}	2				Polarization		V																																																																						
Level (dB _u V/m)										Date: 2015-10-29																																																																			
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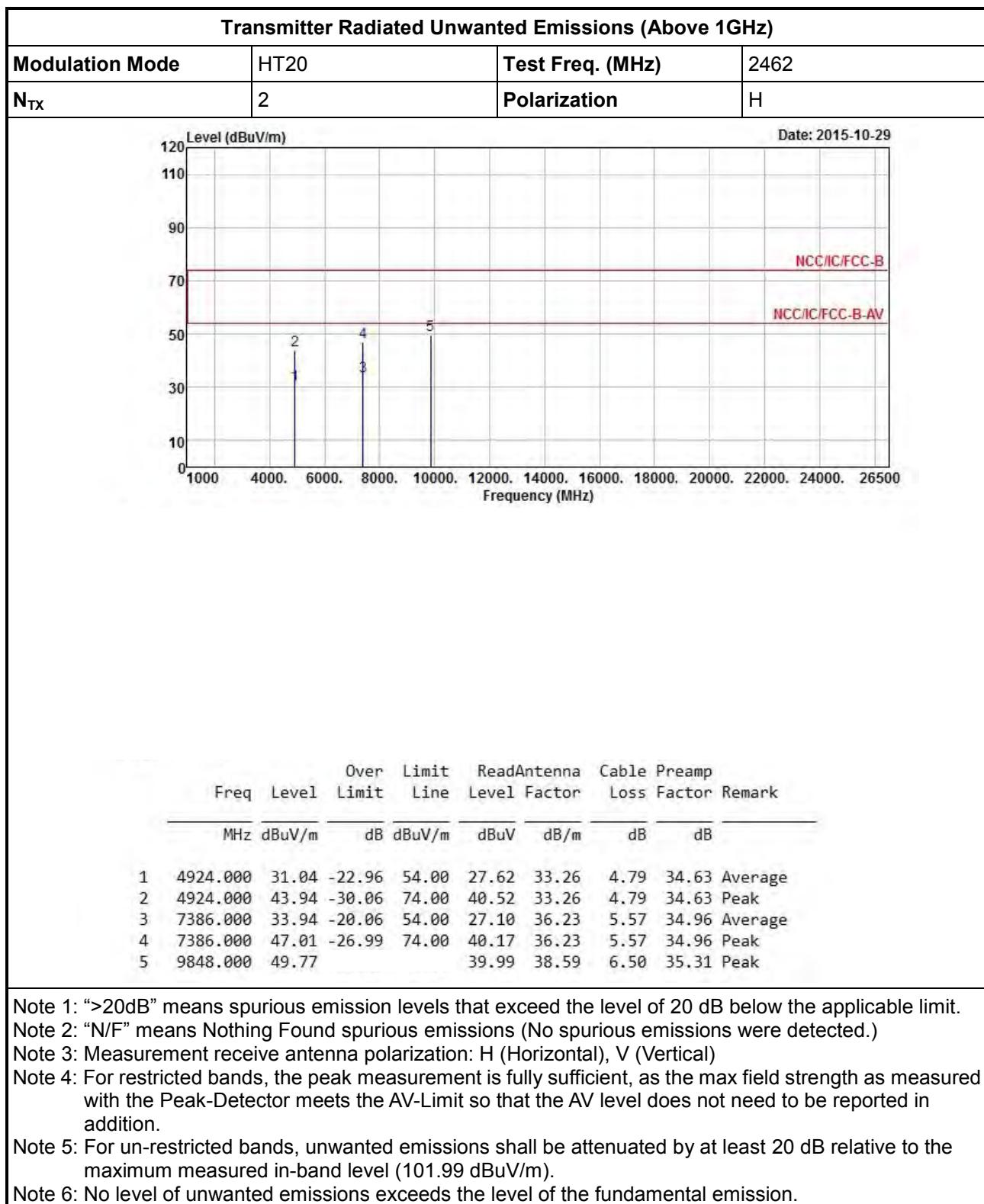
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

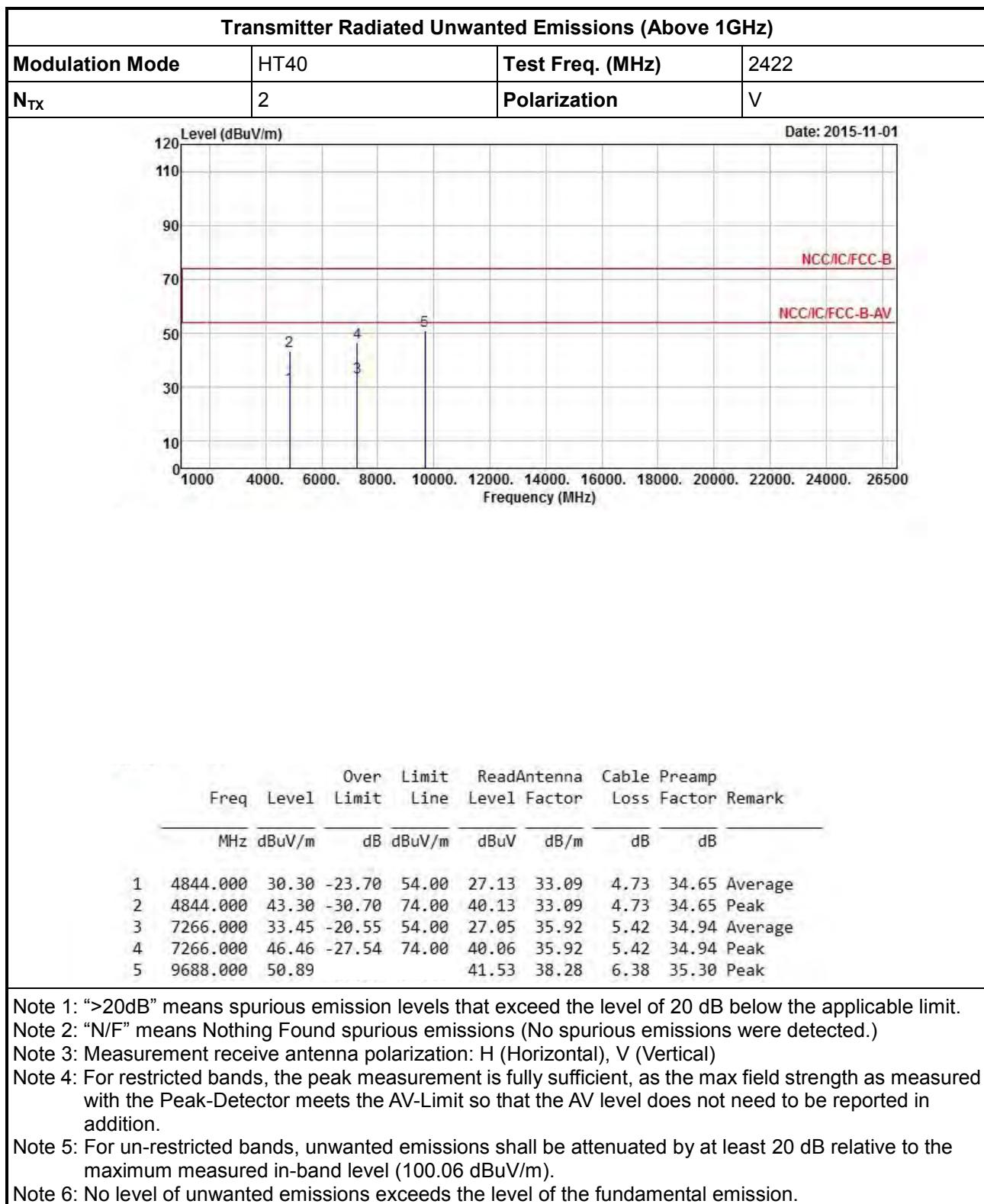
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

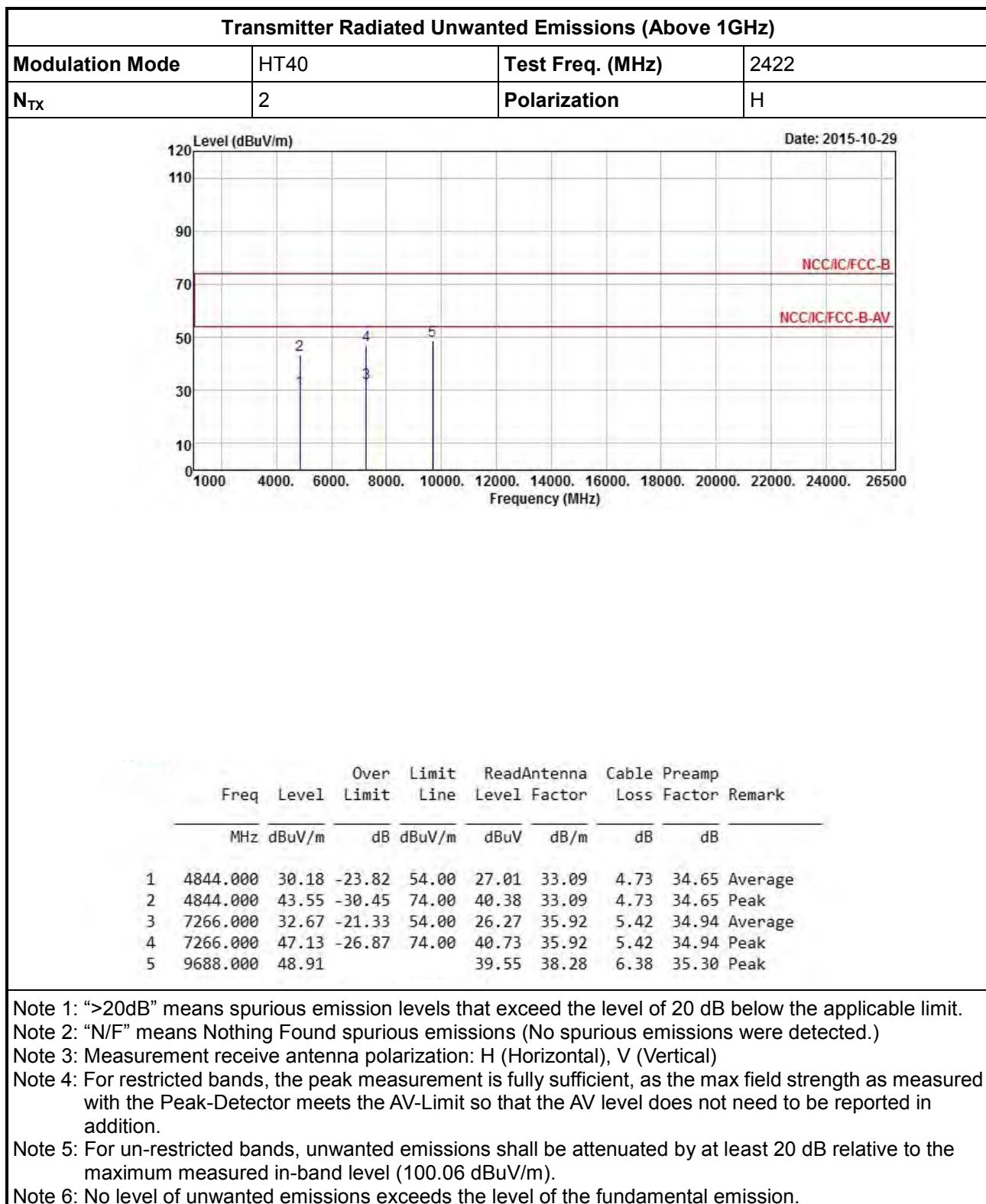
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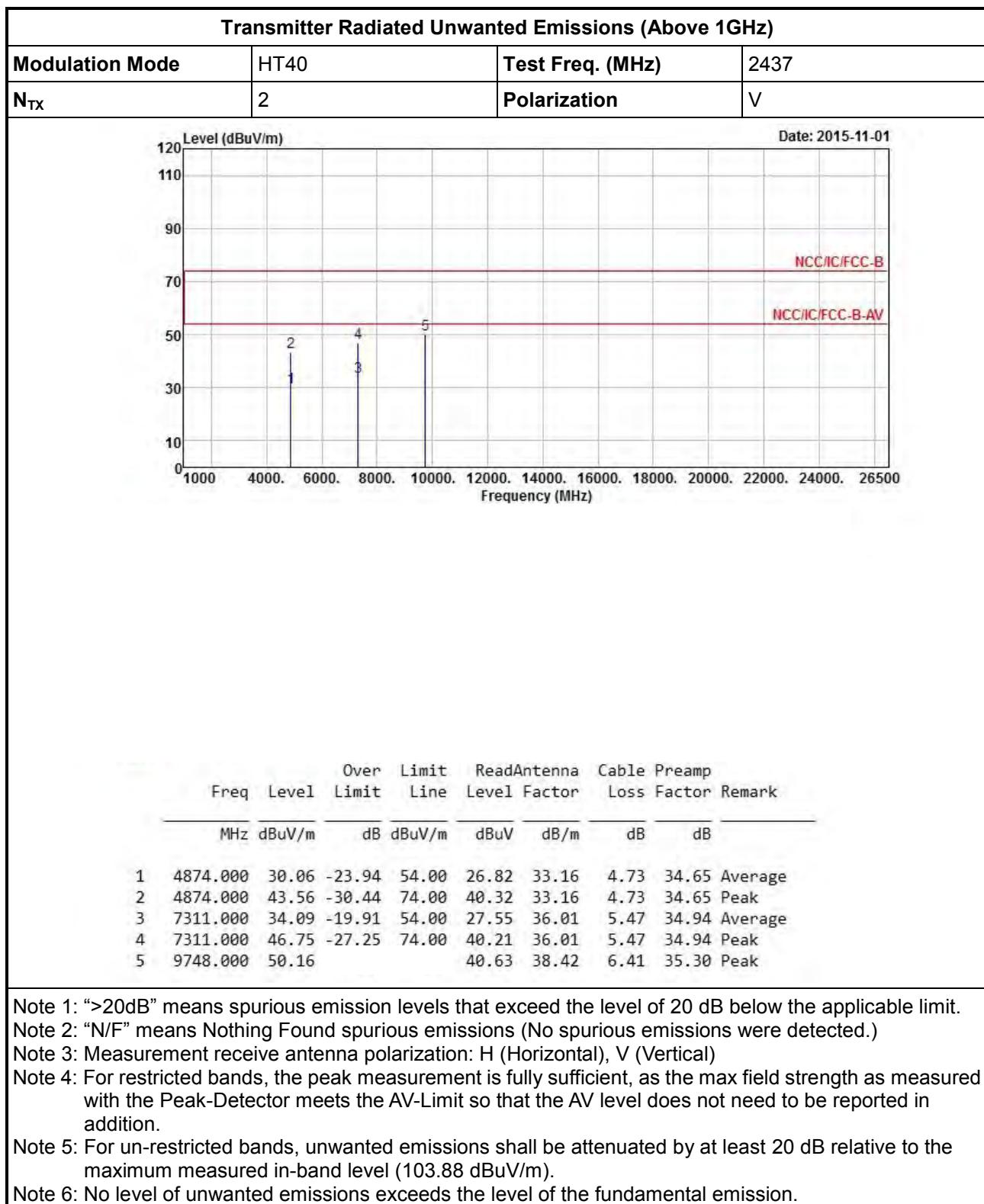
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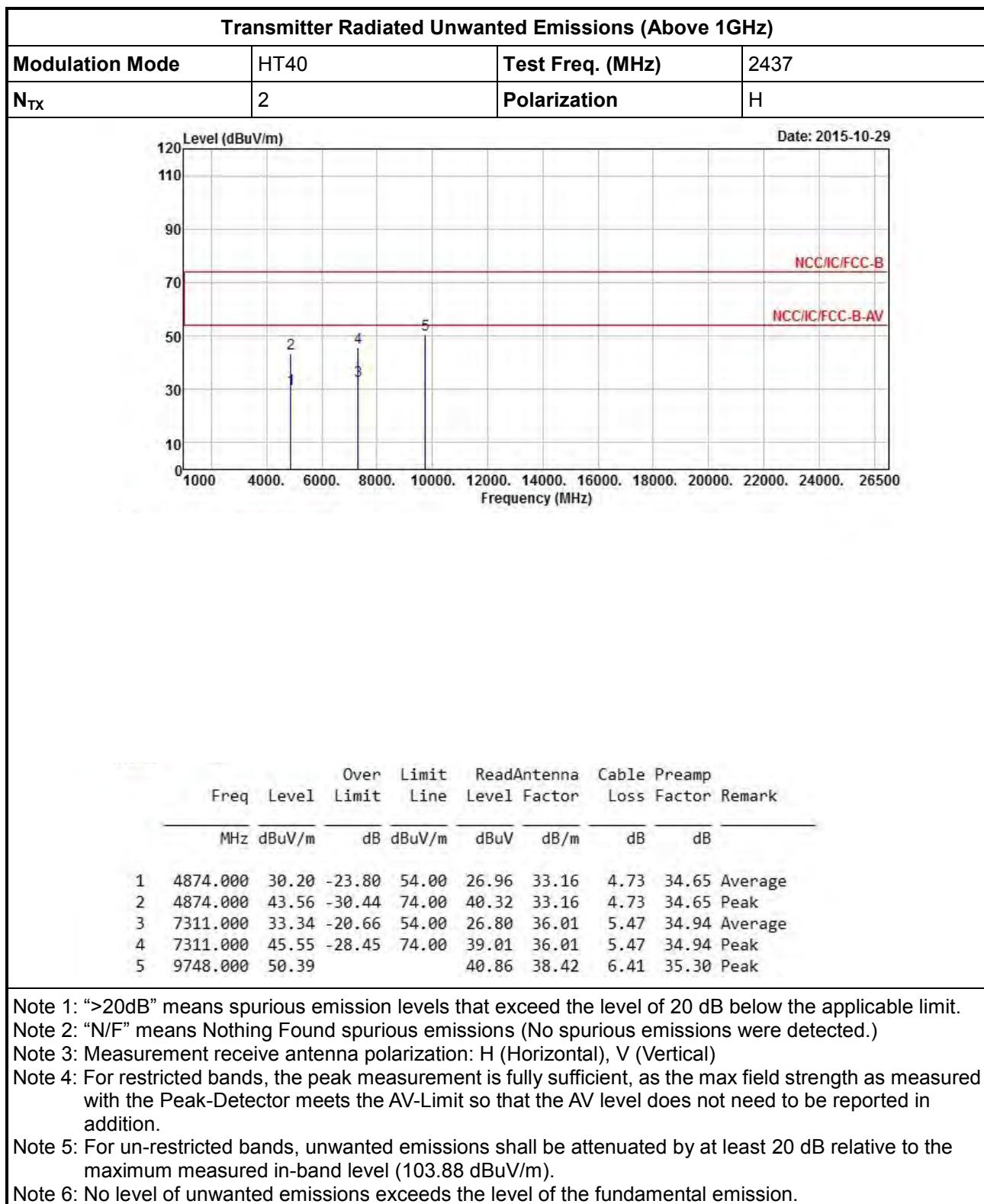
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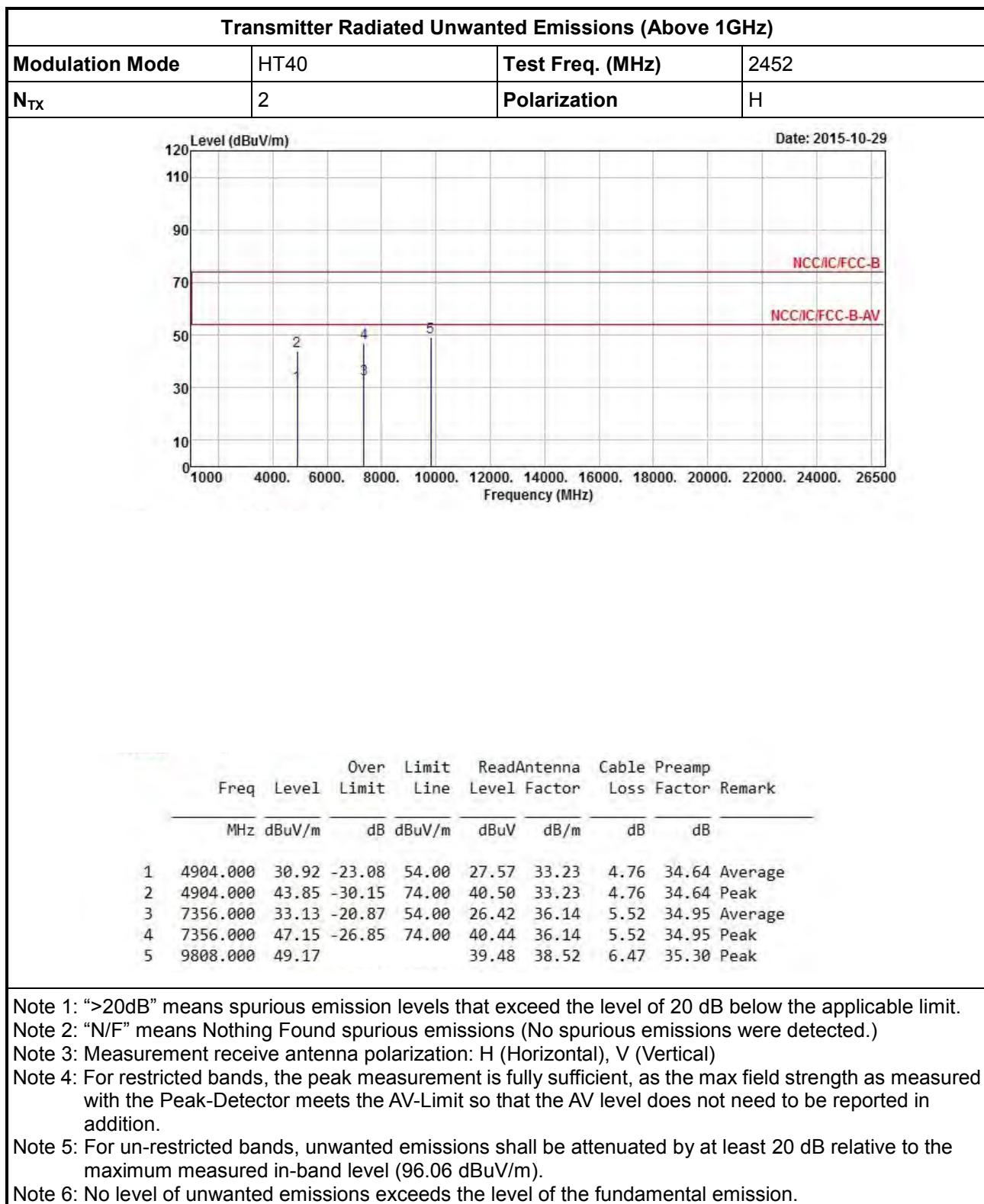








Transmitter Radiated Unwanted Emissions (Above 1GHz)																																																																																						
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4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz ~ 2.75GHz	Apr. 15. 2015	AC Conduction
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	Jan. 22, 2015	AC Conduction
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	Oct. 30, 2015	AC Conduction
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	NCR	AC Conduction

Note: Calibration Interval of instruments listed above is one year. NCR: No Calibration Request.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101500	9KHz~40GHz	May 06, 2015	RF Conducted
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jul. 28, 2015	RF Conducted
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	Feb. 17, 2015	RF Conducted
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	Feb. 17, 2015	RF Conducted
4 Port switch	CEI	P4R-720120	TH01	1GHz~26.5GHz	Jul. 01, 2015	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. 28, 2015	Radiation
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1GHz ~ 6GHz 3m	Dec. 17, 2014	Radiation
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May 11, 2015	Radiation
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Sep. 02, 2015	Radiation
Spectrum	R&S	FSP40	100004	9kHz ~ 40GHz	Apr. 02, 2015	Radiation
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 18, 2015	Radiation
Horn Antenna	ETS • LINDGREN	3115	6741	1GHz ~ 18GHz	Jul. 15, 2015	Radiation
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz ~ 40GHz	Jan. 27, 2015	Radiation
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Oct. 28, 2015	Radiation
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Oct. 29, 2015	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	MITEQ	JS44-18004000-33-8P	1840917	18GHz ~ 40GHz	Jun. 02, 2015	Radiation
Loop Antenna	R&S	HFH2-Z2	100330	9 kHz~30 MHz	Nov.16.2015	Radiation

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