

FCC Test Report

Equipment : N750 Wireless Dual Band Gigabit
ADSL Modem Router

Brand Name : Netgear

Model No. : DGND4000xxxxx

FCC ID : PY312100194

Standard : 47 CFR FCC Part 15.407

Applicant : Netgear Inc.

Manufacturer : 350 East Plumeria Drive San Jose,
CA 95134 U.S.A.

The product sample received on Jul. 12, 2012 and completely tested on Aug. 28, 2012. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 and shown compliance with the applicable technical standards.

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

Reviewed by:

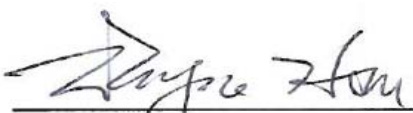

Wayne Hsu / Assistant Manager



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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	9.97MHz: 39.03dBuV (10.97dB) - AV 44.54dBuV (15.46dB) - QP	FCC 15.207	Complied
3.2	15.407(a)	Emission Bandwidth	Bandwidth [MHz] 20MHz: 27.04 40MHz: 40.2	Information only	Complied
3.3	15.407(a)	RF Output Power (Maximum Conducted (Average) Output Power)	Power [dBm] 5180-5240MHz: 15.67 5190-5230MHz: 16.62	Power [dBm] 5180-5240MHz: 17 5190-5230MHz: 17	Complied
3.4	15.407(a)	Peak Power Spectral Density	PPSD [dBm/MHz] 5180-5240MHz: 4.00 5190-5230MHz: 3.00	PPSD [dBm/MHz] 5180-5240MHz: 4 5190-5230MHz: 4	Complied
3.5	15.407(a)	Peak Excursion	10.01 dB	13 dB	Complied
3.6	15.407(b)	Transmitter Radiated Bandedge Emissions	Restricted Bands [dBuV/m at 1m]: 5150MHz 79.49 (Margin 4.05dB) - PK 62.54 (Margin 1.00dB) - AV	Non-Restricted Bands: $\leq$ -27 dBm (68.3dBuV/m@3m) Restricted Bands: FCC 15.209	Complied
3.7	15.407(b)	Transmitter Radiated Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 625.58MHz: 42.79 (Margin 3.21dB) - PK	Non-Restricted Bands: $\leq$ -27 dBm (68.3dBuV/m@3m) Restricted Bands: FCC 15.209	Complied
3.8	15.407(g)	Frequency Stability	1.85 ppm	Signal shall remain in-band	Complied

Revision History

[illegible]

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information				
Frequency Range (MHz)	IEEE Std. 802.11 Protocol	Ch. Frequency (MHz)	Channel Number	RF Output Power (dBm)
5150-5250	a	5180-5240	36-48 [4]	14.93
5150-5250	n (HT20)	5180-5240	36-48 [4]	15.67
5150-5250	n (HT40)	5190-5230	38-46 [2]	16.62
Note 1: IEEE Std. 802.11-2007 modulation consists of IEEE Std. 802.11a-1999.				
Note 2: IEEE Std. 802.11n-2009 modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40.				
Note 3: RF output power specifies that Maximum Conducted (Average) Output Power.				

Transmitter Chains & Receiver Chains Information					
IEEE Std. 802.11 Protocol	Number of Transmit Chains (N _{TX})	Number of Receive Chains (N _{RX})	Correlation Signals with Multiple N _{TX}	99% Emission Bandwidth (MHz)	Co-location
a	1	1	Correlated	17.13	Yes
n (HT20)	3	3	Uncorrelated	17.91	Yes
n (HT40)	3	3	Uncorrelated	36.86	Yes
Note 1: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other. (i.e., EUT has simultaneously co-transmitting that operating 2.4GHz and 5GHz.)					

1.1.2 Product Details

The equipment is N750 Wireless Dual Band Gigabit ADSL2+ Modem Router. There are two types of EUT. One is RJ11 ANNEX A and RJ11 ANNEX B. The only difference is the transformer structure. No impact safety related critical components and constructions.

For more detailed features description, please refer to the manufacturer's specifications or user's manual.

1.1.3 Antenna Information

Antenna Category	
☐	Equipment placed on the market without antennas
☒	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							
Transmit Chains Power Distribution					☒ symmetrical distribution ☐ asymmetrical distribution		
Ant. No.	PL	Ant. Port [Ant No. X connect to Ant. Port Y]	Ant. Cat.	Ant. Type	G _{ANT} (dBi)	DG (dBi) [correlated] N _{TX} = 1	DG (dBi) [uncorrelated] N _{TX} = 3
1	1	1	Integral	PIFA	4.24	4.26	4.25
2	1	2	Integral	PIFA	4.24		
3	1	3	Integral	PIFA	4.26		
☒ The equipment is normally installed and point-to-point or point-to-multipoint systems: Ant. No. <u>1, 2, 3</u>							
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 (DG) = G_{ANT} + 10 log(N) dBi All transmit signals are completely uncorrelated, Directional Gain (DG) = 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 (DG) = $10 \log[(10^{G_{1/20}} + 10^{G_{2/20}} + \dots + 10^{G_{N/20}})^2 / N]$ dBi All transmit signals are completely uncorrelated, Directional Gain (DG) = $10 \log[(10^{G_{1/10}} + 10^{G_{2/10}} + \dots + 10^{G_{N/10}}) / N]$ dBi							

1.1.4 Type of EUT

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

1.1.5 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle		
☐ Operated normally mode for worst duty cycle		
☒ Operated test mode for worst duty cycle		
Test Signal Duty Cycle (x)	Power Duty Factor [dB] – (10 log 1/x)	Voltage Duty Factor [dB] – (20 log 1/x)
☒ 100% - IEEE 802.11a	0.00	0.00
☒ 100% - IEEE 802.11n (HT20)	0.00	0.00
☒ 100% - IEEE 802.11n (HT40)	0.00	0.00

1.1.6 EUT Operational Condition

Supply Voltage	☒ AC mains	☐ DC	
Type of DC Source	☐ Internal DC supply	☒ External DC adapter	☐ Battery

1.2 Accessories

Accessories Information				
AC Adapter	Brand Name	NETGEAR	Model Name	AD8180LF
	Power Rating	I/P: 100-240Vac, 50/60Hz 1.5A; O/P: 12.0Vdc 5A		

1.3 Support Equipment

Support Equipment - Conducted Emissions				
No.	Equipment	Brand Name	Model Name	Serial No.
1	Notebook	DELL	E5500	DoC

Support Equipment - Radiated Emissions				
No.	Equipment	Brand Name	Model Name	Serial No.
1	Notebook	DELL	E5520	DoC

1.4 Testing Applied Standards

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

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2009
- ♦ FCC KDB 789033 - Guidance for Performing Compliance Measurements on UNII
- ♦ FCC KDB 662911 - Emissions Testing of Transmitters with Multiple Outputs
- ♦ FCC KDB 412172 - Guidelines for Determining the ERP and EIRP

1.5 Testing Location Information

Testing Location				
☒	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C		
		TEL : 886-3-327-3456 FAX : 886-3-327-0973		
Test Condition		Test Site No.	Test Engineer	Test Date
Conducted Emission		CO04-HY	Alan	27-Jul-12
RF Conducted		TH01-HY	Ian	10-Aug-12
Radiated Emission		03CH02-HY	Hsiao	08-Aug-12

1.6 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	Limit
AC power-line conducted emissions		±2.26 dB	N/A
Emission bandwidth, 6dB bandwidth		±1.42 %	N/A
RF output power, conducted		±0.63 dB	N/A
Power density, conducted		±0.81 dB	N/A
Unwanted emissions, conducted	30 – 1000 MHz	±0.51 dB	N/A
	1 – 18 GHz	±0.67 dB	N/A
	18 – 40 GHz	±0.83 dB	N/A
	40 – 200 GHz	N/A	N/A
All emissions, radiated	30 – 1000 MHz	± 2.54 dB	N/A
	1 – 18 GHz	±3.59 dB	N/A
	18 – 40 GHz	±3.82 dB	N/A
	40 – 200 GHz	N/A	N/A
Temperature		±0.8 °C	N/A
Humidity		±3 %	N/A
DC and low frequency voltages		±3 %	N/A
Time		±1.42 %	N/A
Duty Cycle		±1.42 %	N/A

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing						
Power Level		1				
IEEE 802.11 Protocol	Number of Transmit Chains (N _{TX})	Data Rate / MCS	Worst Data Rate / MCS	Worst Modulation Mode	RF Output Power (dBm)	Peak Power Spectral Density (dBm/MHz)
a	1	6-54 Mbps	6 Mbps	11A5.2G-20M	14.93	3.90
n (HT20)	3	MCS 0-23	MCS 16	11N5.2G-20M	15.67	4.00
n (HT40)	3	MCS 0-23	MCS 16	11N5.2G-40M	16.62	3.00
Note 1: IEEE Std. 802.11-2007 modulation consists of IEEE Std. 802.11a-1999. Note 2: IEEE Std. 802.11n-2009 modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40. Worst modulation mode of Guard Interval (GI) is 400ns. Note 3: Modulation modes consist of 11A5.2G-20M, 11A5.3G-20M, 11A5.6G-20M, 11N5.2G-20M, 11N5.3G-20M, 11N5.6G-20M, 11N5.2G-40M, 11N5.3G-40M, 11N5.6G-40M: 11A: IEEE 802.11a, 11N: IEEE 802.11n. 5.2G: 5.15-5.25 GHz band, 5.3G: 5.25-5.35 GHz band, 5.6G: 5.47-5.725 GHz band. 20M/40M: Channel Bandwidth 20MHz/40MHz Note 4: RF output power specifies that Maximum Conducted (Average) Output Power.						

2.2 Test Channel Frequencies Configuration

Test Channel Frequencies Configuration		
IEEE 802.11 Protocol	Worst Modulation Mode	Test Channel Frequencies (MHz) – FX (Frequencies Abbreviations)
a	11A5.2G-20M	5180-(F1), 5200-(F2), 5240-(F3)
n (HT20)	11N5.2G-20M	5180-(F1), 5200-(F2), 5240-(F3)
n (HT40)	11N5.2G-40M	5190-(F1'), 5230-(F2')
Note 1: Modulation modes consist of 11A5.2G-20M, 11A5.3G-20M, 11A5.6G-20M, 11N5.2G-20M, 11N5.3G-20M, 11N5.6G-20M, 11N5.2G-40M, 11N5.3G-40M, 11N5.6G-40M: 11A: IEEE 802.11a, 11N: IEEE 802.11n. 5.2G: 5.15-5.25 GHz band, 5.3G: 5.25-5.35 GHz band, 5.6G: 5.47-5.725 GHz band. 20M/40M: Channel Bandwidth 20MHz/40MHz		

2.3 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter					
Test Software Version		DOS			
The Worst Modulation Mode	Number of Transmit Chains (N _{TX})	Frequency (MHz)	Power Setting	Worst Data Rate / MCS	RF Output Power (dBm)
11A5.2G-20M	1	5180	0D,12	6 Mbps	72
11A5.2G-20M	1	5200	0C,12	6 Mbps	78
11A5.2G-20M	1	5240	0B,10	6 Mbps	80
11N5.2G-20M	3	5180	0C,13	MCS 16	40
11N5.2G-20M	3	5200	0C,12	MCS 16	40
11N5.2G-20M	3	5240	0A,10	MCS 16	40
11N5.2G-40M	3	5190	0C,12	MCS 16	42
11N5.2G-40M	3	5230	15,17	MCS 16	43
Note 1: Modulation modes consist of 11A5.2G-20M, 11A5.3G-20M, 11A5.6G-20M, 11N5.2G-20M, 11N5.3G-20M, 11N5.6G-20M, 11N5.2G-40M, 11N5.3G-40M, 11N5.6G-40M: 11A: IEEE 802.11a, 11N: IEEE 802.11n. 5.2G: 5.15-5.25 GHz band, 5.3G: 5.25-5.35 GHz band, 5.6G: 5.47-5.725 GHz band. 20M/40M: Channel Bandwidth 20MHz/40MHz					

2.4 The Worst Case Measurement Configuration

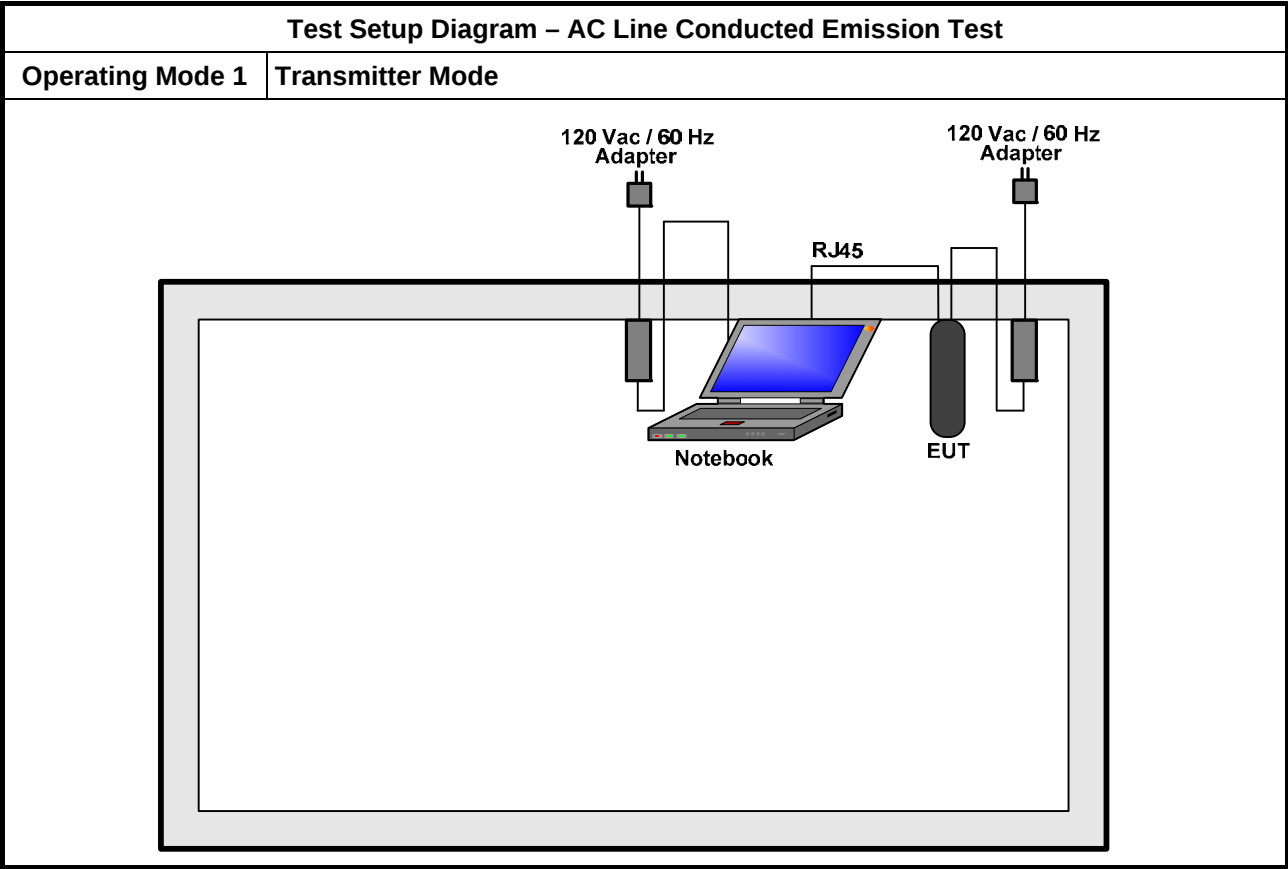
The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	Transmitter Mode

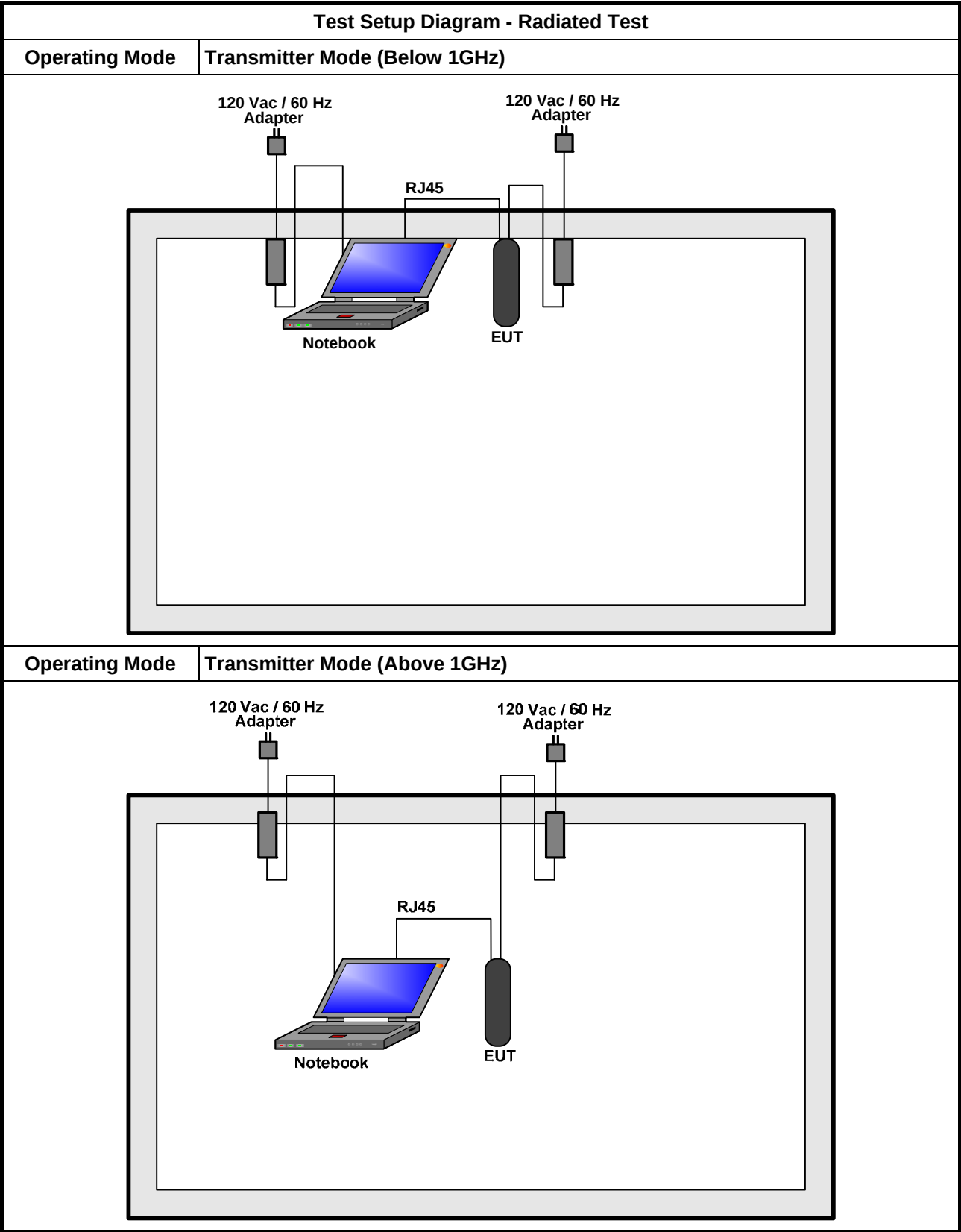
The Worst Case Mode for Following Conformance Tests			
Tests Item	RF Output Power Peak Power Spectral Density Emission Bandwidth Peak Excursion		
Test Condition	Conducted measurement at transmit chains		
Worst Modulation Mode	Number of Transmit Chains (N_{TX})	Worst Data Rate / MCS	Test Frequency
11A5.2G-20M	1	6 Mbps	F1, F2, F3
11N5.2G-20M	3	MCS 16	F1, F2, F3
11N5.2G-40M	3	MCS 16	F1', F2'

The Worst Case Mode for Following Conformance Tests			
Tests Item	Transmitter Radiated Bandedge Emissions		
Test Condition	Radiated measurement		
Worst Modulation Mode	Number of Transmit Chains (N_{TX})	Worst Data Rate / MCS	Test Frequency
11A5.2G-20M	1	6 Mbps	F1
11A5.2G-20M	1	6 Mbps	F3
11N5.2G-20M	3	MCS 16	F1
11N5.2G-20M	3	MCS 16	F3
11N5.2G-40M	3	MCS 16	F1'
11N5.2G-40M	3	MCS 16	F2'

The Worst Case Mode for Following Conformance Tests				
Tests Item	Transmitter Radiated Unwanted Emissions			
Test Condition	Radiated measurement			
User Position	☒ EUT will be placed in fixed position.			
	☐ EUT will be placed in mobile position and operating multiple positions. EUT shall be performed two or three orthogonal planes.			
	☐ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed two or three orthogonal planes.			
Operating Mode < 1GHz	☒ 1. Transmitter Mode			
Worst Modulation Mode	Number of Transmit Chains (N_{TX})	Worst Data Rate / MCS	Test Frequency	Worst Orthogonal Planes of EUT
11A5.2G-20M	1	6 Mbps	F1, F2, F3	Y
11N5.2G-20M	3	MCS 16	F1, F2, F3	Y
11N5.2G-40M	3	MCS 16	F1', F2'	Y
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane	
				

2.5 Test Setup Diagram





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.

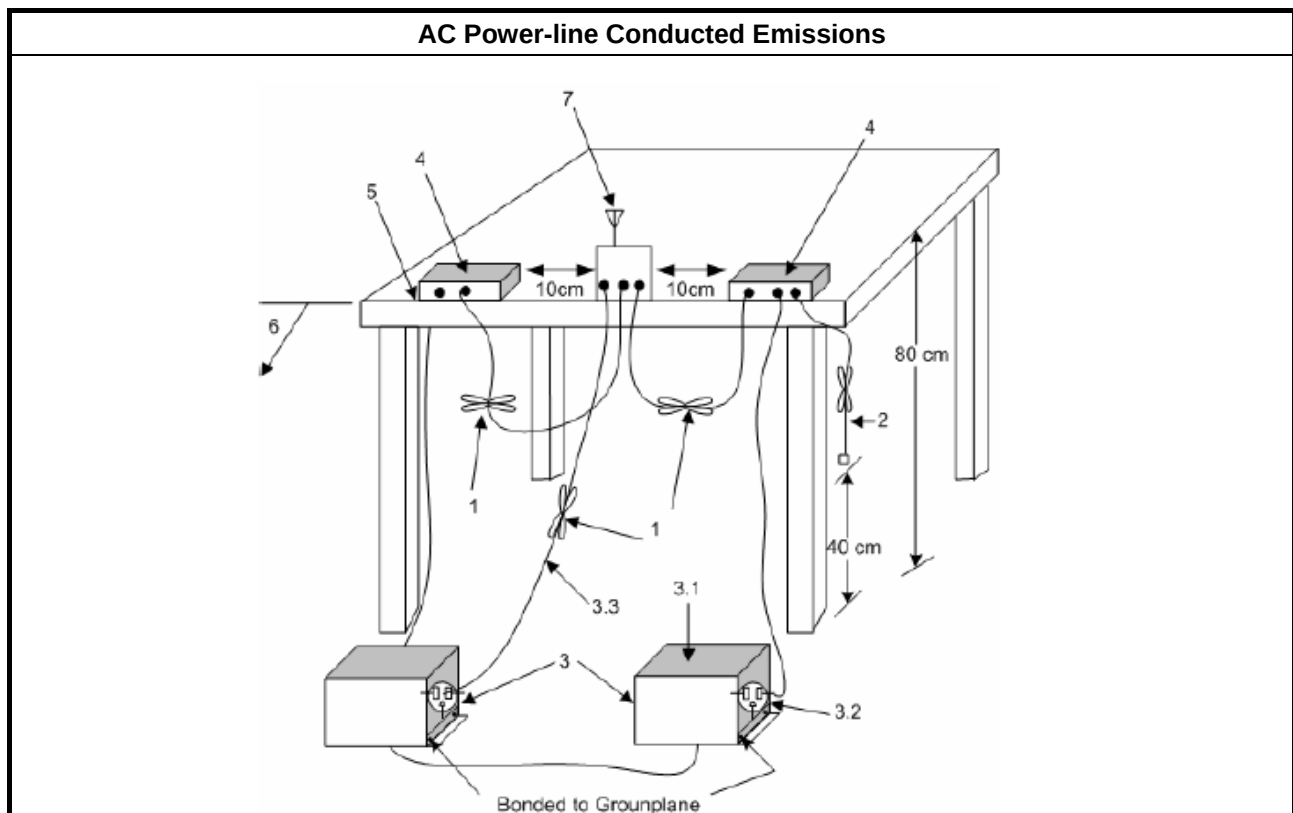
3.1.2 Measuring Instruments

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

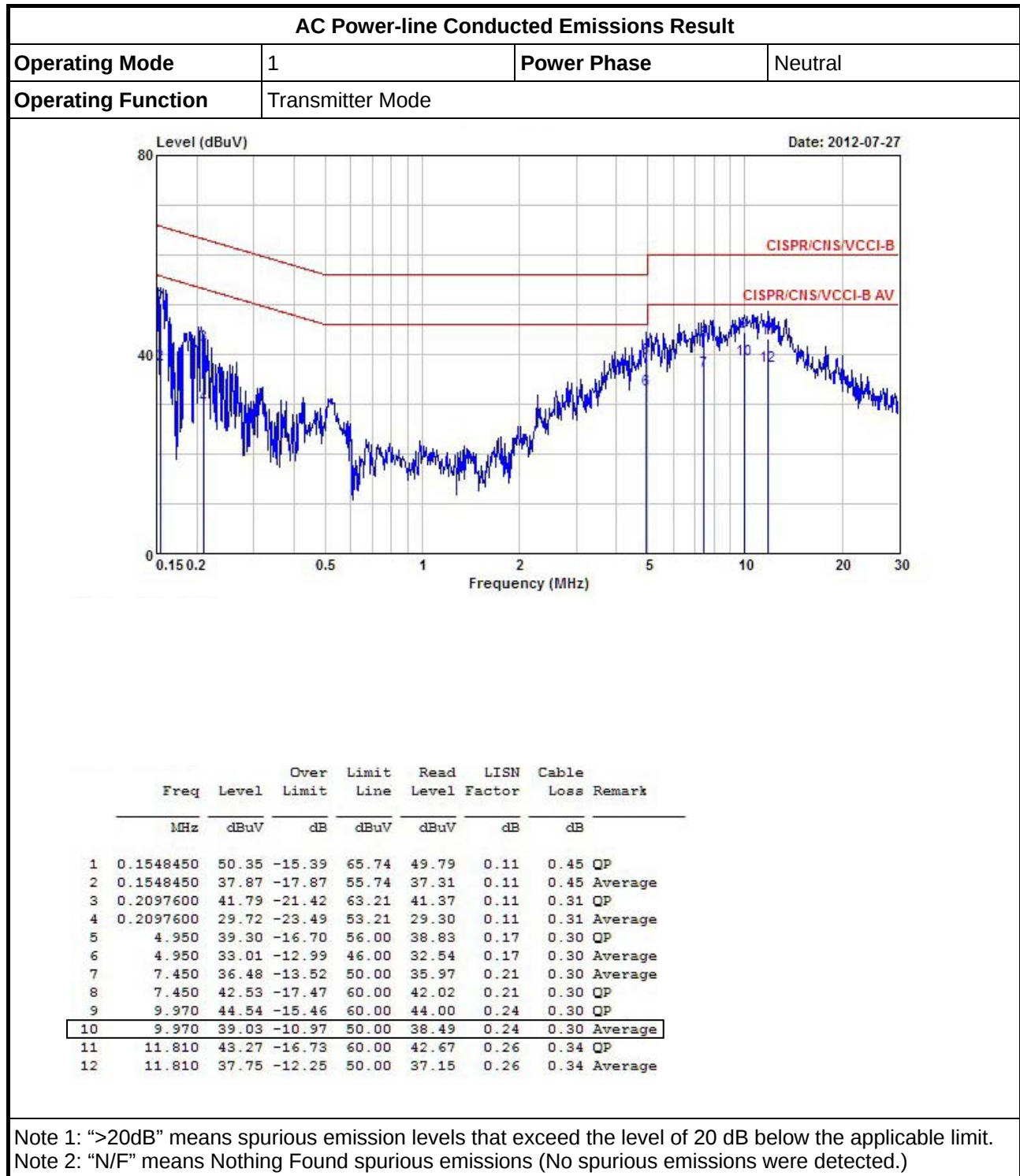
3.1.3 Test Procedures

Test Method
☒ 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



AC Power-line Conducted Emissions Result

Operating Mode

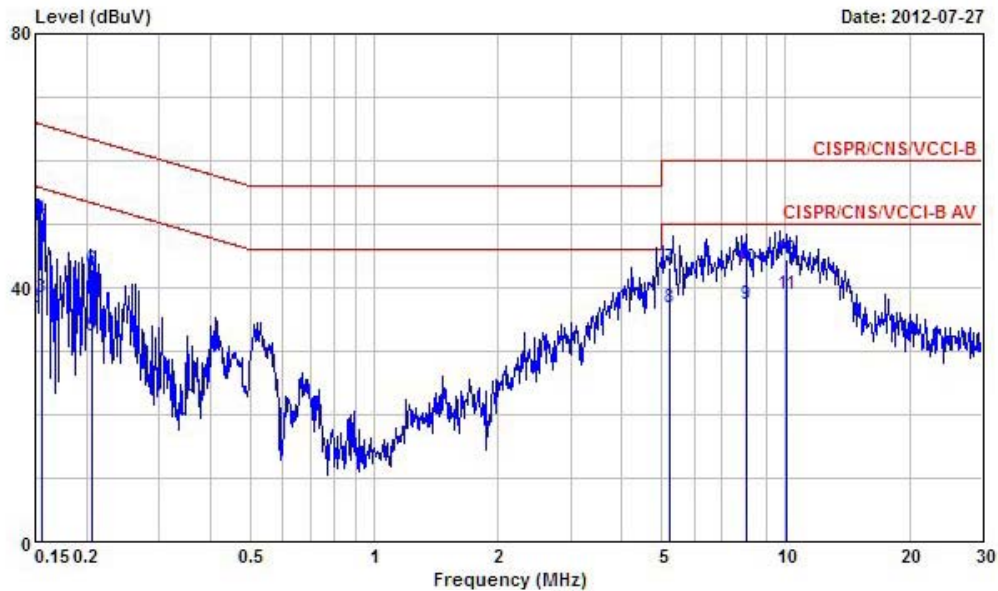
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Power Phase

Line

Operating Function

Transmitter Mode



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1500000	49.78	-16.22	66.00	49.08	0.24	0.46	QP
2	0.1500000	36.95	-19.05	56.00	36.25	0.24	0.46	Average
3	0.1564120	38.35	-17.30	55.65	37.67	0.24	0.44	Average
4	0.1564120	50.83	-14.82	65.65	50.15	0.24	0.44	QP
5	0.2062960	32.41	-20.94	53.35	31.88	0.23	0.30	Average
6	0.2062960	43.02	-20.33	63.35	42.49	0.23	0.30	QP
7	5.235	43.26	-16.74	60.00	42.63	0.33	0.30	QP
8	5.235	36.92	-13.08	50.00	36.29	0.33	0.30	Average
9	8.020	37.43	-12.57	50.00	36.74	0.39	0.30	Average
10	8.020	43.29	-16.71	60.00	42.60	0.39	0.30	QP
11	10.070	38.88	-11.12	50.00	38.16	0.42	0.30	Average
12	10.070	44.46	-15.54	60.00	43.74	0.42	0.30	QP

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.)

3.2 Emission Bandwidth

3.2.1 Emission Bandwidth (EBW) Limit

Emission Bandwidth (EBW) Limit	
UNII Devices	
☒	For the 5.15-5.25 GHz band, the maximum conducted output power shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz.
☒	For the 5.25-5.35 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz.
☒	For the 5.47-5.725 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz.
☐	For the 5.725-5.825 GHz band, the maximum conducted output power shall not exceed the lesser of 1 W or $17 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz.
LE-LAN Devices	
☒	For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
☒	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
☒	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
☐	For the 5.725-5.825 GHz band, the maximum e.i.r.p. shall not exceed 4.0 W or $23 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

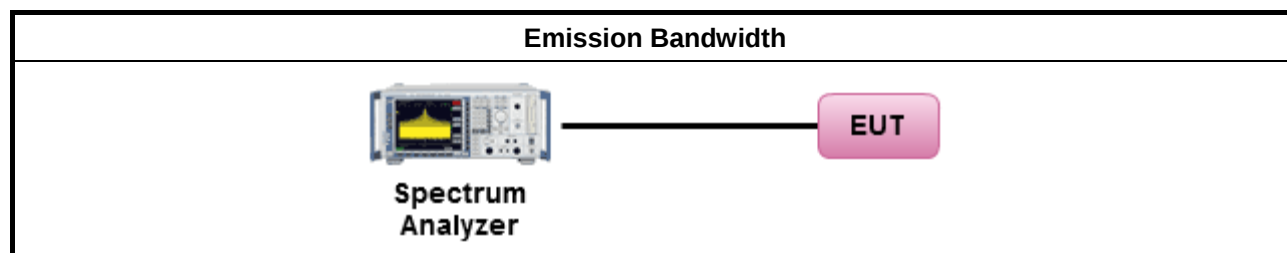
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method	
☒	For the emission bandwidth shall be measured using one of the options below:
☒	Refer as FCC KDB 789033, clause D for EBW measurement.
☐	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
☐	Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.
☒	For conducted measurement.
☒	For conducted measurements on devices with multiple transmit chains using options given below:
☐	Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
☒	Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.
☐	Option 3: A power splitter/combiner shall be used to combine all the transmit chains (antenna outputs) into a single test point and record a single test point EBW.
☐	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.

3.2.4 Test Setup



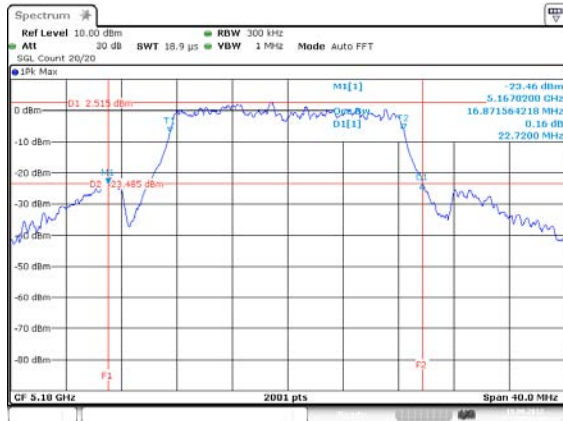
3.2.5 Test Result of Emission Bandwidth

UNII Emission Bandwidth Result								
Modulation Mode	N _{TX}	Freq. (MHz)	Emission Bandwidth (MHz)					
			26dB Bandwidth				Conducted Power Limit (dBm)	
			Chain-Port 1	Chain-Port 2	Chain-Port 3	-	Calculation Power Limit	Final Power Limit
11A5.2G-20M	1	5180	16.87	-	-	-	16.3	16.3
11A5.2G-20M	1	5200	17.13	-	-	-	16.3	16.3
11A5.2G-20M	1	5240	17.05	-	-	-	16.3	16.3
11N5.2G-20M	3	5180	17.91	17.73	17.91	-	16.5	16.5
11N5.2G-20M	3	5200	17.85	17.81	17.89	-	16.5	16.5
11N5.2G-20M	3	5240	17.75	17.85	17.75	-	16.5	16.5
11N5.2G-40M	3	5190	36.86	36.46	36.50	-	19.6	17.0
11N5.2G-40M	3	5230	36.18	36.34	36.42	-	19.6	17.0
Result			Complied					
Note 1: N _{TX} = Number of Transmit Chains								

LE-LAN Emission Bandwidth Result								
Modulation Mode	N _{TX}	Freq. (MHz)	Emission Bandwidth (MHz)					
			99% Bandwidth				e.i.r.p. Power Limit (dBm)	
			Chain-Port 1	Chain-Port 2	Chain-Port 3	-	Calculation Power Limit	Final Power Limit
11A5.2G-20M	1	5180	22.72	-	-	-	17.6	17.0
11A5.2G-20M	1	5200	23.56	-	-	-	17.7	17.0
11A5.2G-20M	1	5240	27.04	-	-	-	18.3	17.0
11N5.2G-20M	3	5180	23.46	19.96	22.74	-	17.0	17.0
11N5.2G-20M	3	5200	20.08	26.02	25.98	-	17.0	17.0
11N5.2G-20M	3	5240	23.62	26.68	22.88	-	17.6	17.0
11N5.2G-40M	3	5190	40.20	39.16	39.72	-	19.9	17.0
11N5.2G-40M	3	5230	38.88	38.84	39.08	-	19.9	17.0
Result			Complied					
Note 1: N _{TX} = Number of Transmit Chains								

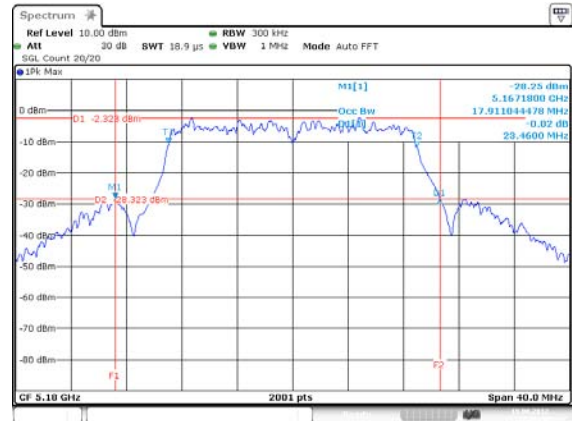
Emission Bandwidth Plots

11A5.2G-20M – F1 [Port 1]



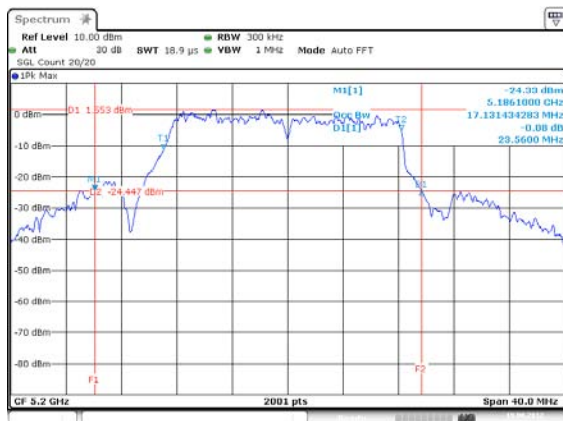
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11N5.2G-20M – F1 [Port 2]



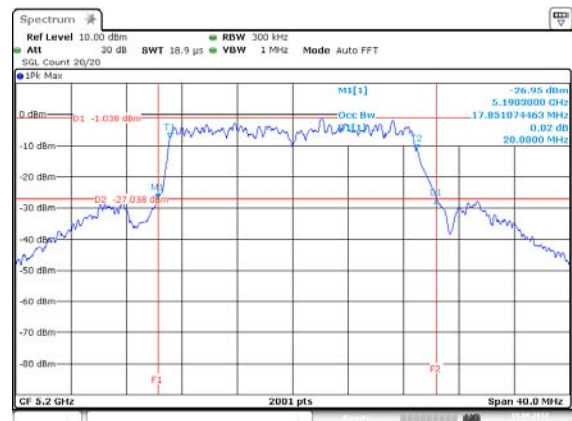
Date: 19.AUG.2012 17:13:46

11A5.2G-20M – F2 [Port 1]



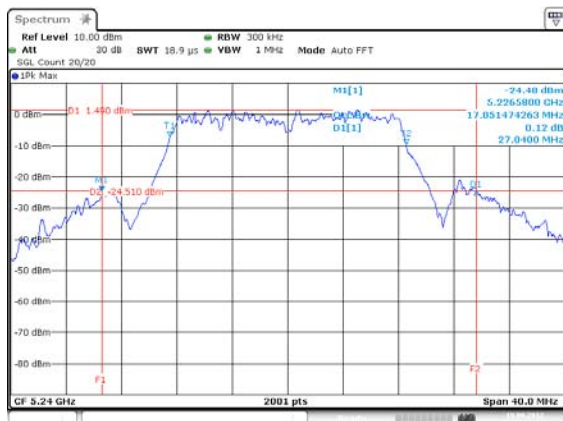
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11N5.2G-20M – F2 [Port 2]



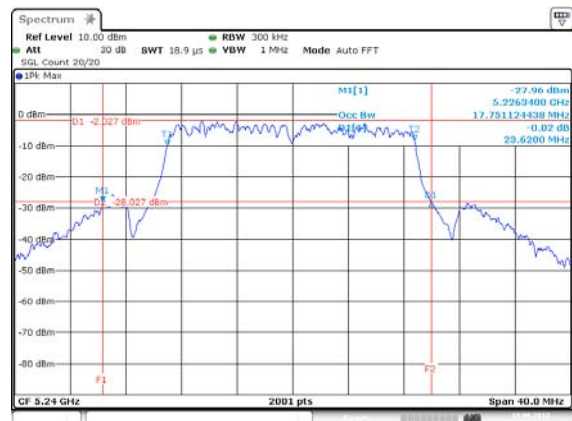
Date: 19.AUG.2012 17:17:03

11A5.2G-20M – F3 [Port 1]



Date: 19.AUG.2012 17:02:53

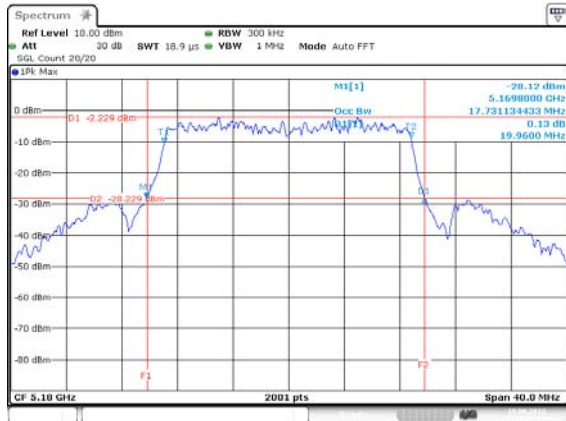
11N5.2G-20M – F3 [Port 2]



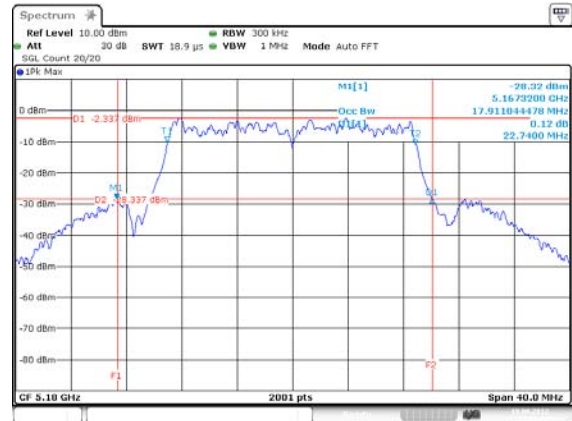
Date: 19.AUG.2012 17:20:44

Emission Bandwidth Plots

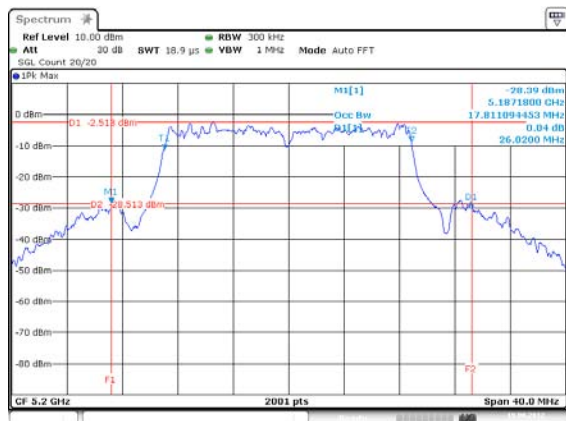
11N5.2G-20M – F1 [Port 2]



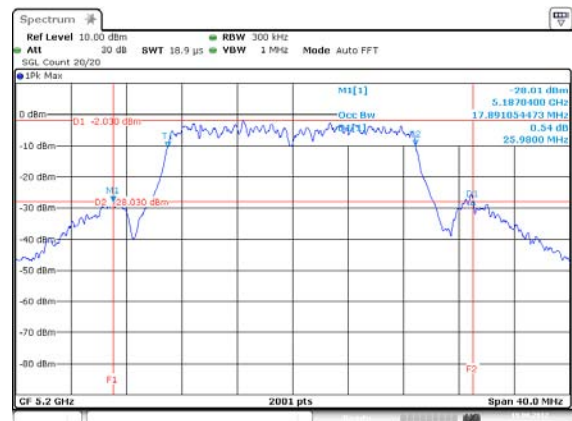
11N5.2G-20M – F1 [Port 3]



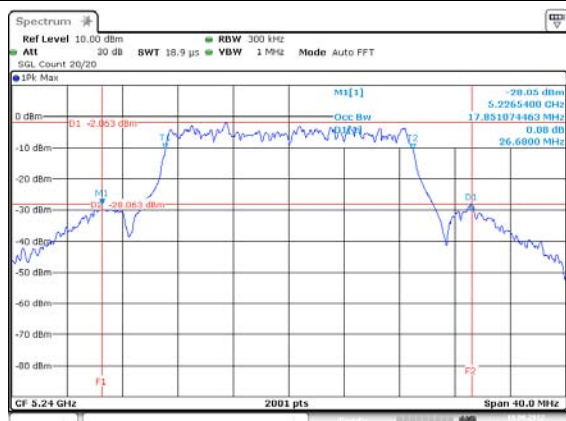
11N5.2G-20M – F2 [Port 2]



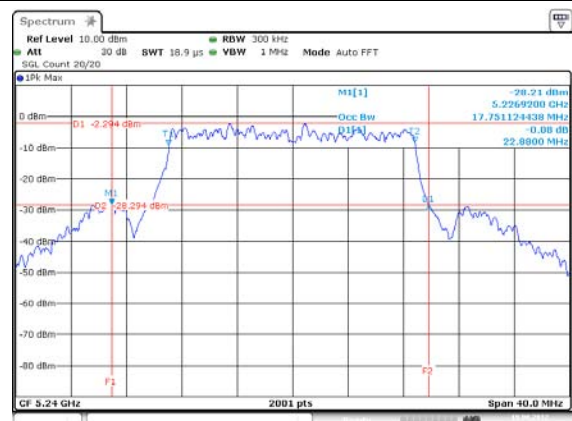
11N5.2G-20M – F2 [Port 3]



11N5.2G-20M – F3 [Port 2]

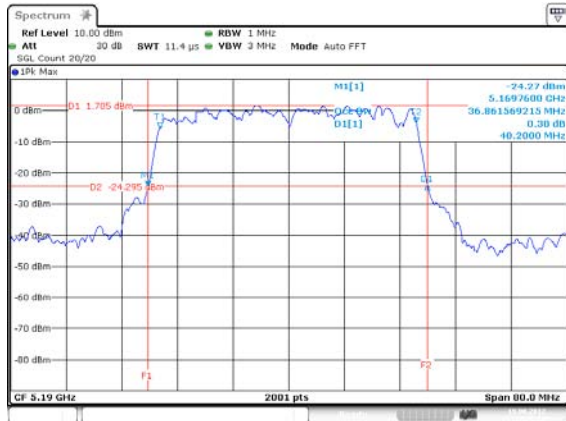


11N5.2G-20M – F3 [Port 3]



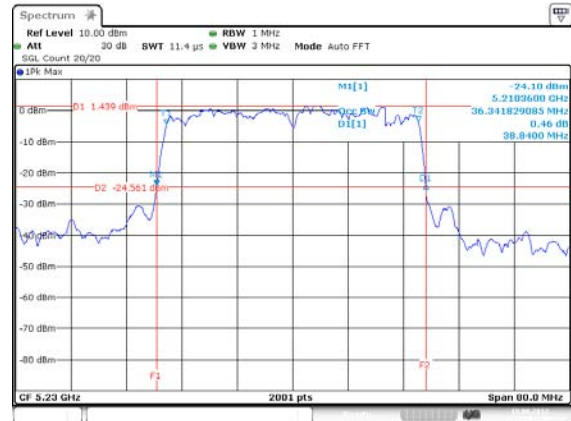
Emission Bandwidth Plots

11N5.2G-40M – F1' [Port 1]



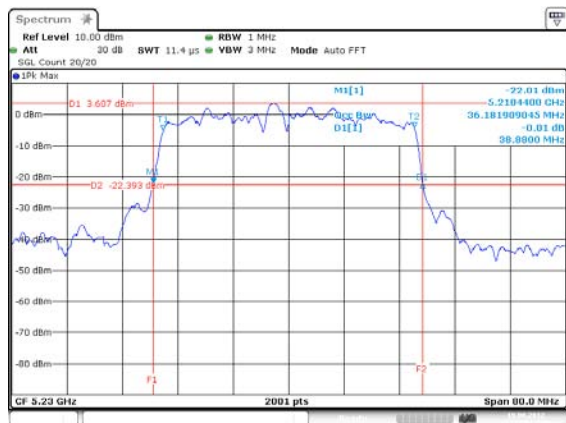
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11N5.2G-40M – F2' [Port 2]



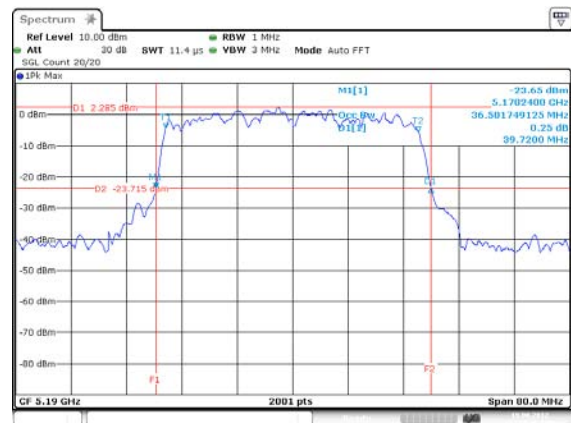
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11N5.2G-40M – F2' [Port 1]



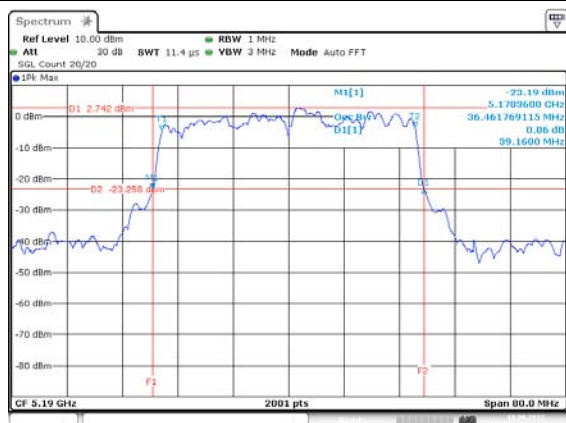
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11N5.2G-40M – F1' [Port 3]



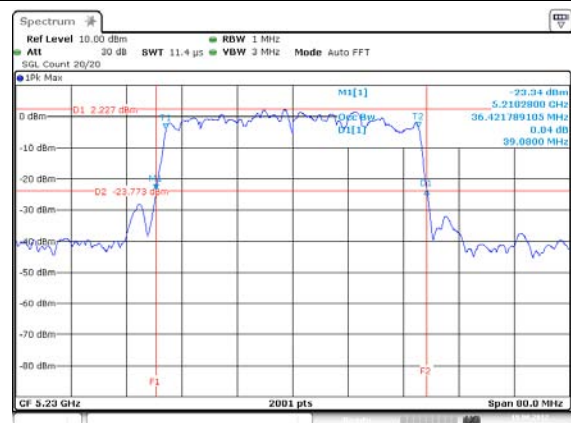
Date: 19.AUG.2012 17:40:15

11N5.2G-40M – F1' [Port 2]



Date: 19.AUG.2012 17:40:07

11N5.2G-40M – F2' [Port 3]



Date: 19.AUG.2012 17:52:57

3.3 RF Output Power

3.3.1 RF Output Power Limit

Maximum Conducted Output Power Limit	
UNII Devices	
☒	For the 5.15-5.25 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6 \text{ dBi}$, then $P_{Out} = 17 - (G_{TX} - 6)$.
☒	For the 5.25-5.35 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6 \text{ dBi}$, then $P_{Out} = 24 - (G_{TX} - 6)$.
☒	For the 5.47-5.725 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6 \text{ dBi}$, then $P_{Out} = 24 - (G_{TX} - 6)$.
☐	For the 5.725-5.825 GHz band:
☐	Point-to-multipoint systems (P2M): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W or $17 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6 \text{ dBi}$, then $P_{Out} = 30 - (G_{TX} - 6)$.
☐	Point-to-point systems (P2P): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W or $17 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 23 \text{ dBi}$, then $P_{Out} = 30 - (G_{TX} - 23)$.
LE-LAN Devices	
☒	For the 5.15-5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
☒	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
☒	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
☐	For the 5.725-5.825 GHz band, the maximum e.i.r.p. shall not exceed 4.0 W or $23 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
☐	Point-to-multipoint systems (P2M): the maximum e.i.r.p. shall not exceed 4.0 W or $23 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
☐	Point-to-point systems (P2P): the maximum e.i.r.p. shall not exceed 4.0 W or $23 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. If e.i.r.p. > 36 dBm, $G_{TX} \leq P_{Out}$
P_{Out} = maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi.	

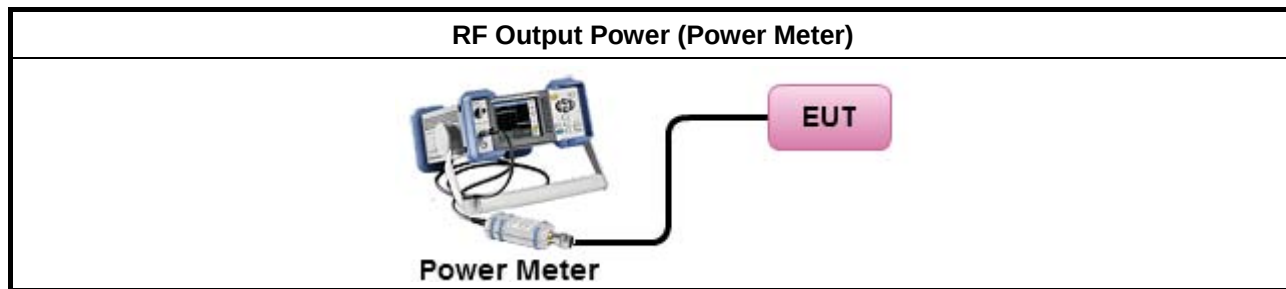
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
☒	Maximum Conducted Output Power
	[duty cycle $\geq 98\%$ or external video / power trigger]
☒	Refer as FCC KDB 789033, clause C Method SA-1 (spectral trace averaging).
☐	Refer as FCC KDB 789033, clause C Method SA-1 Alt. (RMS detection with slow sweep speed)
	duty cycle $< 98\%$ and average over on/off periods with duty factor (refer as clause 1.1.4)
☐	Refer as FCC KDB 789033, clause C Method SA-2 (spectral trace averaging).
☐	Refer as FCC KDB 789033, clause C Method SA-2 Alt. (RMS detection with slow sweep speed)
	Without duty cycle restriction
☐	Refer as FCC KDB 789033, clause C Method SA-3 (band power max-hold).
☐	Refer as FCC KDB 789033, clause C Method SA-3 Alt. (reduced VBW and band power max-hold)
	Wideband RF power meter and average over on/off periods with duty factor (refer as clause 1.1.4)
☐	Refer as FCC KDB 789033, clause C Method PM (using an RF average power meter).
☐	Refer as ANSI C63.10, clause 6.10.3.1 for spectrum analyzer - Method 1 (trace averaging).
☐	Refer as ANSI C63.10, clause 6.10.3.2 for spectrum analyzer - Method 2 (zero-span averaging).
☐	Refer as ANSI C63.10, clause 6.10.3.2 for spectrum analyzer - Method 3 (band power max-hold).
☒	For conducted measurement.
☒	For conducted measurements on devices with multiple transmit chains: 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:
☐	Method 1: $\text{EIRP}_1 = P_1 + G_{\text{ANT1}} ; \text{EIRP}_2 = P_2 + G_{\text{ANT2}} ; \dots \text{EIRP}_n = P_n + G_{\text{ANTn}}$ $\text{EIRP}_{\text{total}} = \text{EIRP}_1 + \text{EIRP}_2 + \dots + \text{EIRP}_n$ (calculated in linear unit [mW] and transfer to log unit [dBm])
☒	Method 2: $P_{\text{total}} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $\text{EIRP}_{\text{total}} = P_{\text{total}} + \text{DG}$
☐	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level. The measured radiated field strength or power levels to equivalent isotropic radiated power (EIRP) (see FCC KDB 412172 for guidance). The equivalent maximum conducted output power can then be determined by subtracting the EUT transmit antenna gain from the EIRP.

3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted (Average) Output Power

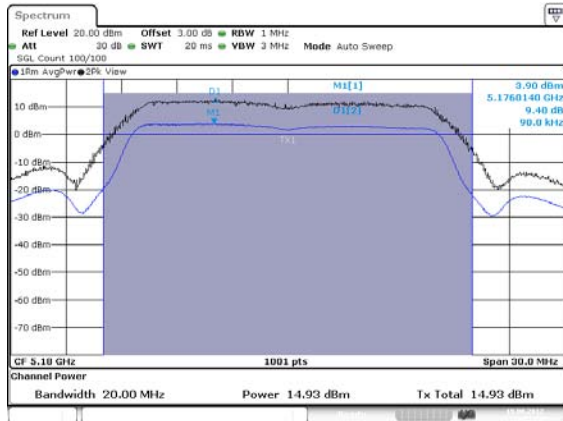
Maximum Conducted Output Power Result										
Directional Gain (dBi)		4.26	RF Output Power (dBm)							
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	-	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11A5.2G-20M	1	5180	14.93	-	-	-	14.93	17.0	19.19	23.0
11A5.2G-20M	1	5200	14.60	-	-	-	14.60	17.0	18.86	23.0
11A5.2G-20M	1	5240	14.55	-	-	-	14.55	17.0	18.81	23.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

Maximum Conducted Output Power Result										
Directional Gain (dBi)		4.25	RF Output Power (dBm)							
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	Chain-Port 3	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11N5.2G-20M	3	5180	10.61	10.62	10.62	-	15.39	17.0	19.63	23.0
11N5.2G-20M	3	5200	10.91	10.90	10.89	-	15.67	17.0	19.92	23.0
11N5.2G-20M	3	5240	10.71	10.69	10.68	-	15.46	17.0	19.71	23.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

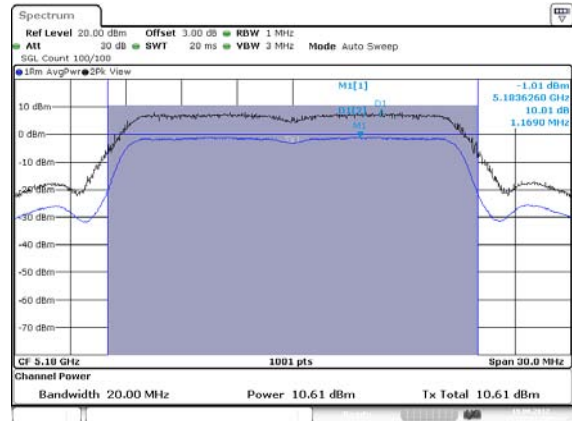
Maximum Conducted Output Power Result										
Directional Gain (dBi)		4.25	RF Output Power (dBm)							
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	Chain-Port 3	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11N5.2G-40M	3	5190	11.70	11.70	11.69	-	16.47	17.0	20.71	23.0
11N5.2G-40M	3	5230	11.85	11.85	11.85	-	16.62	17.0	20.87	23.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

Worst Maximum Conducted Output Power and Peak Excursion Plots

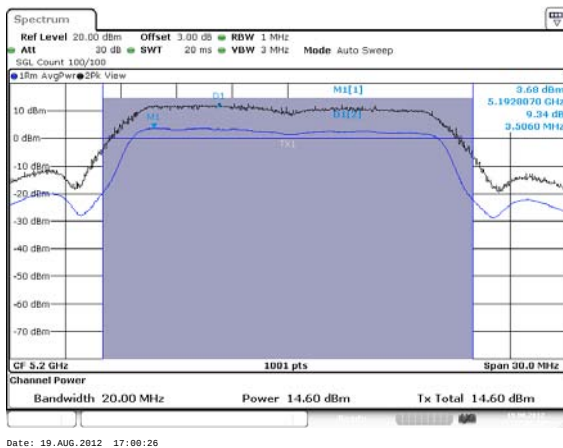
11A5.2G-20M – F1 [Port 1]



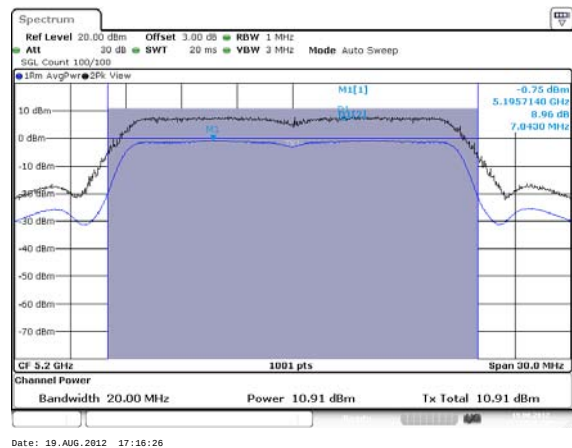
11N5.2G-20M – F1 [Port 1]



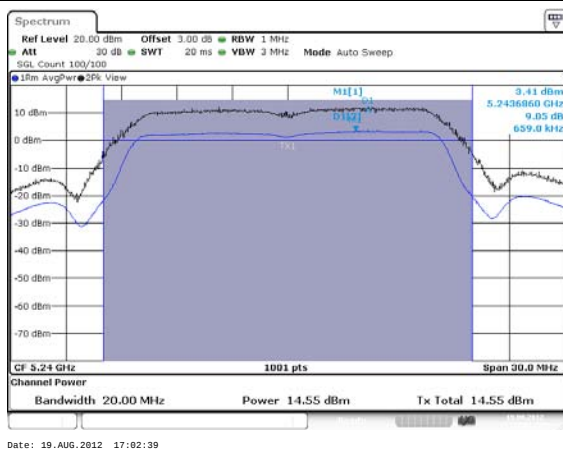
11A5.2G-20M – F2 [Port 1]



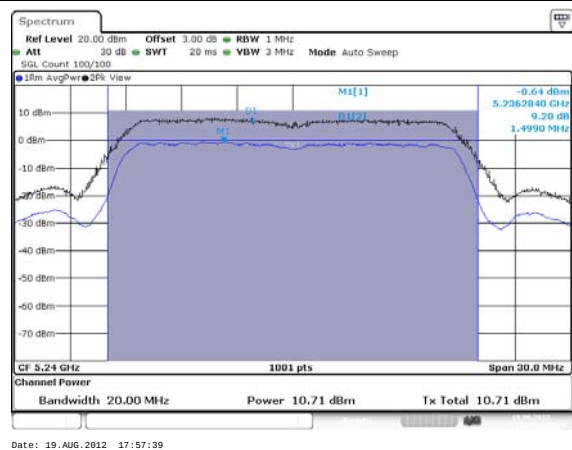
11N5.2G-20M – F2 [Port 1]



11A5.2G-20M – F3 [Port 1]

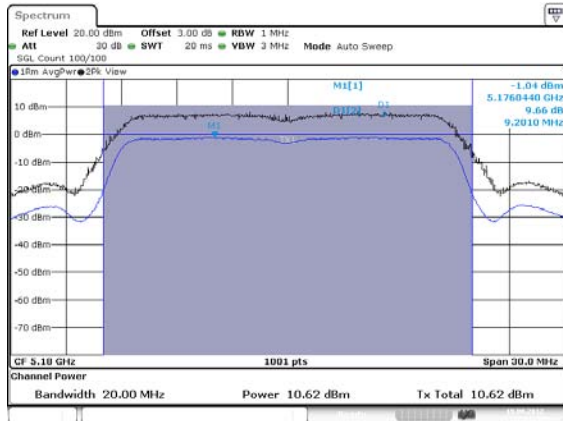


11N5.2G-20M – F3 [Port 1]



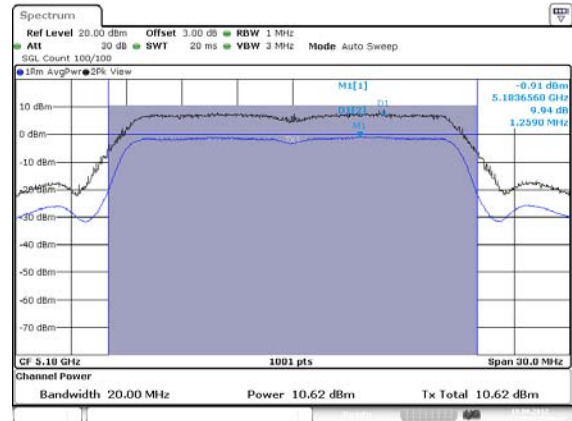
Worst Maximum Conducted Output Power and Peak Excursion Plots

11N5.2G-20M – F1 [Port 2]



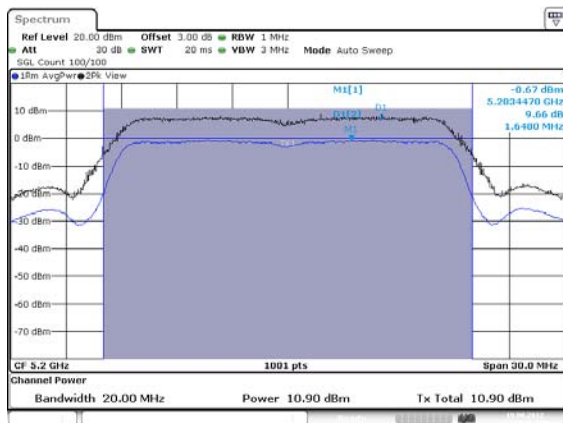
Date: 19.AUG.2012 17:11:41

11N5.2G-20M – F1 [Port 3]



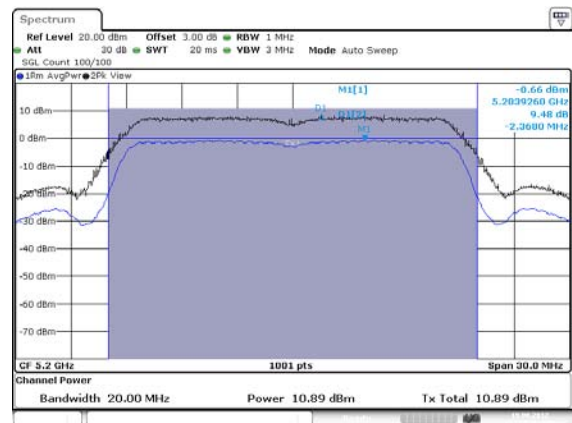
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11N5.2G-20M – F2 [Port 2]



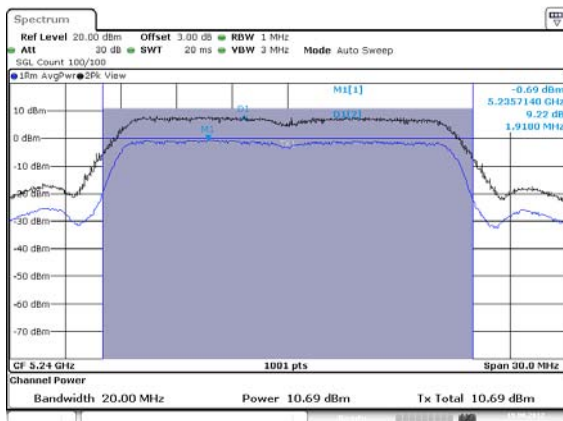
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11N5.2G-20M – F2 [Port 3]



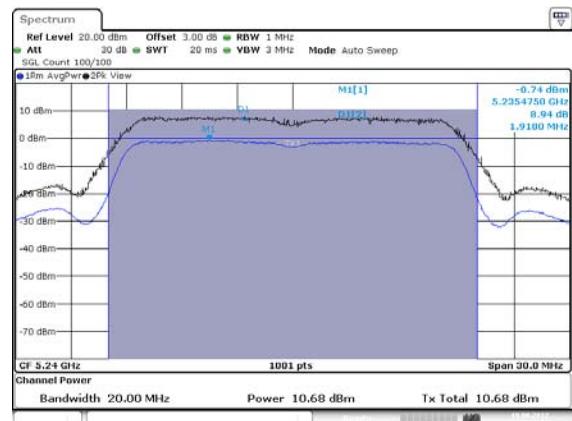
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11N5.2G-20M – F3 [Port 2]



Date: 19.AUG.2012 17:57:50

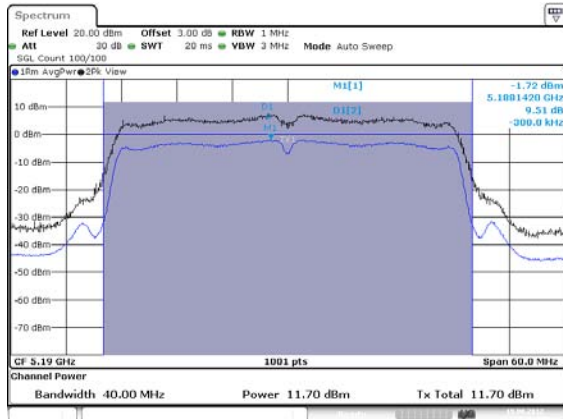
11N5.2G-20M – F3 [Port 3]



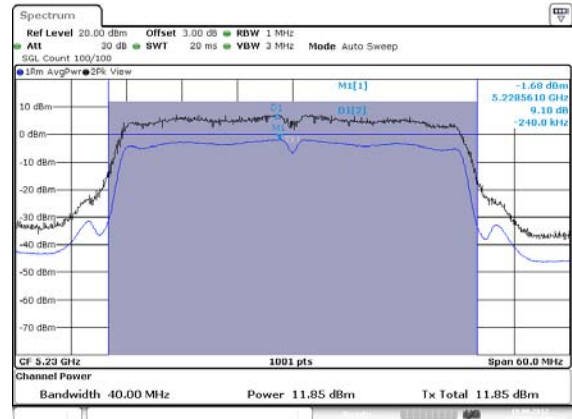
Date: 19.AUG.2012 17:58:01

Worst Maximum Conducted Output Power and Peak Excursion Plots

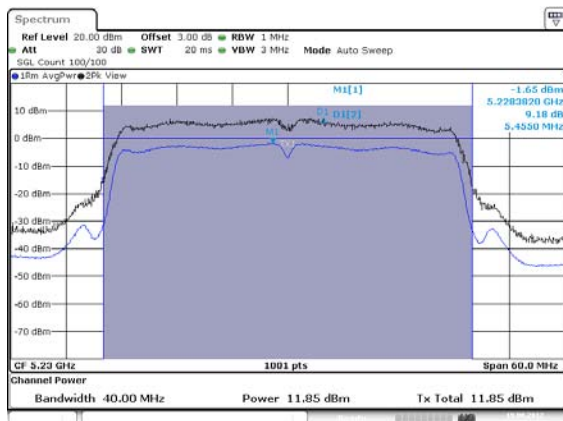
11N5.2G-40M – F1' [Port 1]



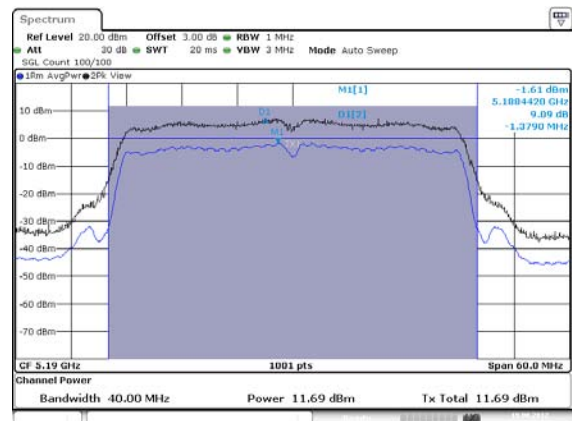
11N5.2G-40M – F2' [Port 2]



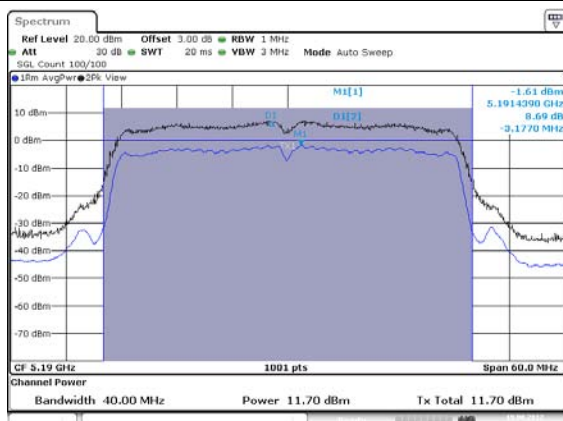
11N5.2G-40M – F2' [Port 1]



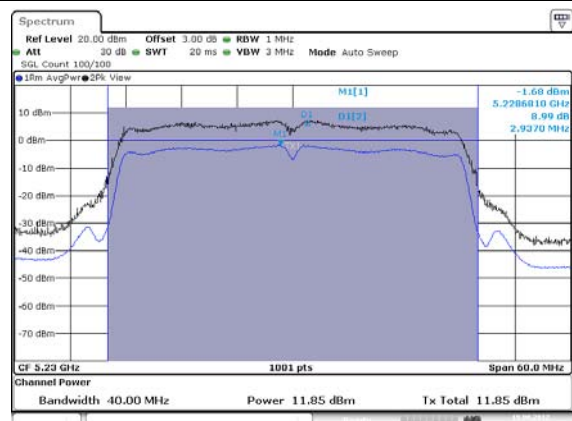
11N5.2G-40M – F1' [Port 3]



11N5.2G-40M – F1' [Port 2]



11N5.2G-40M – F2' [Port 3]



3.4 Peak Power Spectral Density

3.4.1 Peak Power Spectral Density Limit

Peak Power Spectral Density Limit	
UNII Devices	
☐	For the 5.15-5.25 GHz band, the peak power spectral density (PPSD) ≤ 4 dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 4 - (G_{TX} - 6)$.
☐	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 11 - (G_{TX} - 6)$.
☒	For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 11 - (G_{TX} - 6)$.
☐	For the 5.725-5.825 GHz band:
☐	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) ≤ 17 dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 17 - (G_{TX} - 6)$.
☐	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 17 dBm/MHz. If $G_{TX} > 23$ dBi, then $PPSD = 17 - (G_{TX} - 23)$.
LE-LAN Devices	
☒	For the 5.15-5.25 GHz band, the peak power spectral density (PPSD) ≤ 4 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) ≤ 10 dBm/MHz.
☒	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) ≤ 17 dBm/MHz.
☒	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) ≤ 17 dBm/MHz.
☐	For the 5.725-5.825 GHz band, the peak power spectral density (PPSD) ≤ 17 dBm/MHz and the e.i.r.p. peak power spectral density (PPSD) ≤ 23 dBm/MHz.
PPSD = peak power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz G_{TX} = the maximum transmitting antenna directional gain in dBi.	

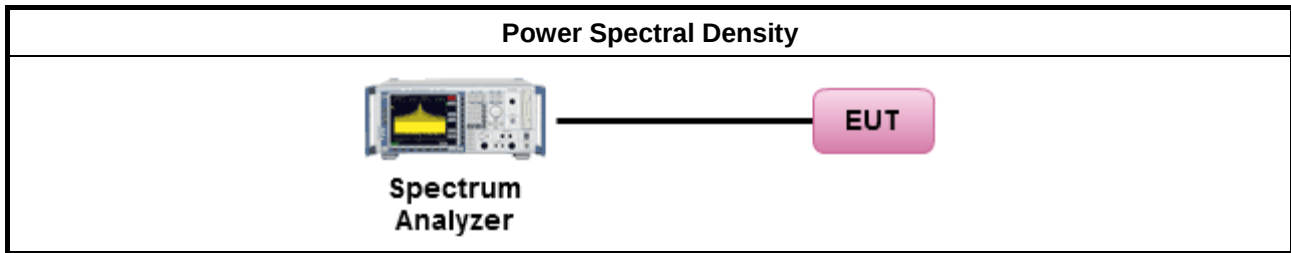
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

Test Method	
☒	Peak power spectral density procedures that the same method as used to determine the conducted output power shall be used to determine the peak power spectral density and use the peak search function on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density shall be measured using below options:
	[duty cycle $\geq$ 98% or external video / power trigger]
☒	Refer as FCC KDB 789033, clause C Method SA-1 (spectral trace averaging).
☐	Refer as FCC KDB 789033, clause C Method SA-1 Alt. (RMS detection with slow sweep speed)
	duty cycle $<$ 98% and average over on/off periods with duty factor (refer as clause 1.1.4)
☐	Refer as FCC KDB 789033, clause C Method SA-2 (spectral trace averaging).
☐	Refer as FCC KDB 789033, clause C Method SA-2 Alt. (RMS detection with slow sweep speed)
	Without duty cycle restriction
☐	Refer as FCC KDB 789033, clause C Method SA-3 (band power max-hold).
☐	Refer as FCC KDB 789033, clause C Method SA-3 Alt. (reduced VBW and band power max-hold). Method SA-3 Alt. was used and the linear mode was used, add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
☐	Refer as ANSI C63.10, clause 6.11.1.2.1 for Method 1—peak measurement.
☐	Refer as ANSI C63.10, clause 6.11.1.2.2 for Method 2—power averaging.
☒	For conducted measurement.
☒	For conducted measurements on devices with multiple transmit chains:
☐	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
☒	Option 2: Measure and add $10 \log(N)$ dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with $10 \log(N)$. Or each transmit chains shall be add $10 \log(N)$ to compared with the limit.
☒	If multiple transmit chains, EIRP PPSD calculation could be following as methods:
☐	Method 1: $EIRP_1 = PPSD_1 + G_{ANT1}$; $EIRP_2 = PPSD_2 + G_{ANT2}$; ... $EIRP_n = PPSD_n + G_{ANTn}$ $EIRP_{total} = EIRP_1 + EIRP_2 + \dots + EIRP_n$ (calculated in linear unit [mW] and transfer to log unit [dBm])
☒	Method 2: $PPSD_{total} = PPSD_1 + PPSD_2 + \dots + PPSD_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = PPSD_{total} + DG$
☐	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level. The measured radiated field strength or power levels to equivalent isotropic radiated power (EIRP) (see FCC KDB 412172 for guidance). The equivalent maximum conducted output power can then be determined by subtracting the EUT transmit antenna gain from the EIRP.

3.4.4 Test Setup



3.4.5 Test Result of Peak Power Spectral Density

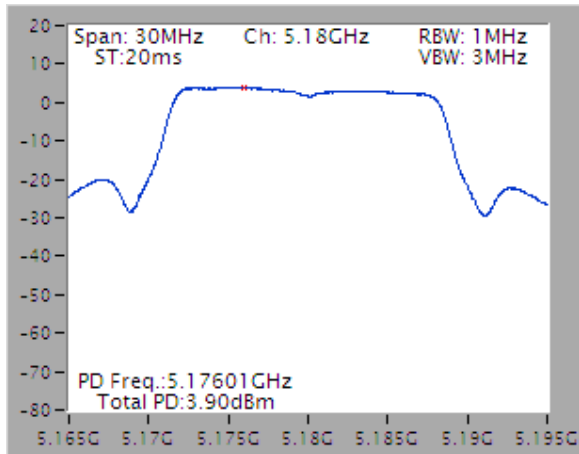
Peak Power Spectral Density Result									
Directional Gain (dBi)		4.26	Peak Power Spectral Density (dBm/MHz)						
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	-	-	-	PSD Limit	EIRP PSD	EIRP PSD Limit
11A5.2G-20M	1	5180	3.90	-	-	-	4.0	7.06	10.0
11A5.2G-20M	1	5200	3.68	-	-	-	4.0	7.09	10.0
11A5.2G-20M	1	5240	3.41	-	-	-	4.0	7.28	10.0
Result			Complied						
Note 1: N _{TX} = Number of Transmit Chains									

Peak Power Spectral Density Result									
Directional Gain (dBi)		4.25	Peak Power Spectral Density (dBm/MHz)						
Modulation Mode	N _{TX}	Freq. (MHz)	Sum All Chains	-	-	-	PSD Limit	EIRP PSD	EIRP PSD Limit
11N5.2G-20M	3	5180	3.72	-	-	-	4.0	3.58	10.0
11N5.2G-20M	3	5200	3.97	-	-	-	4.0	3.75	10.0
11N5.2G-20M	3	5240	4.00	-	-	-	4.0	3.68	10.0
Result			Complied						
Note 1: N _{TX} = Number of Transmit Chains									

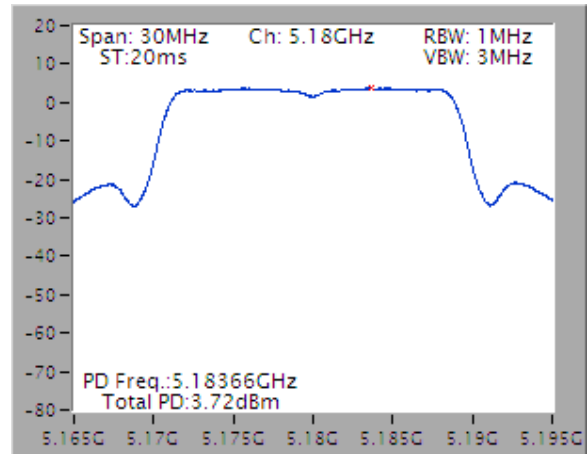
Peak Power Spectral Density Result									
Directional Gain (dBi)		4.25	Power Spectral Density (dBm/MHz)						
Modulation Mode	N _{TX}	Freq. (MHz)	Sum All Chains	-	-	-	PSD Limit	EIRP PSD	EIRP PSD Limit
11N5.2G-40M	3	5190	2.76	-	-	-	4.0	0.56	10.0
11N5.2G-40M	3	5230	3.00	-	-	-	4.0	5.24	10.0
Result			Complied						
Note 1: N _{TX} = Number of Transmit Chains									

Power Spectral Density Plots (w/o Duty Factor)

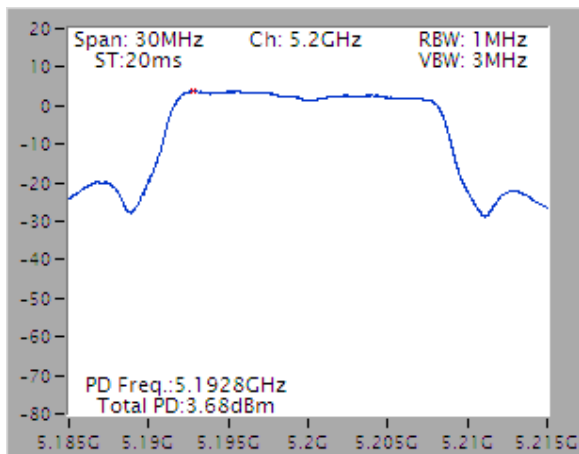
11A5.2G-20M – F1 [Port 1]



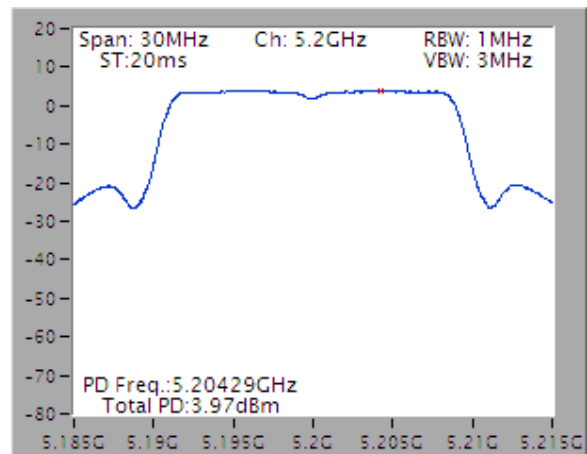
11A5.2G-20M – F1 [Sum All Chains]



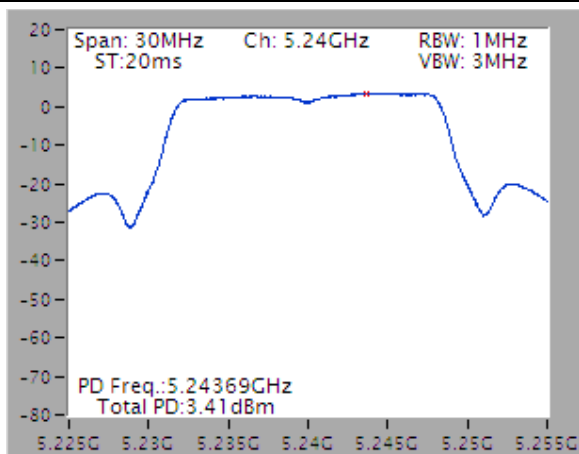
11A5.2G-20M – F2 [Port 1]



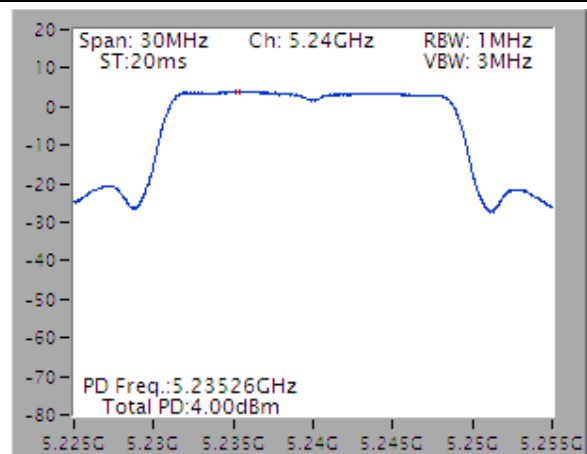
11A5.2G-20M – F2 [Sum All Chains]

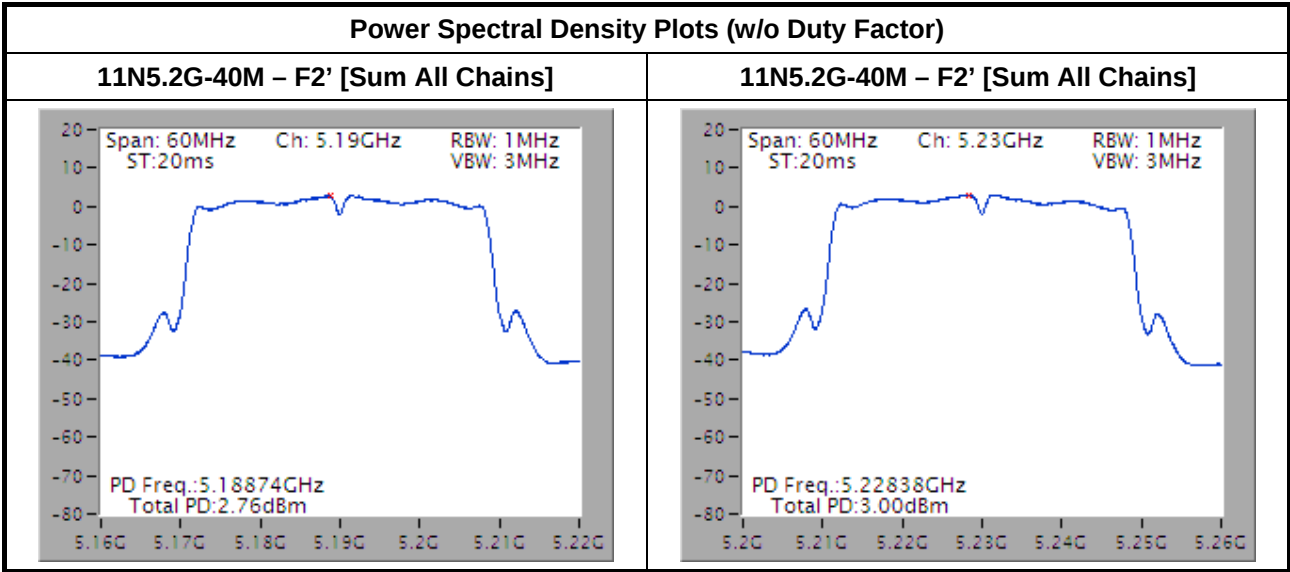


11A5.2G-20M – F3 [Port 1]



11A5.2G-20M – F3 [Sum All Chains]





3.5 Peak Excursion

3.5.1 Peak Excursion Limit

Peak Excursion Limit	
UNII Devices	
☒	Peak excursion ≤ 13 dB. The ratio of the maximum of the peak-max-hold spectrum to the maximum of the average spectrum for continuous transmission does not exceed 13 dB. (Earlier procedures that required computing the ratio of the two spectra at each frequency across the emission bandwidth can lead to unintended failures at band edges and will no longer be required.)
LE-LAN Devices	
☒	N/A

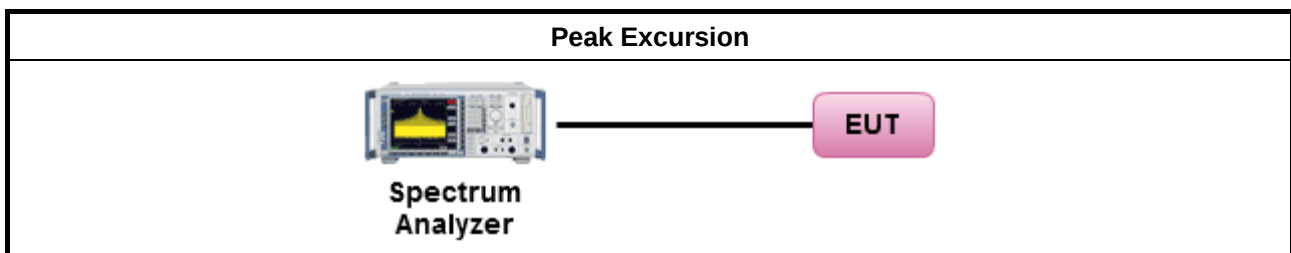
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method	
☒	Refer as FCC KDB 789033, clause F peak excursion method.
☒	For conducted measurement.
☒	For conducted measurements on devices with multiple transmit chains: Refer as FCC KDB 662911, when testing in-band (peak to average ratio) against relative emission limits, tests may be performed on each output individually without summing or adding $10 \log(N)$.
☐	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.

3.5.4 Test Setup

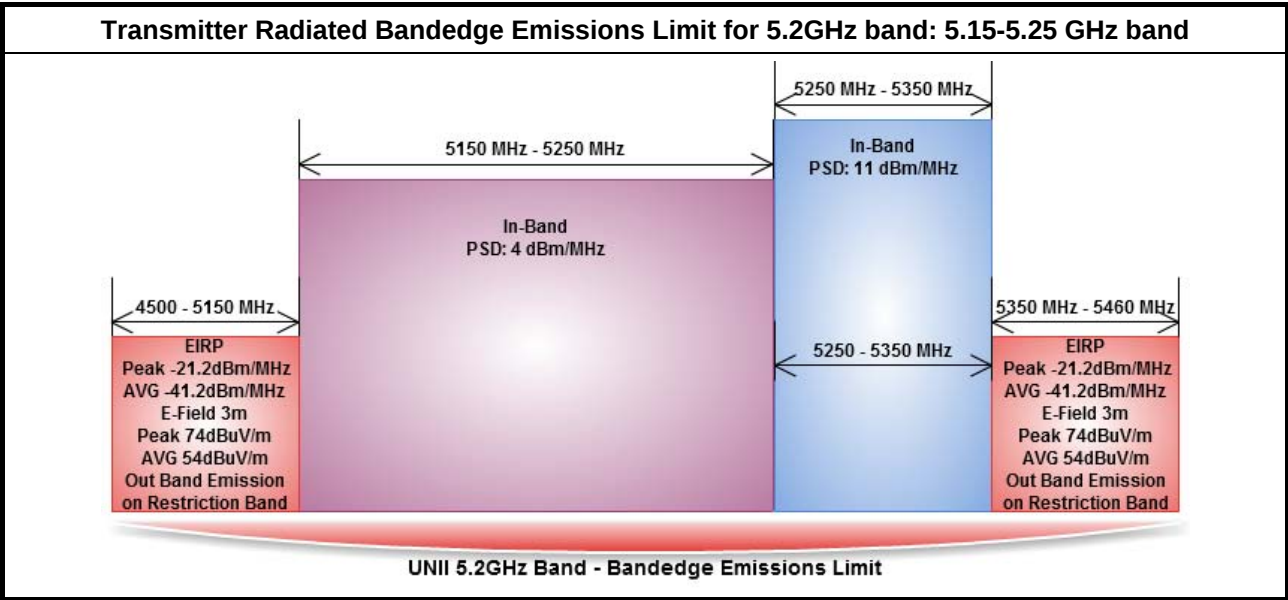


3.5.5 Test Result of Peak Excursion

UNII Peak Excursion Result							
Modulation Mode	N _{TX}	Freq. (MHz)	Peak Excursion (dB)				
			Chain-Port 1	Chain-Port 2	Chain-Port 3	-	Limit
11A5.2G-20M	1	5180	9.40	-	-	-	13.0
11A5.2G-20M	1	5200	9.34	-	-	-	13.0
11A5.2G-20M	1	5240	9.05	-	-	-	13.0
11N5.2G-20M	3	5180	10.01	9.20	9.94	-	13.0
11N5.2G-20M	3	5200	8.96	9.66	9.48	-	13.0
11N5.2G-20M	3	5240	9.20	9.22	8.94	-	13.0
11N5.2G-40M	3	5190	9.51	8.69	9.09	-	13.0
11N5.2G-40M	3	5230	9.18	9.10	8.99	-	13.0
Result			Complied				
Note 1: N _{TX} = Number of Transmit Chains Note 2: Test result plots refer as test report clause 3.3.5 with peak excursion ratio of the maximum of the peak-max-hold spectrum to the maximum of the average spectrum.							

3.6 Transmitter Radiated Bandedge Emissions

3.6.1 Transmitter Radiated Bandedge Emissions Limit



3.6.2 Measuring Instruments

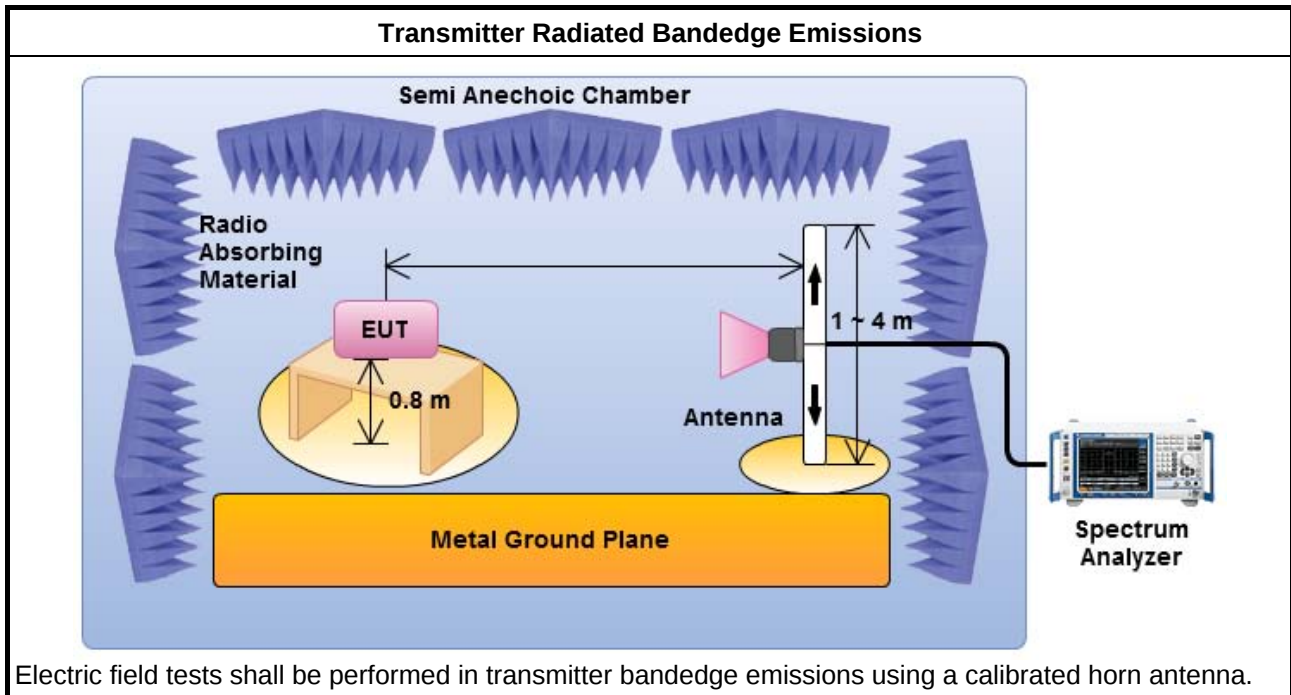
Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

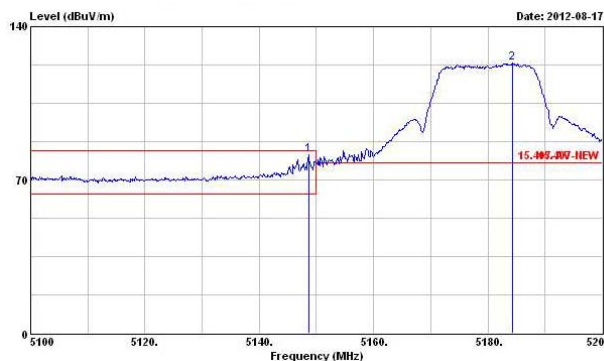
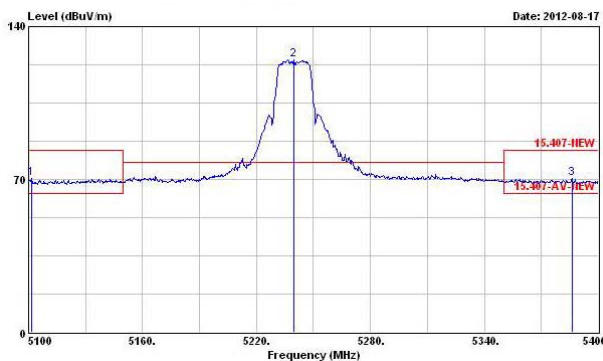
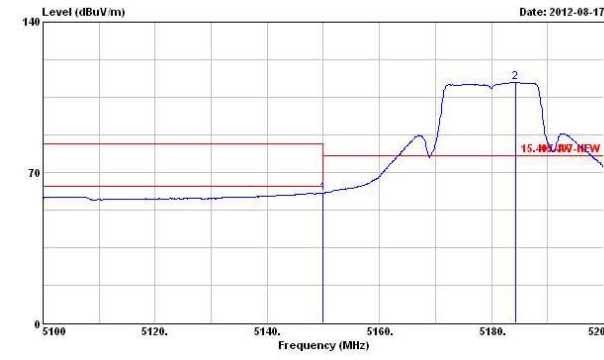
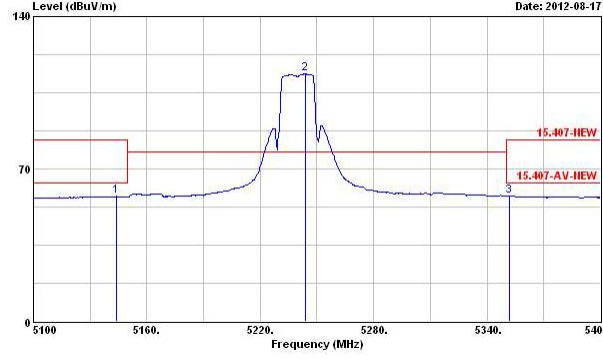
Test Method – General Information	
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements). Measurements in the bandedge are typically made at a closer distance 1m, because the instrumentation noise floor is typically close to the radiated emission limit.
☒	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
☒	Refer as ANSI C63.10, clause 6.9.2.2 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
☐	If EUT operate in adjacent contiguous bands, bandedge testing performed at the lowest frequency channel at lower-band and highest frequency channel at higher-band. Transmitter in-band emissions will consist of adjacent contiguous bands (e.g., IEEE 802.11ac VHT160 The lowest frequency channel at lower-band and highest frequency channel at higher-band in-band emissions will consist of two adjacent contiguous bands.)
☐	☐ Operating in 5.15-5.25 GHz band (lower-band) and 5.25-5.35 GHz band (higher-band). ☐ Operating in 5.47-5.725 GHz band (lower-band) and 5.725-5.825 GHz band (higher-band).
☐	If EUT operate in individual non-contiguous bands, bandedge testing performed at the lowest frequency channel and highest frequency channel within lower-band and higher-band. (e.g., (e.g., IEEE 802.11ac VHT160)
☐	☐ Operating in 5.25-5.35 GHz band (lower-band) and 5.47-5.725 GHz band (higher-band). ☐ Operating in 5.15-5.25 GHz band (lower-band) and 5.725-5.825 GHz band (higher-band).
☒	For the transmitter unwanted emissions shall be measured using following options below:
☒	Refer as FCC KDB 789033, clause G)2) for unwanted emissions into non-restricted bands.
☒	Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands.
☒	Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging).
☐	Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW).
☐	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW) - Duty cycle $\geq$ 98%.
☐	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
☒	Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit.
☐	Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.
☒	For the transmitter bandedge emissions shall be measured using following options below:
☐	Refer as FCC KDB 789033, clause G)3)d) marker-delta method for band-edge measurements.
☒	Refer as ANSI C63.10, clause 6.9.2 for band-edge testing.
☐	Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements.

Test Method	
☐	Refer as FCC KDB 789033, clause G)3)b) for conducted measurement.
☐	For unwanted emissions into non-restricted bands (relative emission limits).
☐	For conducted measurements on devices with multiple transmit chains: Refer as FCC KDB 662911, when testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding $10 \log(N)$ if the measurements are made relative to the in-band emissions on the individual outputs.
☐	For unwanted emissions into restricted bands. Test conducted spurious emissions and radiated by the cabinet with the antenna connector(s) terminated by a specified load (cabinet radiation).
☐	Refer as FCC KDB 789033, clause G)4) unwanted emissions in restricted bands on frequencies ≤ 1000 MHz
☐	Refer as FCC KDB 789033, clause G)5) and G)6) unwanted emissions in restricted bands on frequencies > 1000 MHz
☐	For conducted measurements on devices with multiple transmit chains using options given below:
☐	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, out-of-band and spurious emission measurement. The trace data for each transmit chain has to be individually recorded and each transmit chain trace data shall be added and compared with the limit.
☐	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.
☒	For radiated measurement.
☐	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz.
☐	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions from above 1 GHz.

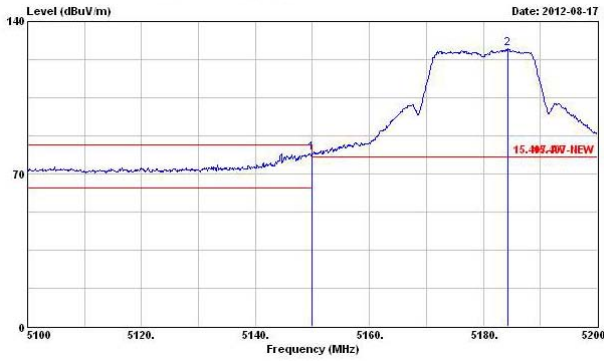
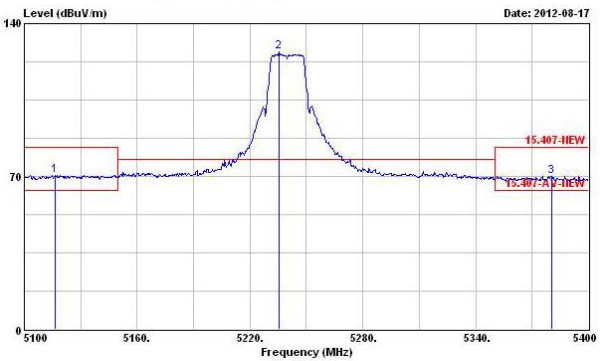
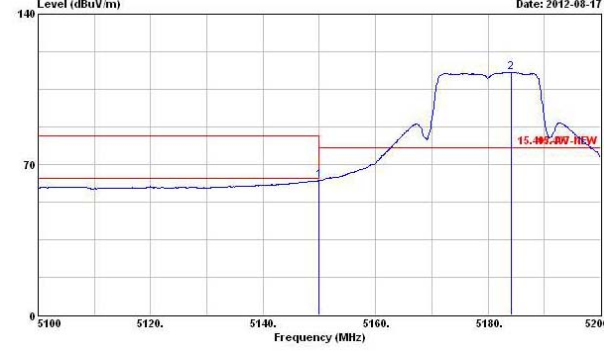
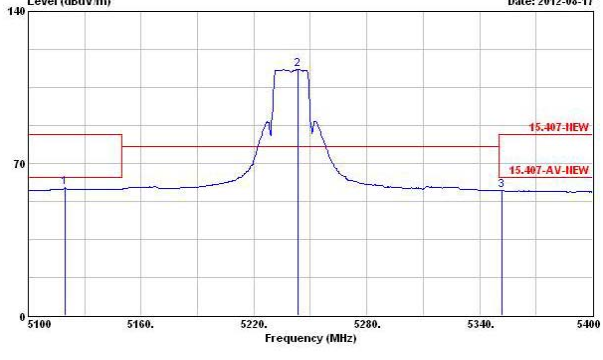
3.6.4 Test Setup



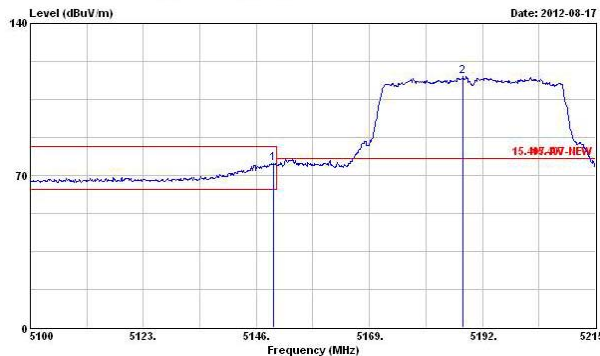
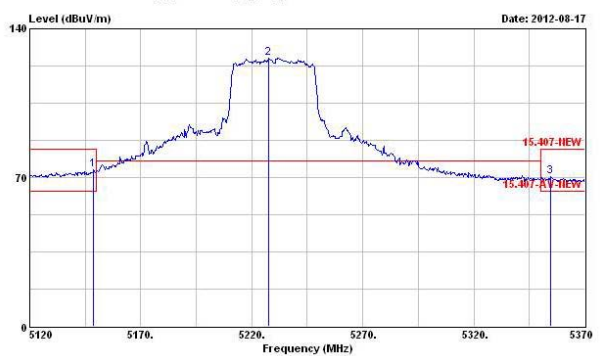
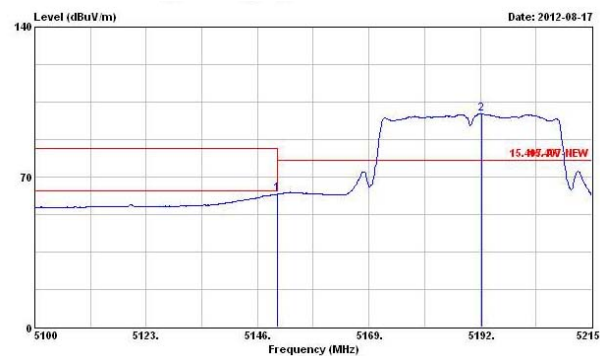
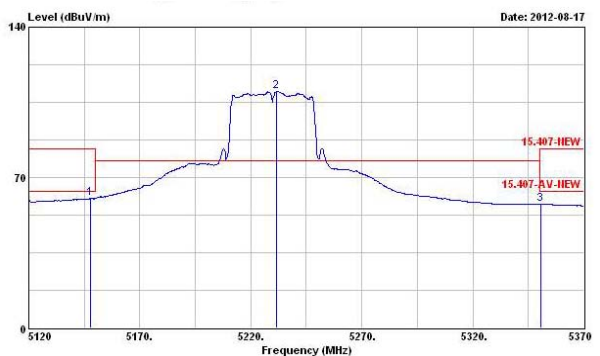
3.6.5 Test Result of Transmitter Radiated Bandedge Emissions

Transmitter Radiated Bandedge Emissions Result									
Gain (dBi)		4.26		Restricted Band Emissions					
Modulation		11A5.2G-20M							
Restricted Band (MHz)	N _{TX}	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/1MHz)	RBE Freq. (MHz)	Measure Distance (m)	Out-Band Level (dBuV/m)	Limit (dBuV/m)	Level Type	Pol. note 1
4500-5150	1	5180	123.45	5148.60	1	81.52	83.54	PK	V
4500-5150	1	5180	111.85	5150.00	1	60.52	63.54	AV	V
5350-5460	1	5240	124.88	5386.20	1	70.45	83.54	PK	V
5350-5460	1	5240	113.71	5351.70	1	57.58	63.54	AV	V
5.2GHz Lower-band (Lowest Ch.)					5.2GHz Lower-band (Highest Ch.)				
									
									

Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).

Transmitter Radiated Bandedge Emissions Result									
Gain (dBi)		4.25		Restricted Band Emissions					
Modulation		11N5.2G-20M							
Restricted Band (MHz)	N _{TX}	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/1MHz)	RBE Freq. (MHz)	Measure Distance (m)	Out-Band Level (dBuV/m)	Limit (dBuV/m)	Level Type	Pol. note 1
4500-5150	3	5180	127.60	5149.90	1	79.49	83.54	PK	V
4500-5150	3	5180	112.94	5150.00	1	62.54	63.54	AV	V
5350-5460	3	5240	127.08	5380.20	1	70.13	83.54	PK	V
5350-5460	3	5240	113.28	5351.70	1	57.45	63.54	AV	V
5.2GHz Lower-band (Lowest Ch.)					5.2GHz Higher-band (Highest Ch.)				
									
									

Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).

Transmitter Radiated Bandedge Emissions Result									
Gain (dBi)		4.25		Restricted Band Emissions					
Modulation		11N5.2G-40M							
Restricted Band (MHz)	N _{TX}	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/1MHz)	RBE Freq. (MHz)	Measure Distance (m)	Out-Band Level (dBuV/m)	Limit (dBuV/m)	Level Type	Pol. note 1
4500-5150	3	5190	115.56	5149.45	1	75.34	83.54	PK	V
4500-5150	3	5190	99.52	5150.00	1	61.99	63.54	AV	V
5350-5460	3	5230	126.08	5354.75	1	70.31	83.54	PK	V
5350-5460	3	5230	110.22	5350.50	1	57.57	63.54	AV	V
5.2GHz Lower-band (Lowest Ch.)					5.2GHz Higher-band (Highest Ch.)				
									
									
Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).									

3.7 Transmitter Radiated Unwanted Emissions

3.7.1 Transmitter Radiated Unwanted Emissions Limit

Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
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 above 1GHz Limit	
Operating Band	Limit
5.15 - 5.25 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.25 - 5.35 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.725 - 5.825 GHz	5.715 5.725 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] 5.825 5.835 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] Other un-restricted band: e.i.r.p. -27 dBm [68.2 dBuV/m@3m]

Note 1: 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).

3.7.2 Measuring Instruments

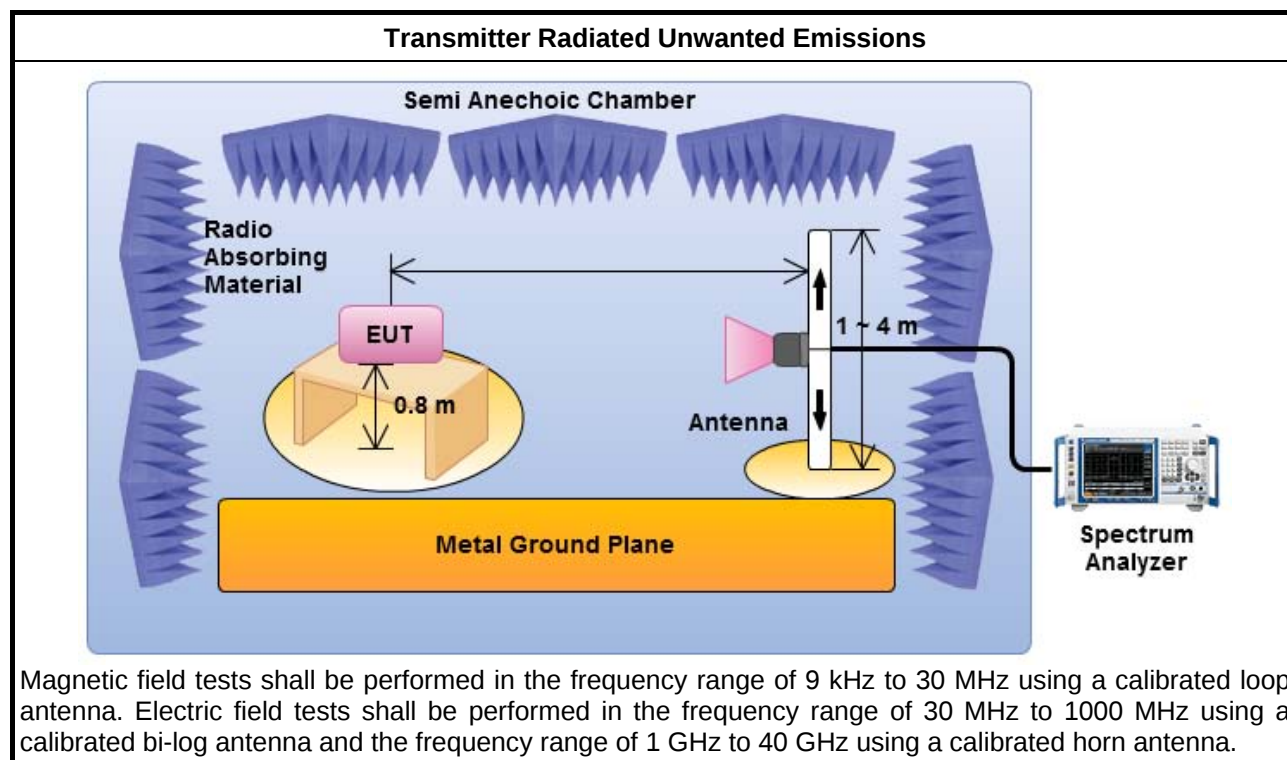
Refer a test equipment and calibration data table in this test report.

3.7.3 Test Procedures

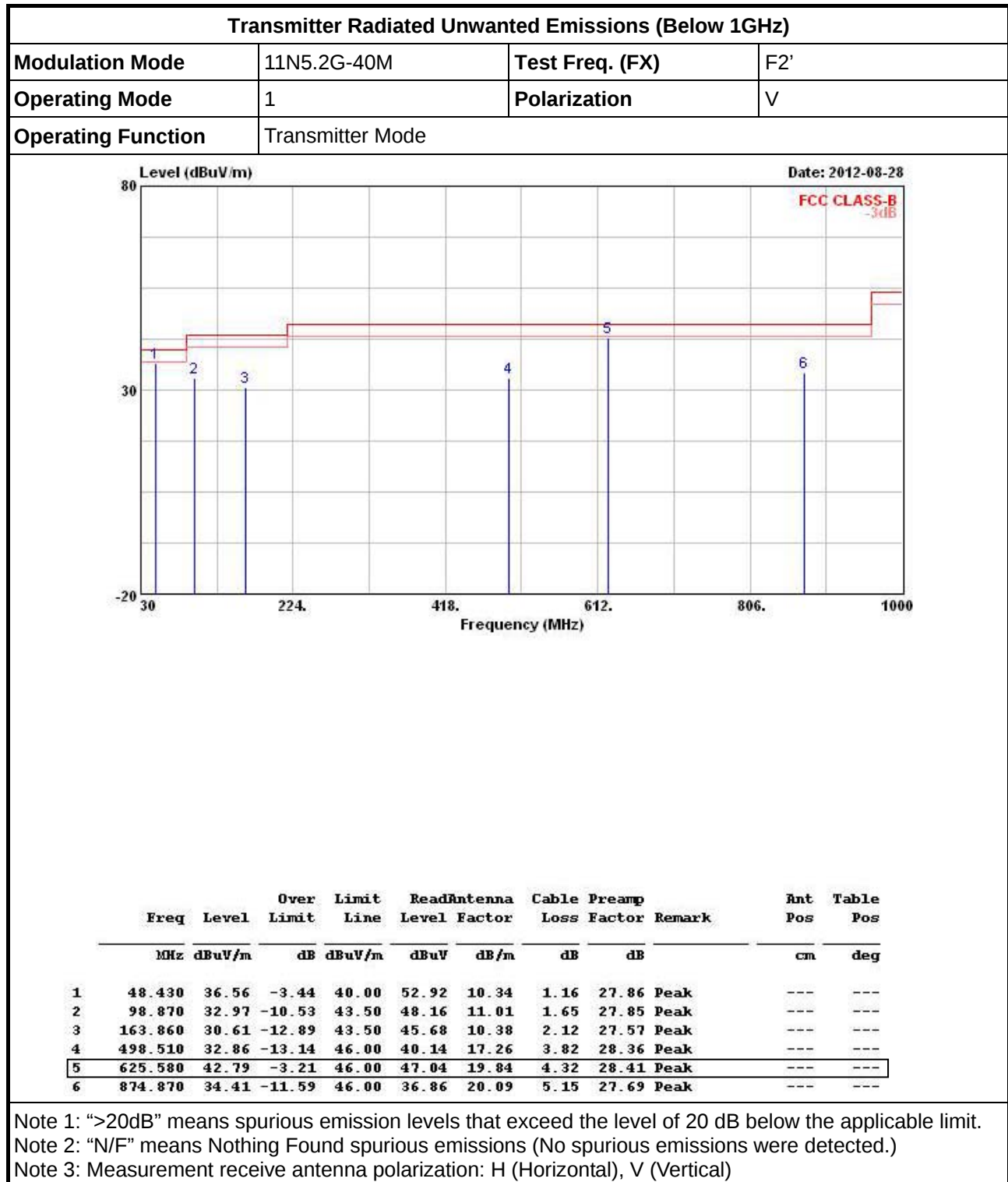
Test Method – General Information	
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
☒	Measurements in the frequency range 5 GHz - 10GHz 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 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 - 40GHz are typically made at a closer distance 1m, because the instrumentation noise floor is typically close to the radiated emission limit.
☒	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
☒	For the transmitter unwanted emissions shall be measured using following options below:
☒	Refer as FCC KDB 789033, clause G)2) for unwanted emissions into non-restricted bands.
☒	Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands.
☒	Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging).
☐	Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW).
☐	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW) – Duty $\geq$ 98%.
☐	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
☒	Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit.
☐	Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.

Test Method	
☐	Refer as FCC KDB 789033, G)3)b) for conducted measurement.
☐	For unwanted emissions into non-restricted bands (relative emission limits).
☐	For conducted measurements on devices with multiple transmit chains: Refer as FCC KDB 662911, when testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding $10 \log(N)$ if the measurements are made relative to the in-band emissions on the individual outputs.
☐	For unwanted emissions into restricted bands. Test conducted spurious emissions and radiated by the cabinet with the antenna connector(s) terminated by a specified load (cabinet radiation).
☐	Refer as FCC KDB 789033, clause G)4) unwanted emissions in restricted bands on frequencies ≤ 1000 MHz
☐	Refer as FCC KDB 789033, clause G)5) and G)6) unwanted emissions in restricted bands on frequencies > 1000 MHz
☐	For conducted measurements on devices with multiple transmit chains using options given below:
☐	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, out-of-band and spurious emission measurement. The trace data for each transmit chain has to be individually recorded and each transmit chain trace data shall be added and compared with the limit.
☐	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.
☒	For radiated measurement.
☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz.
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions from above 1 GHz.

3.7.4 Test Setup

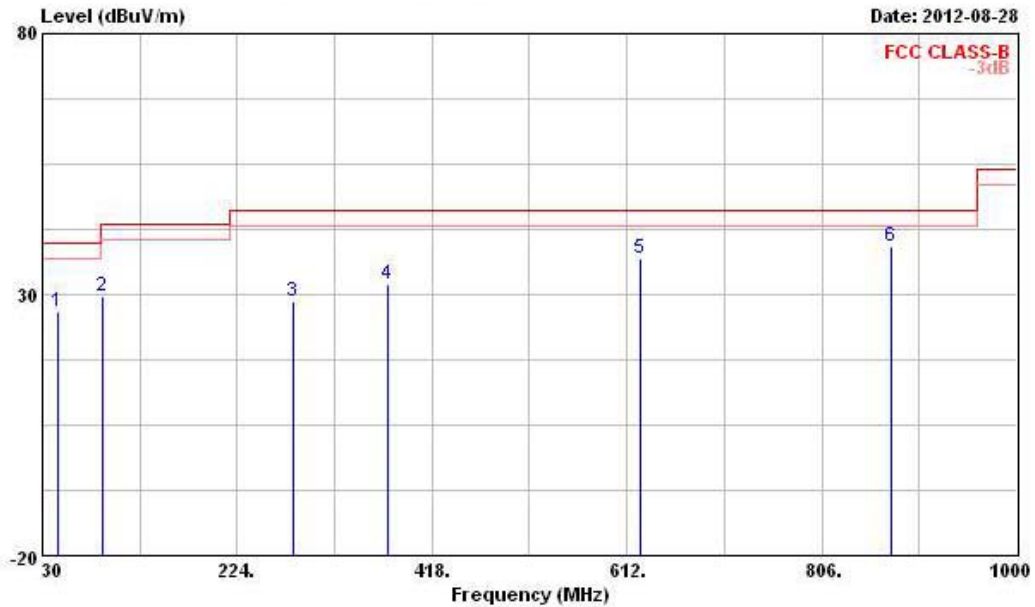


3.7.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)



Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation Mode	11N5.2G-40M	Test Freq. (FX)	F2'
Operating Mode	1	Polarization	H
Operating Function	Transmitter Mode		



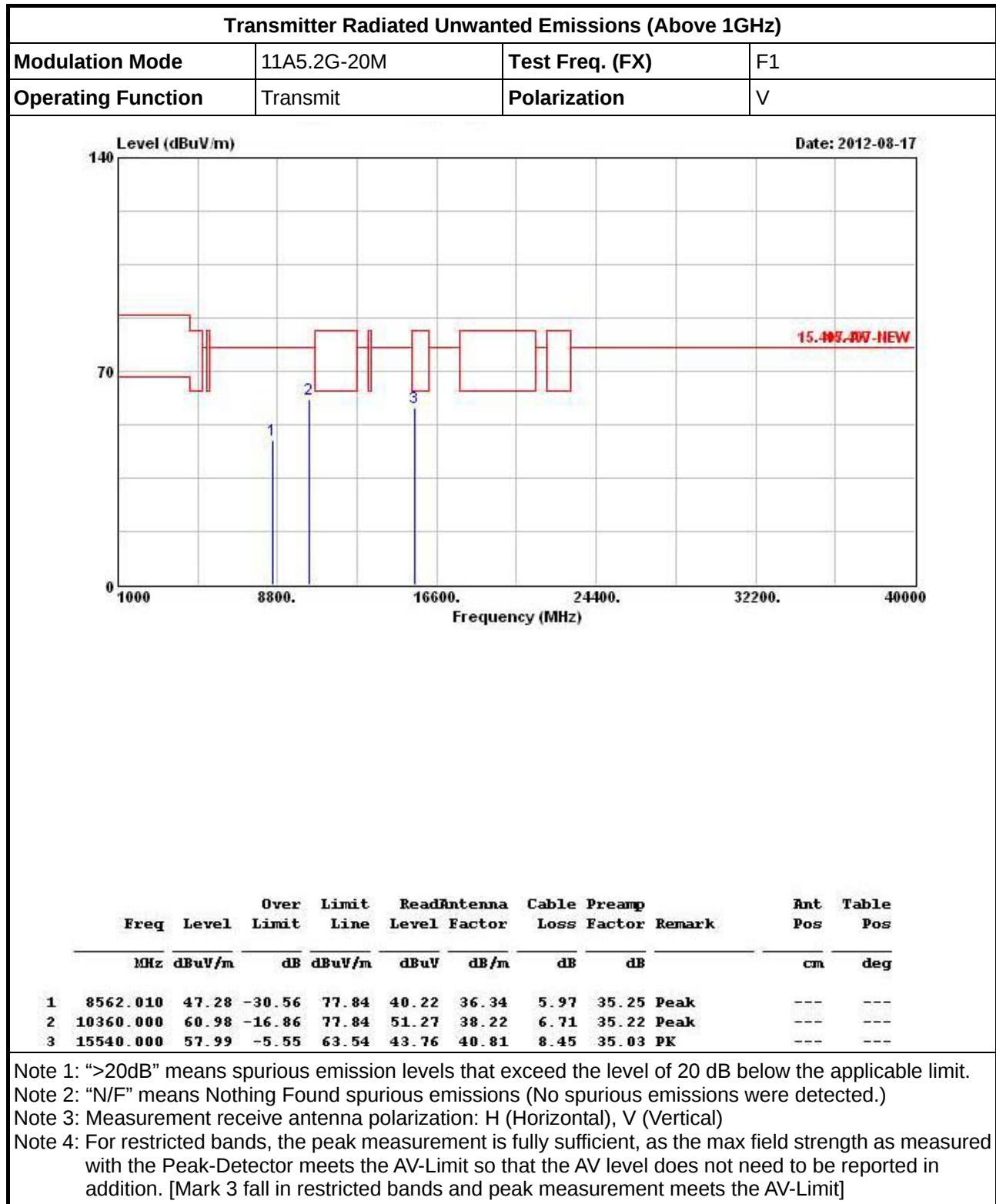
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	44.550	26.61	-13.39	40.00	41.37	12.02	1.10	27.88	Peak	---	---
2	90.140	29.68	-13.82	43.50	46.45	9.50	1.58	27.85	Peak	---	---
3	280.260	28.69	-17.31	46.00	39.58	13.43	2.89	27.21	Peak	---	---
4	374.350	32.09	-13.91	46.00	41.63	14.86	3.29	27.69	Peak	---	---
5	625.580	36.89	-9.11	46.00	41.14	19.84	4.32	28.41	Peak	---	---
6	874.870	39.05	-6.95	46.00	41.50	20.09	5.15	27.69	Peak	---	---

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

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

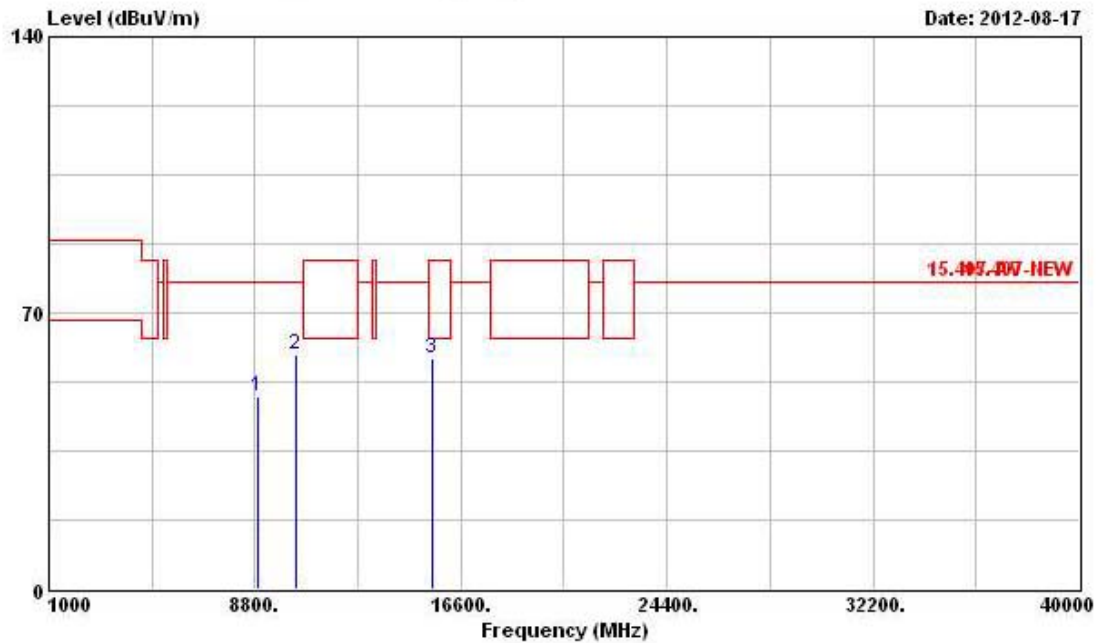
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

3.7.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11A-20M



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11A5.2G-20M	Test Freq. (FX)	F1
Operating Function	Transmit	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	8924.000	48.73	-29.11	77.84	41.36	36.55	6.13	35.31	Peak	---
2	10360.000	59.49	-18.35	77.84	49.78	38.22	6.71	35.22	Peak	---
3	15540.000	58.50	-5.04	63.54	44.27	40.81	8.45	35.03	PK	---

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

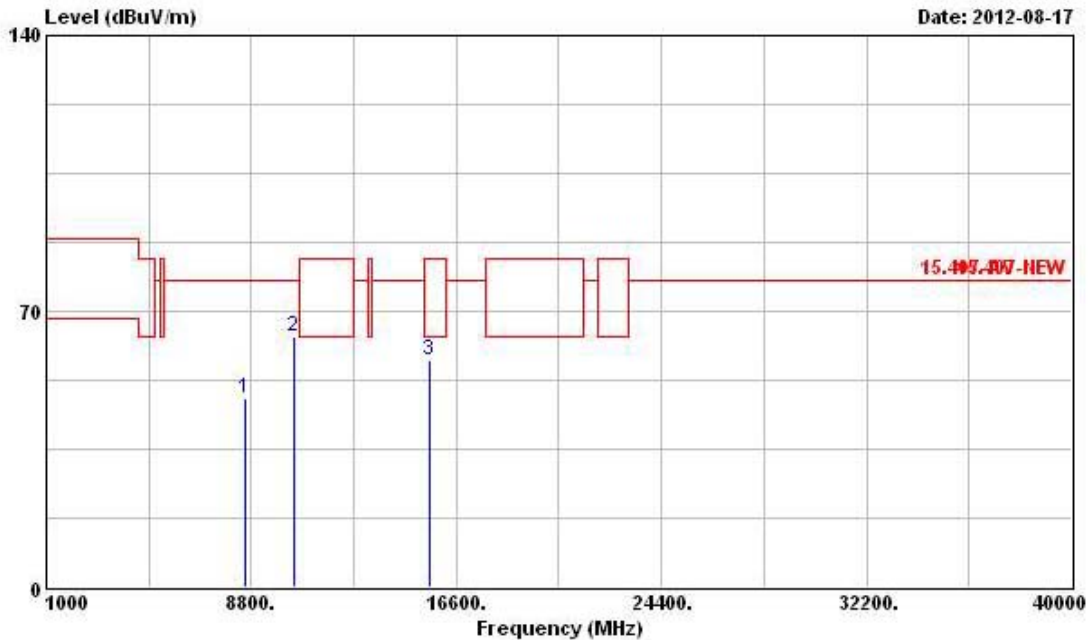
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11A5.2G-20M	Test Freq. (FX)	F2
Operating Function	Transmit	Polarization	V



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8562.000	47.90	-29.94	77.84	40.84	36.34	5.97	35.25	Peak	---	---
2	10400.000	63.42	-14.42	77.84	53.61	38.24	6.75	35.18	Peak	---	---
3	15600.000	57.63	-5.91	63.54	43.44	40.84	8.45	35.10	PK	---	---

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

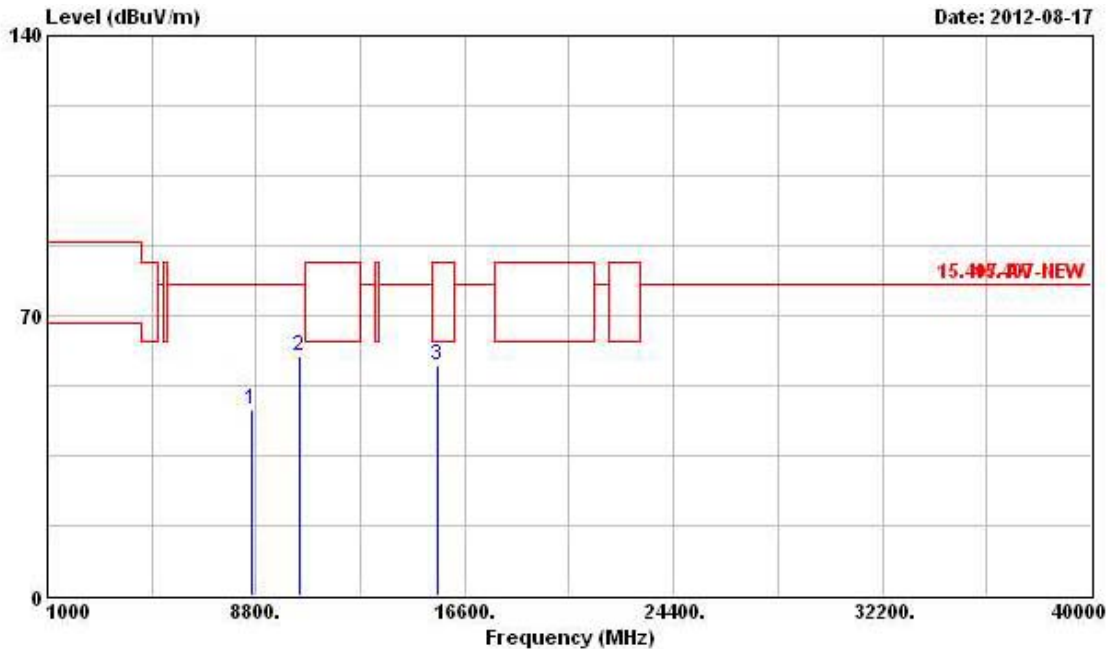
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11A5.2G-20M	Test Freq. (FX)	F2
Operating Function	Transmit	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8639.000	46.54	-31.30	77.84	39.41	36.38	6.01	35.26	Peak	---	---
2	10400.000	59.84	-18.00	77.84	50.03	38.24	6.75	35.18	Peak	---	---
3	15600.000	57.47	-6.07	63.54	43.28	40.84	8.45	35.10	PK	---	---

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

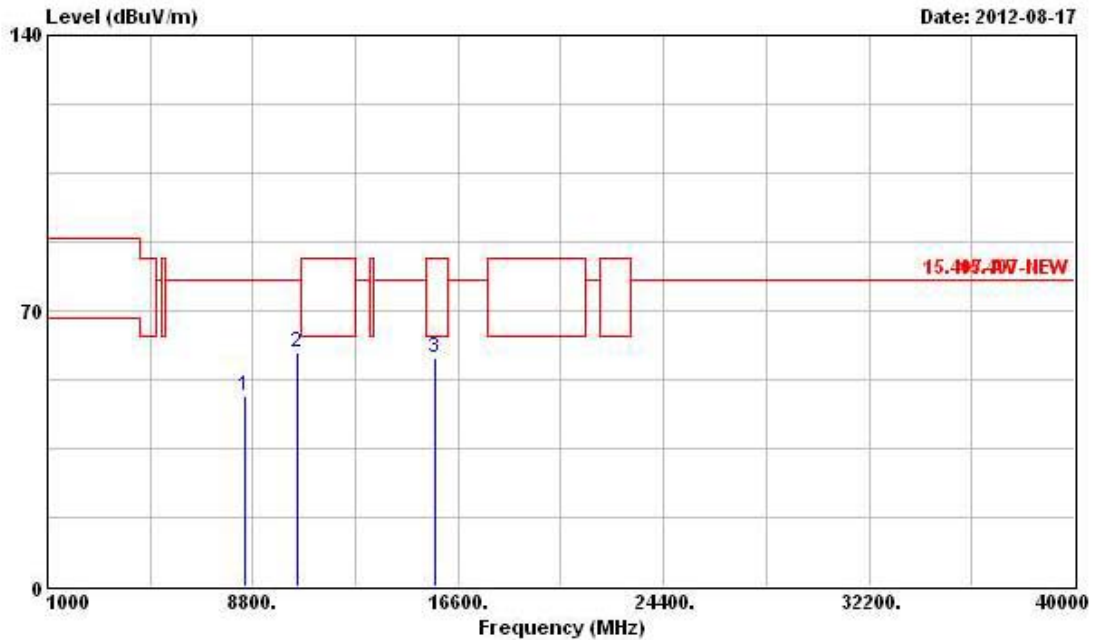
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11A5.2G-20M	Test Freq. (FX)	F3
Operating Function	Transmit	Polarization	V



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8518.000	48.50	-29.34	77.84	41.47	36.31	5.96	35.24	Peak	---	---
2	10480.000	59.35	-18.49	77.84	49.36	38.29	6.82	35.12	Peak	---	---
3	15720.000	57.84	-5.70	63.54	43.69	40.89	8.46	35.20	PK	---	---

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

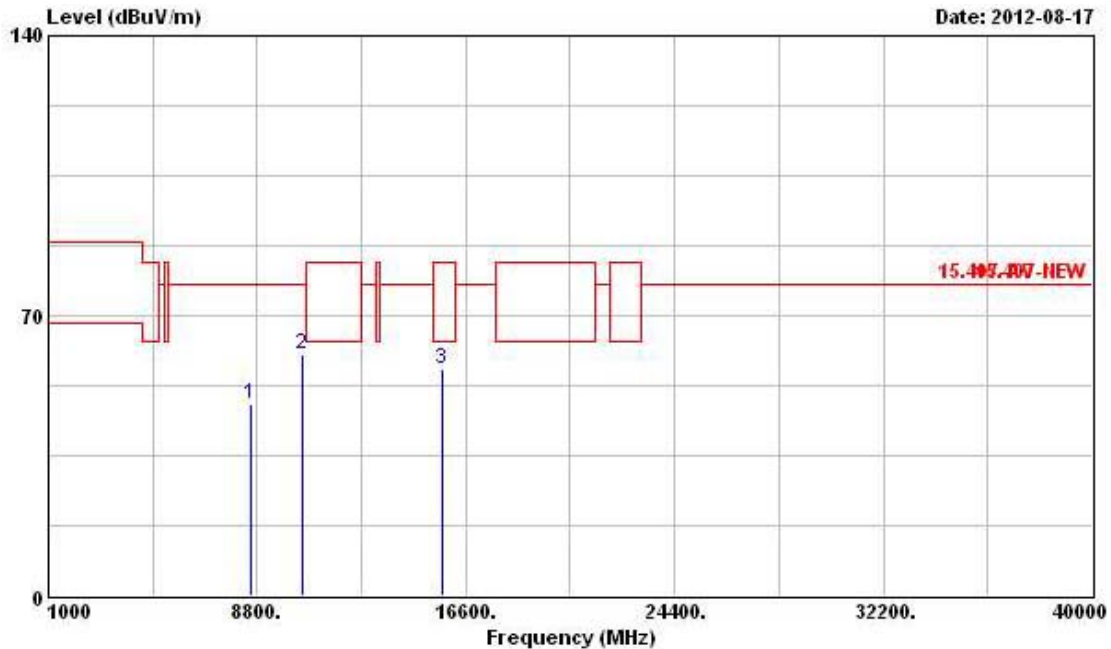
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11A5.2G-20M	Test Freq. (FX)	F3
Operating Function	Transmit	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8562.000	47.94	-29.90	77.84	40.88	36.34	5.97	35.25	Peak	---	---
2	10480.000	60.41	-17.43	77.84	50.42	38.29	6.82	35.12	Peak	---	---
3	15720.000	56.58	-6.96	63.54	42.43	40.89	8.46	35.20	PK	---	---

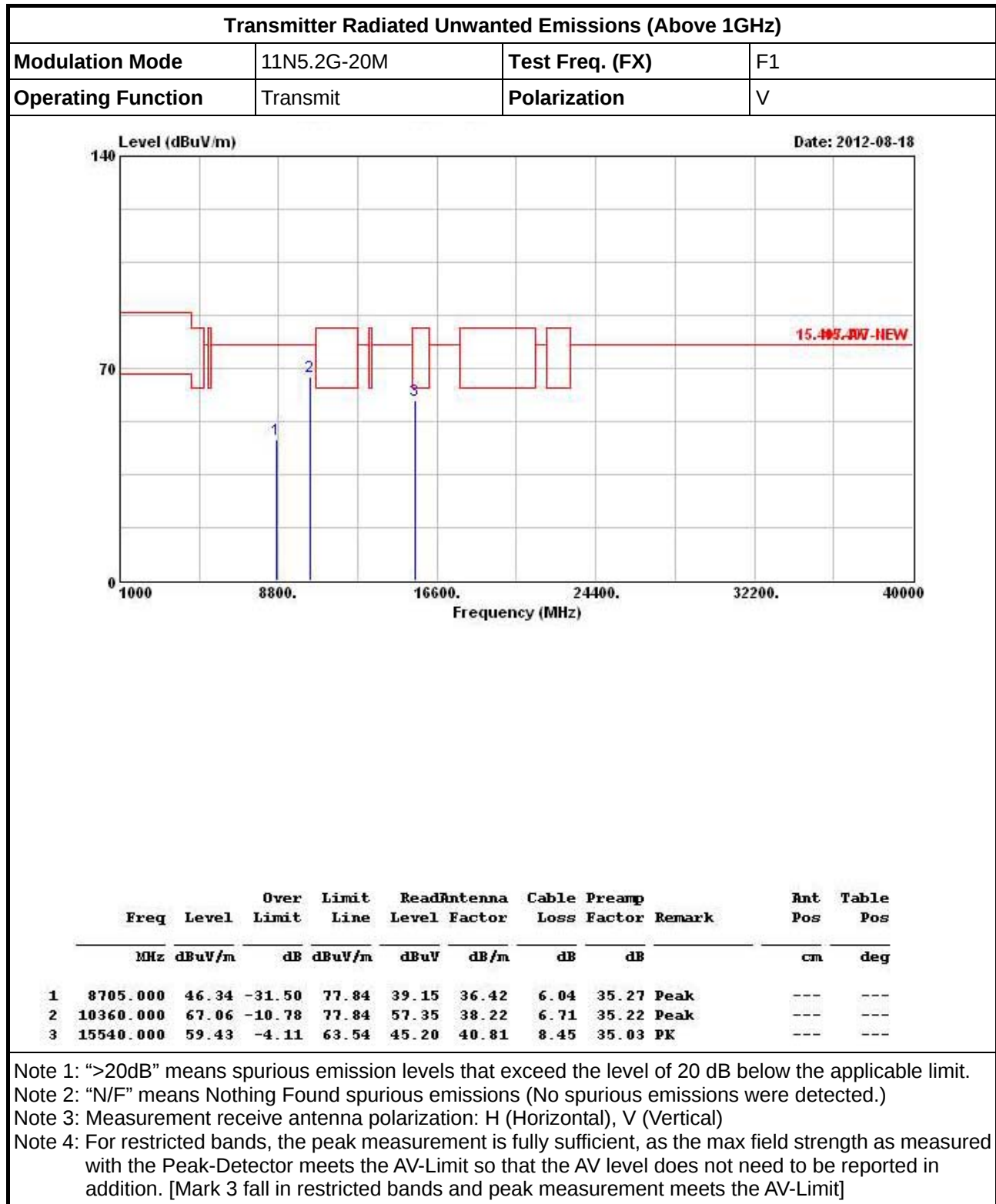
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

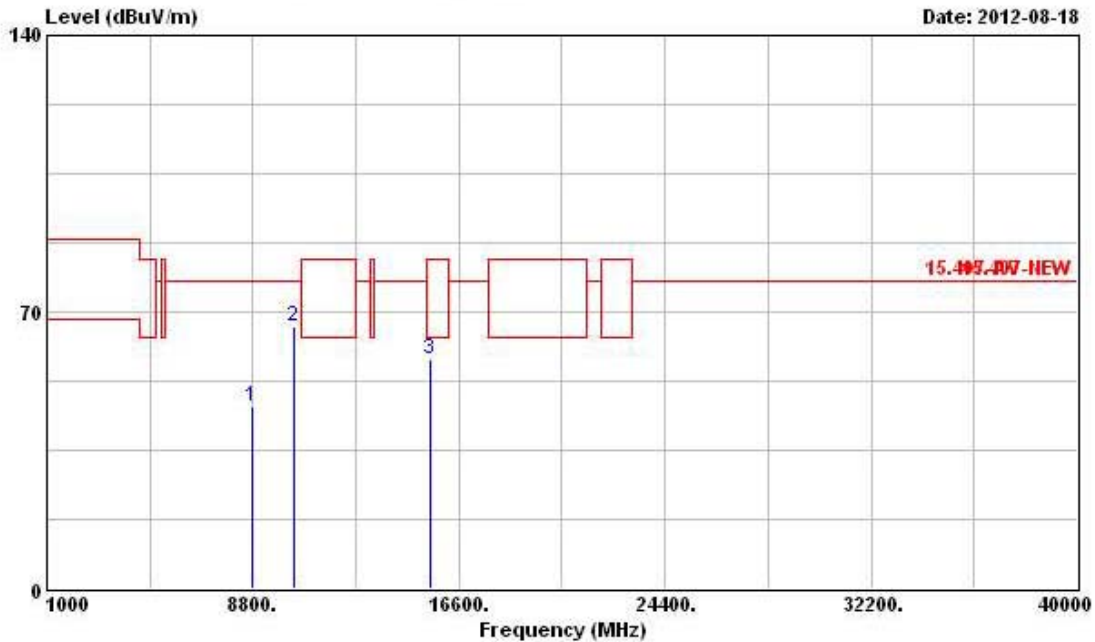
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

3.7.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11N-20M



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N5.2G-20M	Test Freq. (FX)	F1
Operating Function	Transmit	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8771.000	46.04	-31.80	77.84	38.80	36.46	6.06	35.28	Peak	---	---
2	10360.000	66.16	-11.68	77.84	56.45	38.22	6.71	35.22	Peak	---	---
3	15540.000	57.95	-5.59	63.54	43.72	40.81	8.45	35.03	PK	---	---

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

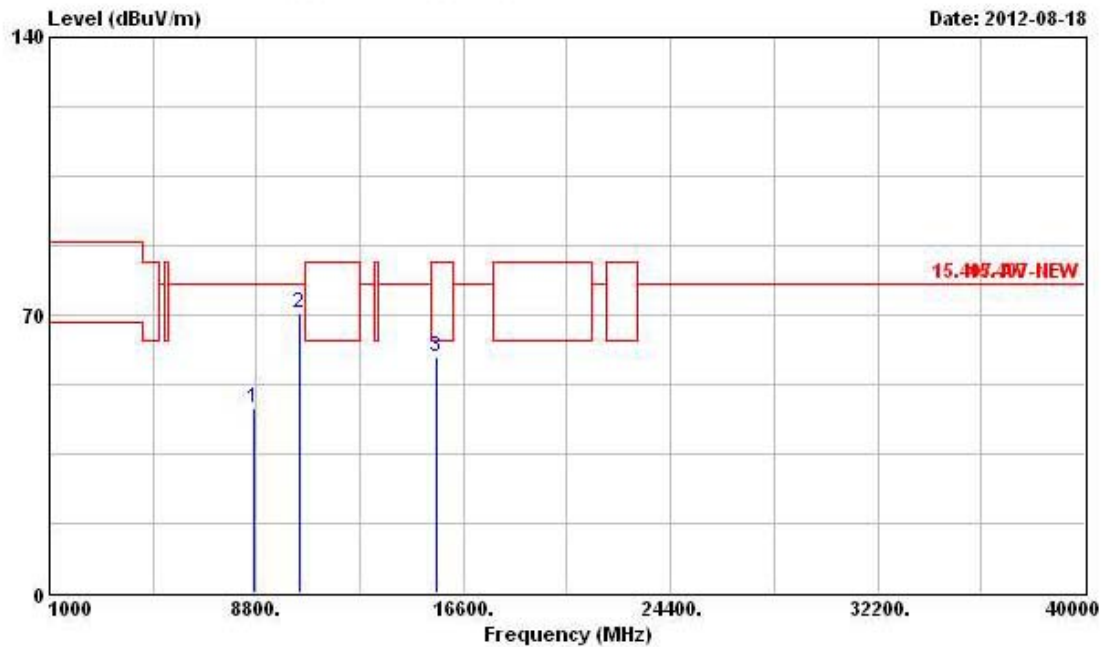
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N5.2G-20M	Test Freq. (FX)	F2
Operating Function	Transmit	Polarization	V



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8705.000	46.40	-31.44	77.84	39.21	36.42	6.04	35.27	Peak	---	---
2	10400.000	70.62	-7.22	77.84	60.81	38.24	6.75	35.18	Peak	---	---
3	15600.000	59.59	-3.95	63.54	45.40	40.84	8.45	35.10	PK	---	---

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

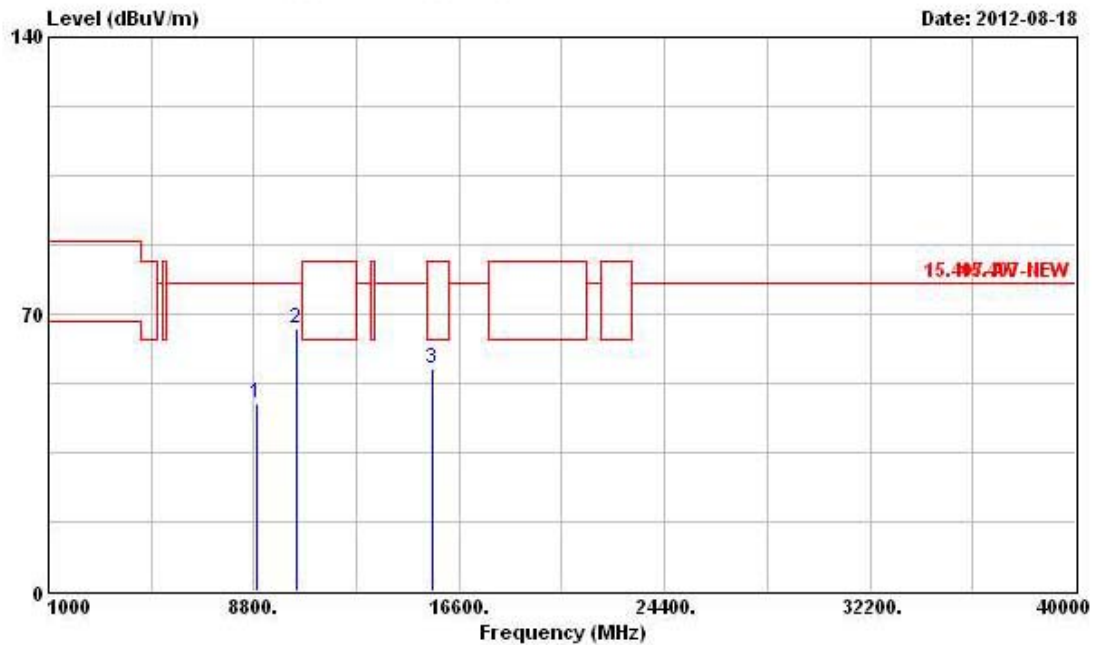
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N5.2G-20M	Test Freq. (FX)	F2
Operating Function	Transmit	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	8925.000	47.52	-30.32	77.84	40.15	36.55	6.13	35.31 Peak	---	---
2	10400.000	66.33	-11.51	77.84	56.52	38.24	6.75	35.18 Peak	---	---
3	15600.000	55.98	-7.56	63.54	41.79	40.84	8.45	35.10 PK	---	---

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

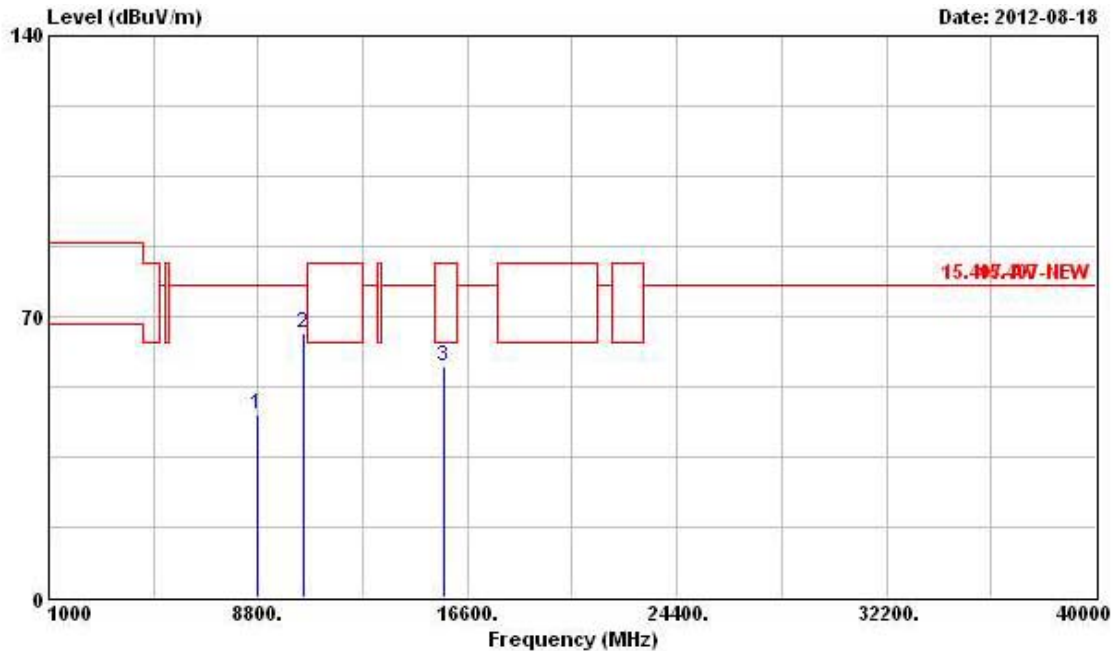
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N5.2G-20M	Test Freq. (FX)	F3
Operating Function	Transmit	Polarization	V



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8771.000	45.69	-32.15	77.84	38.45	36.46	6.06	35.28	Peak	---	---
2	10480.000	65.81	-12.03	77.84	55.82	38.29	6.82	35.12	Peak	---	---
3	15720.000	57.57	-5.97	63.54	43.42	40.89	8.46	35.20	PK	---	---

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

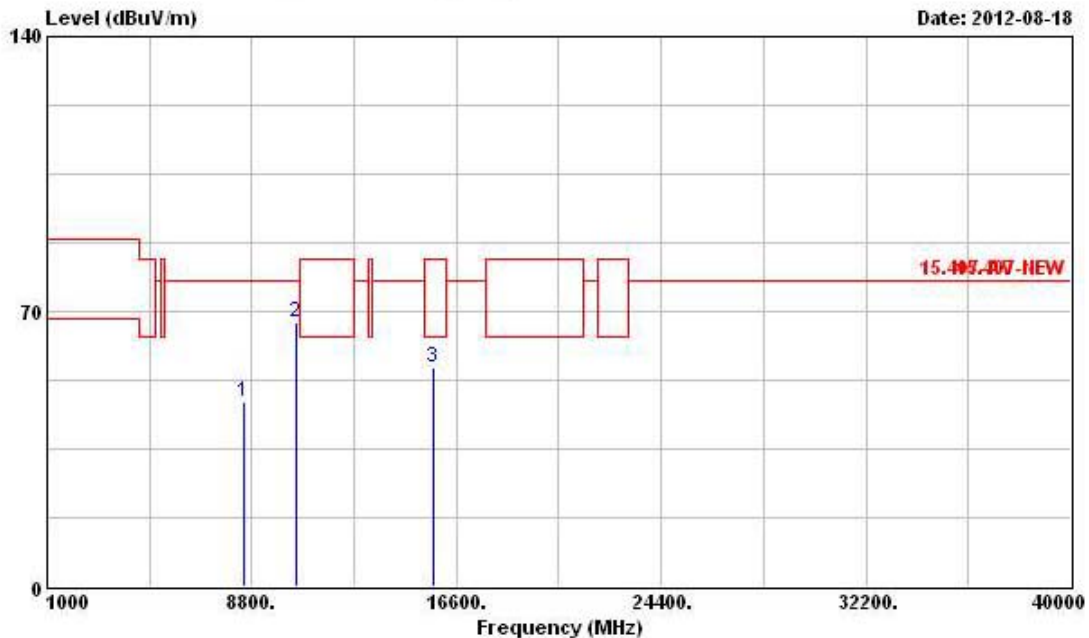
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N5.2G-20M	Test Freq. (FX)	F3
Operating Function	Transmit	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8529.000	47.08	-30.76	77.84	40.04	36.32	5.96	35.24	Peak	---	---
2	10480.000	67.09	-10.75	77.84	57.10	38.29	6.82	35.12	Peak	---	---
3	15720.000	55.84	-7.70	63.54	41.69	40.89	8.46	35.20	PK	---	---

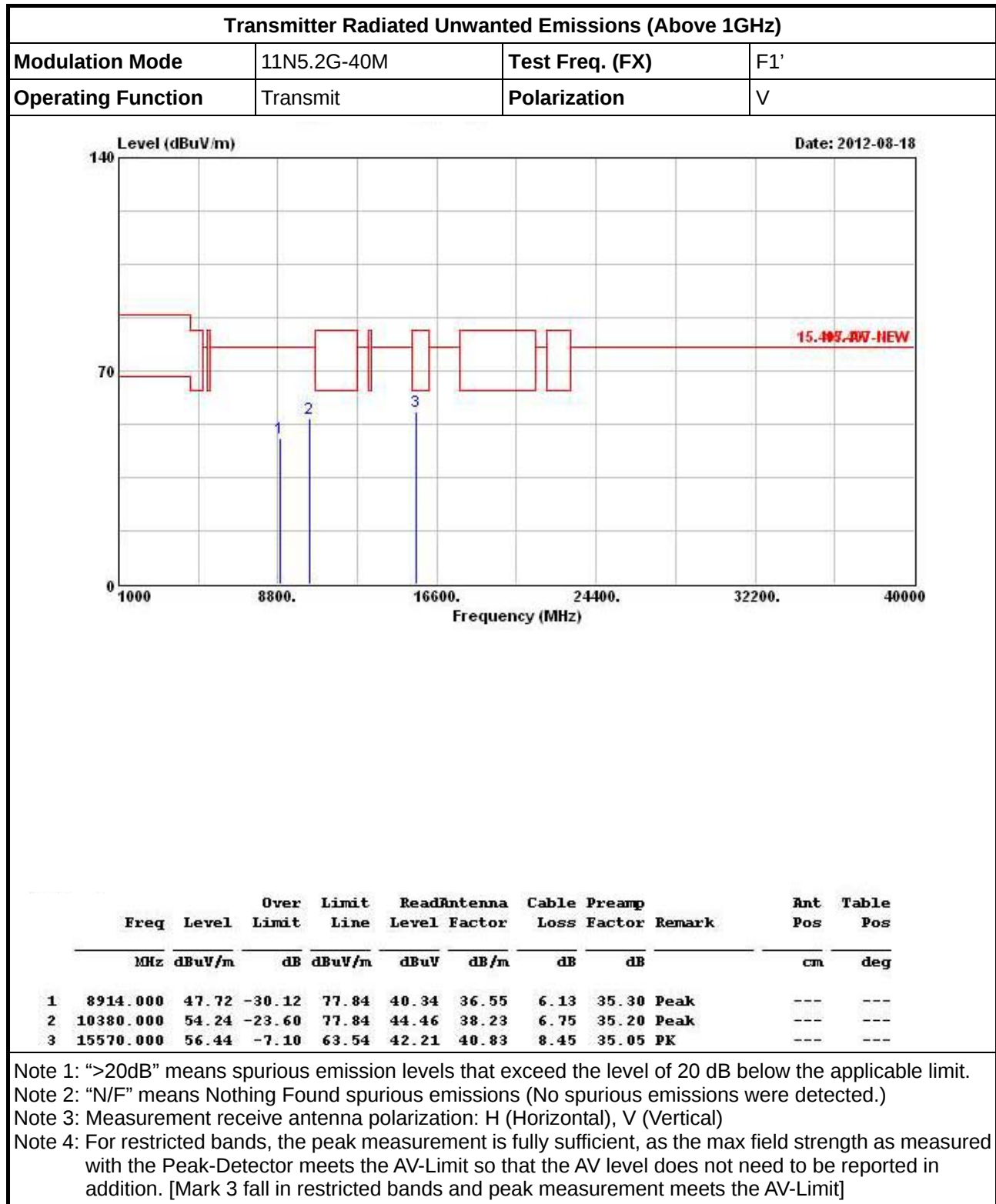
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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

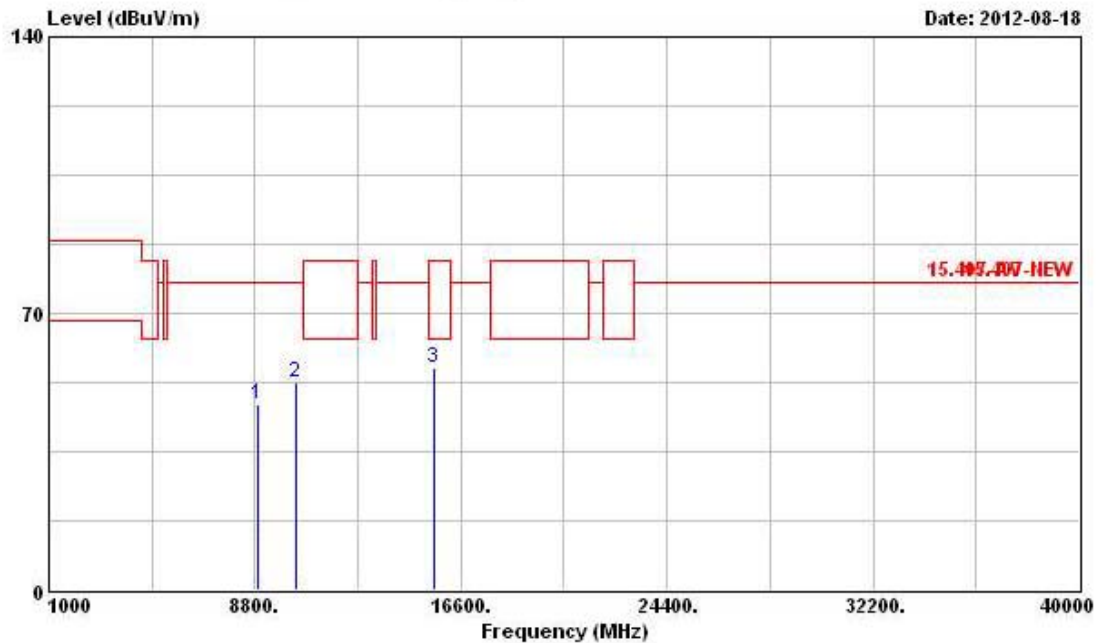
Note 4: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

3.7.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11N-40M



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N5.2G-40M	Test Freq. (FX)	F1'
Operating Function	Transmit	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8914.000	47.14	-30.70	77.84	39.76	36.55	6.13	35.30	Peak	---	---
2	10380.000	52.54	-25.30	77.84	42.76	38.23	6.75	35.20	Peak	---	---
3	15570.000	56.36	-7.18	63.54	42.13	40.83	8.45	35.05	PK	---	---

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

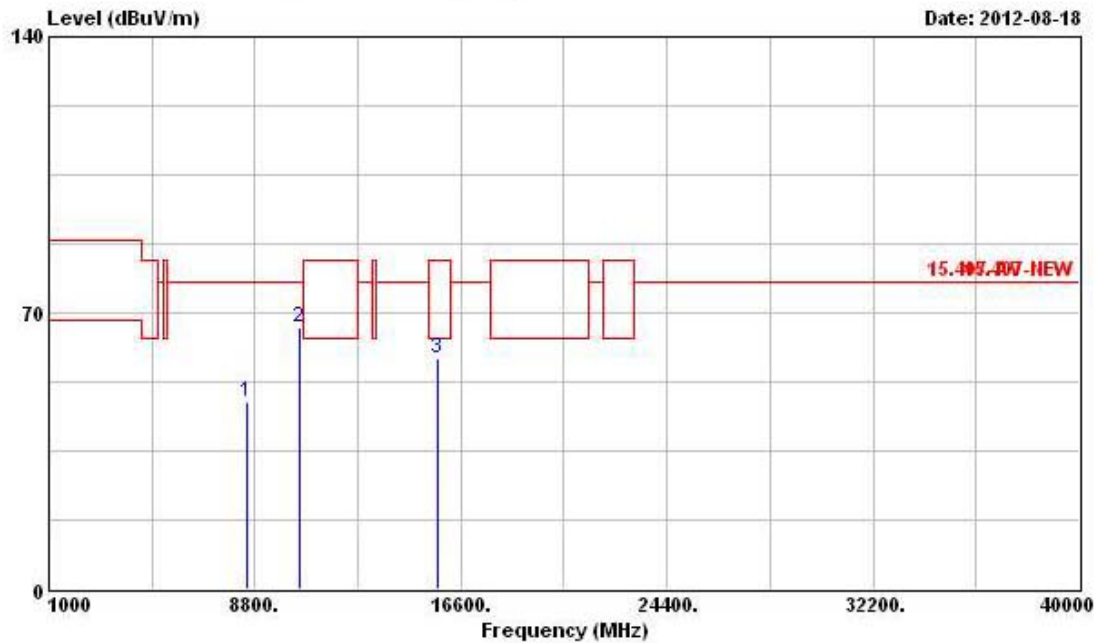
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N5.2G-40M	Test Freq. (FX)	F2'
Operating Function	Transmit	Polarization	V



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	8518.000	47.38	-30.46	77.84	40.35	36.31	5.96	35.24	Peak	---
2	10460.000	66.34	-11.50	77.84	56.39	38.27	6.82	35.14	Peak	---
3	15690.000	58.42	-5.12	63.54	44.26	40.88	8.46	35.18	PK	---

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

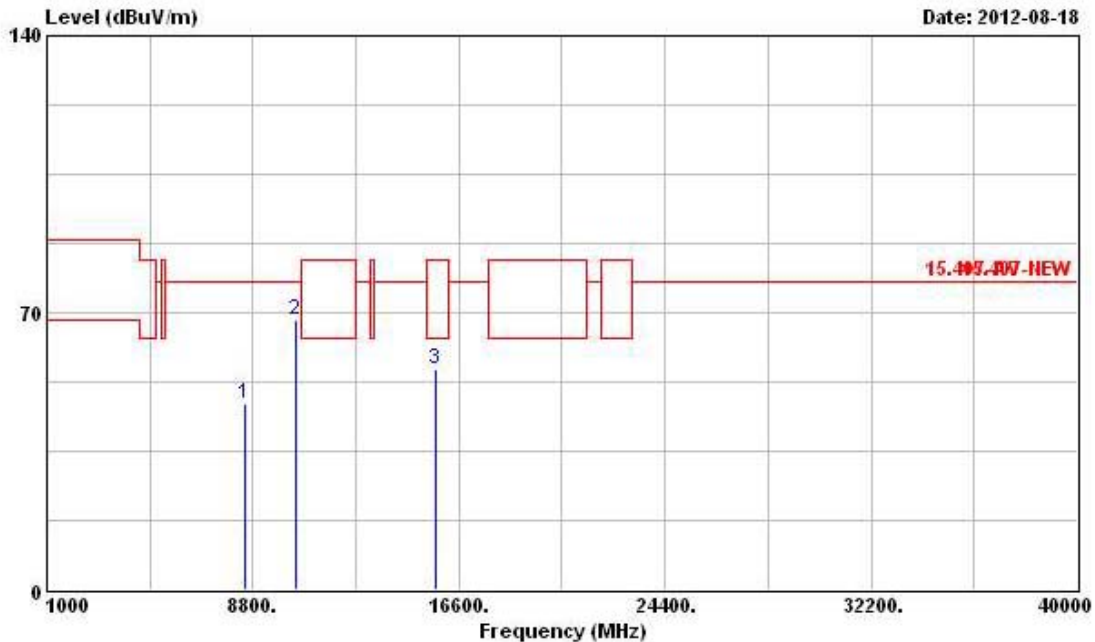
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N5.2G-40M	Test Freq. (FX)	F2'
Operating Function	Transmit	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8518.000	47.17	-30.67	77.84	40.14	36.31	5.96	35.24	Peak	---	---
2	10454.000	68.23	-9.61	77.84	58.32	38.27	6.78	35.14	Peak	---	---
3	15690.000	55.66	-7.88	63.54	41.50	40.88	8.46	35.18	PK	---	---

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. [Mark 3 fall in restricted bands and peak measurement meets the AV-Limit]

3.8 Frequency Stability

3.8.1 Frequency Stability Limit

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

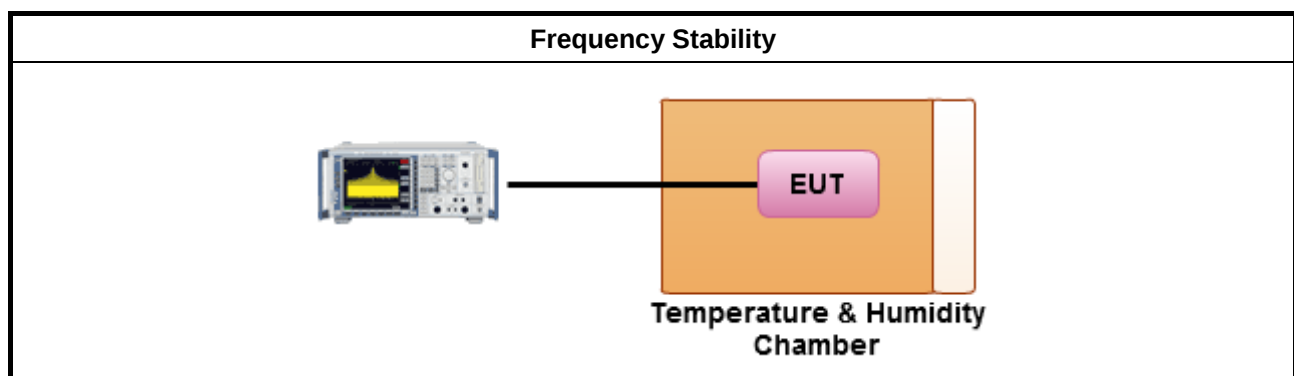
3.8.2 Measuring Instruments

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

3.8.3 Test Procedures

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

3.8.4 Test Setup



3.8.5 Test Result of Frequency Stability

Frequency Stability Result						
Condition	Freq. (MHz)	Frequency Stability (ppm)				
		0 min	2 min	5 min	10 min	Limit
T _{20°C} V _{max}	5200	-7.96	-8.08	-8.19	-8.08	20.0
T _{20°C} V _{min}	5200	-7.96	-8.08	-8.19	-8.08	20.0
T _{50°C} V _{nom}	5200	-5.88	-5.54	-5.65	-5.77	20.0
T _{40°C} V _{nom}	5200	-8.54	-8.65	-8.77	-8.88	20.0
T _{30°C} V _{nom}	5200	-8.77	-8.88	-9.00	-9.00	20.0
T _{20°C} V _{nom}	5200	-8.08	-8.19	-7.96	-7.96	20.0
T _{10°C} V _{nom}	5200	-6.00	-6.12	-6.23	-6.31	20.0
T _{0°C} V _{nom}	5200	-3.12	-3.23	-3.35	-3.46	20.0
T _{-10°C} V _{nom}	5200	0.00	-0.23	-0.35	-0.46	20.0
T _{-20°C} V _{nom}	5200	1.38	1.50	1.62	1.85	20.0
Result		Complied				
Note 1: Measure at 85 % [Vmin] and 115 % [Vmax] of the nominal voltage [Vnom]. The nominal voltage refer test report clause 1.1.6 for EUT operational condition.						

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9 kHz ~ 2.75 GHz	Mar. 23, 2012	Conduction (CO04-HY)
LISN	SCHWARZBECK MESS-ELEKTRO NIK	NSLK 8127	8127-477	9kHz ~ 30MHz	Feb. 08, 2012	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9 kHz ~ 30 MHz	Apr. 20, 2012	Conduction (CO04-HY)
RF Cable-CON	HUBER+SUHNE R	RG213/U	CB049	9 kHz ~ 30 MHz	Apr. 25, 2012	Conduction (CO04-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP 40	100305	9KHz~40GHz	Feb. 21, 2012	Conducted (TH01-HY)
Spectrum Analyzer	R&S	FSV 40	15195-01-00	9KHz~40GHz	Jan. 06, 2012	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Jun. 19, 2012	Conducted (TH01-HY)
AC Power Source	G.W	APS-9102	EL920581	AC 0V ~ 300V	Jul. 02, 2012	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20 ~ 100°C	Dec. 07, 2011	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100302	10MHz ~ 40GHz	Nov. 22, 2011	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	1027452	300MHz ~ 40GHz	Jan. 12, 2012	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	1124009	300MHz ~ 40GHz	Jan. 12, 2012	Conducted (TH01-HY)
RF Cable-2m	HUBER+SUHNE R	SUCOFLEX_104	SN 345672/4	1GHz ~ 26.5GHz	Dec. 03, 2011	Conducted (TH01-HY)
RF Cable-3m	HUBER+SUHNE R	SUCOFLEX_104	SN 345668/4	1GHz ~ 26.5GHz	Dec. 03, 2011	Conducted (TH01-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Jun. 09, 2011*	Conducted (TH01-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100593	9kHz ~ 40GHz	Sep. 01, 2011	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	May 10, 2012	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100kHz ~ 1.3GHz	Jul. 23, 2012	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02096	1GHz ~ 26.5GHz	Mar. 20, 2012	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz ~ 18GHz	Nov. 15, 2011	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz ~ 1GHz	Nov. 11, 2011	Radiation (03CH02-HY)
RF Cable-high	SUHNER	SUCOFLEX106	03CH02-HY	1GHz ~ 40GHz	Mar. 06, 2012	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30MHz ~ 2GHz	Oct. 22, 2011	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0~ 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 ~ 4 m	N/A	Radiation (03CH02-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 29, 2010*	Radiation (03CH02-HY)

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

5 Certification of TAF Accreditation



Certificate No. : L1190-120405

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,
Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria : ISO/IEC 17025:2005
Accreditation Number : 1190
Originally Accredited : December 15, 2003
Effective Period : January 10, 2010 to January 09, 2013
Accredited Scope : Testing Field, see described in the Appendix
Specific Accreditation Program : Accreditation Program for Designated Testing Laboratory for Commodities Inspection
Accreditation Program for Telecommunication Equipment Testing Laboratory
Accreditation Program for BSMI Mutual Recognition Arrangement with Foreign Authorities


Jay-San Chen
President, Taiwan Accreditation Foundation
Date: April 05, 2012

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