

FCC Test Report

Equipment : N600 DB Wireless N+ Router
Brand Name : Belkin
Model No. : F9K1102V2
FCC ID : K7SF9K1102V2
Standard : 47 CFR FCC Part 15.407
Applicant : Belkin International Inc.
Manufacturer : 12045 E. Waterfront Drive Playa Viste,
CA 90094, USA

The product sample received on Apr. 18, 2012 and completely tested on Jun. 21, 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.

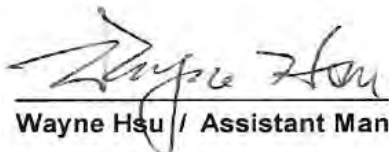

Wayne Hsu / Assistant Manager



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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	0.37511MHz: 40.04 (8.35 dB) - AV 42.74 (15.65dB) - QP [Ref. page 18]	FCC 15.207	Complied
3.2	15.407(a)	Emission Bandwidth	Bandwidth [MHz] 20MHz: 22.72 40MHz: 40.32	Information only	Complied
3.3	15.407(a)	RF Output Power (Maximum Conducted Output Power)	Power [dBm] 5180-5240MHz: 14.64 5190-5230MHz: 16.16	Power [dBm] 5180-5240MHz: 17 5190-5230MHz: 17	Complied
3.4	15.407(a)	Peak Power Spectral Density	PPSD [dBm/MHz] 5180-5240MHz: 1.87 5190-5230MHz: 0.93	PPSD [dBm/MHz] 5180-5240MHz: 4 5190-5230MHz: 4	Complied
3.5	15.407(a)	Peak Excursion	6.16 dB	13 dB	Complied
3.6	15.407(b)	Transmitter Radiated Bandedge Emissions	Restricted Bands [dBuV/m at 1m]: 5150.00MHz 77.29 (Margin 6.25dB) - PK 62.17 (Margin 1.37dB) - AV [Ref. page 45]	Non-Restricted Bands: ≤ -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]: 15600MHz 60.48 (Margin 3.06dB) - PK [Ref. page 54]	Non-Restricted Bands: ≤ -27 dBm (68.3dBuV/m@3m) Restricted Bands: FCC 15.209	Complied
3.8	15.407(g)	Frequency Stability	-3.88 ppm	Signal shall remain in-band	Complied
4.1	2.1091	Maximum Permissible Exposure	0.0292 mW/cm ²	1 mW/cm ²	Complied

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)	Designation of Emission
5150-5250	a	5180-5240	36-48 [4]	13.52	17M1D1D
5150-5250	n (HT20)	5180-5240	36-48 [4]	14.64	18M0D1D
5150-5250	n (HT40)	5190-5230	38-46 [2]	16.16	36M5D1D

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 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	17.12	N/A
n (HT20)	2	2	Uncorrelated	17.92	N/A
n (HT40)	2	2	Uncorrelated	36.48	N/A

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 Antenna Information

Antenna Category	
<input type="checkbox"/>	Equipment placed on the market without antennas
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
	<input checked="" 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 type="checkbox"/>	External antenna (dedicated antennas)
	<input type="checkbox"/> Single power level with corresponding antenna(s). Power Level (PL): 1
	<input type="checkbox"/> Multiple power level and corresponding antenna(s). Power Level (PL): 1~...
	<input type="checkbox"/> No RF connector provided
	<input type="checkbox"/> 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 type="checkbox"/> RF connector provided
	<input type="checkbox"/> Unique antenna connector. (e.g., MMCX, U.FL, IPX, and RP-SMA, RP-N type...)
	<input type="checkbox"/> Standard antenna connector. (e.g., SMA, N, BNC, and TNC type...)

Antenna General Information									
Antenna Port (Total 2 Port)				1(TX/RX), 2(TX/RX)					
Maximum RF Output Power Level (PL)				1					
Transmit Chains Power Distribution				<input checked="" type="checkbox"/> symmetrical distribution <input type="checkbox"/> asymmetrical distribution					
Ant. No.	PL	Ant. Port [Ant No. X connect to Ant. Port Y]	Ant. Cat.	Ant. Type	Brand	Model	G _{ANT} (dBi)	DG (dBi) [correlated] N _{TX} = 1	DG (dBi) [uncorrelated] N _{TX} = 2
1	1	1	Integral	PIFA	-	-	6.27	N/A	5.5
2	1	2	Integral	PIFA	-	-	4.51		
<input checked="" type="checkbox"/> The equipment is normally installed and point-to-point or point-to-multipoint systems: Ant. No. <u>1,2</u>									
<p>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}</p> <p>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}} + ... + 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}} + ... + 10^{G_{N/10}}) / N] dBi</p>									

1.1.3 Type of EUT

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

1.1.4 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)	Voltage Duty Factor [dB] – (20 log 1/x)
<input checked="" type="checkbox"/> 100% - IEEE 802.11a	0.00	0.00
<input checked="" type="checkbox"/> 100% - IEEE 802.11n (HT20)	0.00	0.00
<input checked="" type="checkbox"/> 100% - IEEE 802.11n (HT40)	0.00	0.00

1.1.5 EUT Operational Condition

Supply Voltage	<input checked="" type="checkbox"/> AC mains	<input type="checkbox"/> DC	
Type of DC Source	<input checked="" type="checkbox"/> Internal DC supply	<input type="checkbox"/> External DC adapter	<input type="checkbox"/> Battery
Operational Voltage	<input checked="" type="checkbox"/> Vnom (110 V)	<input checked="" type="checkbox"/> Vmax (126.5 V)	<input checked="" type="checkbox"/> Vmin (93.5 V)
Operational Climatic	<input checked="" type="checkbox"/> Tnom (20°C)	<input checked="" type="checkbox"/> Tmax (50°C)	<input checked="" type="checkbox"/> Tmin (-30°C)

1.1.6 DFS and TPC Information

The DFS Related Operating Mode(s) of the Equipment					
<input checked="" type="checkbox"/> Master w/o operating DFS band					
<input type="checkbox"/> Client with radar detection					
<input type="checkbox"/> Client without radar detection					
Communication Mode		<input checked="" type="checkbox"/> IP Based (Load Based)		<input type="checkbox"/> Frame Based	
IEEE Std. 802.11 Protocol	Frequency Range (MHz)	TPC (Transmit Power Control)	Ad-hoc (Active Scan)	Hotspot (Active Scan)	Passive Scan (Client)
a	<input checked="" type="checkbox"/> 5150-5250	No	No	Yes	No
n (HT20)	<input type="checkbox"/> 5250-5350	-	-	-	-
n (HT40)	<input type="checkbox"/> 5470-5600	-	-	-	-
	<input type="checkbox"/> 5600-5650	-	-	-	-
	<input type="checkbox"/> 5650-5725	-	-	-	-

1.2 Accessories and Support Equipment

Accessories				
No.	Equipment	Brand Name	Model Name	Serial No.
1	AC Adapter 1	belkin	DSA-12PFE-12 BUS 120100	-
2	AC Adapter 2	Sunny	SYS1381-1212-W2	-

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

1.3 Testing Applied Standards

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

- ◆ 47 CFR FCC Part 15
- ◆ ANSI C63.10-2009
- ◆ FCC KDB 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

1.4 Testing Location Information

Testing Location				
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973		
<input checked="" type="checkbox"/>	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085		
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Conducted Emission	CO04-HY	Sam	23°C / 47%	22-May-12
RF Conducted	TH02-CB	Denis	23°C / 63%	15-Jun-12 ~ 21-Jun-12
Radiated Emission	03CH02-HY	Streak	26.3°C / 68%	20-May-12 ~ 31-May-12

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 - HWA YA			
Test Item		Uncertainty	Limit
AC power-line conducted emissions		± 2.26 dB	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

Measurement Uncertainty - JHUBEI		
Test Item	Uncertainty	Limit
Emission bandwidth, 6dB bandwidth	±1.32 %	N/A
RF output power, conducted	±0.72 dB	N/A
Power density, conducted	±0.61 dB	N/A
Temperature	±0.7 °C	N/A
Humidity	±2.6 %	N/A
DC and low frequency voltages	±3.4 %	N/A
Time	±1.82 %	N/A
Duty Cycle	±1.69 %	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	6Mbps	11A5.2G-20M	13.52	1.52
n (HT20)	2	MCS 0-15	MCS 8	11N5.2G-20M	14.64	1.87
n (HT40)	2	MCS 0-15	MCS 8	11N5.2G-40M	16.16	0.93

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 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					
Power Level		1			
Test Software Version		DMAX_1.5.1			
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	51	6 Mbps	13.05
11A5.2G-20M	1	5200	51	6 Mbps	13.52
11A5.2G-20M	1	5240	51	6 Mbps	13.50
11N5.2G-20M	2	5180	51/49	MCS 8	13.43
11N5.2G-20M	2	5200	51/49	MCS 8	14.64
11N5.2G-20M	2	5240	51/48	MCS 8	14.37
11N5.2G-40M	2	5190	51/51	MCS 8	14.49
11N5.2G-40M	2	5230	55/53	MCS 8	16.16




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

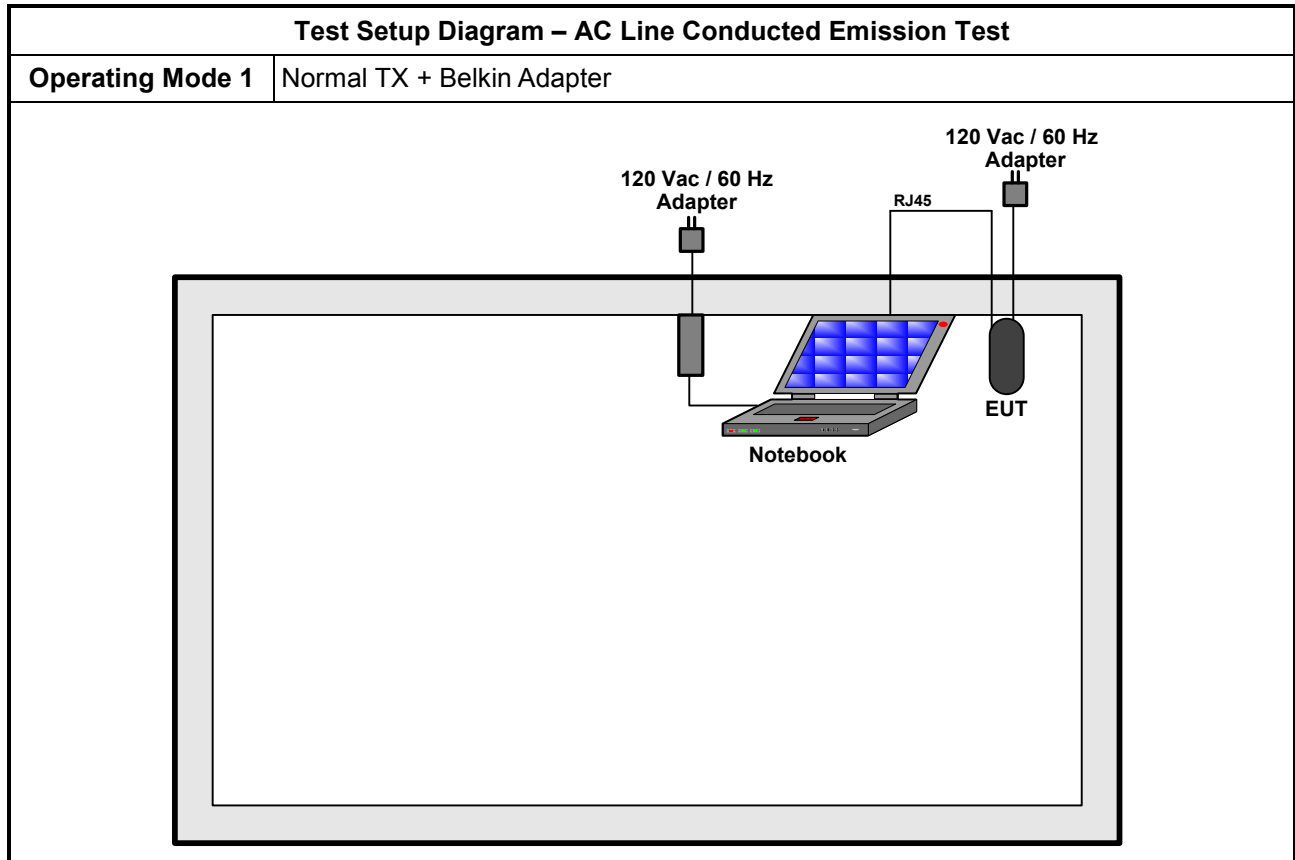
The Worst Case Mode for Following Conformance Tests				
Tests Item	AC power-line conducted emissions			
Condition	AC power-line conducted measurement for line and neutral			
Operating Mode	Operating Mode Description	Worst Modulation Mode	Test Freq.	Power Level
1	Normal TX + Belkin Adapter	11N5.2G-40M	F2'	1
2	Normal TX + Sunny Adapter	11N5.2G-40M	F2'	1
For operating mode 1 is the worst case and it was record in this test report.				

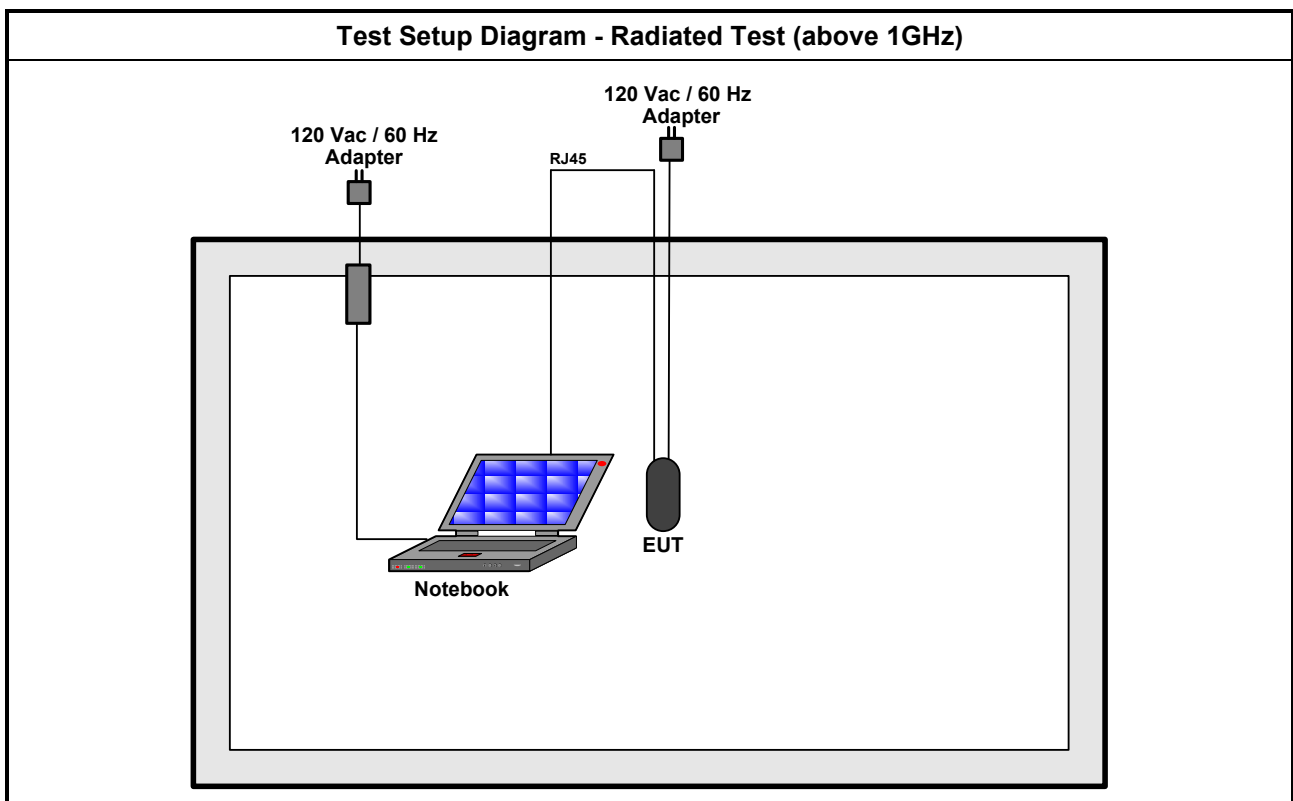
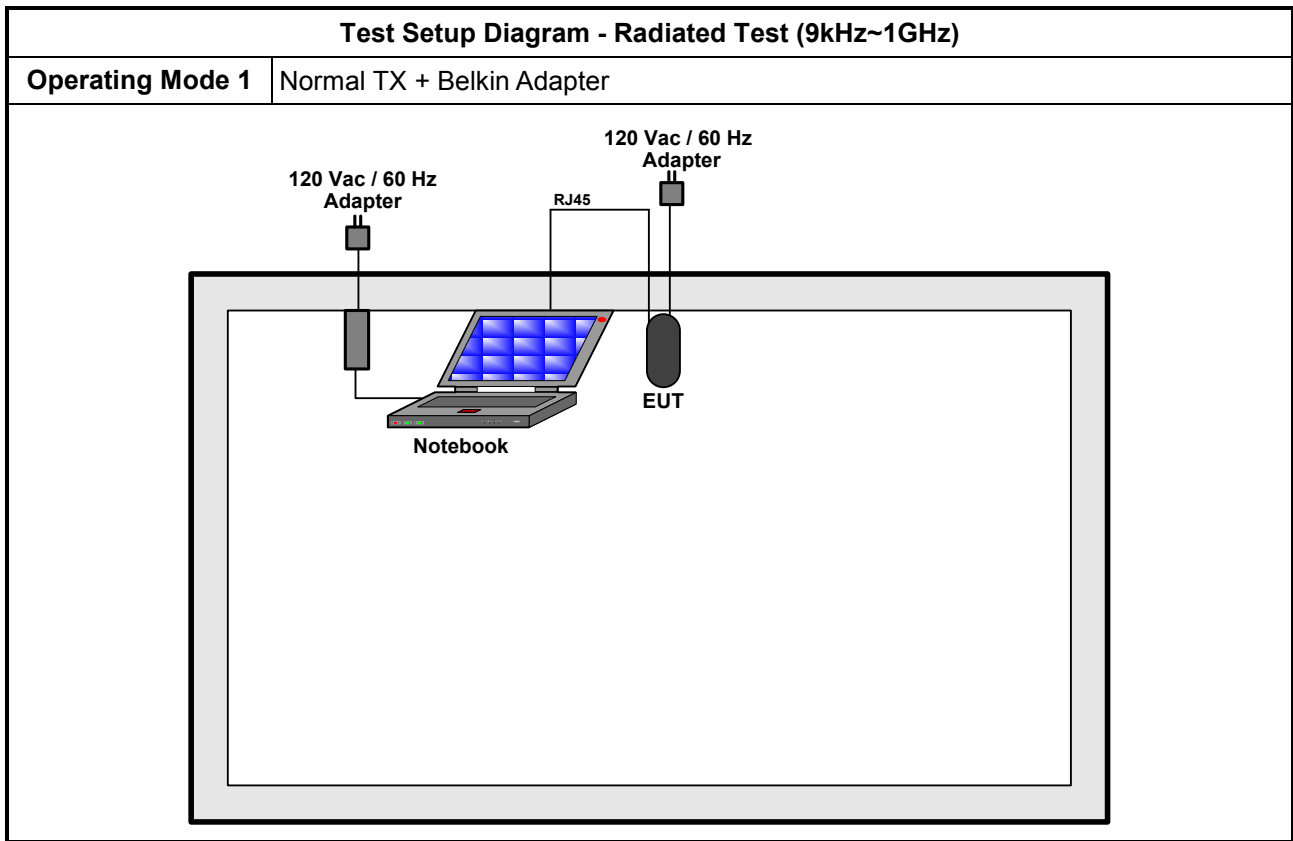
The Worst Case Mode for Following Conformance Tests				
Tests Item	RF Output Power Peak Power Spectral Density Emission Bandwidth Peak Excursion			
Test Condition	Conducted measurement at transmit chains			
Worst Modulation Mode	Number of Transmit Chains (N _{TX})	Worst Data Rate / MCS	Test Frequency	Power Level
11A5.2G-20M	1	6Mbps	F1, F2, F3	1
11N5.2G-20M	2	MCS 8	F1, F2, F3	1
11N5.2G-40M	2	MCS 8	F1', F2'	1

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	Power Level
11A5.2G-20M	1	6Mbps	F1	1
11A5.2G-20M	1	6Mbps	F3	1
11N5.2G-20M	2	MCS 8	F1	1
11N5.2G-20M	2	MCS 8	F3	1
11N5.2G-40M	2	MCS 8	F1'	1
11N5.2G-40M	2	MCS 8	F2'	1

The Worst Case Mode for Following Conformance Tests						
Tests Item	Transmitter Radiated Unwanted 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. EUT shall be performed two or three orthogonal planes.					
	<input type="checkbox"/> 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	<input checked="" type="checkbox"/> 1. Normal TX + Belkin Adapter					
	<input checked="" type="checkbox"/> 2. Normal TX + Sunny Adapter					
Worst Modulation Mode	Number of Transmit Chains (N_{TX})	Worst Data Rate / MCS	Test Frequency	Power Level	Ant No.	Worst Orthogonal Planes of EUT
11A5.2G-20M	1	6Mbps	F1, F2, F3	1	1,2	Y Plane
11N5.2G-20M	2	MCS 8	F1, F2, F3	1	1,2	Y Plane
11N5.2G-40M	2	MCS 8	F1', F2'	1	1,2	Y Plane
Orthogonal Planes of EUT	X Plane		Y Plane		Z Plane	
						
For operating mode 1 is the worst case and it was record in this test report.						

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.

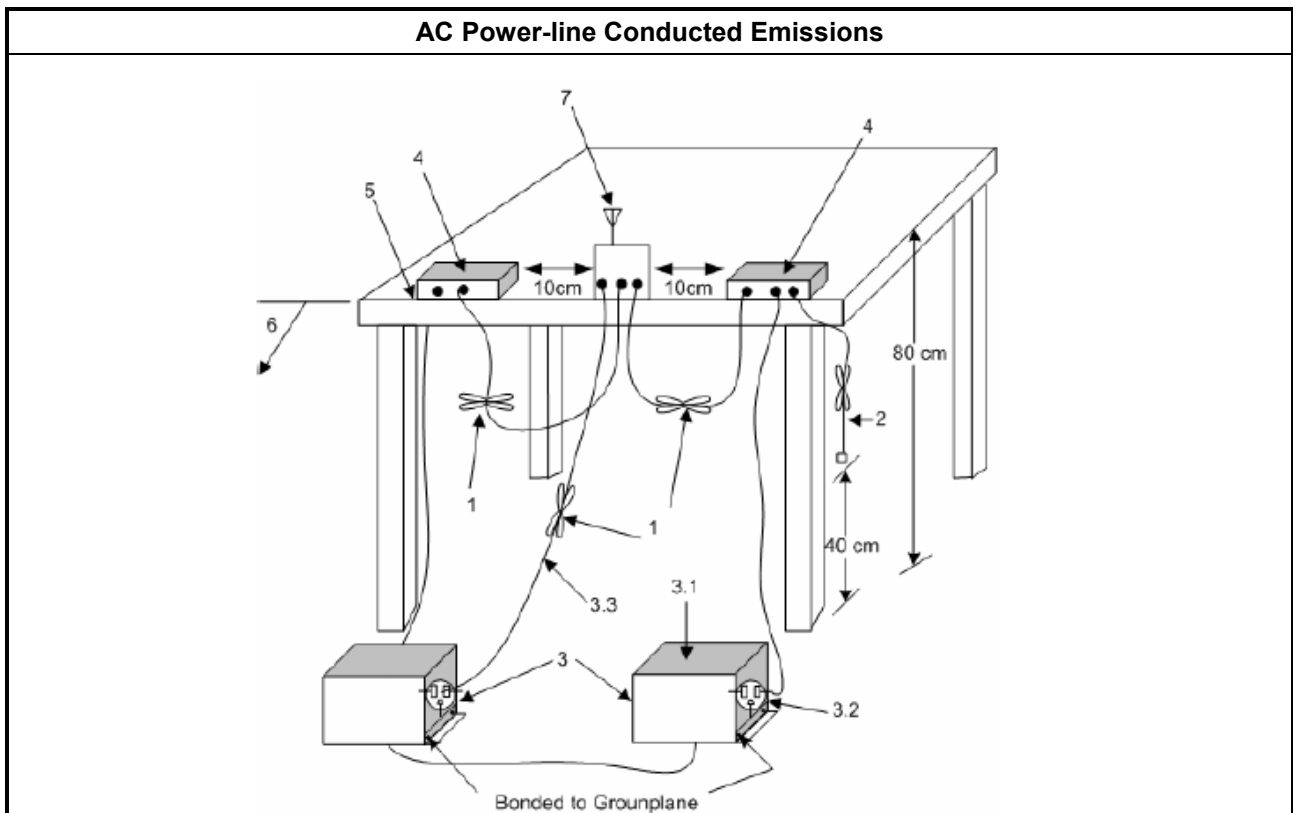
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

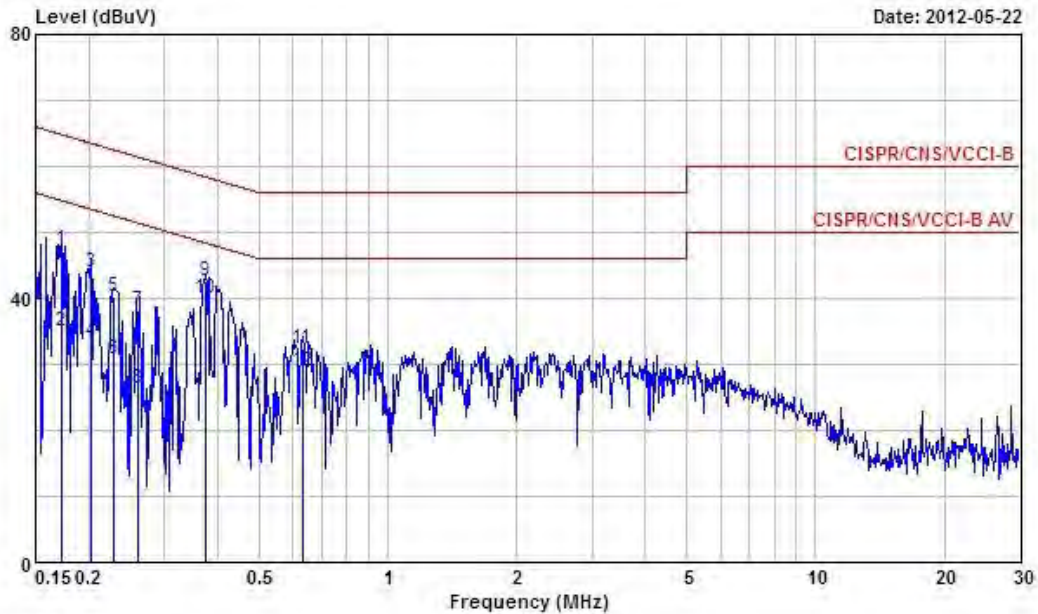
Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions.

3.1.4 Test Setup



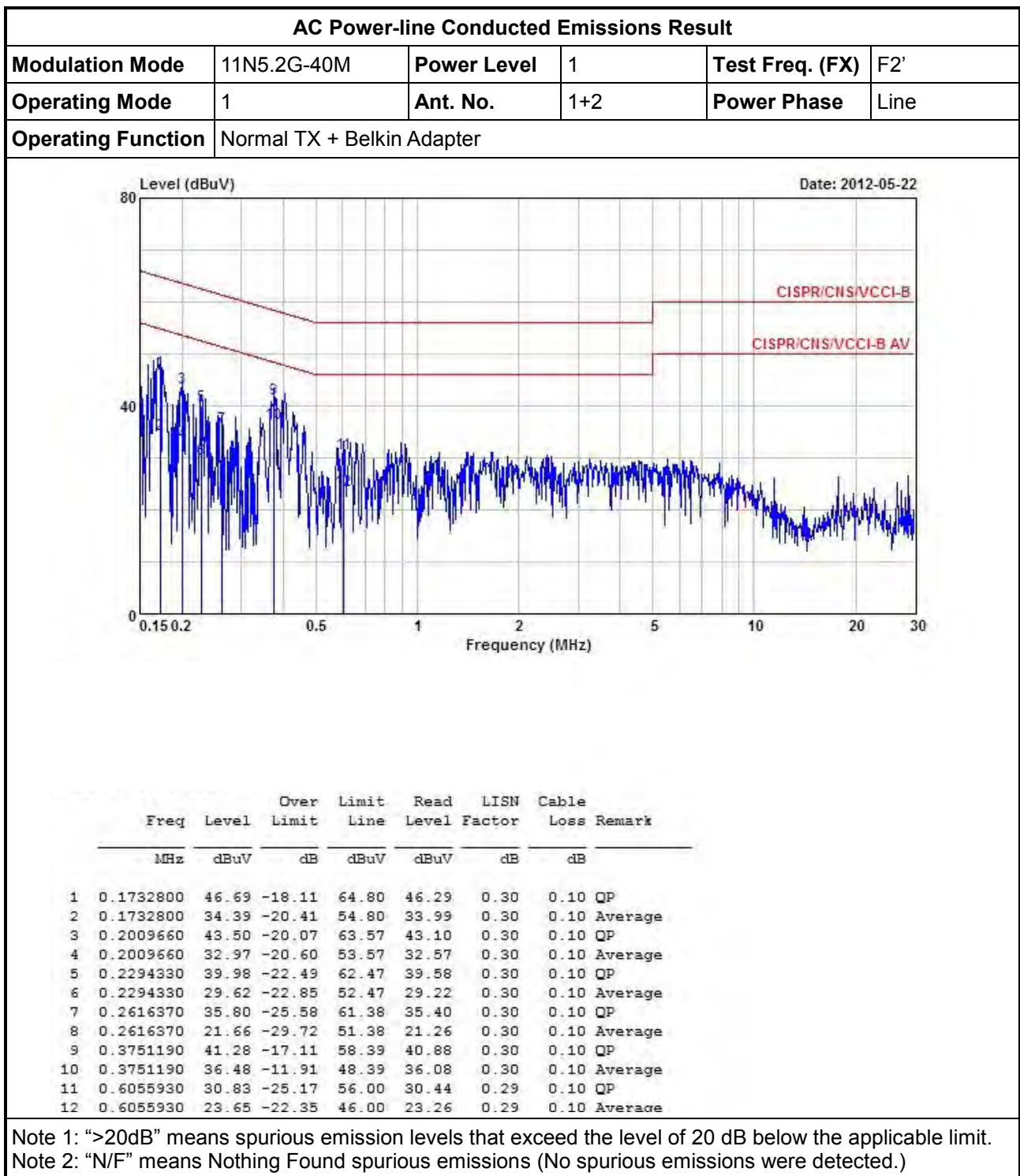
3.1.5 Test Result of AC Power-line Conducted Emissions

AC Power-line Conducted Emissions Result					
Modulation Mode	11N5.2G-40M	Power Level	1	Test Freq. (FX)	F2'
Operating Mode	1	Ant. No.	1+2	Power Phase	Neutral
Operating Function	Normal TX + Belkin Adapter				



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1721540	47.31	-17.55	64.86	46.95	0.26	0.10	QP
2	0.1721540	35.01	-19.85	54.86	34.65	0.26	0.10	Average
3	0.2018130	43.91	-19.63	63.54	43.56	0.25	0.10	QP
4	0.2018130	33.55	-19.99	53.54	33.20	0.25	0.10	Average
5	0.2292570	40.23	-22.25	62.48	39.88	0.25	0.10	QP
6	0.2292570	30.83	-21.65	52.48	30.48	0.25	0.10	Average
7	0.2603570	38.19	-23.23	61.42	37.84	0.25	0.10	QP
8	0.2603570	26.30	-25.12	51.42	25.95	0.25	0.10	Average
9	0.3751190	42.74	-15.65	58.39	42.40	0.24	0.10	QP
10	0.3751190	40.04	-8.35	48.39	39.70	0.24	0.10	Average
11	0.6304790	32.46	-23.54	56.00	32.12	0.24	0.10	QP
12	0.6304790	28.87	-17.13	46.00	28.53	0.24	0.10	Average

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	
<input checked="" type="checkbox"/>	For the 5.15-5.25 GHz band, the maximum conducted output power shall not exceed the lesser of 50 mW or 4 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.
<input type="checkbox"/>	For the 5.25-5.35 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.
<input type="checkbox"/>	For the 5.47-5.725 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.
<input type="checkbox"/>	For the 5.725-5.825 GHz band, the maximum conducted output power shall not exceed the lesser of 1 W or 17 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.
LE-LAN Devices	
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.

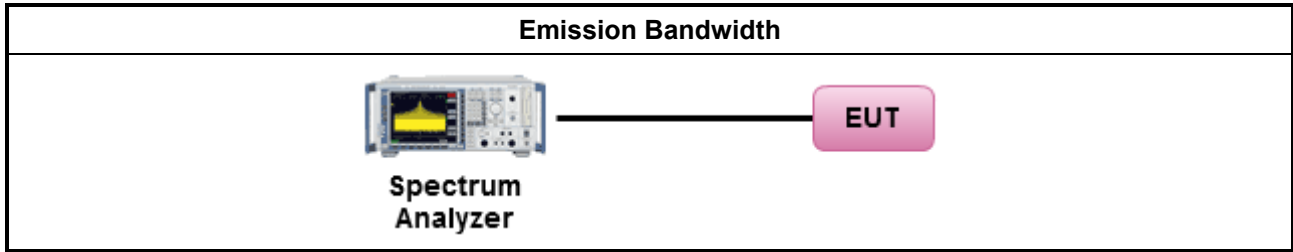
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method	
<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 789033, clause D for EBW measurement.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
<input checked="" type="checkbox"/>	Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.
<input checked="" type="checkbox"/>	For conducted measurement.
<input checked="" type="checkbox"/>	For conducted measurements on devices with multiple transmit chains using options given below:
<input type="checkbox"/>	Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
<input checked="" type="checkbox"/>	Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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



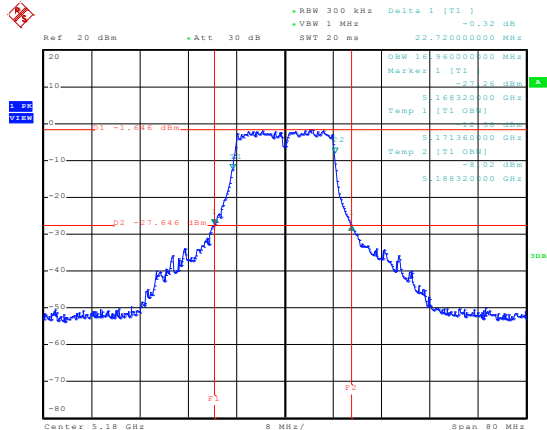
3.2.5 Test Result of Emission Bandwidth

UNII Emission Bandwidth Result					
Power Level	1		Emission Bandwidth (MHz)		
Modulation Mode	N _{TX}	Freq. (MHz)	26dB Bandwidth	Conducted Power Limit (dBm)	
				Calculation Power Limit	Final Power Limit
11A5.2G-20M	1	5180	22.72	17.6	17.0
11A5.2G-20M	1	5200	22.56	17.5	17.0
11A5.2G-20M	1	5240	22.56	17.5	17.0
11N5.2G-20M	2	5180	22.08	17.4	17.0
11N5.2G-20M	2	5200	21.76	17.4	17.0
11N5.2G-20M	2	5240	22.08	17.4	17.0
11N5.2G-40M	2	5190	39.36	20.0	17.0
11N5.2G-40M	2	5230	40.32	20.1	17.0
Result			Complied		
Note 1: N _{TX} = Number of Transmit Chains					

LE-LAN Emission Bandwidth Result					
Power Level	1		Emission Bandwidth (MHz)		
Modulation Mode	N _{TX}	Freq. (MHz)	99% Bandwidth	e.i.r.p. Power Limit (dBm)	
				Calculation Power Limit	Final Power Limit
11A5.2G-20M	1	5180	16.96	16.3	16.2
11A5.2G-20M	1	5200	16.96	16.3	16.2
11A5.2G-20M	1	5240	17.12	16.3	16.1
11N5.2G-20M	2	5180	17.92	16.5	15.6
11N5.2G-20M	2	5200	17.92	16.5	15.6
11N5.2G-20M	2	5240	17.92	16.5	15.9
11N5.2G-40M	2	5190	36.48	19.6	17.0
11N5.2G-40M	2	5230	36.48	19.6	17.0
Result			Complied		
Note 1: N _{TX} = Number of Transmit Chains					

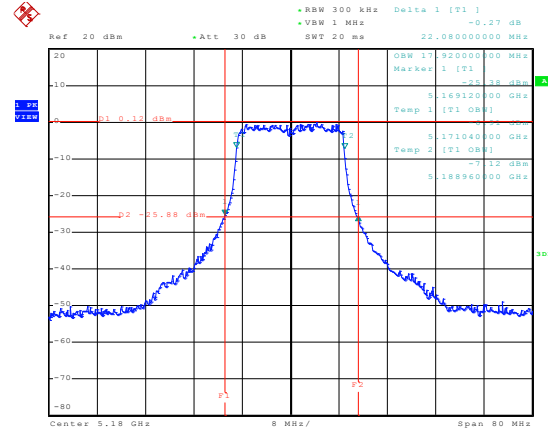
Emission Bandwidth Plots

11A5.2G-20M - F1



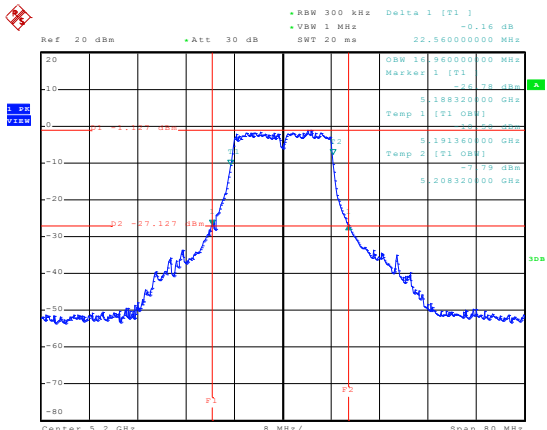
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11N5.2G-20M - F1



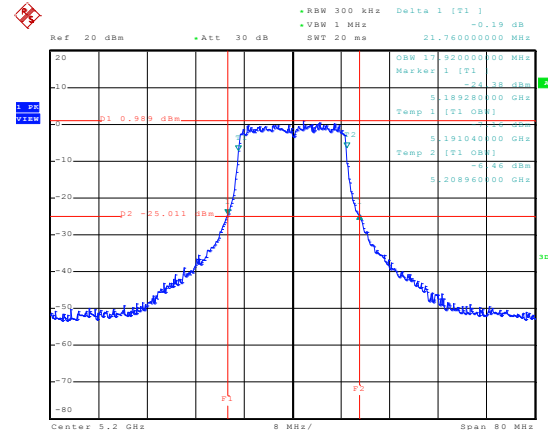
Date: 15.JUN.2012 14:13:18

11A5.2G-20M - F2



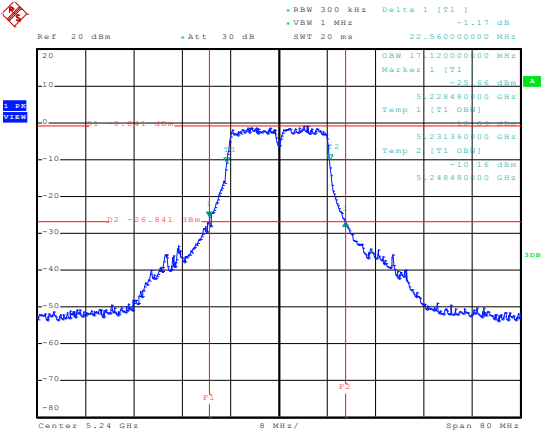
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11N5.2G-20M - F2



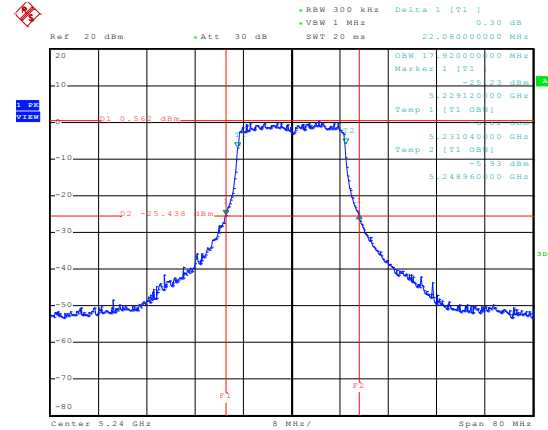
Date: 15.JUN.2012 14:13:53

11A5.2G-20M - F3



Date: 15.JUN.2012 14:15:23

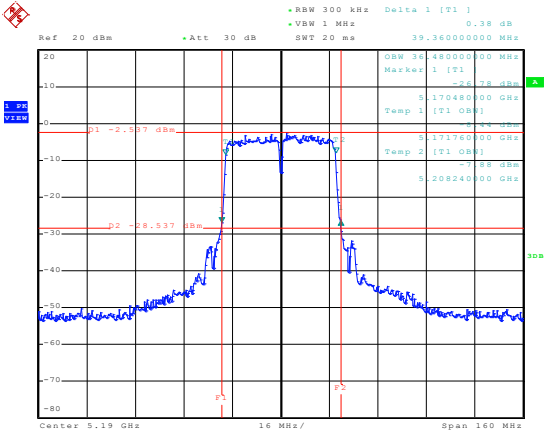
11N5.2G-20M - F3



Date: 15.JUN.2012 14:14:30

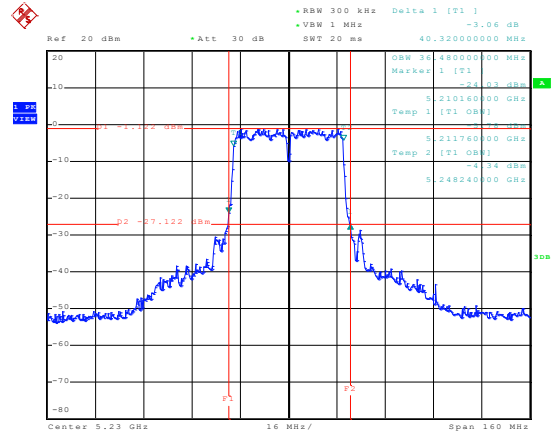
Emission Bandwidth Plots

11N5.2G-40M – F1'



Date: 15.JUN.2012 13:59:43

11N5.2G-40M – F2'



Date: 15.JUN.2012 14:01:05

3.3 RF Output Power

3.3.1 RF Output Power Limit

Maximum Conducted Output Power Limit	
UNII Devices	
<input checked="" type="checkbox"/>	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 $P_{Out} = 17 - (G_{TX} - 6)$.
<input type="checkbox"/>	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 $P_{Out} = 24 - (G_{TX} - 6)$.
<input type="checkbox"/>	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 $P_{Out} = 24 - (G_{TX} - 6)$.
<input type="checkbox"/>	For the 5.725-5.825 GHz band:
<input type="checkbox"/>	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 $P_{Out} = 30 - (G_{TX} - 6)$.
<input type="checkbox"/>	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	
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.	

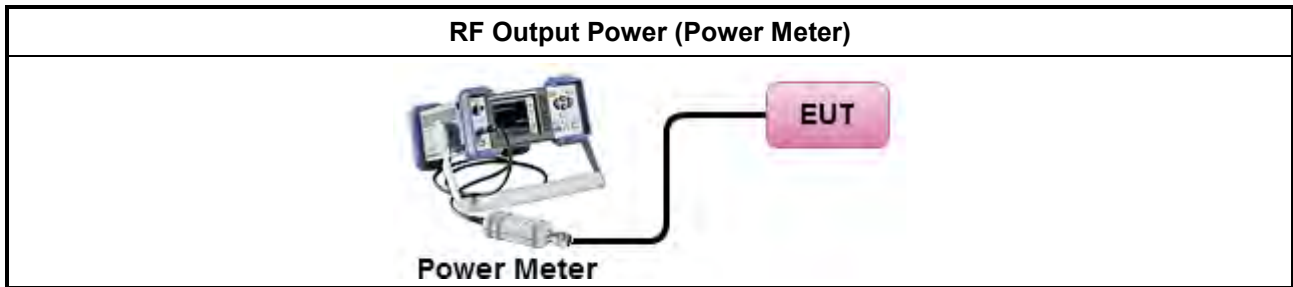
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Maximum Conducted Output Power
	[duty cycle ≥ 98% or external video / power trigger]
<input type="checkbox"/>	Refer as FCC KDB 789033, clause C Method SA-1 (spectral trace averaging).
<input type="checkbox"/>	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)
<input type="checkbox"/>	Refer as FCC KDB 789033, clause C Method SA-2 (spectral trace averaging).
<input type="checkbox"/>	Refer as FCC KDB 789033, clause C Method SA-2 Alt. (RMS detection with slow sweep speed)
	Without duty cycle restriction
<input type="checkbox"/>	Refer as FCC KDB 789033, clause C Method SA-3 (band power max-hold).
<input type="checkbox"/>	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)
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause C Method PM (using an RF average power meter).
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.10.3.1 for spectrum analyzer - Method 1 (trace averaging).
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.10.3.2 for spectrum analyzer - Method 2 (zero-span averaging).
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.10.3.2 for spectrum analyzer - Method 3 (band power max-hold).
<input checked="" type="checkbox"/>	For conducted measurement.
<input checked="" type="checkbox"/>	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.
<input checked="" type="checkbox"/>	If multiple transmit chains, EIRP calculation could be following as methods:
<input type="checkbox"/>	Method 1: $EIRP_1 = P_1 + G_{ANT1}$; $EIRP_2 = P_2 + G_{ANT2}$; ... $EIRP_n = P_n + G_{ANTn}$ $EIRP_{total} = EIRP_1 + EIRP_2 + \dots + EIRP_n$ (calculated in linear unit [mW] and transfer to log unit [dBm])
<input checked="" type="checkbox"/>	Method 2: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$
<input type="checkbox"/>	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 Output Power

Maximum Conducted Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		6.27								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11A5.2G-20M	1	5180	13.05	-	-	-	13.05	17.0	19.32	23.0
11A5.2G-20M	1	5200	13.52	-	-	-	13.52	17.0	19.79	23.0
11A5.2G-20M	1	5240	13.50	-	-	-	13.50	17.0	19.77	23.0
Result			Complied							

Note 1: N_{TX} = Number of Transmit Chains
 Note 2: EUT support diversity transmit and transmit chains port 1 is the worst than other transmit chains.

Maximum Conducted Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		5.5								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11N5.2G-20M	2	5180	10.01	10.80	-	-	13.43	17.0	18.93	23.0
11N5.2G-20M	2	5200	11.03	12.15	-	-	14.64	17.0	20.14	23.0
11N5.2G-20M	2	5240	11.31	11.40	-	-	14.37	17.0	19.87	23.0
Result			Complied							

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

Maximum Conducted Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		5.5								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11N5.2G-40M	2	5190	10.55	12.25	-	-	14.49	17.0	19.99	23.0
11N5.2G-40M	2	5230	12.79	13.48	-	-	16.16	17.0	21.66	23.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

3.4 Peak Power Spectral Density

3.4.1 Peak Power Spectral Density Limit

Peak Power Spectral Density Limit	
UNII Devices	
<input checked="" type="checkbox"/>	For the 5.15-5.25 GHz band, the peak power spectral density (PPSD) ≤ 4 dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 4 - (G_{TX} - 6)$.
<input type="checkbox"/>	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 11 - (G_{TX} - 6)$.
<input type="checkbox"/>	For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 11 - (G_{TX} - 6)$.
<input type="checkbox"/>	For the 5.725-5.825 GHz band:
<input type="checkbox"/>	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) ≤ 17 dBm/MHz. If $G_{TX} > 6$ dBi, then $PPSD = 17 - (G_{TX} - 6)$.
<input type="checkbox"/>	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	
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.
<p>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</p> <p>G_{TX} = the maximum transmitting antenna directional gain in dBi.</p>	

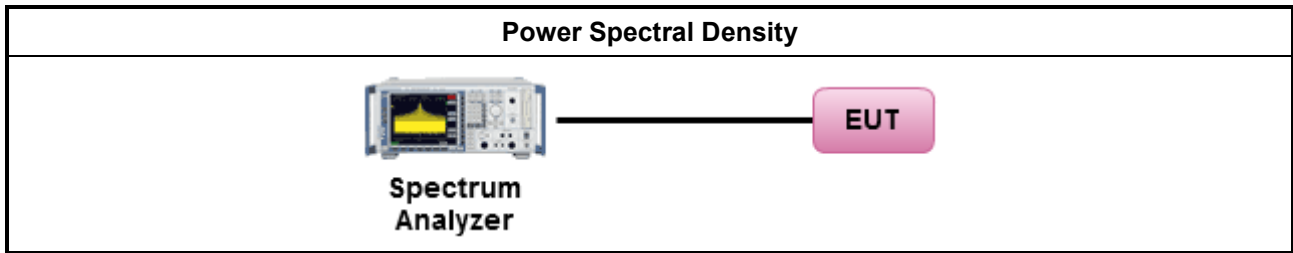
3.4.2 Measuring Instruments

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 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 ≥ 98% or external video / power trigger]
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause C Method SA-1 (spectral trace averaging).
<input type="checkbox"/>	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)
<input type="checkbox"/>	Refer as FCC KDB 789033, clause C Method SA-2 (spectral trace averaging).
<input type="checkbox"/>	Refer as FCC KDB 789033, clause C Method SA-2 Alt. (RMS detection with slow sweep speed)
	Without duty cycle restriction
<input type="checkbox"/>	Refer as FCC KDB 789033, clause C Method SA-3 (band power max-hold).
<input type="checkbox"/>	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.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.11.1.2.1 for Method 1—peak measurement.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.11.1.2.2 for Method 2—power averaging.
<input checked="" type="checkbox"/>	For conducted measurement.
<input checked="" type="checkbox"/>	For conducted measurements on devices with multiple transmit chains:
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input checked="" type="checkbox"/>	If multiple transmit chains, EIRP PPSD calculation could be following as methods:
<input type="checkbox"/>	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])
<input checked="" type="checkbox"/>	Method 2: $PPSD_{total} = PPSD_1 + PPSD_2 + \dots + PPSD_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = PPSD_{total} + DG$
<input type="checkbox"/>	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

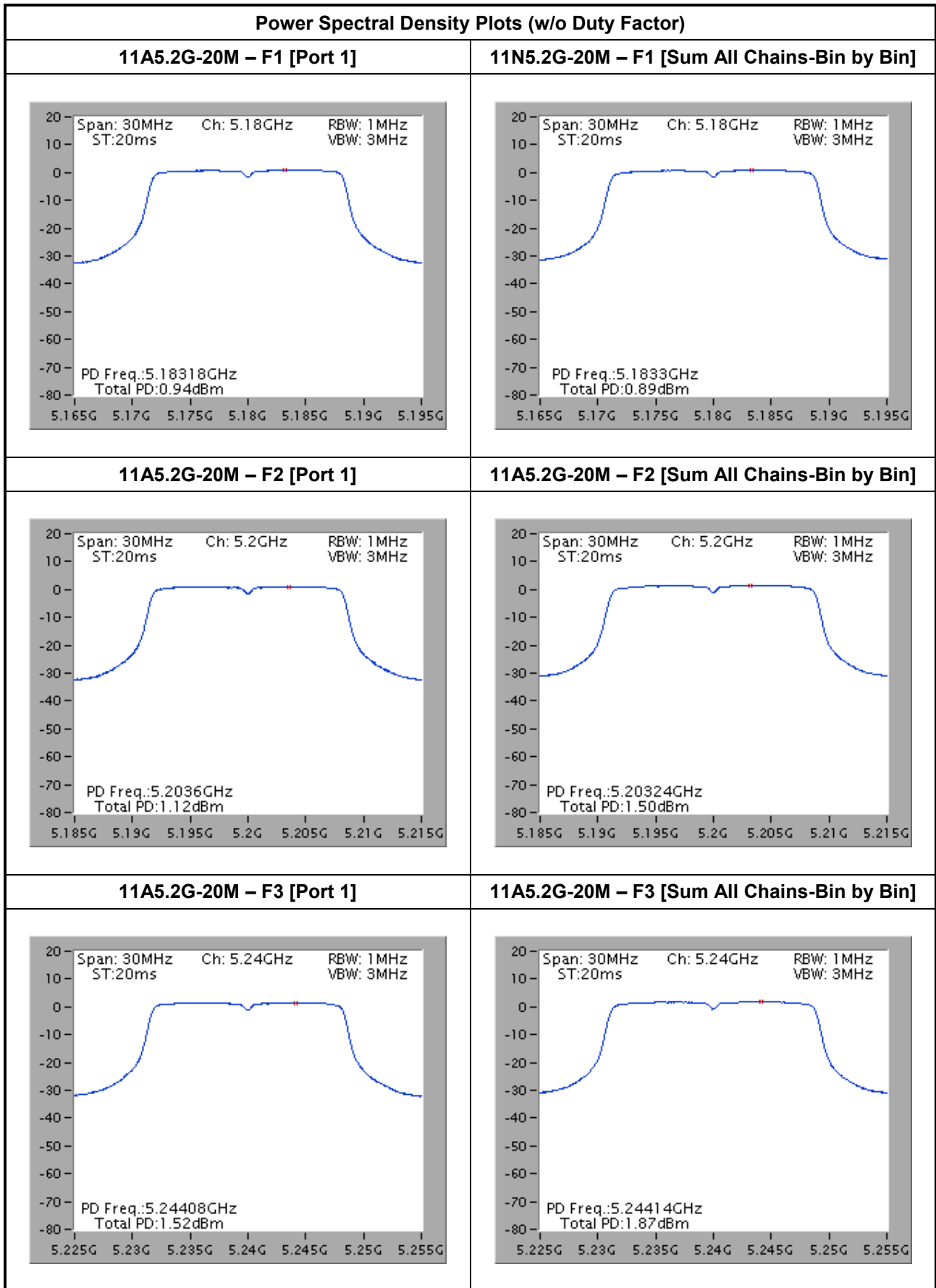


3.4.5 Test Result of Peak Power Spectral Density

Peak Power Spectral Density Result									
Power Level		1	Peak Power Spectral Density (dBm/MHz)						
Directional Gain (dBi)		6.27	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	0.94	-	-	-	4.0	7.21	10.0
11A5.2G-20M	1	5200	1.12	-	-	-	4.0	7.39	10.0
11A5.2G-20M	1	5240	1.52	-	-	-	4.0	7.79	10.0
Result			Complied						
Note 1: N _{TX} = Number of Transmit Chains Note 2: EUT support diversity transmit and transmit chains port 1 is the worst than other transmit chains.									

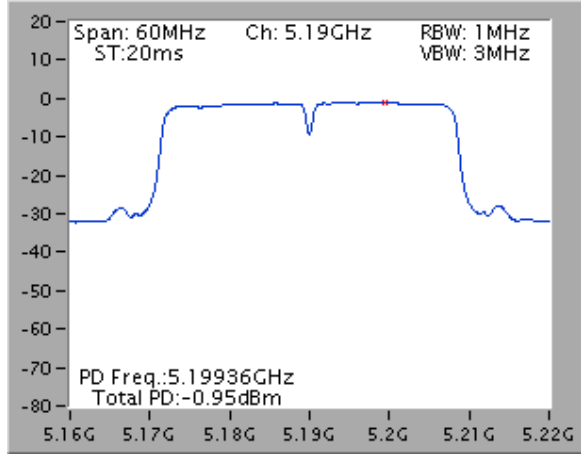
Peak Power Spectral Density Result									
Power Level		1	Peak Power Spectral Density (dBm/MHz)						
Directional Gain (dBi)		5.5	Peak Power Spectral Density (dBm/MHz)						
Modulation Mode	N _{TX}	Freq. (MHz)	Sum All Chains	-	-	-	PSD Limit	EIRP PSD	EIRP PSD Limit
11N5.2G-20M	2	5180	0.89	-	-	-	4.0	6.39	10.0
11N5.2G-20M	2	5200	1.50	-	-	-	4.0	7.00	10.0
11N5.2G-20M	2	5240	1.87	-	-	-	4.0	7.37	10.0
Result			Complied						
Note 1: N _{TX} = Number of Transmit Chains Note 2: PPSD [dBm/MHz] = sum each transmit chains by bin-to-bin PPSD [dBm/MHz]									

Peak Power Spectral Density Result									
Power Level		1	Power Spectral Density (dBm/MHz)						
Directional Gain (dBi)		5.5							
Modulation Mode	N _{TX}	Freq. (MHz)	Sum All Chains	-	-	-	PSD Limit	EIRP PSD	EIRP PSD Limit
11N5.2G-40M	2	5190	-0.95	-	-	-	4.0	4.55	10.0
11N5.2G-40M	2	5230	0.93	-	-	-	4.0	6.43	10.0
Result			Complied						
Note 1: N _{TX} = Number of Transmit Chains Note 2: PPSD [dBm/MHz] = sum each transmit chains by bin-to-bin PPSD [dBm/MHz]									

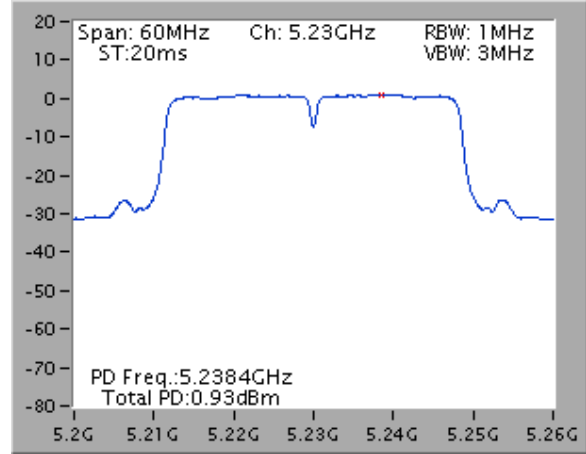


Power Spectral Density Plots (w/o Duty Factor)

11N5.2G-40M – F1' [Sum All Chains-Bin by Bin]



11N5.2G-40M – F2' [Sum All Chains-Bin by Bin]



3.5 Peak Excursion

3.5.1 Peak Excursion Limit

Peak Excursion Limit	
UNII Devices	
<input checked="" type="checkbox"/>	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	
<input checked="" type="checkbox"/>	N/A

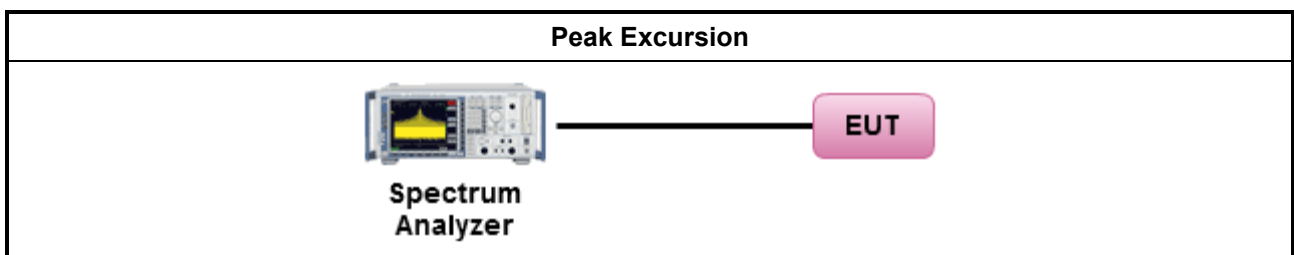
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause F peak excursion method.
<input checked="" type="checkbox"/>	For conducted measurement.
<input checked="" type="checkbox"/>	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 $10 \log(N)$.
<input type="checkbox"/>	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

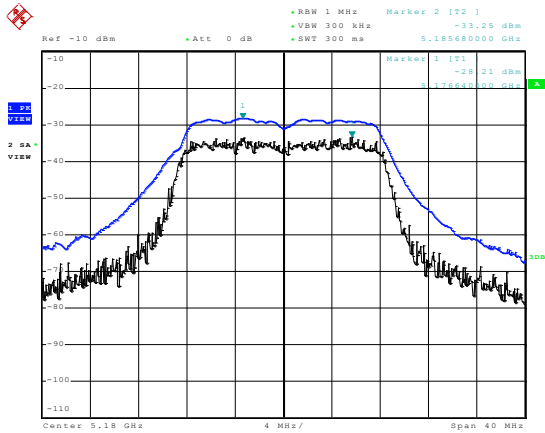


3.5.5 Test Result of Peak Excursion

UNII Peak Excursion Result							
Power Level	1		Peak Excursion (dB)				
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	Chain-Port 3	Chain-Port 4	Limit
11A5.2G-20M	1	5180	5.04	-	-	-	13.0
11A5.2G-20M	1	5200	4.80	-	-	-	13.0
11A5.2G-20M	1	5240	4.22	-	-	-	13.0
11N5.2G-20M	2	5180	5.10	-	-	-	13.0
11N5.2G-20M	2	5200	5.00	-	-	-	13.0
11N5.2G-20M	2	5240	6.16	-	-	-	13.0
11N5.2G-40M	2	5190	5.03	-	-	-	13.0
11N5.2G-40M	2	5230	4.39	-	-	-	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.							

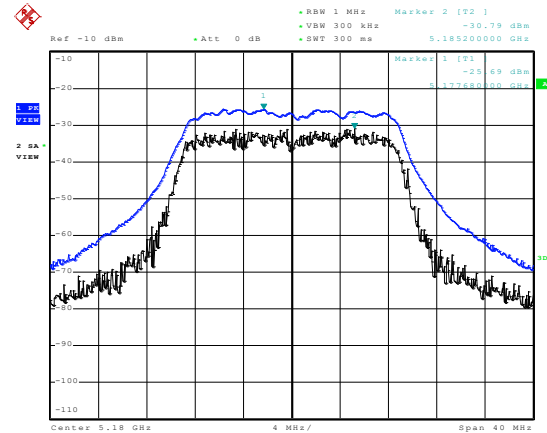
Peak Excursion Plots

11A5.2G-20M – F1



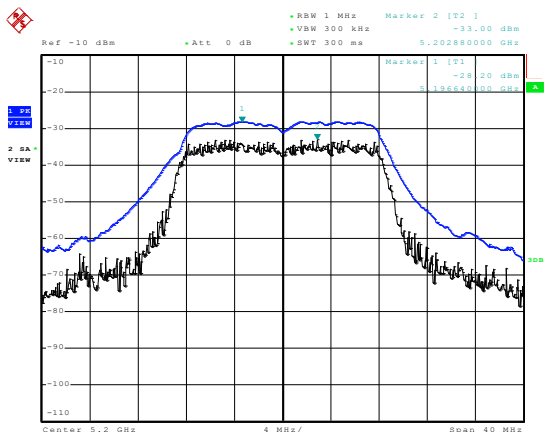
Date: 15.JUN.2012 16:23:01

11N5.2G-20M – F1



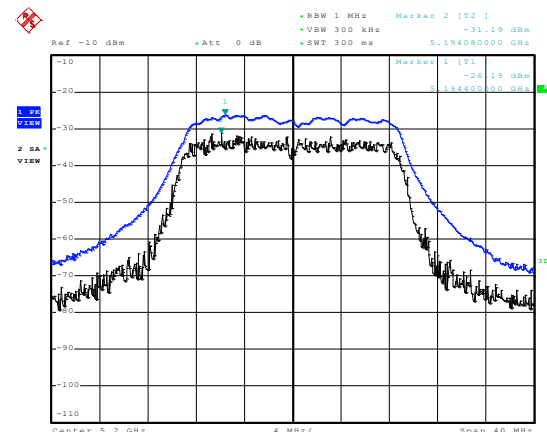
Date: 15.JUN.2012 16:26:47

11A5.2G-20M – F2



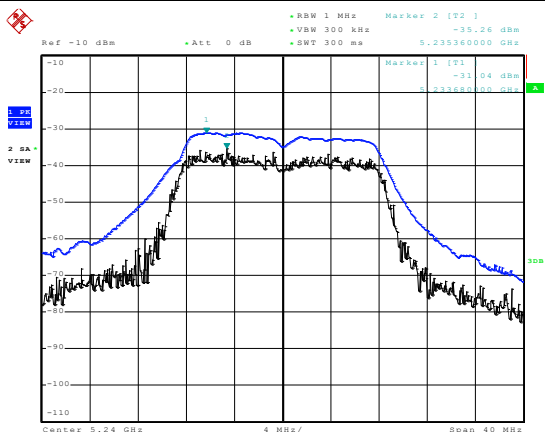
Date: 15.JUN.2012 16:24:02

11N5.2G-20M – F2



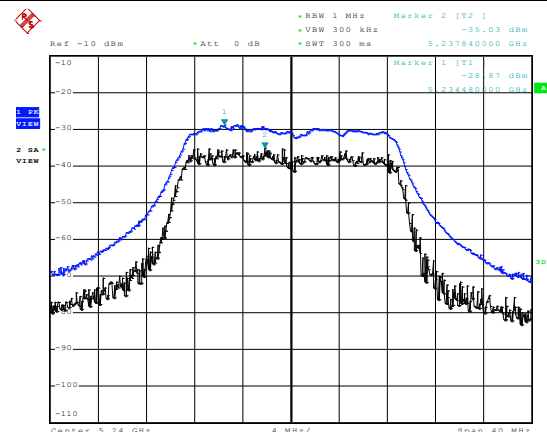
Date: 15.JUN.2012 16:26:18

11A5.2G-20M – F3



Date: 15.JUN.2012 16:24:36

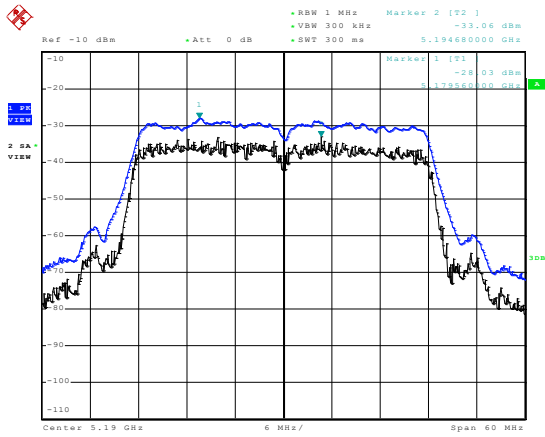
11N5.2G-20M – F3



Date: 15.JUN.2012 16:25:35

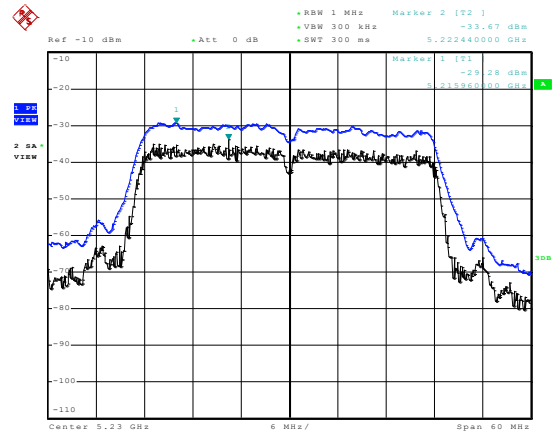
Emission Bandwidth Plots

11N5.2G-40M – F1'



Date: 15.JUN.2012 16:27:32

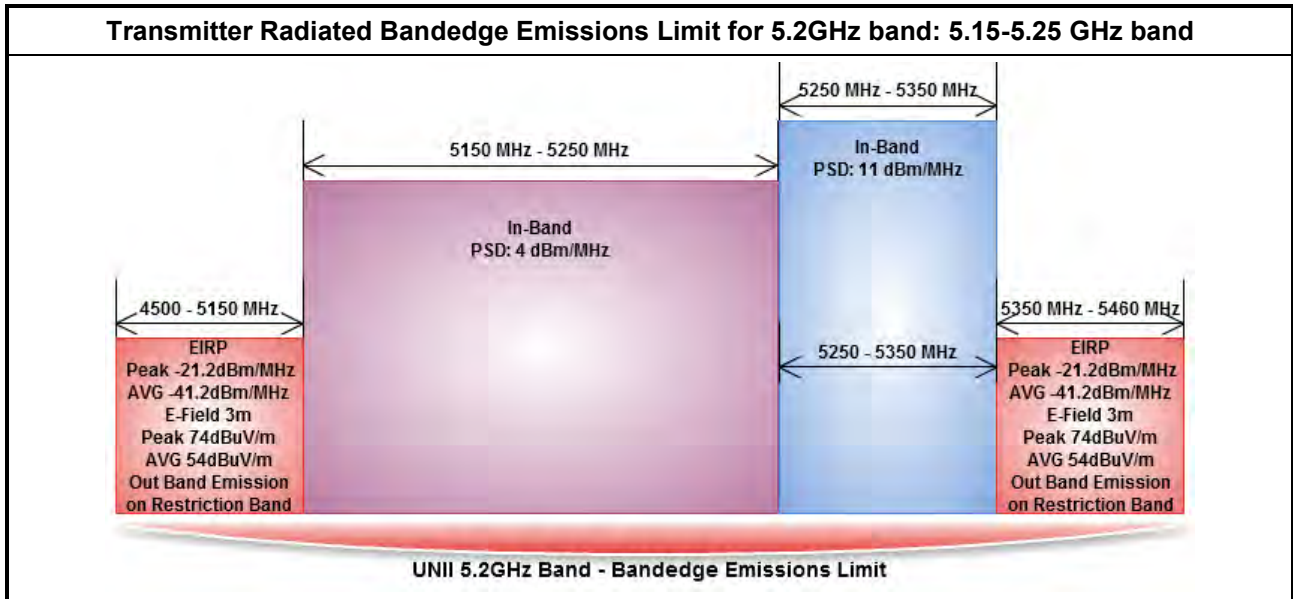
11N5.2G-40M – F2'



Date: 15.JUN.2012 16:28:11

3.6 Transmitter Radiated Bandedge Emissions

3.6.1 Transmitter Radiated Bandedge Emissions Limit



3.6.2 Measuring Instruments

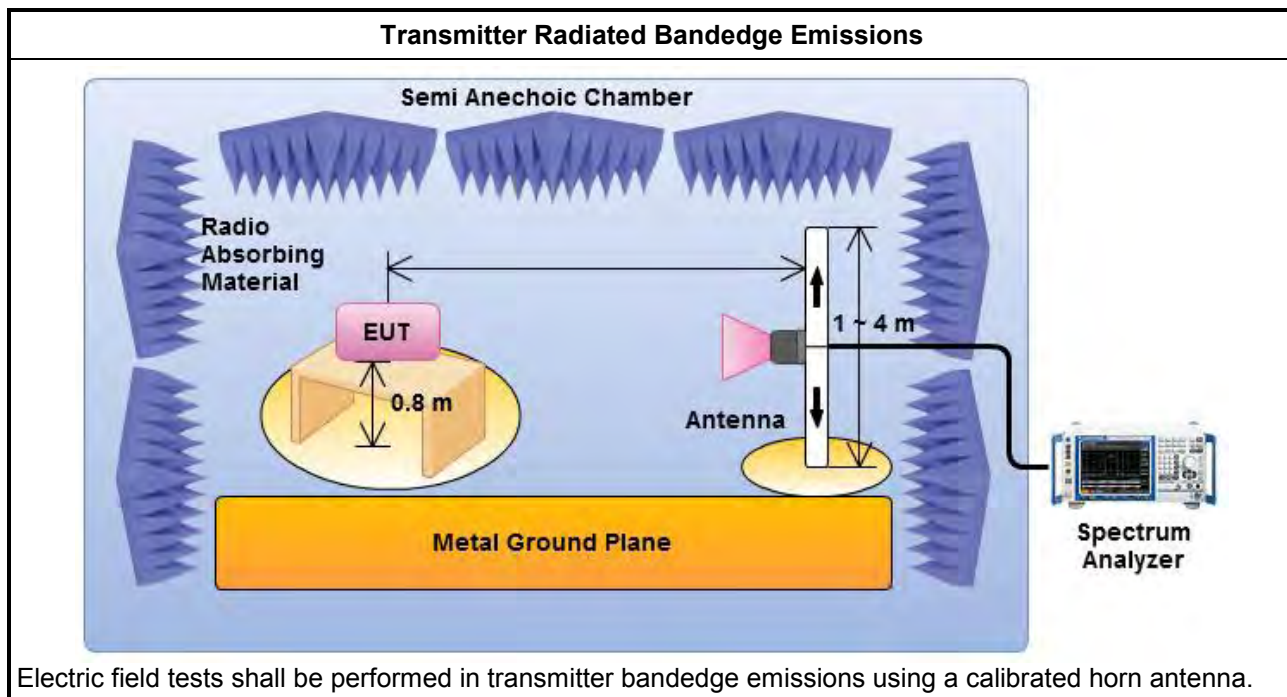
Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

Test Method – General Information	
<input checked="" type="checkbox"/>	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements). Measurements in the bandedge are typically made at a closer distance 1.5m, because the instrumentation noise floor is typically close to the radiated emission limit.
<input checked="" type="checkbox"/>	The average emission levels shall be measured in [duty cycle \geq 98 or duty factor].
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.2.2 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
<input type="checkbox"/>	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.)
<input type="checkbox"/>	Operating in 5.15-5.25 GHz band (lower-band) and 5.25-5.35 GHz band (higher-band).
<input type="checkbox"/>	Operating in 5.47-5.725 GHz band (lower-band) and 5.725-5.825 GHz band (higher-band).
<input type="checkbox"/>	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)
<input type="checkbox"/>	Operating in 5.25-5.35 GHz band (lower-band) and 5.47-5.725 GHz band (higher-band).
<input type="checkbox"/>	Operating in 5.15-5.25 GHz band (lower-band) and 5.725-5.825 GHz band (higher-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 789033, clause G)2) for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands.
<input type="checkbox"/>	Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging).
<input type="checkbox"/>	Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW).
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW) - Duty cycle \geq 98%.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.2 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 789033, clause G)3)d) marker-delta method for band-edge measurements.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.2 for band-edge testing.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements.

Test Method	
<input type="checkbox"/>	Refer as FCC KDB 789033, clause G)3)b) for conducted measurement.
<input type="checkbox"/>	For unwanted emissions into non-restricted bands (relative emission limits).
<input type="checkbox"/>	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.
<input type="checkbox"/>	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).
<input type="checkbox"/>	Refer as FCC KDB 789033, clause G)4) unwanted emissions in restricted bands on frequencies ≤ 1000 MHz
<input type="checkbox"/>	Refer as FCC KDB 789033, clause G)5) and G)6) unwanted emissions in restricted bands on frequencies > 1000 MHz
<input type="checkbox"/>	For conducted measurements on devices with multiple transmit chains using options given below:
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input checked="" type="checkbox"/>	For radiated measurement.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.5 for radiated emissions from above 1 GHz.

3.6.4 Test Setup



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

3.6.5 Test Result of Transmitter Radiated Bandedge Emissions

Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain (dBi)	6.27	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	120.13	5149.00	1	72.54	83.54	PK	V
4500-5150	1	5180	109.56	5149.00	1	58.32	63.54	AV	V
5350-5460	1	5240	120.05	5397.00	1	71.03	83.54	PK	V
5350-5460	1	5240	109.35	5398.20	1	57.21	63.54	AV	V
5.2GHz Lower-band (Lowest Ch.)					5.3GHz Higher-band (Highest Ch.)				

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

Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain (dBi)	5.5	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	2	5180	118.01	5138.30	1	72.05	83.54	PK	V
4500-5150	2	5180	107.22	5149.00	1	57.75	63.54	AV	V
5350-5460	2	5240	116.83	5393.70	1	71.60	83.54	PK	V
5350-5460	2	5240	105.81	5398.20	1	56.93	63.54	AV	V
5.2GHz Lower-band (Lowest Ch.)					5.3GHz Higher-band (Highest Ch.)				
<p>Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).</p>									

Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain (dBi)	5.5	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	2	5190	116.77	5149.10	1	77.29	83.54	PK	V
4500-5150	2	5190	106.19	5150.00	1	62.17	63.54	AV	V
5350-5460	2	5230	117.38	5357.50	1	69.91	83.54	PK	V
5350-5460	2	5230	105.79	5366.50	1	56.62	63.54	AV	V
5.2GHz Lower-band (Lowest Ch.)					5.3GHz Higher-band (Highest Ch.)				
<p>Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).</p>									

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

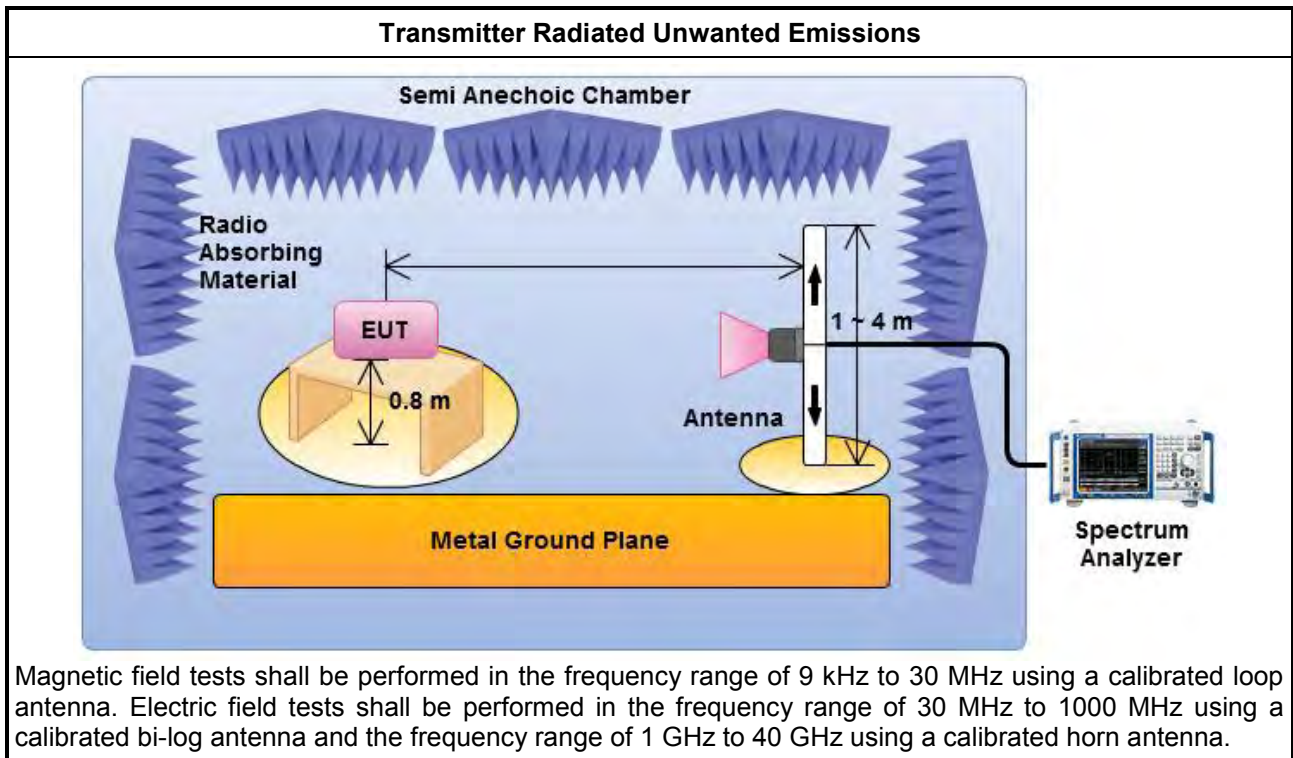
Refer a test equipment and calibration data table in this test report.

3.7.3 Test Procedures

Test Method – General Information	
<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. 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).
<input checked="" type="checkbox"/>	Measurements in the frequency range 5 GHz - 10GHz are typically made at a closer distance 1.0m, because the instrumentation noise floor is typically close to the radiated emission limit.
<input checked="" type="checkbox"/>	Measurements in the frequency range 10 GHz - 18GHz are typically made at a closer distance 1.0m, because the instrumentation noise floor is typically close to the radiated emission limit.
<input checked="" type="checkbox"/>	Measurements in the frequency range above 18 GHz - 40GHz are typically made at a closer distance 1.0m, because the instrumentation noise floor is typically close to the radiated emission limit.
<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 789033, clause G)2) for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause G)1) for unwanted emissions into restricted bands.
<input type="checkbox"/>	Refer as FCC KDB 789033, G)6) Method AD (Trace Averaging).
<input type="checkbox"/>	Refer as FCC KDB 789033, G)6) Method VB (Reduced VBW).
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW) – Duty \geq 98%.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033, clause G)5) measurement procedure peak limit.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.

Test Method	
<input type="checkbox"/>	Refer as FCC KDB 789033, G)3)b) for conducted measurement.
<input type="checkbox"/>	For unwanted emissions into non-restricted bands (relative emission limits).
<input type="checkbox"/>	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.
<input type="checkbox"/>	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).
<input type="checkbox"/>	Refer as FCC KDB 789033, clause G)4) unwanted emissions in restricted bands on frequencies ≤ 1000 MHz
<input type="checkbox"/>	Refer as FCC KDB 789033, clause G)5) and G)6) unwanted emissions in restricted bands on frequencies > 1000 MHz
<input type="checkbox"/>	For conducted measurements on devices with multiple transmit chains using options given below:
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input checked="" type="checkbox"/>	For radiated measurement.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.5 for radiated emissions from above 1 GHz.

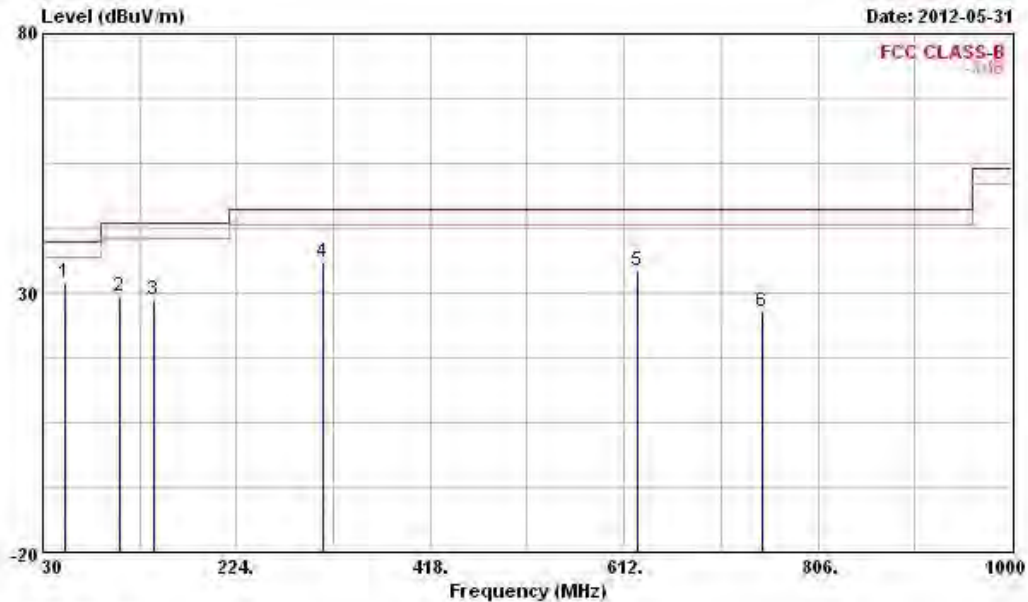
3.7.4 Test Setup



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 and the frequency range of 1 GHz to 40 GHz using a calibrated horn antenna.

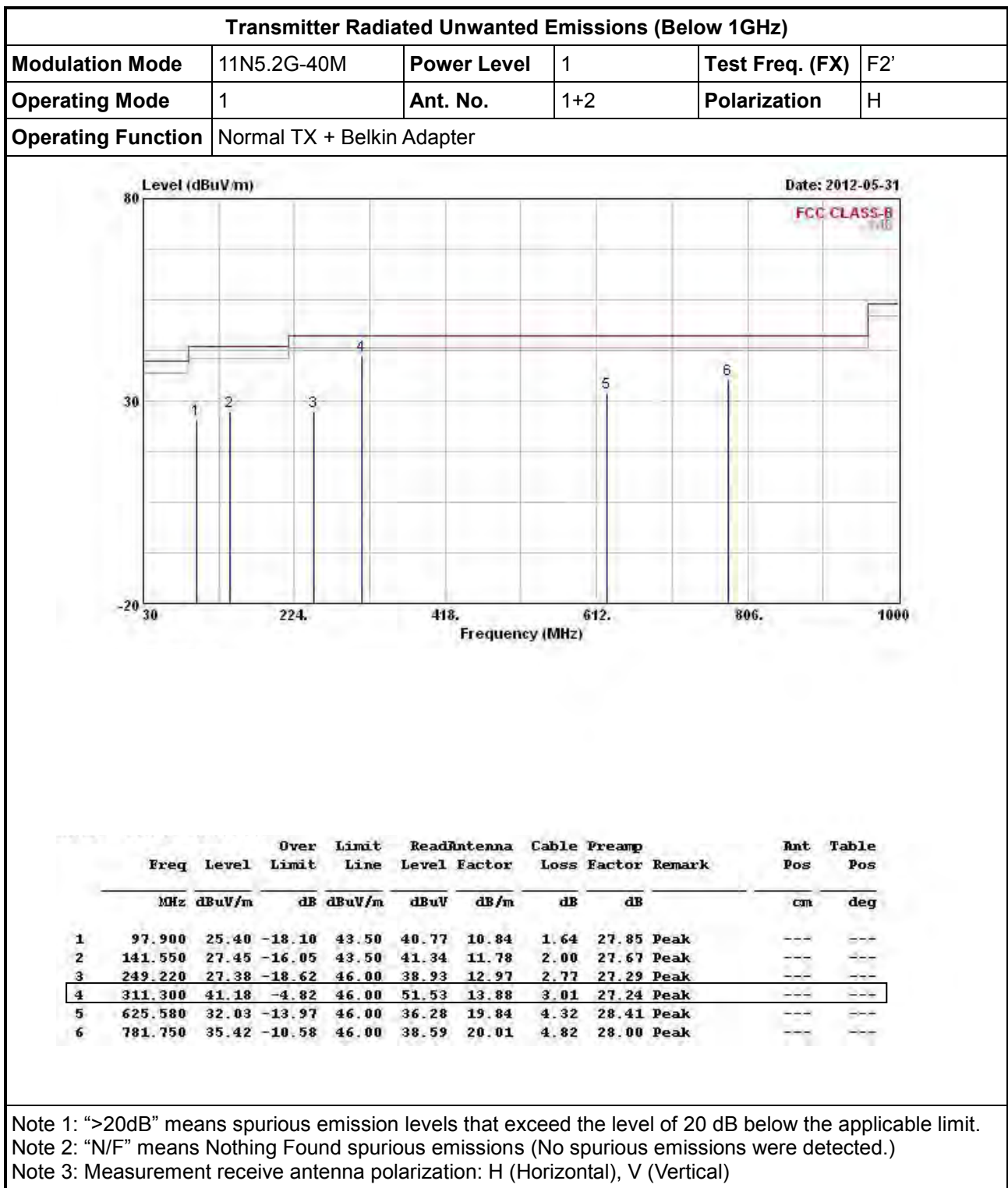
3.7.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Transmitter Radiated Unwanted Emissions (Below 1GHz)					
Modulation Mode	11N5.2G-40M	Power Level	1	Test Freq. (FX)	F2'
Operating Mode	1	Ant. No.	1+2	Polarization	V
Operating Function	Normal TX + Belkin Adapter				

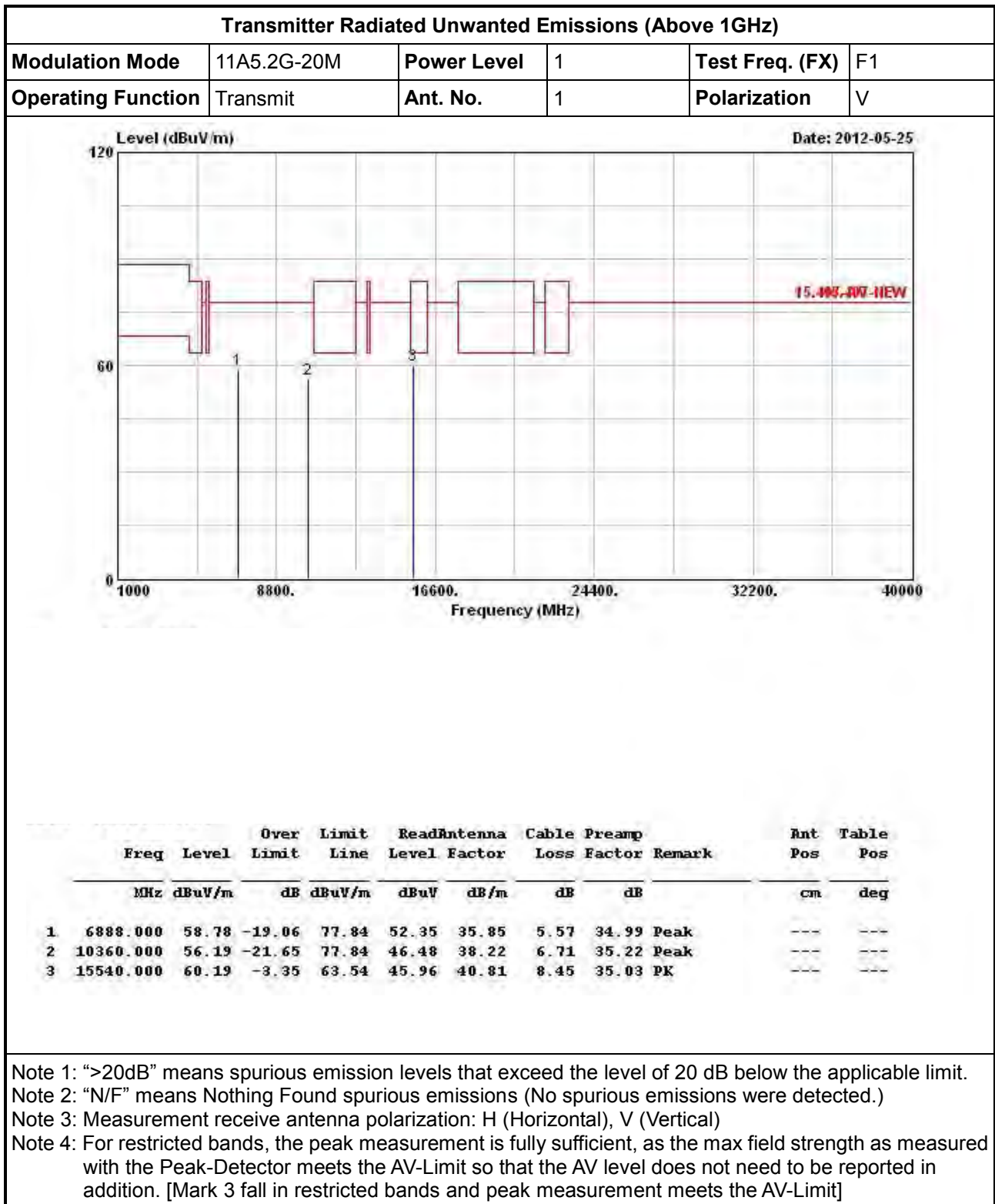


Freq	Level	Over Limit	Limit	ReadAntenna	Cable	Preamp	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB		cm	deg
1	52.310	31.88	-8.12	40.00	49.57	8.94	1.22 27.85 Peak	---	---
2	106.630	29.46	-14.04	43.50	43.57	11.99	1.72 27.82 Peak	---	---
3	141.550	28.55	-14.95	43.50	42.44	11.78	2.00 27.67 Peak	---	---
4	311.300	35.97	-10.03	46.00	46.32	13.88	3.01 27.24 Peak	---	---
5	625.580	34.43	-11.57	46.00	38.68	19.84	4.32 28.41 Peak	---	---
6	749.740	26.22	-19.78	46.00	30.07	19.55	4.71 28.11 Peak	---	---

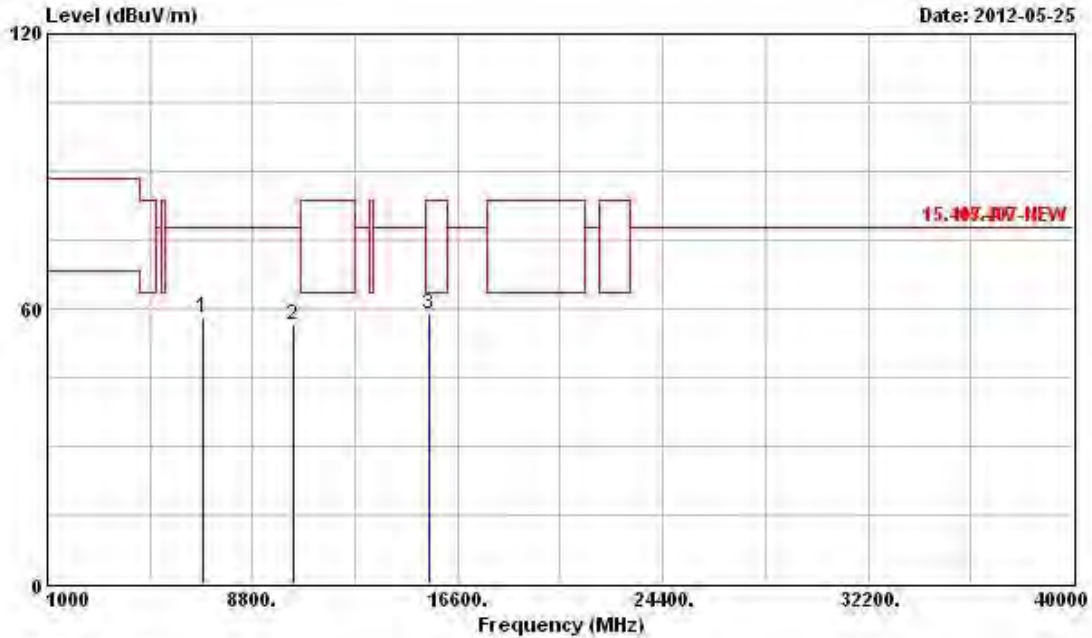
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)



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



Transmitter Radiated Unwanted Emissions (Above 1GHz)					
Modulation Mode	11A5.2G-20M	Power Level	1	Test Freq. (FX)	F1
Operating Function	Transmit	Ant. No.	1	Polarization	H

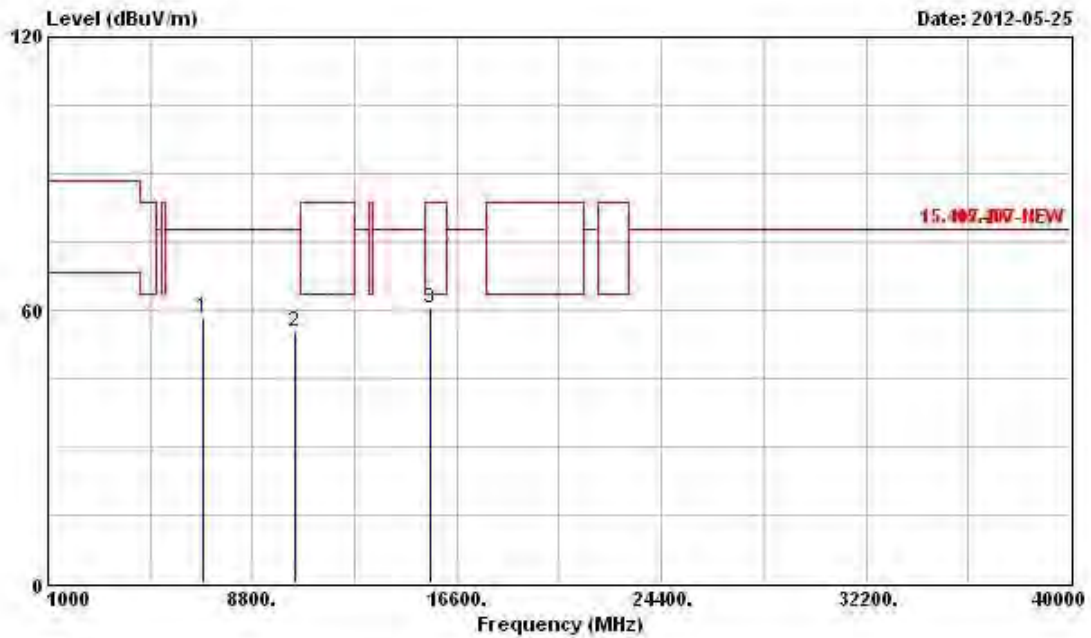


Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB		cm	deg
1	6888.000	58.07	-19.77	77.84	51.64	35.85	5.57 34.99 Peak	---	---
2	10360.000	56.64	-21.20	77.84	46.93	38.22	6.71 35.22 Peak	---	---
3	15540.000	58.93	-4.61	63.54	44.70	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	Power Level	1	Test Freq. (FX)	F2
Operating Function	Transmit	Ant. No.	1	Polarization	V

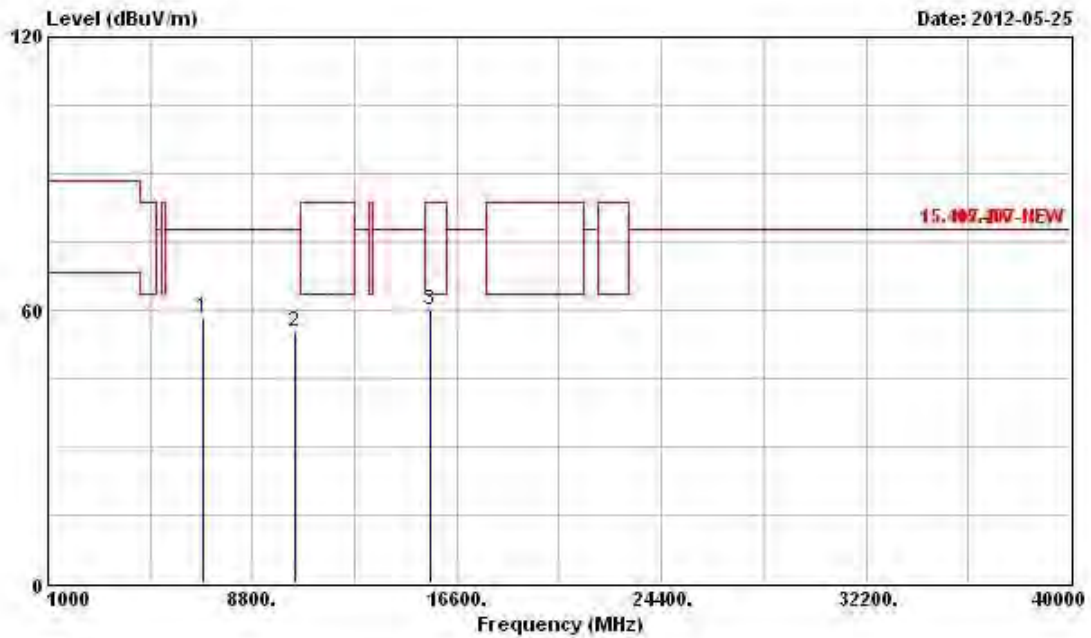


Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB		cm	deg
1	6900.000	58.37	-19.47	77.84	51.93	35.86	5.57 34.99 Peak	---	---
2	10400.000	55.28	-22.56	77.84	45.47	38.24	6.75 35.18 Peak	---	---
3	15600.000	60.48	-3.06	63.54	46.29	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)

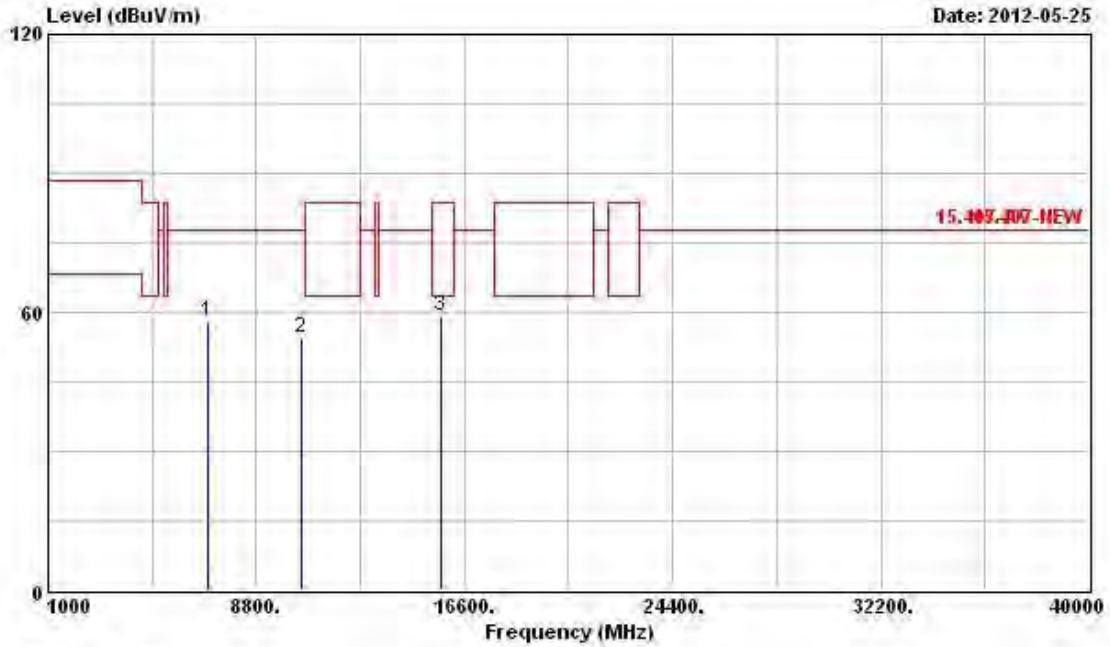
Modulation Mode	11A5.2G-20M	Power Level	1	Test Freq. (FX)	F2
Operating Function	Transmit	Ant. No.	1	Polarization	H



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	6900.000	58.59	-19.25	77.84	52.15	35.86	5.57	34.99	Peak	---
2	10400.000	55.33	-22.51	77.84	45.52	38.24	6.75	35.18	Peak	---
3	15600.000	59.99	-3.55	63.54	45.80	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	Power Level	1	Test Freq. (FX)	F3
Operating Function	Transmit	Ant. No.	1	Polarization	V

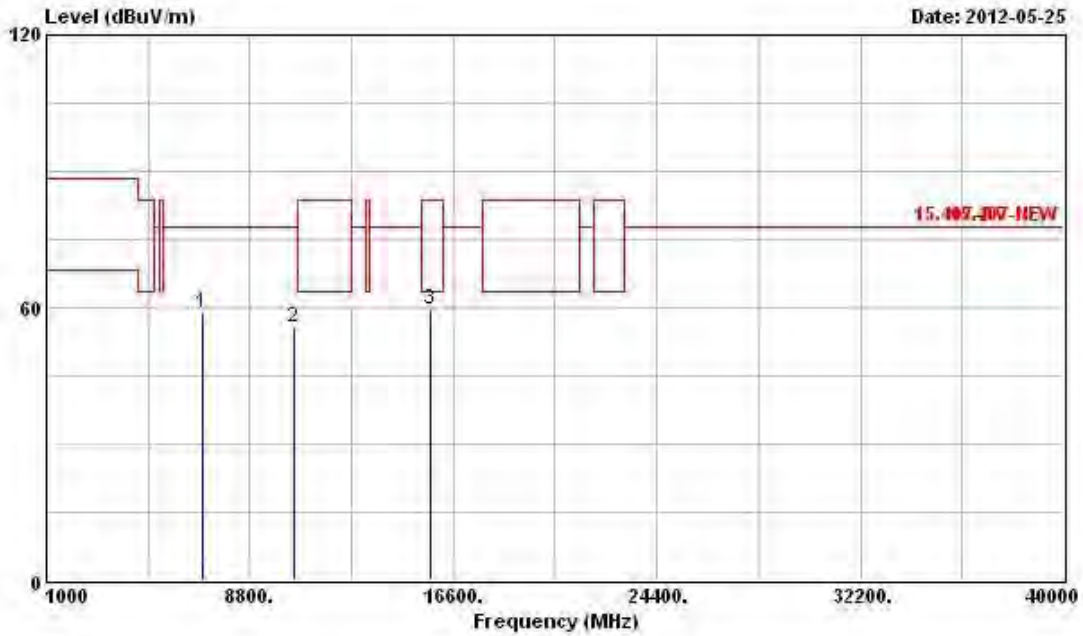


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	6984.000	58.00	-19.84	77.84	51.54	35.89	5.59	35.02	Peak	---	---
2	10480.000	54.59	-23.25	77.84	44.60	38.29	6.82	35.12	Peak	---	---
3	15720.000	59.36	-4.18	63.54	45.21	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)

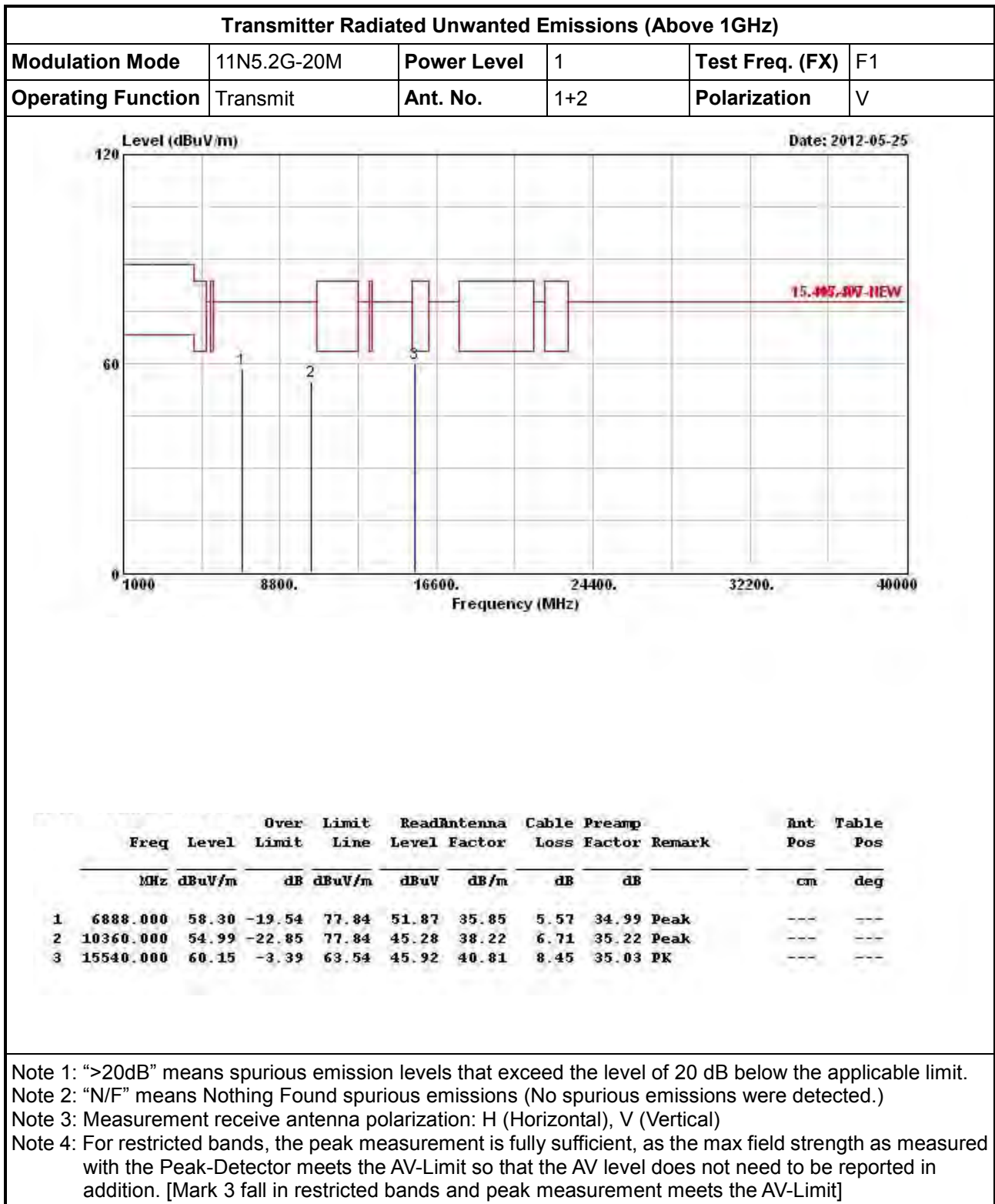
Modulation Mode	11A5.2G-20M	Power Level	1	Test Freq. (FX)	F3
Operating Function	Transmit	Ant. No.	1	Polarization	H



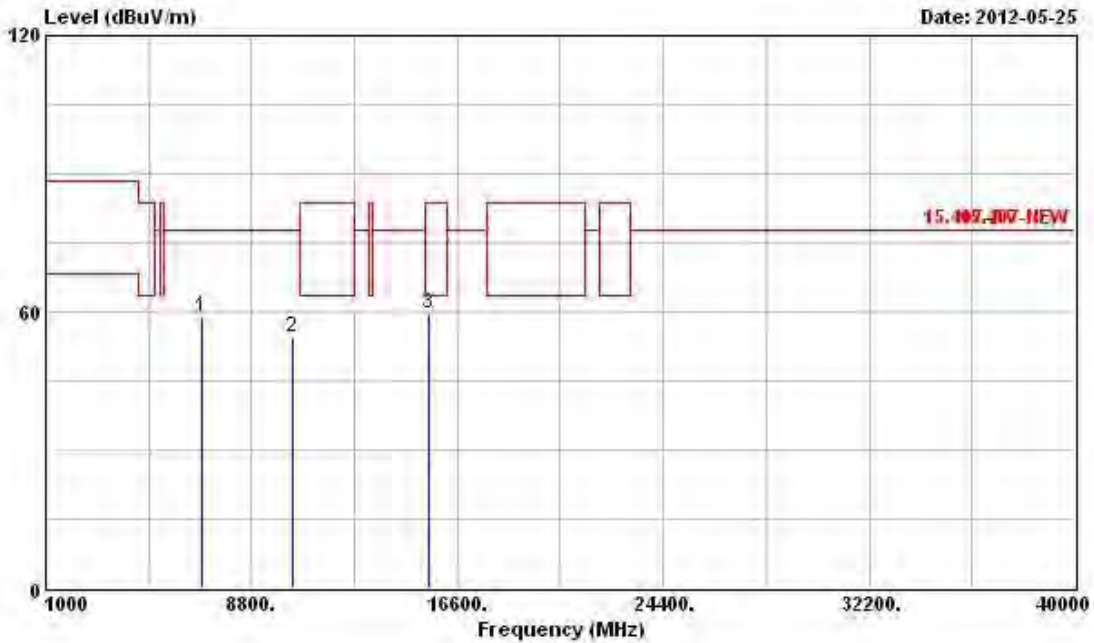
Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	6984.000	58.86	-18.98	77.84	52.40	35.89	5.59	35.02 Peak	---	---
2	10480.000	55.54	-22.30	77.84	45.55	38.29	6.82	35.12 Peak	---	---
3	15720.000	59.52	-4.02	63.54	45.37	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	Power Level	1	Test Freq. (FX)	F1
Operating Function	Transmit	Ant. No.	1+2	Polarization	H

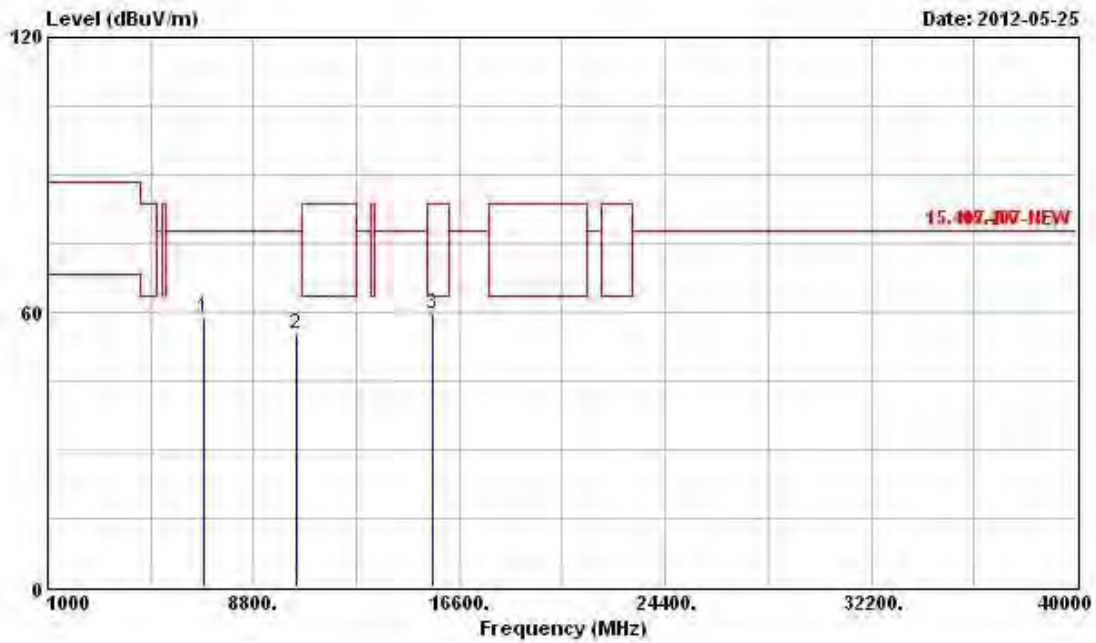


Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 6888.000	58.70	-19.14	77.84	52.27	35.85	5.57	34.99	Peak	---	---
2 10360.000	54.50	-23.34	77.84	44.79	38.22	6.71	35.22	Peak	---	---
3 15540.000	59.60	-3.94	63.54	45.37	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	Power Level	1	Test Freq. (FX)	F2
Operating Function	Transmit	Ant. No.	1+2	Polarization	V

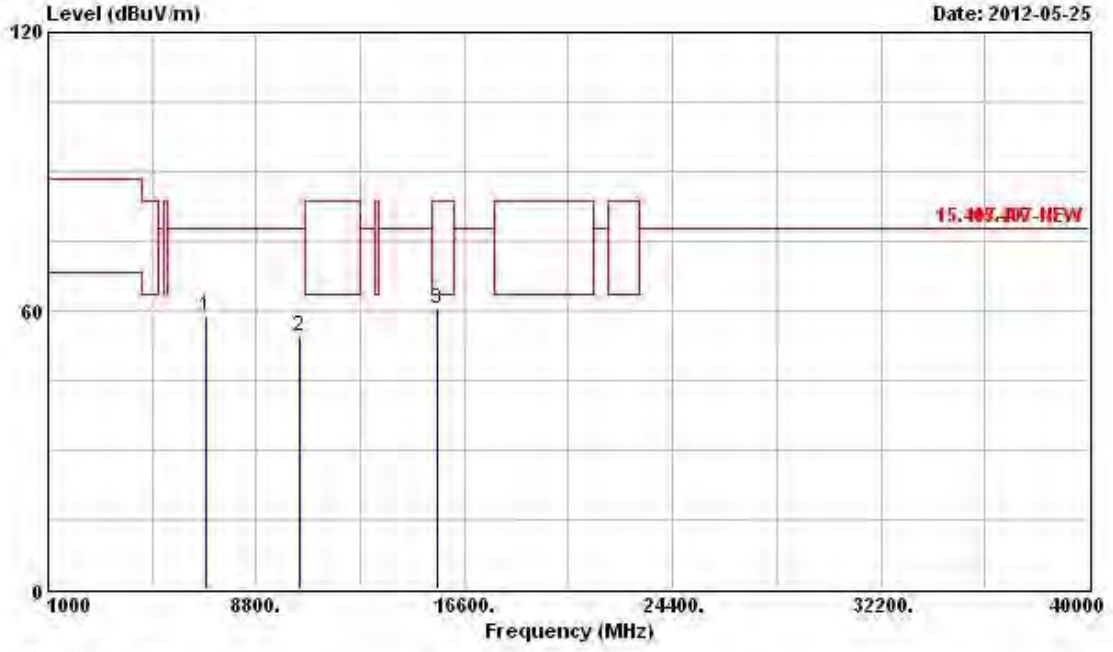


Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	6900.000	58.82	-19.02	77.84	52.38	35.86	5.57	34.99 Peak	---	---
2	10400.000	55.10	-22.74	77.84	45.29	38.24	6.75	35.18 Peak	---	---
3	15600.000	59.66	-3.88	63.54	45.47	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)

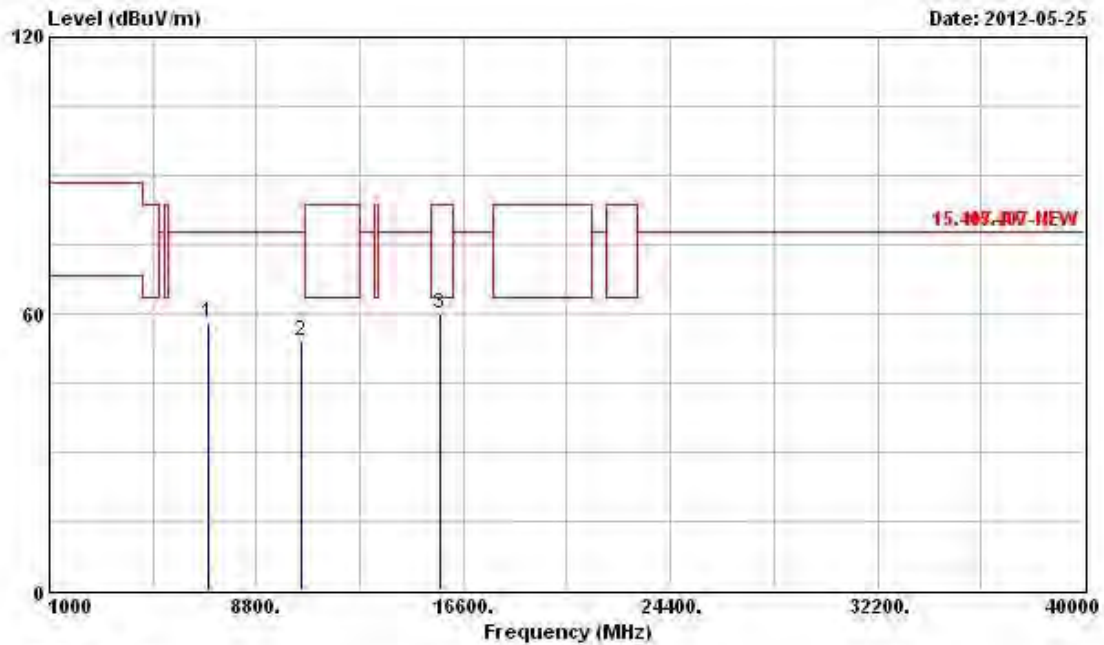
Modulation Mode	11N5.2G-20M	Power Level	1	Test Freq. (FX)	F2
Operating Function	Transmit	Ant. No.	1+2	Polarization	H



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	6900.000	58.88	-18.96	77.84	52.44	35.86	5.57	34.99 Peak	---	---
2	10400.000	54.41	-23.43	77.84	44.60	38.24	6.75	35.18 Peak	---	---
3	15600.000	60.21	-3.33	63.54	46.02	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]

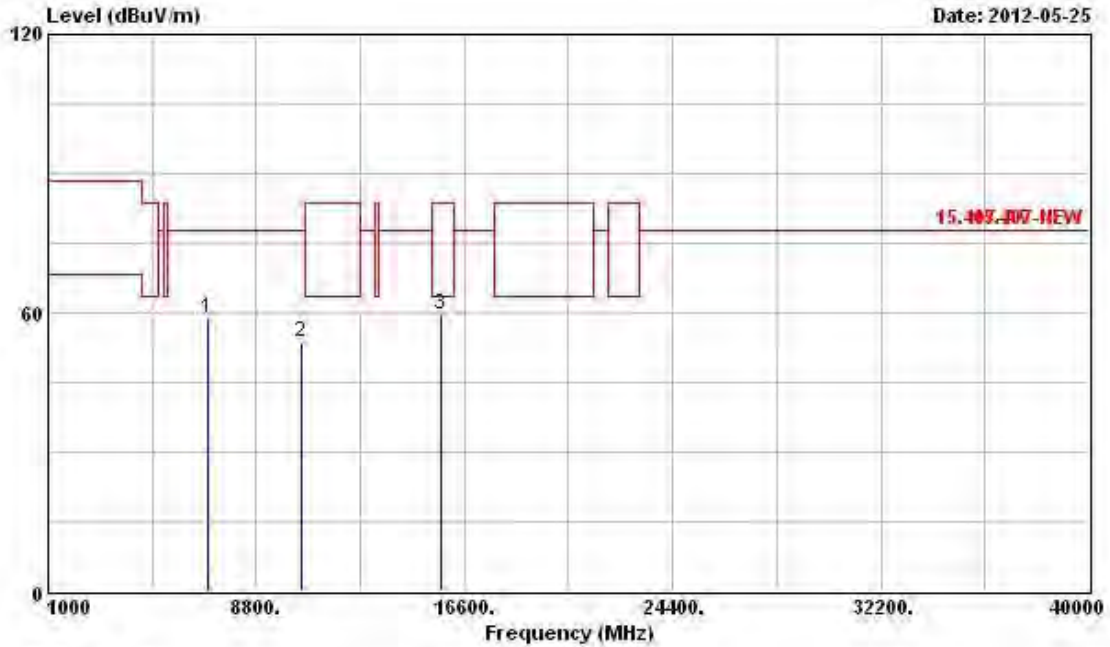
Transmitter Radiated Unwanted Emissions (Above 1GHz)					
Modulation Mode	11N5.2G-20M	Power Level	1	Test Freq. (FX)	F3
Operating Function	Transmit	Ant. No.	1+2	Polarization	V



Peak	Freq	Level	Over Limit	Limit	ReadAntenna	Cable	Preamp	Remark	Ant	Table
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	6984.000	57.88	-19.96	77.84	51.42	35.89	5.59	35.02	Peak	---
2	10480.000	54.04	-23.80	77.84	44.05	38.29	6.82	35.12	Peak	---
3	15720.000	60.05	-3.49	63.54	45.90	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]

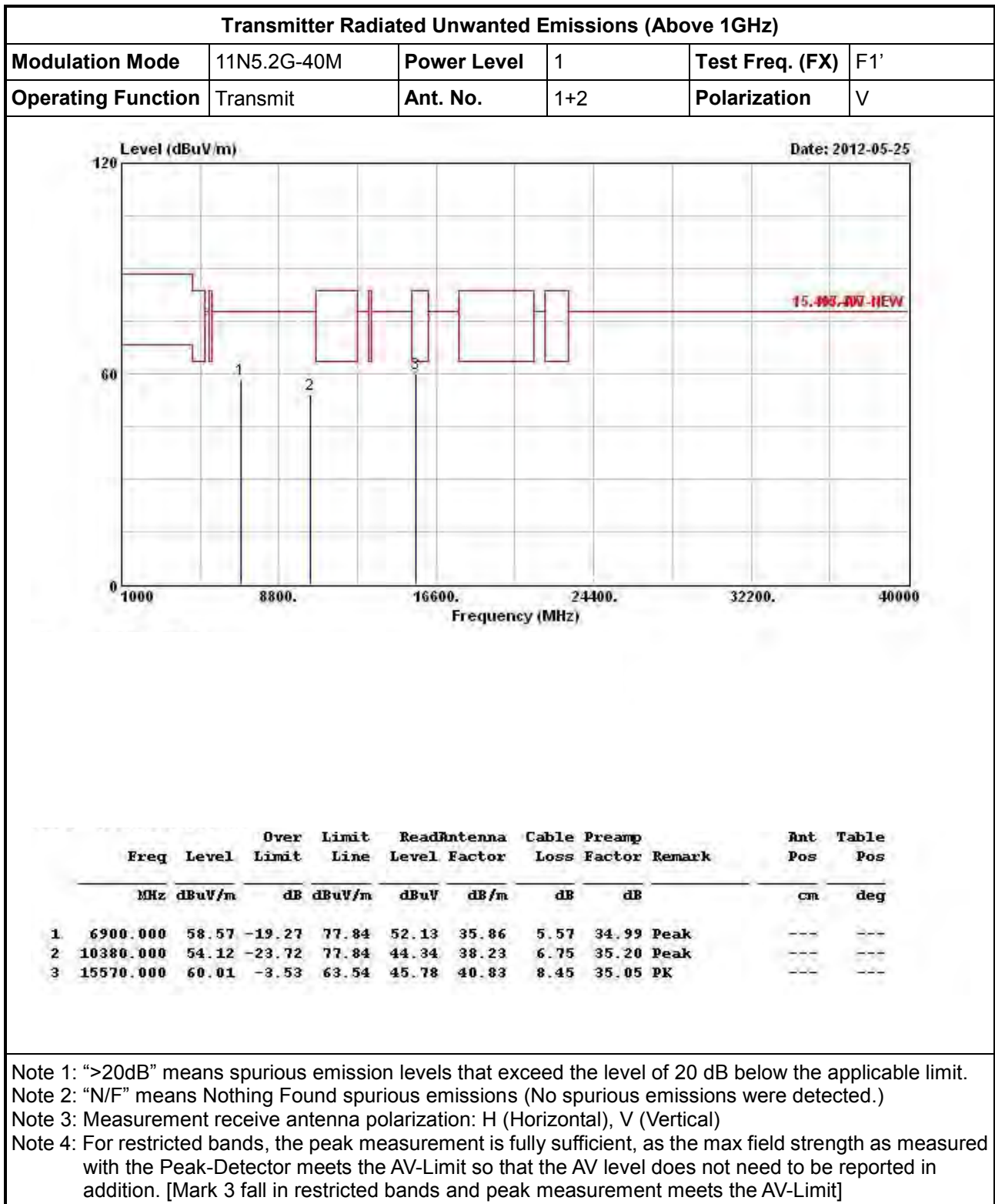
Transmitter Radiated Unwanted Emissions (Above 1GHz)					
Modulation Mode	11N5.2G-20M	Power Level	1	Test Freq. (FX)	F3
Operating Function	Transmit	Ant. No.	1+2	Polarization	H



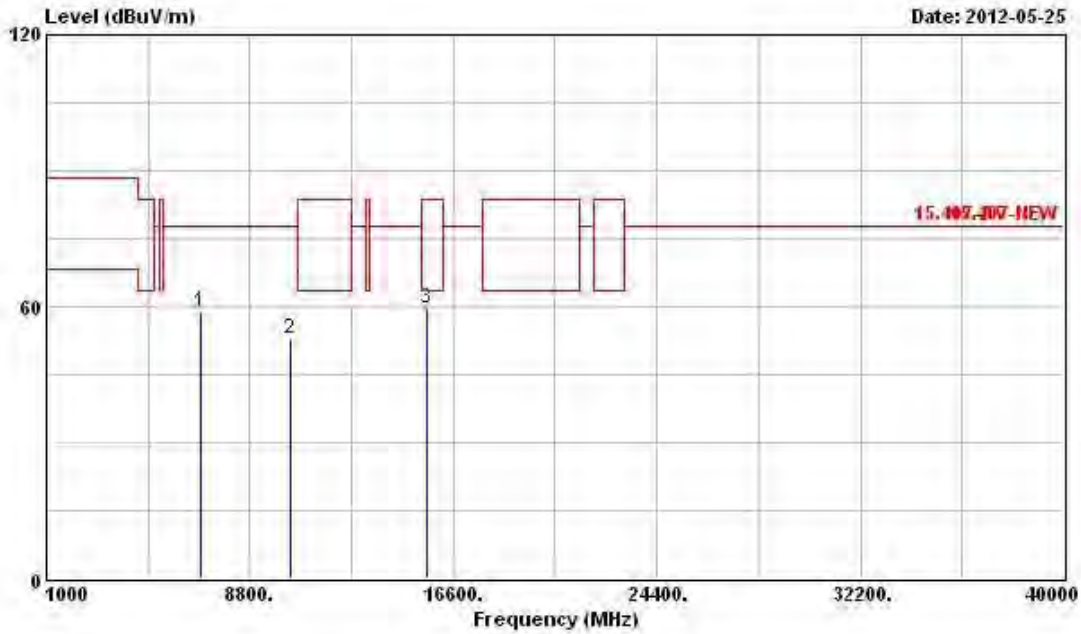
Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 6984.000	58.78	-19.06	77.84	52.32	35.89	5.59	35.02	Peak	---	---
2 10480.000	53.67	-24.17	77.84	43.68	38.29	6.82	35.12	Peak	---	---
3 15720.000	59.69	-3.85	63.54	45.54	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



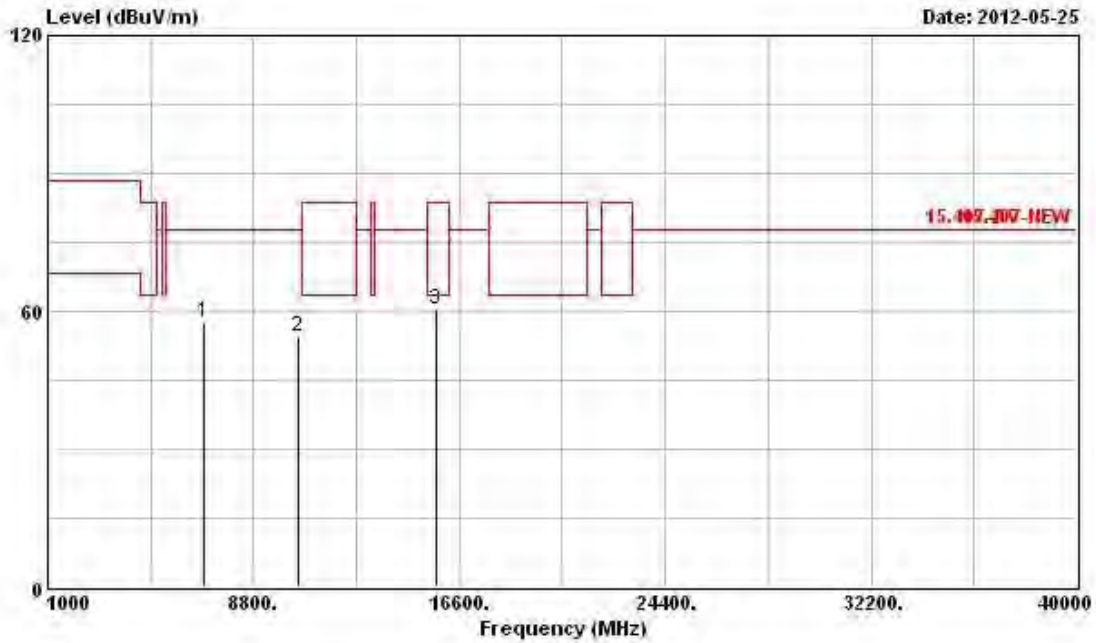
Transmitter Radiated Unwanted Emissions (Above 1GHz)					
Modulation Mode	11N5.2G-40M	Power Level	1	Test Freq. (FX)	F1'
Operating Function	Transmit	Ant. No.	1+2	Polarization	H



	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	6900.000	58.89	-18.95	77.84	52.45	35.86	5.57	34.99	Peak	---	---
2	10380.000	52.85	-24.99	77.84	43.07	38.23	6.75	35.20	Peak	---	---
3	15570.000	59.78	-3.76	63.54	45.55	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	Power Level	1	Test Freq. (FX)	F2'
Operating Function	Transmit	Ant. No.	1+2	Polarization	V

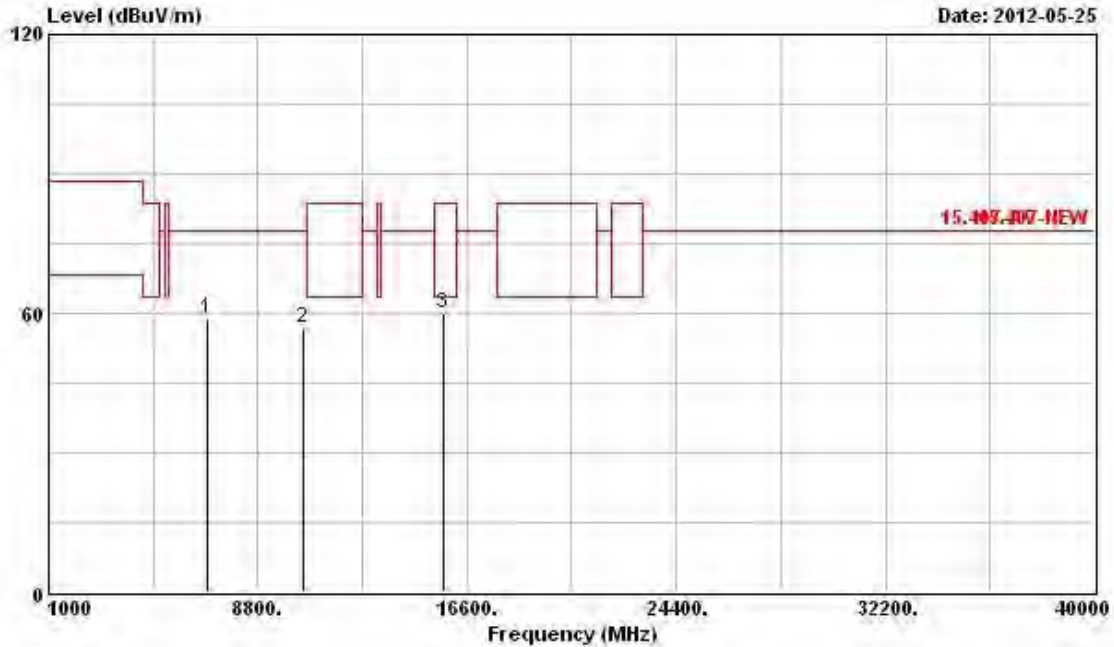


Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 6948.000	57.58	-20.26	77.84	51.12	35.88	5.59	35.01	Peak	---	---
2 10460.000	54.65	-23.19	77.84	44.70	38.27	6.82	35.14	Peak	---	---
3 15690.000	60.34	-3.20	63.54	46.18	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	Power Level	1	Test Freq. (FX)	F2'
Operating Function	Transmit	Ant. No.	1+2	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	6948.000	58.89	-18.95	77.84	52.43	35.88	5.59	35.01	Peak	---	---
2	10460.000	56.97	-20.87	77.84	47.02	38.27	6.82	35.14	Peak	---	---
3	15690.000	59.91	-3.63	63.54	45.75	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	
<input checked="" type="checkbox"/>	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	
<input checked="" type="checkbox"/>	N/A
IEEE Std. 802.11n-2009	
<input checked="" type="checkbox"/>	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.

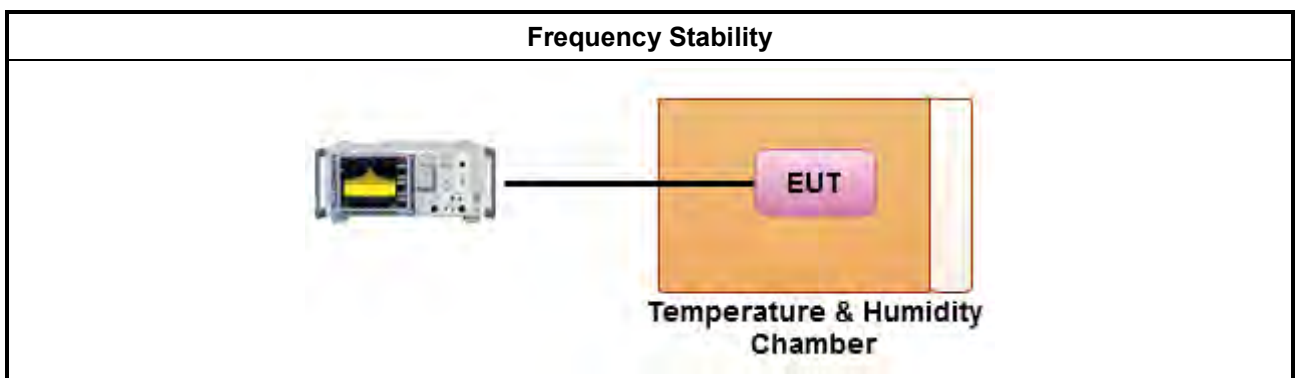
3.8.2 Measuring Instruments

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

3.8.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.8 for frequency stability tests
<input checked="" type="checkbox"/>	Frequency stability with respect to ambient temperature
<input checked="" type="checkbox"/>	Frequency stability when varying supply voltage
<input checked="" type="checkbox"/>	For conducted measurement.
<input checked="" type="checkbox"/>	For conducted measurements on devices with multiple transmit chains: Measurements need only to be performed on one of the active transmit chains (antenna outputs)
<input type="checkbox"/>	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				
Power Level	1	Frequency Stability (ppm)		
Condition	Freq. (MHz)	Freq. (MHz)	ppm	Limit
T _{20°C} V _{max}	5200	5199.9838	-3.12	20.0
T _{20°C} V _{min}	5200	5199.9832	-3.23	20.0
T _{50°C} V _{nom}	5200	5199.9861	-2.67	20.0
T _{40°C} V _{nom}	5200	5199.9842	-3.04	20.0
T _{30°C} V _{nom}	5200	5199.9836	-3.15	20.0
T _{20°C} V _{nom}	5200	5199.9824	-3.38	20.0
T _{10°C} V _{nom}	5200	5199.9832	-3.23	20.0
T _{0°C} V _{nom}	5200	5199.9842	-3.04	20.0
T _{-10°C} V _{nom}	5200	5199.9798	-3.88	20.0
T _{-20°C} V _{nom}	5200	5199.9862	-2.65	20.0
T _{-30°C} V _{nom}	5200	5199.9826	-3.35	20.0
Result		Complied		
Note 1: Measure at 85 % [V _{min}] and 115 % [V _{max}] of the nominal voltage [V _{nom}]. The nominal voltage refer test report clause 1.1.5 for EUT operational condition.				

4 Maximum Permissible Exposure

4.1 Maximum Permissible Exposure

4.1.1 Limit of Maximum Permissible Exposure

Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6
Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30
Note 1: f = frequency in MHz ; *Plane-wave equivalent power density Note 2: For the applicable limit, see FCC 1.1310				

RF Field Strength Limits for Controlled Use Devices (Controlled Environment)				
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Averaging Time (minutes)
0.003-1	600	4.9	-	6
1-10	600/ <i>f</i>	4.9/ <i>f</i>	-	6
10-30	60	4.9/ <i>f</i>	-	6
30-300	60	0.163	10*	6
300-1500	3.54 <i>f</i> ^{0.5}	0.0094 <i>f</i> ^{0.5}	<i>f</i> /30	6
1500-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/ <i>f</i> ^{1.2}
150000-300000	0.354 <i>f</i> ^{0.5}	9.4 x 10 ⁻⁴ <i>f</i> ^{0.5}	3.33 x 10 ⁻⁴ <i>f</i>	616000/ <i>f</i> ^{1.2}
RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Averaging Time (minutes)
0.003-1	280	2.19	-	6
1-10	280/ <i>f</i>	2.19/ <i>f</i>	-	6
10-30	28	2.19/ <i>f</i>	-	6
30-300	28	0.073	2*	6
300-1500	1.585 <i>f</i> ^{0.5}	0.0042 <i>f</i> ^{0.5}	<i>f</i> /150	6
1500-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}
Note 1: <i>f</i> is frequency in MHz.				
Note 2: For the applicable limit, see IC RSS-102				

4.1.2 MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

E = Electric field (V/m)

G = EUT Antenna numeric gain (numeric)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

P = RF output power (W)

d = Separation distance between radiator and human body (m)

4.1.3 Result of Maximum Permissible Exposure

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}	RF Output Power (dBm)	Co-location
a	1	1	Correlated	13.52	N/A
n (HT20)	2	2	Uncorrelated	14.64	N/A
n (HT40)	2	2	Uncorrelated	16.16	N/A

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.)

Worst Maximum Permissible Exposure Result									
Exposure Environment		General Population / Uncontrolled Exposure							
Separation Distance (cm)		20							
Power Level		1		RF Output Power (dBm)					
Modulation Mode	N _{TX}	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Gain (dBi)	EIRP Power	PD (S) (W/m ²)
11A5.2G-20M	1	13.52	-	-	-	-	6.27	19.79	0.0190
11N5.2G-20M	2	11.03	12.15	-	-	14.64	5.5	20.14	0.0206
11N5.2G-40M	2	12.79	13.48	-	-	16.16	5.5	21.66	0.0292
Maximum Permissible Exposure Limit (mW/cm ²)									1

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

5 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-ELEKTRONIK	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+SUHNER	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
Signal analyzer	R&S	FSV40	100979	9KHz~40GHz	Sep. 26, 2011	Conducted (TH02-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	May. 20, 2012	Conducted (TH02-CB)
Signal Generator	R&S	SMR40	100302	10MHz-40GHz	Nov. 22, 2011	Conducted (TH02-CB)
RF Power Divider	HP	11636A	00306	2GHz ~ 18GHz	N/A	Conducted (TH02-CB)
RF Power Splitter	Anaren	44100	1839	2GHz ~ 18GHz	N/A	Conducted (TH02-CB)
RF Power Splitter	Anaren	42100	17930	2GHz ~ 18GHz	N/A	Conducted (TH02-CB)
Horn Antenna	COM-POWER	AH-118	071187	1GHz – 18GHz	May. 09, 2012	Conducted (TH02-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Nov. 01, 2011	Conducted (TH02-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Nov. 01, 2011	Conducted (TH02-CB)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100593	9 kHz ~ 40 GHz	Aug. 08, 2011	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30 MHz ~ 1 GHz 3m	May 10, 2012	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100 kHz ~ 1.3 GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1 GHz ~ 26.5 GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1 GHz ~ 18 GHz	Nov. 15, 2011	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz ~ 1 GHz	Nov. 11, 2011	Radiation (03CH02-HY)
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz ~ 40 GHz	Jan. 18, 2012	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30 MHz ~ 2 GHz	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 m - 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.

6 Certification of TAF Accreditation

