

FCC Test Report

Equipment : 11n/a&11n/g/b Concurrent Smart model /
11n/a,11n/g/b Single Smart model

Brand Name : BUFFALO

Model No. : WAPS-APG600H/WAPS-AG300H

FCC ID : FDI000000004

Standard : 47 CFR FCC Part 15.247

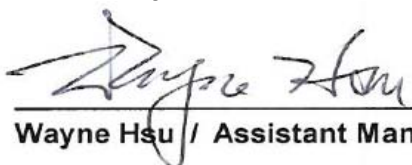
Applicant : Buffalo Inc.

Manufacturer : AKAMONDORI Bldg, 30-20, Ohsu 3-chome,
Naka-ku, Nagoya,460-8315, Japan

The product sample received on Jun. 27, 2012 and completely tested on Oct. 12, 2012. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 and shown compliance with the applicable technical standards.

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

Reviewed by:



Wayne Hsu / Assistant Manager



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Summary of Test Result

Conformance Test Specifications					
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	0.72MHz: 28.24dBuV (17.76dB) - AV 27.89dBuV (28.11dB) - QP	FCC 15.207	Complied
3.2	15.247(a)	6dB Bandwidth	6dB Bandwidth Unit [MHz] 11B-20M: 12.02 11G-20M: 16.36 11N2.4G-20M: 17.50 11N2.4G-40M: 36.04	≥500kHz	Complied
3.3	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm] 11B-20M: 23.64 11G-20M: 27.50 11N2.4G-20M: 26.11 11N2.4G-40M: 26.05	Power [dBm] 2412-2462MHz: 30 2422-2452MHz: 30	Complied
3.4	15.247(d)	Power Spectral Density	PSD [dBm/3kHz] 11B-20M: -5.99 11G-20M: -10.65 11N2.4G-20M: -12.20 11N2.4G-40M: -14.03	PSD [dBm/3kHz] 2412-2462MHz: 8 2422-2452MHz: 8	Complied
3.5	15.247(c)	Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2400.00MHz: 31.60dB Restricted Bands [dBuV/m at 3m]: 2483.60MHz: 66.41 (Margin 7.59dB) – PK 52.97 (Margin 1.03dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied
3.6	15.247(c)	Transmitter Radiated Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 7311MHz: 59.56 (Margin 14.44dB) - PK 51.38 (Margin 2.62dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied

Revision History

[illegible]

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information				
Frequency Range (MHz)	IEEE Std. 802.11 Protocol	Ch. Frequency (MHz)	Channel Number	RF Output Power (dBm)
2400-2483.5	b	2412-2462	1-11 [11]	23.64
2400-2483.5	g	2412-2462	1-11 [11]	27.50
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	26.11
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	26.05

Note 1: IEEE Std. 802.11-2007 modulation consists of IEEE Std. 802.11g-2003 and IEEE Std. 802.11b-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 Peak 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
b	2	2	Correlated	14.33	Yes
g	2	2	Correlated	16.51	Yes
n (HT20)	2	2	Uncorrelated	17.61	Yes
n (HT40)	2	2	Uncorrelated	36.14	Yes

Note 1: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other. (i.e., EUT has simultaneously co-transmitting that operating 2.4GHz and 5GHz.)

1.1.2 Antenna Information

Antenna Category	
☐	Equipment placed on the market without antennas
☐	Integral antenna (antenna permanently attached)
☐	Temporary RF connector provided
☐	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.
☒	External antenna (dedicated antennas)
☐	Single power level with corresponding antenna(s). Power Level (PL): 1
☒	Multiple power level and corresponding antenna(s). Power Level (PL): 1~2
☐	No 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.
☐	RF connector provided
☐	Unique antenna connector. (e.g., MMCX, U.FL, IPX, and RP-SMA, RP-N type...)
☐	Standard antenna connector. (e.g., SMA, N, BNC, and TNC type...)

Antenna General Information							
Antenna Port (Total 2 Port)			2(TX/RX)				
Maximum RF Output Power Level (PL)			1				
Transmit Chains Power Distribution			☒ symmetrical distribution ☐ asymmetrical distribution				
Ant. No.	PL	Ant. Port [Ant No. X connect to Ant. Port Y]	Ant. Cat.	Ant. Type	G _{ANT} (dBi)	DG (dBi) [correlated] N _{TX} = 1	DG (dBi) [uncorrelated] N _{TX} = 2
1	1	1	Internal	Dipole	1.89	4.9	1.89
	1	2	Internal	Dipole	1.89		
Note 1: For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows: Any transmit signals are correlated, Directional Gain (DG) = G_{ANT} + 10 log(N) dBi All transmit signals are completely uncorrelated, Directional Gain (DG) = G_{ANT} Note 2: For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows: Any transmit signals are correlated, Directional Gain (DG) = 10 log[(10^{G_{1/20}} + 10^{G_{2/20}} + ... + 10^{G_{N/20}}) / 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							

1.1.3 Type of EUT

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

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle		
☐ Operated normally mode for worst duty cycle		
☒ Operated test mode for worst duty cycle		
Test Signal Duty Cycle (x)	Power Duty Factor [dB] – (10 log 1/x)	Voltage Duty Factor [dB] – (20 log 1/x)
☒ 100% - IEEE 802.11b	0	0
☒ 100% - IEEE 802.11g	0	0
☒ 100% - IEEE 802.11n (HT20)	0	0
☒ 100% - IEEE 802.11n (HT40)	0	0

1.1.5 EUT Operational Condition

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

1.2 Accessories

Accessories Information				
AC Adapter	Brand Name	APD	Model Name	DA-48P12
	Power Rating	I/P: 100-240V~、50-60Hz、1.2A Max ; O/P: 12V 4A		

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

1.3 Support Equipment

Accessories				
No.	Equipment	Brand Name	Model Name	Serial No.
1	AC Adapter	APD	DA-48P12	-

Support Equipment - Conducted Emissions				
No.	Equipment	Brand Name	Model Name	Serial No.
1	USB Flash 1	TDK	16G	N/A
2	USB Flash 2	LITEON	2G	N/A
3	Notebook	DELL	E5520	DoC
4	iPod	Apple	A1199	DoC
5	USB Mouse	Microsoft	1113	DoC
6	Notebook (Remote Workstation)	DELL	VOSTRO 3350	DoC
7	POE (Remote Workstation)	D-Link	DWL-P200	DoC

Support Equipment - Radiated Emissions				
No.	Equipment	Brand Name	Model Name	Serial No.
1	USB Flash 1	TDK	16G	N/A
2	USB Flash 2	LITEON	2G	N/A
3	Notebook	DELL	E5520	DoC
4	USB Mouse	Microsoft	1113	DoC
5	iPod	Apple	A1199	DoC
6	Notebook (Remote Workstation)	DELL	E5520	DOC
7	POE (Remote Workstation)	D-Link	DWL-P200	DoC

1.4 Testing Applied Standards

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

- ◆ 47 CFR FCC Part 15
- ◆ ANSI C63.10-2009
- ◆ FCC KDB 558074 - Guidance for Performing Compliance Measurements on DTS
- ◆ FCC KDB 662911 - Emissions Testing of Transmitters with Multiple Outputs
- ◆ FCC KDB 412172 - Guidelines for Determining the ERP and EIRP

1.5 Testing Location Information

Testing Location				
☒	HWA YA	ADD :	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C	
		TEL :	886-3-327-3456	FAX : 886-3-327-0973
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Conducted Emission	CO01-HY	David	25.9°C / 53.6%	30-Jun-12
RF Conducted	TH01-HY	Ian	28.5°C / 42%	03-Jul-12~26-Sep-12
Radiated Emission	03CH02-HY	Hsiao	24.1°C / 64%	27-Jun-12~12-Oct-12

1.6 Measurement Uncertainty

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

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

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing						
Power Level		1				
IEEE 802.11 Protocol	Number of Transmit Chains (N _{TX})	Data Rate / MCS	Worst Data Rate / MCS	Worst Modulation Mode	RF Output Power (dBm)	Power Spectral Density (dBm/3kHz)
b	2	1-11 Mbps	1 Mbps	11B-20M	23.64	-5.99
g	2	6-54 Mbps	6Mbps	11G-20M	27.50	-10.65
n (HT20)	2	MCS 0-15	MCS 8	11N2.4G-20M	26.11	-12.20
n (HT40)	2	MCS 0-15	MCS 8	11N2.4G-40M	26.05	-14.03
Note 1: IEEE Std. 802.11-2007 modulation consists of IEEE Std. 802.11g-2003 and IEEE Std. 802.11b-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 11B-20M, 11G-20M, 11N2.4G-20M, 11N2.4G-40M: 11B: IEEE 802.11b, 11G: IEEE 802.11g, 11N2.4G: IEEE 802.11n (2.4GHz Band) 20M/40M: Channel Bandwidth 20MHz/40MHz Note 4: RF output power specifies that Maximum Peak 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)
b	11B-20M	2412-(F1), 2437-(F2), 2462-(F3)
g	11G-20M	2412-(F1), 2437-(F2), 2462-(F3)
n (HT20)	11N2.4G-20M	2412-(F1), 2437-(F2), 2462-(F3)
n (HT40)	11N2.4G-40M	2422-(F4), 2437-(F5), 2452-(F6)
Note 1: Modulation modes consist of 11B-20M, 11G-20M, 11N2.4G-20M, 11N2.4G-40M: 11B: IEEE 802.11b, 11G: IEEE 802.11g, 11N2.4G: IEEE 802.11n (2.4GHz Band) 20M/40M: Channel Bandwidth 20M/40M		

2.3 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter					
Power Level		1			
Test Software Version		RT 3x9x QA_ 1.5.6.8			
Worst Modulation Mode	Number of Transmit Chains (N _{TX})	Frequency (MHz)	Power Setting	Worst Data Rate / MCS	RF Output Power (dBm)
11B-20M	2	2412	16,16	1 Mbps	21.23
11B-20M	2	2442	1F,1F	1 Mbps	23.64
11B-20M	2	2472	19,19	1 Mbps	20.28
11G-20M	2	2412	13,13	6 Mbps	21.05
11G-20M	2	2442	1F,1F	6 Mbps	27.50
11G-20M	2	2472	12,12	6 Mbps	20.05
11N2.4G-20M	2	2412	13,13	MCS 8	20.92
11N2.4G-20M	2	2442	1F,1F	MCS 8	26.11
11N2.4G-20M	2	2472	13,13	MCS 8	19.69
11N2.4G-40M	2	2422	10,10	MCS 8	17.76
11N2.4G-40M	2	2437	1F,1F	MCS 8	26.05
11N2.4G-40M	2	2452	10,10	MCS 8	17.92
Note 1: Modulation modes consist of 11B-20M, 11G-20M, 11N2.4G-20M, 11N2.4G-40M: 11B: IEEE 802.11b, 11G: IEEE 802.11g, 11N2.4G: IEEE 802.11n (2.4GHz Band) 20M/40M: Channel Bandwidth 20MHz/40MHz Note 2: RF output power specifies that Maximum Peak Conducted Output Power.					

2.4 The Worst Case Measurement Configuration

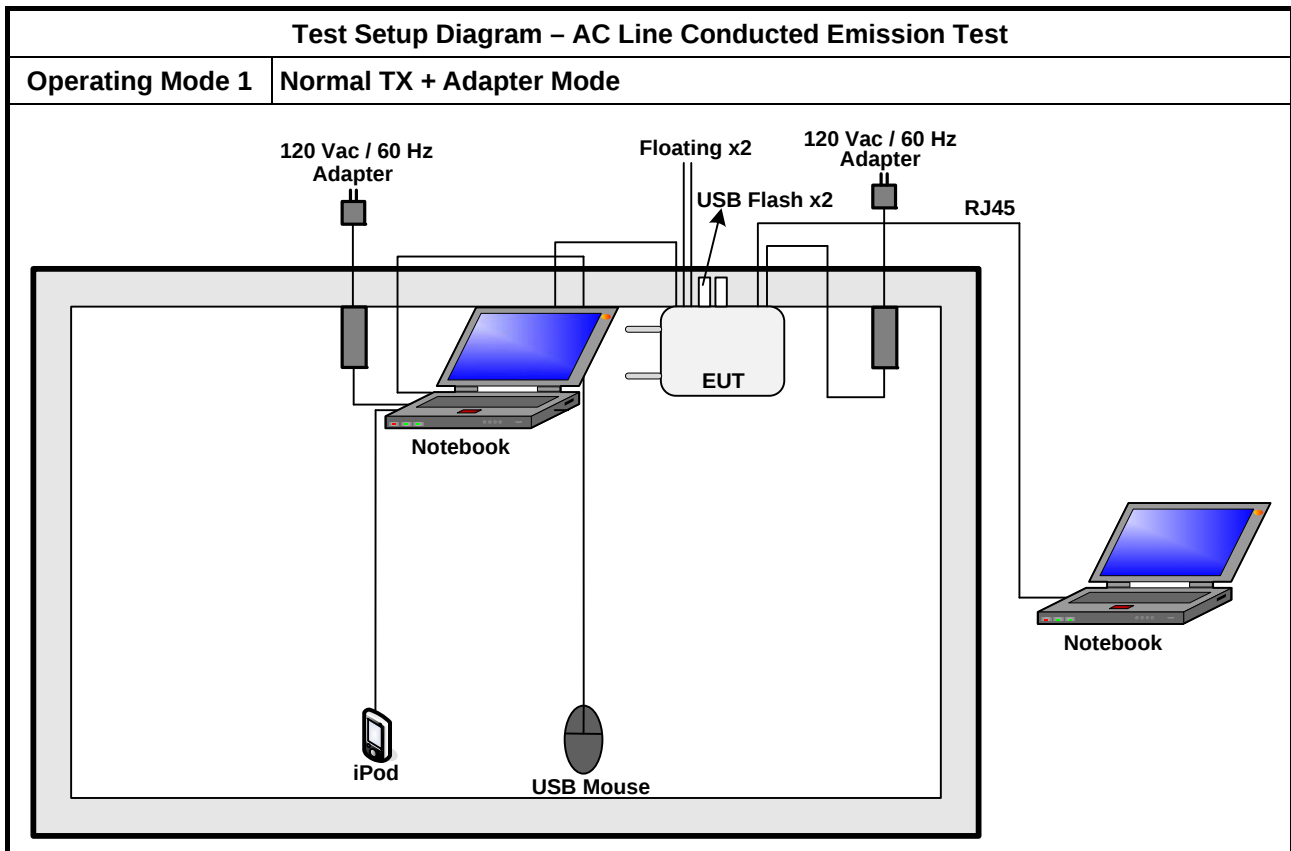
The Worst Case Mode for Following Conformance Tests				
Tests Item	AC power-line conducted emissions			
Condition	AC power-line conducted measurement for line and neutral			
Operating Mode	Operating Mode Description	Worst Modulation Mode	Test Freq.	Power Level
1	Normal TX + Adapter Mode	11N2.4G-20M	F2	1
2	Normal TX + POE Mode	11N2.4G-20M	F5	1
For operating mode 1 is the worst case and it was record in this test report.				

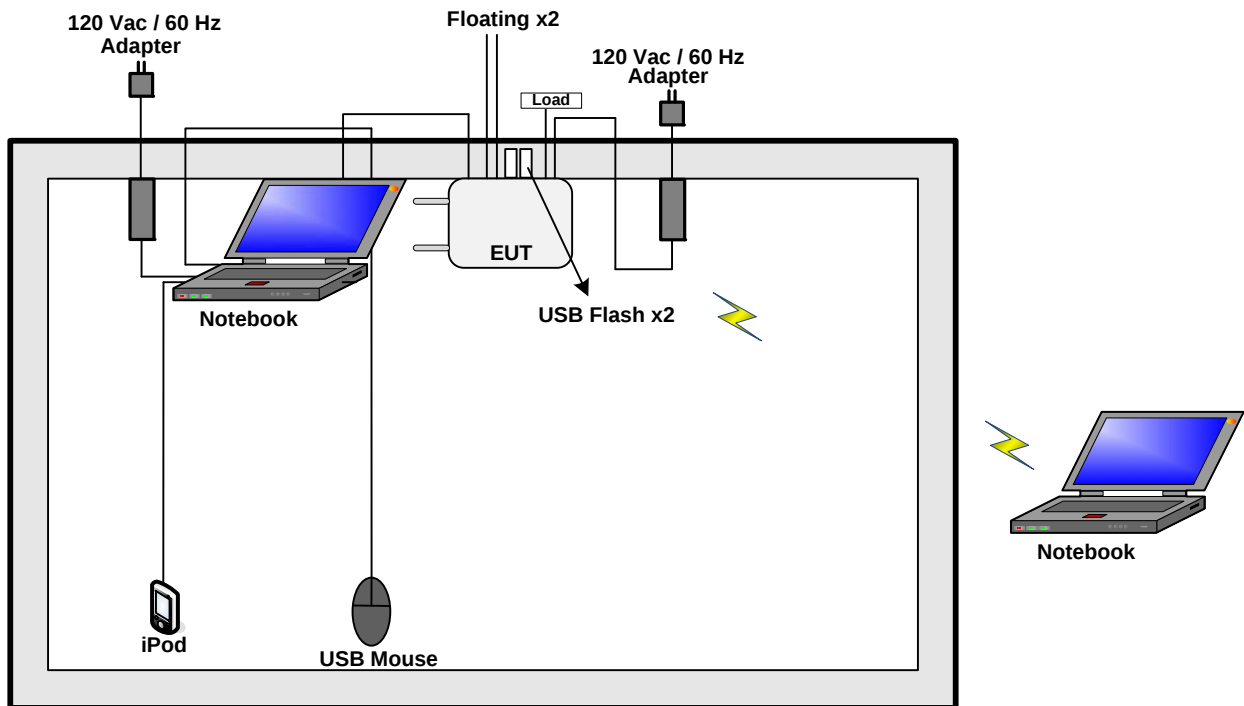
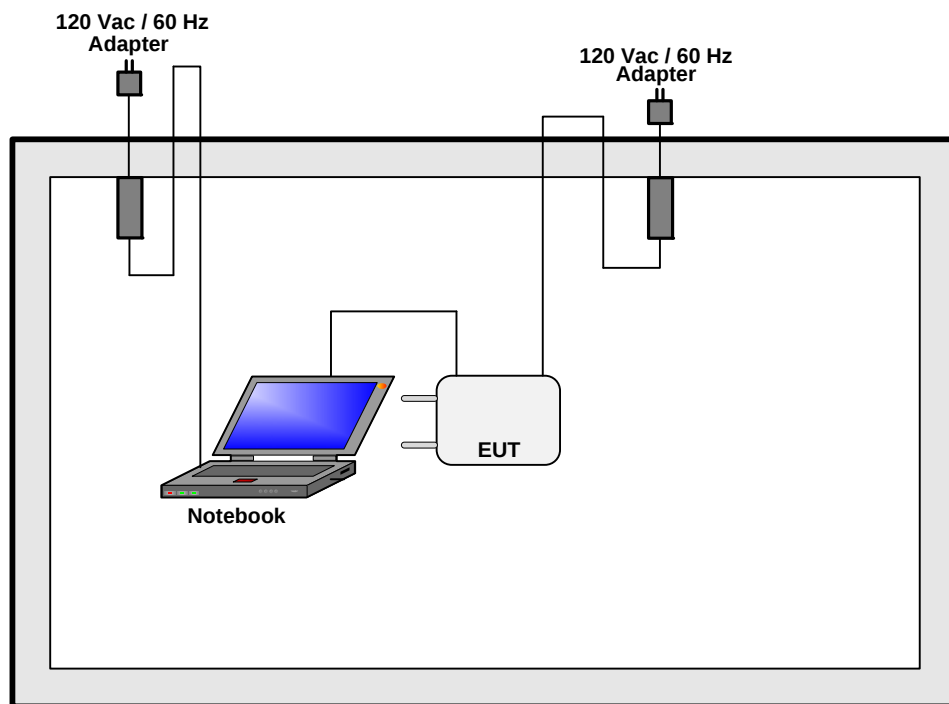
The Worst Case Mode for Following Conformance Tests				
Tests Item	RF Output Power Power Spectral Density 6 dB Bandwidth			
Test Condition	Conducted measurement at transmit chains			
Worst Modulation Mode	Number of Transmit Chains (N_{TX})	Worst Data Rate / MCS	Test Frequency	Power Level
11B-20M	2	1 Mbps	F1, F2, F3	1
11G-20M	2	6Mbps	F1, F2, F3	1
11N2.4G-20M	2	MCS 8	F1, F2, F3	1
11N2.4G-40M	2	MCS 8	F4, F5, F6	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
11B-20M	2	1 Mbps	F1, F3	1
11G-20M	2	6Mbps	F1, F3	1
11N2.4G-20M	2	MCS 8	F1, F3	1
11N2.4G-40M	2	MCS 8	F4, F6	1

The Worst Case Mode for Following Conformance Tests						
Tests Item	Transmitter Radiated Unwanted Emissions					
Test Condition	Radiated measurement					
User Position	☒ EUT will be placed in fixed position.					
	☐ EUT will be placed in mobile position and operating multiple positions. EUT shall be performed two or three orthogonal planes.					
	☐ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed two or three orthogonal planes.					
Operating Mode < 1GHz	☒ 1. Normal TX + Adapter Mode					
	☒ 2. Normal TX + POE Mode					
Worst Modulation Mode	Number of Transmit Chains (N_{TX})	Worst Data Rate / MCS	Test Frequency	Power Level	Ant No.	Worst Orthogonal Planes of EUT
11B-20M	2	1 Mbps	F1, F2, F3	1	1,2	X Plane
11G-20M	2	6Mbps	F1, F2, F3	1	1,2	X Plane
11N2.4G-20M	2	MCS 8	F1, F2, F3	1	1,2	X Plane
11N2.4G-40M	2	MCS 8	F4, F5	1	1,2	X 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



Test Setup Diagram - Radiated Test (Below 1GHz)
Operating Mode 1 | Normal TX + Adapter Mode

Test Setup Diagram - Radiated Test (above 1GHz)
Operating Mode 1 | Normal TX + Adapter Mode


3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

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

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

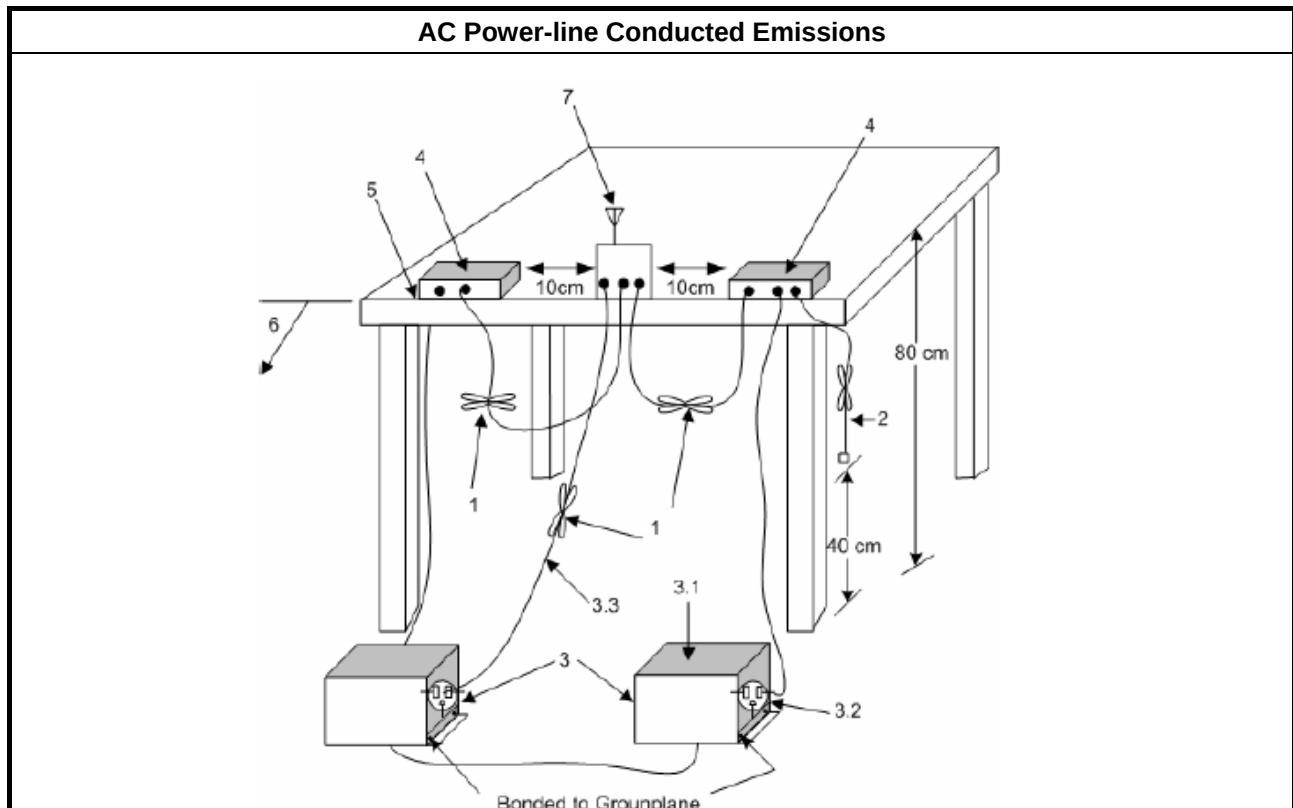
3.1.2 Measuring Instruments

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

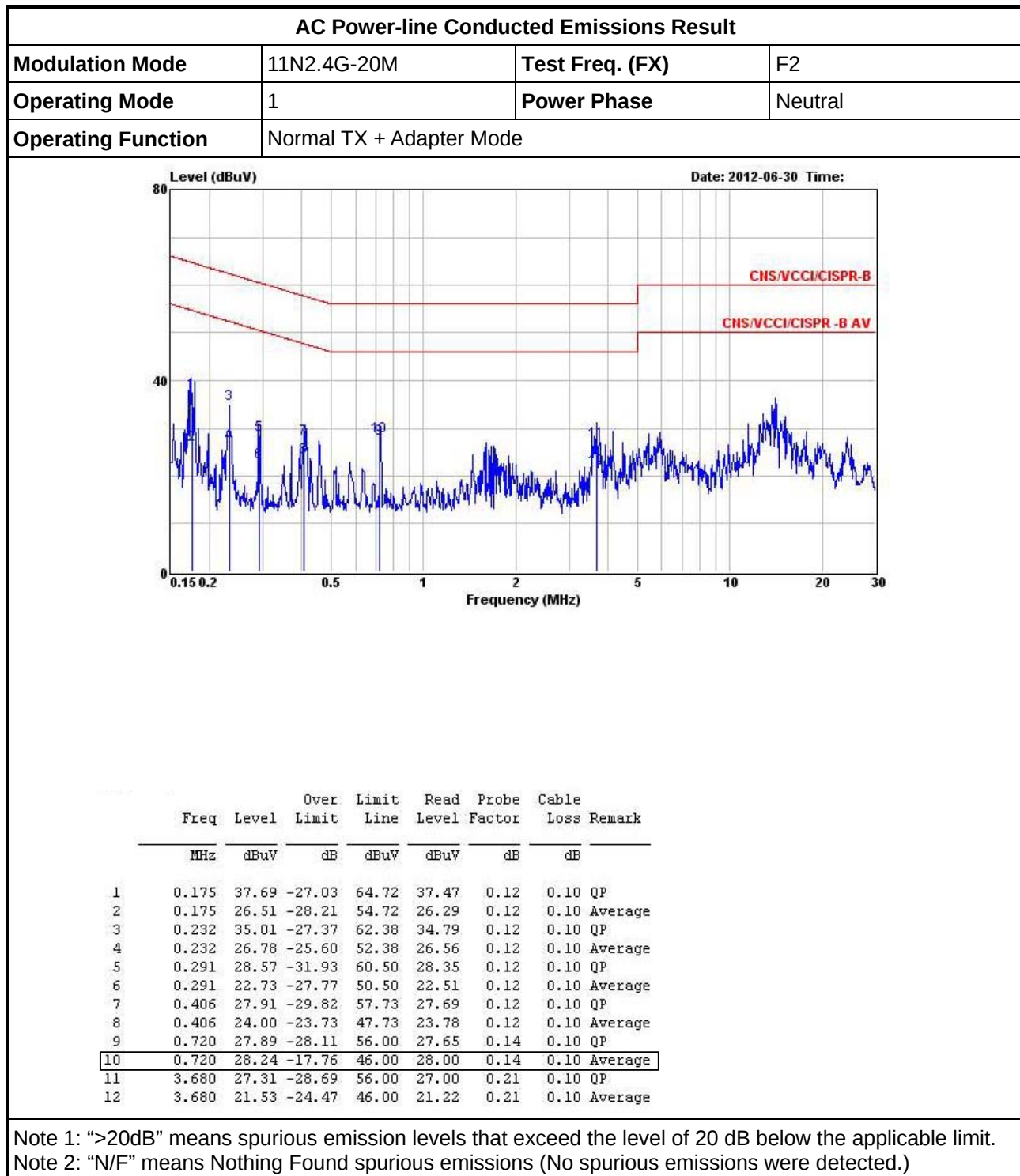
3.1.3 Test Procedures

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

3.1.4 Test Setup

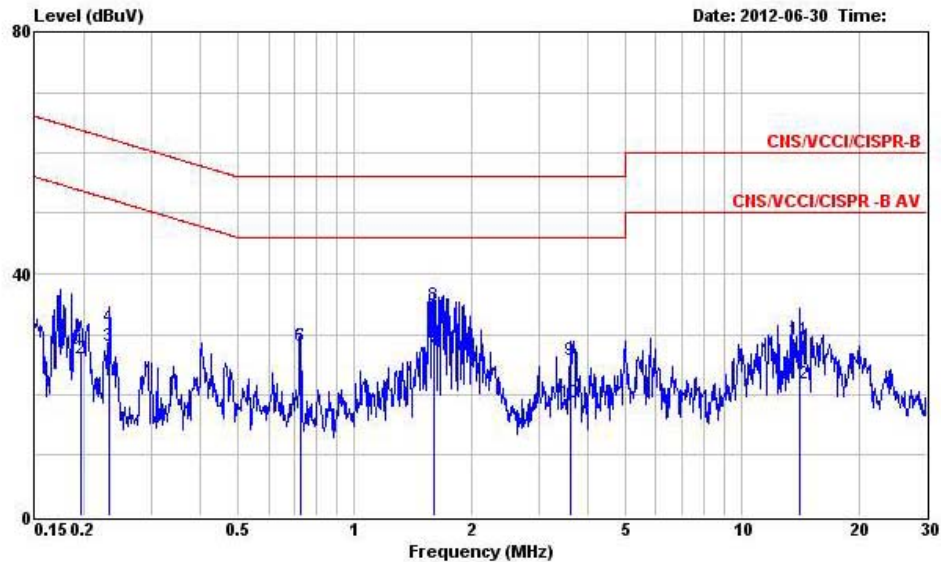


3.1.5 Test Result of AC Power-line Conducted Emissions



AC Power-line Conducted Emissions Result

Modulation Mode	11N2.4G-20M	Test Freq. (FX)	F2
Operating Mode	1	Power Phase	Line
Operating Function	Normal TX + Adapter Mode		



	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.196	27.24	-36.54	63.78	27.06	0.08	0.10	QP
2	0.196	25.90	-27.88	53.78	25.72	0.08	0.10	Average
3	0.233	27.98	-24.36	52.34	27.80	0.08	0.10	Average
4	0.233	31.13	-31.21	62.34	30.95	0.08	0.10	QP
5	0.724	28.02	-27.98	56.00	27.81	0.11	0.10	QP
6	0.724	28.16	-17.84	46.00	27.95	0.11	0.10	Average
7	1.600	26.90	-19.10	46.00	26.67	0.13	0.10	Average
8	1.600	34.90	-21.10	56.00	34.67	0.13	0.10	QP
9	3.620	25.81	-30.19	56.00	25.53	0.18	0.10	QP
10	3.620	18.81	-27.19	46.00	18.53	0.18	0.10	Average
11	14.140	29.08	-30.92	60.00	28.66	0.32	0.10	QP
12	14.140	21.84	-28.16	50.00	21.42	0.32	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 6dB Bandwidth

3.2.1 6dB Bandwidth Limit

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

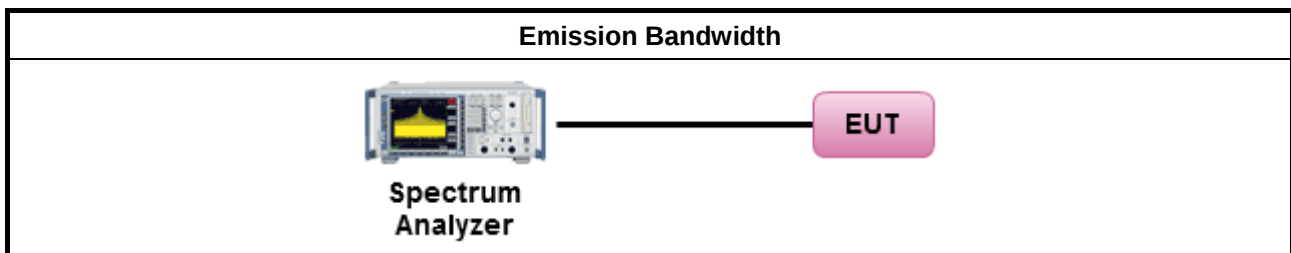
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method			
☒ For the emission bandwidth shall be measured using one of the options below:			
☒ Refer as FCC KDB 558074, clause 5.1.1 Option 1 for 6 dB bandwidth measurement. ☐ Refer as FCC KDB 558074, clause 5.1.2 Option 2 for 6 dB bandwidth measurement. ☐ Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.			
☒ For conducted measurement.			
☒ For conducted measurements on devices with multiple transmit chains using options given below: <table border="1" style="margin-left: 20px;"> <tr> <td>☐ 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.</td> </tr> <tr> <td>☒ 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.</td> </tr> <tr> <td>☐ 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.</td> </tr> </table>	☐ Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.	☒ Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.	☐ Option 3: A power splitter/combiner shall be used to combine all the transmit chains (antenna outputs) into a single test point and record a single test point EBW.
☐ Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.			
☒ Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.			
☐ Option 3: A power splitter/combiner shall be used to combine all the transmit chains (antenna outputs) into a single test point and record a single test point EBW.			
☐ For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.			

3.2.4 Test Setup

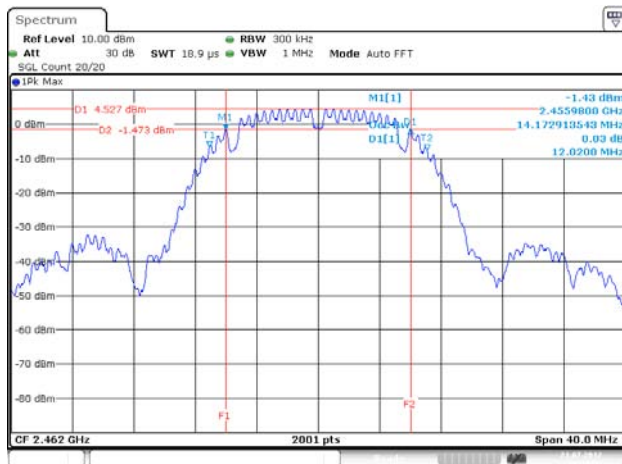


3.2.5 Test Result of Emission Bandwidth

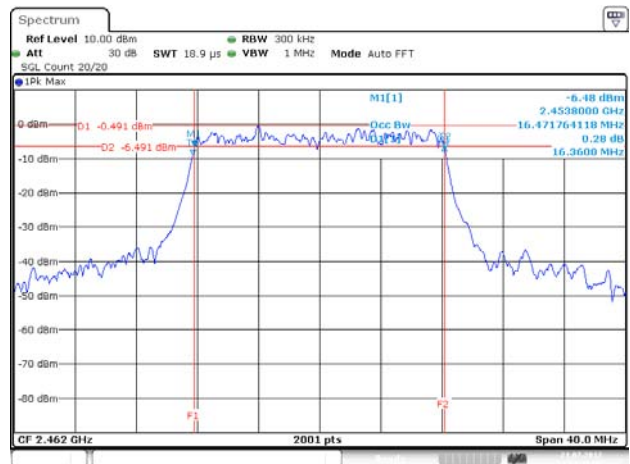
Emission Bandwidth Result										
Power Level	1		Emission Bandwidth (MHz)							
Modulation Mode	N _{TX}	Freq. (MHz)	99% Bandwidth				6dB Bandwidth			
			Chain-Port 1	Chain-Port 2	-	-	Chain-Port 1	Chain-Port 2	-	-
11B-20M	2	2412	14.21	14.33	-	-	11.18	11.20	-	-
11B-20M	2	2437	14.07	14.07	-	-	10.28	10.28	-	-
11B-20M	2	2462	14.17	14.13	-	-	12.02	11.16	-	-
11G-20M	2	2412	16.35	16.29	-	-	16.30	16.16	-	-
11G-20M	2	2437	16.51	16.39	-	-	16.28	16.28	-	-
11G-20M	2	2462	16.47	16.39	-	-	16.36	16.24	-	-
11N2.4G-20M	2	2412	17.57	17.61	-	-	17.50	17.34	-	-
11N2.4G-20M	2	2437	17.41	17.43	-	-	17.12	17.16	-	-
11N2.4G-20M	2	2462	17.47	17.45	-	-	17.44	16.44	-	-
11N2.4G-40M	2	2412	36.06	36.06	-	-	36.04	35.20	-	-
11N2.4G-40M	2	2437	36.14	35.86	-	-	35.40	34.88	-	-
11N2.4G-40M	2	2462	36.06	36.02	-	-	35.80	34.12	-	-
Limit			N/A				≥500 kHz			
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

Emission Bandwidth Plots

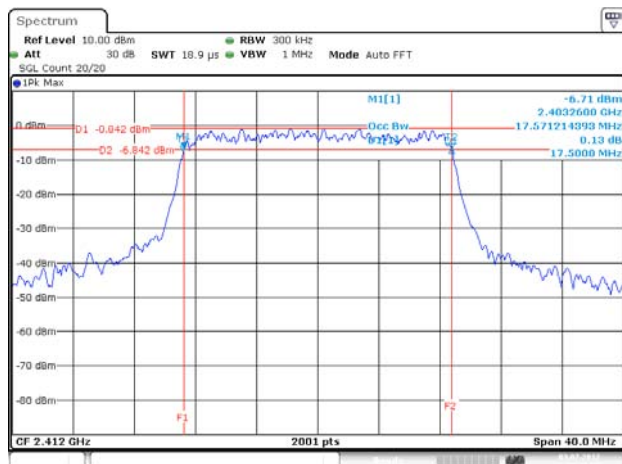
11B-20M – F3 [Port 1]



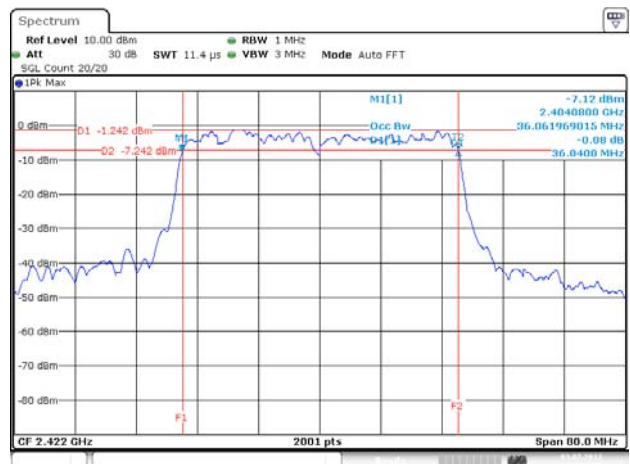
11G-20M – F3 [Port 1]



11N2.4G-20M – F1 [Port 1]



11N2.4G-40M – F4 [Port 1]



3.3 RF Output Power

3.3.1 RF Output Power Limit

RF Output Power Limit	
Maximum Peak Conducted Output Power or Maximum Conducted Output Power Limit	
☐ 902-928 MHz Band:	
☐	If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)
☐	If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm
☒ 2400-2483.5 MHz Band:	
☒	If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)
☐	Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm
☐	Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
☐	Smart antenna system (SAS):
☐	Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
☐	Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
☐	Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3 + 8$ dBm
☐ 5725-5850 MHz Band:	
☐	If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)
☐	Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm
☐	Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30$ dBm
e.i.r.p. Power Limit:	
☐ 902-928 MHz Band: $P_{eirp} \leq 36$ dBm (4 W)	
☒ 2400-2483.5 MHz Band	
☒	Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)
☐	Point-to-point systems (P2P): $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])$ dBm
☐	Smart antenna system (SAS)
☐	Single beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
☐	Overlap beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
☐	Aggregate power on all beams: $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX} + 8])$ dBm
☐ 5725-5850 MHz Band	
☐	Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)
☐	Point-to-point systems (P2P): N/A
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi. P_{eirp} = e.i.r.p. Power in dBm.	

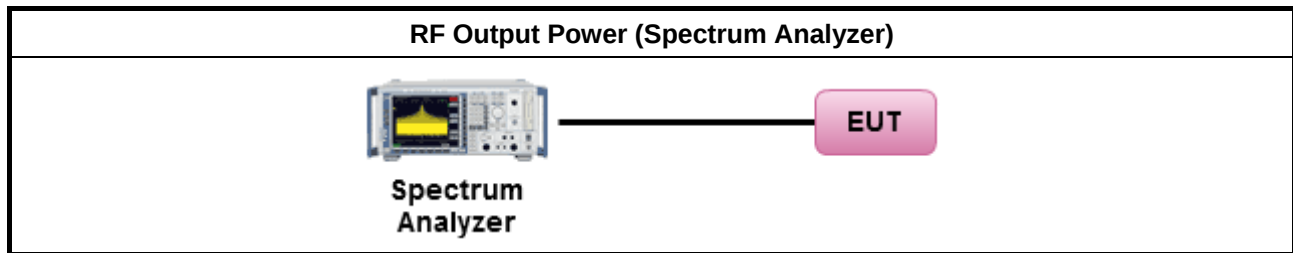
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
☒	Maximum Peak Conducted Output Power
☐	Refer as FCC KDB 558074, clause 5.2.1.1 Option 1 (RBW ≥ EBW method).
☒	Refer as FCC KDB 558074, clause 5.2.1.2 Option 2 (integrated band power method).
☐	Refer as ANSI C63.10, clause 6.10.2.1 a) for peak power meter.
☐	Refer as ANSI C63.10, clause 6.10.2.1 a) for spectrum analyzer - (RBW ≥ EBW).
☐	Refer as ANSI C63.10, clause 6.10.2.1 b) for spectrum analyzer - BW correction factor.
☒	Maximum Conducted (Average) Output Power
☐	Refer as FCC KDB 558074, clause 5.2.2.1 Option 1 (RMS detection with slow sweep speed).
☒	Refer as FCC KDB 558074, clause 5.2.2.2 Option 2 (spectral trace averaging).
☐	Refer as ANSI C63.10, clause 6.10.3.1 for spectrum analyzer - Method 1 (trace averaging).
☐	Refer as ANSI C63.10, clause 6.10.3.2 for spectrum analyzer - Method 2 (zero-span averaging).
☐	Refer as ANSI C63.10, clause 6.10.3.2 for spectrum analyzer - Method 3 (band power max-hold).
☒	Refer as FCC KDB 558074, clause 2 for conducted measurement.
☒	For conducted measurements on devices with multiple transmit chains: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
☒	If multiple transmit chains, EIRP calculation could be following as methods:
☐	Method 1: $EIRP_1 = P_1 + G_{ANT1} ; EIRP_2 = P_2 + G_{ANT2} ; \dots EIRP_n = P_n + G_{ANTn}$ $EIRP_{total} = EIRP_1 + EIRP_2 + \dots + EIRP_n$ (calculated in linear unit [mW] and transfer to log unit [dBm])
☒	Method 2: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$
☐	Refer as FCC KDB 558074, clause 2 for radiated measurement.

3.3.4 Test Setup



3.3.5 Test Result of Maximum Peak Conducted Output Power

Maximum Peak Conducted Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		4.9								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11B-20M	2	2412	19.24	16.88	-	-	21.23	30.0	26.13	36.0
11B-20M	2	2437	21.59	19.39	-	-	23.64	30.0	28.54	36.0
11B-20M	2	2462	17.93	16.48	-	-	20.28	30.0	25.18	36.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

Maximum Peak Conducted Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		4.9								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11G-20M	2	2412	19.01	16.80	-	-	21.05	30.0	25.95	36.0
11G-20M	2	2437	25.41	23.33	-	-	27.50	30.0	32.40	36.0
11G-20M	2	2462	17.67	16.31	-	-	20.05	30.0	24.95	36.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										



Maximum Peak Conducted Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		1.89								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11N2.4G-20M	2	2412	18.92	16.59	-	-	20.92	30.0	22.81	36.0
11N2.4G-20M	2	2437	23.97	22.02	-	-	26.11	30.0	28.00	36.0
11N2.4G-20M	2	2462	17.37	15.87	-	-	19.69	30.0	21.58	36.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

Maximum Peak Conducted Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		1.89								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11N2.4G-40M	2	2422	15.75	13.45	-	-	17.76	30.0	19.65	36.0
11N2.4G-40M	2	2437	24.14	21.56	-	-	26.05	30.0	27.94	36.0
11N2.4G-40M	2	2452	15.76	13.85	-	-	17.92	30.0	19.81	36.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

3.3.6 Test Result of Maximum Conducted (Average) Output Power

Maximum Conducted (Average) Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		4.9								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11B-20M	2	2412	16.20	13.84	-	-	18.19	30.0	23.09	36.0
11B-20M	2	2437	18.58	16.39	-	-	20.63	30.0	25.53	36.0
11B-20M	2	2462	14.86	13.43	-	-	17.21	30.0	22.11	36.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

Maximum Conducted (Average) Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		4.9								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11G-20M	2	2412	11.27	9.07	-	-	13.32	30.0	18.22	36.0
11G-20M	2	2437	17.71	15.60	-	-	19.79	30.0	24.69	36.0
11G-20M	2	2462	9.93	8.57	-	-	12.31	30.0	17.21	36.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

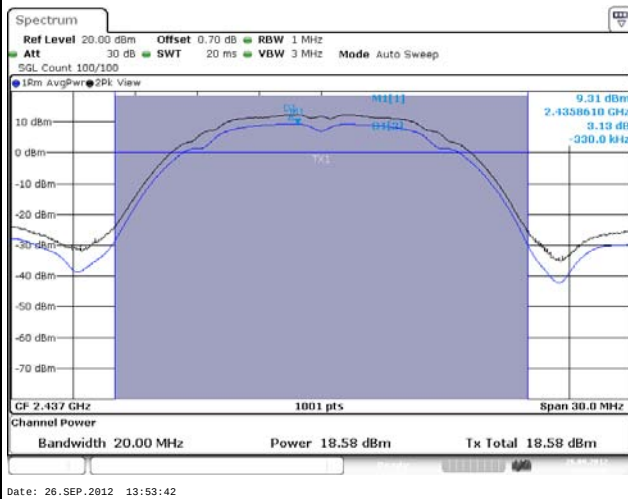


Maximum Conducted (Average) Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		1.89								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11N2.4G-20M	2	2412	10.96	8.45	-	-	12.89	30.0	14.78	36.0
11N2.4G-20M	2	2437	16.05	13.86	-	-	18.10	30.0	19.99	36.0
11N2.4G-20M	2	2462	9.48	7.69	-	-	11.69	30.0	13.58	36.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

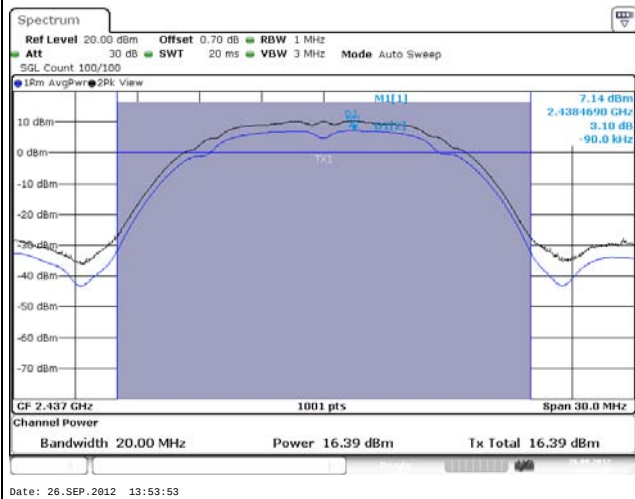
Maximum Conducted (Average) Output Power Result										
Power Level		1	RF Output Power (dBm)							
Directional Gain (dBi)		1.89								
Modulation Mode	N _{TX}	Freq. (MHz)	Chain-Port 1	Chain-Port 2	-	-	Sum Chain	Power Limit	EIRP Power	EIRP Limit
11N2.4G-40M	2	2422	7.82	5.35	-	-	9.77	30.0	11.66	36.0
11N2.4G-40M	2	2437	16.13	13.94	-	-	18.18	30.0	20.07	36.0
11N2.4G-40M	2	2452	7.84	5.76	-	-	9.93	30.0	11.82	36.0
Result			Complied							
Note 1: N _{TX} = Number of Transmit Chains										

Worst Maximum Conducted Output Power Plots

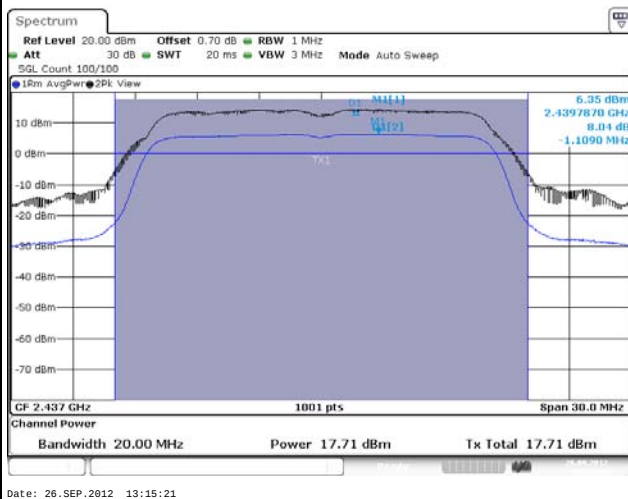
11B-20M – F2 [Port 1]



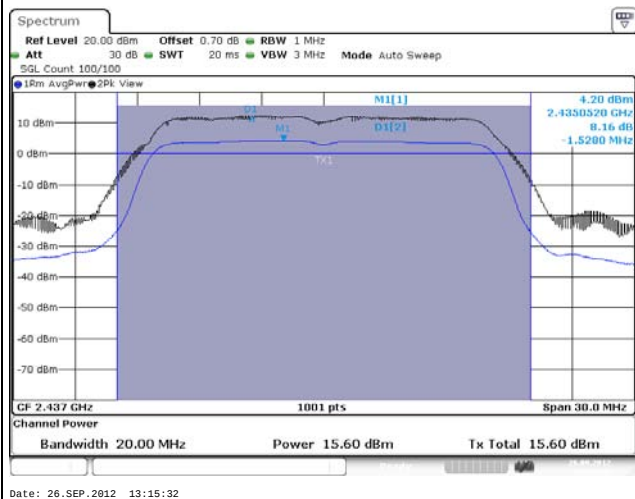
11B-20M – F2 [Port 2]



11G-20M – F2 [Port 1]



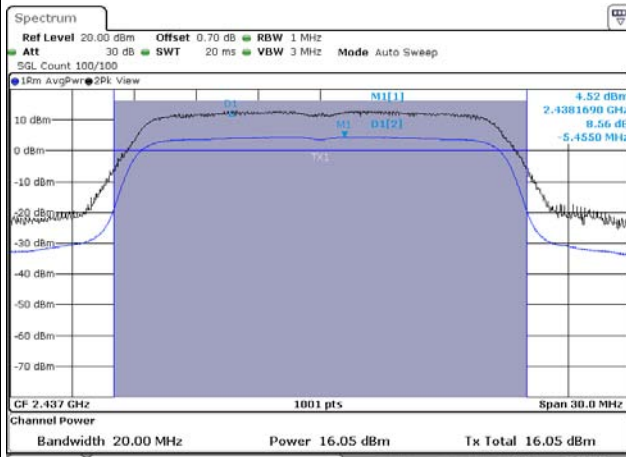
11G-20M – F2 [Port 2]



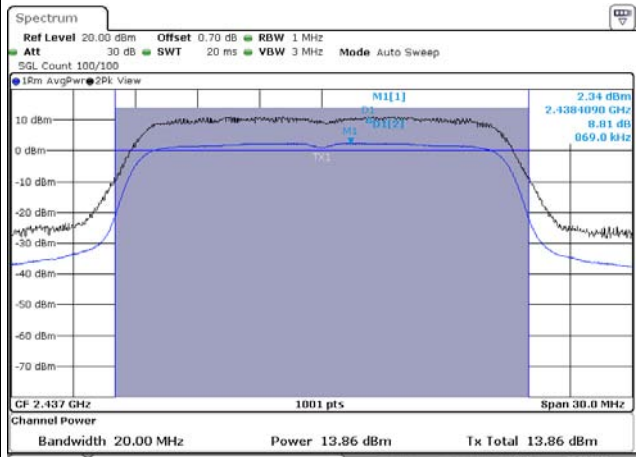


Worst Maximum Conducted Output Power Plots

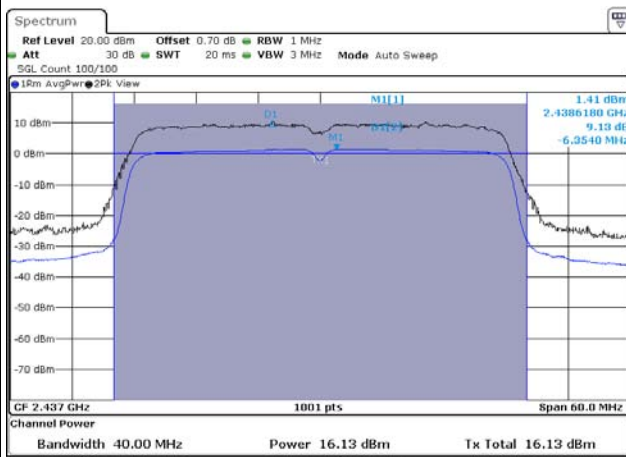
11N2.4G-20M – F2 [Port 1]



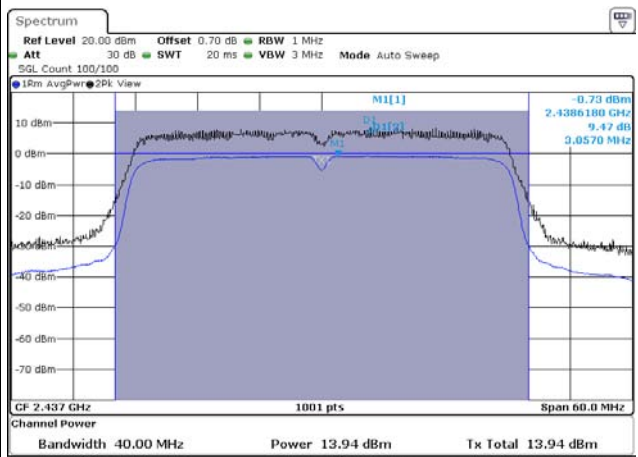
11N2.4G-20M – F2 [Port 2]



11N2.4G-40M – F5 [Port 1]



11N2.4G-40M – F5 [Port 2]



3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit	
☒	Power Spectral Density (PSD) ≤ 8 dBm/3kHz

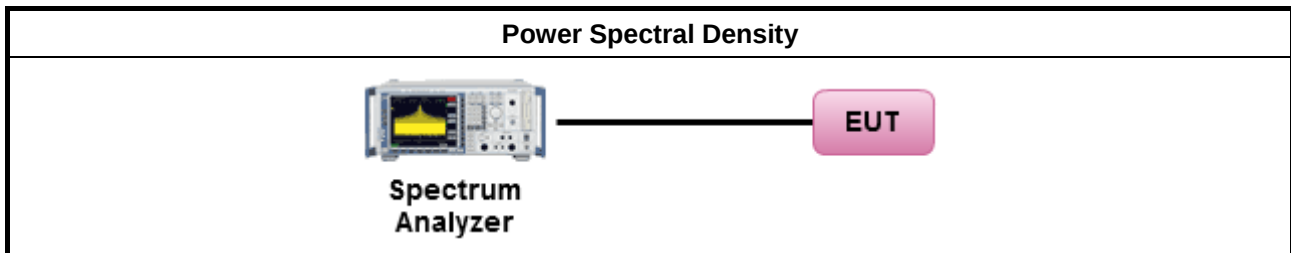
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

Test Method	
☒	Power spectral density procedures that the same method as used to determine the conducted output power shall be used to determine the power spectral density. In addition, the use of a peak PSD procedure will always result in a "worst-case" measured level for comparison to the limit. Therefore, whenever the DTS bandwidth exceeds 500 kHz, it is acceptable to utilize the peak PSD procedure to demonstrate compliance to the PSD limit, regardless of how the fundamental output power was measured. For the power spectral density shall be measured using below options:
☒	Refer as FCC KDB 558074, clause 5.3.1 Option 1 (peak PSD; BWCF=-15.2dB).
☐	Refer as FCC KDB 558074, clause 5.3.2 Option 2 (average PSD; BWCF=-15.2dB).
☐	Refer as ANSI C63.10, clause 6.11.2.3 for PSD for DTS - (RBW=3kHz; sweep=100s).
☐	Refer as ANSI C63.10, clause 6.11.2.4 for Alternative PSD for DTS - (RBW=3kHz; average=100)
☒	Refer as FCC KDB 558074, clause 2 for conducted measurement.
☒	For conducted measurements on devices with multiple transmit chains using options given below:
☒	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the N _{TX} output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace. The new data trace samples added 100 kHz segment and found the highest value of each 100 kHz segments. Add the bandwidth correction factor (BWCF) [-15.2 dB] adjusting in power spectral density per 3kHz.
☐	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.
☐	Refer as FCC KDB 558074, clause 2 for radiated measurement.

3.4.4 Test Setup



3.4.5 Test Result of Power Spectral Density

Power Spectral Density Result							
Power Level		1	Power Spectral Density (dBm/3kHz)				
Directional Gain (dBi)		4.9					
Modulation Mode	N _{TX}	Freq. (MHz)	Sum All Chains	-	-	-	PSD Limit
11B-20M	2	2412	-8.72	-	-	-	8
11B-20M	2	2437	-5.99	-	-	-	8
11B-20M	2	2462	-9.57	-	-	-	8
Result			Complied				

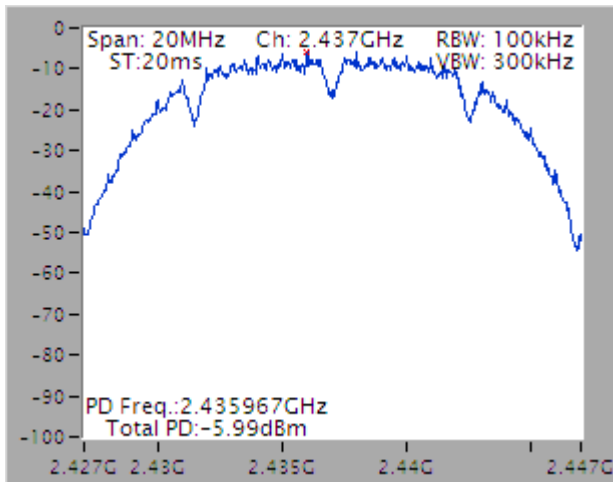
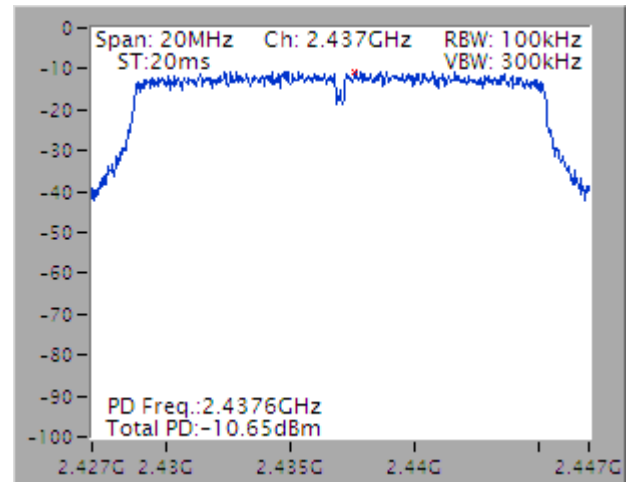
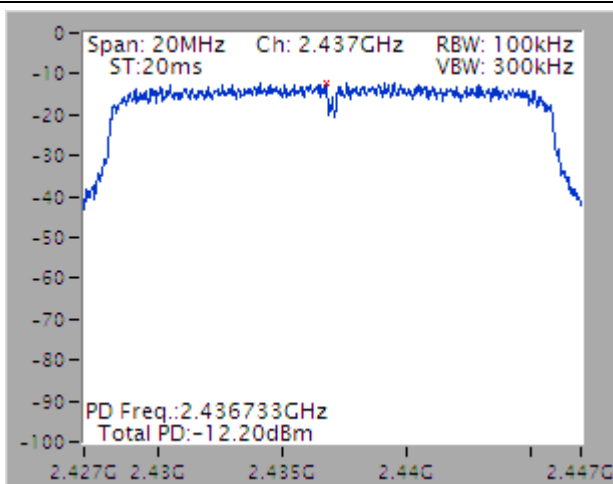
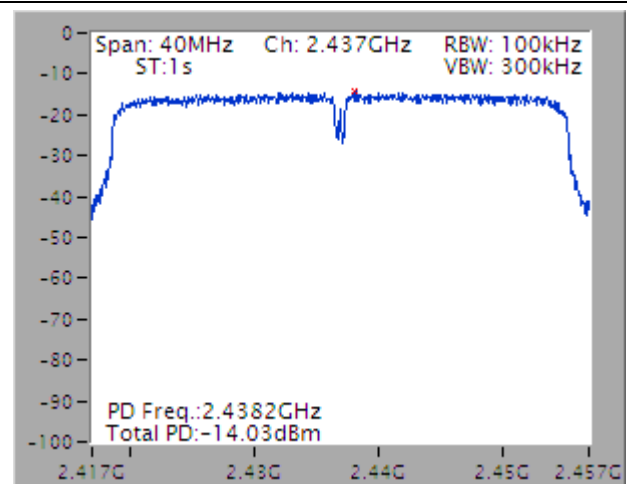
Note 1: N_{TX} = Number of Transmit Chains
 Note 2: PSD [dBm/3kHz] = sum each transmit chains by bin-to-bin PSD [dBm/100kHz] + BWFC [-15.2 dB]

Power Spectral Density Result							
Power Level		1	Power Spectral Density (dBm/3kHz)				
Directional Gain (dBi)		4.9					
Modulation Mode	N _{TX}	Freq. (MHz)	Sum All Chains	-	-	-	PSD Limit
11G-20M	2	2412	-17.05	-	-	-	8
11G-20M	2	2437	-10.65	-	-	-	8
11G-20M	2	2462	-17.85	-	-	-	8
Result			Complied				

Note 1: N_{TX} = Number of Transmit Chains
 Note 2: PSD [dBm/3kHz] = sum each transmit chains by bin-to-bin PSD [dBm/100kHz] + BWFC [-15.2 dB]

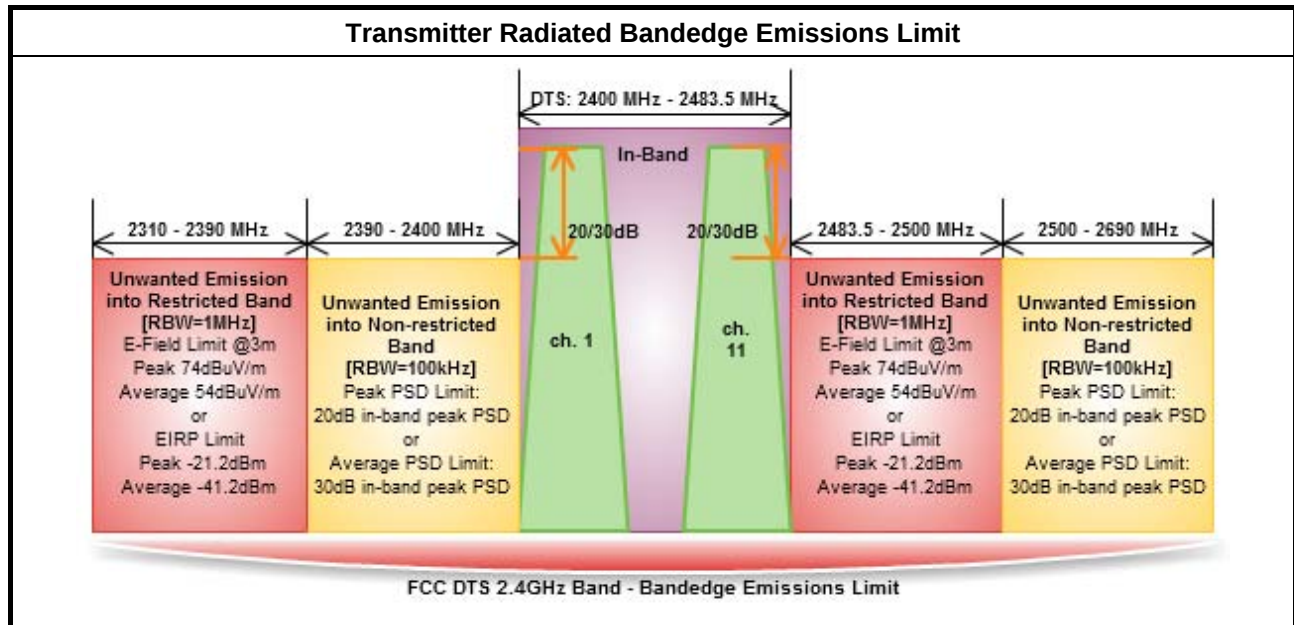
Power Spectral Density Result							
Power Level		1	Power Spectral Density (dBm/3kHz)				
Directional Gain (dBi)		1.89					
Modulation Mode	N _{TX}	Freq. (MHz)	Sum All Chains	-	-	-	PSD Limit
11N2.4G-20M	2	2412	-17.52	-	-	-	8
11N2.4G-20M	2	2437	-12.20	-	-	-	8
11N2.4G-20M	2	2462	-18.52	-	-	-	8
Result			Complied				
Note 1: N _{TX} = Number of Transmit Chains							
Note 2: PSD [dBm/3kHz] = sum each transmit chains by bin-to-bin PSD [dBm/100kHz] + BWFC [-15.2 dB]							

Power Spectral Density Result							
Power Level		1	Power Spectral Density (dBm/3kHz)				
Directional Gain (dBi)		1.89					
Modulation Mode	N _{TX}	Freq. (MHz)	Sum All Chains	-	-	-	PSD Limit
11N2.4G-40M	2	2422	-23.75	-	-	-	8
11N2.4G-40M	2	2437	-14.03	-	-	-	8
11N2.4G-40M	2	2452	-23.33	-	-	-	8
Result			Complied				
Note 1: N _{TX} = Number of Transmit Chains							
Note 2: PSD [dBm/3kHz] = sum each transmit chains by bin-to-bin PSD [dBm/100kHz] + BWFC [-15.2 dB]							

Power Spectral Density Plots - w/o BWFC
11B-20M – F2 [Sum All Chains]

11G-20M – F2 [Sum All Chains]

11N2.4G-20M – F2 [Sum All Chains]

11N2.4G-40M – F5 [Sum All Chains]


3.5 Transmitter Radiated Bandedge Emissions

3.5.1 Transmitter Radiated Bandedge Emissions Limit



3.5.2 Measuring Instruments

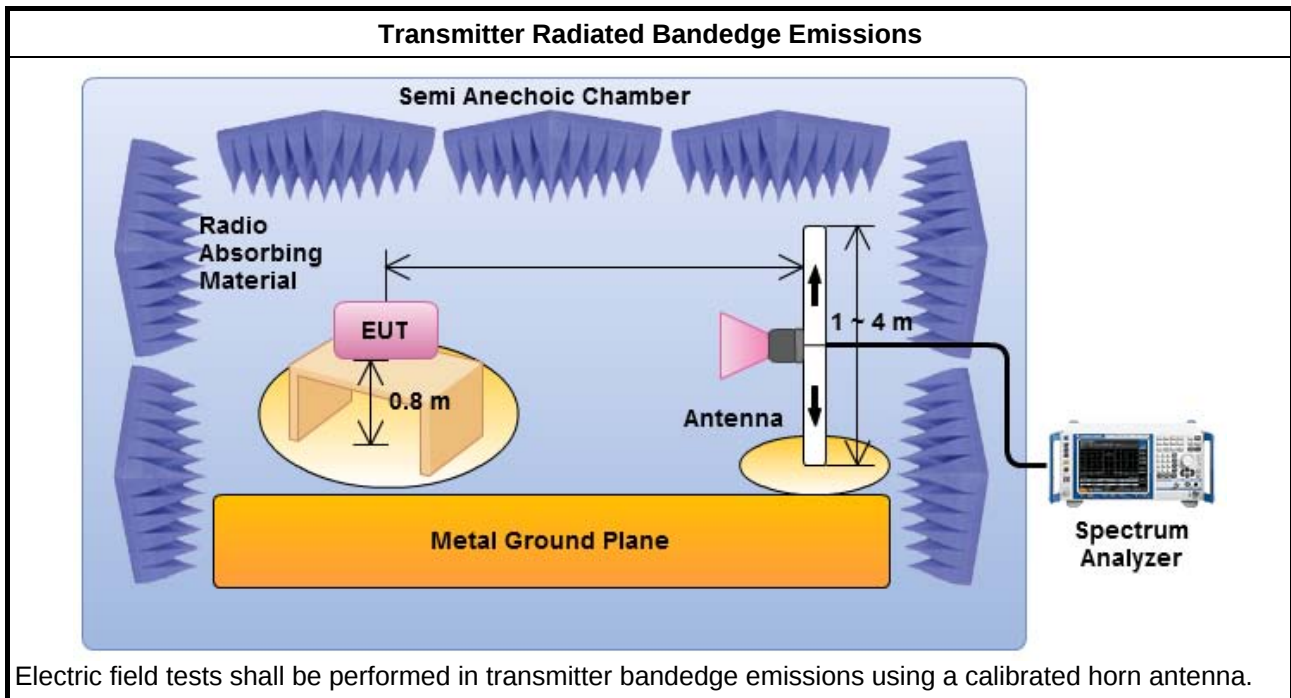
Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

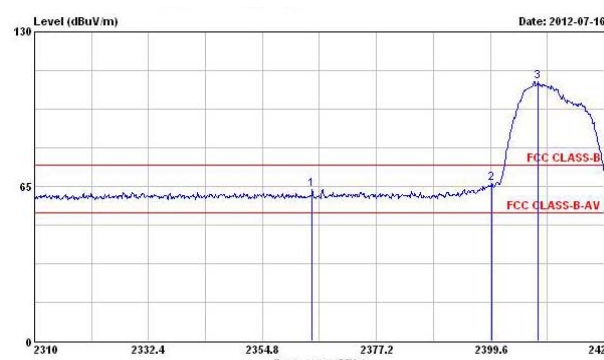
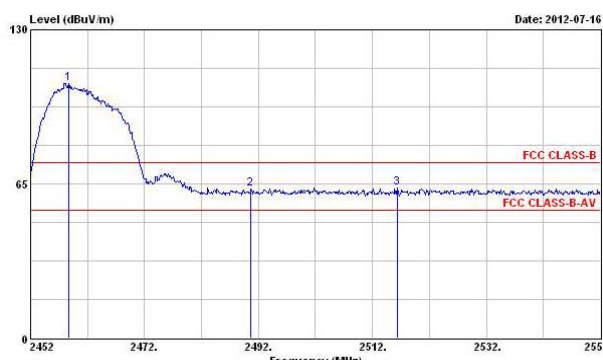
Test Method – General Information	
☒	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
☒	Refer as ANSI C63.10, clause 6.9.2.2 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
☒	For the transmitter unwanted emissions shall be measured using following options below:
☒	Refer as FCC KDB 558074, clause 5.4.1 for unwanted emissions into non-restricted bands.
☒	Refer as FCC KDB 558074, clause 5.4.2 for unwanted emissions into restricted bands.
☐	Refer as FCC KDB 558074, clause 5.4.2.2.2.1 Option 1 (Power Averaging).
☐	Refer as FCC KDB 558074, clause 5.4.2.2.2.2 Option 2 (Trace Averaging).
☒	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). – Duty cycle $\geq$ 98%.
☐	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
☒	Refer as FCC KDB 558074, clause 5.4.2.2.1.1 measurement procedure peak limit.
☐	Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.
☒	For the transmitter bandedge emissions shall be measured using following options below:
☐	Refer as FCC KDB 558074, clause 5.4.2.2.4 for narrower resolution bandwidth using the band power and summing the spectral levels (i.e., 100 kHz or 1 MHz).
☒	Refer as ANSI C63.10, clause 6.9.2 for band-edge testing.
☐	Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements.

Test Method	
☐	Refer as FCC KDB 558074, clause 2 for conducted measurement.
☐	For unwanted emissions into non-restricted bands (relative emission limits).
☐	For conducted measurements on devices with multiple transmit chains: Refer as FCC KDB 662911, when testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding 10 log(N) if the measurements are made relative to the in-band emissions on the individual outputs.
☐	For unwanted emissions into restricted bands. Test conducted spurious emissions and radiated by the cabinet with the antenna connector(s) terminated by a specified load (cabinet radiation).
☐	Refer as FCC KDB 558074, clause 5.4.2.2.1 unwanted emissions in restricted bands on frequencies ≤ 1000 MHz
☐	Refer as FCC KDB 558074, clause 5.4.2.2.2 unwanted emissions in restricted bands on frequencies > 1000 MHz
☐	For conducted measurements on devices with multiple transmit chains using options given below:
☐	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, out-of-band and spurious emission measurement. The trace data for each transmit chain has to be individually recorded and each transmit chain trace data shall be added and compared with the limit.
☐	Option 2: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.
☒	Refer as FCC KDB 558074, clause 2 for radiated measurement.
☐	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz.
☐	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions from above 1 GHz.

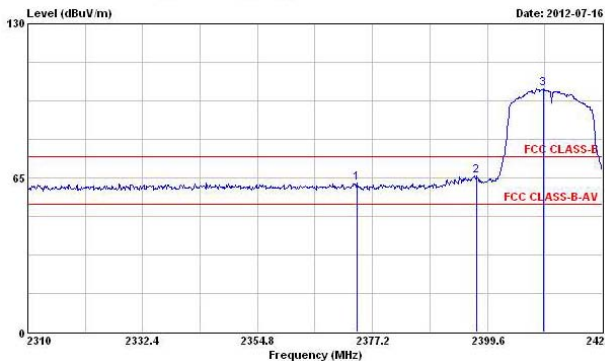
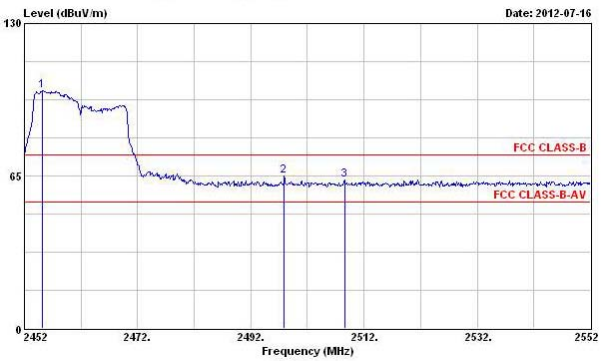
3.5.4 Test Setup



3.5.5 Test Result of Transmitter Radiated Bandedge Emissions

Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain (dBi)	4.9	Non-restricted Band Emissions					
Modulation	11B-20M								
Non-restricted Band (MHz)	N _{TX}	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	NBE Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Level Type	Pol. note 1
2390-2400	2	2412	109.25	2399.94	66.31	42.94	20	PK	V
2500-2690	2	2462	107.33	2536.20	63.19	44.14	20	PK	V
Low Band				Up Band					
									
Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical)									

Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain _(dBi)	4.9	Restricted Band Emissions					
Modulation	11B-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}
2310-2390	2	2412	116.31	2368.46	3	63.92	74	PK	V
2310-2390	2	2412	107.45	2369.02	3	51.84	54	AV	V
2483.5-2500	2	2462	114.32	2499.00	3	61.83	74	PK	V
2483.5-2500	2	2462	105.41	2483.50	3	49.91	54	AV	V
Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).									

Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain (dBi)	4.9	Non-restricted Band Emissions					
Modulation	11G-20M								
Non-restricted Band (MHz)	N _{TX}	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	NBE Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Level Type	Pol. note 1
2390-2400	2	2412	102.62	2397.58	65.80	36.82	20	PK	V
2500-2690	2	2462	101.54	2508.60	63.31	38.23	20	PK	V
Low Band				Up Band					
									
Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical)									

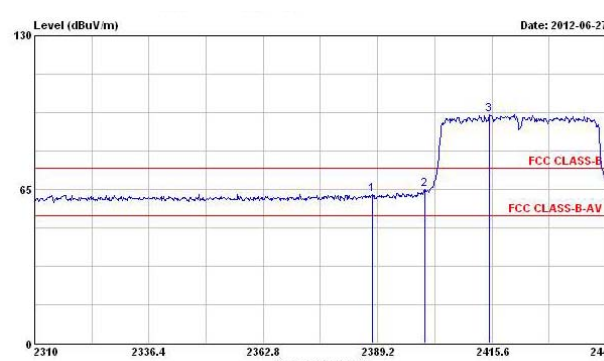
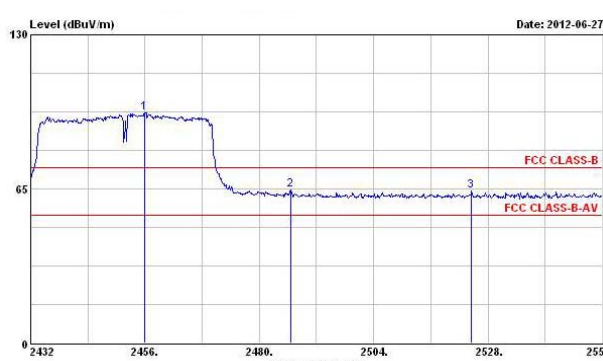
Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain _(dBi)	4.9	Restricted Band Emissions					
Modulation	11G-20M								
Restricted Band (MHz)	N _{TX}	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/1MHz)	RBE Freq. (MHz)	Measure Distance (m)	Out-Band Level (dBuV/m)	Limit (dBuV/m)	Level Type	Pol. note 1
2310-2390	2	2412	111.09	2389.97	3	68.54	74	PK	V
2310-2390	2	2412	101.64	2390.00	3	52.77	54	AV	V
2483.5-2500	2	2462	109.63	2484.30	3	64.66	74	PK	V
2483.5-2500	2	2462	100.58	2483.50	3	50.56	54	AV	V
Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).									

Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain (dBi)	1.89	Non-restricted Band Emissions					
Modulation	11N2.4G-20M								
Non-restricted Band (MHz)	N _{TX}	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	NBE Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Level Type	Pol. note 1
2390-2400	2	2412	102.37	2400.00	68.10	34.27	20	PK	V
2500-2690	2	2462	101.18	2508.70	64.13	37.05	20	PK	V

Low Band	Up Band
Level (dBuV/m) Date: 2012-06-27 Frequency (MHz)	Level (dBuV/m) Date: 2012-06-27 Frequency (MHz)

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

Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain _(dBi)	1.89	Restricted Band Emissions					
Modulation	11N2.4G-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
2310-2390	2	2412	110.98	2389.63	3	67.74	74	PK	V
2310-2390	2	2412	100.59	2390.00	3	52.94	54	AV	V
2483.5-2500	2	2462	110.40	2483.50	3	67.58	74	PK	V
2483.5-2500	2	2462	99.59	2483.50	3	52.92	54	AV	V
Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).									

Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain (dBi)	1.89	Non-restricted Band Emissions					
Modulation	11N2.4G-40M								
Non-restricted Band (MHz)	N _{TX}	Test Ch. Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	NBE Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Level Type	Pol. note 1
2390-2400	2	2422	96.51	2400.00	64.83	31.60	20	PK	V
2500-2690	2	2452	97.10	2524.52	64.21	32.89	20	PK	V
Low Band				Up Band					
									
Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical)									

Transmitter Radiated Bandedge Emissions Result									
Power Level	1	Gain _(dBi)	1.89	Restricted Band Emissions					
Modulation	11N2.4G-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
2310-2390	2	2422	105.73	2389.60	3	66.71	74	PK	V
2310-2390	2	2422	95.05	2390.00	3	52.96	54	AV	V
2483.5-2500	2	2452	106.29	2483.72	3	66.41	74	PK	V
2483.5-2500	2	2452	95.46	2483.60	3	52.97	54	AV	V
Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).									

3.6 Transmitter Radiated Unwanted Emissions

3.6.1 Transmitter Radiated Unwanted Emissions Limit

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

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

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

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

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

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

3.6.2 Measuring Instruments

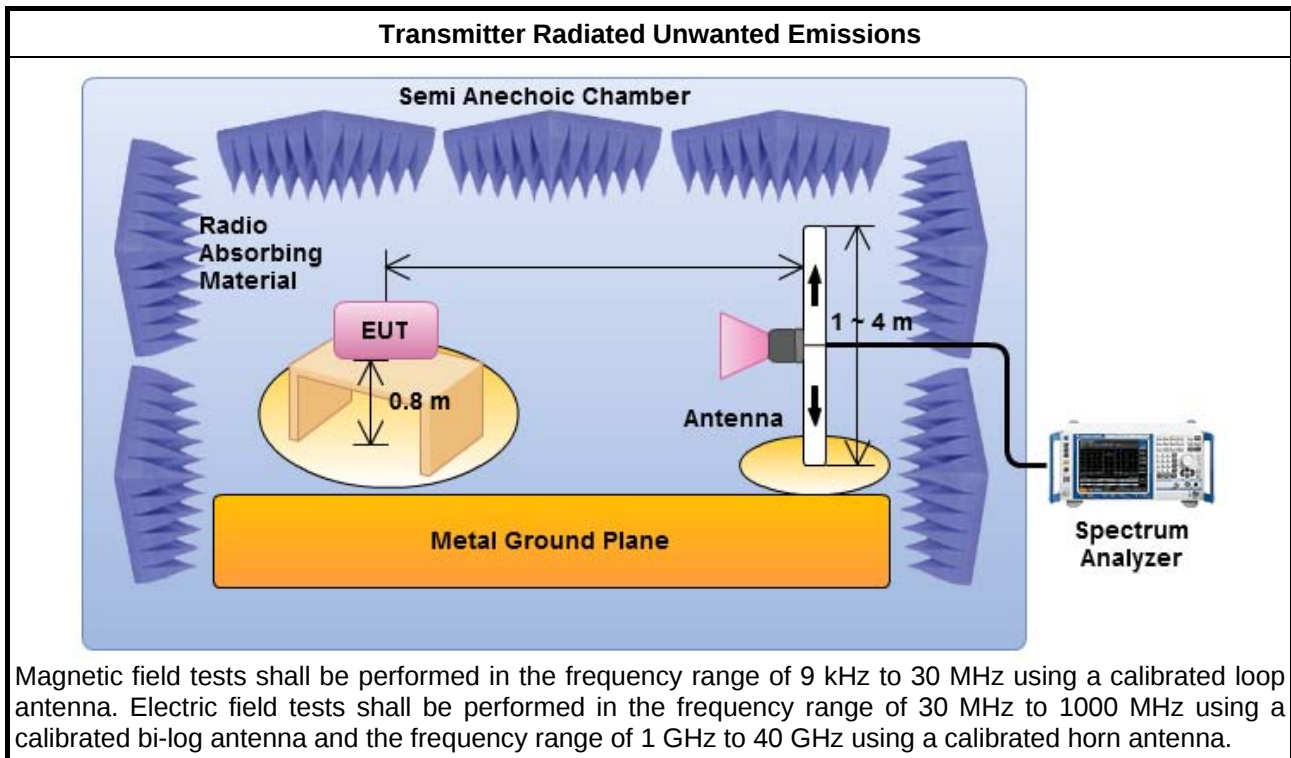
Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

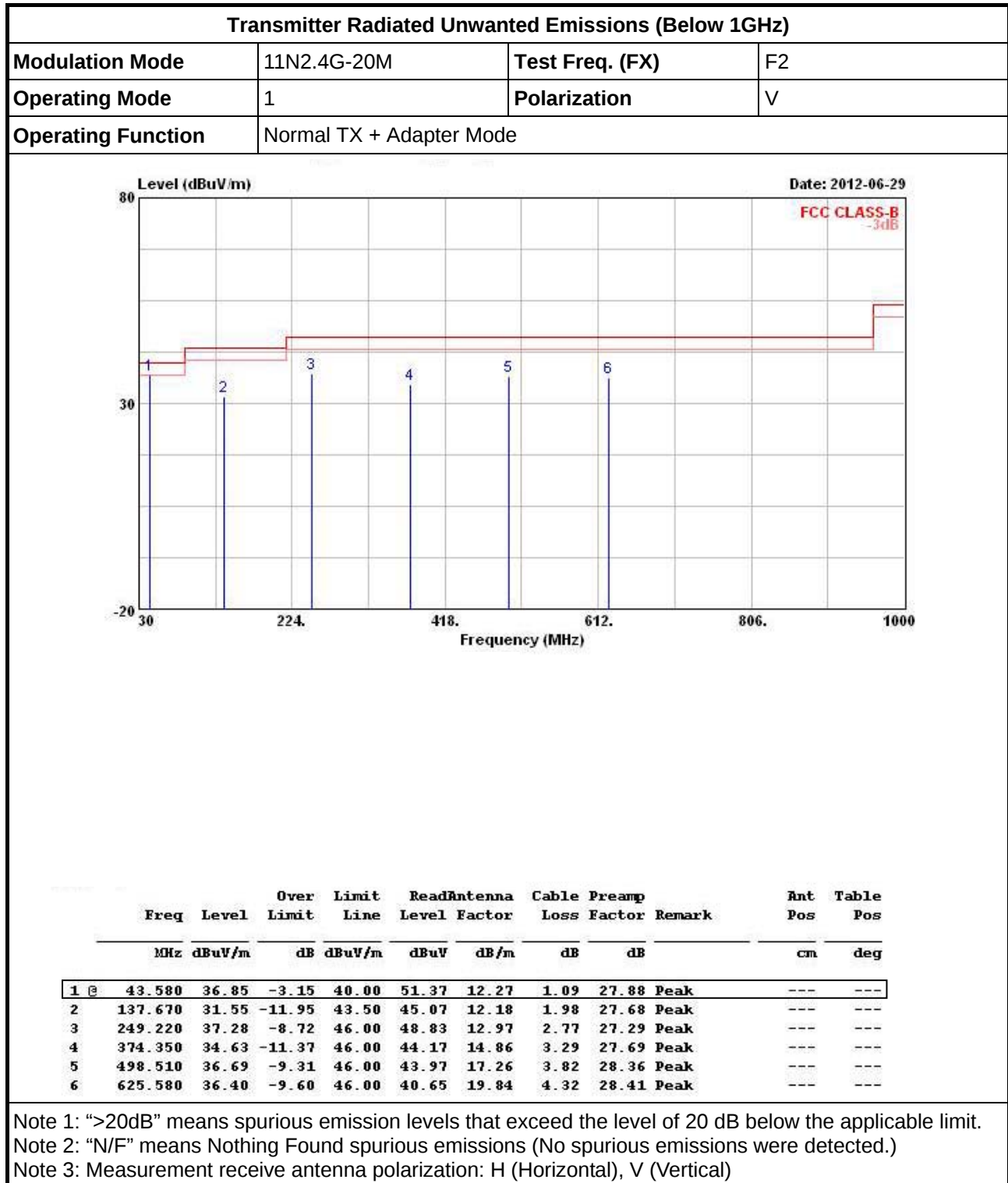
Test Method – General Information	
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
☒	Measurements in the frequency range 10 GHz - 18GHz are typically made at a closer distance 1m, because the instrumentation noise floor is typically close to the radiated emission limit.
☒	Measurements in the frequency range above 18 GHz - 25GHz are typically made at a closer distance 0.5m, because the instrumentation noise floor is typically close to the radiated emission limit.
☒	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
☒	For the transmitter unwanted emissions shall be measured using following options below:
☒	Refer as FCC KDB 558074, clause 5.4.1 for unwanted emissions into non-restricted bands.
☒	Refer as FCC KDB 558074, clause 5.4.2 for unwanted emissions into restricted bands.
☐	Refer as FCC KDB 558074, clause 5.4.2.2.1 Option 1 (Power Averaging).
☐	Refer as FCC KDB 558074, clause 5.4.2.2.2 Option 2 (Trace Averaging).
☒	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW) – Duty cycle $\geq$ 98%.
☐	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
☒	Refer as FCC KDB 558074, clause 5.4.2.1.1 measurement procedure peak limit.
☐	Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.

Test Method	
☐	Refer as FCC KDB 558074, clause 2 for conducted measurement.
☐	For unwanted emissions into non-restricted bands (relative emission limits).
☐	For conducted measurements on devices with multiple transmit chains: Refer as FCC KDB 662911, when testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding $10 \log(N)$ if the measurements are made relative to the in-band emissions on the individual outputs.
☐	For unwanted emissions into restricted bands. Test conducted spurious emissions and radiated by the cabinet with the antenna connector(s) terminated by a specified load (cabinet radiation).
☐	Refer as FCC KDB 558074, clause 5.4.2.2.1 unwanted emissions in restricted bands on frequencies ≤ 1000 MHz
☐	Refer as FCC KDB 558074, clause 5.4.2.2.2 unwanted emissions in restricted bands on frequencies > 1000 MHz
☐	For conducted measurements on devices with multiple transmit chains using options given below:
☐	Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, out-of-band and spurious emission measurement. The trace data for each transmit chain has to be individually recorded and each transmit chain trace data shall be added and compared with the limit.
☐	Option 2: Measure and add $10 \log(N)$ dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with $10 \log(N)$. Or each transmit chains shall be add $10 \log(N)$ to compared with the limit.
☒	For radiated measurement.
☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz.
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions from above 1 GHz.

3.6.4 Test Setup

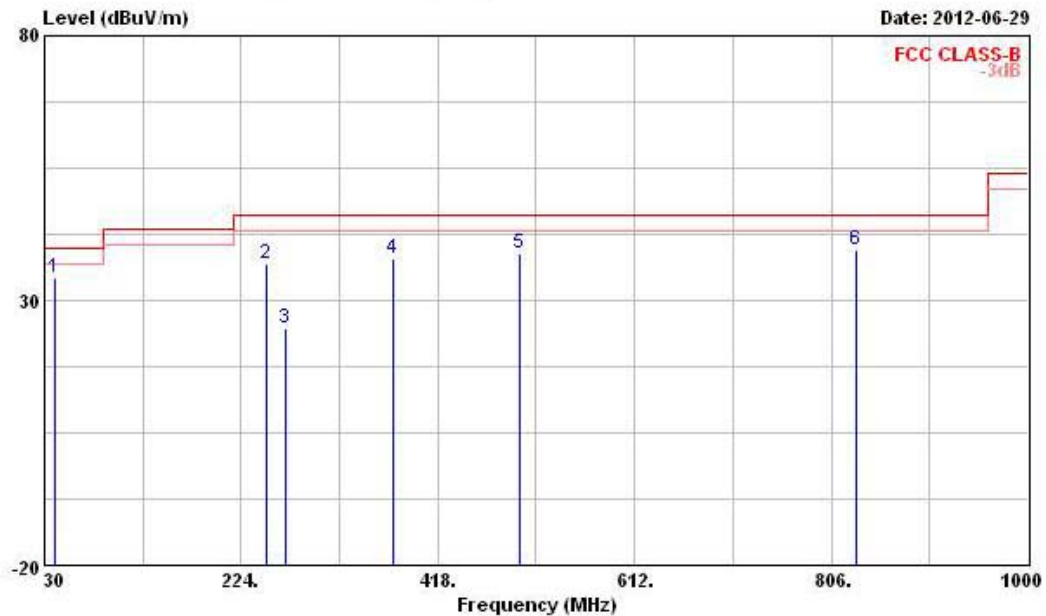


3.6.5 Test Result of Transmitter Radiated Unwanted Emissions (Below 1GHz)



Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation Mode	11N2.4G-20M	Test Freq. (FX)	F2
Operating Mode	1	Polarization	H
Operating Function	Normal TX + Adapter Mode		



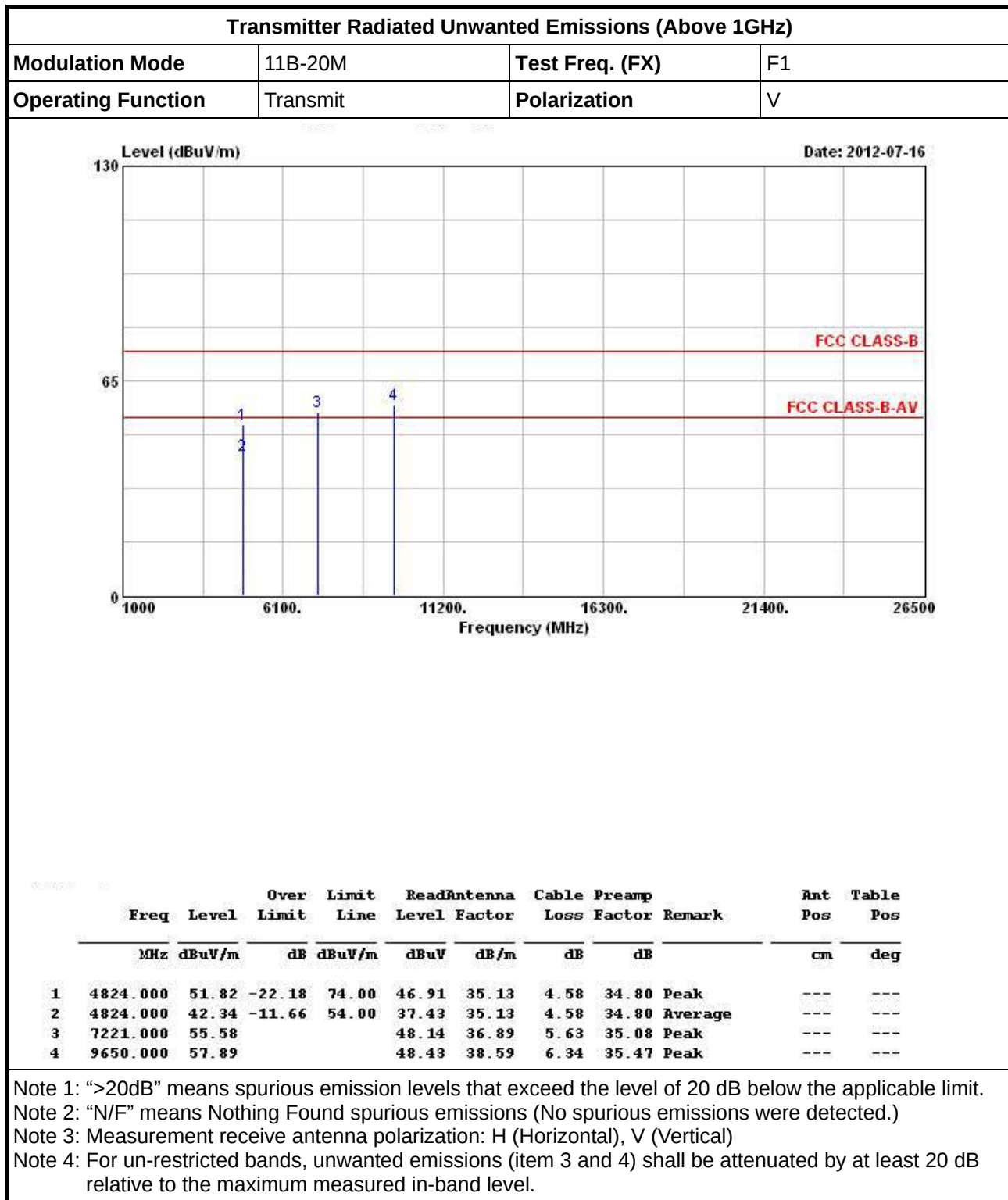
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	40.670	34.18	-5.82	40.00	48.02	13.01	1.05	27.90	Peak	---	---
2	249.220	36.87	-9.13	46.00	48.42	12.97	2.77	27.29	Peak	---	---
3	268.620	24.81	-21.19	46.00	35.94	13.26	2.85	27.24	Peak	---	---
4	374.350	37.83	-8.17	46.00	47.37	14.86	3.29	27.69	Peak	---	---
5	498.510	38.96	-7.04	46.00	46.24	17.26	3.82	28.36	Peak	---	---
6	831.220	39.59	-6.41	46.00	42.24	20.19	4.99	27.83	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.)

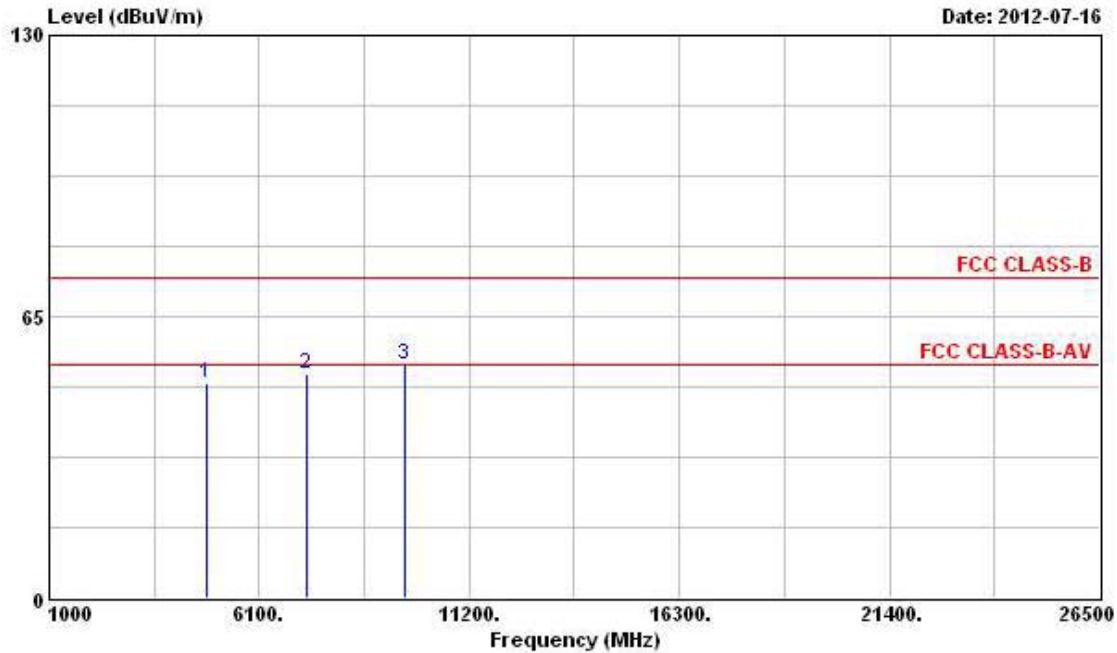
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

3.6.6 Test Result of Transmitter Radiated Unwanted Emissions (Above 1GHz)



Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

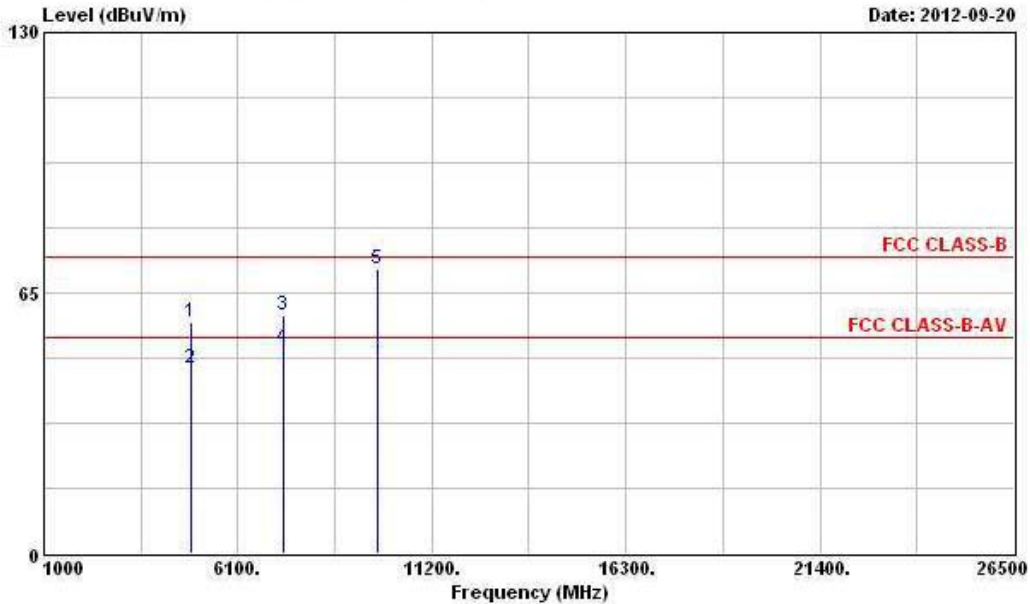


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	49.53	-4.47	54.00	43.99	35.76	4.58	34.80	PK	---	---
2	7236.000	51.76			43.36	37.85	5.63	35.08	Peak	---	---
3	9648.000	53.73			43.47	39.39	6.34	35.47	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
Note 4: For un-restricted bands, unwanted emissions (item 3 and 4) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

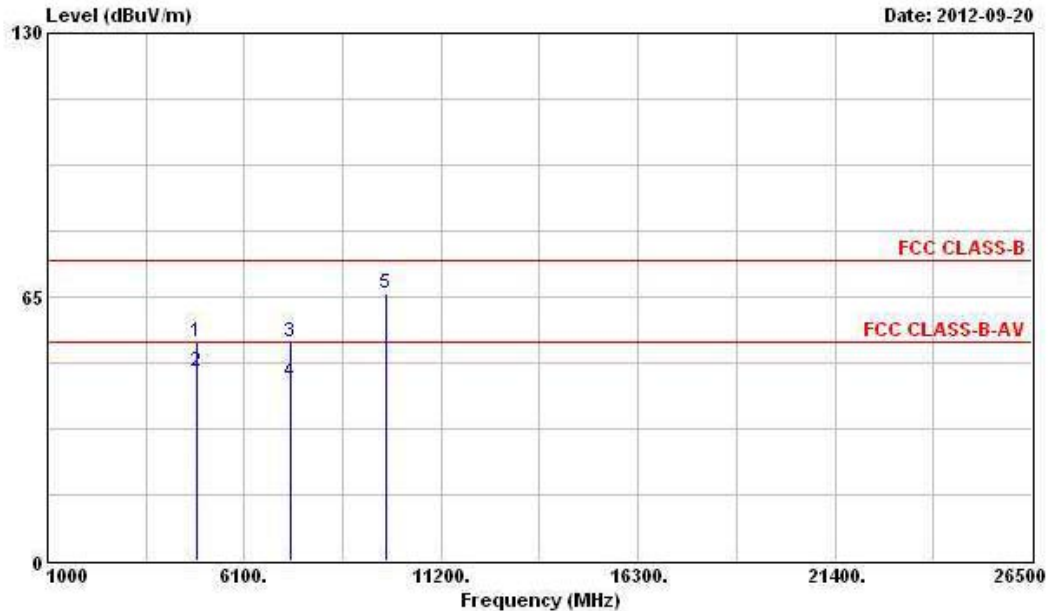


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	4874.000	57.94	-16.06	74.00	52.93	35.18	4.61	34.78	Peak	---
2	4874.000	46.31	-7.69	54.00	41.30	35.18	4.61	34.78	Average	---
3	7311.000	59.56	-14.44	74.00	52.10	36.92	5.64	35.10	Peak	---
4	7311.000	51.38	-2.62	54.00	43.92	36.92	5.64	35.10	Average	---
5	9748.000	71.06			61.47	38.71	6.36	35.48	Peak	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

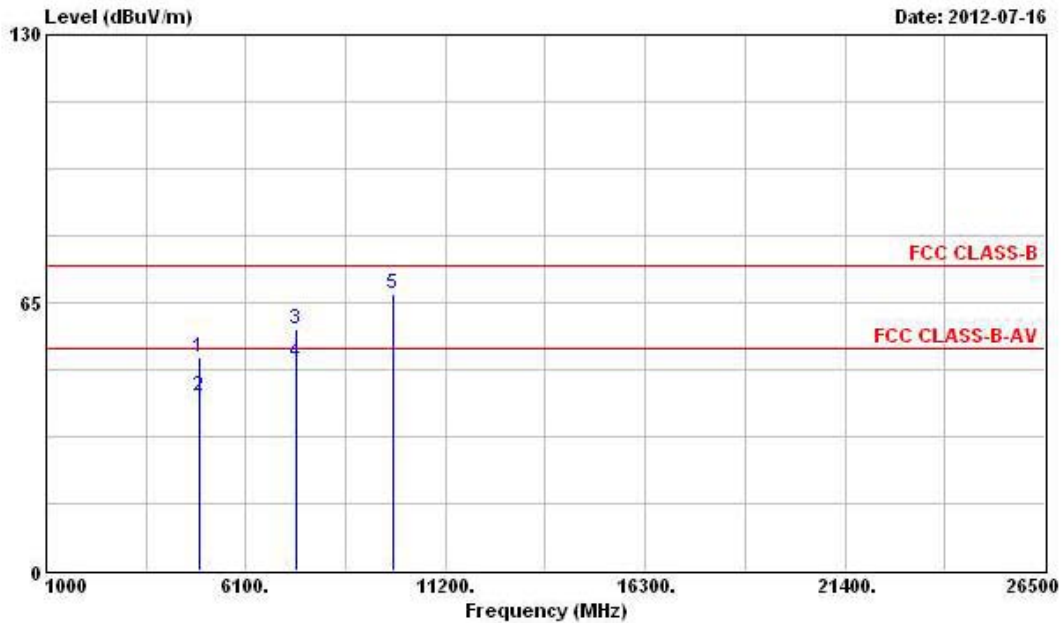


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	4874.000	54.04	-19.96	74.00	48.38	35.83	4.61	34.78 Peak	---	---
2 @	4874.000	46.42	-7.58	54.00	40.76	35.83	4.61	34.78 Average	---	---
3	7311.000	54.05	-19.95	74.00	45.65	37.86	5.64	35.10 Peak	---	---
4 @	7311.000	43.84	-10.16	54.00	35.44	37.86	5.64	35.10 Average	---	---
5 @	9748.000	65.94			55.55	39.51	6.36	35.48 Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

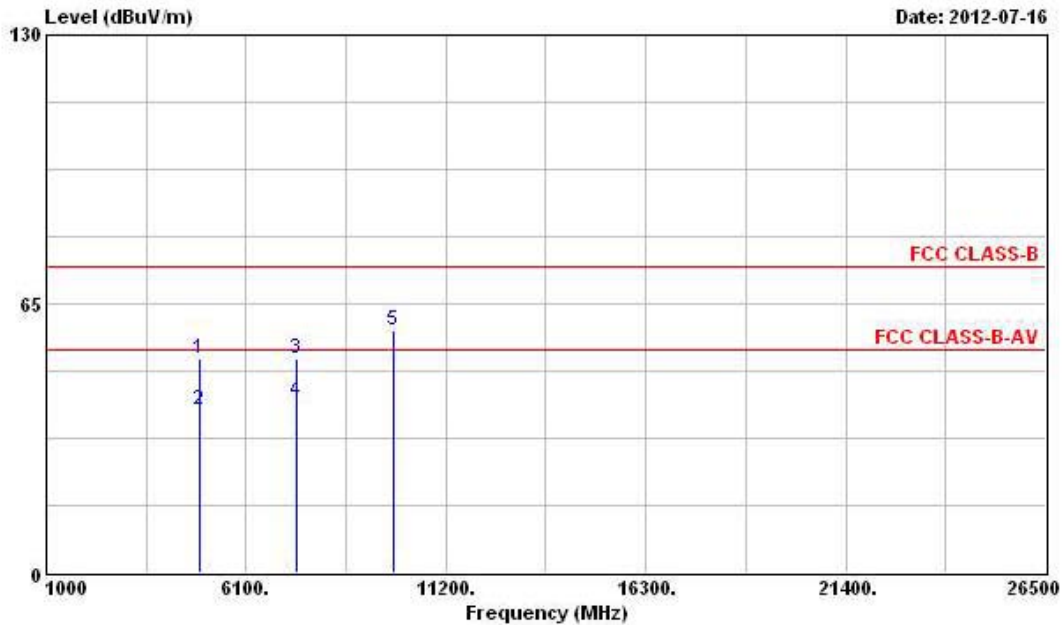


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	51.70	-22.30	74.00	46.56	35.23	4.68	34.77	Peak	---	---
2	4924.000	42.51	-11.49	54.00	37.37	35.23	4.68	34.77	Average	---	---
3	7386.000	58.78	-15.22	74.00	51.29	36.96	5.65	35.12	Peak	---	---
4	7386.000	50.26	-3.74	54.00	42.77	36.96	5.65	35.12	Average	---	---
5	9848.000	67.18			57.48	38.81	6.38	35.49	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

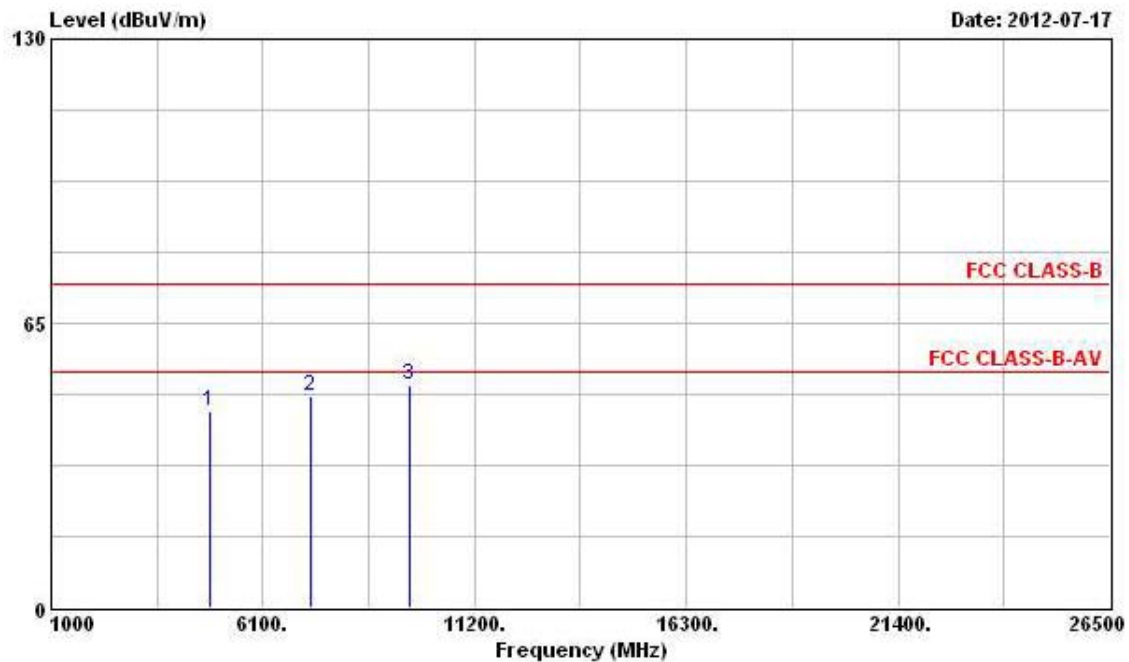


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	51.64	-22.36	74.00	45.83	35.90	4.68	34.77	Peak	---	---
2	4924.000	39.53	-14.47	54.00	33.72	35.90	4.68	34.77	Average	---	---
3	7386.000	51.82	-22.18	74.00	43.41	37.88	5.65	35.12	Peak	---	---
4	7386.000	41.61	-12.39	54.00	33.20	37.88	5.65	35.12	Average	---	---
5	9848.000	58.73			48.23	39.61	6.38	35.49	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

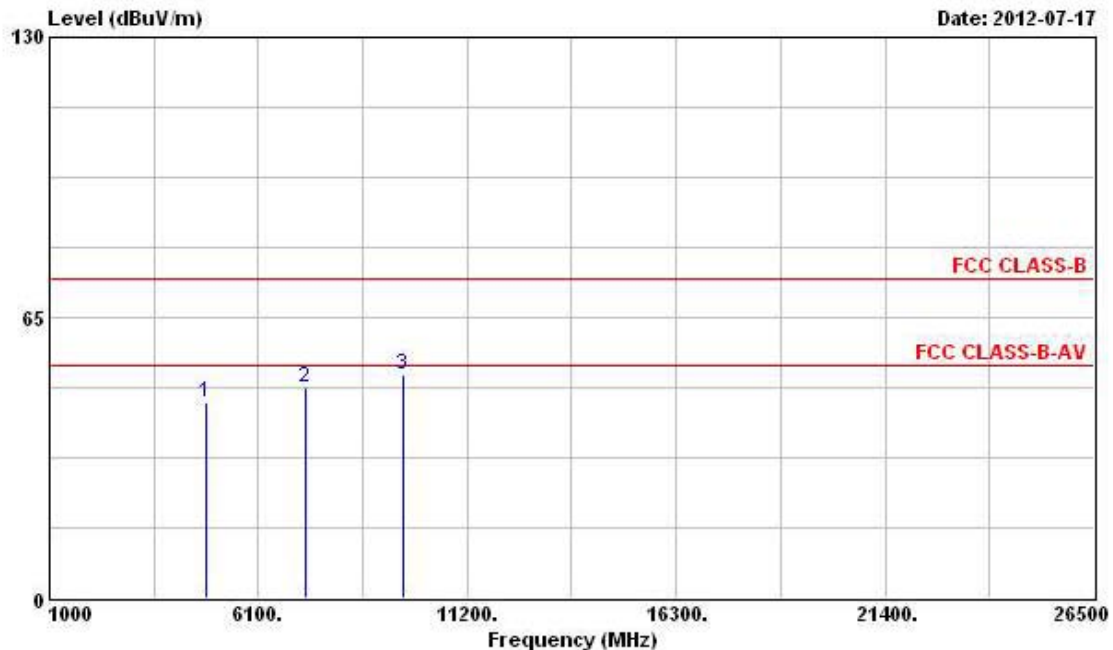


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	44.81	-9.19	54.00	39.90	35.13	4.58	34.80	PK	0	0
2	7236.000	48.41			40.96	36.90	5.63	35.08	Peak	0	0
3	9648.000	50.76			41.30	38.59	6.34	35.47	Peak	0	0

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 un-restricted bands, unwanted emissions (item 2 and 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

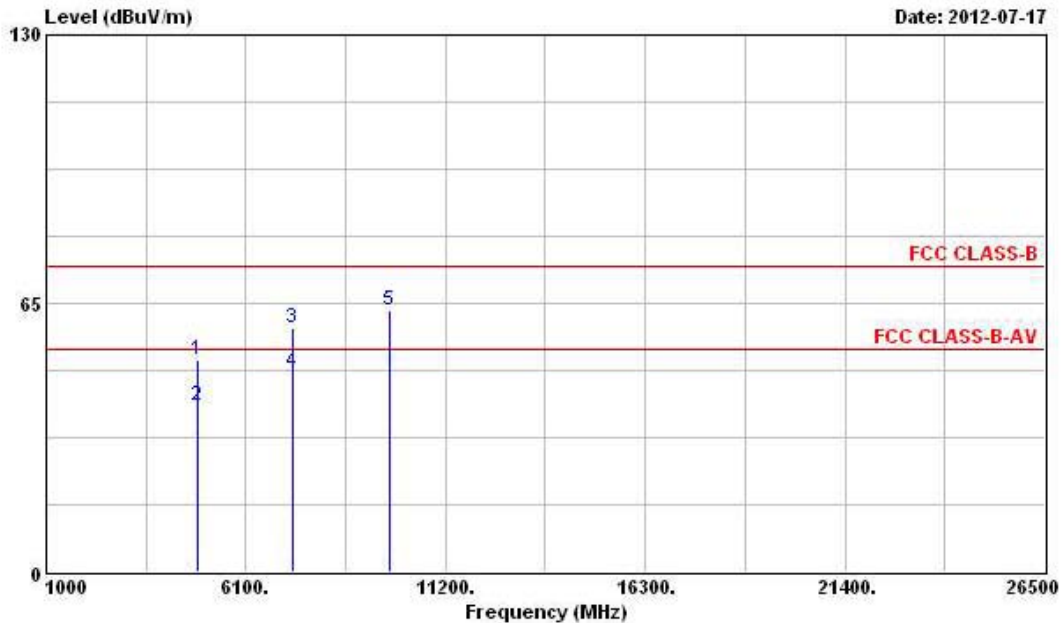


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	45.50	-8.50	54.00	39.96	35.76	4.58	34.80	PK	---	---
2	7236.000	48.58			40.18	37.85	5.63	35.08	Peak	---	---
3	9648.000	51.68			41.42	39.39	6.34	35.47	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 2 and 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

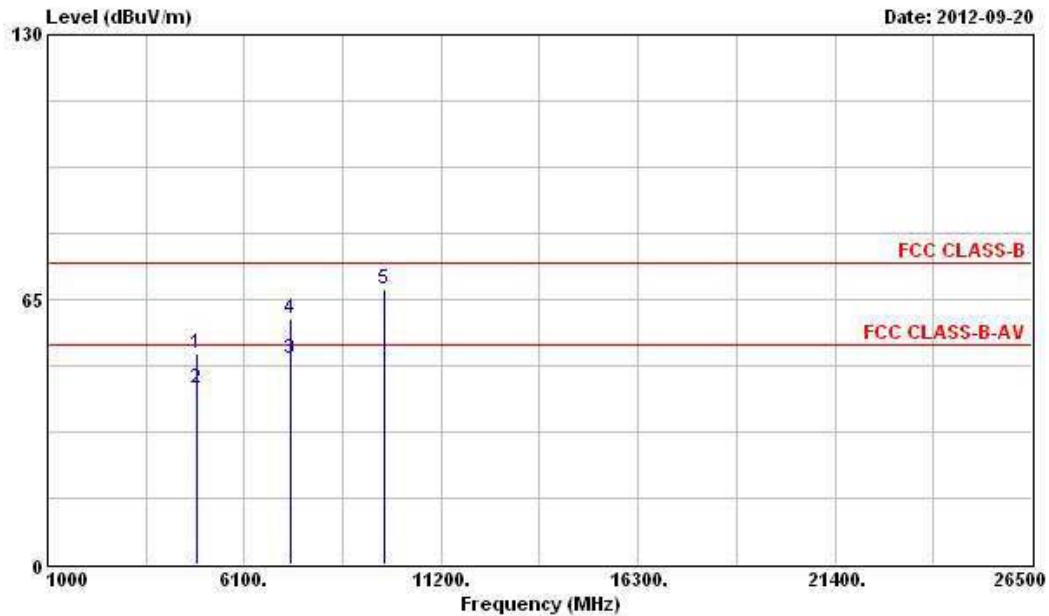


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	51.50	-22.50	74.00	46.49	35.18	4.61	34.78	Peak	---	---
2	4874.000	40.38	-13.62	54.00	35.37	35.18	4.61	34.78	Average	---	---
3	7311.000	59.19	-14.81	74.00	51.73	36.92	5.64	35.10	Peak	---	---
4	7311.000	48.20	-5.80	54.00	40.74	36.92	5.64	35.10	Average	---	---
5	9748.000	63.22			53.63	38.71	6.36	35.48	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

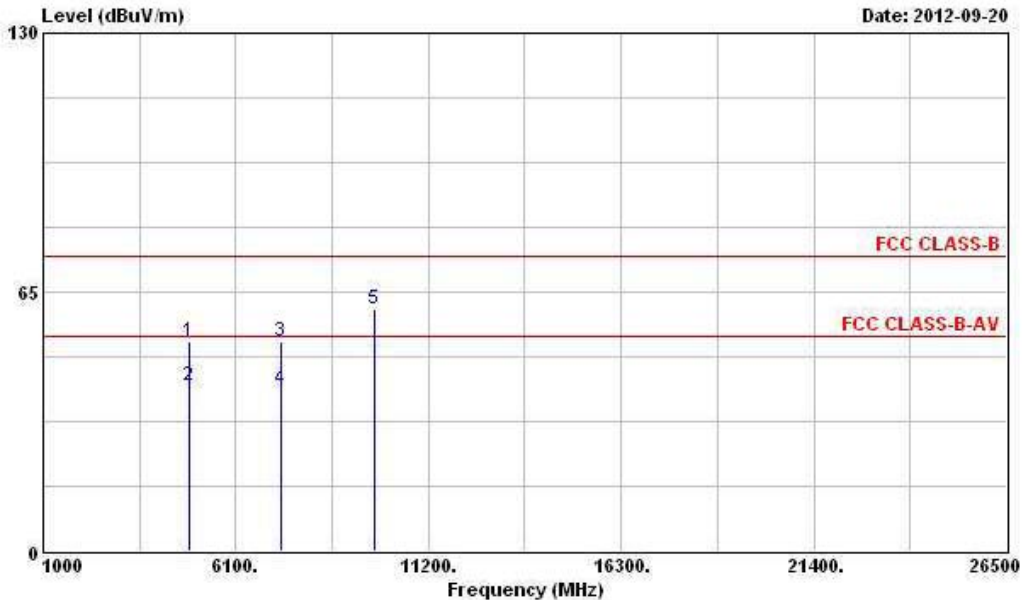


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	51.72	-22.28	74.00	46.71	35.18	4.61	34.78	Peak	---	---
2 @	4874.000	43.28	-10.72	54.00	38.27	35.18	4.61	34.78	Average	---	---
3 @	7311.000	50.47	-3.53	54.00	43.01	36.92	5.64	35.10	Average	---	---
4	7311.000	60.43	-13.57	74.00	52.97	36.92	5.64	35.10	Peak	---	---
5 @	9744.000	67.60			58.03	38.69	6.36	35.48	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

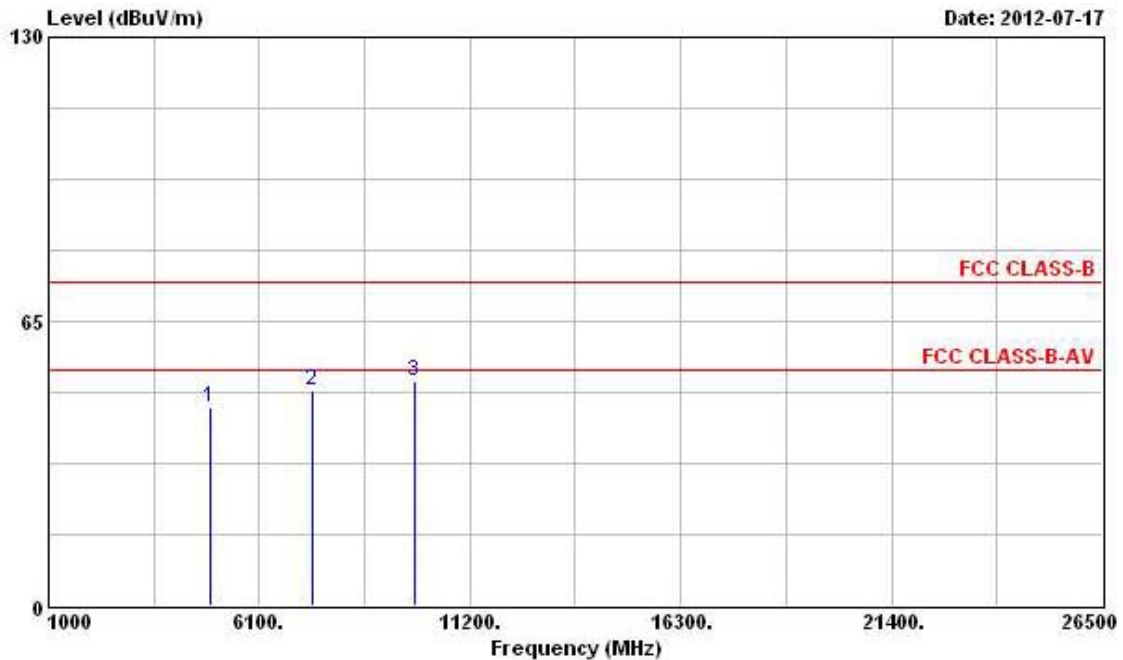


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	52.48	-21.52	74.00	46.82	35.83	4.61	34.78	Peak	---	---
2	4874.000	41.68	-12.32	54.00	36.02	35.83	4.61	34.78	Average	---	---
3	7311.000	52.54	-21.46	74.00	44.14	37.86	5.64	35.10	Peak	---	---
4	7311.000	40.82	-13.18	54.00	32.42	37.86	5.64	35.10	Average	---	---
5	9748.000	60.67			50.28	39.51	6.36	35.48	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

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

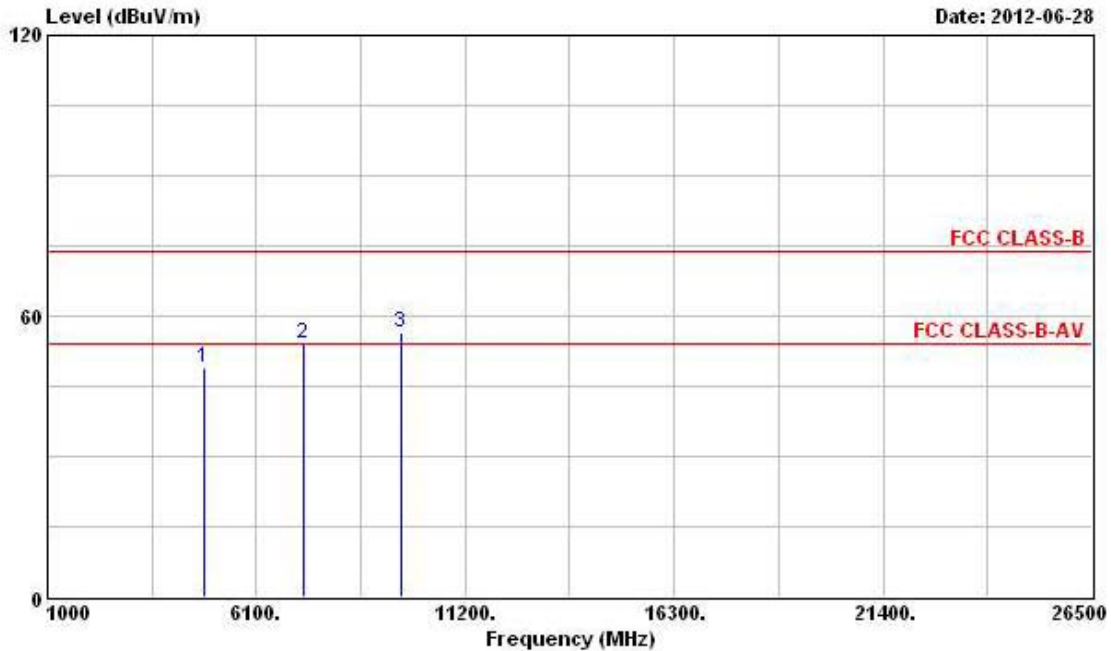


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	45.18	-8.82	54.00	39.37	35.90	4.68	34.77	PK	---	---
2	7386.000	49.02	-4.98	54.00	40.61	37.88	5.65	35.12	PK	---	---
3	9848.000	51.45			40.95	39.61	6.38	35.49	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-20M	Test Freq. (FX)	F1
Operating Function	Transmit	Polarization	V

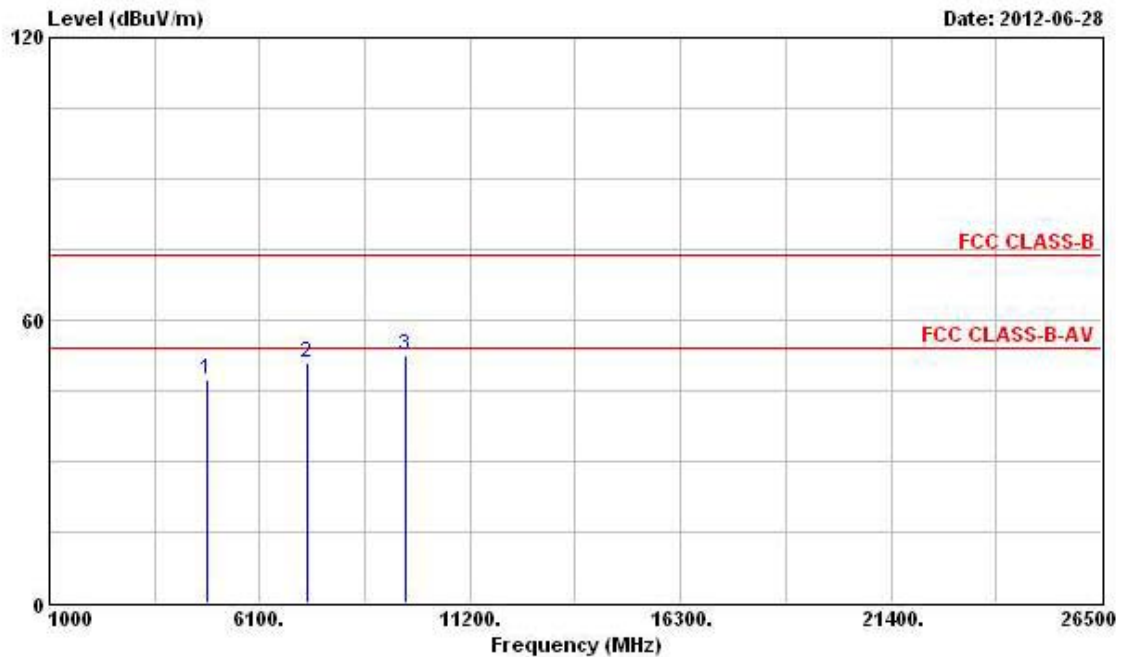


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	48.96	-5.04	54.00	44.05	35.13	4.58	34.80	PK	---	---
2	7236.000	54.16			46.71	36.90	5.63	35.08	Peak	---	---
3	9648.000	56.25			46.79	38.59	6.34	35.47	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 2 and 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-20M	Test Freq. (FX)	F1
Operating Function	Transmit	Polarization	H

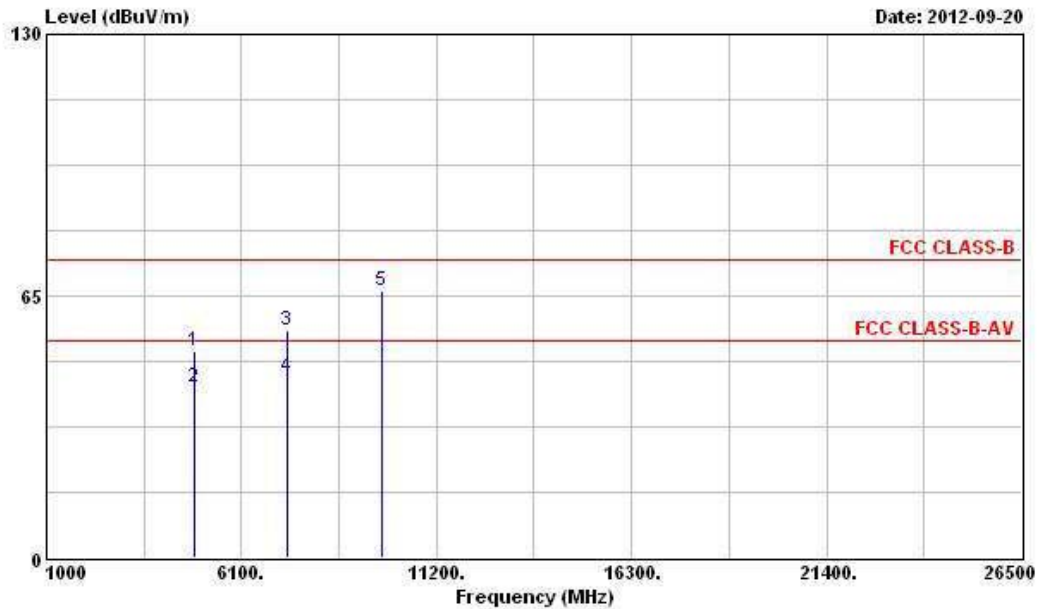


	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp		Ant	Table
	MHz	dBuV/m	dB	dBuV/m	Level	Loss	Factor	Remark	Pos	Pos
					dBuV	dB/m	dB	dB	cm	deg
1	4824.000	47.42	-6.58	54.00	41.88	35.76	4.58	34.80 PK	---	---
2	7236.000	50.99			42.59	37.85	5.63	35.08 Peak	---	---
3	9648.000	52.65			42.39	39.39	6.34	35.47 Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 2 and 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-20M	Test Freq. (FX)	F2
Operating Function	Transmit	Polarization	V

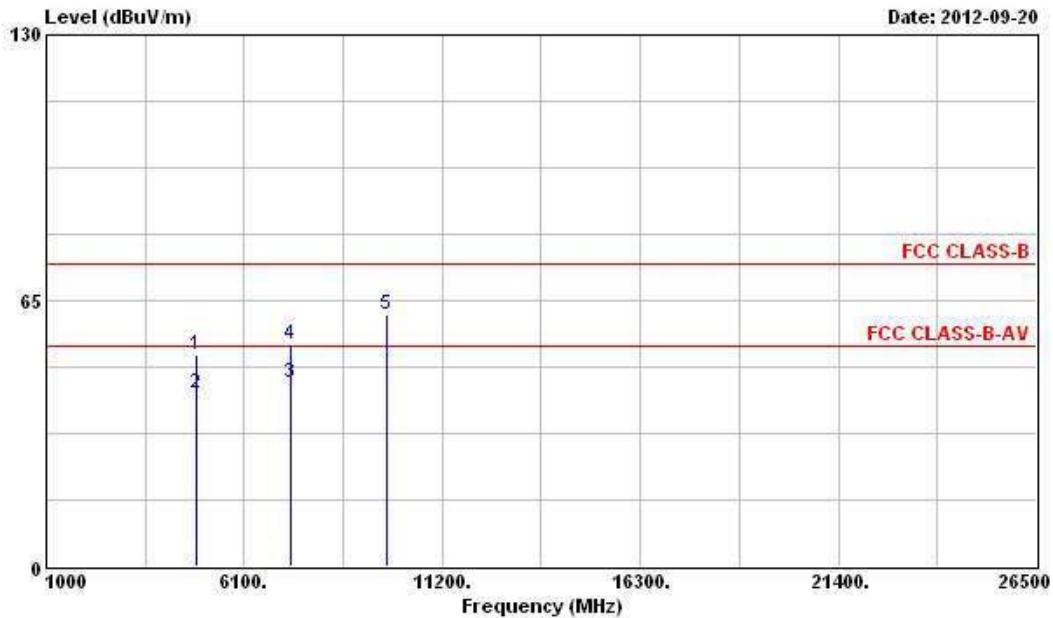


Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 4874.000	51.49	-22.51	74.00	46.48	35.18	4.61	34.78 Peak	---	---
2 4874.000	42.24	-11.76	54.00	37.23	35.18	4.61	34.78 Average	---	---
3 7311.000	56.40	-17.60	74.00	48.94	36.92	5.64	35.10 Peak	---	---
4 7311.000	44.81	-9.19	54.00	37.35	36.92	5.64	35.10 Average	---	---
5 9748.000	66.49			56.90	38.71	6.36	35.48 Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-20M	Test Freq. (FX)	F2
Operating Function	Transmit	Polarization	H

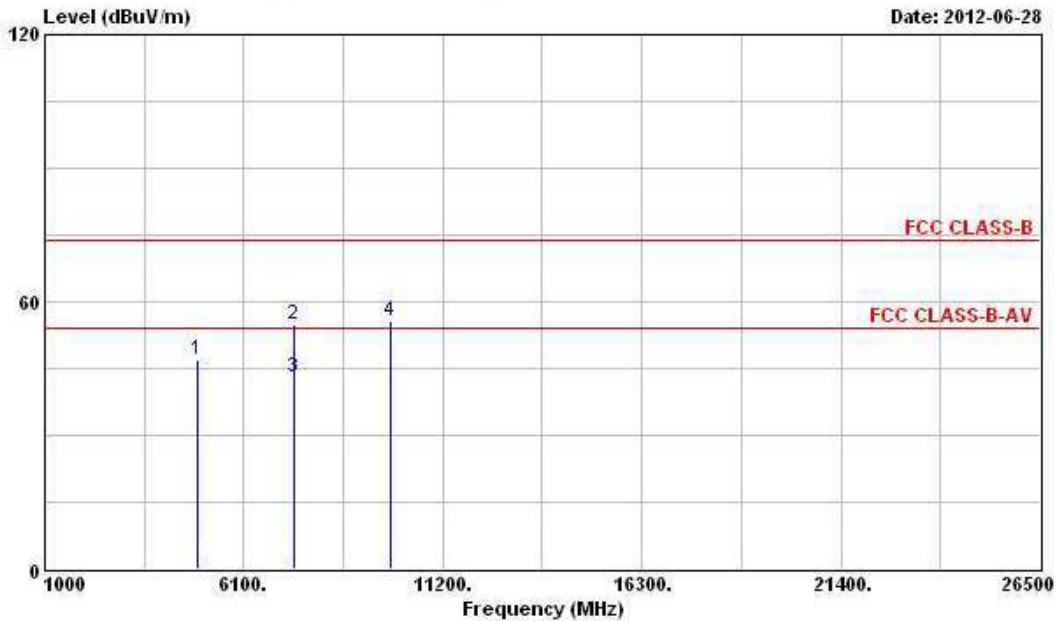


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	51.63	-22.37	74.00	45.97	35.83	4.61	34.78	Peak	---	---
2	4874.000	42.41	-11.59	54.00	36.75	35.83	4.61	34.78	Average	---	---
3	7311.000	44.86	-9.14	54.00	36.46	37.86	5.64	35.10	Average	---	---
4	7311.000	54.30	-19.70	74.00	45.90	37.86	5.64	35.10	Peak	---	---
5	9748.000	61.74			51.35	39.51	6.36	35.48	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-20M	Test Freq. (FX)	F3
Operating Function	Transmit	Polarization	V

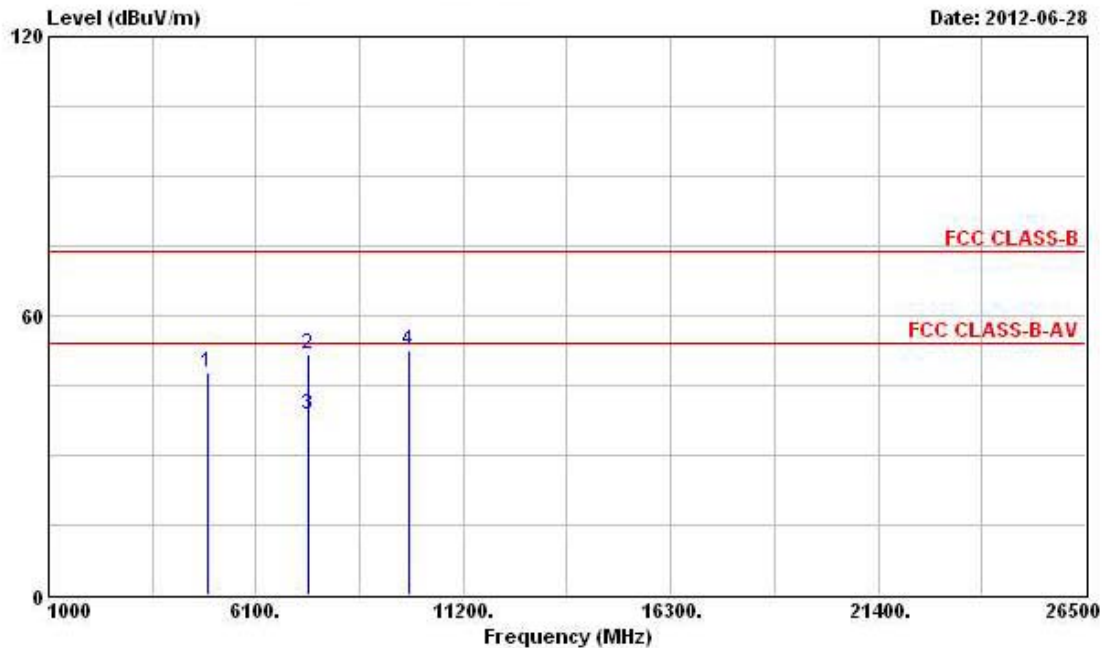


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	4924.000	47.16	-6.84	54.00	42.02	35.23	4.68	34.77 PK	---	---
2	7386.000	54.69	-19.31	74.00	47.20	36.96	5.65	35.12 Peak	---	---
3	7386.000	43.13	-10.87	54.00	35.64	36.96	5.65	35.12 Average	---	---
4	9848.000	55.78			46.08	38.81	6.38	35.49 Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 4) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-20M	Test Freq. (FX)	F3
Operating Function	Transmit	Polarization	H

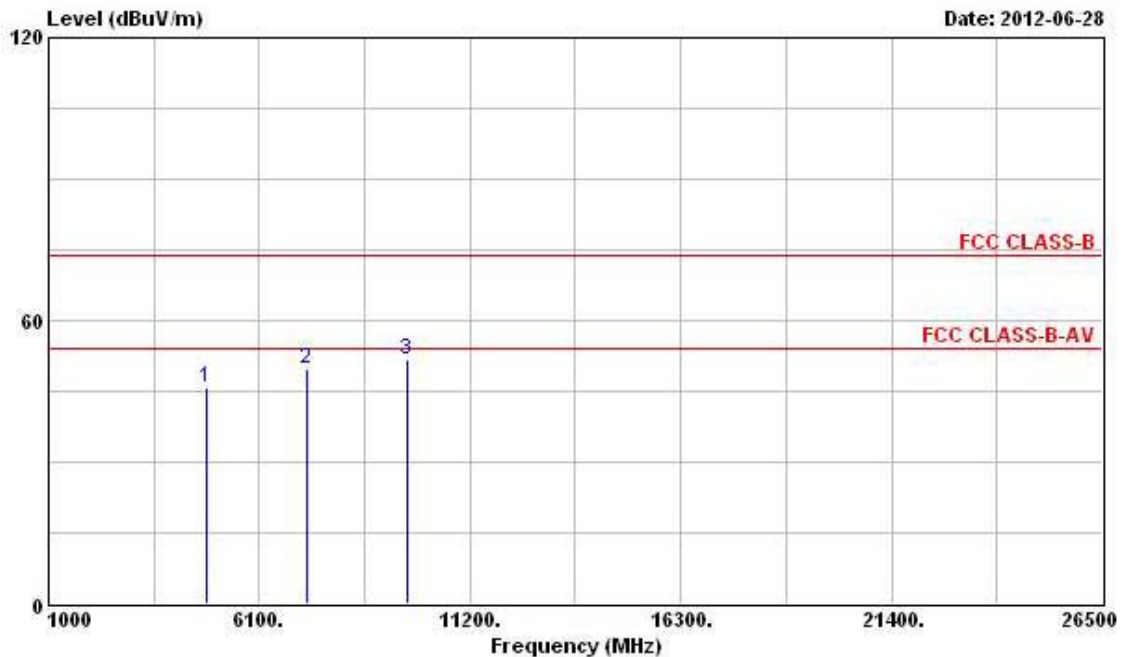


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	47.65	-6.35	54.00	41.84	35.90	4.68	34.77	PK	---	---
2	7386.000	51.85	-22.15	74.00	43.44	37.88	5.65	35.12	Peak	---	---
3	7386.000	38.86	-15.14	54.00	30.45	37.88	5.65	35.12	Average	---	---
4	9848.000	52.40			41.90	39.61	6.38	35.49	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 4) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-40M	Test Freq. (FX)	F4
Operating Function	Transmit	Polarization	V

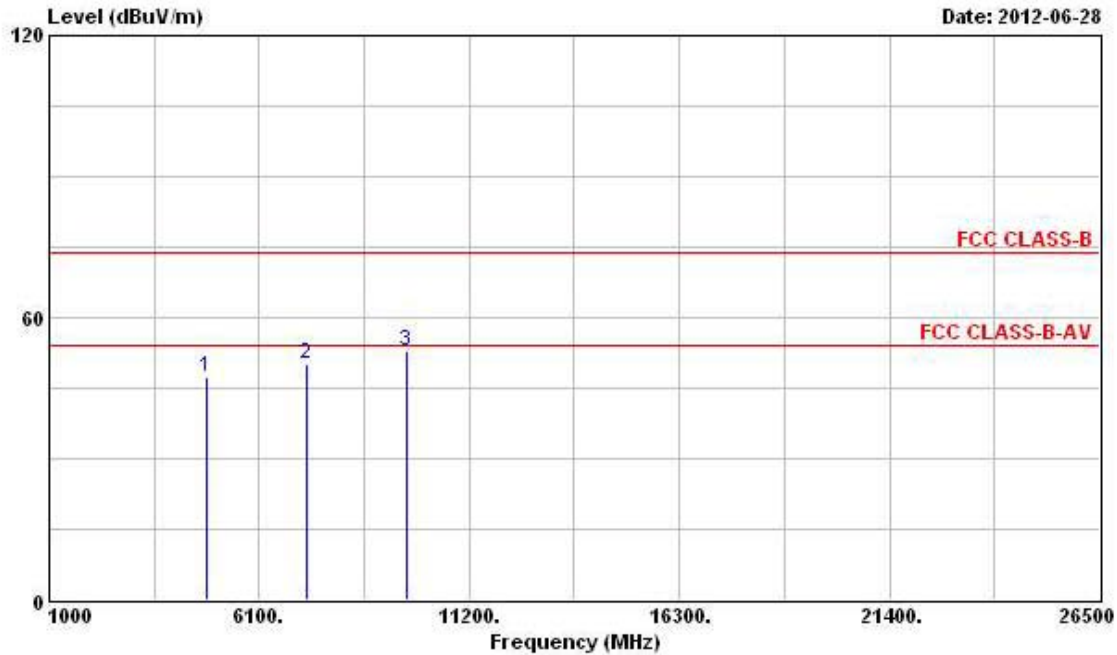


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4844.000	45.80	-8.20	54.00	40.84	35.14	4.61	34.79	PK	---	---
2	7266.000	49.90	-4.10	54.00	42.45	36.91	5.63	35.09	PK	---	---
3	9688.000	51.84			42.34	38.63	6.35	35.48	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-40M	Test Freq. (FX)	F4
Operating Function	Transmit	Polarization	H

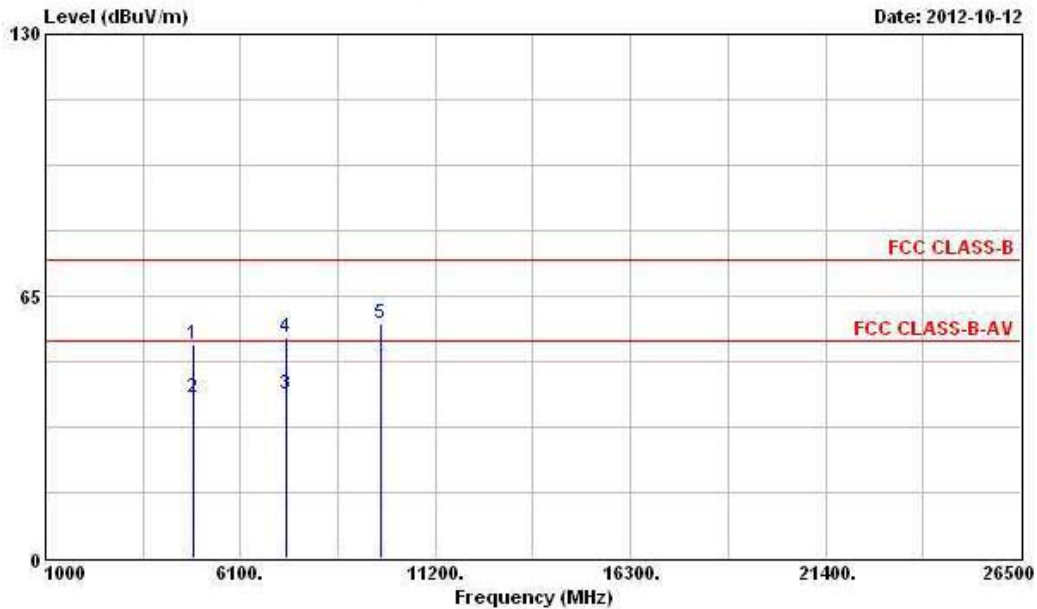


	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Pos	Pos
			dB	dBuV/m	dBuV		dB	dB	cm	deg
1	4844.000	47.52	-6.48	54.00	41.92	35.78	4.61	34.79	PK	---
2	7266.000	50.00	-4.00	54.00	41.60	37.86	5.63	35.09	PK	---
3	9688.000	52.90			42.60	39.43	6.35	35.48	Peak	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-40M	Test Freq. (FX)	F5
Operating Function	Transmit	Polarization	V

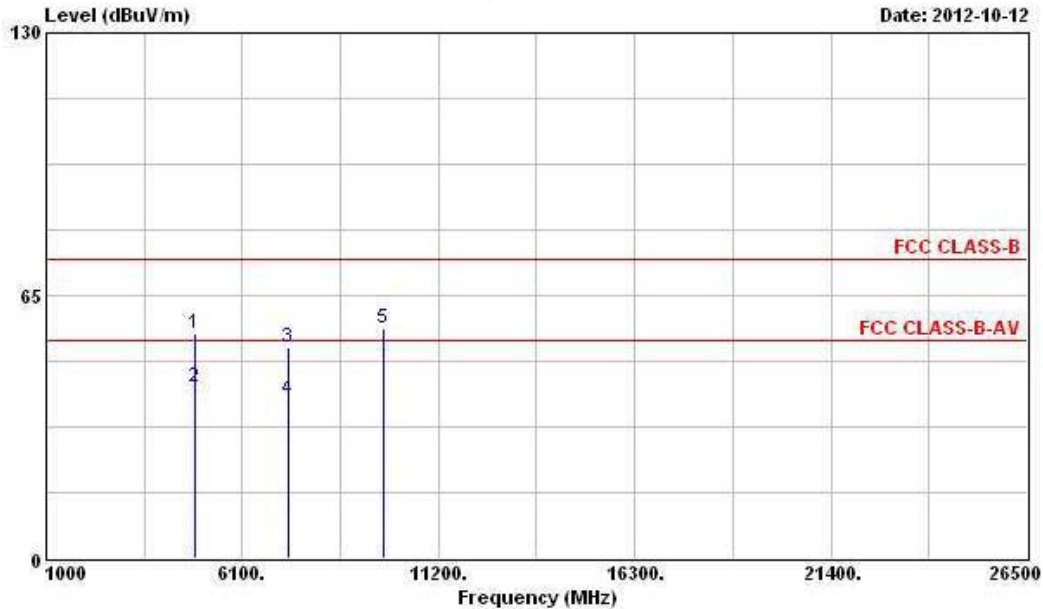


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	52.92	-21.08	74.00	47.91	35.18	4.61	34.78	Peak	---	---
2	4874.000	39.60	-14.40	54.00	34.59	35.18	4.61	34.78	Average	---	---
3	7311.000	40.58	-13.42	54.00	33.12	36.92	5.64	35.10	Average	---	---
4	7311.000	54.57	-19.43	74.00	47.11	36.92	5.64	35.10	Peak	---	---
5	9748.000	58.24			48.65	38.71	6.36	35.48	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-40M	Test Freq. (FX)	F5
Operating Function	Transmit	Polarization	H

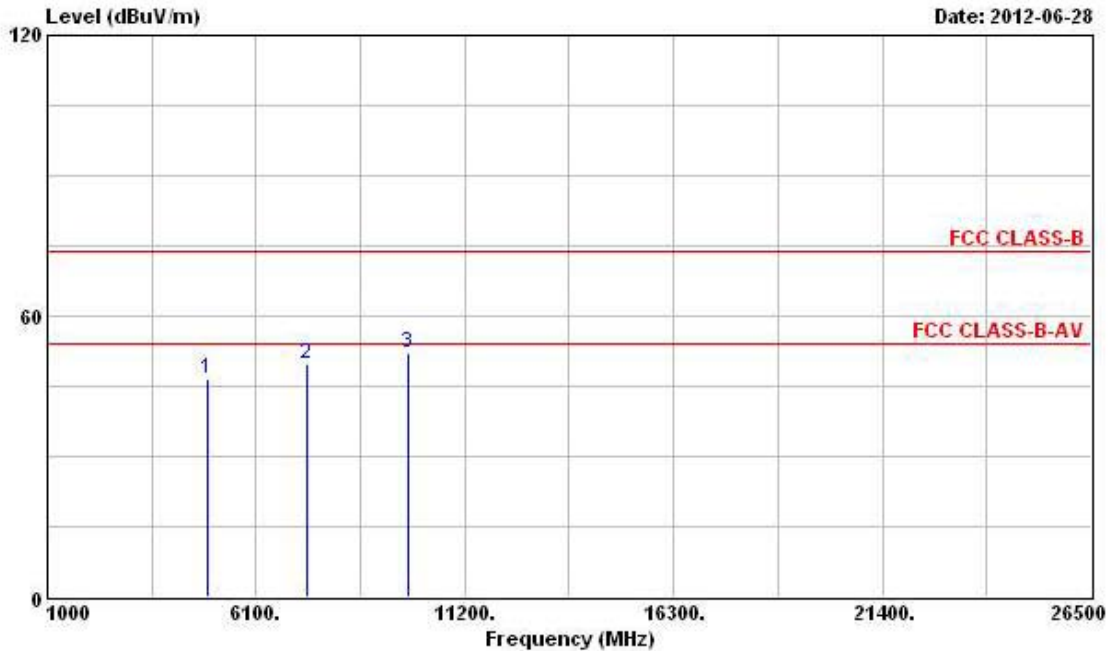


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	55.50	-18.50	74.00	49.84	35.83	4.61	34.78	Peak	---	---
2	4874.000	42.42	-11.58	54.00	36.76	35.83	4.61	34.78	Average	---	---
3	7311.000	52.03	-21.97	74.00	43.63	37.86	5.64	35.10	Peak	---	---
4	7311.000	39.24	-14.76	54.00	30.84	37.86	5.64	35.10	Average	---	---
5	9748.000	56.79			46.40	39.51	6.36	35.48	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-40M	Test Freq. (FX)	F6
Operating Function	Transmit	Polarization	V

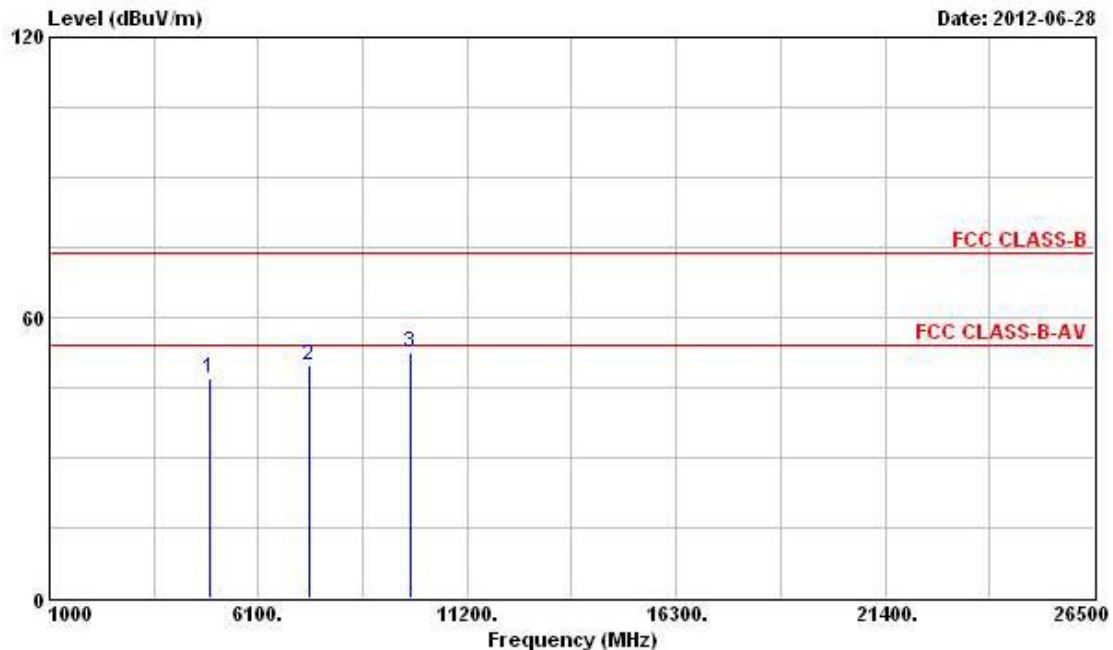


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4904.000	46.51	-7.49	54.00	41.44	35.21	4.64	34.78	PK	---	---
2	7356.000	49.78	-4.22	54.00	42.31	36.94	5.64	35.11	PK	---	---
3	9808.000	52.27			42.61	38.77	6.37	35.48	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	11N2.4G-40M	Test Freq. (FX)	F6
Operating Function	Transmit	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4904.000	47.13	-6.87	54.00	41.39	35.88	4.64	34.78	PK	---	---
2	7356.000	49.80	-4.20	54.00	41.40	37.87	5.64	35.11	PK	---	---
3	9808.000	52.31			41.85	39.57	6.37	35.48	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 4: For un-restricted bands, unwanted emissions (item 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9 kHz ~ 2.75 GHz	Mar. 23, 2012	Conduction (CO04-HY)
LISN	SCHWARZBECK MESS-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
Spectrum Analyzer	R&S	FSP 40	100305	9 KHz ~ 40 GHz	Feb. 21, 2012	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20- SP-SD	MAA1112-007	-20~100℃	Dec. 07, 2011	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100302	10MHz ~ 40GHz	Nov. 22, 2011	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	1027452	300MHz ~ 40GHz	Jan. 12, 2012	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	1124009	300MHz ~ 40GHz	Jan. 12, 2012	Conducted (TH01-HY)
RF Cable-1m	Jye Bao	RG142	CB034-1m	20 MHz ~ 7 GHz	Dec. 03, 2011	Conducted (TH01-HY)
RF Cable-2m	Jye Bao	RG142	CB035-2m	20 MHz ~ 1 GHz	Dec. 03, 2011	Conducted (TH01-HY)

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

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

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100004	9kHz ~ 40GHz	Feb. 01, 2012	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	May 10, 2012	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100kHz ~ 1.3GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Apr. 23 2012	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz ~ 18GHz	Nov. 15, 2011	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz ~ 1GHz	Nov. 11, 2011	Radiation (03CH02-HY)
RF Cable-high	SUHNER	SUCOFLEX106	03CH02-HY	1GHz ~ 40GHz	Mar. 06, 2012	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30MHz ~ 2GHz	Oct. 22, 2011	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0~ 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 ~ 4 m	N/A	Radiation (03CH02-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Sep. 09, 2010*	Radiation (03CH02-HY)

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

5 Certification of TAF Accreditation



Certificate No. : L1190-120405

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

Certificate of Accreditation

This is to certify that

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

is accredited in respect of laboratory

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



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

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