

Report No.: FR281437

FCC Test Report

Equipment : Wireless module

Brand Name : PEGATRON Model No. : UPWL6017

FCC ID : VUIUPWL6017

Standard : 47 CFR FCC Part 15.247

Frequency Range: 2400 MHz - 2483.5 MHz

Equipment Class : DTS

Applicant : PEGATRON CORPORATION

Manufacturer 5F., NO. 76, LIGONG ST., BEITOU DISTRICT,

TAIPEI CITY 112 Taiwan

The product sample received on Aug. 27, 2012 and completely tested on Oct. 06, 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

lac-MRA



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Summary of Test Result

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		Conforr	mance Test Specifications		
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 16.75MHz 37.40 (Margin 12.60dB) - AV 43.15 (Margin 16.85dB) - QP	FCC 15.207	Complied
3.2	15.247(a)	6dB Bandwidth	6dB Bandwidth Unit [MHz] 11B-20M: 8.21 11G-20M: 15.44 11N2.4G-20M: 16.95 11N2.4G-40M: 35.56	≥500kHz	Complied
3.3	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm] 11B-20M: 20.45 11G-20M: 23.47 11N2.4G-20M: 26.69 11N2.4G-40M: 26.03	Power [dBm]:30	Complied
3.4	15.247(d)	Power Spectral Density	PSD [dBm/3kHz] 11B-20M: -7.85 11G-20M: -13.35 11N2.4G-20M: -10.91 11N2.4G-40M: -15.26	PSD [dBm/3kHz]:8	Complied
3.5	15.247(c)	Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2400.00MHz: 29.06dB Restricted Bands [dBuV/m at 3m]: 2390.00MHz 69.49 (Margin 4.51dB) - PK 53.00 (Margin 1.00dB) - 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]: 4874MHz 50.99 (Margin 3.01dB) - PK	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied

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Revision History

Report No. : FR281437

Report No.	Version	Description	Issued Date
FR281437	Rev. 01	Initial issue of report	Nov. 20, 2012

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1 General Description

1.1 Information

1.1.1 RF General Information

	RF General Information							
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Transmit Chains (N _{TX})	RF Output Power (dBm)	Co-location			
2400-2483.5	b	2412-2462	1-11 [11]	1	20.45	N/A		
2400-2483.5	g	2412-2462	1-11 [11]	1	23.47	N/A		
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	1	23.36	N/A		
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	1	22.26	N/A		
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	26.69	N/A		
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	26.03	N/A		

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

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

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

Note 4: 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.)

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1.1.2 Antenna Information

Antenna Category				
Integral antenna (antenna permanently attached)				
	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.			

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		Antenna	General Information		
No.	Ant. Cat.	Ant. Type	Brand	Part No.	G _{ANT (dBi)}
1	Integral	PCB	Wanshih	UC3WFI0063	2.04
2	Integral	PCB	Wanshih	UC3WFI0064	3.90
3	Integral	PCB	Wanshih	UC3WFI0072	2.04
4	Integral	PCB	Wanshih	UC3WFI0073	5.72
5	Integral	PCB	Wanshih	UC3WFI0080	4.73
6	Integral	PCB	Wanshih	UC3WFI0081	5.65
7	Integral	PCB	Hong-lin	260-23396	2.32
8	Integral	PCB	Hong-lin	260-23397	4.64
9	Integral	PCB	Hong-lin	260-23042	4.36
10	Integral	PCB	Hong-lin	260-23403	4.40
11	Integral	PCB	Hong-lin	260-23432	2.58
12	Integral	PCB	Hong-lin	260-23434	4.36
13	Integral	PCB	Airgain	N2420DS (10cm)	3.1
14	Integral	PCB	Airgain	N2420DS (27cm)	3.1
15	Integral	PCB	Airgain	N2420 (10cm)	3.3
16	Integral	PCB	Airgain	N2420 (40cm)	3.3

EUT is consist of multiple antenna models assembly (multiple antenna models are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type. Then Ant. No. <u>4</u> shall be performed the radiated test.

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1.1.3 Type of EUT

	Identify EUT			
EU	Γ Serial Number	N/A		
Pre	sentation of Equipment	☐ Production ; ☐ Prototype		
		Type of EUT		
\boxtimes	Stand-alone			
	Combined (EUT where th	e radio part is fully integrated within another device)		
	Combined Equipment - B	rand Name / Model No.:		
	Plug-in radio (EUT intended for a variety of host systems)			
	Host System - Brand Name / Model No.:			
	Other:			

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1.1.4 Test Signal Duty Cycle

	Operated Mode for Worst Duty Cycle					
	Operated normally mode for worst duty cycle					
\boxtimes	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)					
	97.75% - IEEE 802.11b	0.10	0.20			
	97.33% - IEEE 802.11g	0.12	0.23			
	97.81% - IEEE 802.11n (HT20) - N _{TX} 1	0.10	0.19			
	95.65% - IEEE 802.11n (HT40) - N _{TX} 1	0.19	0.39			
	100% - IEEE 802.11n (HT20) - N _{TX} 2	0	0			
\boxtimes	100% - IEEE 802.11n (HT40) - N _{TX} 2	0	0			

Note 1: Average Output Power Plots w/o Duty Factor

1.1.5 EUT Operational Condition

Supply Voltage	☐ AC mains	□ DC	
Type of DC Source	☐ Internal DC supply		☐ Battery

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1.2 Support Equipment

	Support Equipment - Conducted Emissions						
No.	No. Equipment Brand Name Model Name Serial No.						
1	Notebook	DELL	XPS M1330	DoC			
2	iPod	Apple	A1199	N/A			
3	(USB) Mouse	Microsoft	1113	N/A			
4	Wireless AP (Remote Workstation)	ASUS	RT-AC66U	DoC			

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	Support Equipment - Radiated Emissions							
No.	No. Equipment Brand Name Model Name Serial No.							
1	Notebook	DELL	E5500	DoC				
2	(USB) Mouse	Microsoft	1113	DoC				
3	iPod	APPLE	A1199	DoC				
4	Wireless AP (Remote Workstation)	ASUS	RT-AC66U	DoC				

1.3 Testing Applied Standards

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

- 47 CFR FCC Part 15
- ANSI C63.10-2009
- FCC KDB 558074
- FCC KDB 662911
- FCC KDB 412172

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1.4 Testing Location Information

	Testing Location					
\boxtimes	HWA YA ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C					
		TE	L : 886-3-327-34	156 FAX :	886-3-327-0973	
Те	st Conditio	n	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted		1	TH01-HY	Shiming	25.9°C / 42%	06-Oct-12
AC Conduction CO04-HY		CO04-HY	Bill	25.2°C / 49.3%	04-Sep-12	
Radiated Emission 03CH03-I			03CH03-HY	Daniel	25.4°C / 56%	20-Sep-12 ~ 29-Sep-12

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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)

Me	easurement Uncertainty	1	
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	±2.56 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

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2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing					
IEEE Std. 802.11	Transmit Chains (N _{TX})	Data Rate / MCS	Worst Data Rate / MCS	Modulation Mode	RF Output Power (dBm)
b	1	1-11 Mbps	1 Mbps	11B-20M	20.45
g	1	6-54 Mbps	6 Mbps	11G-20M	23.47
n (HT20)	1	MCS 0-7	MCS 0	11N2.4G-20M	23.36
n (HT40)	1	MCS 0-7	MCS 0	11N2.4G-40M	22.26
n (HT20)	2	MCS 7-15	MCS 8	11N2.4G-20M	26.69
n (HT40)	2	MCS 7-15	MCS 8	11N2.4G-40M	26.03

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Note 1: 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 800ns.

Note 2: Modulation modes consist below configuration::

11B: IEEE 802.11b, 11G: IEEE 802.11g, 11N: IEEE 802.11n

2.4G: 2.4-2.4835GHz band

20M/40M: Channel Bandwidth 20MHz/40MHz

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

2.2 Test Channel Frequencies Configuration

Test Channel Frequencies Configuration		
IEEE Std. 802.11	Test Channel Frequencies (MHz) – FX (Frequencies Abbreviations)	
b, g, n (HT20)	2412-(F1), 2437-(F2), 2462-(F3)	
n (HT40)	2422-(F4), 2437-(F5), 2452-(F6)	

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2.3 The Worst Case Power Setting Parameter

	The	Worst Case Pov	ver Setting Parame	eter	
Test Software Version Mtool_1.0.0.9					
Modulation Mode	Transmit Chains (N _{TX})	Frequency (MHz)	Power Setting	Data Rate / MCS	RF Output Power (dBm)
11B-20M	1	2412	66	1 Mbps	19.67
11B-20M	1	2437	72	1 Mbps	20.45
11B-20M	1	2462	66	1 Mbps	19.78
11G-20M	1	2412	37	6 Mbps	17.37
11G-20M	1	2437	65	6 Mbps	23.47
11G-20M	1	2462	40	6 Mbps	17.84
11N2.4G-20M	1	2412	36	MCS 0	16.81
11N2.4G-20M	1	2437	65	MCS 0	23.36
11N2.4G-20M	1	2462	36	MCS 0	16.57
11N2.4G-40M	1	2422	32	MCS 0	14.57
11N2.4G-40M	1	2437	60	MCS 0	22.26
11N2.4G-40M	1	2452	33	MCS 0	15.59
11N2.4G-20M	2	2412	33	MCS 8	17.93
11N2.4G-20M	2	2437	65	MCS 8	26.69
11N2.4G-20M	2	2462	35	MCS 8	18.66
11N2.4G-40M	2	2422	32	MCS 8	17.51
11N2.4G-40M	2	2437	62	MCS 8	26.03
11N2.4G-40M	2	2452	33	MCS 8	18.04
Note 1: RF output	t power specifies t	hat Maximum Pea	k Conducted Outpu	ut Power.	•

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2.4 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests		
Tests Item AC power-line conducted emissions		
Condition AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz		
Operating Mode		
1	Radio link (2.4G-WLAN)	

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The Worst Case Mode for Following Conformance Tests					
Tests Item	RF Output Power, Power S	RF Output Power, Power Spectral Density, 6 dB Bandwidth			
Test Condition	Conducted measurement a	Conducted measurement at transmit chains			
Modulation Mode	Transmit Chains (N _{TX})	Data Rate / MCS	Test Frequency		
11B-20M	1	1 Mbps	F1, F2, F3		
11G-20M	1	6 Mbps	F1, F2, F3		
11N2.4G-20M	1	MCS 0	F1, F2, F3		
11N2.4G-40M	1	MCS 0	F4, F5, F6		
11N2.4G-20M	2	MCS 8	F1, F2, F3		
11N2.4G-40M	2	MCS 8	F4, F5, F6		

The Worst Case Mode for Following Conformance Tests				
Tests Item	Transmitter Radiated Bandedge Emissions			
Test Condition	Radiated measurement	Radiated measurement		
Modulation Mode	Transmit Chains (N _{TX})	Data Rate / MCS	Test Frequency	
11B-20M	1	1 Mbps	F1, F3	
11G-20M	1	6 Mbps	F1, F3	
11N2.4G-20M	1	MCS 0	F1, F3	
11N2.4G-40M	1	MCS 0	F4, F6	
11N2.4G-20M	2	MCS 8	F1, F3	
11N2.4G-40M	2	MCS 8	F4, F6	

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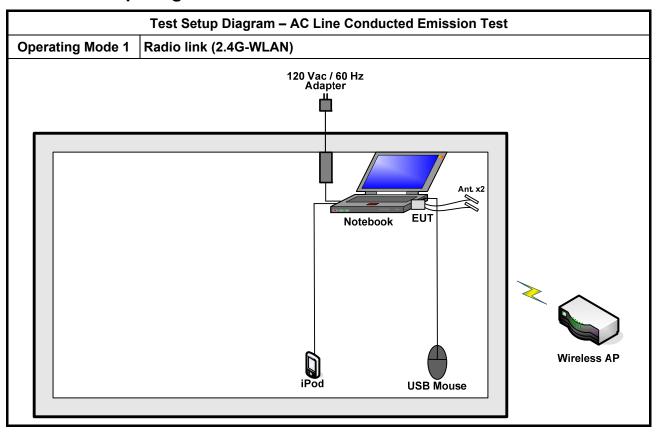
The Worst Case Mode for Following Conformance Tests				
Tests Item	Transmitter Radiated Unwanted Emissions			
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.			
	⊠ EUT will be placed in □ □	fixed position.		
User Position		mobile position and operating multiple positions. EUT o or three orthogonal planes.		
		eld or body-worn battery-powered devices and sitions. EUT shall be performed two or three		
Operating Mode < 1GHz				
Modulation Mode	Data Rate / MCS	Test Frequency		
11B-20M	1 Mbps	F1, F2, F3		
11G-20M	6 Mbps	F1, F2, F3		
11N2.4G-20M	MCS 0	F1, F2, F3		
11N2.4G-40M	MCS 0	F4, F5, F6		
11N2.4G-20M	MCS 8	F1, F2, F3		
11N2.4G-40M	MCS 8	F4, F5, F6		

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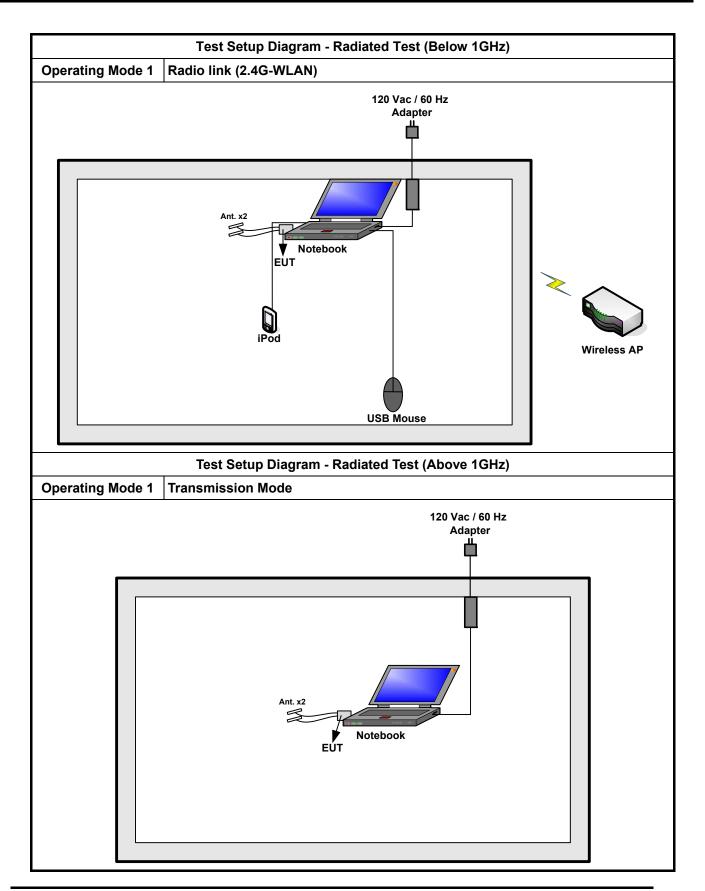
2.5 Test Setup Diagram



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3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Pow	er-line Conducted Emissions L	imit
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

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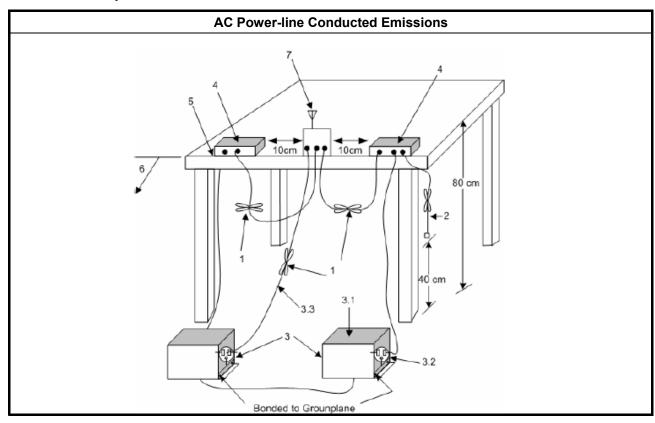
3.1.2 Measuring Instruments

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.	

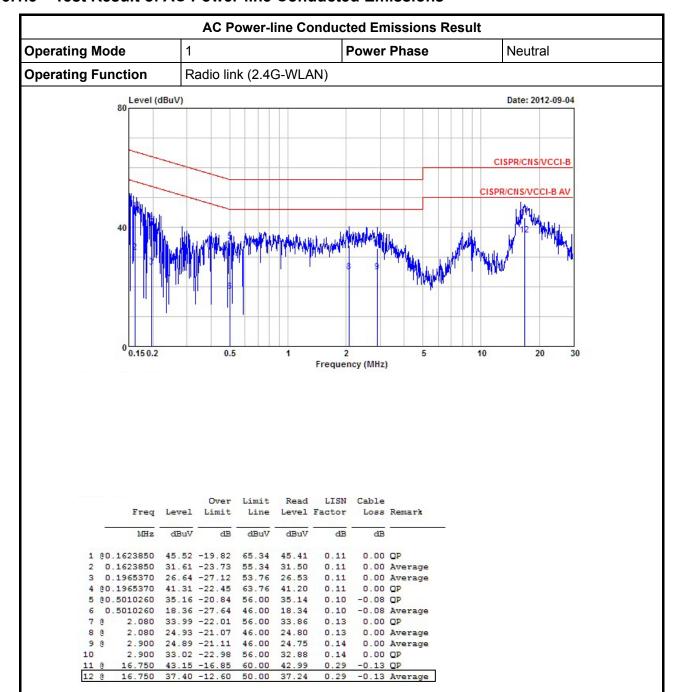
3.1.4 Test Setup



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3.1.5 Test Result of AC Power-line Conducted Emissions

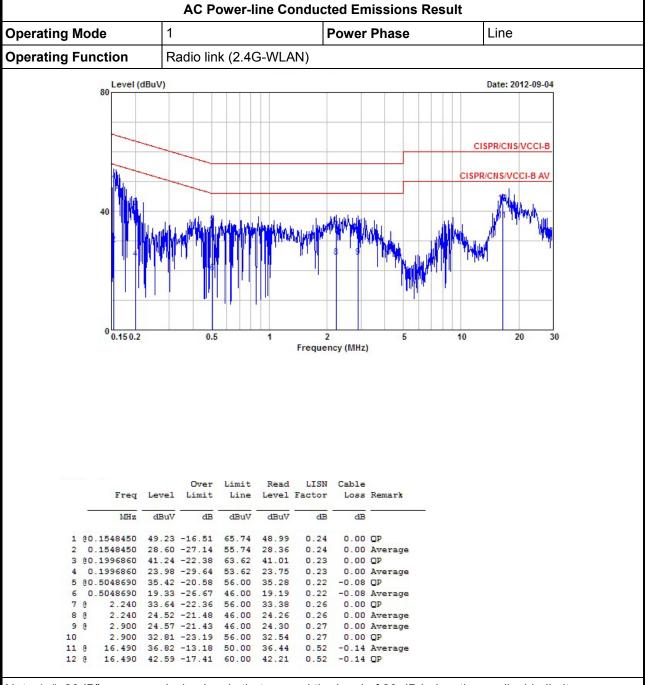


Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.

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

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

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

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3.2 6dB Bandwidth

3.2.1 6dB Bandwidth Limit

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

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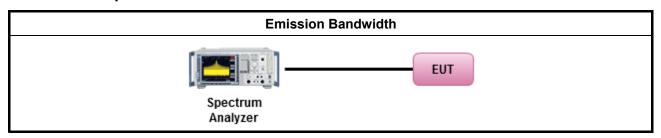
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

			Test Method
\boxtimes	For	the e	emission bandwidth shall be measured using one of the options below:
		Ref	er as FCC KDB 558074, clause 5.1.1 Option 1 for 6 dB bandwidth measurement.
		Ref	er as FCC KDB 558074, clause 5.1.2 Option 2 for 6 dB bandwidth measurement.
		Ref	er as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
\boxtimes	For	cond	lucted measurement.
	\boxtimes	The	EUT supports single transmit chain and measurements performed on this transmit chain.
	\boxtimes	The	EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
	\boxtimes	The	EUT supports multiple transmit chains using options given below:
			Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
		\boxtimes	Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.

3.2.4 Test Setup



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3.2.5 Test Result of Emission Bandwidth

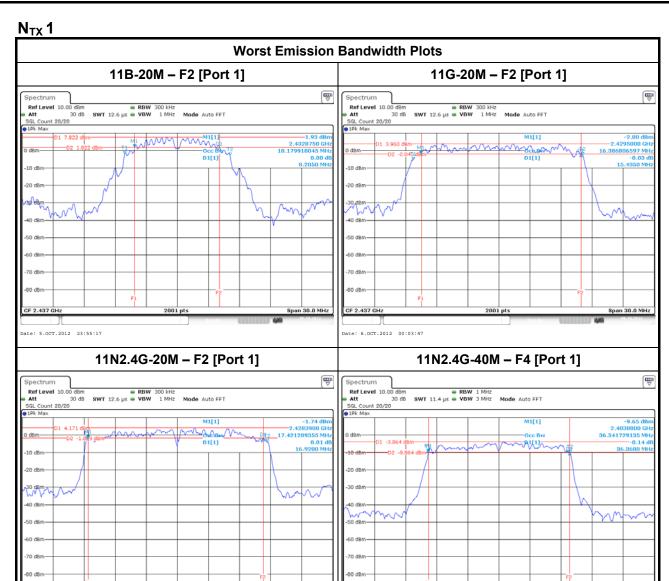
	Emission Bandwidth Result										
Condi	tion		Emission Bandwidth (MHz)								
Modulation		Freq.		99% Ba	ndwidth			6dB Bai	ndwidth		
Mode	N _{TX}	(MHz)	Chain- Port 1	Chain- Port 2	-	-	Chain- Port 1	Chain- Port 2	1	1	
11B-20M	1	2412	10.18	-	-	-	8.19	-	-	-	
11B-20M	1	2437	10.18	-	-	-	8.21	-	-	-	
11B-20M	1	2462	10.18	-	-	_	8.18	-	-	-	
11G-20M	1	2412	16.28	-	-	-	14.07	-	-	-	
11G-20M	1	2437	16.39	-	-	-	15.44	-	-	-	
11G-20M	1	2462	16.52	-	-	-	15.08	-	-	-	
11N2.4G-20M	1	2412	17.45	-	-	-	16.38	-	-	-	
11N2.4G-20M	1	2437	17.42	-	-	_	16.92	-	-	-	
11N2.4G-20M	1	2462	17.45	-	-	_	16.70	-	-	-	
11N2.4G-40M	1	2422	36.54	-	-	-	36.36	-	-	-	
11N2.4G-40M	1	2437	36.30	-	-	-	33.28	-	-	-	
11N2.4G-40M	1	2452	36.06	-	-	_	35.04	-	-	-	
11N2.4G-20M	2	2412	17.44	17.45	-	_	16.16	15.57	-	-	
11N2.4G-20M	2	2437	17.44	17.44	-	_	14.49	15.89	-	-	
11N2.4G-20M	2	2462	17.38	17.50	-	_	15.14	16.95	-	-	
11N2.4G-40M	2	2422	36.34	36.42	-	-	33.56	31.68	-	-	
11N2.4G-40M	2	2437	36.54	36.22	-	-	35.44	35.56	-	-	
11N2.4G-40M	2	2452	36.02	36.30	-	-	29.92	33.60	-	-	
Lim	it			N	/A			≥500	kHz		
Resu	ult					Com	plied				
Note 1: N _{TX} = Nur	nber c	of Transm	it Chains								

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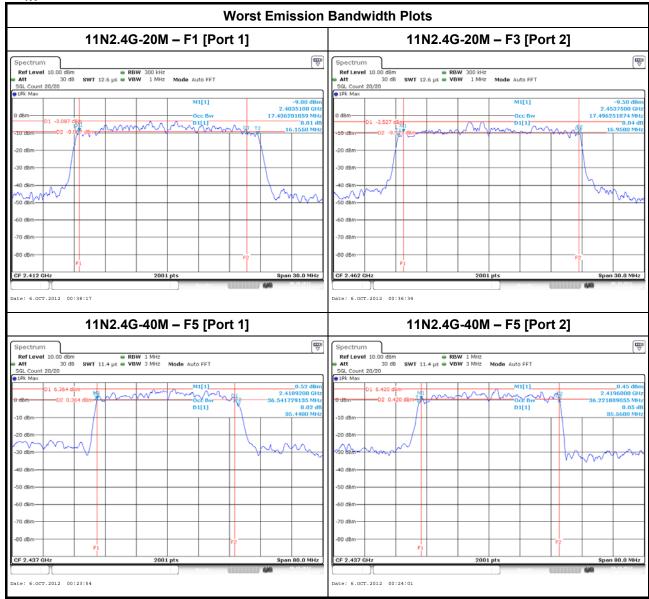
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3.3 RF Output Power

3.3.1 RF Output Power Limit

		RF Output Power Limit
Max	imui	m Peak Conducted Output Power or Maximum Conducted Output Power Limit
		0-2483.5 MHz Band:
		If $G_{TX} \le 6$ dBi, then $P_{Out} \le 30$ 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 $P_{Out} = 30 - (G_{TX} - 6)/3 + 8$ dB dBm
e.i.r	.p. P	ower Limit:
\boxtimes	240	0-2483.5 MHz Band
	\boxtimes	Point-to-multipoint systems (P2M): P _{eirp} ≤ 36 dBm (4 W)
		Point-to-point systems (P2P): $P_{eirp} \le MAX(36, [P_{Out} + G_{TX}]) dBm$
		Smart antenna system (SAS)
		☐ Single beam: $P_{eirp} \le MAX(36, P_{Out} + G_{TX}) dBm$
		☐ Overlap beam: $P_{eirp} \le MAX(36, P_{Out} + G_{TX}) dBm$
		☐ Aggregate power on all beams: $P_{eirp} \le MAX(36, [P_{Out} + G_{TX} + 8]) dBm$
G_{TX}	= the	aximum peak conducted output power or maximum conducted output power in dBm, maximum transmitting antenna directional gain in dBi. i.r.p. Power in dBm.

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3.3.2 Measuring Instruments

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

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3.3.3 Test Procedures

		Test Method
\boxtimes	Max	rimum Peak Conducted Output Power
		Refer as FCC KDB 558074, clause 5.2.1.1 Option 1 (RBW ≥ EBW method).
	\boxtimes	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.
\boxtimes	Max	ximum Conducted (Average) Output Power
		Refer as FCC KDB 558074, clause 5.2.2.1 Option 1 (RMS detection with slow sweep speed).
	\boxtimes	Refer as FCC KDB 558074, clause 5.2.2.2 Option 2 (spectral trace averaging).
\boxtimes	For	conducted measurement.
	\boxtimes	The EUT supports single transmit chain and measurements performed on this transmit chain.
	\boxtimes	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
	\boxtimes	The EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	\boxtimes	If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP _{total} = $P_{total} + DG$

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3.3.4 Test Setup

RF Output Power (Spectro	um Analyzer)
Spectrum Analyzer	EUT

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3.3.5 Directional Gain for Power Measurement

Directional Gain (DG) Result											
Transmit Chains No.		1	2	-	-						
Maximum G _{ANT} (dBi)		5.72	5.72	-	-						
Modulation Mode	DG (dBi)	N _{TX}	N _{ss}	STBC	Array Gain (dB)						
Legacy CCK,1-11Mbps (11b)	5.72	1	1	-	-						
Non HT20,6-54Mbps (11g)	5.72	1	1	-	-						
HT20,M0-M7	5.72	1	1	-	-						
HT20,M8-15	5.72	2	2	-	-						
HT40,M0-M7	5.72	1	1	-	-						
HT40,M8-M15	5.72	2	2	-	-						

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

 All transmit signals are completely uncorrelated, Directional Gain = G_{ANT}
- Note 2: For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows: Any transmit signals are correlated, Directional Gain =10 log[(10^{G1/20} +... + 10^{GN/20})² /N_{TX}]

 All transmit signals are completely uncorrelated, Directional Gain = 10 log[(10^{G1/10} +... + 10^{GN/10)}/N_{TX}]
- Note 3: For Spatial Multiplexing, Directional Gain (DG) = G_{ANT} + 10 log(N_{TX}/N_{SS}), where Nss = the number of independent spatial streams data.
- Note 4: For CDD transmissions, directional gain is calculated as power measurements: Directional Gain (DG) = G_{ANT} + Array Gain, where Array Gain is as follows: Array Gain = 0 dB (i.e., no array gain) for $N_{TX} \le 4$; Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{TX} ;

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3.3.6 Test Result of Maximum Peak Conducted Output Power

Maximum Peak Conducted Output Power Result													
Condi	tion			RF Output Power (dBm)									
Modulation Mode	N _{TX}	Freq. (MHz)	Chain Port 1	Chain Port 2	-	-	Sum Chain	Power Limit	DG (dBi)	EIRP Power	EIRP Limit		
11B-20M	1	2412	19.67	-	-	-	19.67	30	5.72	25.39	36.0		
11B-20M	1	2437	20.45	-	-	-	20.45	30	5.72	26.17	36.0		
11B-20M	1	2462	19.78	-	-	-	19.78	30	5.72	25.50	36.0		
11G-20M	1	2412	17.37	-	-	-	17.37	30	5.72	23.09	36.0		
11G-20M	1	2437	23.47	-	-	-	23.47	30	5.72	29.19	36.0		
11G-20M	1	2462	17.84	-	-	-	17.84	30	5.72	23.56	36.0		
11N2.4G-20M	1	2412	16.81	-	ı	ı	16.81	30	5.72	22.53	36.0		
11N2.4G-20M	1	2437	23.36	-	-	-	23.36	30	5.72	29.08	36.0		
11N2.4G-20M	1	2462	16.57	-	-	-	16.57	30	5.72	22.29	36.0		
11N2.4G-40M	1	2422	14.57	-	ı	ı	14.57	30	5.72	20.29	36.0		
11N2.4G-40M	1	2437	22.26	-	-	-	22.26	30	5.72	27.98	36.0		
11N2.4G-40M	1	2452	15.59	-	-	-	15.59	30	5.72	21.31	36.0		
11N2.4G-20M	2	2412	15.53	14.20	-	-	17.93	30	5.72	23.65	36.0		
11N2.4G-20M	2	2437	23.82	23.53	-	-	26.69	30	5.72	32.41	36.0		
11N2.4G-20M	2	2462	15.82	15.47	-	1	18.66	30	5.72	24.38	36.0		
11N2.4G-40M	2	2422	14.92	14.03	-	1	17.51	30	5.72	23.23	36.0		
11N2.4G-40M	2	2437	22.87	23.16	-	-	26.03	30	5.72	31.75	36.0		
11N2.4G-40M	2	2452	15.50	14.51	-	-	18.04	30	5.72	23.76	36.0		
Resu	ılt					(Complie	d					

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3.3.7 Test Result of Maximum Conducted (Average) Output Power

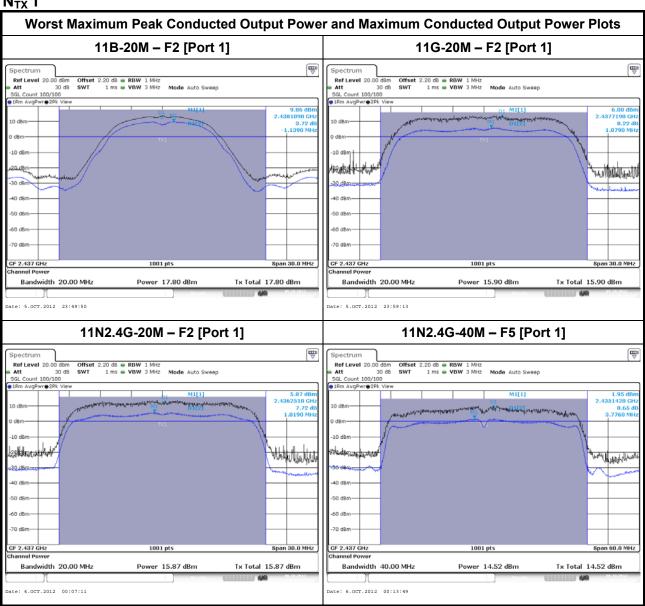
	Maximum Conducted (Average) Output Power											
Condi	tion		RF Output Power (dBm)									
Modulation Mode	N _{TX}	Freq. (MHz)	Chain Port 1	Chain Port 2	-	-	Sum Chain	Power Limit	DG (dBi)	EIRP Power	EIRP Limit	
11B-20M	1	2412	16.32	-	-	-	16.32	30	5.72	22.04	36.0	
11B-20M	1	2437	17.90	-	-	-	17.90	30	5.72	23.62	36.0	
11B-20M	1	2462	16.13	-	-	-	16.13	30	5.72	21.85	36.0	
11G-20M	1	2412	9.82	-	-	-	9.82	30	5.72	15.54	36.0	
11G-20M	1	2437	16.02	-	ı	ı	16.02	30	5.72	21.74	36.0	
11G-20M	1	2462	10.38	-	ı	ı	10.38	30	5.72	16.10	36.0	
11N2.4G-20M	1	2412	9.38	-	ı	ı	9.38	30	5.72	15.10	36.0	
11N2.4G-20M	1	2437	15.97	-	ı	ı	15.97	30	5.72	21.69	36.0	
11N2.4G-20M	1	2462	9.19	-	ı	ı	9.19	30	5.72	14.91	36.0	
11N2.4G-40M	1	2422	7.09	ı	ı	ı	7.09	30	5.72	12.81	36.0	
11N2.4G-40M	1	2437	14.71	-	ı	ı	14.71	30	5.72	20.43	36.0	
11N2.4G-40M	1	2452	8.01	ı	ı	ı	8.01	30	5.72	13.73	36.0	
11N2.4G-20M	2	2412	7.79	6.31	ı	1	10.12	30	5.72	15.84	36.0	
11N2.4G-20M	2	2437	16.10	15.51	ı	ı	18.83	30	5.72	24.55	36.0	
11N2.4G-20M	2	2462	8.13	7.04	-	1	10.63	30	5.72	16.35	36.0	
11N2.4G-40M	2	2422	6.84	5.55	ı	-	9.25	30	5.72	14.97	36.0	
11N2.4G-40M	2	2437	14.82	14.71	ı	ı	17.78	30	5.72	23.50	36.0	
11N2.4G-40M	2	2452	7.41	6.08	-	1	9.81	30	5.72	15.53	36.0	
Resu	ılt						Complie	d				

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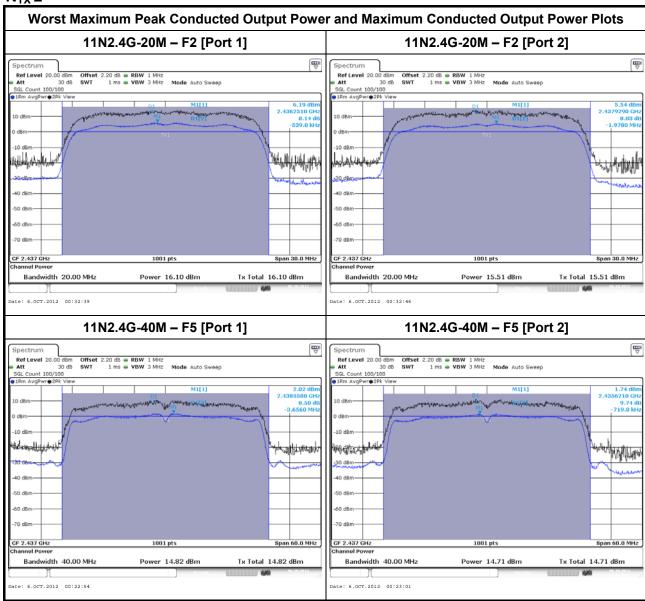


Note 1: Average Output Power Plots w/o Duty Factor

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3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

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

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3.4.2 Measuring Instruments

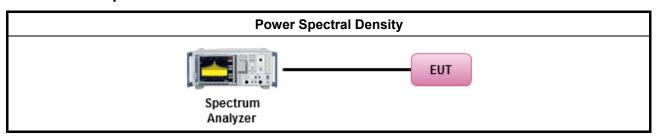
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

		Test Method
	pow prod whe dem	rer spectral density procedures that the same method as used to determine the conducted output er shall be used to determine the power spectral density. In addition, the use of a peak PSD redure will always result in a "worst-case" measured level for comparison to the limit. Therefore, never the DTS bandwidth exceeds 500 kHz, it is acceptable to utilize the peak PSD procedure to constrate compliance to the PSD limit, regardless of how the fundamental output power was usured. 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)
\boxtimes	For	conducted measurement.
	\boxtimes	The EUT supports single transmit chain and measurements performed on this transmit chain.
	\boxtimes	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
	\boxtimes	The EUT supports multiple transmit chains using options given below:
		 ☑ Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the N_{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

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Test Setup 3.4.4



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Test Result of Power Spectral Density 3.4.5

			Power S	pectral Den	sity Result						
Condi	tion			Power Spectral Density (dBm/3kHz)							
Modulation Mode	NI			-	-	-	-	Power Limit			
11B-20M	1	2412	-9.33	-	-	-	-	8			
11B-20M	1	2437	-9.16	-	_	-	-	8			
11B-20M	1	2462	-7.85	-	_	-	-	8			
11G-20M	1	2412	-19.56	-	-	-	-	8			
11G-20M	1	2437	-13.35	-	-	-	-	8			
11G-20M	1	2462	-20.19	-	_	-	-	8			
11N2.4G-20M	1	2412	-20.52	-	_	-	-	8			
11N2.4G-20M	1	2437	-13.77	-	_	-	-	8			
11N2.4G-20M	1	2462	-20.75	-	_	-	-	8			
11N2.4G-40M	1	2422	-25.22	-	-	-	-	8			
11N2.4G-40M	1	2437	-17.79	-	_	-	-	8			
11N2.4G-40M	1	2452	-23.35	-	-	-	-	8			
11N2.4G-20M	2	2412	-19.67	-	-	-	-	8			
11N2.4G-20M	2	2437	-10.91	-	-	-	-	8			
11N2.4G-20M	2	2462	-18.42	-	-	-	-	8			
11N2.4G-40M	2	2422	-21.25	-	-	-	-	8			
11N2.4G-40M	2	2437	-15.26	-	-	-		8			
11N2.4G-40M	2	2452	-21.59	-	_	-	-	8			
Resi	ult				Con	nplied					
Note 1: PSD [dBm	1/3kHz]	= sum ea	ch transmit	chains by bi	n-to-bin PSI) [dBm/100kl	dz] + BWFC	[-15.2 dB]			

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-90-

-100 -

2.452G 2.455G

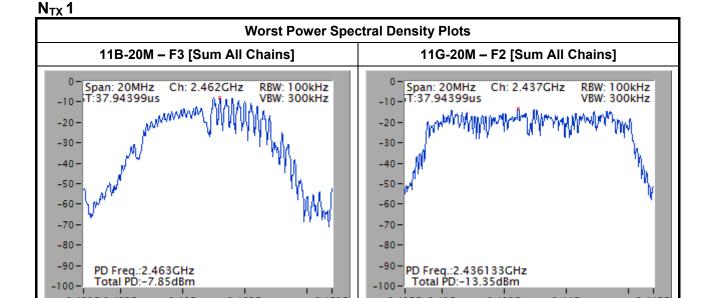
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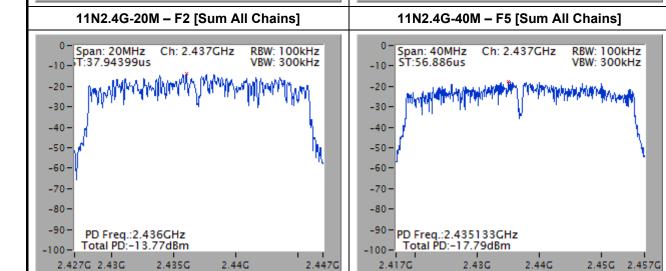
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2.465G

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2.472G

2.427G 2.43G

2.435G

2.44G

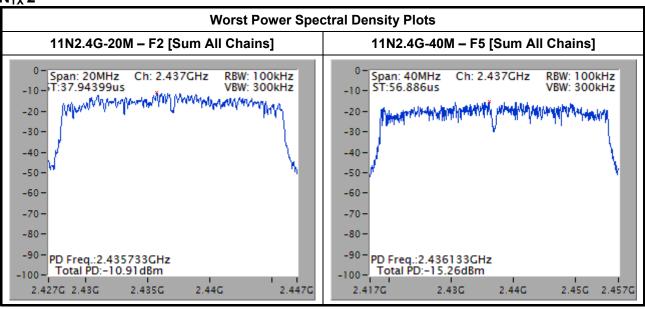
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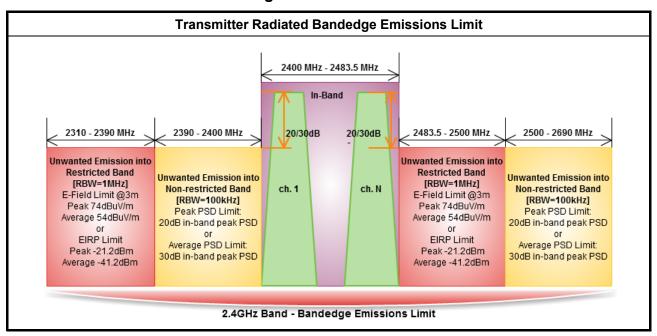




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3.5 Transmitter Radiated Bandedge Emissions

3.5.1 Transmitter Radiated Bandedge Emissions Limit



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3.5.2 Measuring Instruments

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

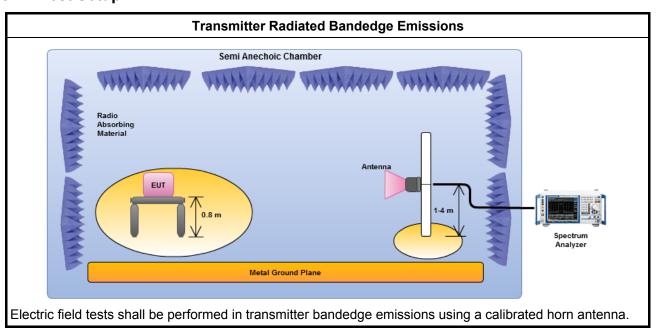
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3.5.3 Test Procedures

		Test Method									
\boxtimes	The	average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].									
\boxtimes		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.									
\boxtimes	For	the transmitter unwanted emissions shall be measured using following options below:									
	\boxtimes	Refer as FCC KDB 558074, clause 5.4.1 for unwanted emissions into non-restricted bands.									
	\boxtimes	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 Option 2 (Trace Averaging).									
		☐ Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). – Duty cycle ≥ 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.									
\boxtimes	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).									
	\boxtimes	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.									
\boxtimes	For	radiated measurement, refer as ANSI C63.10, clause 6.5 for radiated emissions from above 1 GHz.									

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3.5.4 Test Setup

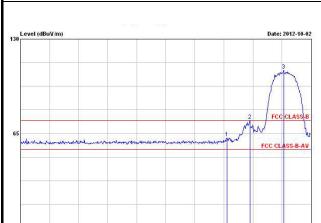


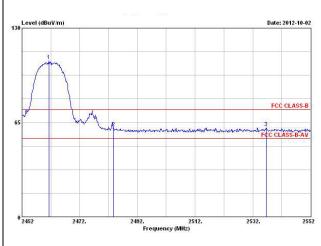
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3.5.5 Test Result of Transmitter Radiated Bandedge Emissions-N_{TX} 1

	Transmitter Radiated Bandedge Emissions Result											
Modulation	11E	3-20M		Non-restricted Band Emissions								
Non-restricted Band (MHz)	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.				
2390-2400	2412	108.59	2398.48	73.82	34.77	20	PK	V				
2500-2690	2462	107.38	2536.70	61.34	46.04	20	PK	V				
	Low Band	edge			Up Ba	ndedge						





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

Transmitter Radiated Bandedge Emissions Result								
Modulation	11B-20M		Restricted Band Emissions					
Restricted Band (MHz)	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.
2310-2390	2412	114.13	2390.00	3	66.13	74	PK	٧
2310-2390	2412	104.37	2390.00	3	52.31	54	AV	V
2483.5-2500	2462	113.07	2483.90	3	67.29	74	PK	V
2483.5-2500	2462	103.19	2483.50	3	52.38	54	AV	V

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

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				ndedge Emis						
Modulation	tion 11G-20M			Non-restricted Band Emissions						
Non-restricted Band (MHz)	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.		
2390-2400	2412	98.44	2393.55	64.72	33.72	20	PK	٧		
2500-2690	2462	98.05	2538.70	61.49	36.56	20	PK	V		
	Low Bande	edge			Up Ba	indedge	1			
Level (dBuV/m)			Date: 2012-10-02	130 Level (dBuVm)			Dat	e: 2012-10-0		
65	description of the control of the co	1 popular	FCC CLASS-B-AV	65	man harring 2	standen	3	CC CLASS-I		
0 2310 2332.4	2354.8 Frequency (M	2377.2 2399	0.6 2422	0 2452 247	2. 2492.	2512.	2532.	25		

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Transmitter Radiated Bandedge Emissions Result								
Modulation	110	11G-20M Restricted Band Emissions						
Restricted Band (MHz)	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.
2310-2390	2412	106.89	2390.00	3	69.49	74	PK	V
2310-2390	2412	95.55	2390.00	3	53.00	54	AV	V
2483.5-2500	2462	106.81	2483.50	3	69.39	74	PK	V
2483.5-2500	2462	94.78	2483.50	3	52.22	54	AV	V

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

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	Tra	ansmitter Ra	idiated Bai	ndedge Emis	sions Result	<u> </u>				
Modulation	11N	I-20M		Non-restricted Band Emissions						
Non-restricted Band (MHz)	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.		
2390-2400	2412	95.75	2393.10	63.35	32.40	20	PK	V		
2500-2690	2462	97.51	2547.00	61.33	36.18	20	PK	V		
	Low Band	edge			Up Ba	ndedge		•		
Sevel (dBuVm) 65	make many the trap may to be a factor of the trap may to be a	udan na managarang	PCC CLASS-B-AV	Level (dBuV m) 130 130 130 130 130 130 130 13	and marked a 2 grant grant and a stand		FCC	2012-10-02 CLASS-B 3 ASS B-AV		
0 2310 2332.4	2354.8 Frequency (M	2377.2 2399 Hz)	3.6 2422	0 2452 2472		2512. ency (MHz)	2532.	255		

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	Transmitter Radiated Bandedge Emissions Result									
Modulation	11N-20M Restricted Band Emissions									
Restricted Band (MHz)	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.		
2310-2390	2412	103.82	2390.00	3	71.21	74	PK	V		
2310-2390	2412	92.63	2390.00	3	52.78	54	AV	V		
2483.5-2500	2462	105.69	2485.00	3	68.99	74	PK	V		
2483.5-2500	2462	94.05	2483.50	3	52.42	54	AV	V		
Note 1: Measurem	Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).									

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

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	Tra	ansmitter Ra	idiated Bai	ndedge Emis	sions Result				
Modulation	11N	I-40M		Non-restricted Band Emissions					
Non-restricted Band (MHz)	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.	
2390-2400	2422	93.54	2400.00	64.48	29.06	20	PK	V	
2500-2690	2452	94.12	2520.20	61.53	32.59	20	PK	V	
	Low Band	edge			Up Ba	ndedge		•	
		pomente	FCC CLASS-B	men many me	unhany		FCC	CLASS-B	
65	den and proposed the second	manufus 3	FCC CLASS-B-AV	65	Vername 2	3 3 mm while you want to the design when the same of t	FCC CL	ASS-B-AV	
0 2310 2336.4	2362.8 Frequency (N	2389.2 2415 THz)	5.6 2442	0 2432 245		2504. ency (MHz)	2528.	2552	

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

	Transmitter Radiated Bandedge Emissions Result									
Modulation	11N	I-40M		Restricted Band Emissions						
Restricted Band (MHz)	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.		
2310-2390	2422	100.70	2388.54	3	69.32	74	PK	V		
2310-2390	2422	88.83	2384.18	3	52.95	54	AV	V		
2483.5-2500	2452	101.61	2490.92	3	68.31	74	PK	V		
2483.5-2500	2452	89.22	2483.60	3	52.76	54	AV	V		

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

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3.5.6 Test Result of Transmitter Radiated Bandedge Emissions- N_{TX} 2

	Tra	ansmitter Ra	idiated Bai	ndedge Emis	sions Result	t			
Modulation	11N	I-20M		Non-restricted Band Emissions					
Non-restricted Band (MHz)	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.	
2390-2400	2412	98.70	2392.77	64.48	32.44	20	PK	V	
2500-2690	2462	99.05	2531.00	61.38	37.67	20	PK	V	
	Low Bande	edge			Up Ba	ndedge			
130 Level (dBuV/m)			Date: 2012-10-02	130 Level (dBuV/m)			Dat	e: 2012-10-02	
65	ne displayed in the contract of the contract o	dan and and and and and and and and and	FCC CLASS-B	photography 65	Market and 2		1 020	C CLASS-B	

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

	Transmitter Radiated Bandedge Emissions Result									
Modulation	11N	11N-20M Restricted Band Emissions								
Restricted Band (MHz)	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.		
2310-2390	2412	106.15	2390.00	3	68.59	74	PK	٧		
2310-2390	2412	92.85	2390.00	3	52.41	54	AV	V		
2483.5-2500	2462	106.92	2484.60	3	70.31	74	PK	V		
2483.5-2500	2462	93.45	2483.50	3	52.89	54	AV	V		
Note 1: Measurem	Note 1: Measurement worst emissions of receive antenna polarization: H (Horizontal) or V (Vertical).									

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2362.8 2389.2 Frequency (MHz)

		Tra	ansmitter Ra	idiated Bar	ndedge Emis	sions Result	:			
Modulat	ion	11N	I-40M		Non-restricted Band Emissions					
Non-restr Band (M		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.	
2390-24	100	2422	95.24	2400.00	64.27	30.97	20	PK	V	
2500-26	90	2452	95.67	2549.48	61.26	34.41	20	PK	V	
		Low Bande	edge			Up Ba	ndedge			
Level (dBuVim)			phone in the second	Pate: 2012-10-03	Level (dBuVm) 130 65	2	Market State of the Control of the C	FCC	2012-10-03 CLASS-B ASS-B-AV	

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

	Transmitter Radiated Bandedge Emissions Result								
Modulation	11N	11N-40M Restricted Band Emissions							
Restricted Band (MHz)	Test Ch. Freq. (MHz)	In-band PSD [i]	RBE Freq. (MHz)	Measure Distance (m)	Out-Band Level (dBuV/m)	Limit (dBuV/m)	Level Type	Pol.	
2310-2390	2422	101.00	2381.68	3	69.25	74	PK	V	
2310-2390	2422	85.10	2383.79	3	52.98	54	AV	V	
2483.5-2500	2452	101.16	2486.48	3	69.08	74	PK	V	
2483.5-2500	2452	85.43	2484.20	3	52.65	54	AV	V	

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

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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					

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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.

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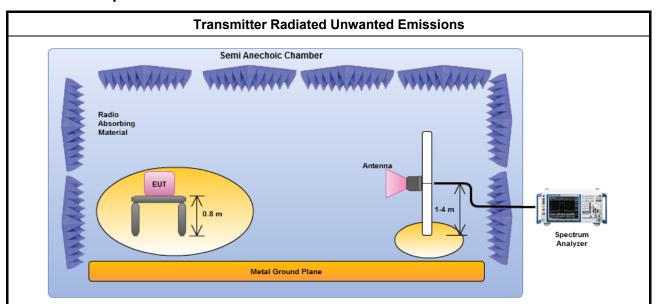
3.6.3 Test Procedures

		Test Method
\boxtimes	perfo equi extra dista	surements may be performed at a distance other than the limit distance provided they are not ormed in the near field and the emissions to be measured can be detected by the measurement pment. When performing measurements at a distance other than that specified, the results shall be applated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear name for field-strength measurements, inverse of linear distance-squared for power-density surements).
		Measurements in the frequency range 10 GHz - 18GHz are typically made at a closer distance 1m, because the instrumentation noise floor is typically close to the radiated emission limit.
	\boxtimes	Measurements in the frequency range above 18 GHz - 25GHz are typically made at a closer distance 0.5m, because the instrumentation noise floor is typically close to the radiated emission limit.
\boxtimes	The	average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].
\boxtimes	For	the transmitter unwanted emissions shall be measured using following options below:
	\boxtimes	Refer as FCC KDB 558074, clause 5.4.1 for unwanted emissions into non-restricted bands.
	\boxtimes	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 ≥ 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.
\boxtimes	For	radiated measurement.
	\boxtimes	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz.
	\boxtimes	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.
	\boxtimes	Refer as ANSI C63.10, clause 6.5 for radiated emissions from above 1 GHz.

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3.6.4 Test Setup



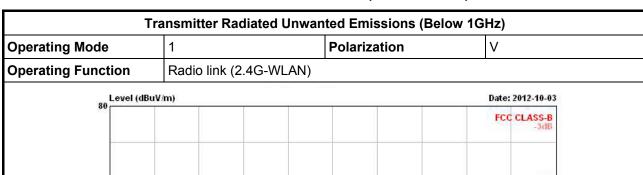
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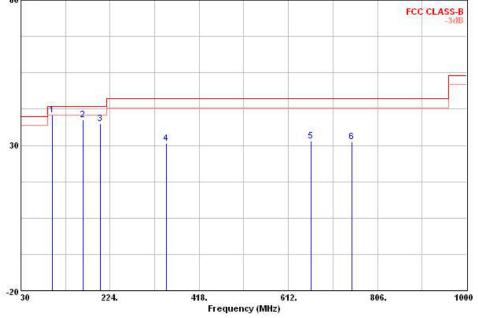
Magnetic field tests shall be performed in the frequency range of 9 kHz to 30 MHz using a calibrated loop antenna. Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna and the frequency range of 1 GHz to 40 GHz using a calibrated horn antenna.

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3.6.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)





	Freq	Level	Over Limit			Antenna Factor	7 (20)	Preamp Factor		Ant Pos	Table Pos
1 <u>00</u>	мн	MHz dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	98.870	40.48	-3.02	43.50	55.56	11.03	1.34	27.45	QP	257.7	
2 @	164.830	38.91	-4.59	43.50	54.68	9.89	1.47	27.13	Peak	2710757	Street
3 @	203.630	37.53	-5.97	43.50	52.65	9.55	2.28	26.95	Peak	1210101	
4	347.190	30.55	-15.45	46.00	39.95	14.92	2.68	27.00	Peak		222
5	661.470	31.55	-14.45	46.00	35.73	19.71	3.74	27.63	Peak		
6	749.740	31.35	-14.65	46.00	34.62	20.71	3.89	27.87	Peak	0.00	Sec.

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)

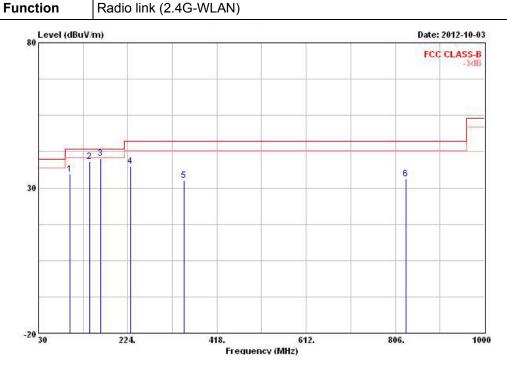
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Transmitter Radiated Unwanted Emissions (Below 1GHz)

Operating Mode 1 Polarization H

Operating Function Radio link (2.4G-WLAN)

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			0ver			Antenna		Preamp		Ant	Table		
	Freq	Level	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos		
<u>-</u>	MKz	MHz	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	B	cm.	deg
1	98.870	34.67	-8.83	43.50	49.75	11.03	1.34	27.45	Peak	***			
2 @	141.550	39.21	-4.29	43.50	53.54	11.26	1.66	27.25	Peak	575755	10000		
3 @	164.830	40.21	-3.29	43.50	55.98	9.89	1.47	27.13	QP	222	222		
4	230.790	37.32	-8.68	46.00	51.44	10.48	2.28	26.88	Peak		2224		
5	347.190	32.53	-13.47	46.00	41.93	14.92	2.68	27.00	Peak				
6	828.310	33.25	-12.75	46.00	35.68	20.80	4.47	27.70	Peak	2707470	(5.5.5		

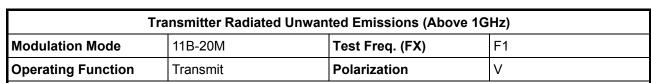
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

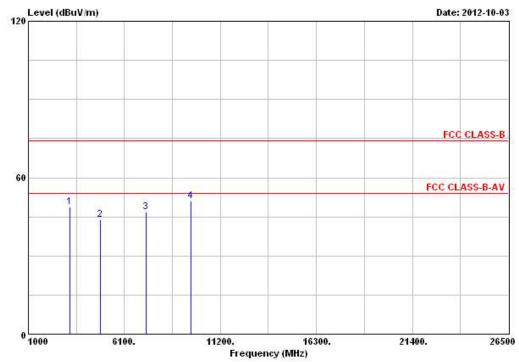
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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3.6.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11B-20M-N_{Tx}1



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	_		0ver	Limit	Read	Antenna	Cable	Preamp		Ant	Table
	Freq	Level	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	Мнг	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	3216.000	48.70			45.86	30.21	5.42	32.79	Peak		
2	4824.000	43.80	-10.20	54.00	38.20	32.79	5.43	32.62	PK	270727	3755
3	7236.000	46.67			38.83	35.58	5.14	32.88	Peak	1,010,00	222
4	9648.000	51.18			39.50	38.31	6.70	33.33	Peak		10774

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

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

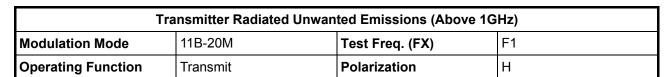
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

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

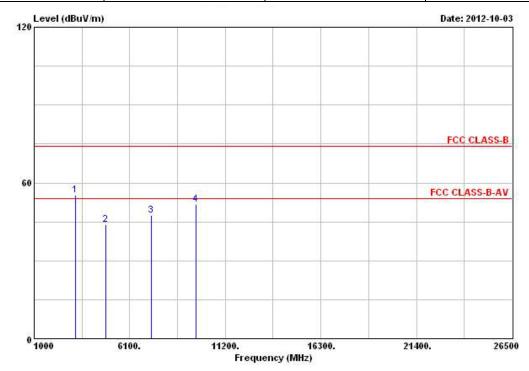
Note 5: For un-restricted bands, unwanted emissions (item 1, 3 and 4) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

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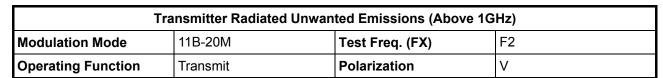


			0ver	Limit	Read	Antenna	Cable	Preamp		Ant	Table
	Freq	Level	Limit	t Line B dBuV/m	Level	Factor	Loss	Factor	<u> </u>	Pos ————————————————————————————————————	Pos
	MHz	dBuV/m	dB		dBuV	dB/m	dB	dB			deg
1	3216.000	55.22			52.38	30.21	5.42	32.79	Peak	200	
2	4824.000	43.75	-10.25	54.00	38.15	32.79	5.43	32.62	PK	57475	Stands
3	7236.000	47.48			39.64	35.58	5.14	32.88	Peak		2000
4	9648.000	51.71			40.03	38.31	6.70	33.33	Peak		

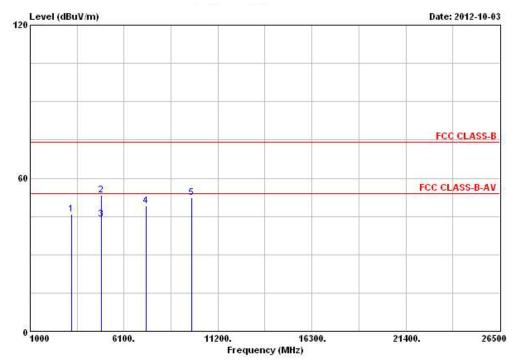
- Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
- Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
- Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
- Note 4: For restricted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

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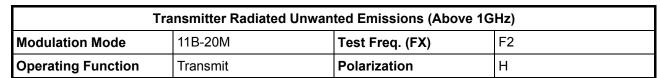


			0ver	Limit	Read	Antenna	Cable	Preamp		Ant	Table
	Freq	Level	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	<u> </u>	cm.	deg
1	3249.000	45.79			42.88	30.28	5.42	32.79	Peak		
2	4874.000	53.32	-20.68	74.00	47.62	32.88	5.43	32.61	Peak	5000000	()
3	4874.000	43.91	-10.09	54.00	38.21	32.88	5.43	32.61	Average		
4 @	7311.000	49.01	-4.99	54.00	40.80	35.74	5.36	32.89	PK	222	222
5	9748.000	52.52			40.58	38.52	6.74	33.32	Peak		

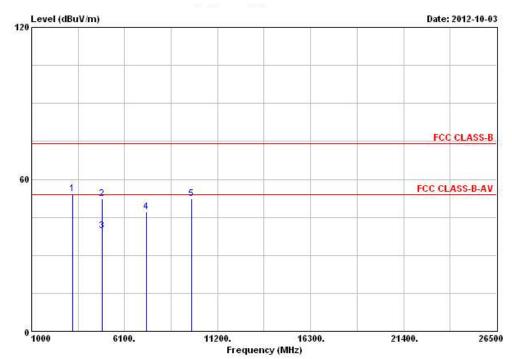
- Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
- Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
- Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
- Note 4: For restricted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

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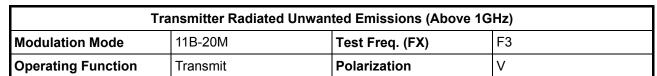


			0ver	Limit	Read	Antenna	Cable	Preamp		Ant	Table
	Freq	Level	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
2	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dВ	dB	1	cm	deg
1	3249.000	54.29			51.38	30.28	5.42	32.79	Peak		iees.
2	4874.000	52.34	-21.66	74.00	46.64	32.88	5.43	32.61	Peak	7.7.7.	100000
3	4874.000	39.58	-14.42	54.00	33.88	32.88	5.43	32.61	Average	2000	200
4 @	7311.000	47.13	-6.87	54.00	38.92	35.74	5.36	32.89	PK		
5	9748.000	52.28			40.34	38.52	6.74	33.32	Peak	2000	

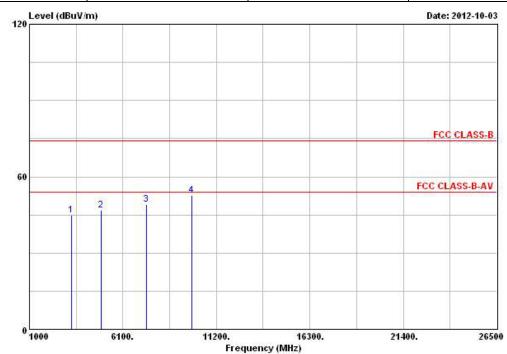
- Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
- Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
- Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
- Note 4: For restricted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

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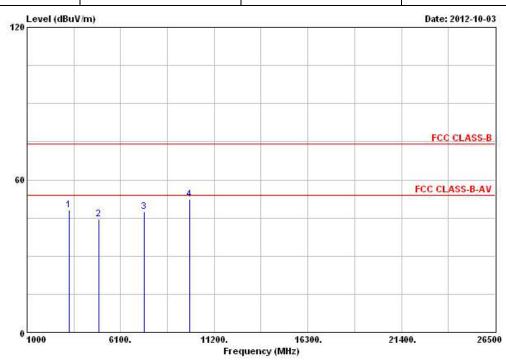
				0ver	Limit	Read	Antenna	Cable	Preamp		Ant	Table
		Freq	Level	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	2	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		can	deg
1		3282.000	44.75			41.78	30.35	5.41	32.79	Peak	***	
2		4924.000	46.83	-7.17	54.00	41.04	32.98	5.41	32.60	PK	575000	10000
3	0	7386.000	49.09	-4.91	54.00	40.48	35.95	5.57	32.91	PK		
4		9848.000	52.76			40.58	38.69	6.80	33.31	Peak		222

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

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				0ver	Limit	Read	Antenna	Cable	Preamp		Ant	Table
		Freq	Level	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	-	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		can	deg
1		3282.000	48.11			45.14	30.35	5.41	32.79	Peak		
2		4924.000	44.42	-9.58	54.00	38.63	32.98	5.41	32.60	PK	-	100000
3	0	7386.000	47.37	-6.63	54.00	38.76	35.95	5.57	32.91	PK	2000	2000
4		9848.000	52.43			40.25	38.69	6.80	33.31	Peak		2000

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

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