



## 1 CO-LOCATION

### 1.1 Transmitter Radiated Unwanted Emissions

#### 1.1.1 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.

#### 1.1.2 Measuring Instruments

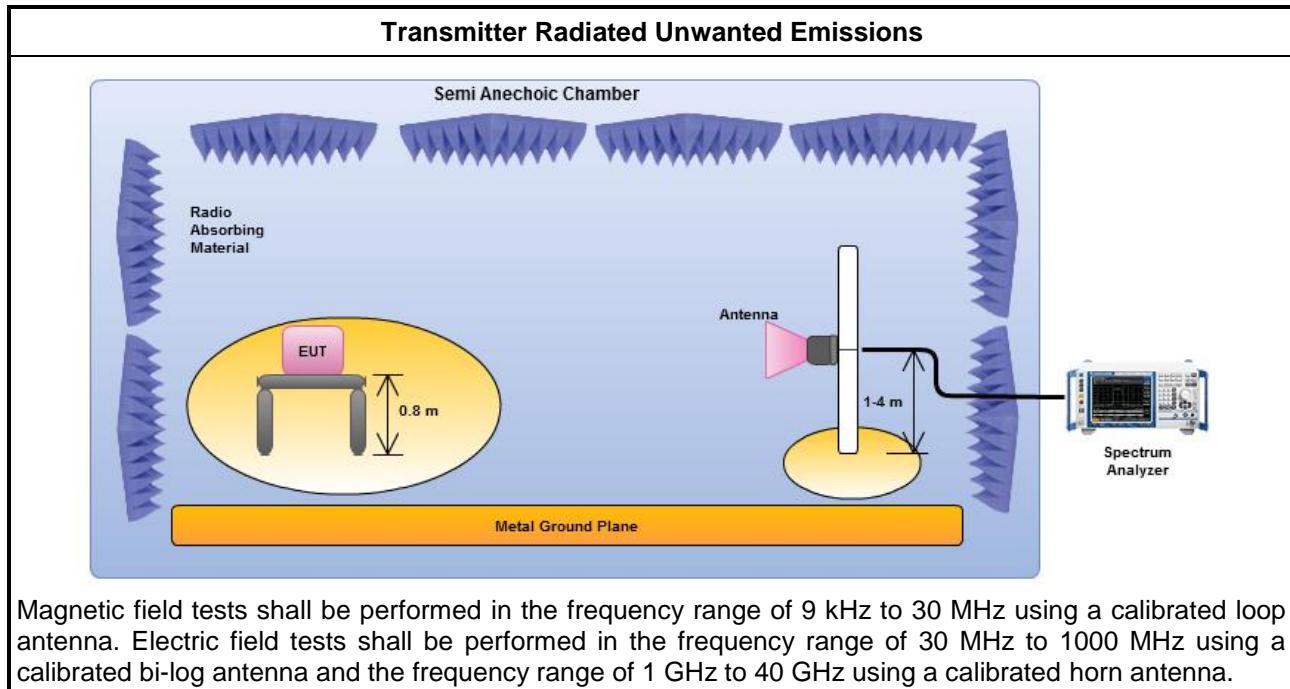
Refer a test equipment and calibration data table in this test report.



### 1.1.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/> Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).	
<input checked="" type="checkbox"/> 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.	
<input checked="" type="checkbox"/> 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.	
<input checked="" type="checkbox"/> The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].	
<input checked="" type="checkbox"/> For the transmitter unwanted emissions shall be measured using following options below:	
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 10.1 for unwanted emissions into non-restricted bands.	
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 10.2 for unwanted emissions into restricted bands.	
<input type="checkbox"/> Refer as FCC KDB 558074, clause 10.2.3.3 and 8.2.1 Option 1 (spectral trace averaging)	
<input type="checkbox"/> Refer as FCC KDB 558074, clause 10.2.3.3 and 8.2.1 Option 2 (slow sweep speed).	
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). $VBW \geq 1/T$ , where T is pulse time.	
<input type="checkbox"/> Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.	
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 10.2.3.2 and 8.1.1 measurement procedure peak limit.	
<input type="checkbox"/> Refer as FCC KDB 558074, clause 10.2.3.1 measurement procedure Quasi-Peak limit.	
<input checked="" type="checkbox"/> For radiated measurement, refer as FCC KDB 558074, clause 10.2.1.	
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz.	
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.	
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.6 for radiated emissions from above 1 GHz.	
<input checked="" type="checkbox"/> For conducted and cabinet radiation measurement, refer as FCC KDB 558074, clause 10.2.2.	
<input checked="" type="checkbox"/> For conducted unwanted emissions into non-restricted bands (relative emission limits). Devices with multiple transmit chains: Refer as FCC KDB 662911, when testing out-of-band and spurious emissions against relative emission limits, tests may be performed on each output individually without summing or adding 10 log(N) if the measurements are made relative to the in-band emissions on the individual outputs.	
<input checked="" type="checkbox"/> For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB	

#### 1.1.4 Test Setup

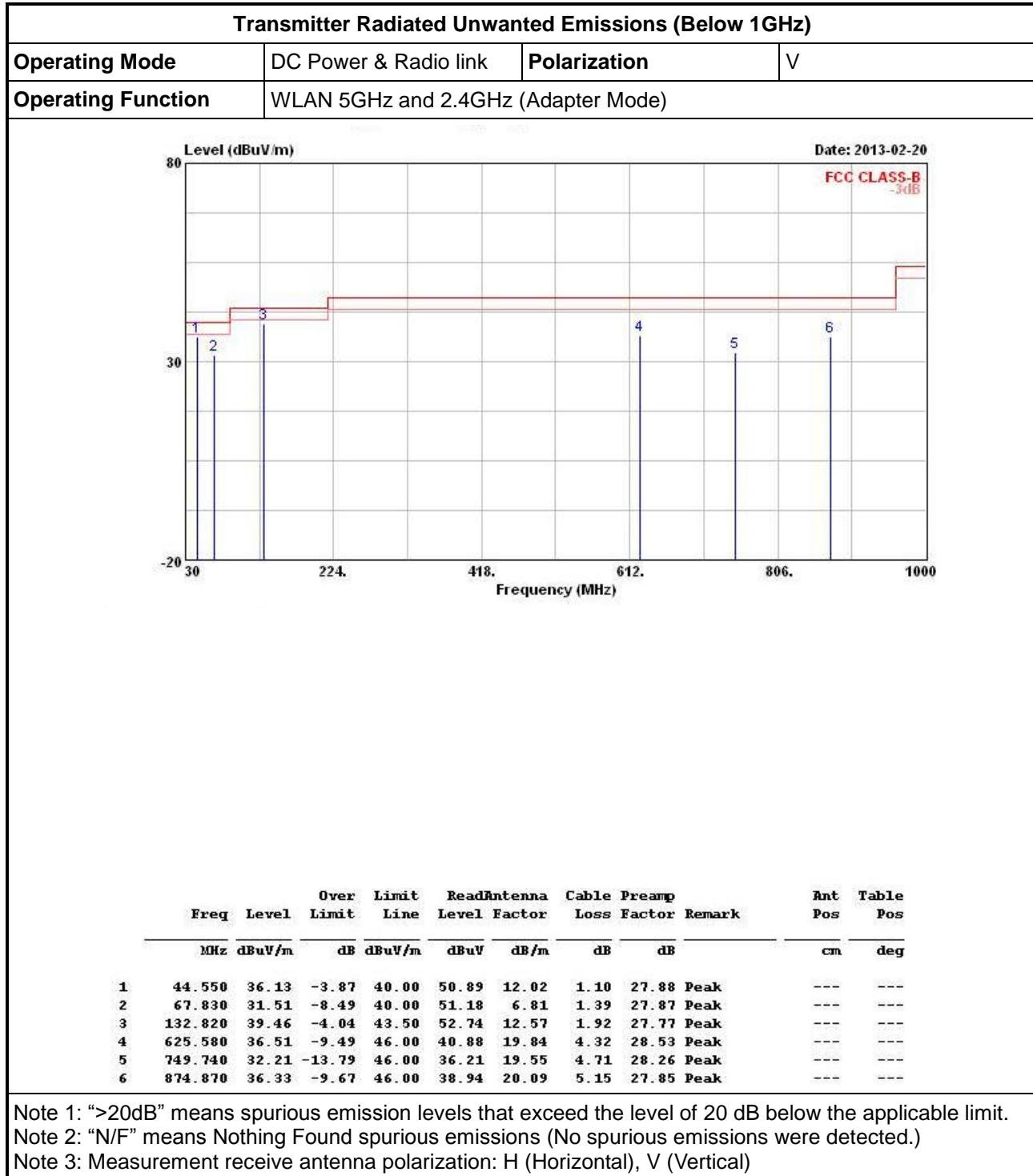


#### 1.1.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.



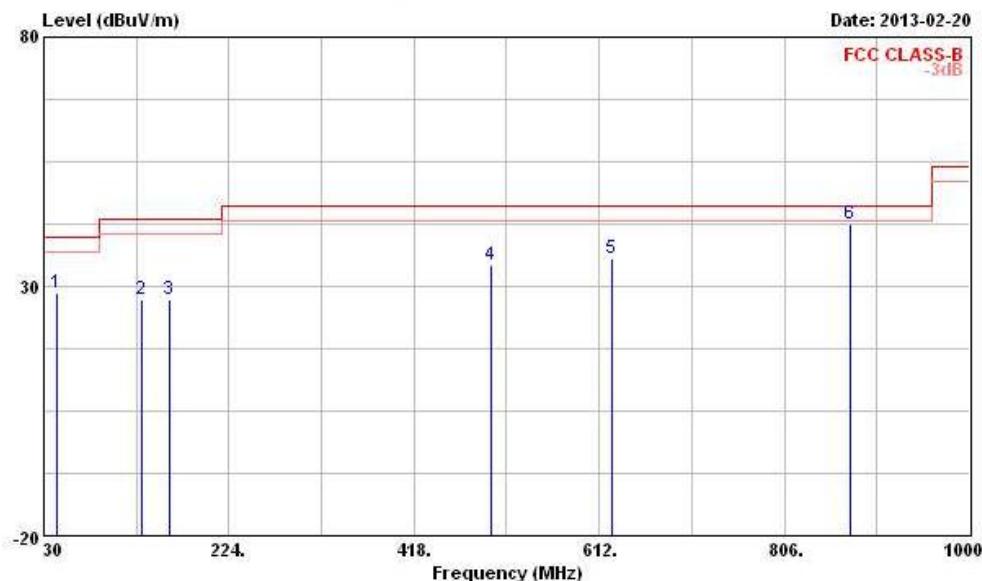
## 1.1.6 Results of Radiated Emissions (30MHz~1GHz)





## Transmitter Radiated Unwanted Emissions (Below 1GHz)

Operating Mode	DC Power & Radio link	Polarization	H
Operating Function	WLAN 5GHz and 2.4GHz (Adapter Mode)		



Freq	Level	Over Limit	Limit Line	ReadAntenna		Cable Preamp		Remark	Ant Pos	Table Pos	
				MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB
1	43.580	28.53	-11.47	40.00	43.06	12.27	1.09	27.89	Peak	---	---
2	132.820	27.21	-16.29	43.50	40.49	12.57	1.92	27.77	Peak	---	---
3	160.950	27.33	-16.17	43.50	42.39	10.51	2.09	27.66	Peak	---	---
4	498.510	34.25	-11.75	46.00	41.64	17.26	3.82	28.47	Peak	---	---
5	625.580	35.68	-10.32	46.00	40.05	19.84	4.32	28.53	Peak	---	---
6	874.870	42.44	-3.56	46.00	45.05	20.09	5.15	27.85	Peak	---	---

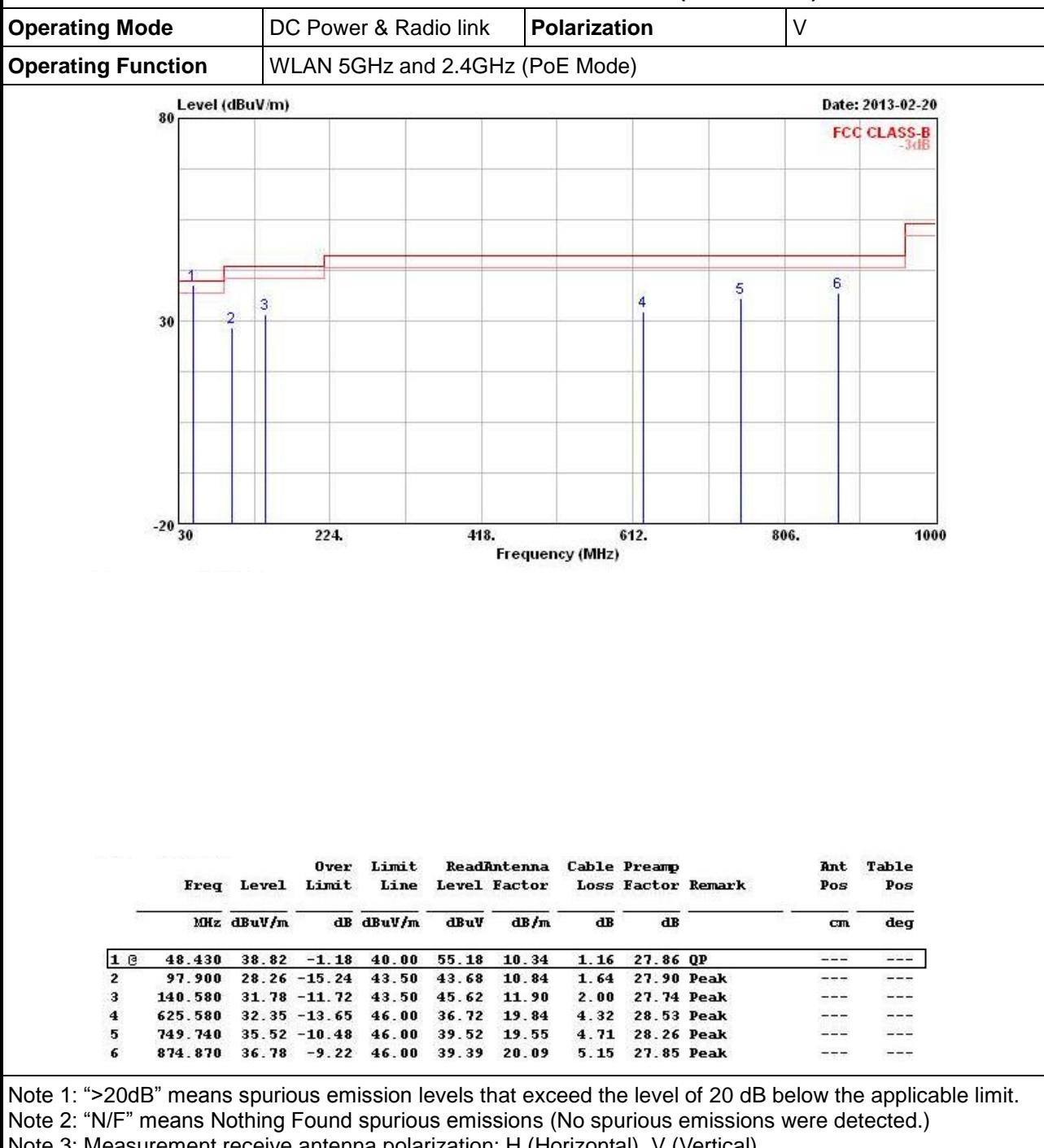
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

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

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



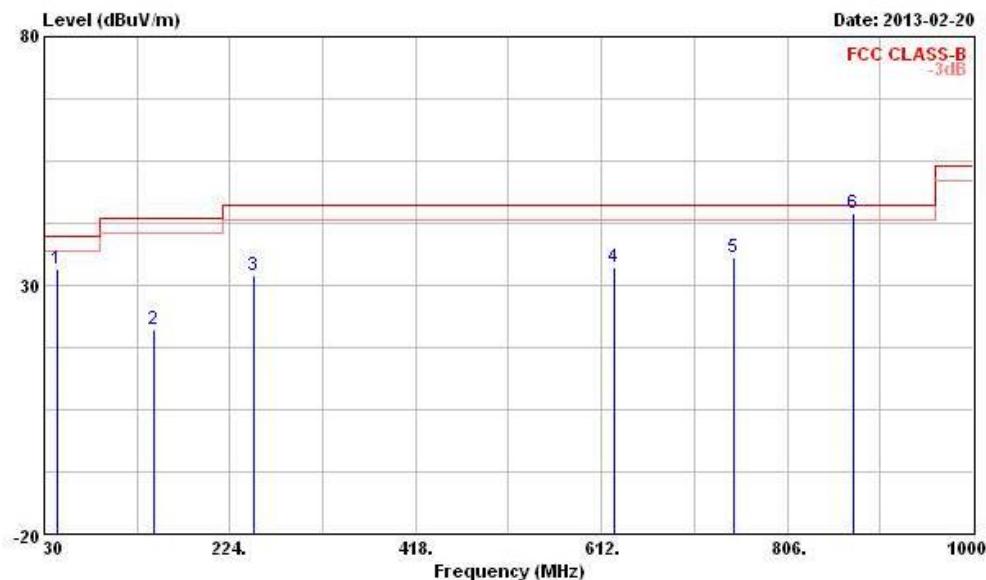
## Transmitter Radiated Unwanted Emissions (Below 1GHz)





## Transmitter Radiated Unwanted Emissions (Below 1GHz)

Operating Mode	DC Power & Radio link	Polarization	H
Operating Function	WLAN 5GHz and 2.4GHz (PoE Mode)		



Freq	Over Limit			Read	Antenna	Cable	Preamp	Ant	Table	
	Level	Limit	Line							
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 43.580	33.31	-6.69	40.00	47.84	12.27	1.09	27.89	Peak	---	---
2 145.430	21.04	-22.46	43.50	35.48	11.27	2.01	27.72	Peak	---	---
3 249.220	31.92	-14.08	46.00	43.54	12.97	2.77	27.36	Peak	---	---
4 625.580	33.58	-12.42	46.00	37.95	19.84	4.32	28.53	Peak	---	---
5 749.740	35.69	-10.31	46.00	39.69	19.55	4.71	28.26	Peak	---	---
6 @ 874.870	44.64	-1.36	46.00	47.25	20.09	5.15	27.85	QP	---	---

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

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

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

1.1.7 Results for Radiated Emissions (1GHz~10<sup>th</sup> Harmonic)

Transmitter Radiated Unwanted Emissions (Below 1GHz)																																																																																																																													
Operating Mode		DC Power & Radio link		Polarization		V																																																																																																																							
Operating Function		WLAN 5GHz and 2.4GHz																																																																																																																											
Level (dBuV/m)											Date: 2013-02-20																																																																																																																		
											FCC-B-1M																																																																																																																		
											FCC-B-1M-AV																																																																																																																		
<table border="1"> <thead> <tr> <th rowspan="2">Freq</th> <th rowspan="2">Level</th> <th>Over</th> <th>Limit</th> <th>Read</th> <th>Antenna</th> <th>Cable</th> <th>Preamp</th> <th rowspan="2">Remark</th> <th rowspan="2">Ant</th> <th rowspan="2">Table</th> <th rowspan="2">Pos</th> </tr> <tr> <th>Limit</th> <th>Line</th> <th>Level</th> <th>Factor</th> <th>Loss</th> <th>Factor</th> </tr> <tr> <th>MHz</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV/m</th> <th>dBuV</th> <th>dB/m</th> <th>dB</th> <th>dB</th> <th></th> <th>cm</th> <th>deg</th> <th></th> </tr> </thead> <tbody> <tr> <td>1 4824.000</td> <td>64.58</td> <td>-9.42</td> <td>74.00</td> <td>60.76</td> <td>34.37</td> <td>4.32</td> <td>34.87</td> <td>Peak</td> <td>---</td> <td>---</td> <td></td> </tr> <tr> <td>2 4824.000</td> <td>49.85</td> <td>-4.15</td> <td>54.00</td> <td>46.03</td> <td>34.37</td> <td>4.32</td> <td>34.87</td> <td>Average</td> <td>---</td> <td>---</td> <td></td> </tr> <tr> <td>3 7236.000</td> <td>47.93</td> <td></td> <td></td> <td>42.07</td> <td>35.30</td> <td>5.71</td> <td>35.15</td> <td>Peak</td> <td>---</td> <td>---</td> <td></td> </tr> <tr> <td>4 9648.000</td> <td>51.99</td> <td></td> <td></td> <td>44.26</td> <td>36.89</td> <td>6.41</td> <td>35.57</td> <td>Peak</td> <td>---</td> <td>---</td> <td></td> </tr> <tr> <td>5 10480.000</td> <td>73.98</td> <td></td> <td></td> <td>65.11</td> <td>37.59</td> <td>6.50</td> <td>35.22</td> <td>Peak</td> <td>---</td> <td>---</td> <td></td> </tr> <tr> <td>6 15720.000</td> <td>74.83</td> <td>-8.71</td> <td>83.54</td> <td>61.38</td> <td>40.62</td> <td>8.11</td> <td>35.28</td> <td>Peak</td> <td>---</td> <td>---</td> <td></td> </tr> <tr> <td>7 15720.000</td> <td>62.34</td> <td>-1.20</td> <td>63.54</td> <td>48.89</td> <td>40.62</td> <td>8.11</td> <td>35.28</td> <td>Average</td> <td>---</td> <td>---</td> <td></td> </tr> </tbody> </table>												Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table	Pos	Limit	Line	Level	Factor	Loss	Factor	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg		1 4824.000	64.58	-9.42	74.00	60.76	34.37	4.32	34.87	Peak	---	---		2 4824.000	49.85	-4.15	54.00	46.03	34.37	4.32	34.87	Average	---	---		3 7236.000	47.93			42.07	35.30	5.71	35.15	Peak	---	---		4 9648.000	51.99			44.26	36.89	6.41	35.57	Peak	---	---		5 10480.000	73.98			65.11	37.59	6.50	35.22	Peak	---	---		6 15720.000	74.83	-8.71	83.54	61.38	40.62	8.11	35.28	Peak	---	---		7 15720.000	62.34	-1.20	63.54	48.89	40.62	8.11	35.28	Average	---	---	
Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table	Pos																																																																																																																		
		Limit	Line	Level	Factor	Loss	Factor																																																																																																																						
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg																																																																																																																			
1 4824.000	64.58	-9.42	74.00	60.76	34.37	4.32	34.87	Peak	---	---																																																																																																																			
2 4824.000	49.85	-4.15	54.00	46.03	34.37	4.32	34.87	Average	---	---																																																																																																																			
3 7236.000	47.93			42.07	35.30	5.71	35.15	Peak	---	---																																																																																																																			
4 9648.000	51.99			44.26	36.89	6.41	35.57	Peak	---	---																																																																																																																			
5 10480.000	73.98			65.11	37.59	6.50	35.22	Peak	---	---																																																																																																																			
6 15720.000	74.83	-8.71	83.54	61.38	40.62	8.11	35.28	Peak	---	---																																																																																																																			
7 15720.000	62.34	-1.20	63.54	48.89	40.62	8.11	35.28	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.) 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 (items 3 ~5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.																																																																																																																													



## Transmitter Radiated Unwanted Emissions (Below 1GHz)

Operating Mode	DC Power & Radio link	Polarization	H								
Operating Function	WLAN 5GHz and 2.4GHz										
Level (dBuV/m)											
			Date: 2013-02-20								
1	4813.000	64.97	-9.03	74.00	61.16	34.36	4.32	34.87	Peak	---	---
2	4813.000	51.13	-2.87	54.00	47.32	34.36	4.32	34.87	Average	---	---
3	7236.000	48.55			42.69	35.30	5.71	35.15	Peak	---	---
4	9648.000	51.54			43.81	36.89	6.41	35.57	Peak	---	---
5	10480.000	69.22			60.35	37.59	6.50	35.22	Peak	---	---
6	15720.000	67.32	-16.22	83.54	53.87	40.62	8.11	35.28	Peak	---	---
7	15720.000	53.70	-9.84	63.54	40.25	40.62	8.11	35.28	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.)

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 (items 3 ~5) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.



## 2 TEST EQUIPMENT AND CALIBRATION DATA

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100593	9kHz ~ 40GHz	Sep. 14, 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. 23, 2012	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1GHz ~ 26.5GHz	Aug. 10, 2012	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz ~ 18GHz	Nov. 16, 2012	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 10, 2012	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, 2012	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0~ 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 ~ 4 m	N/A	Radiation (03CH02-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	R&S	HFH2-Z2	860004/0001	9 kHz - 30 MHz	Jul. 03, 2012	Radiation (03CH02-HY)

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