

7. OUTPUT POWER TEST

7.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	May.08, 13	1 Year
2.	Amp	HP	8449B	3008A08495	May.08, 13	1 Year
3.	Horn Antenna	EMCO	3115	9510-4580	May.28, 13	1 Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	May.08, 13	1 Year
1.	Power Meter	Anritsu	ML2487A	6K00002472	May.08, 13	1Year
2.	Power Sensor	Anritsu	MA2491A	033005	May.08, 13	1Year

7.2. Limit

For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, For the 5250-5350MHz and 5.47-5.725GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250Mw or $11 \text{ dBm} + 10 \log B$. where B is the 26-dB emission bandwidth in MHz, If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.3. Test Procedure

The transmitter output was connected to a spectrum analyzer by suitable attenuation, the channel power measure function of spectrum Analyzer was used to measure out the PK output power of device

7.4. Test Results

EUT:WIFI Module					
M/N:WAE22-DF01-AR					
Test date: 2013-09-14		Pressure: 101.1±1.0 kpa		Humidity: 52.4±3.0%	
Tested by: Kevin_Hu		Test site: RF site		Temperature:22.3±0.6 °C	
Cable loss: 1 dB			Attenuator loss: 20 dB		
Test Mode	Frequency (MHz)	Peak output Power (dBm)			Limit (dBm)
		Chain 0	Chain 1	Total	
11a	5180	13.63	14.26	N/A	17
	5200	13.81	14.35	N/A	17
	5240	14.05	14.81	N/A	17
11n HT20	5180	10.59	11.82	14.26	17
	5200	10.39	11.89	14.21	17
	5240	10.41	11.59	14.05	17
11n HT40	5190	11.33	11.82	14.59	17
	5230	10.96	11.41	14.20	17
Conclusion: PASS					

8. POWER SPECTRAL DENSITY TEST

8.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Oct.31, 12	1 Year
2.	Amp	HP	8449B	3008A08495	May.08, 13	1 Year
3.	Horn Antenna	EMCO	3115	9510-4580	May.28, 13	1 Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	May.08, 13	1 Year

8.2. Limit

For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. 5250-5350MHz, 5470-5725MHz shall not exceed 11dBm in any 1-MHz band.

8.3. Test Procedure

The transmitter output was connected to a spectrum analyzer. Power density was measured by spectrum analyzer with 1MHz RBW and 3MHz VBW

8.4. Test Results

EUT:WIFI Module		
M/N:WAE22-DF01-AR		
Test date: 2013-09-14	Pressure: 101.2±1.0 kpa	Humidity:52.6±3.0%
Tested by:Kevin_Hu	Test site: RF site	Temperature:22.7±0.6 °C

Cable loss: 1 dB		Attenuator loss: 20 dB			
Test Mode	Frequency (MHz)	Chain 0	Chain 1	Total	Limit
		(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)
11a	5180	2.532	2.287	N/A	4
	5200	2.265	1.481	N/A	4
	5240	1.961	1.360	N/A	4
11n HT20	5180	-0.731	-2.166	1.62	4
	5200	-1.029	-2.132	1.46	4
	5240	-1.525	-2.329	1.10	4
11n HT40	5190	-3.301	-3.964	-0.61	4
	5230	-3.311	-3.897	-0.58	4
Conclusion: PASS					

ANT 0
11a
5180MHz



5210MHz

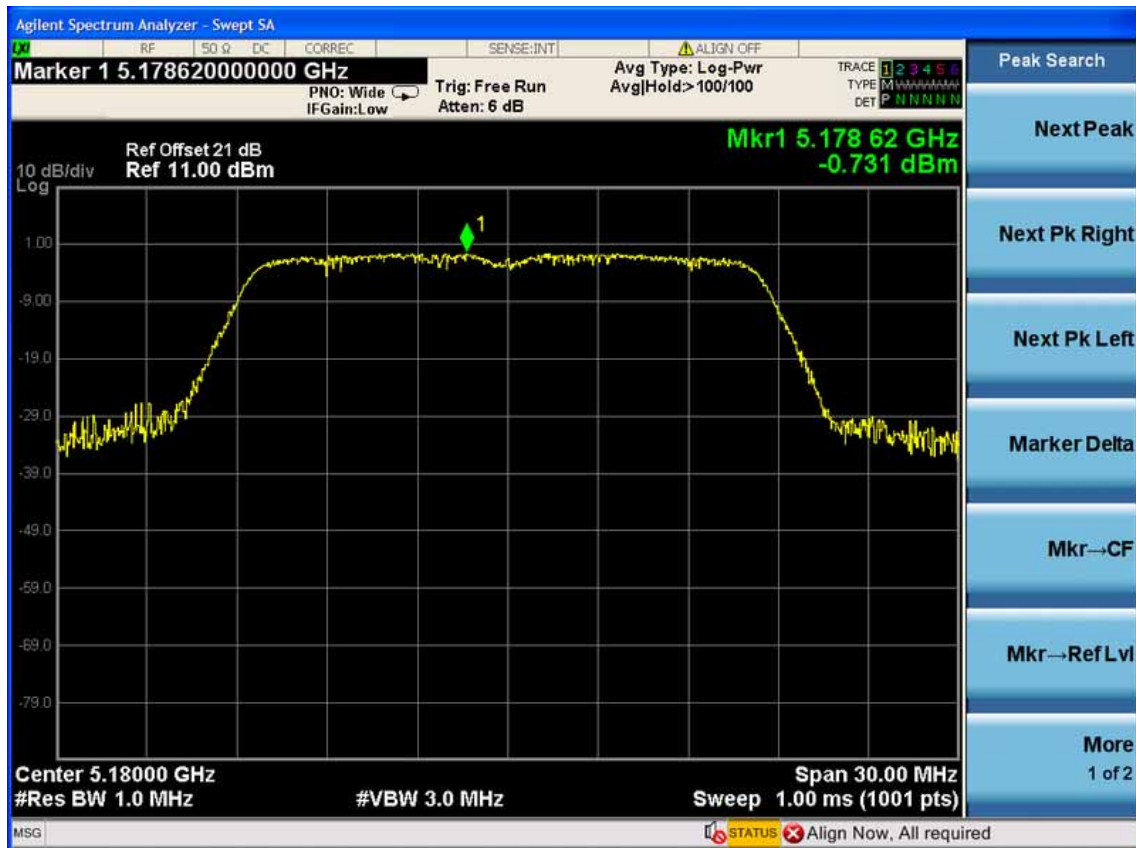


5240MHz



11nHT20

5180MHz



5210MHz



5240MHz



11nHT40
5190MHz



5230MHz



ANT 1
11a
5180MHz



5210MHz



5240MHz



11nHT20

5180MHz



5210MHz



5240MHz



11nHT40
5190MHz



5230MHz



9. PEAK EXCURSION MEASUREMENT

9.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	May.08, 13	1 Year
2.	Amp	HP	8449B	3008A08495	May.08, 13	1 Year
3.	Antenna	EMCO	3115	9510-4580	May.08, 13	1Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	May.08, 13	1 Year

9.2. Limit

The ratio of the peak excursion of modulation envelope (measured using a peak hold function) to the maximum conducted power (measured as specified above) shall not exceed 13 dB across any 1MHz bandwidth whichever is less.

9.3. Test Procedure

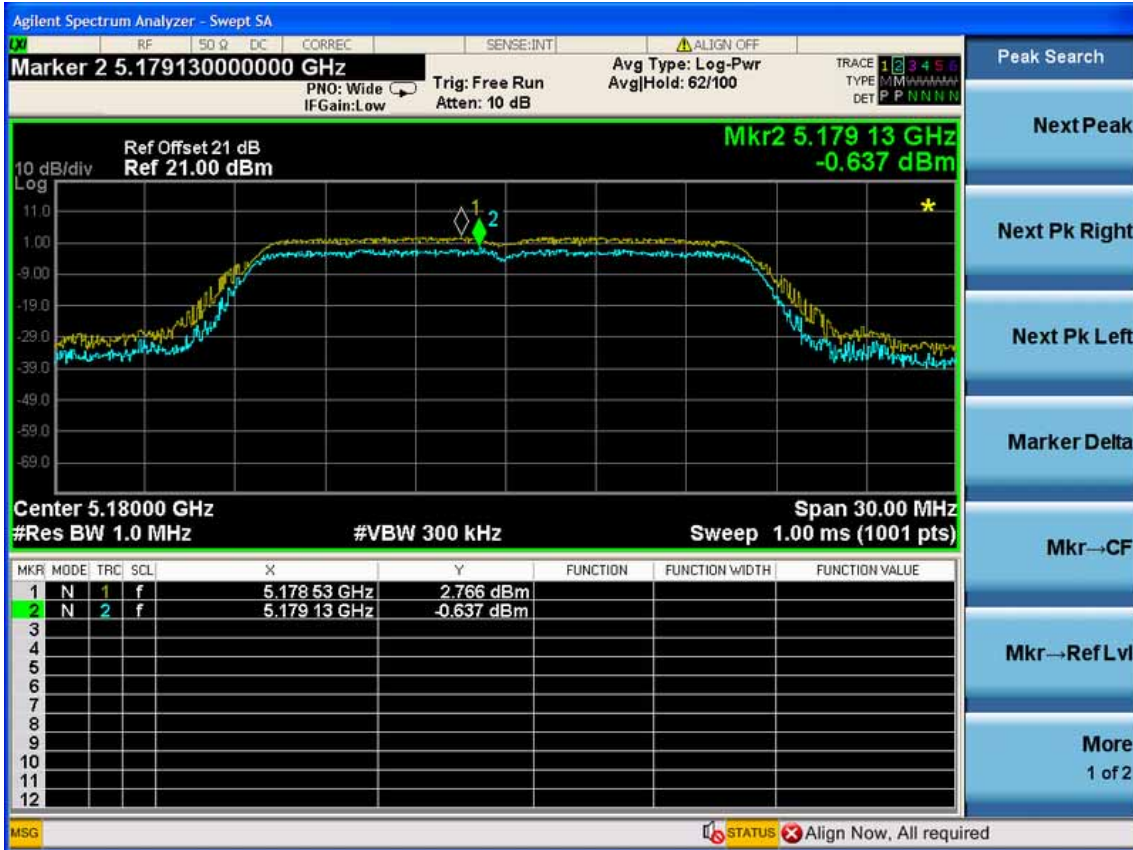
1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set the spectrum analyzer span to view the entire emissions bandwidth. The largest difference between the following two traces (Peak Trace and Average Trace) must be ≤ 13 dB for all frequencies across the emissions bandwidth. Submit a plot.
3. Peak Trace: Set RBW = 1 MHz, VBW ≥ 3 MHz with peak detector and max-hold settings.
4. Average Trace: Method #3—video averaging with max hold--and sum power across the band. Set span to encompass the entire emissions bandwidth (EBW) of the signal. Set sweep trigger to “free run”. Set RBW = 1 MHz. Set VBW $\geq 1/T$ (Draft n VBW = 300kHz $\geq 1/4 \mu s$). Use sample detector mode if bin width (i.e., span/number of points in spectrum) < 0.5 RBW. Otherwise use peak detector mode. Set max hold. Allow max hold to run for 60 seconds.

9.4. Test Results

EUT:WIFI Module		
M/N:WAE22-DF01-AR		
Test date: 2013-09-13	Pressure: 101.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Kevin_Hu	Test site: RF Site	Temperature : 22.7±0.6°C

Cable loss: 1 dB		Attenuator loss: 20 dB		
Test Mode	Frequency (MHz)	Power excursion (dB)		Limit (dB)
		ANT 0	ANT 1	
11a	5180	3.403	3.063	13
	5200	3.283	3.974	13
	5240	3.286	3.454	13
11nHT20	5180	3.146	2.984	13
	5200	3.111	3.109	13
	5240	3.162	1.965	13
11nHT40	5190	3.068	3.645	13
	5230	2.766	2.879	13
Conclusion : PASS				

ANT 0
11a
5180MHz



5210MHz



5240MHz



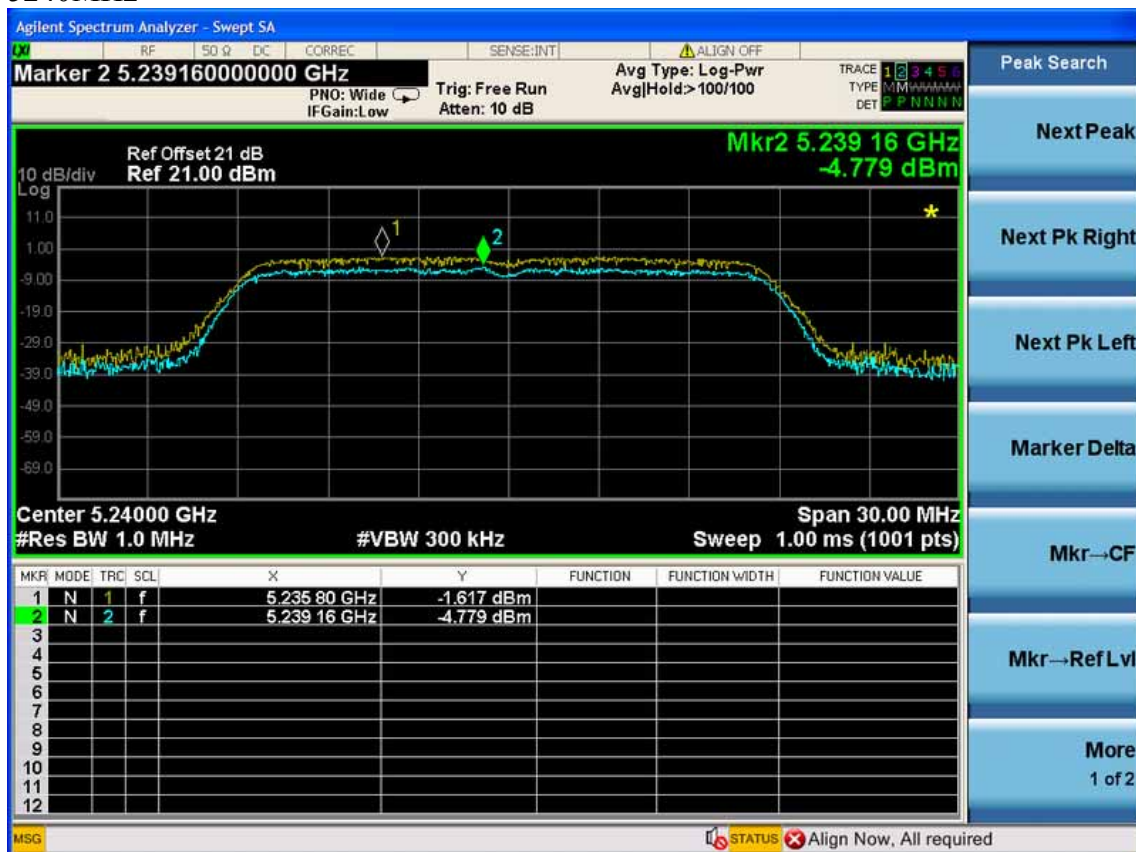
11nHT20
5180MHz



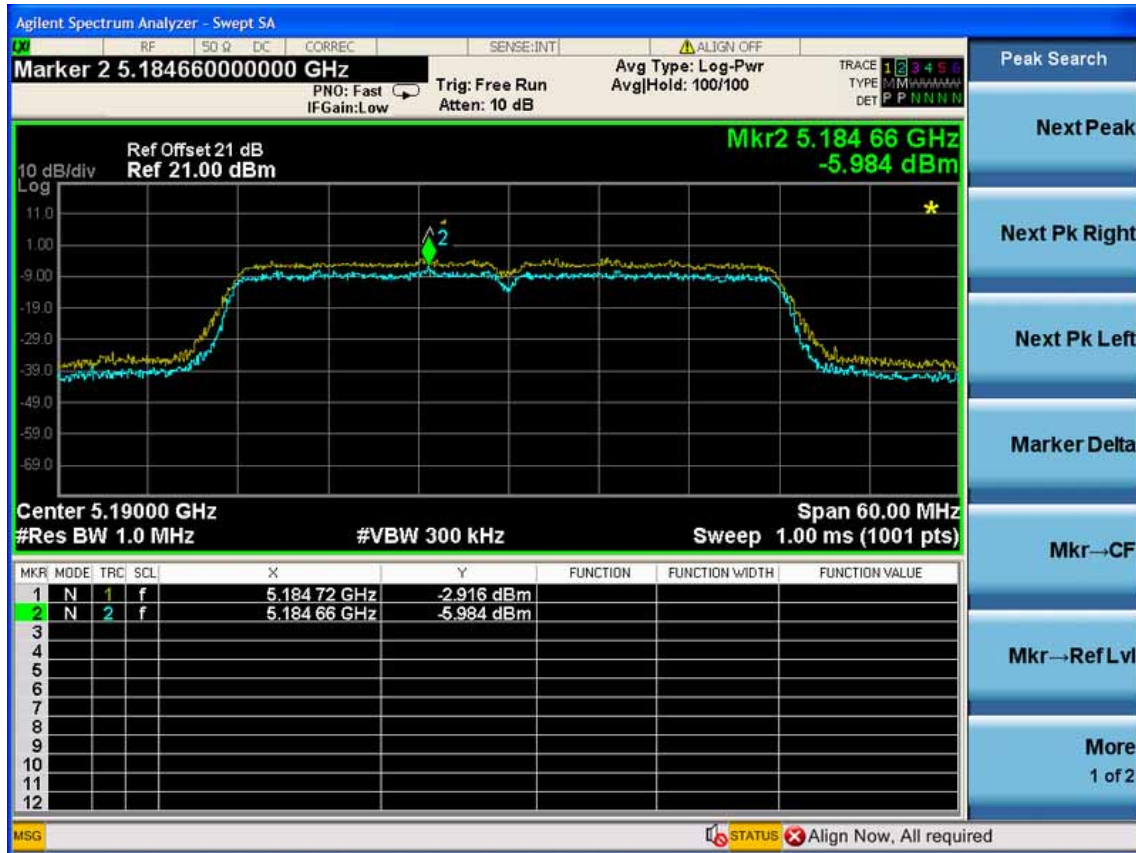
5210MHz



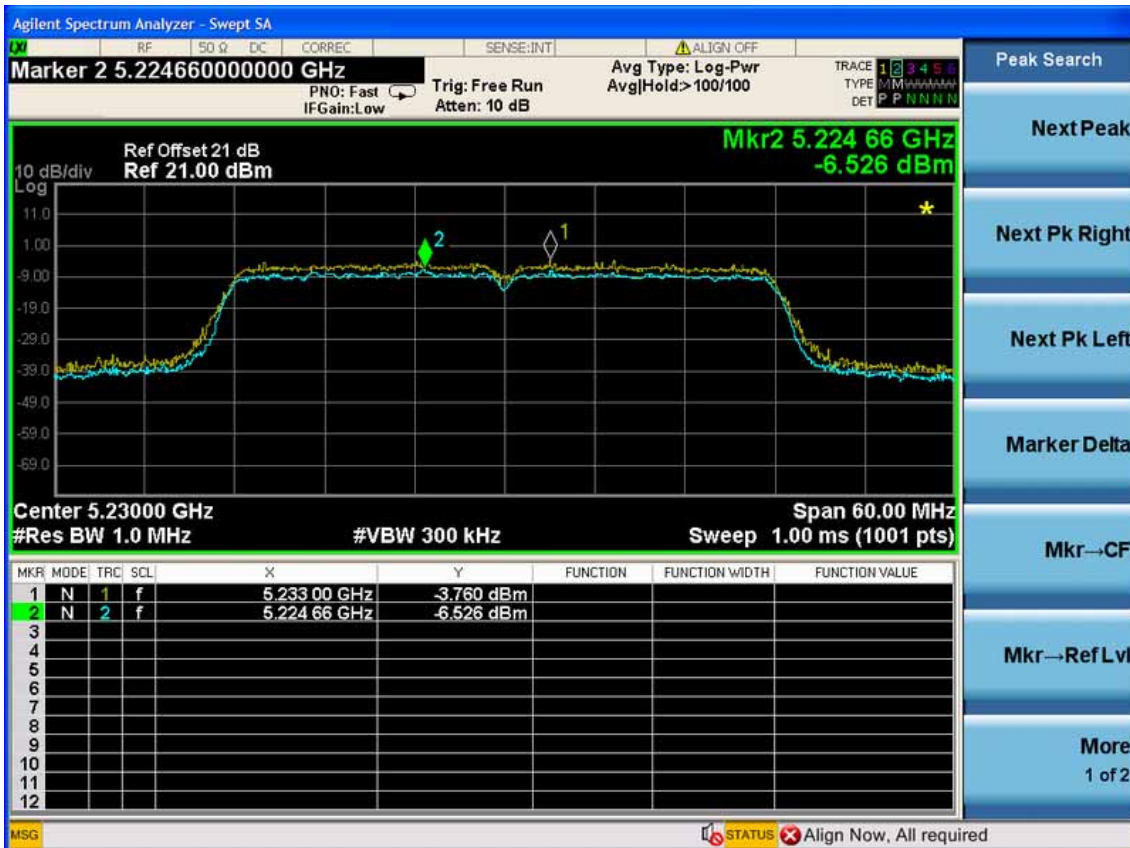
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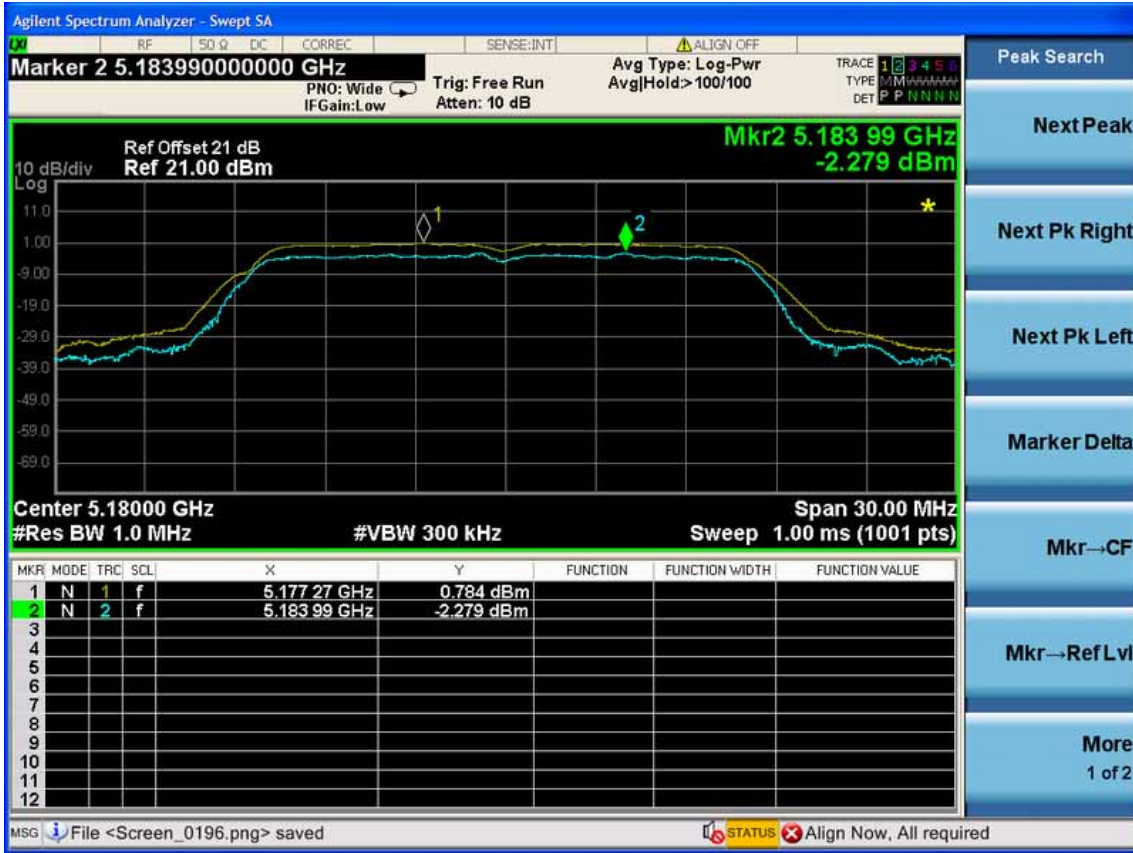
11nHT40
5190MHz



5230MHz



ANT 1
11a
5180MHz



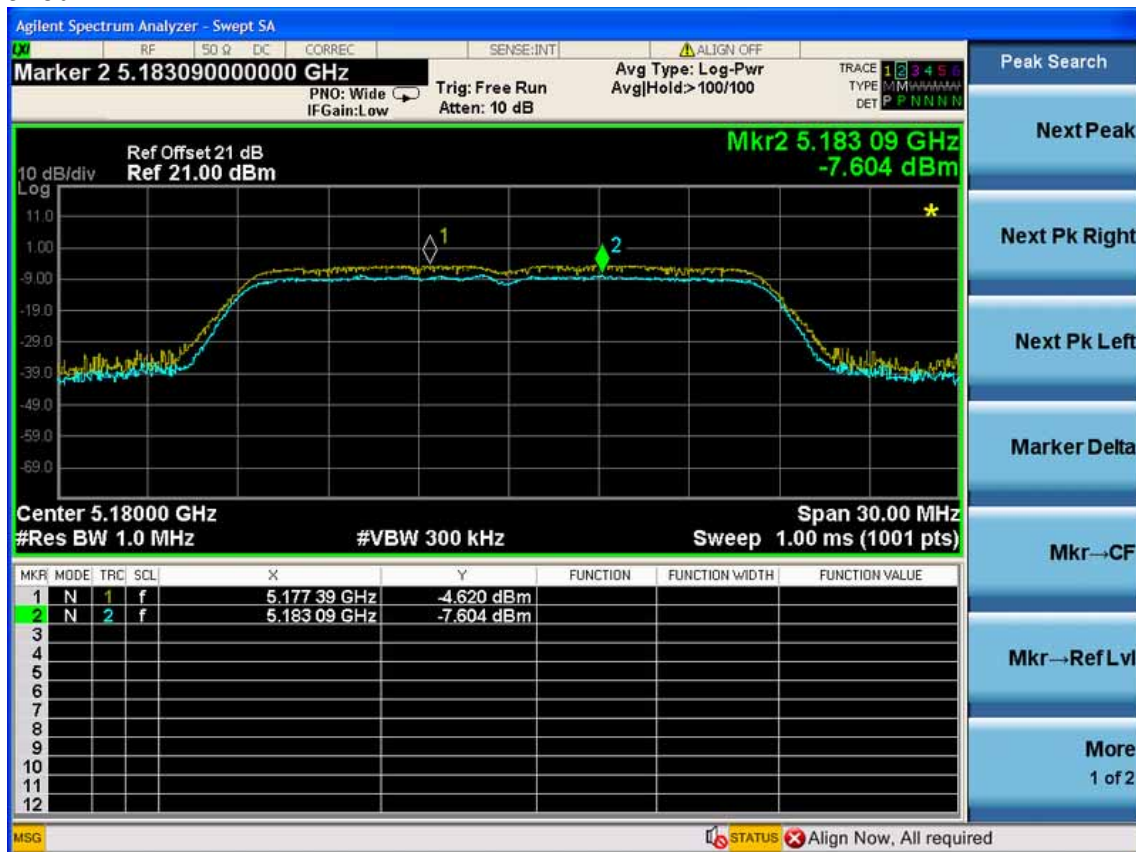
5210MHz



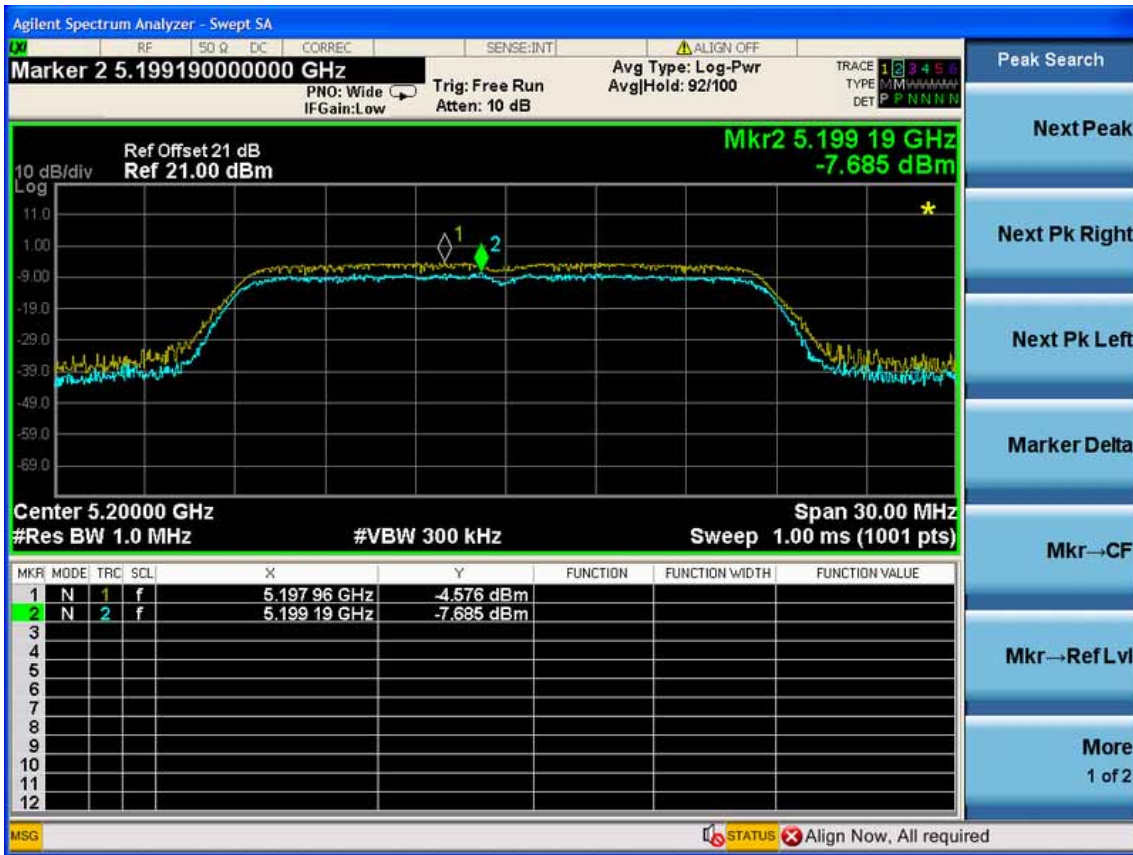
5240MHz



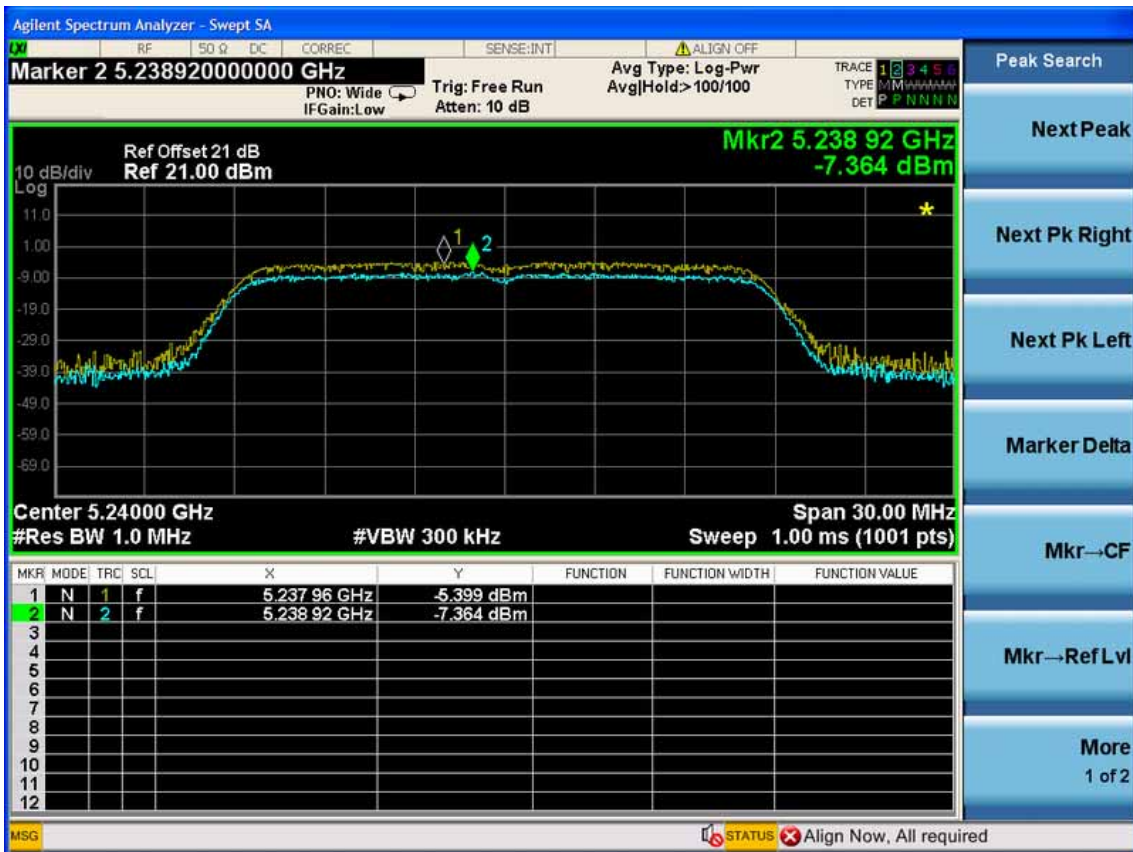
11nHT20
5180MHz



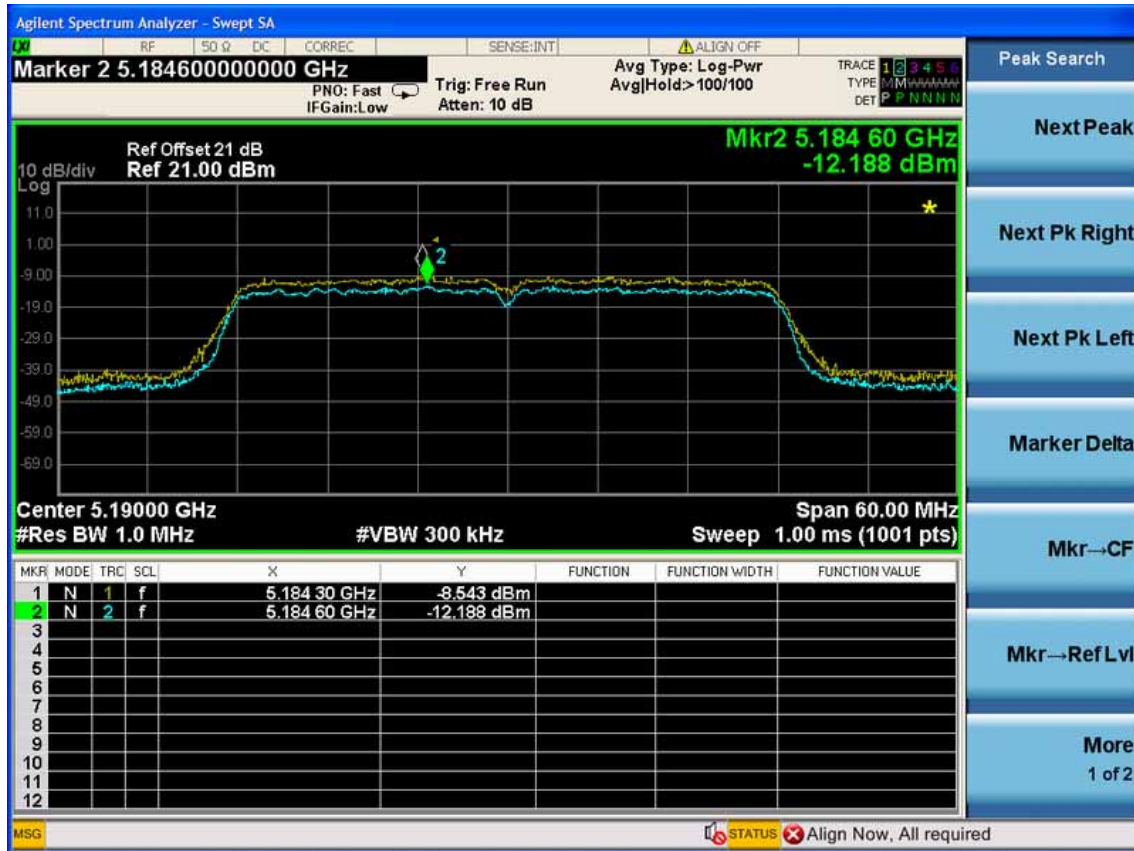
5210MHz



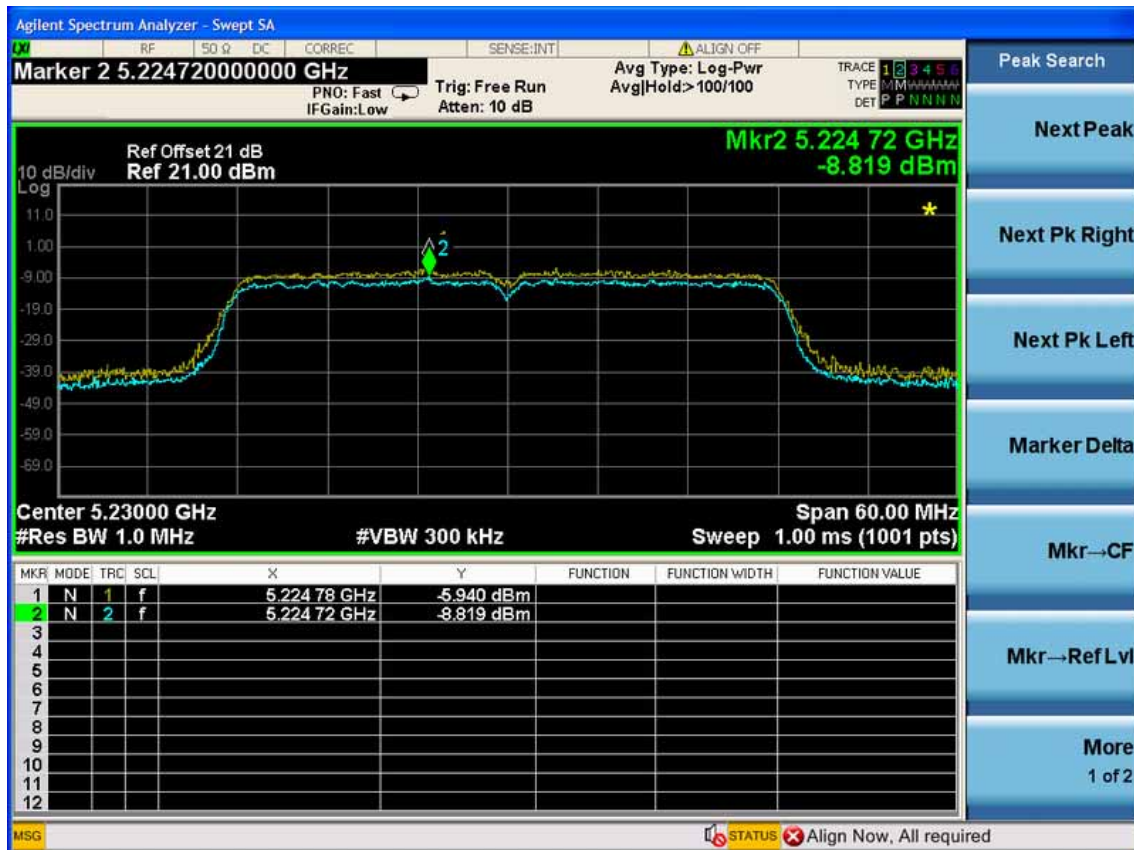
5240MHz



11nHT40
5190MHz



5230MHz



10. FREQUENCY STABILITY MEASUREMENT

10.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	May.08, 13	1 Year
2.	Amp	HP	8449B	3008A08495	May.08, 13	1 Year
3.	Antenna	EMCO	3115	9510-4580	May.08, 13	1Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	May.08, 13	1 Year

10.2. Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emissions is maintained within the band of operation under all conditions of normal operation as specified in the user's manual or ± 20 ppm

10.3. Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyser. EUT have transmitted absence of modulation signal and fixed channelize. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f) / f_c \times 10^6$ ppm and the limit is less than ± 20 ppm The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
2. Extreme temperature rule is $-30^\circ\text{C} \sim 50^\circ\text{C}$.

10.4. Test Result

EUT:WIFI Module						
M/N:WAE22-DF01-AR						
Power: DC 5V						
Test Date: 2013-09-14		Test site: RF Chamber		Tested by: Kevin_Hu		
Ambient Temperature: 21.2±1.0℃		Relative Humidity: 53.1±1.0%		Pressure:101.2±1.0 kpa		
Frequency stability VS Voltage (Temperature:20℃)						
Supply Voltage (V)	Test frequency (MHz)	Test result (MHz)	Max Deviation (MHz)	Max Deviation (ppm)	Limit (ppm)	Conclusion
102V	5180	5179.9155	0.0845	-16.31	+/-20	PASS
120V	5180	5179.9953				
138V	5180	5179.9987				
102V	5200	5199.9241	0.0759	-14.60	+/-20	
120V	5200	5199.9897				
138V	5200	5199.9940				
102V	5240	5239.9041	0.0959	-18.30	+/-20	
120V	5240	5239.9890				
138V	5240	5239.9946				
Frequency stability VS Temperature (supply voltage AC 120V/60Hz)						
Temperature (℃)	Test frequency (MHz)	Test result (MHz)	Max Deviation (MHz)	Max Deviation (ppm)	Limit (ppm)	Conclusion
-30℃	5180	5179.9104	0.0896	-17.30	+/-20	PASS
-20℃	5180	5179.9221				
-10℃	5180	5179.9312				
0℃	5180	5179.9384				
10℃	5180	5179.9551				
20℃	5180	5179.9953				
30℃	5180	5180.0145				
40℃	5180	5180.0207				
50℃	5180	5180.0315				

Frequency stability VS Temperature (supply voltage AC 120V/60Hz)						
Temperature (°C)	Test frequency (MHz)	Test result (MHz)	Max Deviation (MHz)	Max Deviation (ppm)	Limit (ppm)	Conclusion
-30°C	5200	5199.9120	0.088	-16.92	+/-20	PASS
-20°C	5200	5199.9308				
-10°C	5200	5199.9416				
0°C	5200	5199.9589				
10°C	5200	5199.9761				
20°C	5200	5199.9897				
30°C	5200	5200.0261				
40°C	5200	5200.0337				
50°C	5200	5200.0398				

Frequency stability VS Temperature (supply voltage AC 120V/60Hz)						
Temperature (°C)	Test frequency (MHz)	Test result (MHz)	Max Deviation (MHz)	Max Deviation (ppm)	Limit (ppm)	Conclusion
-30°C	5240	5239.9095	0.0905	-17.27	+/-20	PASS
-20°C	5240	5239.9210				
-10°C	5240	5239.9326				
0°C	5240	5239.9467				
10°C	5240	5239.9656				
20°C	5240	5239.9890				
30°C	5240	5240.0128				
40°C	5240	5240.0387				
50°C	5240	5240.0612				

11. NTENNA REQUIREMENT

11.1. STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. ANTENNA CONNECTED CONSTRUCTION

The antennas used for this product are PCB antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 3.7dBi.

12.DEVIATION TO TEST SPECIFICATIONS

[NONE]