

5825 MHz:



### 5.3 DSSS Maximum Output Power [Section 15.247 (b)(1)]

#### 5.3.1 Test Procedure

- The Transmitter output of EUT was connected to the spectrum analyzer.
  - Equipment mode: Spectrum analyzer
  - Detector function: Channel Power
  - SPAN:30MHz
  - Channel BW:30MHz
  - RBW: 1MHz
  - VBW: 3MHz
  - Center frequency: fundamental frequency tested.
  - Sweep time= auto
  - Average times = 100.

#### 5.3.2 Test Setup



#### 5.3.3 Test Data

##### Maximum Peak Output Power

Temp. (deg. C): 25

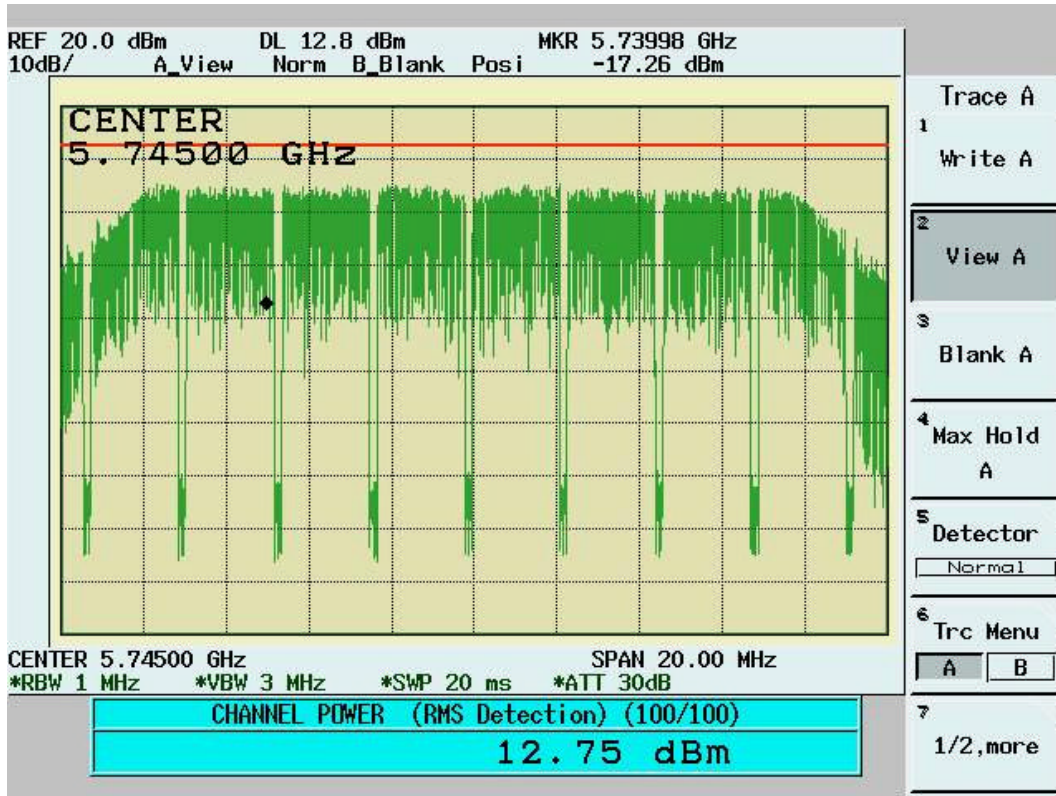
Test Engr: Jerry Chiou

Humidity (%): 50

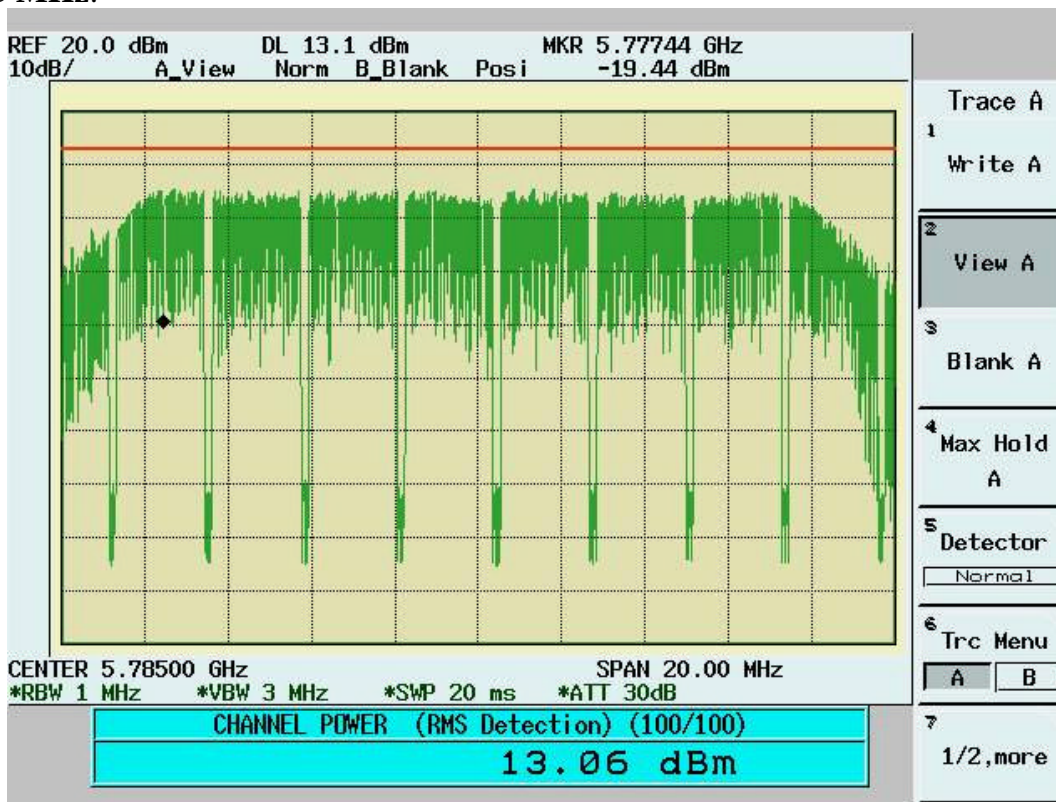
Frequency (Mhz)	Analyzer Reading (dBm)	Cable Loss (dB)	Output Power (mW)	Output Power (dBm)	Limit (dBm)	Pass/Fail
5745	12.75	1.3	25.41	14.05	30	Pass
5785	13.06	1.3	27.29	14.36	30	Pass
5825	13.15	1.3	27.86	14.45	30	Pass

Note: Two RF output( MAIN & AUX) have been test,the worse data shown above.

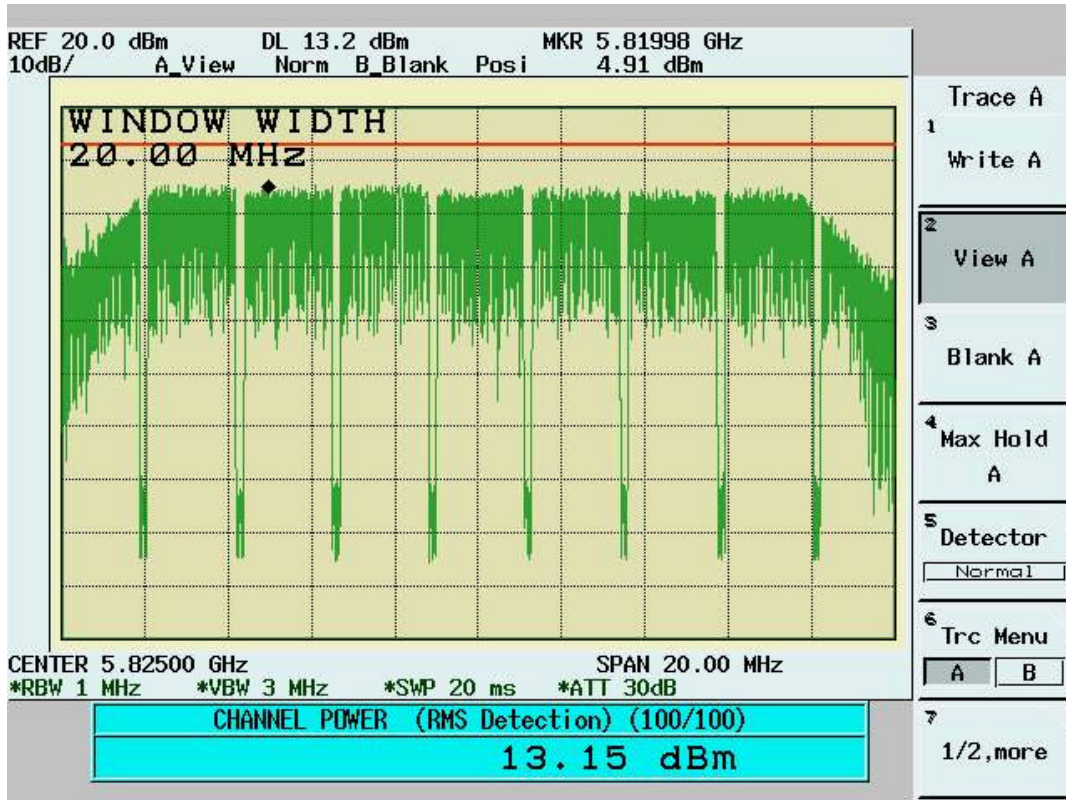
5745 MHz:



5785 MHz:



5825 MHz:



## 5.4 Radiated Emission Measurement [Section [15.247(c)(4)]

### 5.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

### 5.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to *EMI Receiver/Spectrum Analyzer Configuration*.

For the test of 2<sup>nd</sup> to 10<sup>th</sup> harmonics frequencies, the equipment setup was also refer to *EMI Receiver/Spectrum Analyzer Configuration*. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

### 5.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz

Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	3MHz

Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

**5.4.4 Test Data (30MHz – 1GHz):**

**30M – 1GHz Open Field Radiated Emissions (Horizontal)**

Operator: Jerry Chiou  
 Temperature(C): 25  
 Humidity(%): 63

Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	Corrct.Emi.	Limit	Margin	Ant.Pos.	TablePos
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
59.1	19.28	6.72	1.33	0.00	27.33	40.00	-12.67	96.00	245.00
68.8	22.93	6.16	1.51	0.00	30.60	40.00	-9.40	96.00	219.00
88.2	23.45	8.54	1.67	0.00	33.66	43.50	-9.84	96.00	219.00
95.96	18.16	9.91	1.79	0.00	29.87	43.50	-13.63	96.00	35.00
99.84	14.61	10.57	1.92	0.00	27.11	43.50	-16.39	96.00	35.00
102.75	14.55	11.10	1.93	0.00	27.57	43.50	-15.93	96.00	61.00
105.66	14.84	11.62	1.93	0.00	28.38	43.50	-15.12	96.00	35.00
111.48	18.73	12.43	1.90	0.00	33.06	43.50	-10.44	96.00	61.00
158.04	21.85	10.12	2.36	0.00	34.33	43.50	-9.17	96.00	219.00
177.44	16.34	9.35	2.49	0.00	28.17	43.50	-15.33	96.00	193.00
197.81	21.01	9.16	2.60	0.00	32.76	43.50	-10.74	96.00	245.00
202.66	22.27	9.17	2.63	0.00	34.07	43.50	-9.43	96.00	245.00

**30M – 1GHz Open Field Radiated Emissions (Vertical)**

Operator: Jerry Chiou  
 Temperature(C): 25  
 Humidity(%): 63

Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	Corrct.Emi.	Limit	Margin	Ant.Pos.	TablePos
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
70.74	22.55	6.16	1.55	0.00	30.25	40.00	-9.75	96.00	245.00
89.17	23.28	8.73	1.66	0.00	33.68	43.50	-9.82	96.00	219.00
95.96	18.13	9.91	1.79	0.00	29.84	43.50	-13.66	96.00	35.00
105.66	15.46	11.62	1.93	0.00	29.01	43.50	-14.49	96.00	35.00
108.57	14.66	12.14	1.94	0.00	28.74	43.50	-14.76	96.00	61.00
111.48	15.78	12.43	1.90	0.00	30.12	43.50	-13.38	96.00	61.00
155.13	17.70	10.15	2.31	0.00	30.16	43.50	-13.34	96.00	219.00
159.98	17.04	10.10	2.39	0.00	29.53	43.50	-13.97	96.00	219.00
162.89	17.05	9.93	2.39	0.00	29.37	43.50	-14.13	96.00	219.00
197.81	16.45	9.16	2.60	0.00	28.20	43.50	-15.30	96.00	245.00
202.66	16.30	9.17	2.63	0.00	28.10	43.50	-15.40	96.00	245.00
334.58	13.27	14.03	3.30	0.00	30.60	46.00	-15.40	96.00	140.00

NOTE:

➤ During the Pre-test, the EUT has been tested for Channel 1, 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.

➤ Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

**All frequencies from 30MHz to 1GHz have been tested**

**5.4.5 Test Data ( 1GHz – 40 GHz ) .**

**1GHz~ 40 GHz (Horizontal), 5745 MHz**

Operator:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4927.27	39.23pk	35.32	2.15	27.34	49.36pk	54.00av	-4.64	100	7

**1GHz~ 40 GHz (Vertical), 5745 MHz**

Operator:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
5272.53	38.64pk	35.82	2.67	27.40	49.72pk	54.00av	-4.28	100	78

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ \* ”: Fundamental Frequency
- “\*\*”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “ pk ”: peak mode
- “ av ”: average mode
- “--“: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 40 GHz have been tested.**

**1GHz~ 40 GHz (Horizontal) , 5785 MHz**

Operator:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
5157.44	41.02pk	35.73	2.55	27.33	51.96pk	54.00av	-2.04	100	45

**1GHz~ 40 GHz (Vertical), 5785 MHz**

Operator:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
5150.25	38.80pk	35.72	2.52	27.33	49.71pk	54.00av	-4.29	100	43

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ \* ”: Fundamental Frequency
- “\*\*”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “pk”: peak mode
- “av”: average mode
- “-“-”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 40 GHz have been tested.**



**1GHz~ 40 GHz (Horizontal), 5825 MHz**

Operator:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
5200.6	41.04pk	35.76	2.66	27.36	52.10pk	54.00av	-1.90	100	58

**1GHz~ 40 GHz (Vertical), 5825 MHz**

Operator:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
5207.79	41.87pk	35.77	2.66	27.36	52.92pk	54.00av	-1.08	100	60

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ \* ”: Fundamental Frequency
- “\*\*\*”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “ pk”: peak mode
- “ av”: average mode
- “- - -”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 40 GHz have been tested.**

## 5.5 Band Edge Measurement

### 5.5.1 Test Procedure (Conducted)

1. The transmitter output of EUT was connected to the spectrum analyzer.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN: 100MHz  
RBW: 100KHz  
VBW: 100KHz
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

### 5.5.2 Test Setup (Conducted)



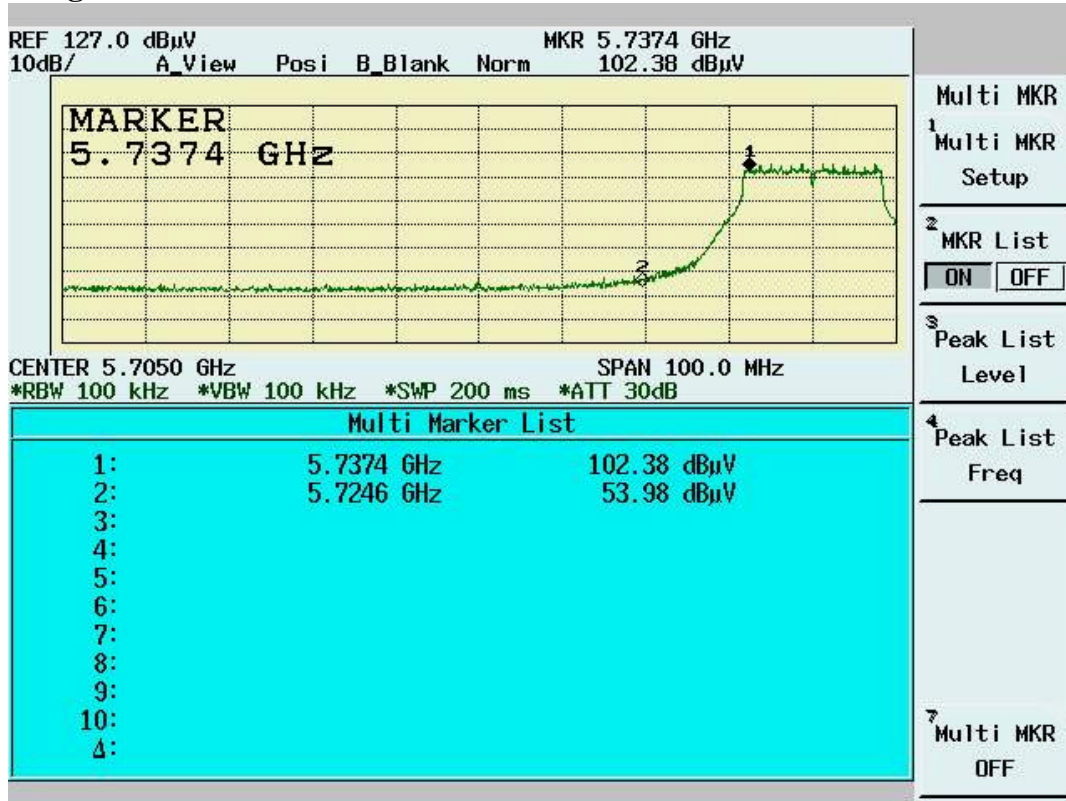
### 5.5.3 Test Data:

**Table: Band Edge measurement (Conducted)**

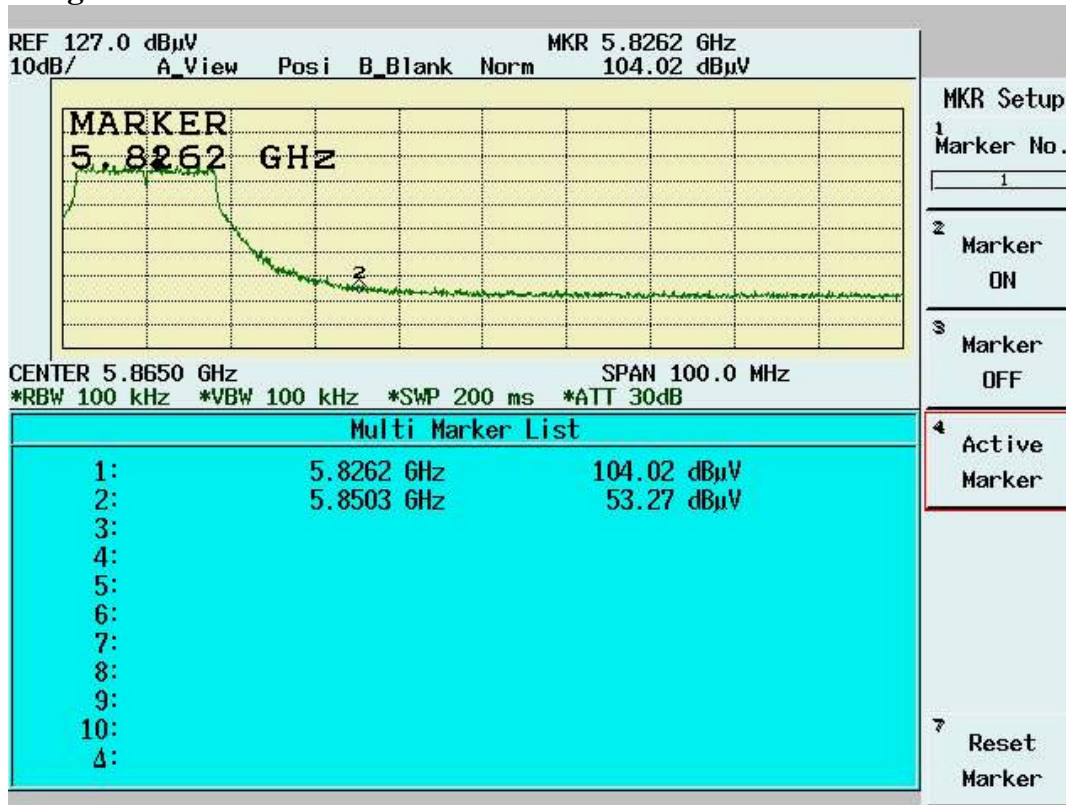
Test Engr: Jerry Chiou		Temp. (deg. C):	25	
		Humidity (%):	50	
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
5745 MHz	5737.4	102.38	---	---
Outside band	5724.6	53.98	48.4	Pass
5825 MHz	5826.2	104.02	---	---
Outside band	5850.3	53.27	50.75	Pass

Note: Two RF output( MAIN & AUX) have been test,the worse data shown above.

**Band Edge Conducted measurement**



**Band Edge Conducted Measurement**



#### 5.5.4 Test Procedure (Radiated)

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.  
Equipment mode: Spectrum analyzer  
Detector function: Average mode  
SPAN: 100MHz  
RBW: 1MHz  
VBW: 10MHz
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band
4. Get the spectrum reading after Maximum Hold function is completed.

#### 5.5.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

5.5.6 Test Data

Table Band Edge measurement (Radiated)

Temp. (deg. C): 25  
Humidity (%): 50

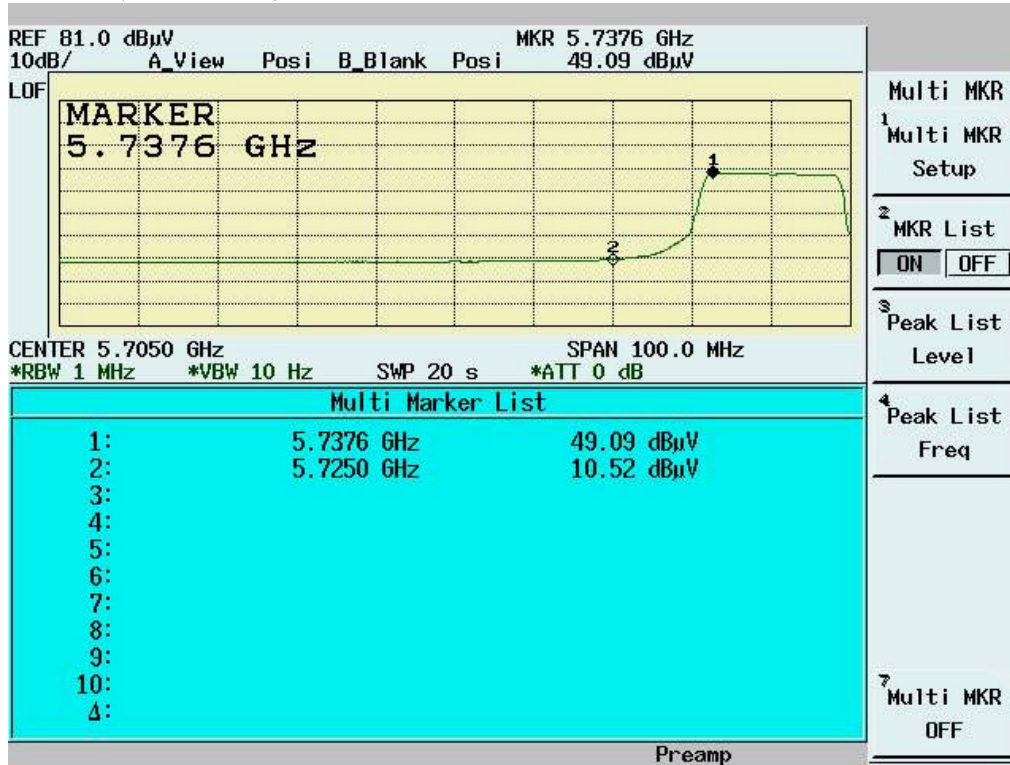
Test Engr: Jerry Chiou

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBc ( Limit: > 30dBc)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
5745 MHz (average mode)	5737.6	49.09	39.41	88.5	---	---	10Hz	---
Outside band (average mode)	5725	10.52	39.41	49.93	38.57	---	10Hz	Pass
5825 MHz (average mode)	5817.7	49.29	39.42	88.71	---	---	10Hz	---
Outside band (average mode)	5850	9.88	39.45	49.33	39.38	---	10Hz	Pass

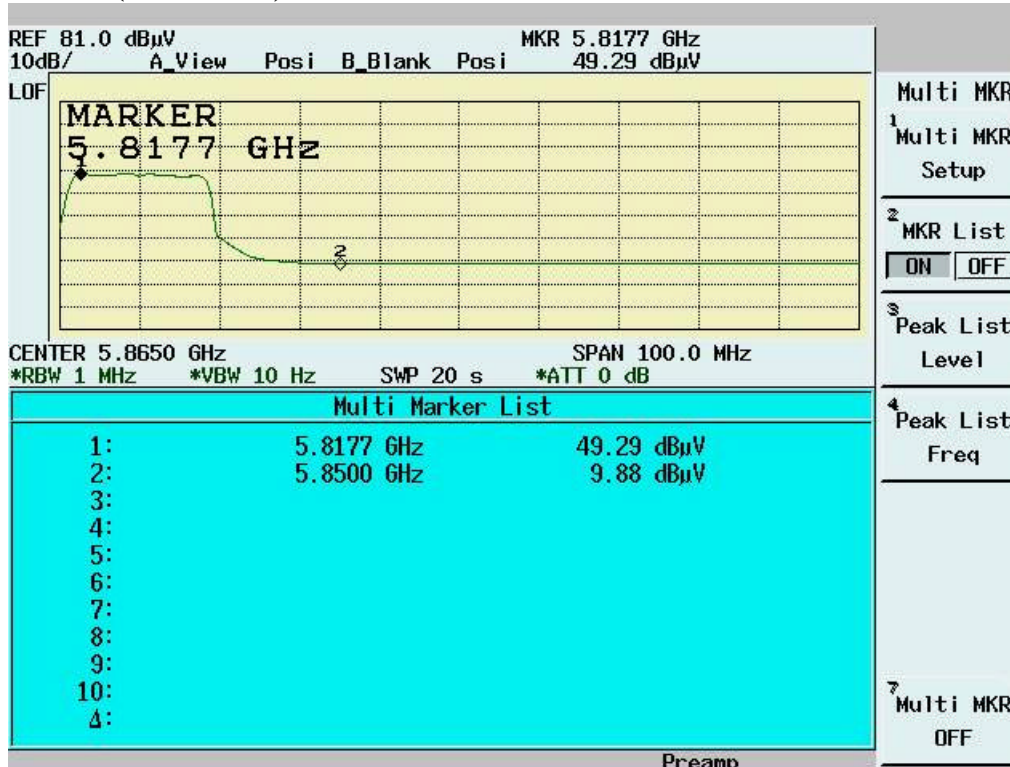
Note:

- The Spectrum plot of emission level measurement in Restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

**Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (5745 MHz)**



**Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (5825 MHz)**



## 5.6 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]

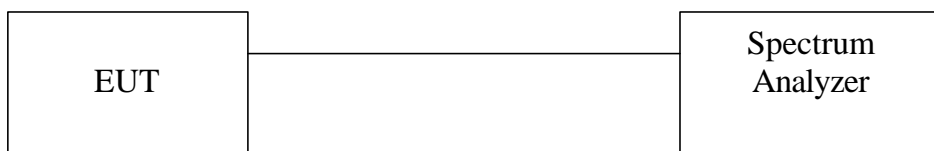
See SAR report

## 5.7 DSSS Peak Power Spectral Density [Section 15.247(d) ]

### 5.7.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.  
 Equipment mode: Spectrum analyzer  
 Detector function: Peak mode  
 SPAN:1.5MHz  
 RBW: 3KHz  
 VBW: 30KHz  
 Center frequency: fundamental frequency tested.  
 Sweep time= 500 sec.
2. Using Peak Search to read the peak power after Maximum Hold function is completed.

### 5.7.2 Test Setup



### 5.7.3 Test Data

#### Maximum Peak Output Power Density

Temp. (deg. C): 25

Test Engr: Jerry Chiou

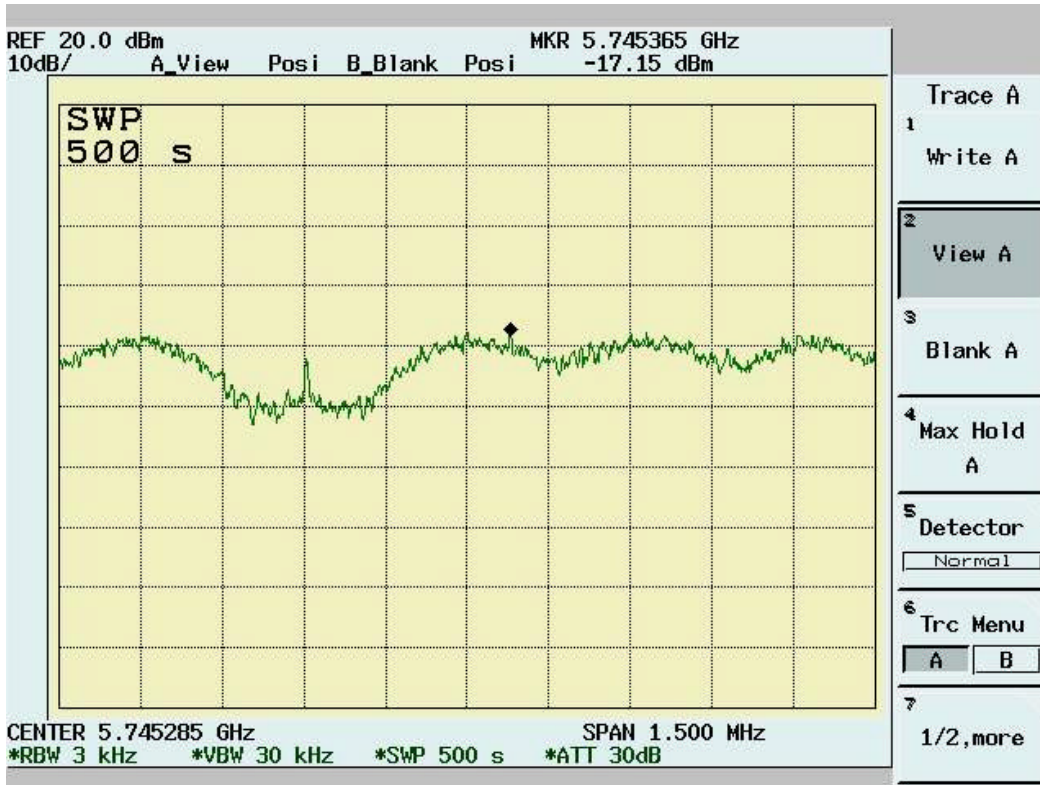
Humidity (%): 50

Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
5745	-17.15	1.3	-15.85	8	Pass
5785	-16.73	1.3	-15.43	8	Pass
5825	-16.61	1.3	-15.31	8	Pass

Note: Two RF output( MAIN & AUX) have been test,the worse data shown above.



Channel 1



Channel 6



Channel 11



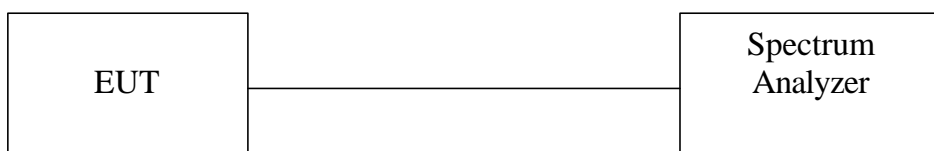
## 6. TEST RESULTS (802.11a 5150 – 5350MHz)

### 6.1. Maximum output Power [Section 15.407 (a)(1)(2)(3)]

#### 6.1.1. Test Procedure

- The Transmitter output of EUT was connected to the spectrum analyzer.
  - Equipment mode: Spectrum analyzer
  - Detector function: Channel Power
  - SPAN:30MHz
  - Channel BW:30MHz
  - RBW: 1MHz
  - VBW: 3MHz
  - Center frequency: fundamental frequency tested.
  - Sweep time= auto
  - Average times = 100.

#### 6.1.2. Test Setup



Frequency Band	Limit
5.15 – 5.25 GHz	The lesser of 50mW (17dBm) or 4dBm+10logB
5.25 – 5.35GHz	The lesser of 250mW (24dBm) or 11dBm+10logB

Note: B is the 26dB emission bandwidth in MHz

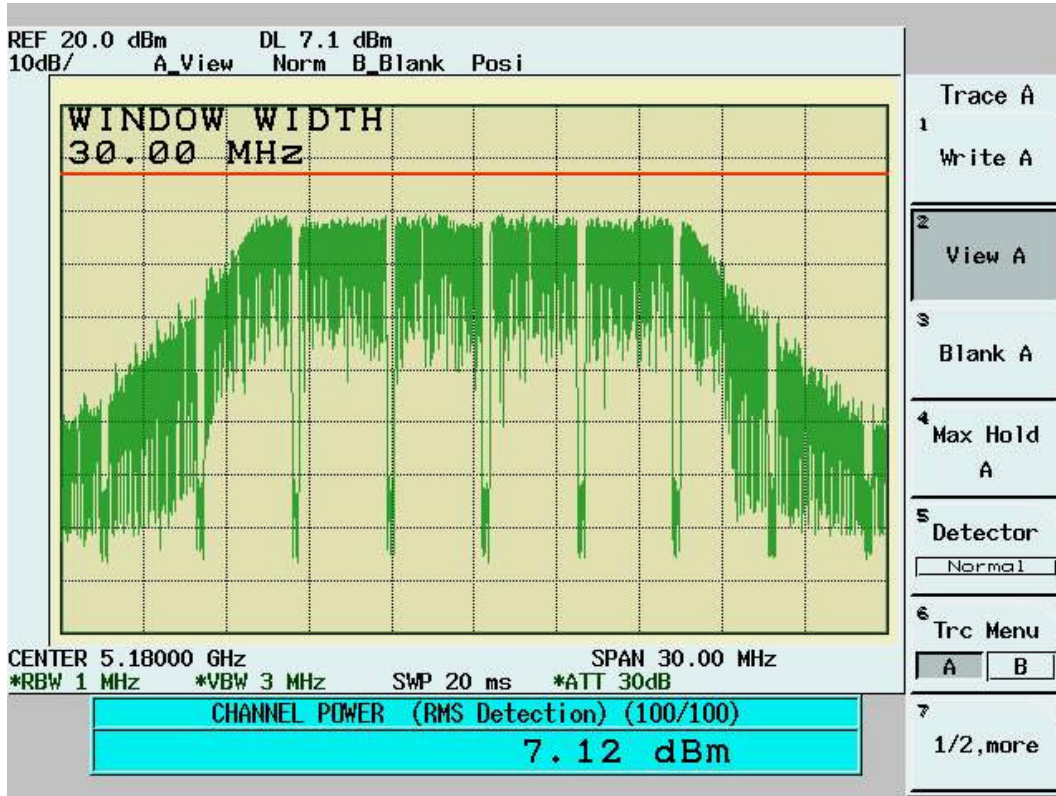
#### 6.1.3. Test Data: (Normal Mode)

##### Maximum Peak Output Power

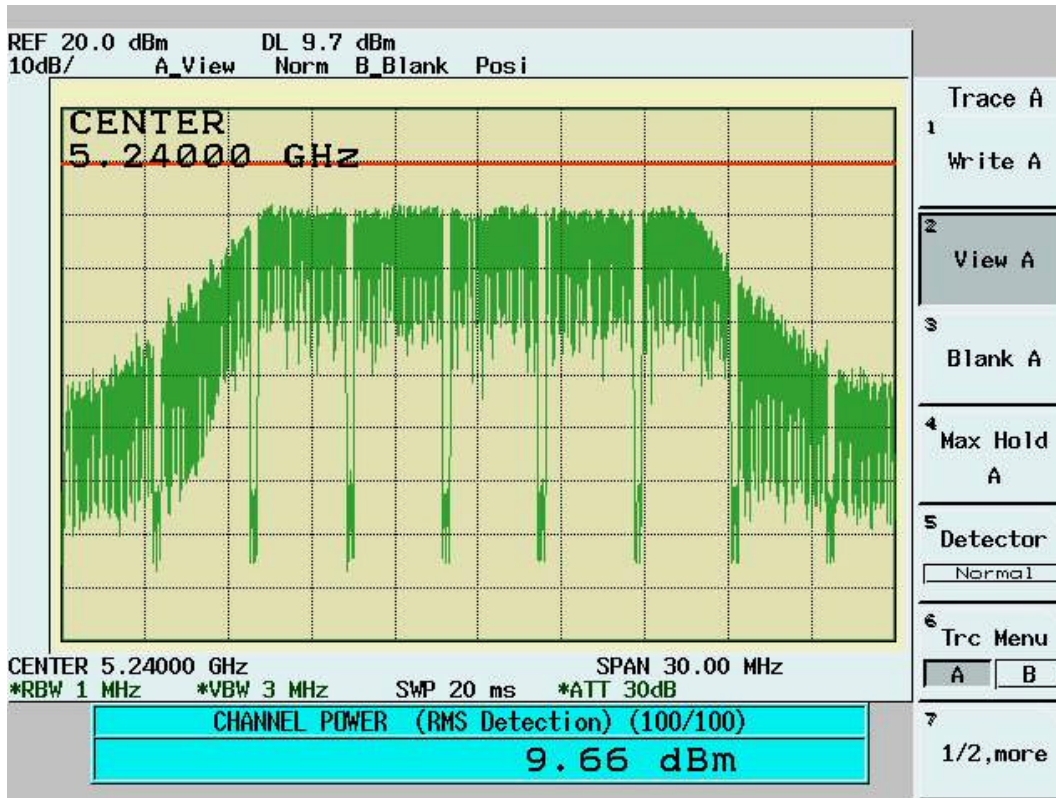
Test Engineer: Jerry Chiou      Temperature (deg. C): 25  
 Humidity (%): 50

Chennel	Frequency (Mhz)	Output Power (dBm)	26 dBc BW/Limit Mhz/dBm	The lesser Limit (dBm)	Pass/Fail
1	5180	8.32	23.45/ 17.70	17.00	Pass
4	5240	10.86	23.59/ 17.73	17.00	Pass
5	5260	10.41	23.59/ 24.73	24.00	Pass
8	5320	9.58	23.59/ 24.73	24.00	Pass

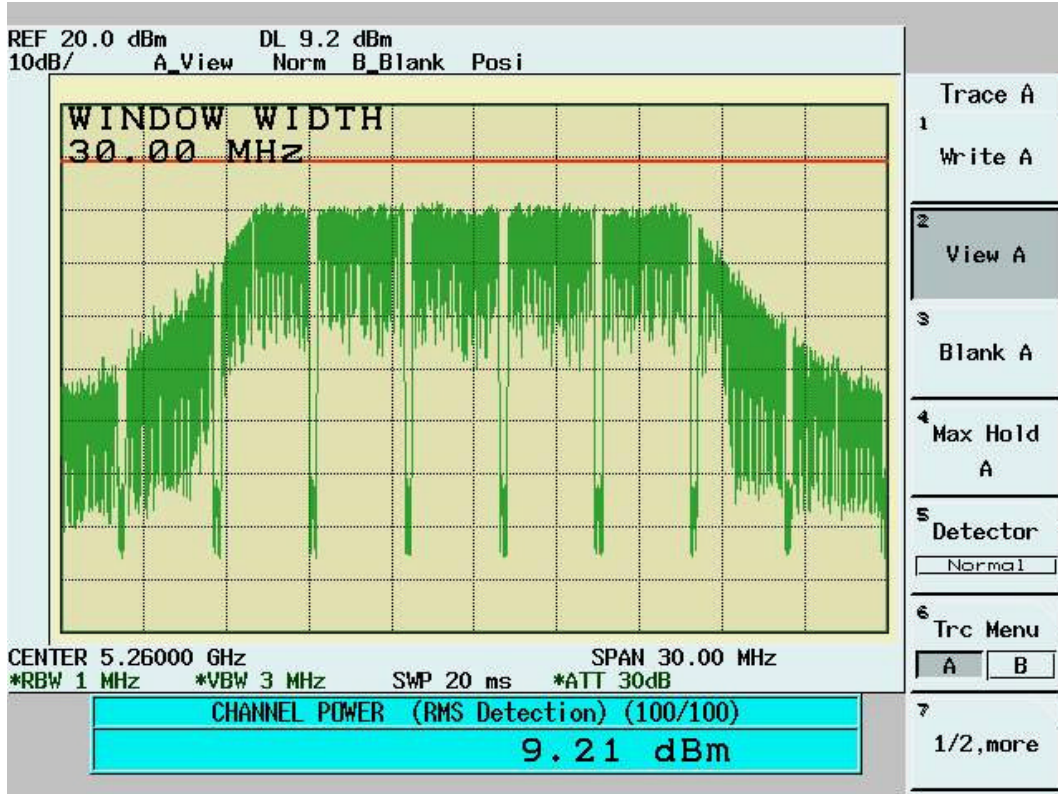
5180 MHz:



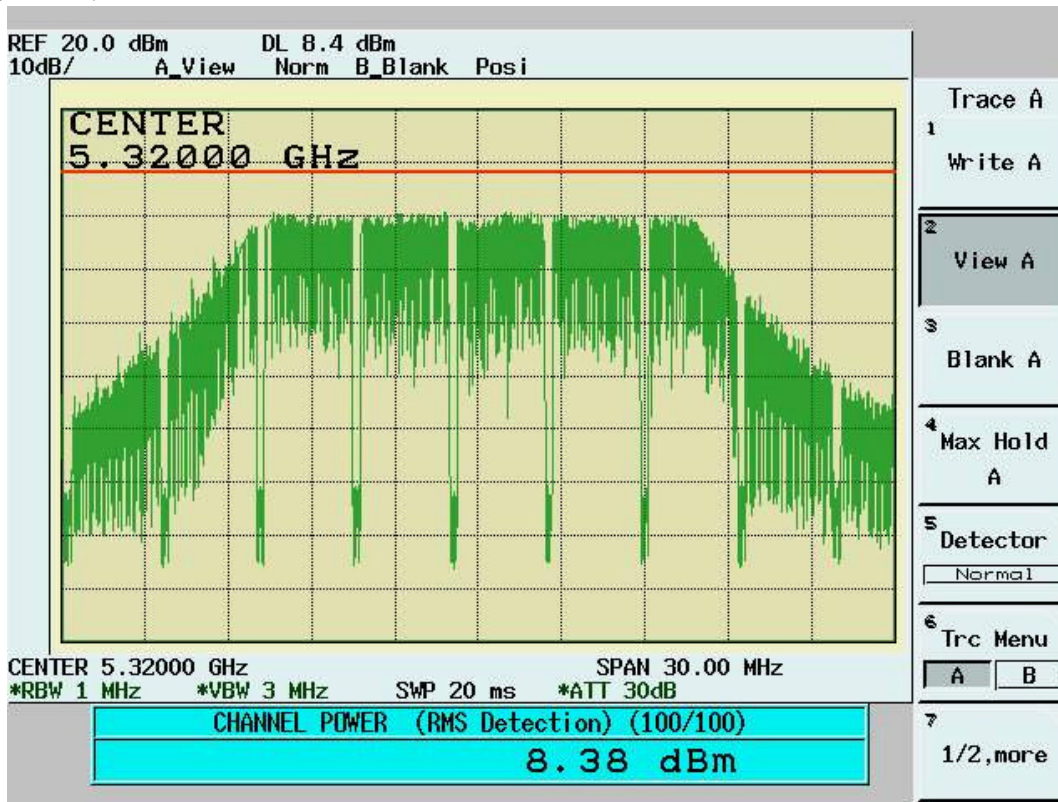
5240 MHz:



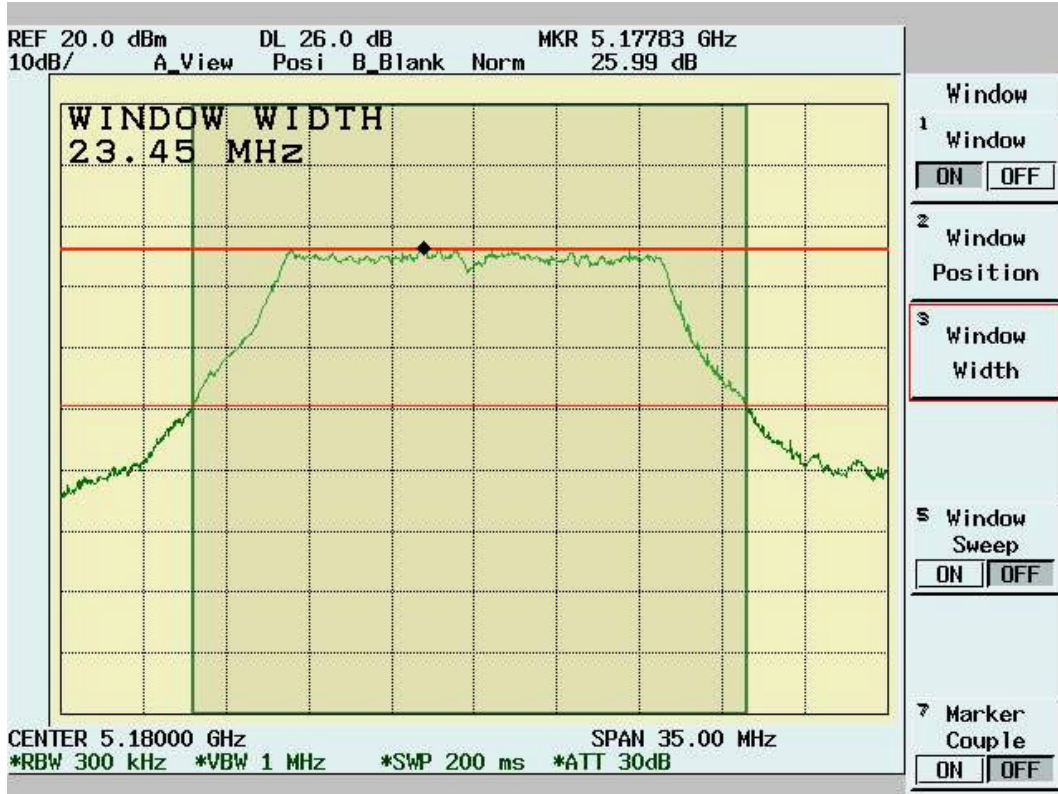
5260 MHz:



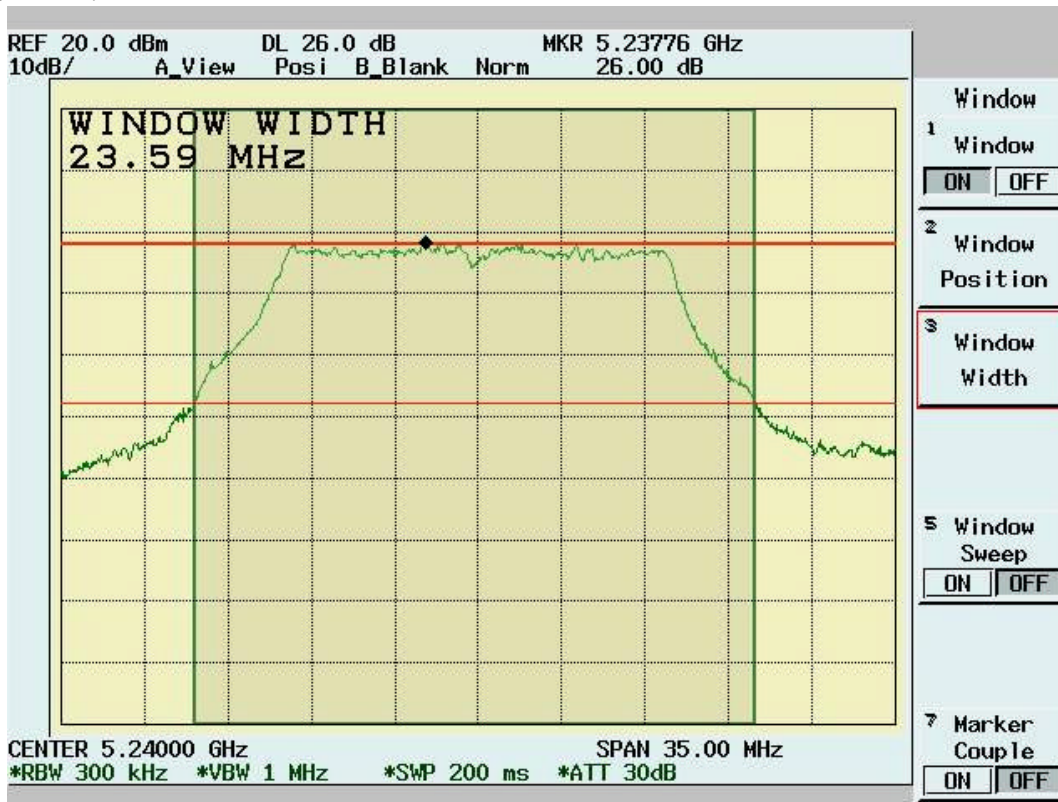
5320 MHz:



5180 MHz:



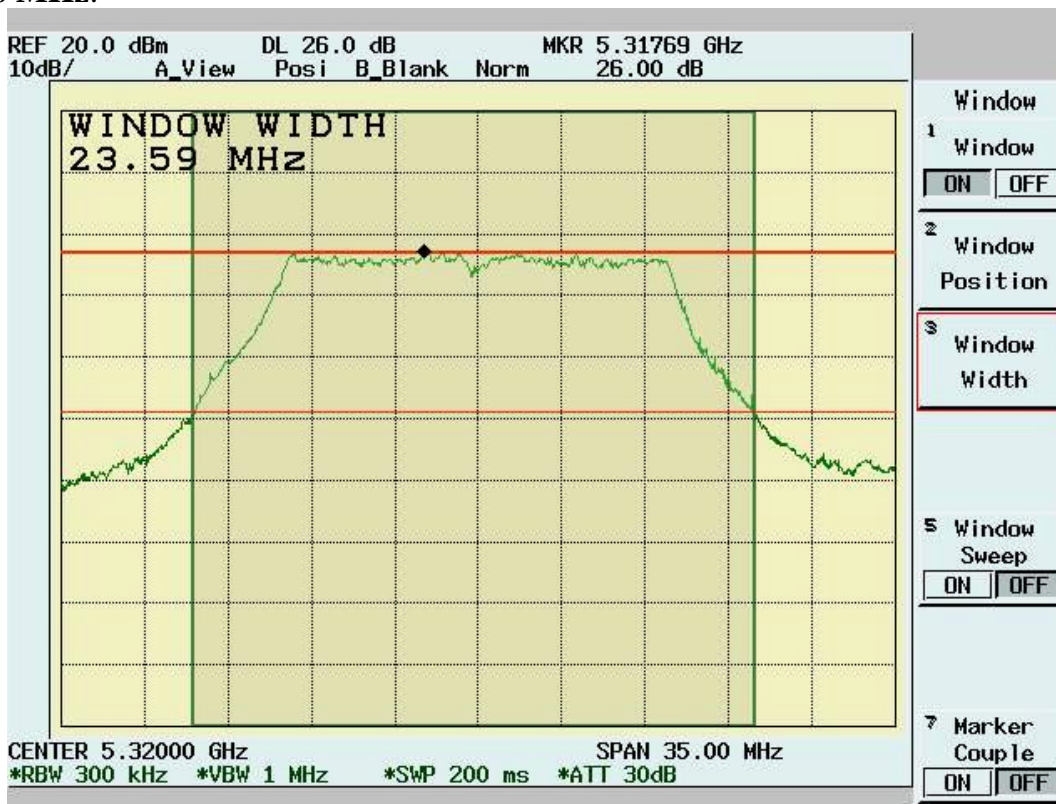
5240 MHz:



5260 MHz:



5320 MHz:



## 6.2. Peak Power Spectral Density [Section 15.407(a)(1)(2)(3) ]

### 6.2.1. Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.  
 Equipment mode: Spectrum analyzer  
 Detector function: Peak mode  
 SPAN: 30MHz or 50MHz  
 RBW: 1MHz  
 VBW: 3MHz  
 Sweep time: 30 or 50 sec.  
 Center frequency: fundamental frequency tested
2. Peak search was read to the peak power after maximum hold function is completed.

### 6.2.2. Test Setup



### 6.2.3. Test Data: (Normal Mode)

#### Maximum Peak Output Power Density

Temperature (deg. C): 25

Test Engineer: Jerry Chiou

Humidity (%): 50

Channel	Frequency (Mhz)	Spectrum Reading (dBm)	Cable Loss(dB)	Peak Power Output (dBm/MHz)	Limit (dBm/Mhz)	Pass/Fail
1	5180	0.55	1.20	1.75	4.00	Pass
4	5240	1.89	1.20	3.09	4.00	Pass
5	5260	1.73	1.20	2.93	11.00	Pass
8	5320	1.13	1.20	2.33	11.00	Pass