

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

### 4.7.1 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

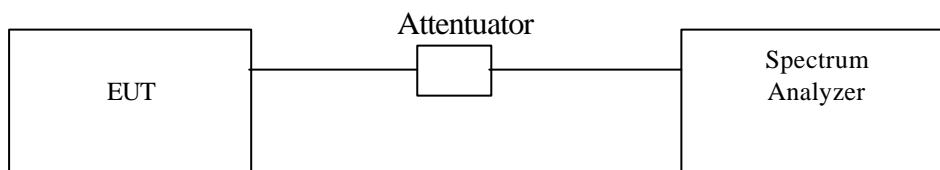
Center frequency: fundamental frequency tested.

Sweep time= 500 sec.

Cable loss=2.25dB

2. Using Peak Search to read the peak power after Maximum Hold function is completed.

### 4.7.2 Test Setup



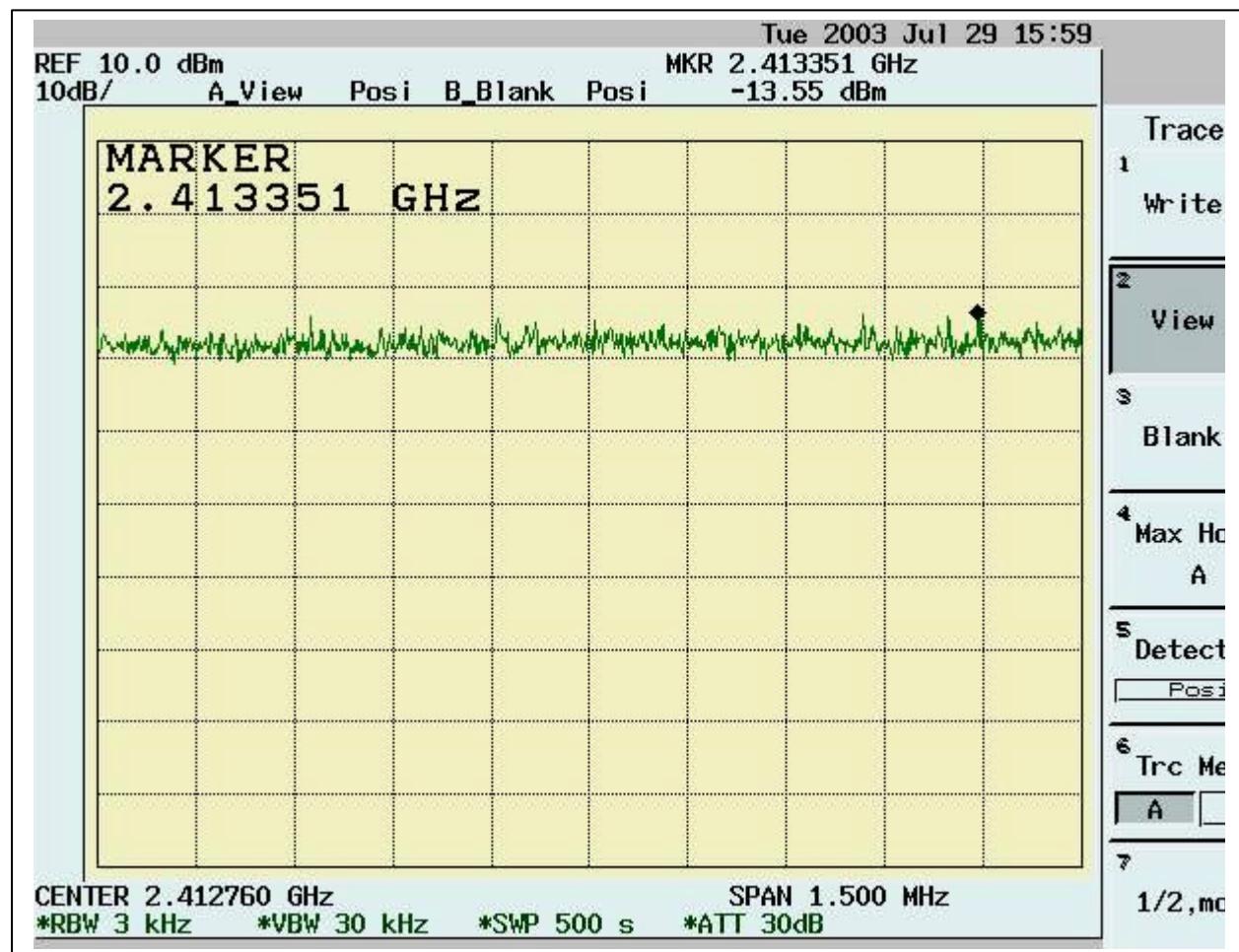
### 4.7.3 Test Data:

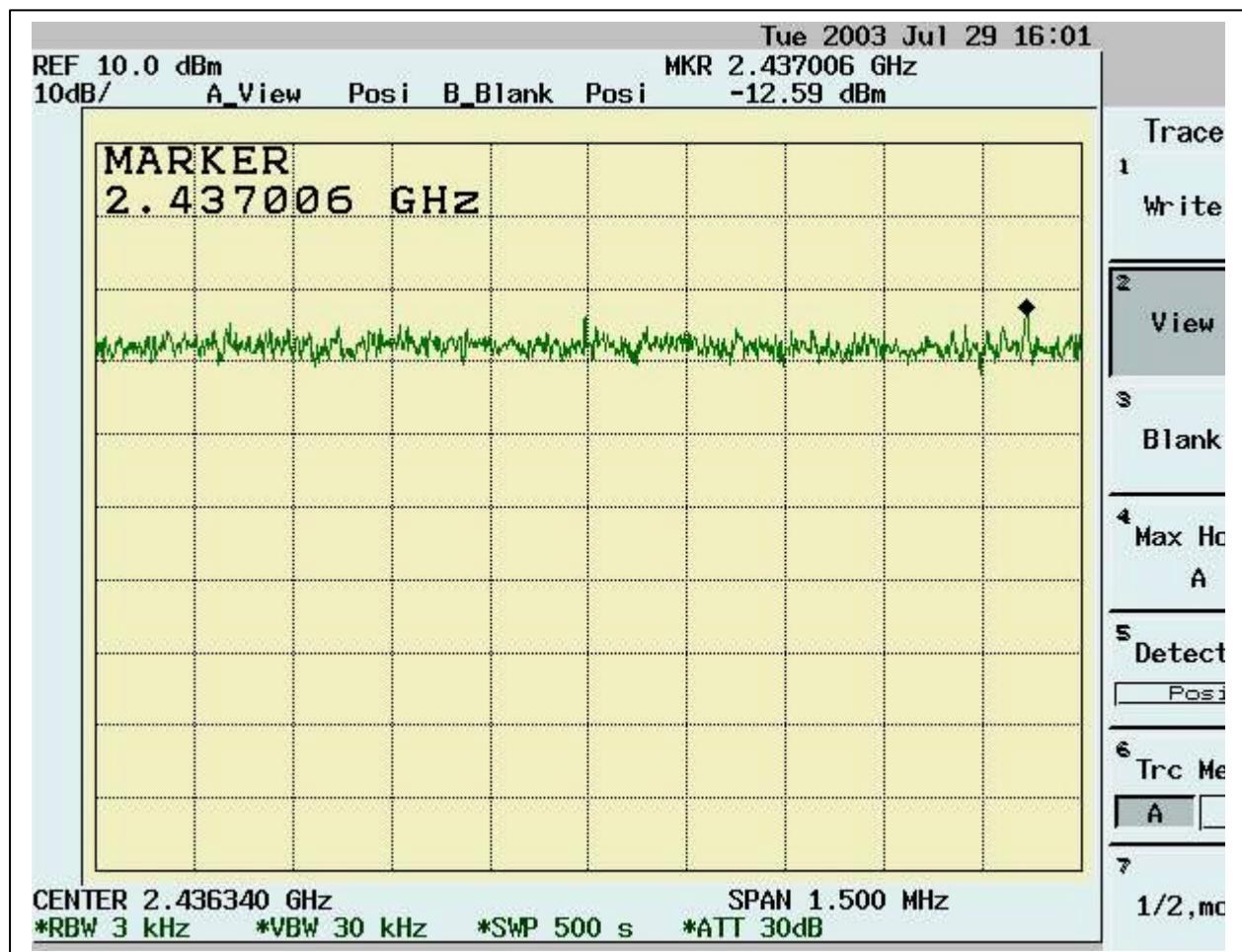
**Table Maximum Peak Output Power Density**

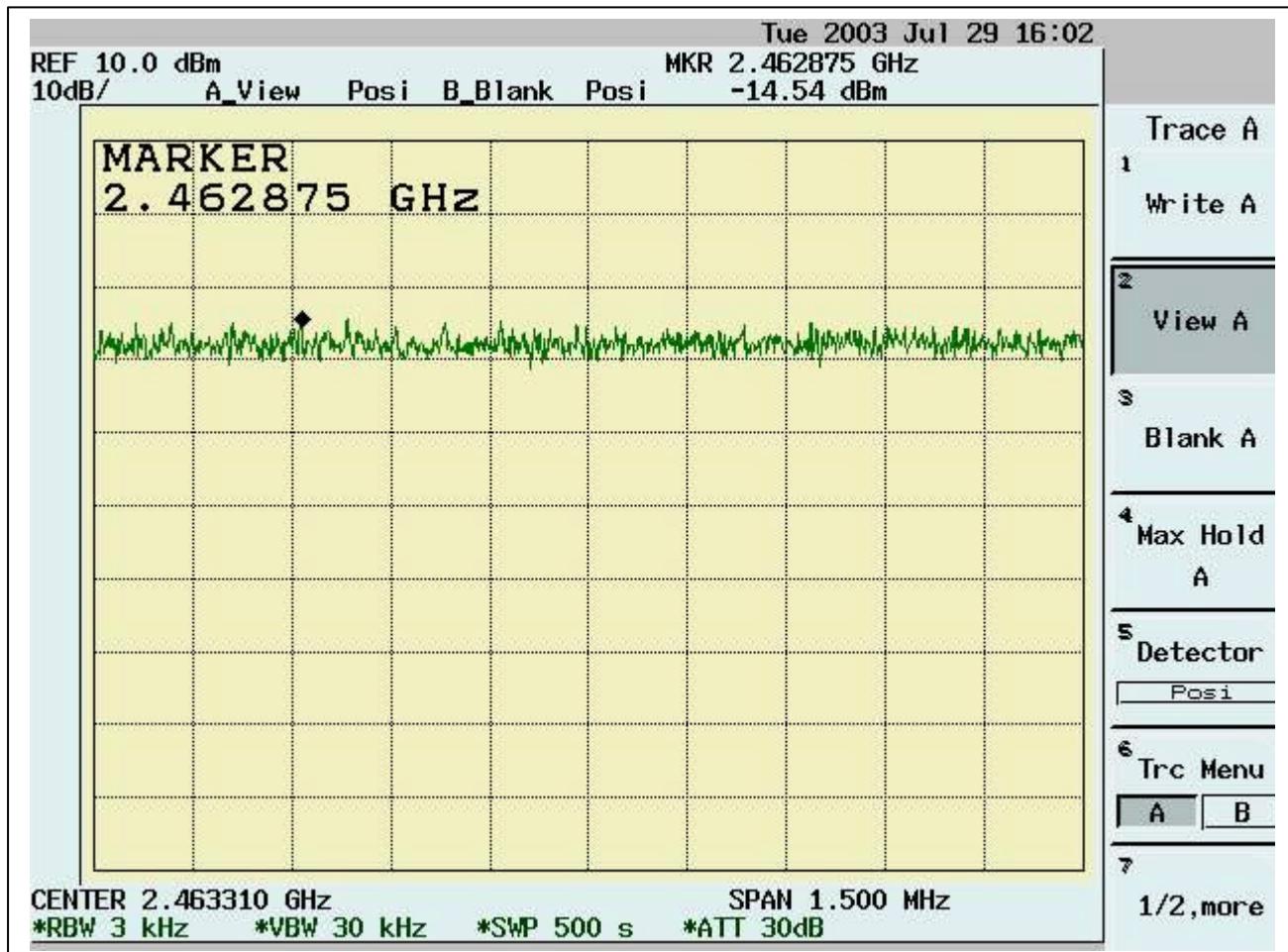
Chennel	Frequency (MHz)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412.5	-11.3	8	Pass
6	2437.5	-10.34	8	Pass
11	2462.5	-12.29	8	Pass

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

Cable Lose=2.25dB







## 5. TEST RESULTS (802.11g)

### 5.1 Powerline Conducted Emissions [Section 15.207]

#### 5.1.1 EUT Configuration

The conducted emission test setups are in accordance with Figs 9, 10(a) and 10(b) of ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996.

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit shown on the figure 1 of ANSI C63.4-2001.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

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

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

#### 5.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

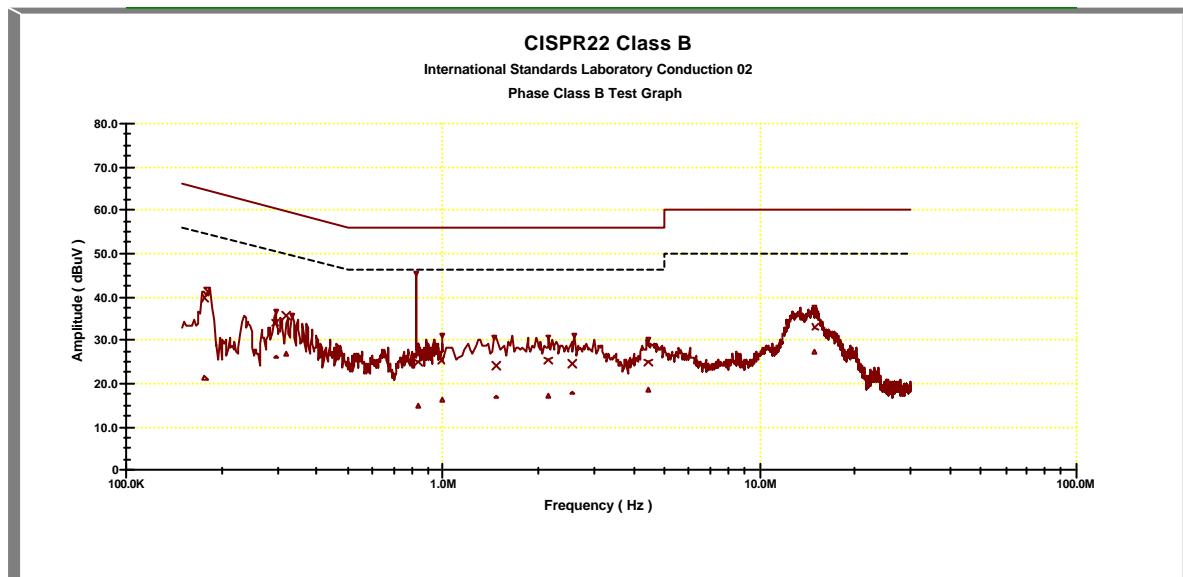
#### 5.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150 KHz--30MHz
Detector Function:	Quasi-Peak/Average
Bandwidth (RBW):	9KHz

#### 5.1.4 Test Data:

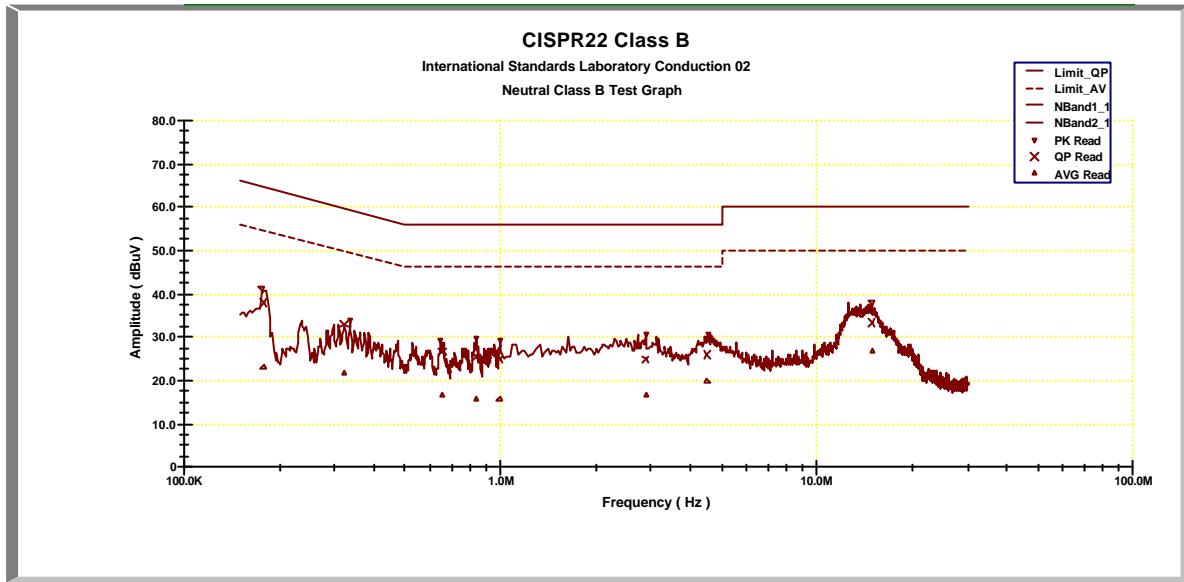
##### Power Line Conducted Emissions (Hot) Channel 1, 6, 11

Frequency (MHz)	Corrective Factor		Quasi-Peak			Average		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.17698	0.10	0.02	39.89	65.23	-25.34	21.16	55.23	-34.07
0.29528	0.10	0.02	33.96	61.85	-27.89	26.06	51.85	-25.79
0.32053	0.10	0.02	35.48	61.13	-25.65	26.94	51.13	-24.19
0.83868	0.17	0.06	24.76	56.00	-31.24	14.68	46.00	-31.32
0.98958	0.20	0.07	25.42	56.00	-30.58	16.34	46.00	-29.66
1.47087	0.36	0.08	24.15	56.00	-31.85	16.82	46.00	-29.18
2.14268	0.21	0.10	25.26	56.00	-30.74	17.21	46.00	-28.79
2.56846	0.23	0.11	24.61	56.00	-31.39	17.76	46.00	-28.24
4.43791	0.32	0.12	24.79	56.00	-31.21	18.45	46.00	-27.55
14.9889	0.70	0.30	33.03	60.00	-26.97	27.37	50.00	-22.63



**Power Line Conducted Emissions (Neutral) Channel 1, 6, 11**

Frequency (MHz)	Corrective Factor		Quasi-Peak			Average		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.17805	0.10	0.02	37.91	65.20	-27.29	22.89	55.20	-32.31
0.32123	0.10	0.02	33.03	61.11	-28.08	21.90	51.11	-29.21
0.652	0.14	0.04	26.65	56.00	-29.35	16.69	46.00	-29.31
0.83403	0.17	0.06	25.45	56.00	-30.55	15.60	46.00	-30.40
0.99185	0.20	0.07	24.80	56.00	-31.20	15.62	46.00	-30.38
2.87818	0.20	0.11	24.79	56.00	-31.21	16.41	46.00	-29.59
4.50313	0.21	0.13	25.99	56.00	-30.01	19.73	46.00	-26.27
14.9035	0.40	0.30	33.18	60.00	-26.82	26.68	50.00	-23.32



\* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1 , 6, 11 to get the maximum reading of all these channels.  
Two type of antennas have been test, and the worse data show above.  
Margin = Amplitude + Insertion Loss- Limit  
A margin of -8dB means that the emission is 8dB below the limit

## 5.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

### 5.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer through an attenuator. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

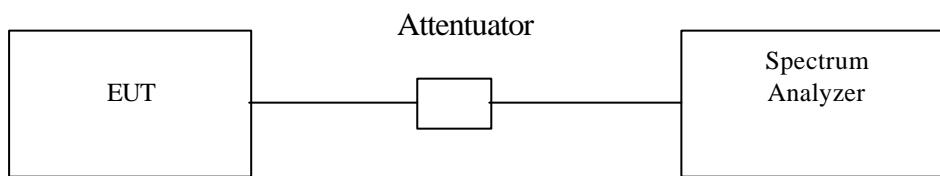
Equipment mode: Spectrum analyzer

Detector function: Peak mode

RBW: 100KHz

VBW: 100KHz

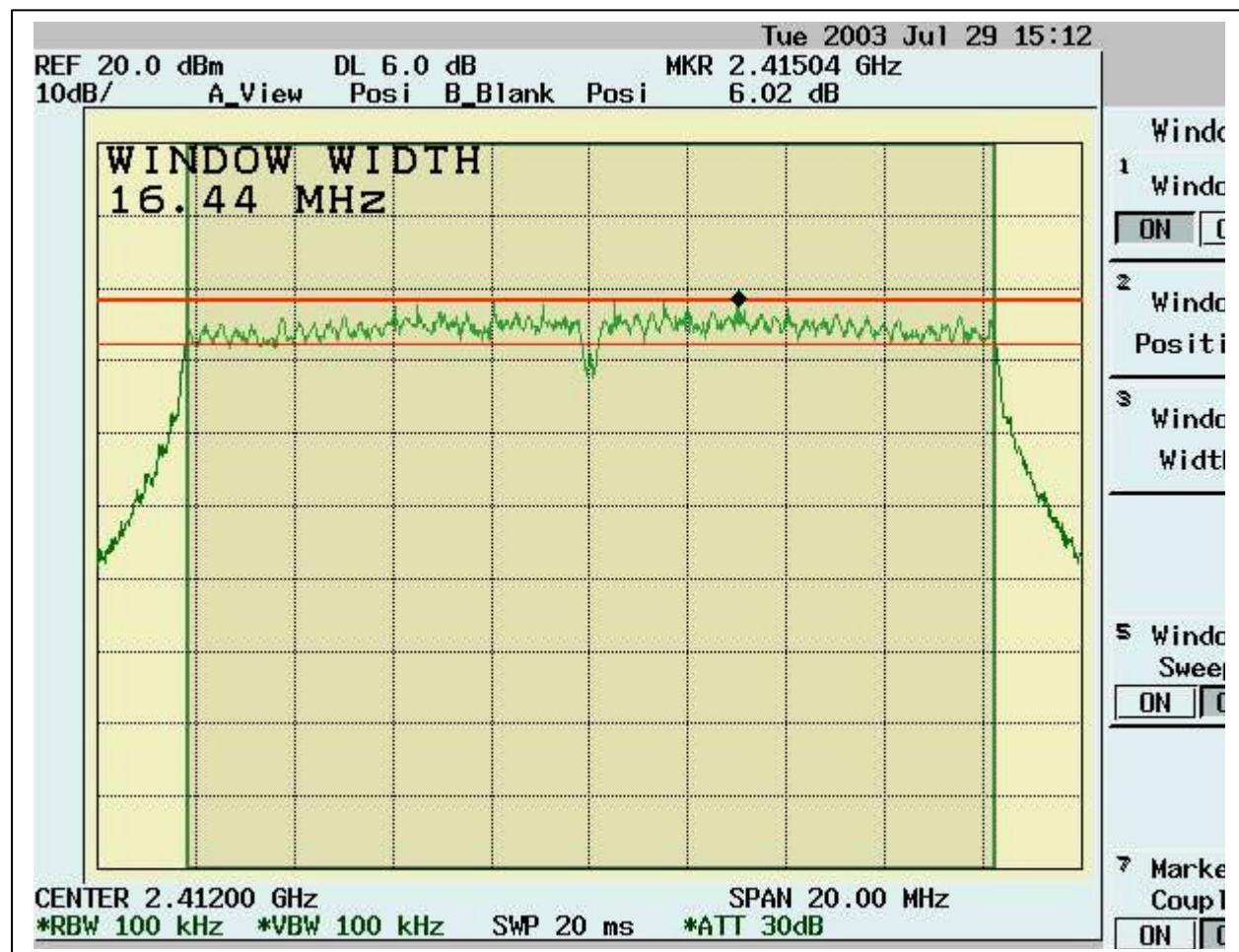
### 5.2.2 Test Setup

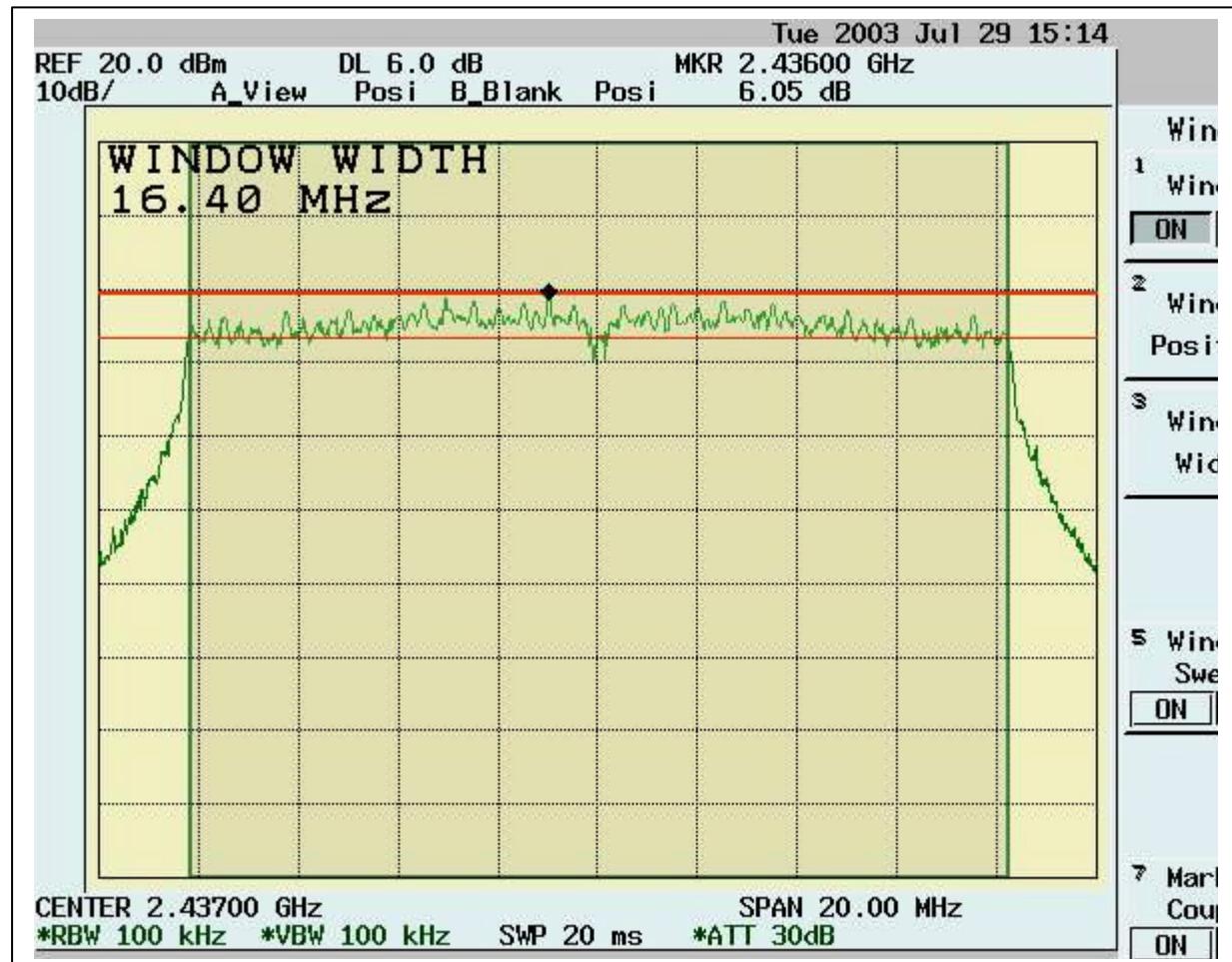


### 5.2.3 Test Data:

**Table 6dB Bandwidth**

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	16.44	0.5	Pass
6	2437	16.40	0.5	Pass
11	2462	16.44	0.5	Pass





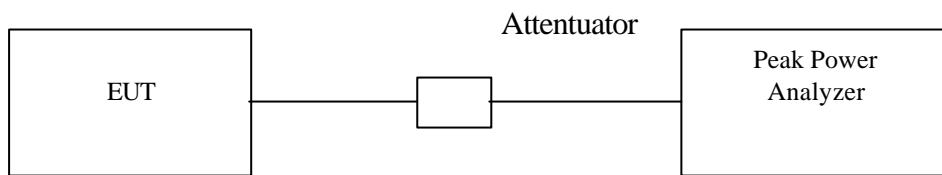


### 5.3 DSST Maximum Peak Output Power [Section 15.247 (b)(1)]

#### 5.3.1 Test Procedure

+The Transmitter output of EUT was connected to the peak power analyzer through an attenuator.

#### 5.3.2 Test Setup



#### 5.3.3 Test Data

##### Maximum Peak Output Power

Chennel	Frequency (MHz)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	50.153	17.003	30	Pass
6	2437	50.687	17.049	30	Pass
11	2462	52.215	17.178	30	Pass

## 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)	1MHz
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) Channel 1, 6, 11**

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
178.41	23.84	8.63	3.55	0.00	36.02	43.50	-7.48	100.00	141.00
194.9	20.17	8.45	3.72	0.00	32.34	43.50	-11.16	100.00	141.00
198.78	18.07	8.56	3.77	0.00	30.40	43.50	-13.10	100.00	286.00
211.39	18.71	8.67	3.87	0.00	31.25	43.50	-12.25	200.00	124.00
330.7	15.84	13.67	4.75	0.00	34.26	46.00	-11.74	150.00	302.00
363.68	12.91	14.57	4.99	0.00	32.47	46.00	-13.53	100.00	335.00
389.87	12.87	15.10	5.15	0.00	33.12	46.00	-12.88	150.00	108.00
596.48	8.62	18.50	6.30	0.00	33.42	46.00	-12.58	100.00	76.00
649.83	7.18	18.85	6.55	0.00	32.58	46.00	-13.42	200.00	189.00
797.27	10.03	19.90	7.26	0.00	37.19	46.00	-8.81	250.00	237.00
902.03	3.74	20.43	7.68	0.00	31.85	46.00	-14.15	100.00	302.00
942.77	8.03	20.83	7.83	0.00	36.69	46.00	-9.31	100.00	302.00

**30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11**

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
87.23	19.87	8.05	2.50	0.00	30.42	40.00	-9.58	150.00	266.00
178.41	21.11	8.63	3.55	0.00	33.30	43.50	-10.20	100.00	282.00
389.87	12.88	15.10	5.15	0.00	33.13	46.00	-12.87	150.00	153.00
431.58	14.92	16.33	5.39	0.00	36.64	46.00	-9.36	100.00	169.00
519.85	11.85	17.40	5.90	0.00	35.15	46.00	-10.85	200.00	88.00
531.49	13.24	16.91	5.97	0.00	36.12	46.00	-9.88	200.00	185.00
596.48	11.09	18.50	6.30	0.00	35.89	46.00	-10.11	150.00	39.00
649.83	10.23	18.85	6.55	0.00	35.63	46.00	-10.37	100.00	120.00
661.47	10.94	18.81	6.60	0.00	36.35	46.00	-9.65	200.00	315.00
779.81	7.71	19.90	7.17	0.00	34.78	46.00	-11.22	250.00	315.00
944.71	6.31	20.85	7.83	0.00	34.99	46.00	-11.01	100.00	185.00

**\* 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 – 25 GHz, Transmitting from Main antenna) .**

**1GHz~ 25 GHz (Horizontal), Channel 1 : 2412 MHz**

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3181.82	52.23	31.02	1.41	46.61	38.05	54.00	-15.95	100	288
3313.69	49.95	31.18	1.45	46.62	35.95	54.00	-18.05	104	257
3409.59	49.44	31.29	1.48	46.64	35.58	54.00	-18.42	100	302
3577.42	49.20	31.49	1.54	46.57	35.66	54.00	-18.34	100	241
3961.04	48.70	31.95	1.67	46.15	36.17	54.00	-17.83	106	209
7521.48	40.14	39.48	2.41	45.99	36.04	54.00	-17.96	109	294
7893.11	35.03	40.82	2.48	44.25	34.08	54.00	-19.92	100	253

**1GHz~ 25 GHz (Vertical), Channel 1 : 2412 MHz**

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3193.81	52.46	31.03	1.41	46.61	38.30	54.00	-15.70	100	256
3313.69	52.88	31.18	1.45	46.62	38.89	54.00	-15.11	100	289
3409.59	54.40	31.29	1.48	46.64	40.54	54.00	-13.46	109	247
3469.53	49.68	31.36	1.50	46.65	35.90	54.00	-18.10	100	324
3577.42	54.99	31.49	1.54	46.57	41.46	54.00	-12.54	100	310
3637.36	50.30	31.56	1.56	46.50	36.92	54.00	-17.08	100	317
3829.17	49.30	31.80	1.62	46.29	36.42	54.00	-17.58	102	286
3961.04	54.76	31.95	1.67	46.15	42.23	54.00	-11.77	100	277
4092.91	48.21	32.26	1.71	46.20	35.98	54.00	-18.02	100	231
7137.86	46.88	39.83	2.34	46.25	42.80	54.00	-11.20	100	243
7581.42	40.10	39.69	2.42	45.71	36.51	54.00	-17.49	101	251
7953.05	36.81	41.03	2.49	43.97	36.36	54.00	-17.64	101	261
8048.95	33.99	41.18	2.51	43.62	34.06	54.00	-19.94	100	205

Note:

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 25 GHz have been tested.**

**1GHz~ 25 GHz (Horizontal), Channel 6 : 2437 MHz**

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Am pl. (dB)	Ampl. (dBuV/ m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
3169.83	51.29	31.00	1.40	46.60	37.09	54.00	-16.91	100	197
3241.76	50.98	31.09	1.43	46.61	36.89	54.00	-17.11	100	203
3325.67	50.18	31.19	1.46	46.63	36.20	54.00	-17.80	102	189
3409.59	49.66	31.29	1.48	46.64	35.80	54.00	-18.20	100	241
3577.42	49.07	31.49	1.54	46.57	35.54	54.00	-18.46	100	223
3961.04	48.66	31.95	1.67	46.15	36.13	54.00	-17.87	100	178
7797.2	37.41	40.47	2.46	44.70	35.64	54.00	-18.36	100	189

**1GHz~ 25 GHz (Vertical), Channel 6 : 2437 MHz**

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Am pl. (dB)	Ampl. (dBuV/ m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
3181.82	52.21	31.02	1.41	46.61	38.03	54.00	-15.97	100	165
3241.76	50.80	31.09	1.43	46.61	36.70	54.00	-17.30	100	173
3325.67	52.59	31.19	1.46	46.63	38.61	54.00	-15.39	100	183
3409.59	54.78	31.29	1.48	46.64	40.92	54.00	-13.08	100	144
3577.42	54.98	31.49	1.54	46.57	41.44	54.00	-12.56	100	125
3637.36	51.02	31.56	1.56	46.50	37.65	54.00	-16.35	100	153
3817.18	49.27	31.78	1.62	46.31	36.37	54.00	-17.63	100	163
3997	54.75	32.00	1.68	46.11	42.31	54.00	-11.69	100	115
4104.9	47.84	32.29	1.72	46.21	35.63	54.00	-18.37	100	162
7809.19	36.61	40.51	2.46	44.64	34.94	54.00	-19.06	100	182

**Note:**

“\*\*” Not in the restricted band, Limit level=Fundamental Emission-20dB

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 25 GHz have been tested.**

**1GHz~ 25 GHz (Horizontal), Channel 11: 2462 MHz**

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/ m)	Limit (dBuV/ m)	Margin* (dB)	Height (cm)	Position (°)
3181.82	51.49	31.02	1.41	46.61	37.31	54.00	-16.69	100	234
3277.72	51.05	31.13	1.44	46.62	37.01	54.00	-16.99	101	210
3313.69	49.74	31.18	1.45	46.62	35.75	54.00	-18.25	100	222
3409.59	48.72	31.29	1.48	46.64	34.86	54.00	-19.14	100	251
3577.42	49.49	31.49	1.54	46.57	35.96	54.00	-18.04	100	160
3985.01	48.51	31.98	1.68	46.13	36.04	54.00	-17.96	100	173
7653.35	38.91	39.95	2.44	45.37	35.93	54.00	-18.07	100	201
7725.27	38.45	40.21	2.45	45.04	36.07	54.00	-17.93	107	253
7905.09	36.44	40.86	2.48	44.19	35.58	54.00	-18.42	100	288
7989.01	35.01	41.16	2.50	43.80	34.86	54.00	-19.14	101	211

**1GHz~ 25 GHz (Vertical), Channel 11 : 2462 MHz**

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Amp l. (dB)	Ampl. (dBuV/ m)	Limit (dBuV/ m)	Margin* (dB)	Height (cm)	Position (°)
3169.83	52.70	31.00	1.40	46.60	38.50	54.00	-15.50	100	232
3313.69	52.89	31.18	1.45	46.62	38.90	54.00	-15.10	100	219
3385.61	61.75	31.26	1.48	46.63	47.85	54.00	-6.15	100	129
3577.42	54.45	31.49	1.54	46.57	40.92	54.00	-13.08	109	253
3637.36	50.61	31.56	1.56	46.50	37.23	54.00	-16.77	100	169
3829.17	50.20	31.80	1.62	46.29	37.32	54.00	-16.68	102	172
3997	54.65	32.00	1.68	46.11	42.21	54.00	-11.79	100	200
4104.9	47.22	32.29	1.72	46.21	35.02	54.00	-18.98	102	292
7977.02	35.93	41.12	2.49	43.86	35.68	54.00	-18.32	100	222

**Note:**

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 25 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

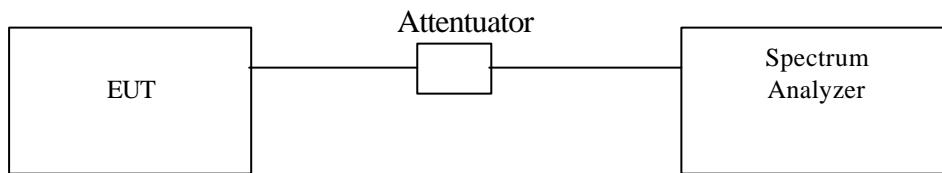
VBW: 100KHz

Center frequency: 2.4GHz, 2.4835GHz.

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:

#### Band Edge measurement (Conducted)

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: > 20dB (dB)	Pass/Fail
1	2409.9	105.18	---	---
Outside band	2400.0	67.16	38.02	Pass
11	2464.5	103.43	---	---
Outside band	2473.8	67.63	35.80	Pass

Band Edge Conducted measurement



Band Edge Conducted Measurement

