

# **PART I**

**(For Antenna 1: Vendor:WNC, Model DMA)**

## **Test Report for FCC Part 15 Subpart B & C & E**

*of*

**WLAN a+b+g mini-PCI Module**

*Model*

**CM9**

**(Brand: Wistron NeWeb)**

*Applied by:*

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**LT LAB:**NVLAP:200234-0;VCCI: R-1435,C-1440;NEMKO:ELA 113b,113d;BSMI:SL2-IN-E-0013;CNLA:0997

ISL-T10-R29-1

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## 1. General

### 1.1 Certification of Accuracy of Test Data

<b>Standards:</b>	CFR 47 Part 15 Subpart B Class B CFR 47 Part 15 Subpart C (Section 15.247) CFR 47 Part 15 Subpart E (Section 15.407)
<b>Test Procedure:</b>	ANSI C63.4: 2001
<b>Equipment Tested:</b>	WLAN a+b+g mini-PCI Module
<b>Model:</b>	CM9
<b>Applied by:</b>	Wistron Neweb Corporation
<b>Sample received Date:</b>	2004/05/10
<b>Final test Date :</b>	2004/05/11-2004/05/20
<b>Test Site:</b>	Chamber 02, Conduction 02
<b>Temperature</b>	Refer to each site test data
<b>Humidity:</b>	Refer to each site test data
<b>Test Engineer:</b>	Mailes Hsieh

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Approve & Signature

  
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Eddy Hsiung/Director

Test results given in this report apply only to the specific sample(s) tested under stated test conditions.

This report shall not be reproduced other than in full without the explicit written consent of ISL.

This report totally contains 4 parts, this part totally 131 pages, including 1 cover page , 3 contents page, and 127 pages for the test description.

This report must not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.

This test data shown below is traceable to NIST or national or international standard.

International Standards Laboratory certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

## 2. Test Results Summary

The 802.11b functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247( c )	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 ( c )	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

The 802.11g functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247( c )	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 ( c )	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

The 802.11a functions of EUT has been tested to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart E			
Standard Section	Test Type	Result	Remarks
15.407 (a)(1)(2)(3)	Peak Transmit Power	Pass	
15.407 (a)(1)(2)(3)	Peak Power Spectral Density	Pass	
15.407 (a)(6)	Peak Power Excursion	Pass	
15.407 (b)(5)	AC Power Line Emissions	Pass	
15.407 (b)(5)	Radiated Emissions 30MHz – 40 GHz	Pass	
15.407(f)	Radiation exposure	Pass	MPE report attached
15.407 (g)	Frequency Stability	Pass	

### 3. Description of Equipment Under Test (EUT)

Description:	WLAN a+b+g Mini- PCI module
Model No.:	CM9
FCC ID:	<b>NKRCM9</b>
Brand:	Wistron NeWeb
Frequency Range 802.11a:	5150~5350 MHz, 5725~5825 MHz
Frequency Range 802.11b/g:	2400~2483.5 MHz
Support channel:	
802.11a Normal mode	12 Channels
802.11a Turbo mode	5 Channels
802.11b/g	11 Channels
Modulation Skill:	
802.11a Normal mode	OFDM (6 Mbps – 54 Mbps)
802.11a Turbo mode	OFDM (12 Mbps – 108 MBps)
802.11b	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
802.11g	OFDM (6M - 54Mbps)
Antennas Type:	
Antenna 1: PIFA	( DMA , made by Wistron NeWeb)
Antenna 2: Dipole	(GA30038-YMSE , made by GigaAnt Co.)
Antenna 3: Dipole	(FCF-004 , made by Long-Chu Co.)
Antenna 4: Dipole	(DBA-IPEX-01 , made by Long-Chu Co.)
Antenna 5: Dipole	(SRSM5150MRA;SRSM2400MRA , made by CUSLICRAFT )
Antenna 6: Dipole	(DBA-BSMA-01 , made by Long-Chu Co.)
Antenna 7: Dipole	(DBA-SSMA-01, made by Long-Chu Co.)
Antenna 8: Dipole	(DBA-IPEX-02 , made by Long-Chu Co.)
Antenna Connected:	The antenna is connected to the RF connector of the WLAN adapter.
Antenna peak Gain:	
Antenna 1:	2.68 dBi (11b/g) ,4.87 dBi(11a)
Antenna 2:	2.40 dBi (11b/g) ,5.90 dBi(11a)
Antenna 3:	4.00 dBi (11b/g) ,3.50 dBi(11a)
Antenna 4:	1.89 dBi (11b/g) ,3.11 dBi(11a)
Antenna 5:	2.00 dBi (11b/g) ,2.00 dBi(11a)
Antenna 6:	1.34 dBi (11b/g) ,1.65 dBi(11a)
Antenna 7:	1.29 dBi (11b/g) ,2.06 dBi(11a)
Antenna 8:	2.91 dBi (11b/g) ,3.19 dBi(11a)
WLAN Power Type :	3.3V DC from the EUT

The channel and the operation frequency of 802.11b and 802.11g is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437		

The channel and the operation frequency of 802.11a Normal Mode is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	5180	07	5300
02	5200	08	5320
03	5220	09	5340
04	5240	10	5360
05	5260	11	5380
06	5280	12	5400

The channel and the operation frequency of 802.11a Turbo Mode is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	5210	04	5760
02	5250	05	5800
03	5290		

**During the test, the EUT was tested as a modular device of a notebook PC using a PCMCIA extender board to extend the EUT outside the notebook PC enclosure. There are eight antennas in the EUT:**

Antenna 1 is PIFA type.

Antenna 2 is Dipole in printed type.

Antenna 3, 5,6,7 are Dipole type in reverse SMA connector.

Antenna 4,8 are Dipole type in Hirose connector.

All antennas have been tested. The worse data of each type are shown, so, four sets of radiated data are listed in the test report.



## The Power Setting of the test program

### 802.11b

	Data Rate	11 Mbps
Channel	Frequency(MHz)	Power Setting
Channel 1	2412	21
Channel 6	2437	21.5
Channel 11	2462	21.5

### 802.11g

	Data Rate	6 Mbps
Channel	Frequency(MHz)	Power Setting
Channel 1	2412	15
Channel 6	2437	15
Channel 11	2462	15

### 802.11a

<b>Normal Mode</b>	Data Rate	6 Mbps
Channel	Frequency(MHz)	Power Setting
Channel 1	5180	6.5
Channel 4	5240	6.5
Channel 5	5260	11
Channel 8	5320	11
Channel 9	5745	13
Channel 12	5805	12.5
<b>Turbo Mode</b>	Data Rate	12 Mbps
Channel	Frequency(MHz)	Power Setting
Channel 1	5210	10.5
Channel 2	5250	10.5
Channel 3	5290	13
Channel 4	5760	11.5
Channel 5	5800	9

## 4. TEST RESULTS (802.11a) (for Antenna DMA)

### 4.1 Maximum Peak Output Power [Section 15.407 (a)(1)(2)(3)]

#### 4.1.1 Test Procedure

The transmitter output of EUT was connected to the peak power analyzer.

#### 4.1.2 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
5.725-5.825GHz	The lesser of 1W (30dBm) or 17dBm+10logB

Note: B is the 26dB emission bandwidth in MHz

#### 4.1.3 Test Data: (Normal Mode)

##### Maximum Peak Output Power

Temperature (deg. C): 25

Test Engr: Mailes Hsieh

Humidity (%): 50

Channel	Frequency (Mhz)	Peak Power Output (dBm)	26 dBc BW/Limit Mhz/dBm	The lesser Limit (dBm)	Pass/Fail
1	5180	14.481	25.83/ 18.12	17.00	Pass
4	5240	13.918	26.28/ 18.20	17.00	Pass
5	5260	18.387	29.88/ 25.75	24.00	Pass
8	5320	17.606	29.88/ 25.75	24.00	Pass
9	5745	20.012	26.28/ 31.20	30.00	Pass
12	5805	20.043	29.34/ 31.67	30.00	Pass

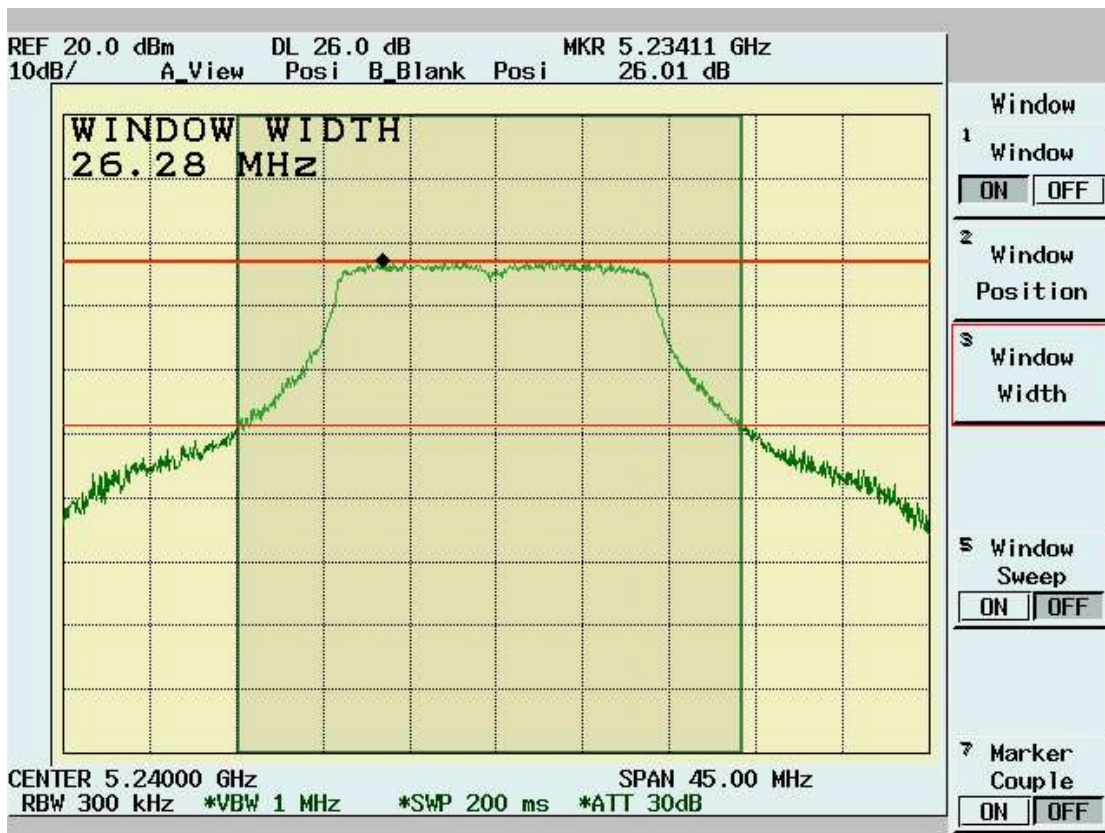
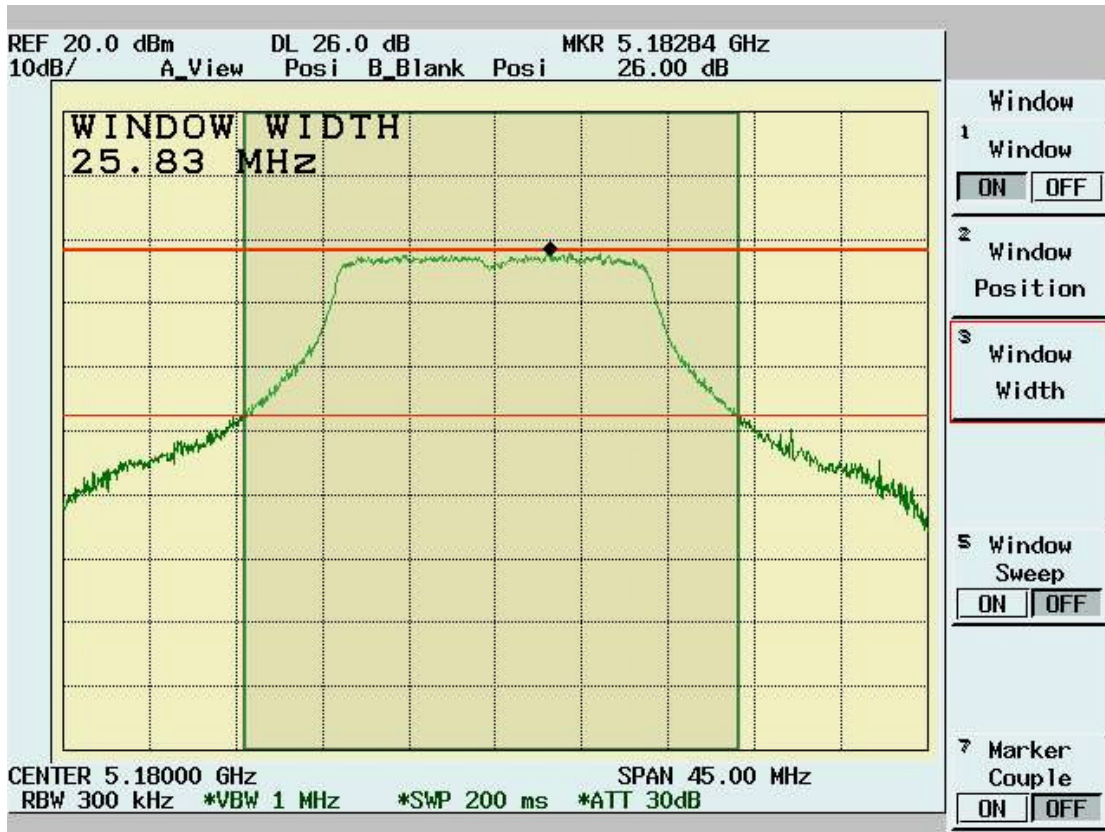
**4.1.4 Test Data: (Turbo Mode)****Maximum Peak Output Power**

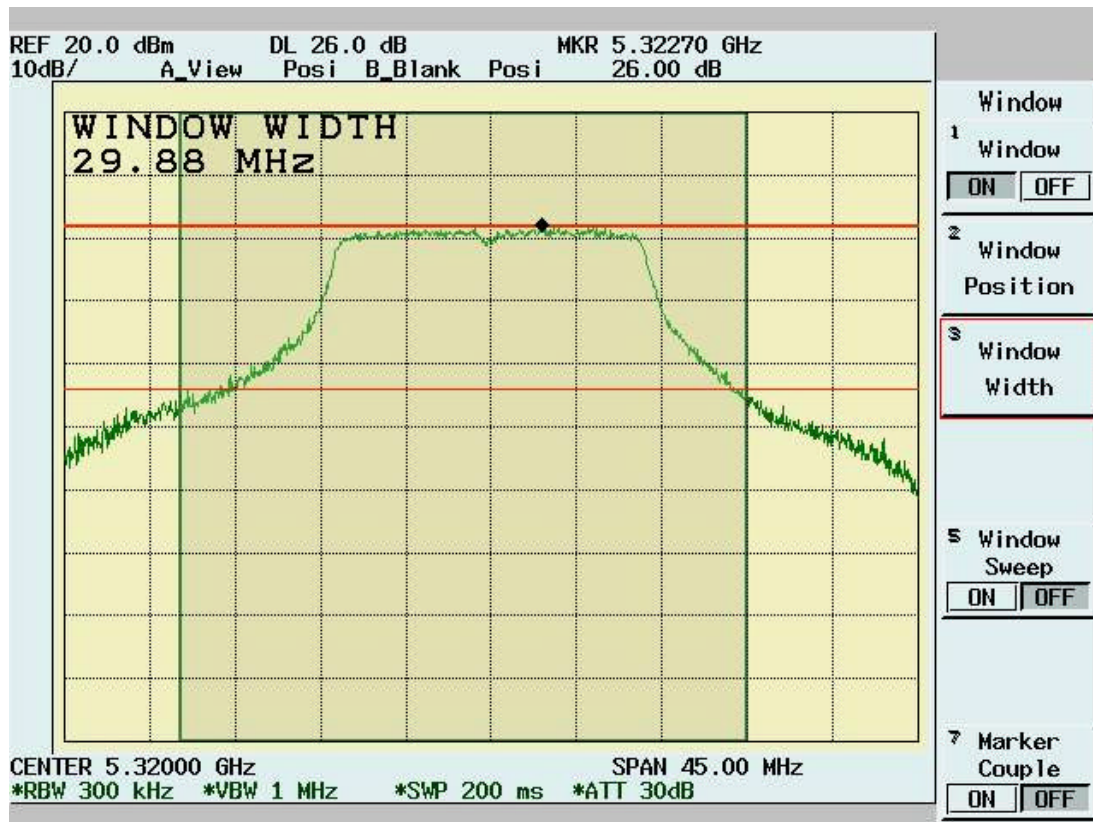
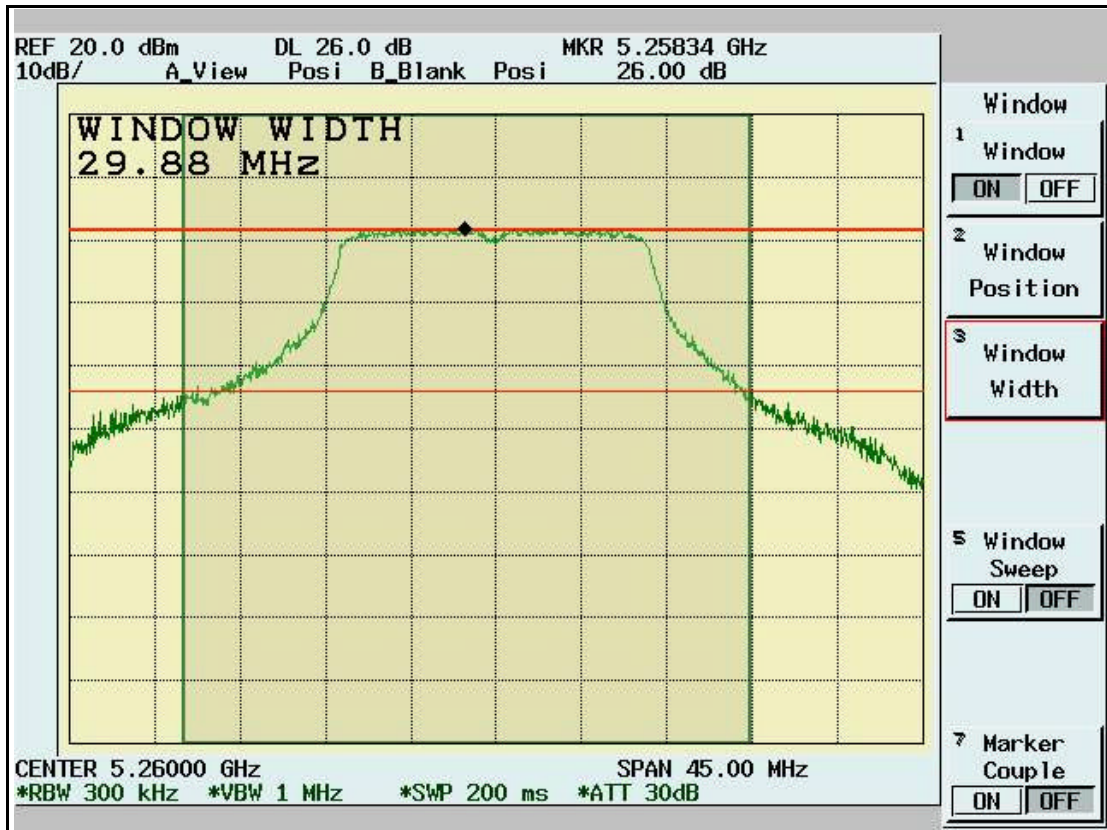
Temperature (deg. C): 25

Test Engr: Mailes Hsieh

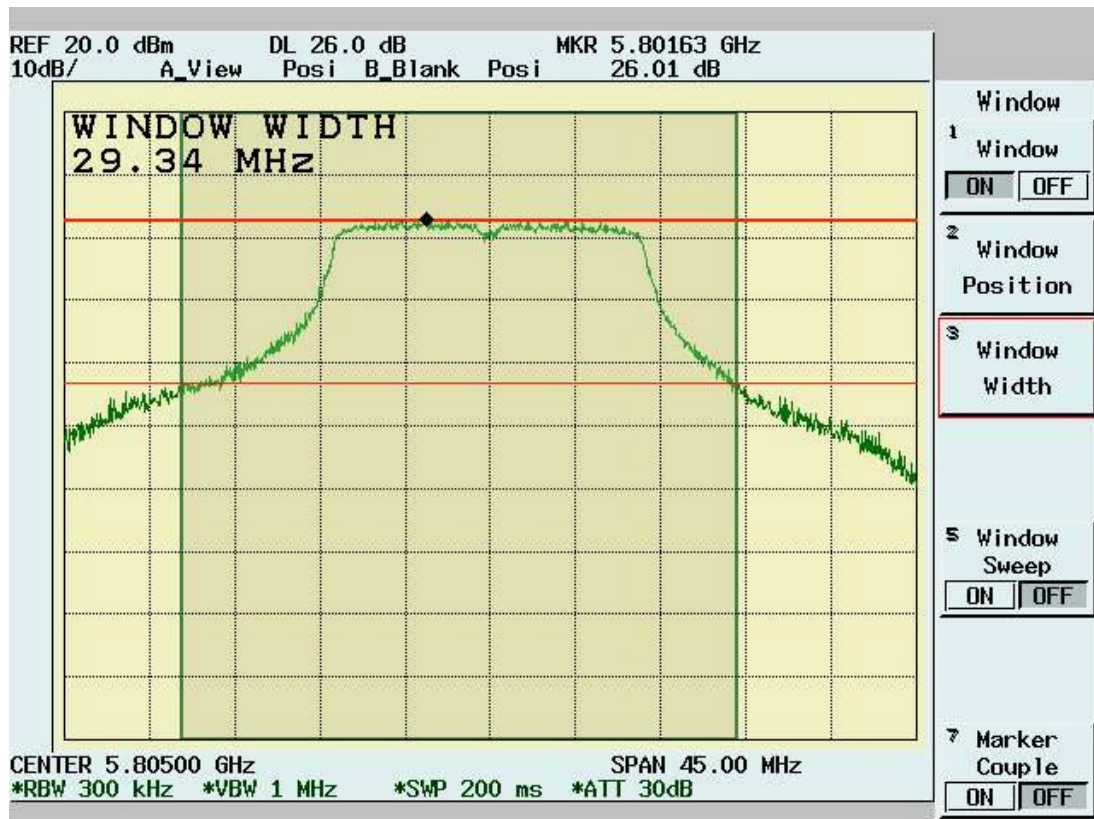
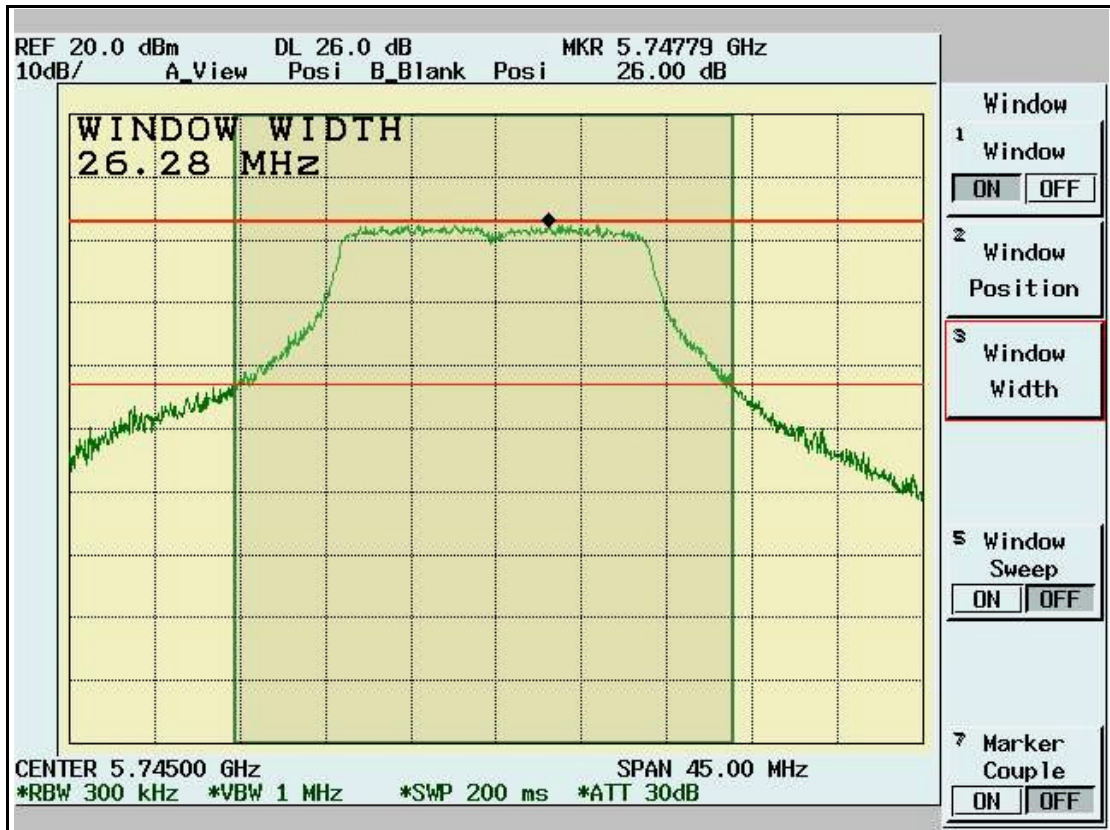
Humidity (%): 50

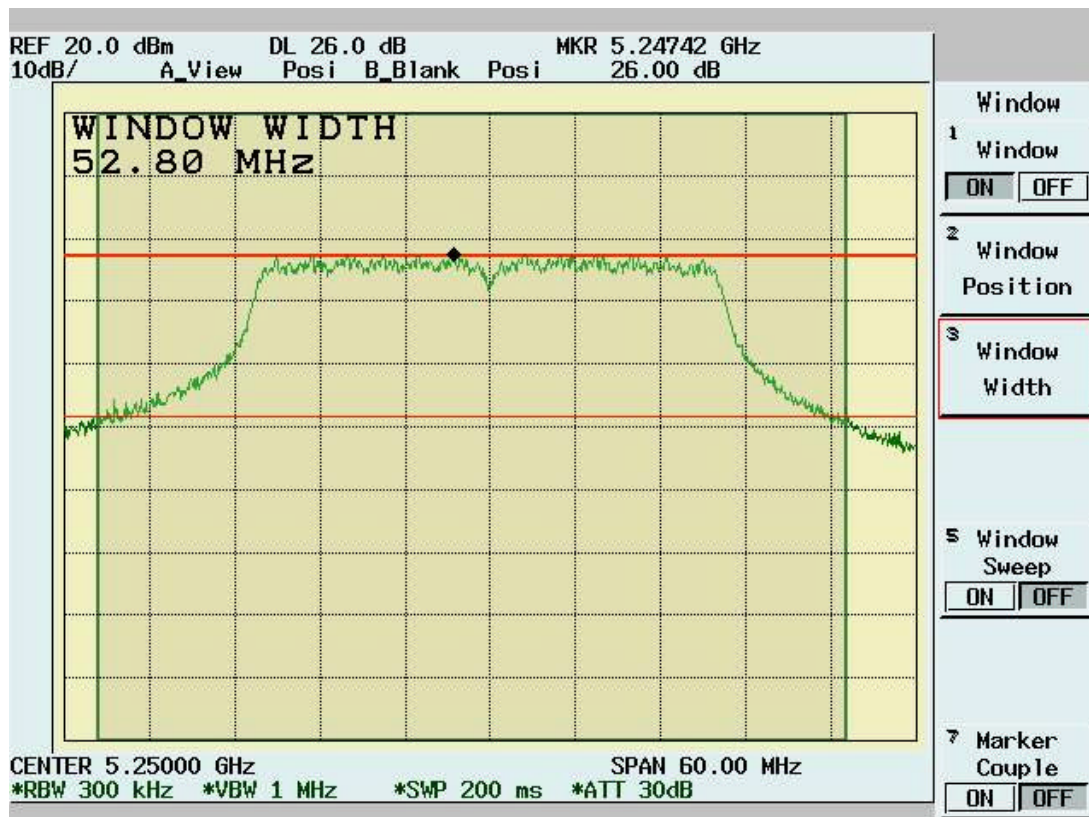
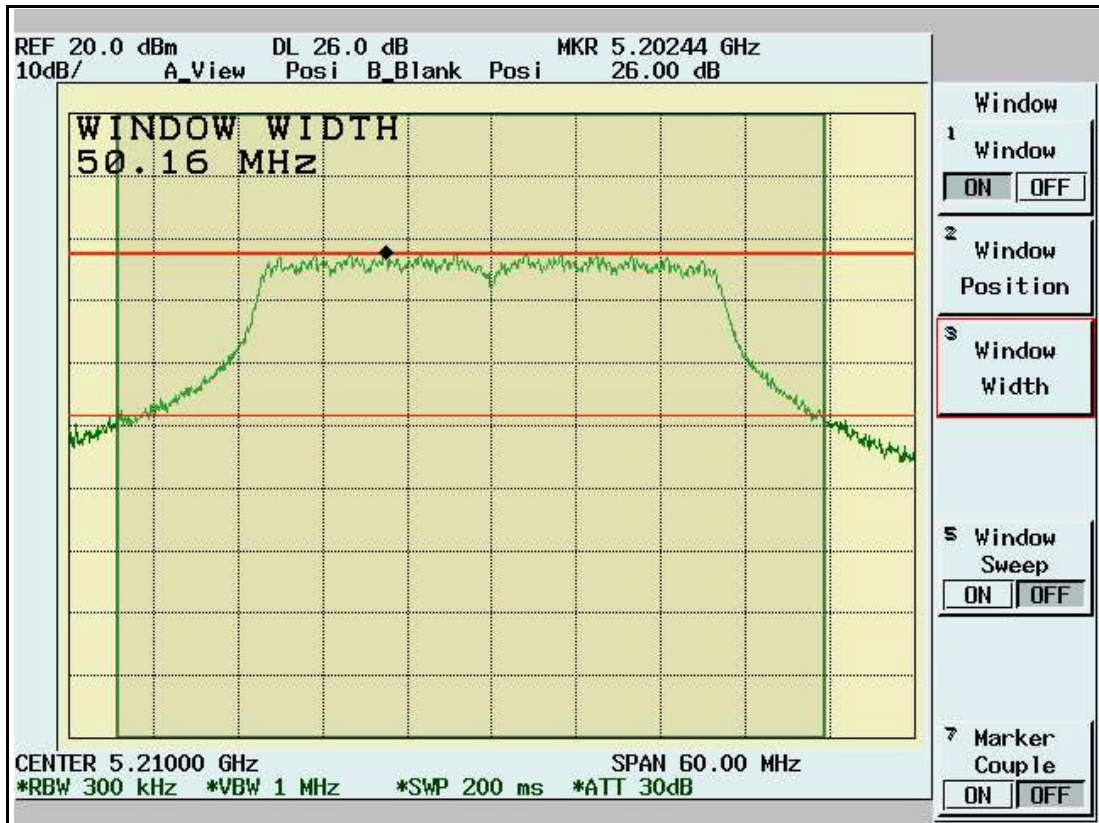
Chennel	Frequency (Mhz)	Peak Power Output (dBm)	26 dBc BW/Limit Mhz/dBm		The lesser Limit (dBm)	Pass/Fail
1	5210	16.825	50.16/	21.00	17.00	Pass
2	5250	16.887	52.8/	21.23	17.00	Pass
3	5290	19.762	51.84/	28.15	24.00	Pass
4	5760	19.293	53.04/	34.25	30.00	Pass
5	5800	17.262	50.88/	34.07	30.00	Pass



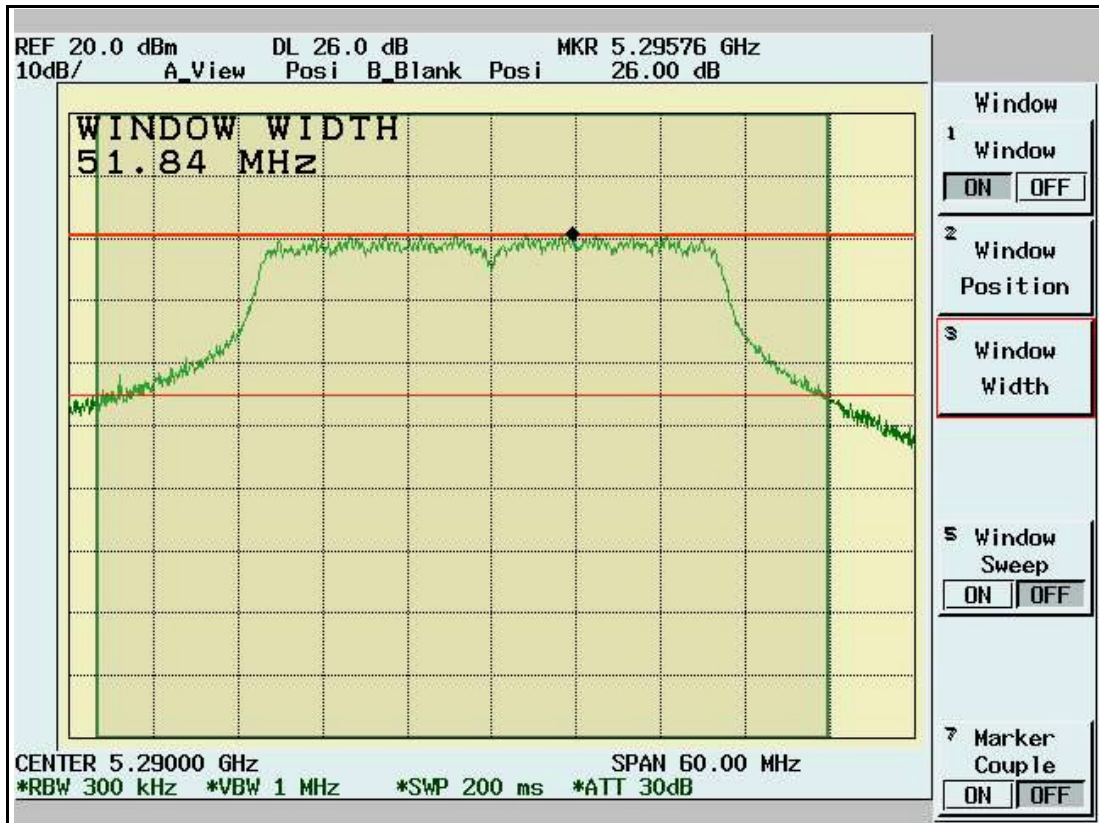




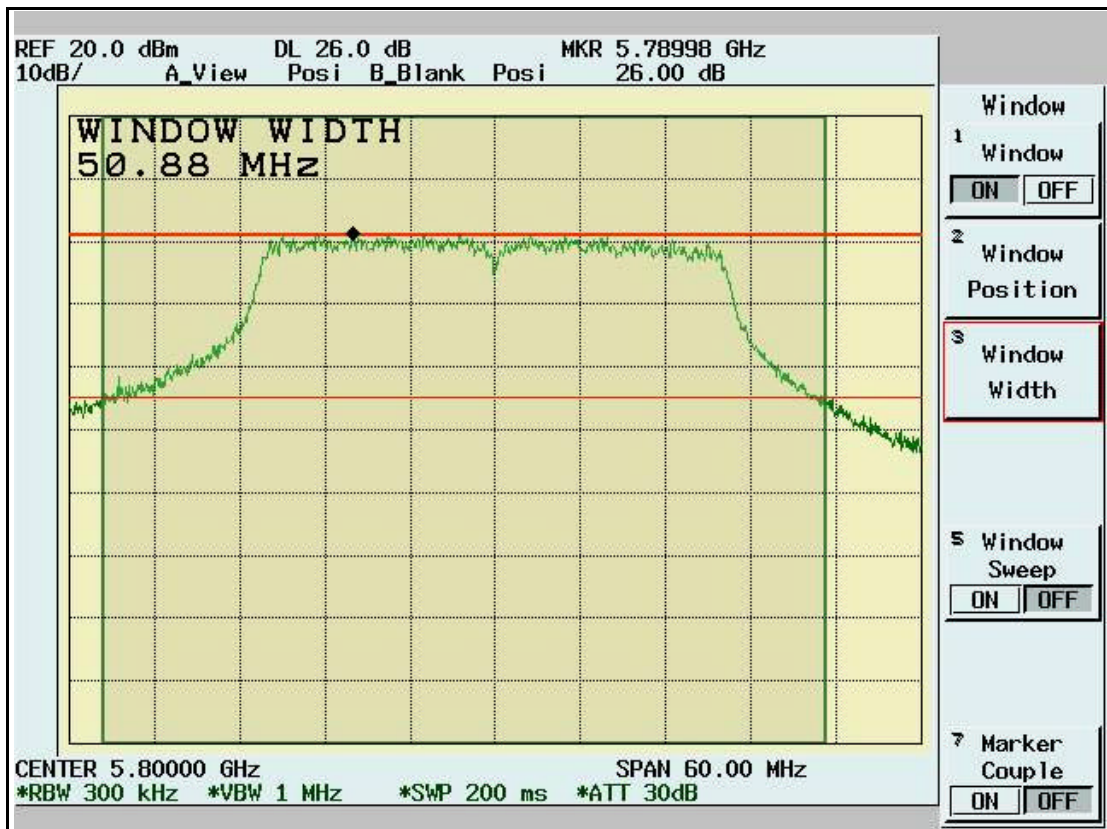










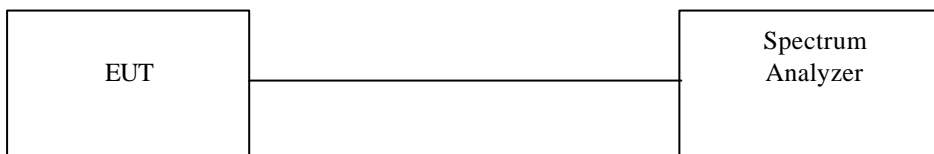


## 4.2 Peak Power Spectral Density [Section 15.407(a)(1)(2)(3) ]

### 4.2.1 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.

### 4.2.2 Test Setup



### 4.2.3 Test Data: (Normal Mode)

#### Maximum Peak Output Power Density

Temp. (deg. C): 25

Test Engr: Mailes Hsieh

Humidity (%): 50

Channel	Frequency (Mhz)	Spectrum Reading (dBm)	Cable Loss(dB)	Peak Power Output dBm/MHz)	Limit (dBm/Mhz)	Pass/Fail
1	5180	2.68	1.20	3.88	4.00	Pass
4	5240	2.13	1.20	3.33	4.00	Pass
5	5260	6.09	1.20	7.29	11.00	Pass
8	5320	6.10	1.20	7.30	11.00	Pass
9	5745	8.07	1.20	9.27	17.00	Pass
12	5805	8.34	1.20	9.54	17.00	Pass

#### 4.2.4 Test Data: (Turbo Mode)

##### Maximum Peak Output Power Density

Temp. (deg. C): 25

Test Engr: Mailes Hsieh

Humidity (%): 50

Channel	Frequency (Mhz)	Spectrum Reading (dBm)	Cable Loss(dB)	Peak Power Output dBm/MHz)	Limit (dBm/Mhz)	Pass/Fail
1	5210	2.60	1.20	3.80	4.00	Pass
2	5250	2.66	1.20	3.86	4.00	Pass
3	5290	2.81	1.20	4.01	11.00	Pass
4	5760	3.79	1.20	4.99	11.00	Pass
5	5800	1.36	1.20	2.56	17.00	Pass

