



## Test Report

Product Name	Notebook P.C.
Model No	UX30
FCC ID	MSQUX30INTEL512H

Applicant	ASUSTek COMPUTER INC.
Address	4FL., No. 15, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.

Date of Receipt	June 06, 2009
Issued Date	July 15, 2009
Report No.	096116R-RFUSP08V01
Report Version	V2.0

The test results relate only to the samples tested.

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# Test Report Certification

Issued Date: July 15, 2009

Report No.: 096116R-RFUSP08V01



Product Name	Notebook P.C.	
Applicant	ASUSTek COMPUTER INC.	
Address	4FL., No. 15, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.	
Manufacturer	1.PEGATRON CORPORATION Taoyuan Mfg 2.Protek (Shanghai) Limited. 3.NorthTec Asia (Shanghai) Limited.	
Model No.	UX30	
FCC ID.	MSQUX30INTEL512H	
Rated Voltage	AC 120V/60Hz	
Working Voltage	AC 100-240V, 50-60Hz	
Trade Name	ASUS	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E: 2008 ANSI C63.4: 2003	 <small>NVLAP Lab Code: 200533-0</small>
Test Result	Complied	

The Test Results relate only to the samples tested.

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 ( Manager / Vincent Lin)



## TABLE OF CONTENTS

Description	Page
<b>1. GENERAL INFORMATION</b> .....	<b>5</b>
1.1. EUT Description.....	5
1.2. Operational Description .....	7
1.3. Tested System Details.....	8
1.4. Configuration of tested System .....	8
1.5. EUT Exercise Software .....	9
1.6. Test Facility .....	10
<b>2. Conducted Emission</b> .....	<b>11</b>
2.1. Test Equipment.....	11
2.2. Test Setup .....	11
2.3. Limits .....	11
2.4. Test Procedure .....	12
2.5. Uncertainty .....	12
2.6. Test Result of Conducted Emission.....	13
<b>3. Peak Transmit Power</b> .....	<b>15</b>
3.1. Test Equipment.....	15
3.2. Test Setup .....	15
3.3. Limits .....	16
3.4. Test Procedur .....	16
3.5. Uncertainty .....	16
3.6. Test Result of Peak Transmit Power.....	17
<b>4. Peak Power Spectral Density</b> .....	<b>29</b>
4.1. Test Equipment.....	29
4.2. Test Setup .....	29
4.3. Limits .....	29
4.4. Test Procedure .....	29
4.5. Uncertainty .....	29
4.6. Test Result of Peak Power Spectral Density .....	30
<b>5. Peak Excursion</b> .....	<b>36</b>
5.1. Test Equipment.....	36
5.2. Test Setup .....	36
5.3. Limits .....	36
5.4. Test Procedure .....	36
5.5. Uncertainty .....	36
5.6. Test Result of Peak Excursion.....	37
<b>6. Undesirable Emission</b> .....	<b>43</b>
6.1. Test Equipment.....	43
6.2. Test Setup .....	43
6.3. Limits .....	44
6.4. Test Procedure .....	44
6.5. Uncertainty .....	44
6.6. Test Result of Undesirable Emission.....	45
<b>7. Radiated Emission</b> .....	<b>57</b>

7.1.	Test Equipment.....	57
7.2.	Test Setup .....	57
7.3.	Limits .....	58
7.4.	Test Procedure .....	59
7.5.	Uncertainty .....	59
7.6.	Test Result of Radiated Emission.....	60
<b>8.</b>	<b>Band Edge .....</b>	<b>81</b>
8.1.	Test Equipment.....	81
8.2.	Test Setup .....	82
8.3.	Limits .....	83
8.4.	Test Procedure .....	83
8.5.	Uncertainty .....	83
8.6.	Test Result of Band Edge .....	84
<b>9.</b>	<b>Frequency Stability.....</b>	<b>90</b>
9.1.	Test Equipment.....	90
9.2.	Test Setup .....	90
9.3.	Limits .....	90
9.4.	Test Procedure .....	90
9.5.	Uncertainty .....	90
9.6.	Test Result of Frequency Stability.....	91
<b>10.</b>	<b>EMI Reduction Method During Compliance Testing .....</b>	<b>94</b>

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Notebook P.C.
Trade Name	ASUS
FCC ID.	MSQUX30INTEL512H
Model No.	UX30
Frequency Range	5470-5725MHz
Number of Channels	802.11a/n-20MHz: 11; 802.11n-40MHz: 5
Data Rate	802.11a: 6 - 54Mbps 802.11n(20BW): 13.5-144Mbps, 802.11n(40BW): 27-300Mbps
Channel Control	Auto
Type of Modulation	802.11a/n:OFDM BPSK, QPSK, 16QAM, 64QAM
Antenna type	PIFA Antenna
Antenna Gain	Refer to the table "Antenna List"
Power Adapter	MFR: PIE(ASUS), M/N: AD6630 Input: AC 100-240V, 50-60Hz, 1.0A Output: DC 19V, 2.1A Cable Out: Shielded, 1.8m, with one ferrite core bonded.

#### Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	INPAQ	WA-P-LB-02-007 (Tx1)	2.5dBi in 2.4 GHz
		WA-P-LB-01-002 (Tx2) (or Rx2 for 512 family)	1.73dBi in 5GHz
2	ACON	AMP6P-700064 (Tx1)	1.34dBi in 2.4 GHz
		AMP6P-700065 (Tx2) (or Rx2 for 512 family)	2.38dBi in 5GHz

## 802.11a/n-20MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 100:	5500 MHz	Channel 104:	5520 MHz	Channel 108:	5540 MHz	Channel 112:	5560 MHz
Channel 116:	5580 MHz	Channel 120:	5600 MHz	Channel 124:	5620 MHz	Channel 128:	5640 MHz
Channel 132:	5660 MHz	Channel 136:	5680 MHz	Channel 140:	5700 MHz		

## 802.11n-40MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 102:	5510 MHz	Channel 110:	5550 MHz	Channel 118:	5590 MHz	Channel 126:	5630 MHz
Channel 134:	5670 MHz						

## Note:

1. This device is a Notebook P.C. with a built-in WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11a is 6Mbps, 802.11n-20BW is 13.5Mbps and 802.11n-40BW are 27Mbps)
3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

**1.2. Operational Description**

The EUT is a Notebook P.C. with a built-in 2.4GHz and 5GHz WLAN card. This device provided four kinds of transmitting speed 1, 2, 5.5 and 11Mbps and the device of RF carrier is DBPSK, DQPSK and CCK (IEEE 802.11b). The device provided of eight kinds of transmitting speed 6, 9, 12, 18, 24, 36, 48 and 54Mbps the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM (IEEE 802.11a/g).

The device provided of eight kinds of transmitting speed 13.5,26,39,52,78,104,117 and 130Mbps in 802.11n(20BW) mode and 27,54,81,108,162,216,243 and 270Mbps(40BW) the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM (IEEE 802.11n), the IEEE 802.11n is Multiple In, Multiple Out” (MIMO) technology.

The device adapts direct sequence spread spectrum modulation. The antenna provides diversity function to improve the receiving function and the antennas to support 1(Transmit) × 2 (Receive) MISO technology.

This Notebook P.C. , compliant with IEEE 802.11b and IEEE 802.11a/g/n, is a high-efficiency Wireless LAN adapter. It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Operation in 2.4GHz Direct Sequence Spread Spectrum (DSSS) radio transmission, the Notebook P.C. Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any IEEE 802.11b and IEEE 802.11a/g/n network.

Another information please refer to users manual.

Test Mode	Mode 1: Transmitter (802.11a-6Mbps)-Antenna 2 Mode 2: Transmitter (802.11n-20BW 13.5Mbps)-Antenna 2 Mode 3: Transmitter (802.11n-40BW 27Mbps)-Antenna 2
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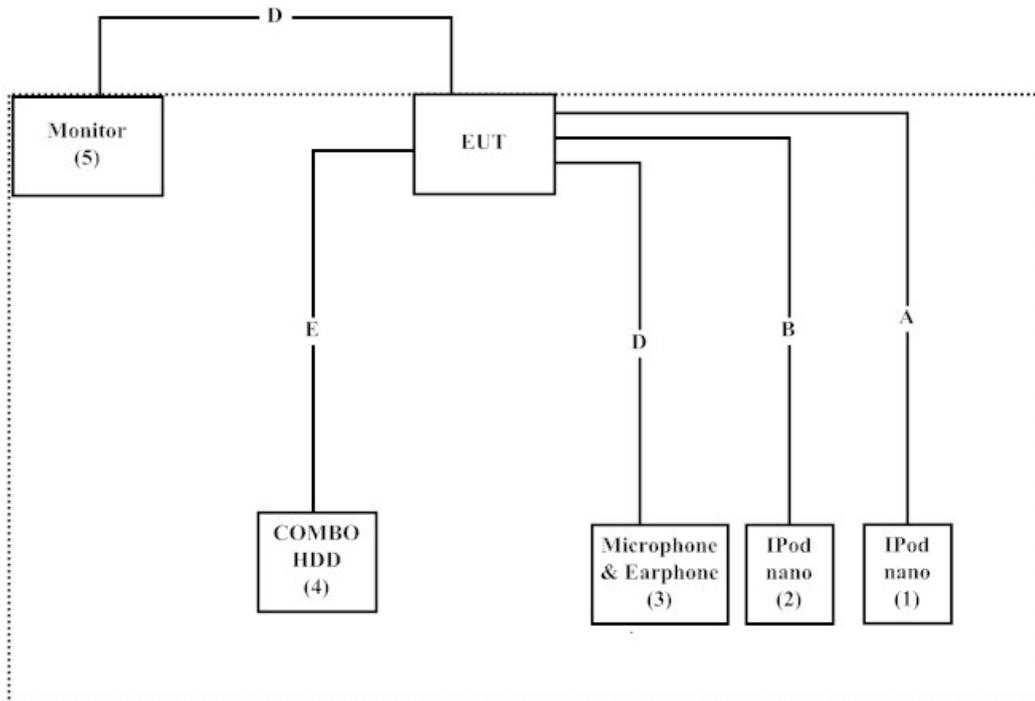
### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
(1) iPod nano	Apple	A1236	7K818WQLY0P	N/A
(2) iPod nano	Apple	A1236	YM827ERSY0P	N/A
(3) Microphone & Earphone	PCHOME	N/A	N/A	N/A
(4) COMBO HDD	TeraSys	F12-UF	A0100215-63m0031	Non-Shielded 1.8m
(5) Monitor	Dell	2407WFPb	CN-0FC255-46633-67T-04HS	Non-Shielded, 1.8m

Signal Cable Type	Signal cable Description
A. USB Cable	Shielded, 1.2m
B. USB Cable	Shielded, 1.2m
C. Earphone Cable	Non-Shielded, 1.2m
D. VGA Cable	Non-Shielded, 1.8m
E. USB Cable	Shielded, 1.2m

### 1.4. Configuration of tested System



## 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute CRTU (Version 5.0.48.0000) on the EUT.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press “OK” to start the continuous transmission.
- (5) Verify that the EUT works properly.

**1.6. Test Facility**

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site : <http://tw.quietek.com/modules/myalbum/>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

Site Description: File on  
 Federal Communications Commission  
 FCC Engineering Laboratory  
 7435 Oakland Mills Road  
 Columbia, MD 21046  
 Registration Number: 92195



Accreditation on NVLAP  
 NVLAP Lab Code: 200533-0



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 E-Mail : [service@quietek.com](mailto:service@quietek.com)

FCC Accreditation Number: TW1014



## 2. Conducted Emission

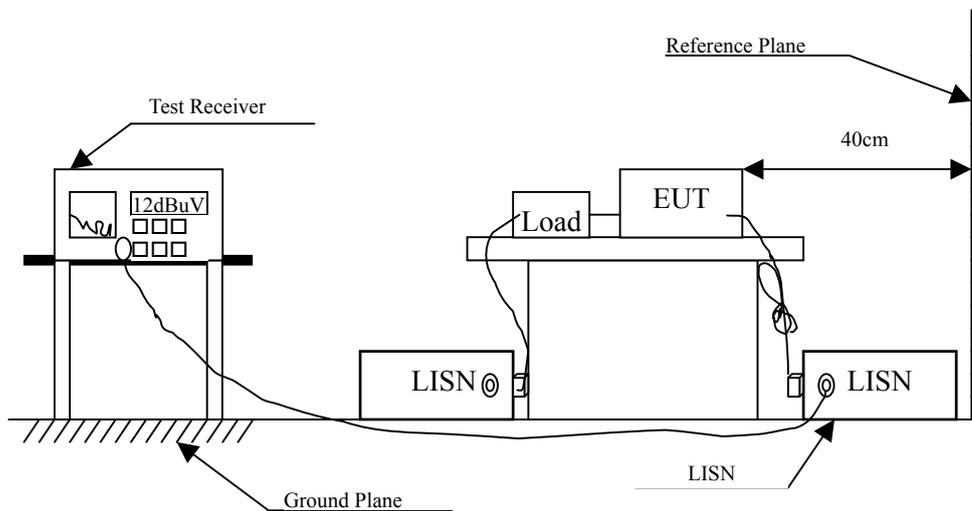
### 2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2009	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2009	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2009	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2009	
5	No.1 Shielded Room			N/A	

Note: All equipments are calibrated every one year.

### 2.2. Test Setup



### 2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

## 2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Aug 2002 DA 02-2138 for compliance to FCC 47CFR Subpart E requirements.

## 2.5. Uncertainty

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product : Notebook P.C.  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 3: Transmitter (802.11n-40BW 27Mbps)-Antenna 2 (5510MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.181	9.724	45.560	55.284	-9.830	65.114
0.357	9.650	27.680	37.330	-22.756	60.086
0.732	9.635	30.430	40.065	-15.935	56.000
1.420	9.670	18.400	28.070	-27.930	56.000
6.263	9.740	16.530	26.270	-33.730	60.000
23.752	10.037	21.090	31.127	-28.873	60.000
<b>Average</b>					
0.181	9.724	33.530	43.254	-11.860	55.114
0.357	9.650	14.850	24.500	-25.586	50.086
0.732	9.635	22.550	32.185	-13.815	46.000
1.420	9.670	8.080	17.750	-28.250	46.000
6.263	9.740	10.670	20.410	-29.590	50.000
23.752	10.037	15.930	25.967	-24.033	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Notebook P.C.  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 3: Transmitter (802.11n-40BW 27Mbps)-Antenna 2 (5510MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.177	9.736	44.620	54.356	-10.873	65.229
0.236	9.692	37.210	46.902	-16.641	63.543
0.755	9.663	31.390	41.053	-14.947	56.000
1.951	9.680	15.940	25.620	-30.380	56.000
6.228	9.730	16.070	25.800	-34.200	60.000
25.537	10.160	20.350	30.510	-29.490	60.000
<b>Average</b>					
0.177	9.736	32.340	42.076	-13.153	55.229
0.236	9.692	23.650	33.342	-20.201	53.543
0.755	9.663	23.110	32.773	-13.227	46.000
1.951	9.680	7.400	17.080	-28.920	46.000
6.228	9.730	10.460	20.190	-29.810	50.000
25.537	10.160	15.230	25.390	-24.610	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "█" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

### 3. Peak Transmit Power

#### 3.1. Test Equipment

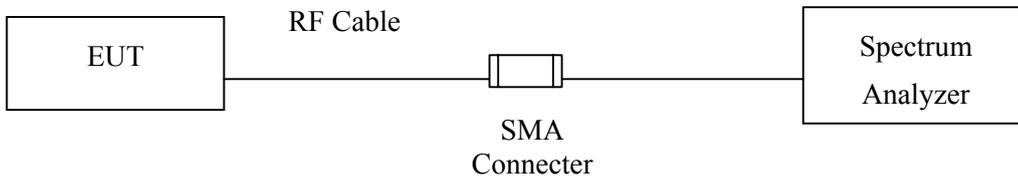
The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Power Meter	Anritsu	ML2495A/6K00003357	May, 2009
X Power Sensor	Anritsu	MA2491A/034457	May, 2009
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr, 2009

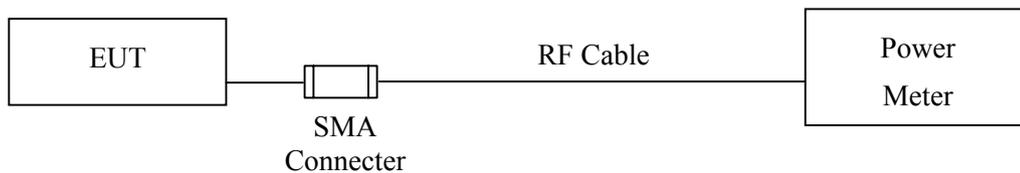
- Note:
1. All equipments are calibrated every one year.
  2. The test instruments marked by “X” are used to measure the final test results.

#### 3.2. Test Setup

##### 26dBc Occupied Bandwidth



##### Conduction Power Measurement



### 3.3. Limits

- (1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or  $4 \text{ dBm} + 10 \log B$ , where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (2) For the band 5.25-5.35 GHz and 5.47-5.725GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.825 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1W or  $17 \text{ dBm} + 10 \log B$ , where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

### 3.4. Test Procedur

As an alternative to DA 02-2138, the EUT peak power was measured with a peak power meter employing a video bandwidth greater than 6dB BW of the emission under test. Peak output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of DA 02-2138, and provides more accurate measurements.

### 3.5. Uncertainty

$\pm 1.27 \text{ dB}$

### 3.6. Test Result of Peak Transmit Power

Product : Notebook P.C.  
 Test Item : Peak Transmit Power  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (802.11a-6Mbps)-Antenna 2

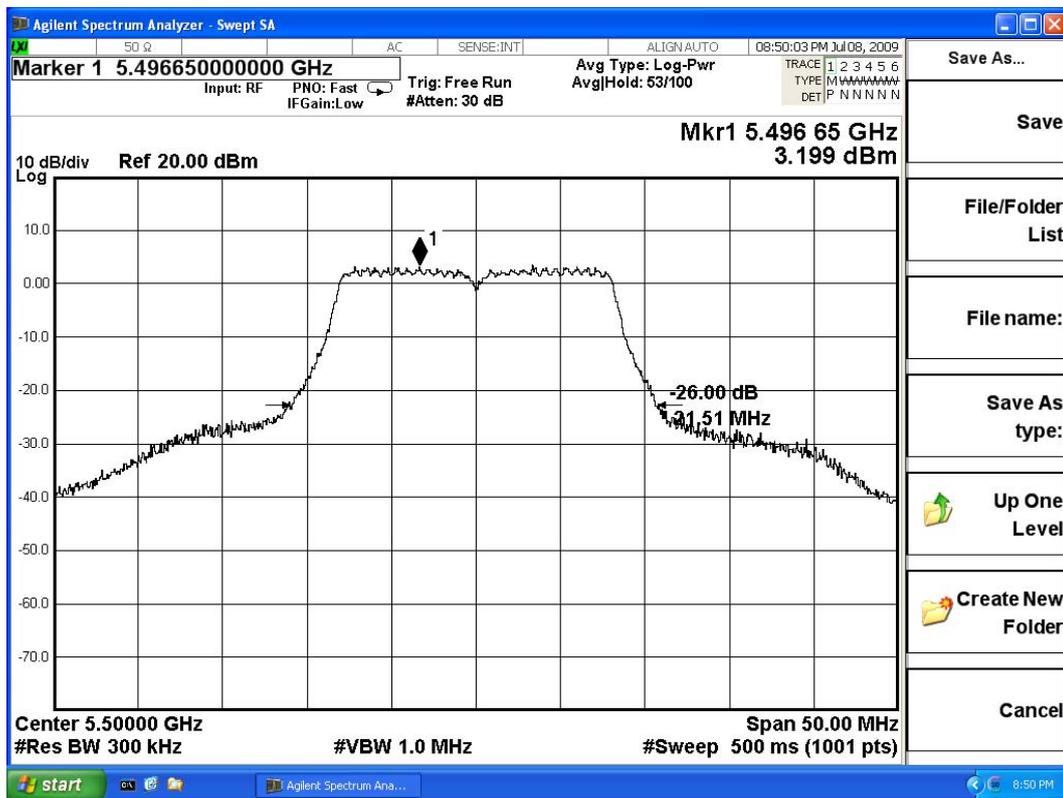
Cable loss=1dB		Peak Power Output								Required Limit
Channel No.	Frequency (MHz)	Data Rate						54		
		6	9	12	18	24	36			48
100	5500	16.98	--	--	--	--	--	--	--	<24dBm
120	5600	17.41	17.3	16.58	16.66	16.45	17.08	17.12	17	<24dBm
140	5700	15.00	--	--	--	--	--	--	--	<24dBm

Note: Peak Power Output Value =Reading value on peak power meter + cable loss

**Peak Transmit Power Measurement:**

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
100	5500	31.51	16.98	24	25.98	Pass

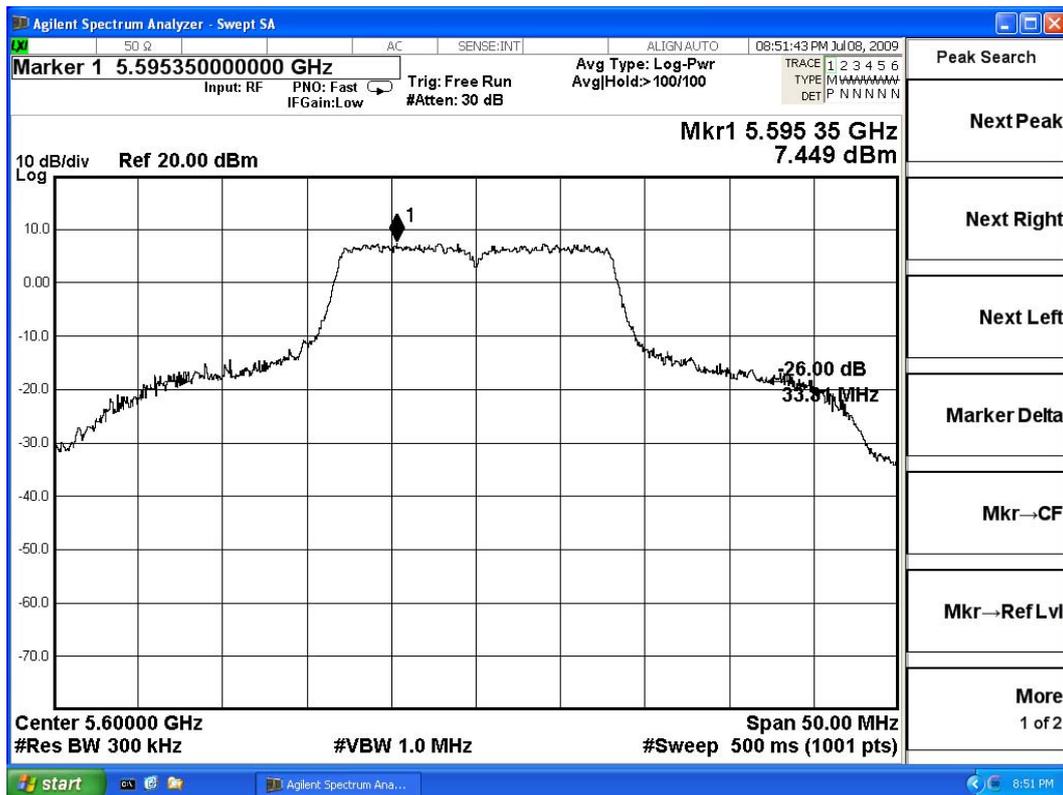
**26dBc Occupied Bandwidth:  
Channel 100**



**Peak Transmit Power Measurement:**

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
120	5600	33.31	17.41	24	26.23	Pass

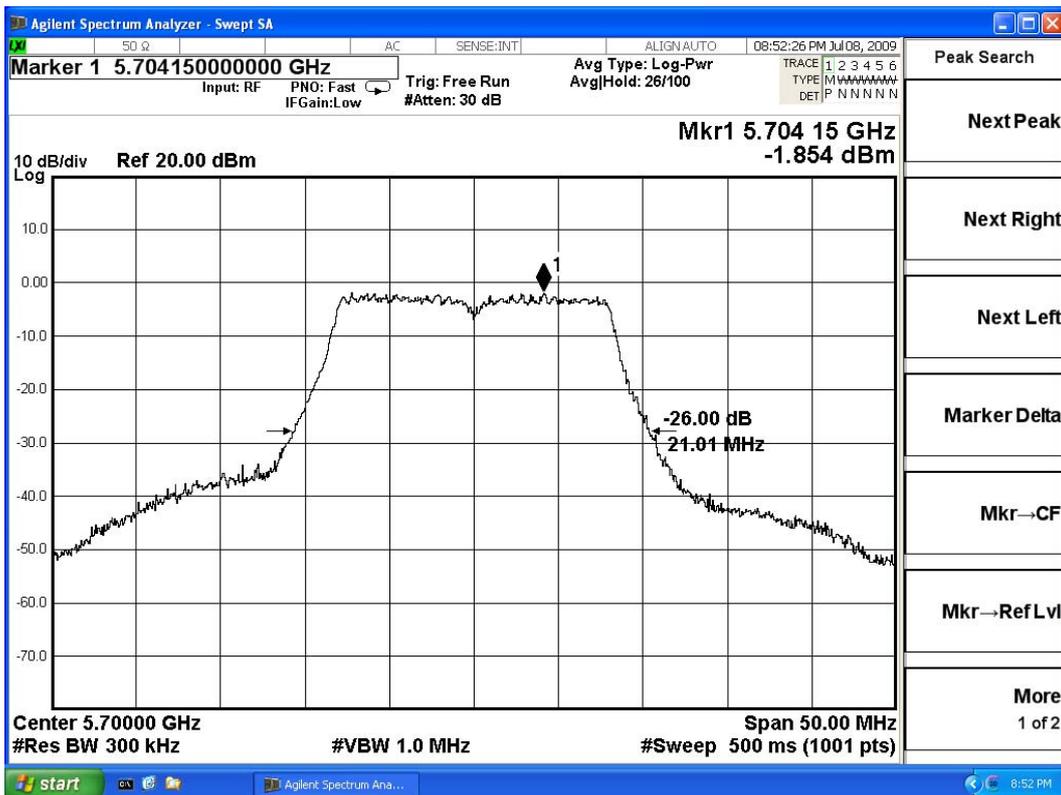
**26dBc Occupied Bandwidth:  
Channel 120**



**Peak Transmit Power Measurement:**

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
140	5700	21.01	15.00	24	24.22	Pass

**26dBc Occupied Bandwidth:  
Channel 140**



Product : Notebook P.C.  
 Test Item : Peak Transmit Power  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter (802.11n-20BW 13.5Mbps)-Antenna 2

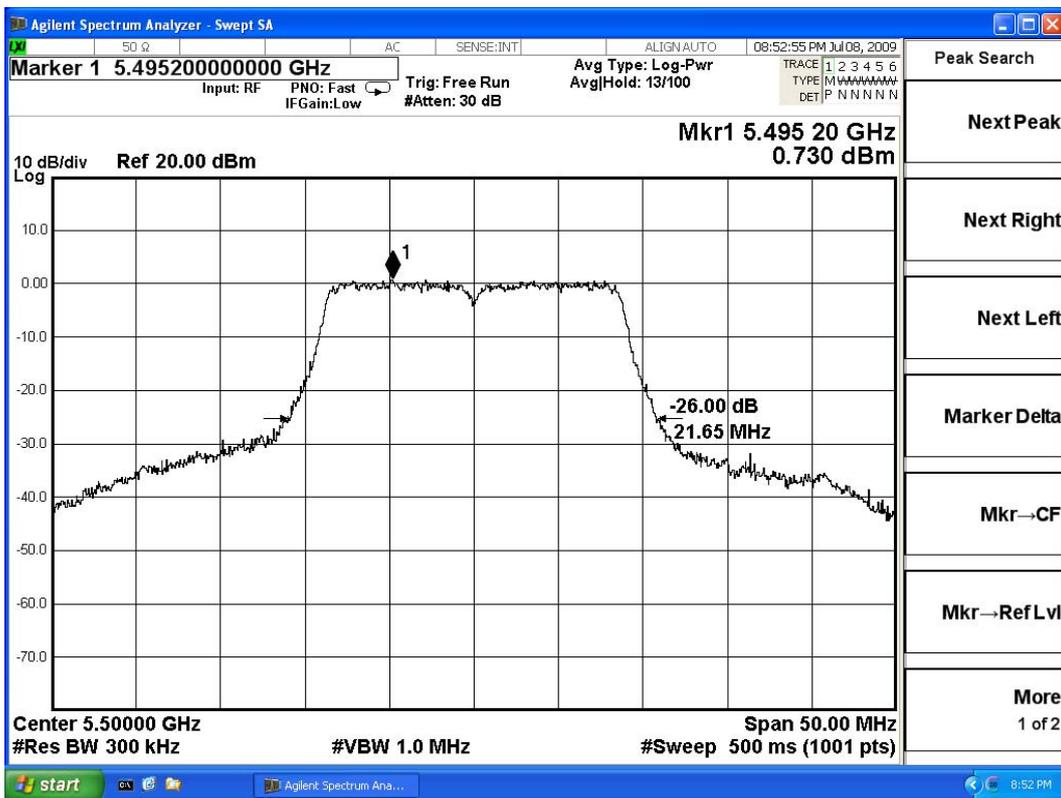
Cable loss=1dB		Peak Power Output								
Channel No.	Frequency (MHz)	Data Rate(MCS)								Required Limit
		6	9	12	18	24	36	48	54	
100	5500	16.39	--	--	--	--	--	--	--	<24dBm
120	5600	16.47	16.33	16.25	15.88	15.95	16.22	16.05	16.2	<24dBm
140	5700	16.29	--	--	--	--	--	--	--	<24dBm

Note: Peak Power Output Value =Reading value on peak power meter + cable loss

**Peak Transmit Power Measurement:**

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
100	5500	21.65	16.39	24	24.35	Pass

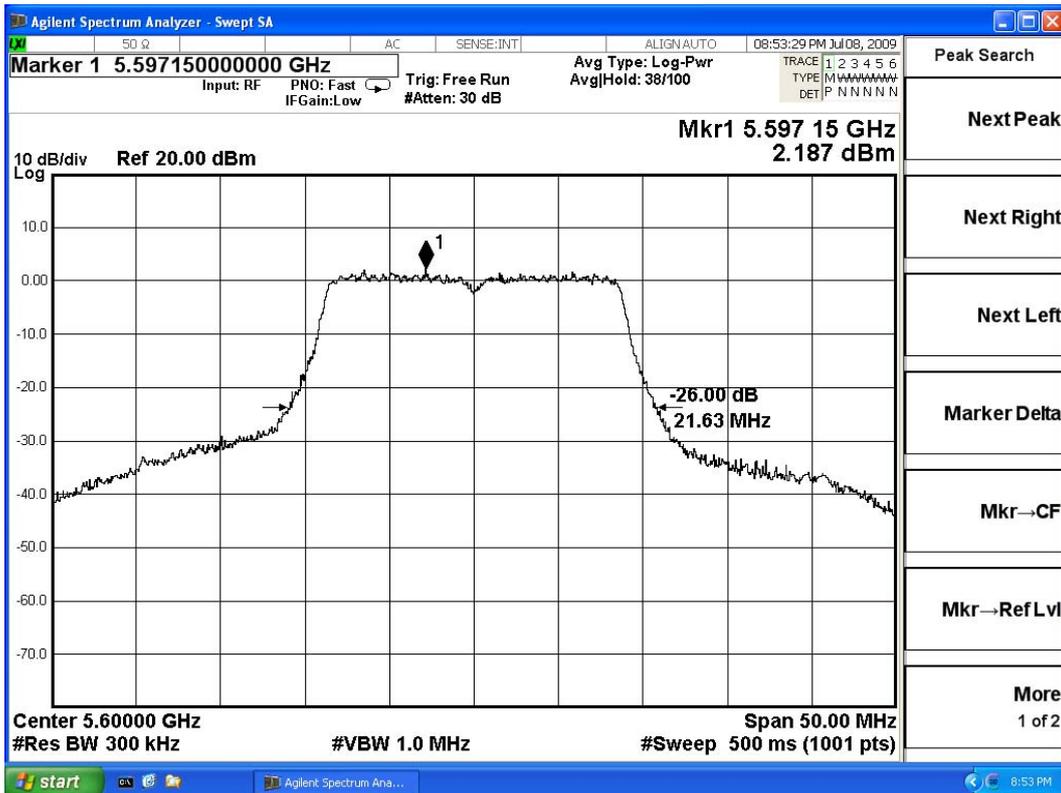
**26dBc Occupied Bandwidth:  
Channel 100**



**Peak Transmit Power Measurement:**

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
120	5600	21.63	16.47	24	24.35	Pass

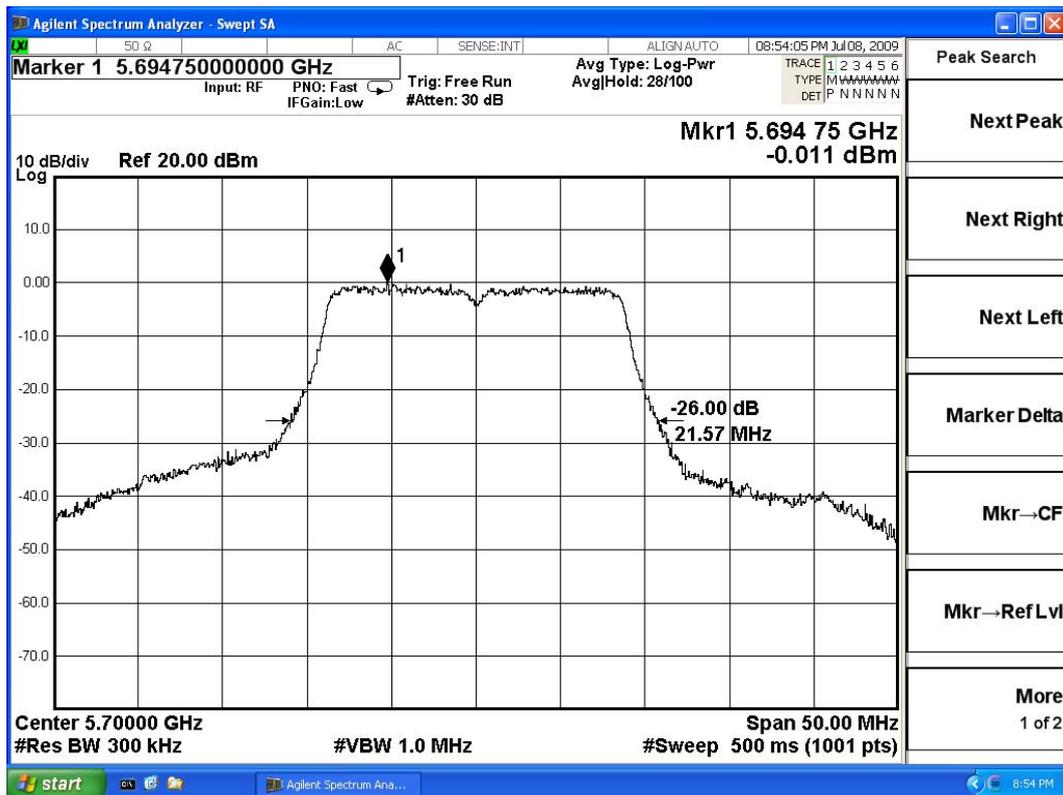
**26dBc Occupied Bandwidth:  
Channel 120**



**Peak Transmit Power Measurement:**

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
140	5700	21.57	16.29	24	24.34	Pass

**26dBc Occupied Bandwidth:  
Channel 140**



Product : Notebook P.C.  
 Test Item : Peak Transmit Power  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter (802.11n-40BW 27Mbps)-Antenna 2

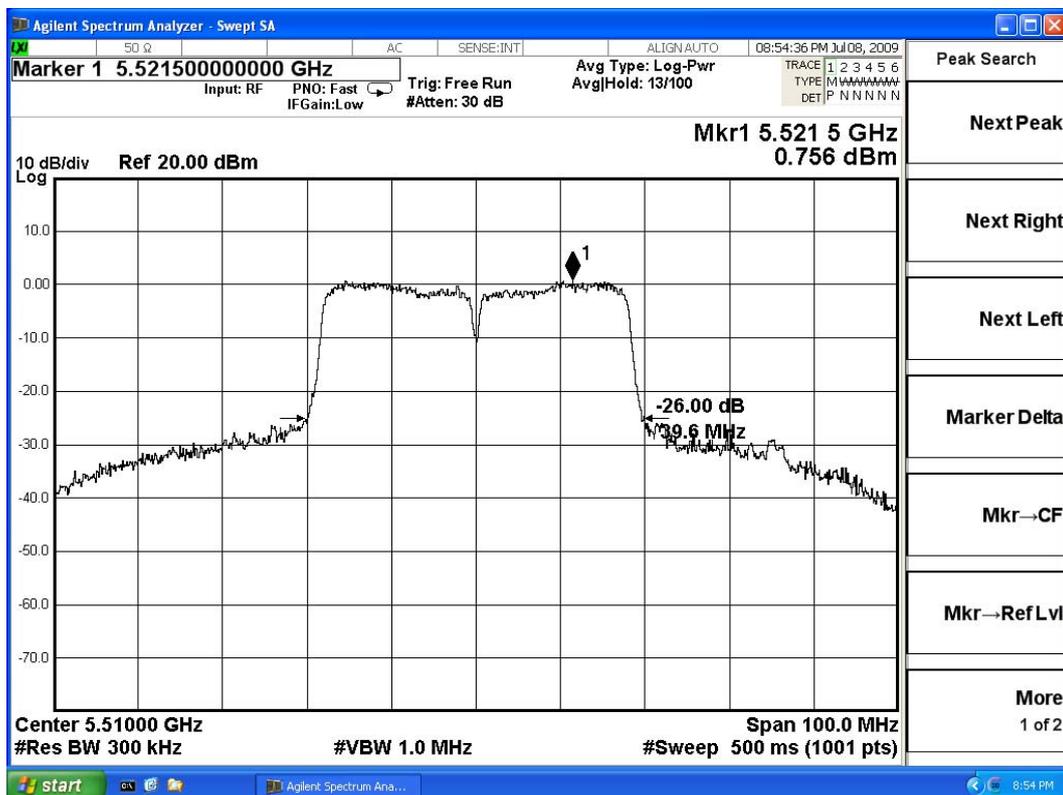
Cable loss=1dB		Peak Power Output								
Channel No.	Frequency (MHz)	Data Rate(MCS)								Required Limit
		6	9	12	18	24	36	48	54	
102	5510	17.00	--	--	--	--	--	--	--	<24dBm
118	5590	16.88	16.55	16.32	16.55	16.05	16.25	16.21	16.55	<24dBm
134	5670	16.44	--	--	--	--	--	--	--	<24dBm

Note: Peak Power Output Value =Reading value on peak power meter + cable loss

**Peak Transmit Power Measurement:**

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
102	5510	39.60	17.00	24	26.98	Pass

**26dBc Occupied Bandwidth:  
Channel 102**

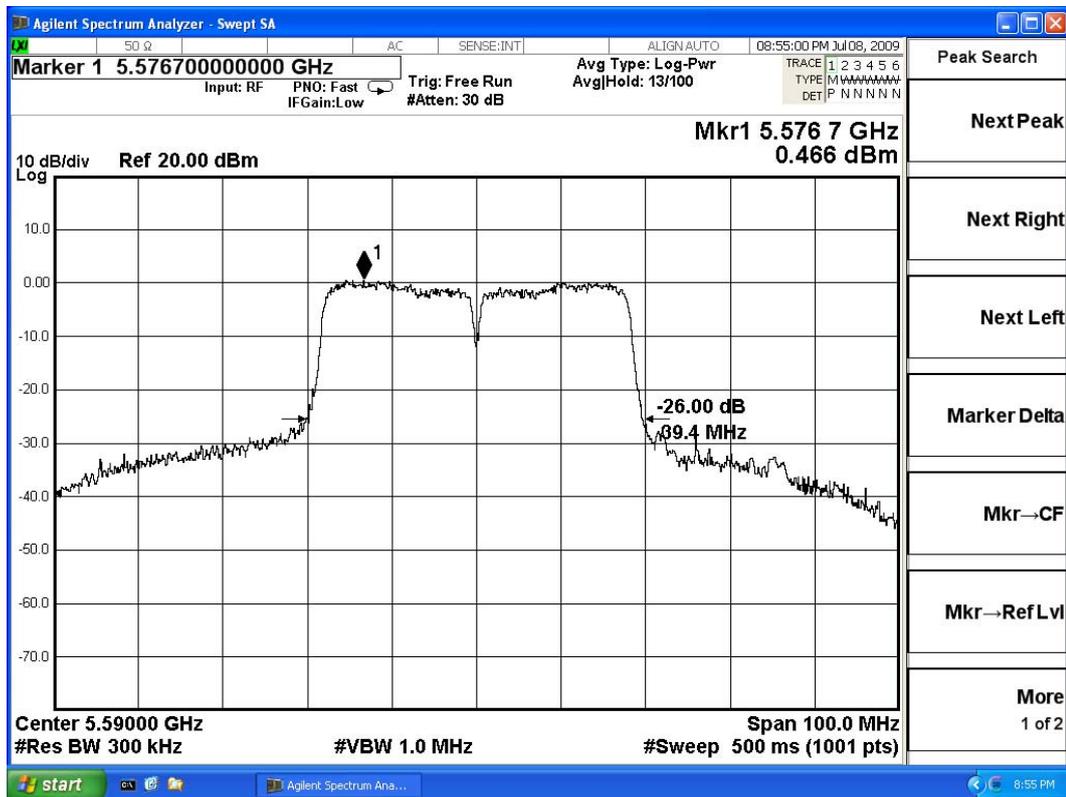


**Peak Transmit Power Measurement:**

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
118	5590	39.40	16.88	24	26.95	Pass

**26dBc Occupied Bandwidth:**

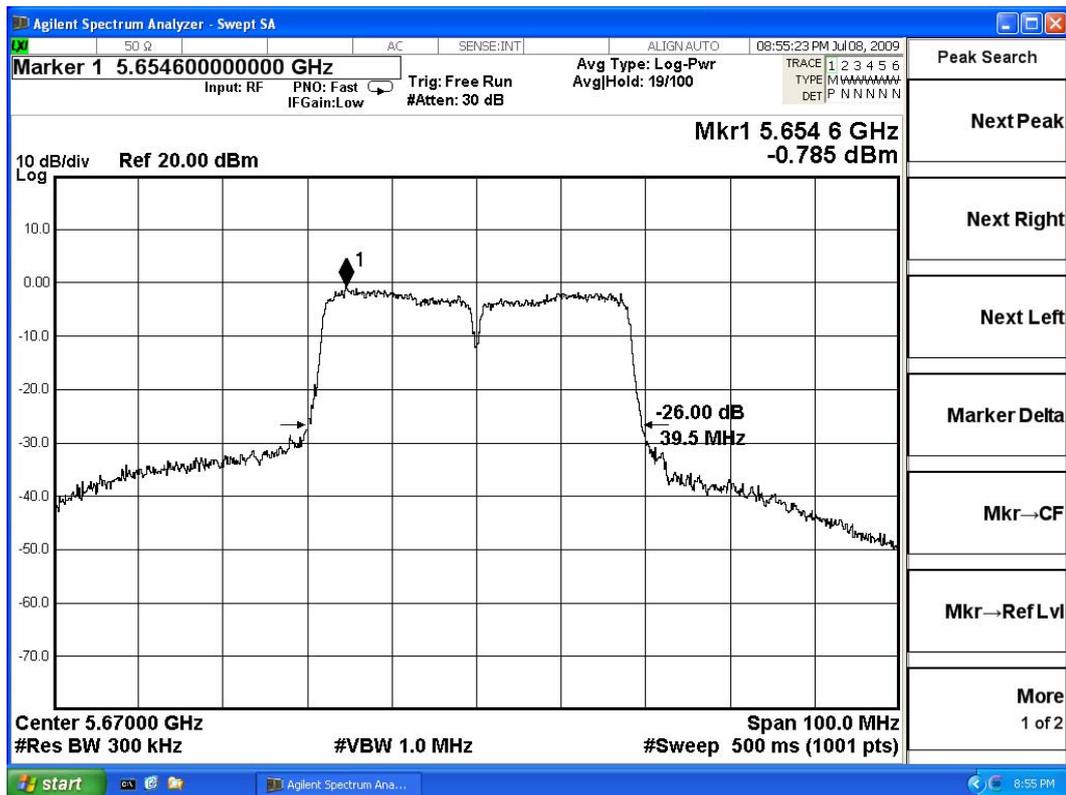
**Channel 118**



**Peak Transmit Power Measurement:**

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
134	5670	39.50	16.44	24	26.97	Pass

**26dBc Occupied Bandwidth:  
Channel 134**



## 4. Peak Power Spectral Density

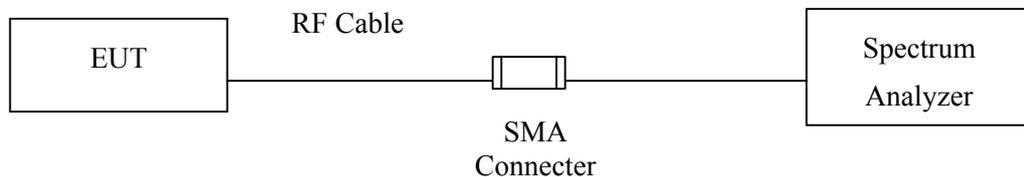
### 4.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2009
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr, 2009

- Note:
1. All equipments are calibrated every one year.
  2. The test instruments marked by “X” are used to measure the final test results.

### 4.2. Test Setup



### 4.3. Limits

- (4) 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 antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (5) For the band 5.25-5.35 GHz and 5.47-5.725GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (6) For the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

### 4.4. Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Aug 2002 DA 02-2138 for compliance to FCC 47CFR Subpart E requirements.

### 4.5. Uncertainty

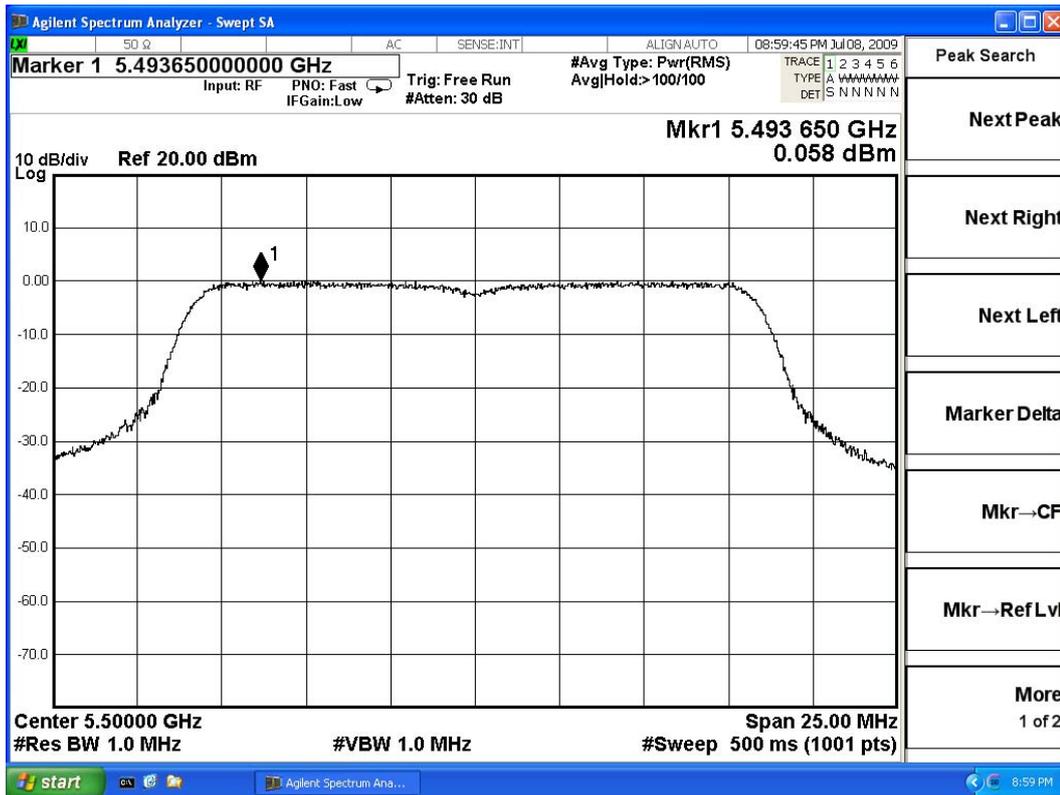
± 1.27 dB

#### 4.6. Test Result of Peak Power Spectral Density

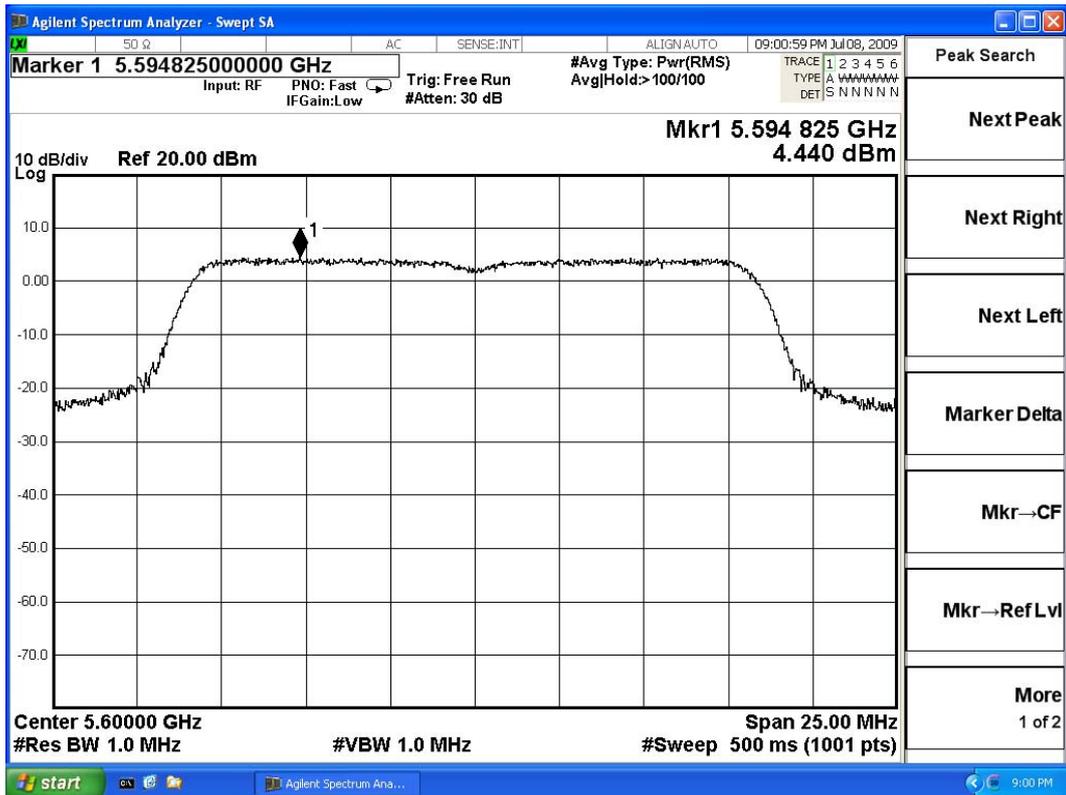
Product : Notebook P.C.  
 Test Item : Peak Power Spectral Density  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (802.11a-6Mbps)-Antenna 2

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
100	5500	0.058	<11	Pass
120	5600	4.440	<11	Pass
140	5700	-4.484	<11	Pass

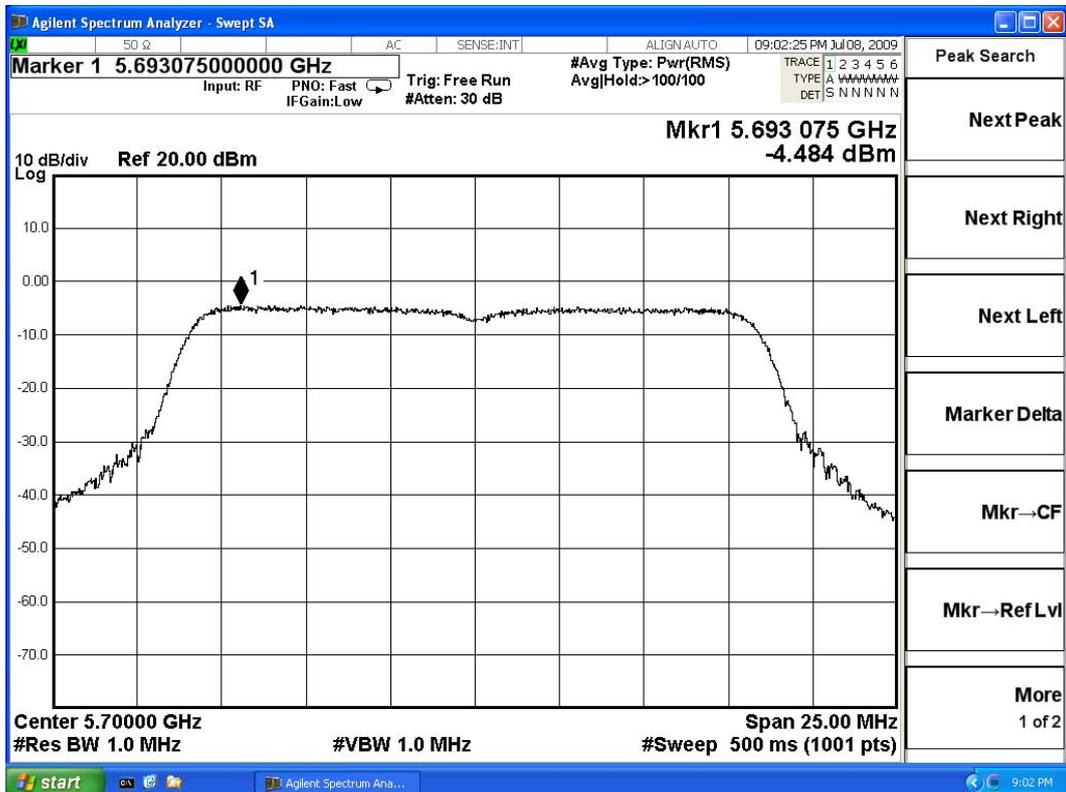
**Channel 100:**



**Channel 120:**



**Channel 140:**

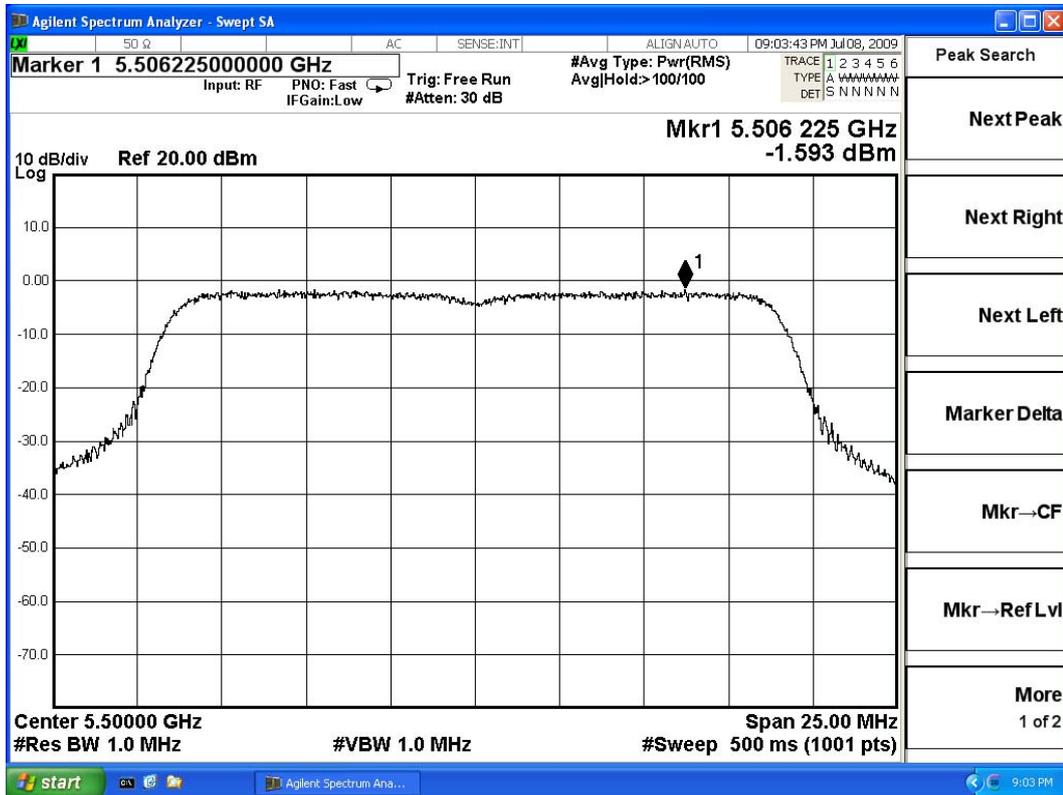


Product : Notebook P.C.  
 Test Item : Peak Power Spectral Density  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter (802.11n-20BW 13.5Mbps)-Antenna 2

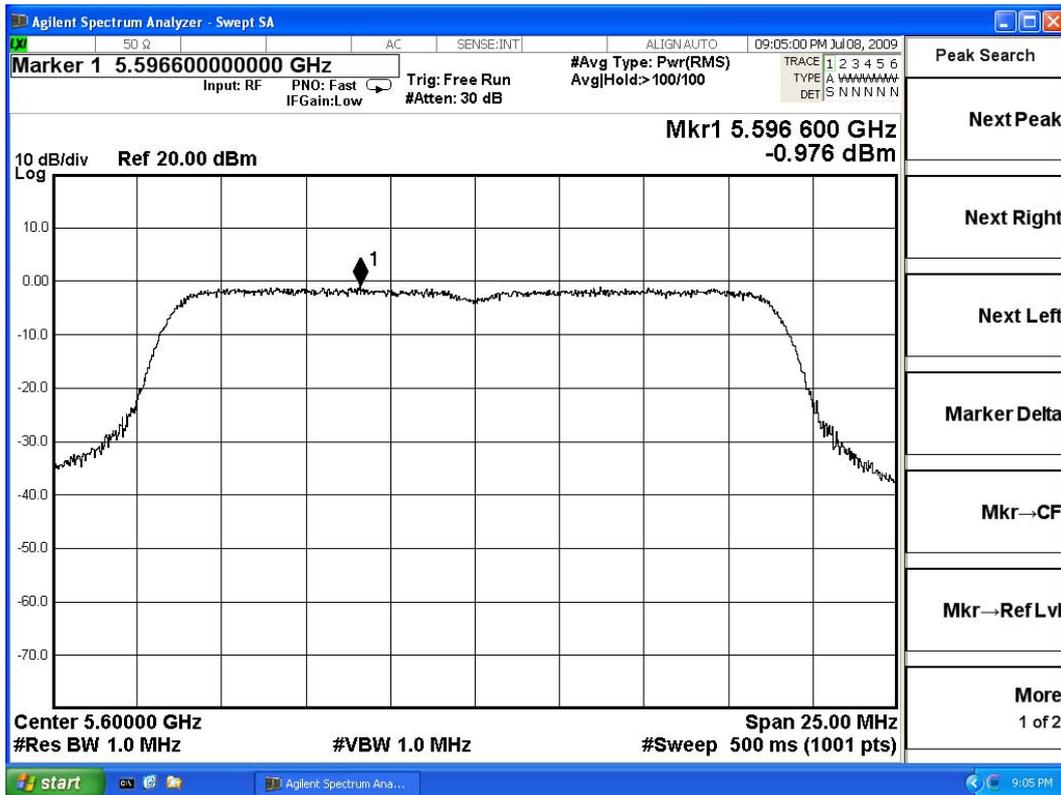
Ant A

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
100	5500	-1.593	<11	Pass
120	5600	-0.976	<11	Pass
140	5700	-2.888	<11	Pass

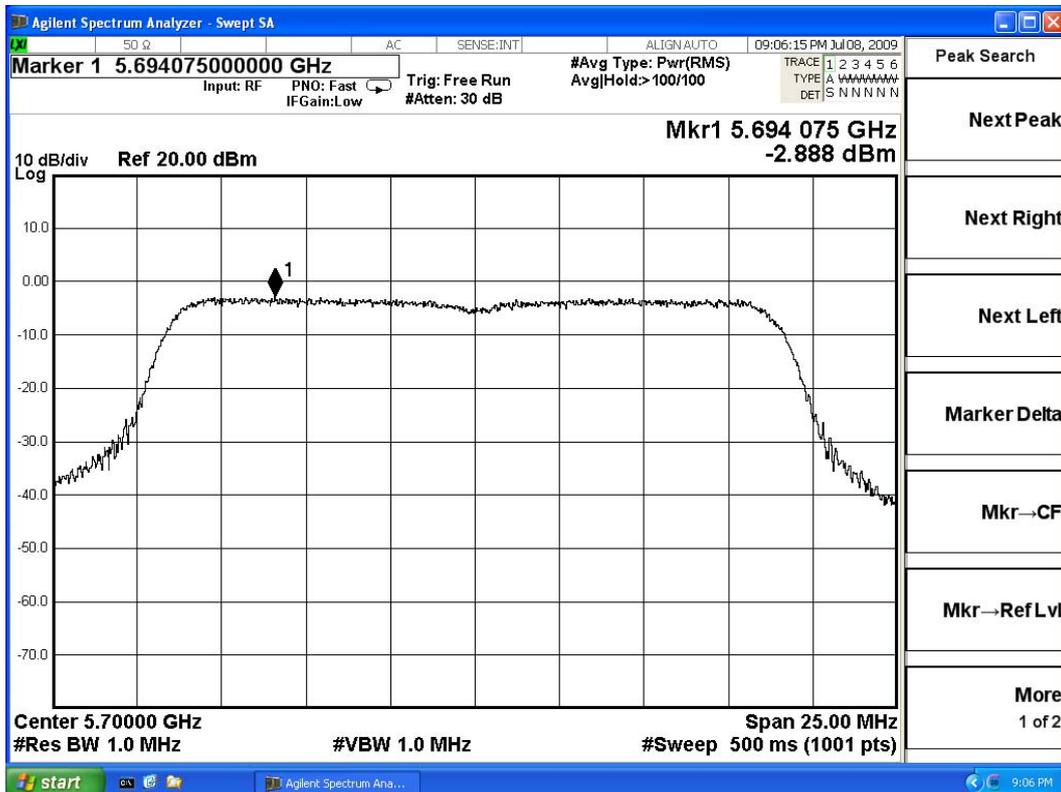
**Channel 120:**



**Channel 120:**



**Channel 140:**



Product : Notebook P.C.  
 Test Item : Peak Power Spectral Density  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter (802.11n-40BW 27Mbps)-Antenna 2

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
102	5510	-2.056	<11	Pass
118	5590	-2.420	<11	Pass
134	5670	-3.923	<11	Pass

**Channel 102:**

