

# FCC Test Report

Product Name	ASUS Miracast Dongle
Model No	90XB01F0-BEX000 / 90XB01F0-BEX010 / 90XB01F0-BEX020 / 90XB01F0-BEX030 / 90XB01F0-BEX040 / 90XB01F0-BEX050 / 90XB01F0-BEX060 / 90XB01F0-BEX070
FCC ID	PPQ-SWS003

Applicant	Lite-On Technology Corp.
Address	4F, 90, Chien 1 Road, Chung Ho, New Taipei City 235, Taiwan, R.O.C.

Date of Receipt	Aug. 23, 2013
Issued Date	Oct. 17, 2013
Report No.	138468R-RFUSP31V01
Report Version	V1.0



The test results relate only to the samples tested.


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# Test Report Certification

Issued Date: Oct. 17, 2013

Report No.: 138468R-RFUSP31V01



Product Name	ASUS Miracast Dongle
Applicant	Lite-On Technology Corp.
Address	4F, 90, Chien 1 Road, Chung Ho, New Taipei City 235, Taiwan, R.O.C.
Manufacturer	DONG GUAN G-COM COMPUTER CO., LTD.
Model No.	90XB01F0-BEX000 / 90XB01F0-BEX010 / 90XB01F0-BEX020 / 90XB01F0-BEX030 / 90XB01F0-BEX040 / 90XB01F0-BEX050 / 90XB01F0-BEX060 / 90XB01F0-BEX070
FCC ID.	PPQ-SWS003
EUT Rated Voltage	DC 5V
EUT Test Voltage	AC 120V/60Hz
Trade Name	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E: 2012 ANSI C63.4: 2003, ANSI C63.10: 2009, FCC KDB-789033
Test Result	Complied


The test results relate only to the samples tested.

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( Manager / Vincent Lin )

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	ASUS Miracast Dongle
Trade Name	
FCC ID.	PPQ-SWS003
Model No.	90XB01F0-BEX000 / 90XB01F0-BEX010 / 90XB01F0-BEX020 / 90XB01F0-BEX030 / 90XB01F0-BEX040 / 90XB01F0-BEX050 / 90XB01F0-BEX060 / 90XB01F0-BEX070
Frequency Range	802.11a/n-20MHz: 5180-5240MHz 802.11n-40MHz: 5190-5230MHz
Number of Channels	802.11a/n-20MHz: 4, n-40MHz: 2
Data Rate	802.11a/g: 6-54Mbps, 802.11n: up to 150Mbps
Channel Control	Auto
Type of Modulation	802.11a/n:OFDM, BPSK, QPSK, 16QAM, 64QAM
Antenna type	Printed on PCB
Antenna Gain	Refer to the table "Antenna List"
HDMI Converter	1 set
USB Cable	Non-shielded, 0.3m
Power Adapter	MFR : DVE, M/N : DSA-5PFK-05-FUS 050100a Input : 100-240V~50/60Hz 0.2A Output : +5V $\overline{\text{---}}$ 1A

#### Antenna List

No.	Manufacturer	Model Name.	Peak Gain
1	LITE-ON	SWS003C (Main) (Aux)	3.75 dBi for 5.15~5.25GHz

Note: The antenna of EUT is conform to FCC 15.203

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

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 36:	5180 MHz	Channel 40:	5200 MHz	Channel 44:	5220 MHz	Channel 48:	5240 MHz

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

Channel	Frequency	Channel	Frequency
Channel 38:	5190 MHz	Channel 46:	5230 MHz

## Note:

1. This device is an ASUS Miracast Dongle with a built-in 2.4GHz and 5GHz WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. 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 7.2Mbps and 802.11n-40BW are 15Mbps)
4. 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.
5. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
6. The EUT is including eight models for different marketing requirement.
7. The different of each model is shown as below:

Model Number	Description
90XB01F0-BEX000	MIRACAST DONGLE/US/HDMI/6IN1
90XB01F0-BEX010	MIRACAST DONGLE/AU/HDMI/6IN1
90XB01F0-BEX020	MIRACAST DONGLE/TW/HDMI/6IN1
90XB01F0-BEX030	MIRACAST DONGLE/EU/HDMI/6IN1
90XB01F0-BEX040	MIRACAST DONGLE/UK/HDMI/6IN1
90XB01F0-BEX050	MIRACAST DONGLE/CN/HDMI/6IN1
90XB01F0-BEX060	MIRACAST DONGLE/JP/HDMI/6IN1
90XB01F0-BEX070	MIRACAST DONGLE/CA/HDMI/6IN1

Test Mode	Mode 1: Transmit (802.11a-6Mbps) Mode 2: Transmit (802.11n-20BW 7.2Mbps) Mode 3: Transmit (802.11n-40BW 15Mbps) Mode 4: Adapter mode
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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:

For Adapter Mode

Product	Manufacturer	Model No.	Serial No.	Power Cord
(1) Monitor	Dell	ST2320Lf	CN-OM2NN6 72872-22I-C9WS	Non-shielded, 1.8m

Signal Cable Type	Signal cable Description
A HDMI Cable	Non-shielded, 1.2m

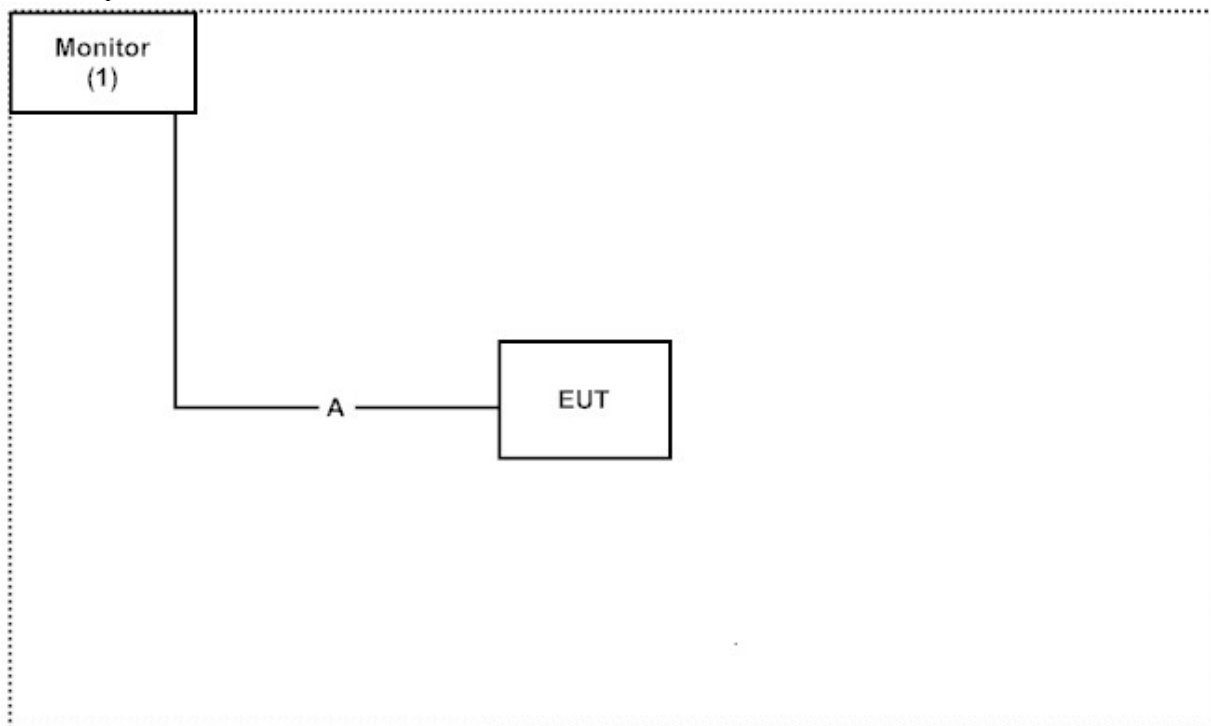
For Transmit mode

Product	Manufacturer	Model No.	Serial No.	Power Cord
(1) Monitor	Dell	ST2320Lf	CN-OM2NN6 72872-22I-C9WS	Non-shielded, 1.8m
(2) Notebook PC	DELL	PPT	N/A	Non-shielded, 0.8m

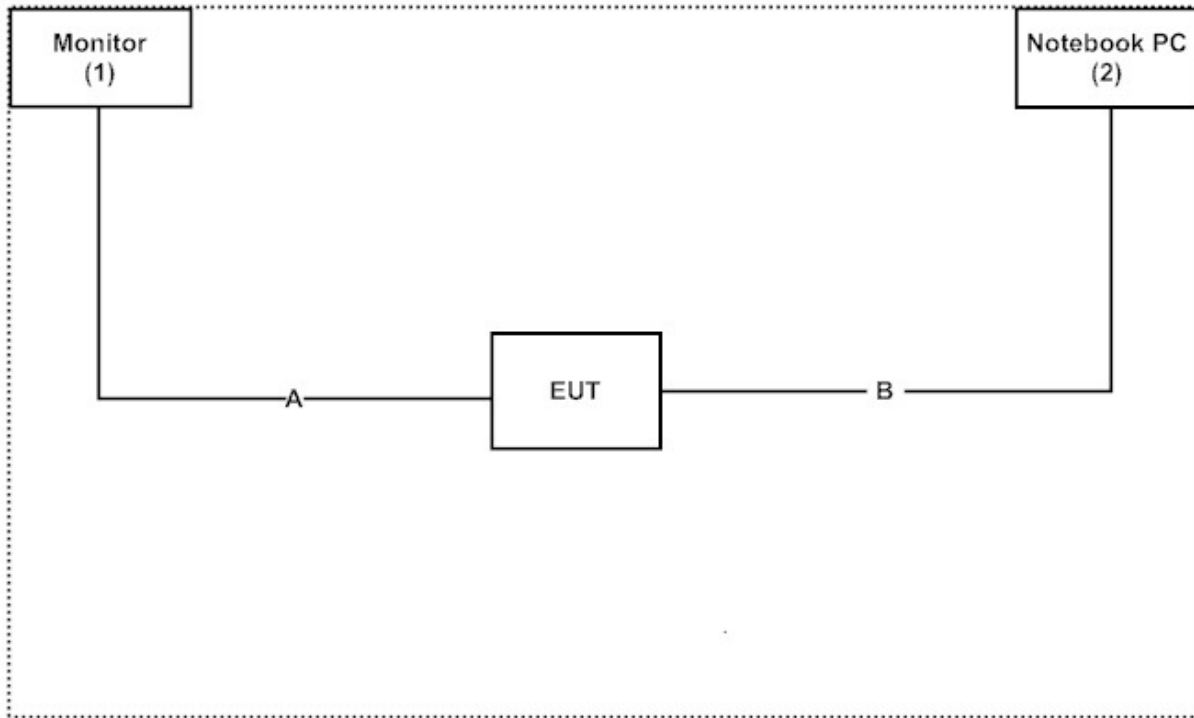
Signal Cable Type	Signal cable Description
A HDMI Cable	Non-shielded, 1.2m
B USB Cable	Non-shielded, 0.3m

### 1.4. Configuration of Tested System

For Adapter Mode



For Transmit mode



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute program “ART2-GUI v2.3” on the Notebook PC.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Start transmits continually.
- (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

Site Name: Quietek Corporation  
Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,  
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E-Mail : [service@quietek.com](mailto:service@quietek.com)

FCC Accreditation Number: TW1014

## 2. Conducted Emission

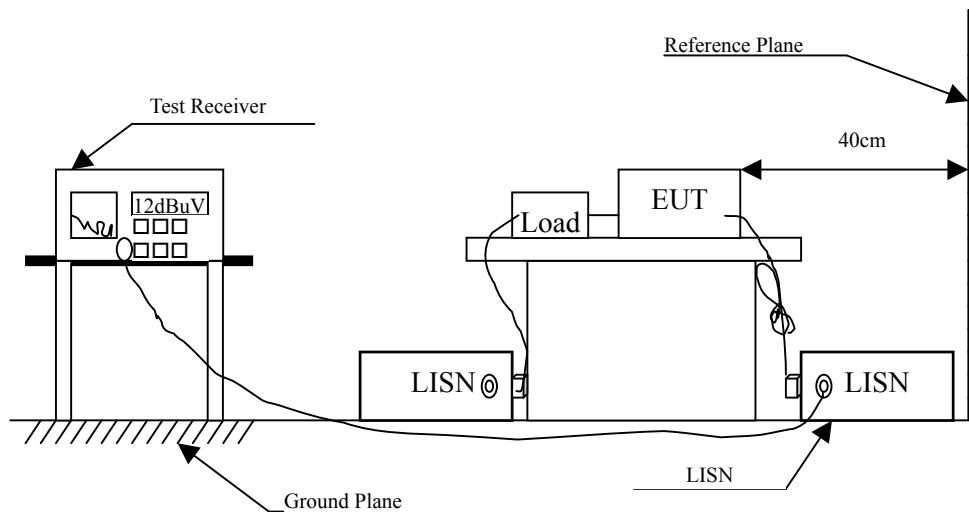
### 2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2013	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2013	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2013	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2013	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2013	
	No.1 Shielded Room				

Note:

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

### 2.2. Test Setup



**2.3. Limits**

<b>FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit</b>		
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 C63.10:2009 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 C63.10, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

**2.5. Uncertainty**

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product : ASUS Miracast Dongle  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 4: Adapter mode

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.396	9.708	32.590	42.298	-16.673	58.971
0.654	9.719	34.030	43.749	-12.251	56.000
1.212	9.745	24.820	34.565	-21.435	56.000
2.134	9.807	25.110	34.917	-21.083	56.000
5.240	9.830	27.520	37.350	-22.650	60.000
11.396	9.880	28.940	38.820	-21.180	60.000
<b>Average</b>					
0.396	9.708	28.880	38.588	-10.383	48.971
0.654	9.719	19.950	29.669	-16.331	46.000
1.212	9.745	17.070	26.815	-19.185	46.000
2.134	9.807	16.890	26.697	-19.303	46.000
5.240	9.830	19.650	29.480	-20.520	50.000
11.396	9.880	19.720	29.600	-20.400	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 : ASUS Miracast Dongle  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 4: Adapter mode

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.392	9.687	33.660	43.347	-15.739	59.086
0.588	9.696	24.140	33.836	-22.164	56.000
1.759	9.770	21.970	31.740	-24.260	56.000
4.158	9.810	24.450	34.260	-21.740	56.000
6.009	9.840	23.650	33.490	-26.510	60.000
11.959	9.920	24.520	34.440	-25.560	60.000
<b>Average</b>					
0.392	9.687	29.600	39.287	-9.799	49.086
0.588	9.696	15.420	25.116	-20.884	46.000
1.759	9.770	14.480	24.250	-21.750	46.000
4.158	9.810	18.010	27.820	-18.180	46.000
6.009	9.840	16.480	26.320	-23.680	50.000
11.959	9.920	16.220	26.140	-23.860	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 : ASUS Miracast Dongle  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.158	9.697	33.420	43.117	-22.654	65.771
0.240	9.700	28.430	38.130	-25.299	63.429
0.287	9.703	34.310	44.013	-18.073	62.086
0.572	9.716	24.510	34.226	-21.774	56.000
1.154	9.742	18.230	27.972	-28.028	56.000
8.701	9.870	13.010	22.880	-37.120	60.000
<b>Average</b>					
0.158	9.697	13.750	23.447	-32.324	55.771
0.240	9.700	25.090	34.790	-18.639	53.429
0.287	9.703	33.420	43.123	-8.963	52.086
0.572	9.716	21.190	30.906	-15.094	46.000
1.154	9.742	10.570	20.312	-25.688	46.000
8.701	9.870	7.180	17.050	-32.950	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 : ASUS Miracast Dongle  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)

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	9.678	28.040	37.718	-27.511	65.229
0.232	9.680	25.940	35.620	-28.037	63.657
0.287	9.683	34.550	44.233	-17.853	62.086
0.599	9.697	17.660	27.357	-28.643	56.000
1.123	9.731	13.830	23.561	-32.439	56.000
7.791	9.860	13.000	22.860	-37.140	60.000
<b>Average</b>					
0.177	9.678	18.530	28.208	-27.021	55.229
0.232	9.680	16.550	26.230	-27.427	53.657
0.287	9.683	32.710	42.393	-9.693	52.086
0.599	9.697	10.000	19.697	-26.303	46.000
1.123	9.731	7.120	16.851	-29.149	46.000
7.791	9.860	7.400	17.260	-32.740	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. Maximun conducted output power

#### 3.1. Test Equipment

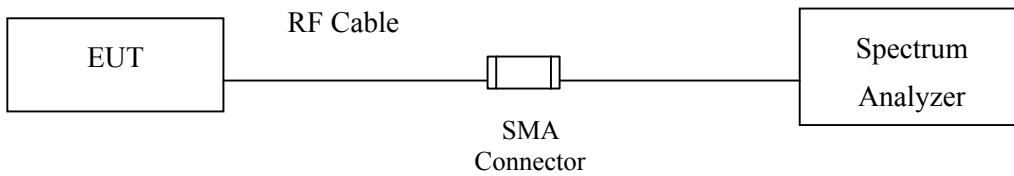
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2013
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2013
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note:

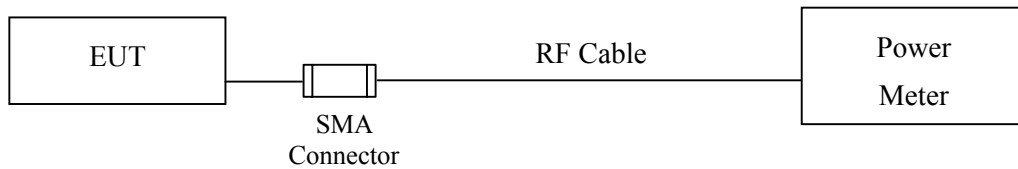
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

#### 3.2. Test Setup

##### 26dBc Occupied Bandwidth



##### Conduction Power Measurement





### 3.3. Limits

- (1) For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or  $4 \text{ dBm} + 10\log B$ , 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, the maximum conducted output 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 maximum conducted output 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 FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater than 6dB BW of the emission under test. Maximum conducted 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 FCC KDB-789033, and provides more accurate measurements.

The Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter).

### 3.5. Uncertainty

$\pm 1.27 \text{ dB}$

### 3.6. Test Result of Maximum conducted output power

Product : ASUS Miracast Dongle  
 Test Item : Maximum conducted output power  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (802.11a-6Mbps)

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		6	9	12	18	24	36	48	54	
		Measurement Level (dBm)								
36	5180	16.22	--	--	--	--	--	--	--	<17dBm
44	5220	15.88	15.79	15.74	15.71	15.66	15.58	15.51	15.47	<17dBm
48	5240	16.14	--	--	--	--	--	--	--	<17dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

#### Maximum conducted output power Measurement:

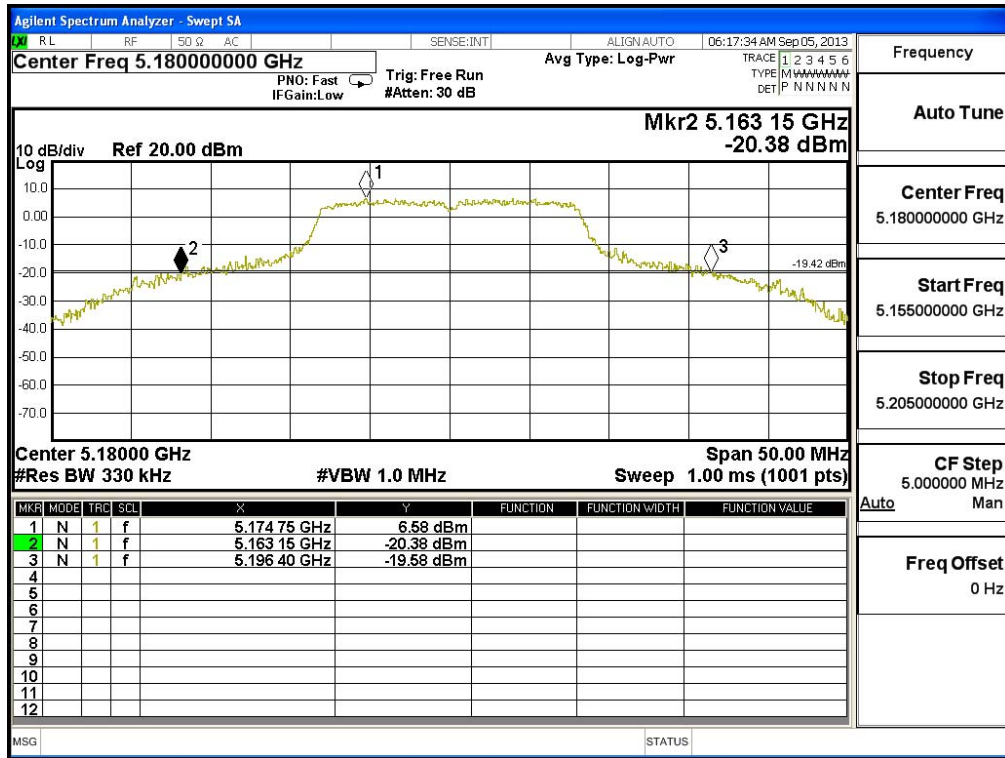
Channel Number	Frequency (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
36	5180	33.25	16.22	17	19.22
44	5220	33.05	15.88	17	19.19
48	5240	31.65	16.14	17	19.00

Note:

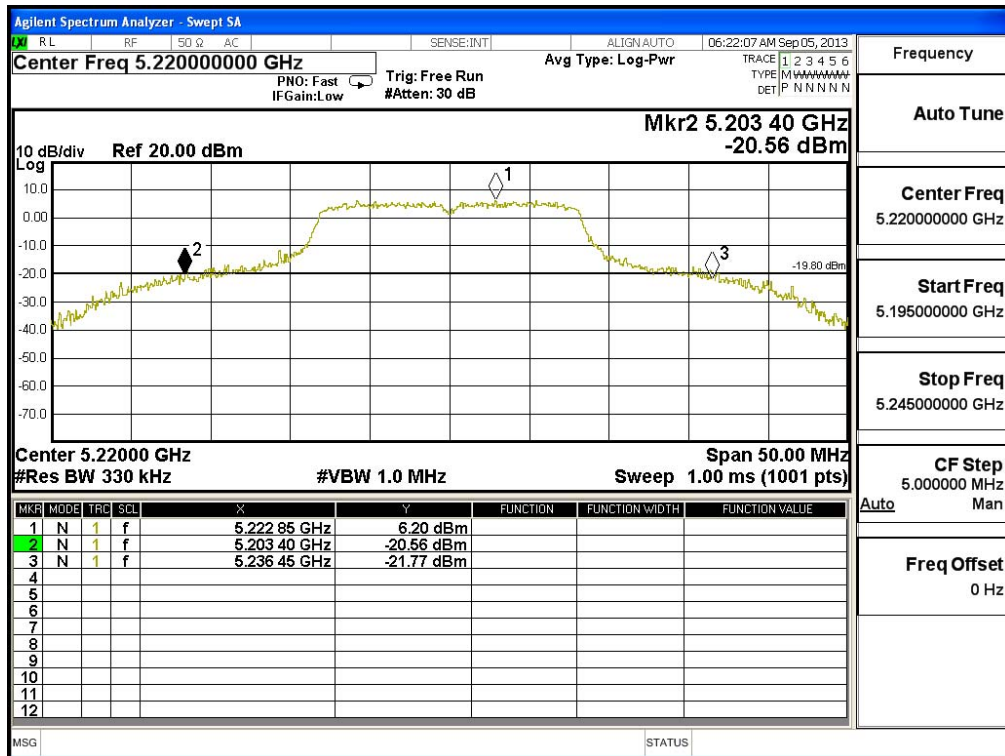
1. Power Output Value =Reading value on average power meter + cable loss

**26dBc Occupied Bandwidth:**

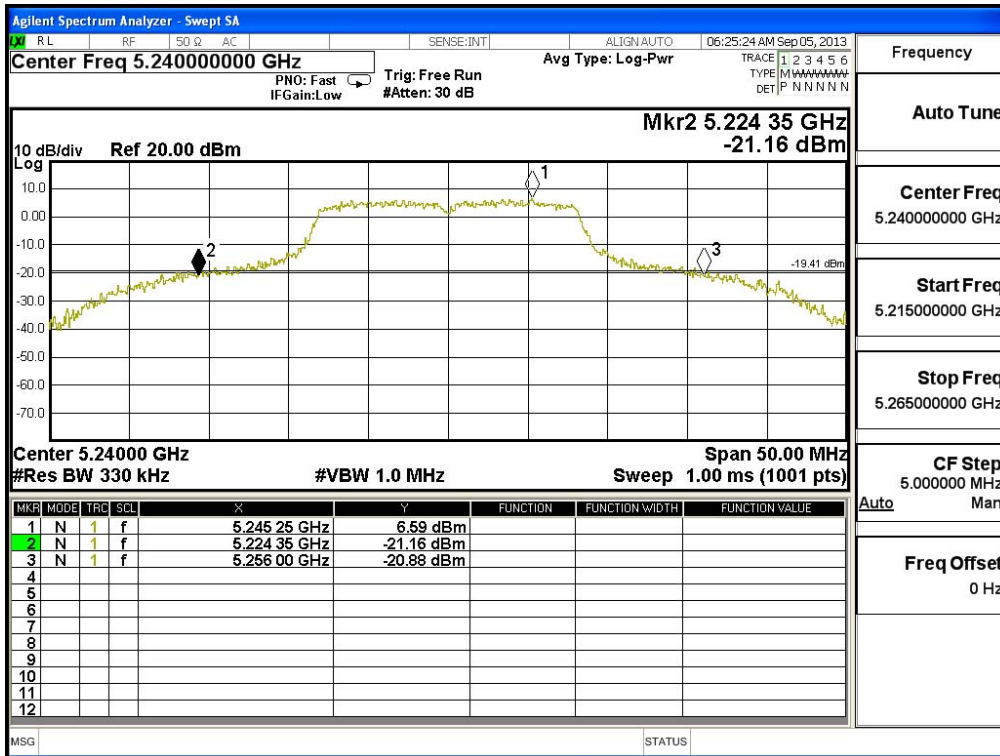
**Channel 36**



**Channel 40**



**Channel 48**



Product : ASUS Miracast Dongle  
 Test Item : Maximum conducted output power  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		7.2	14.4	21.7	28.9	43.3	57.8	65	72.2	
		Measurement Level (dBm)								
36	5180	16.88	--	--	--	--	--	--	--	<17dBm
44	5220	16.94	16.88	16.84	16.79	16.74	16.66	16.54	16.44	<17dBm
48	5240	16.93	--	--	--	--	--	--	--	<17dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

### Maximum conducted output power Measurement:

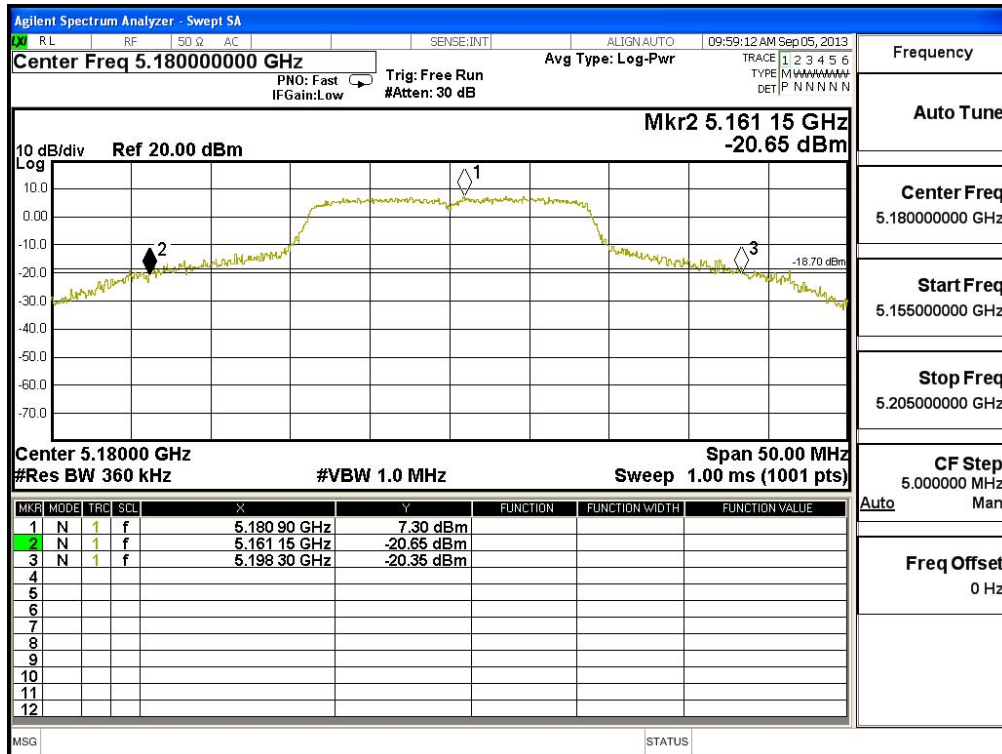
Channel Number	Frequency (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
36	5180	37.15	16.88	17	19.70
44	5220	35.90	16.94	17	19.55
48	5240	33.95	16.93	17	19.31

Note:

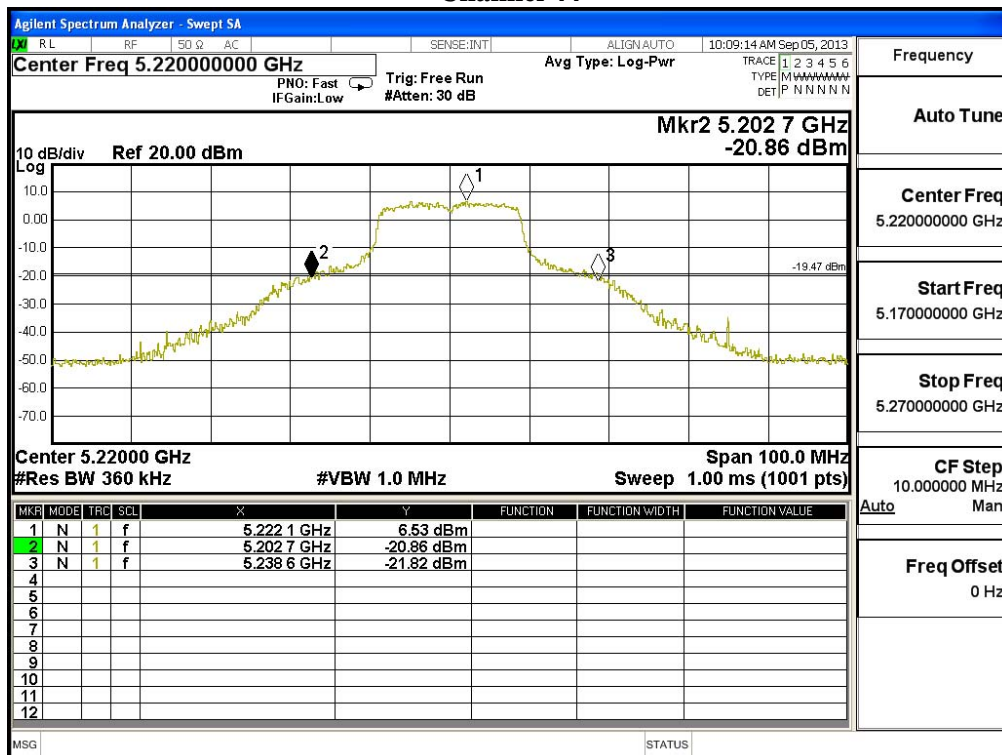
1. Power Output Value =Reading value on average power meter + cable loss

**26dBc Occupied Bandwidth:**

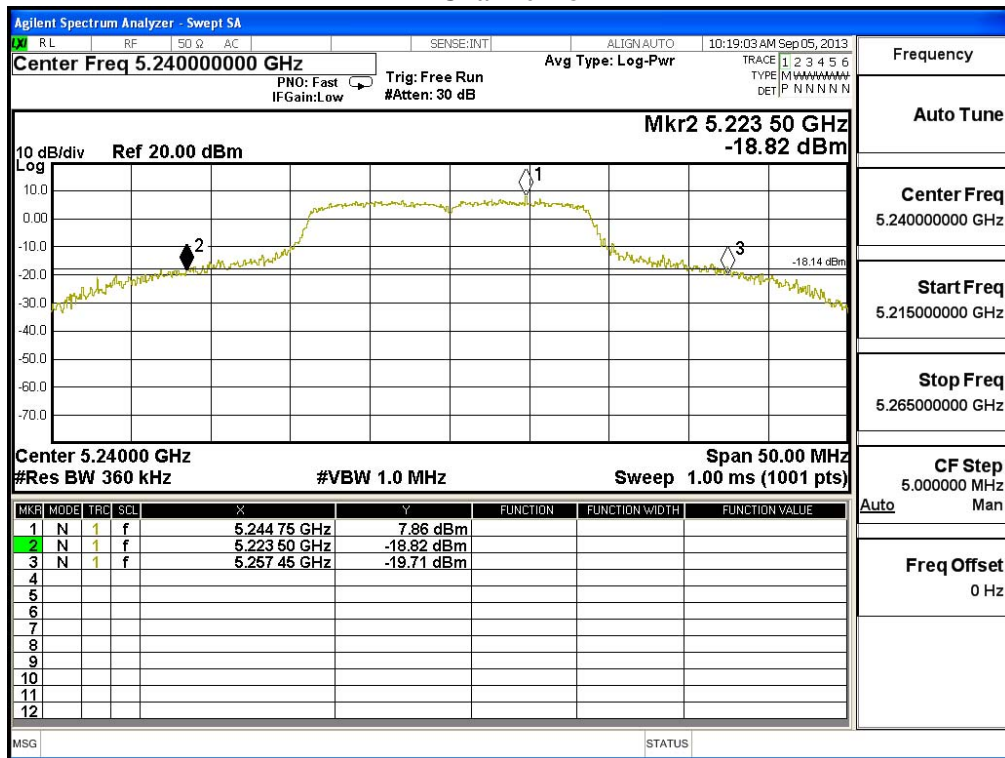
**Channel 36**



**Channel 44**



### Channel 48



Product : ASUS Miracast Dongle  
 Test Item : Maximum conducted output power  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		15	30	45	60	90	120	135	150	
		Measurement Level (dBm)								
38	5190	14.11	14.01	13.89	13.78	13.74	13.64	13.54	13.41	<17dBm
46	5230	16.38	--	--	--	--	--	--	--	<17dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

### Maximum conducted output power Measurement:

Channel Number	Frequency (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
38	5190	54.2	14.11	17	21.34
46	5230	68.7	16.38	17	22.37

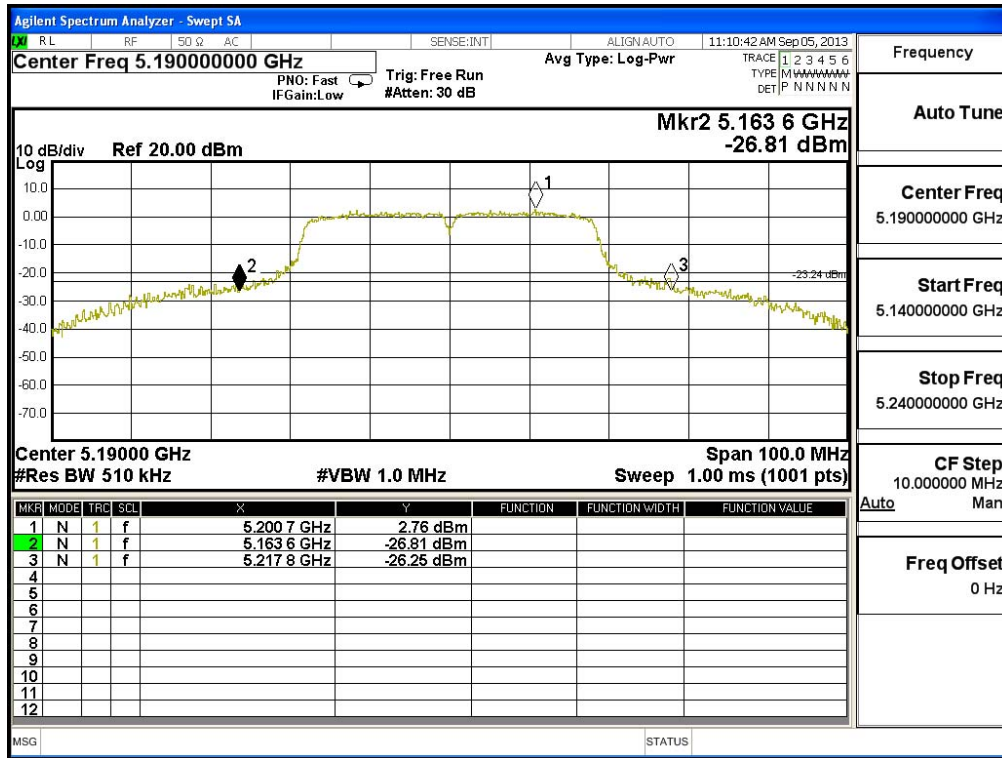
Note:

1. Power Output Value =Reading value on average power meter + cable loss

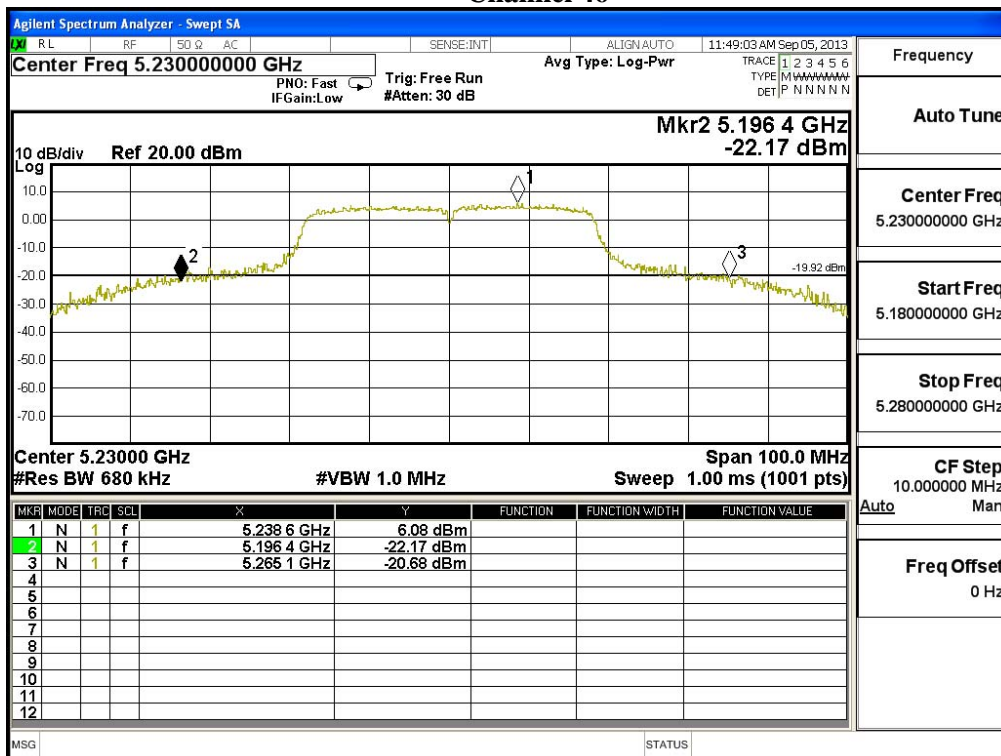


**26dBc Occupied Bandwidth:**

**Channel 38**



**Channel 46**



## 4. Peak Power Spectral Density

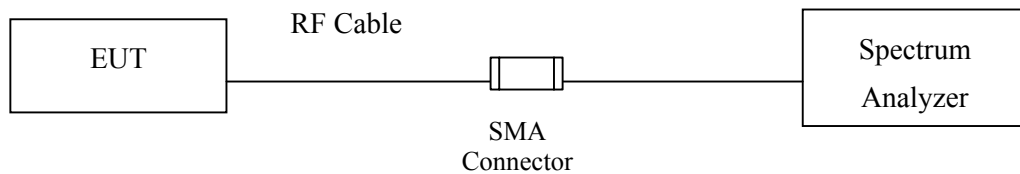
### 4.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2013
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2013
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr, 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “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, 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 C63.10, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer.

SA-1 method is selected to run the test.

#### 4.5. Uncertainty

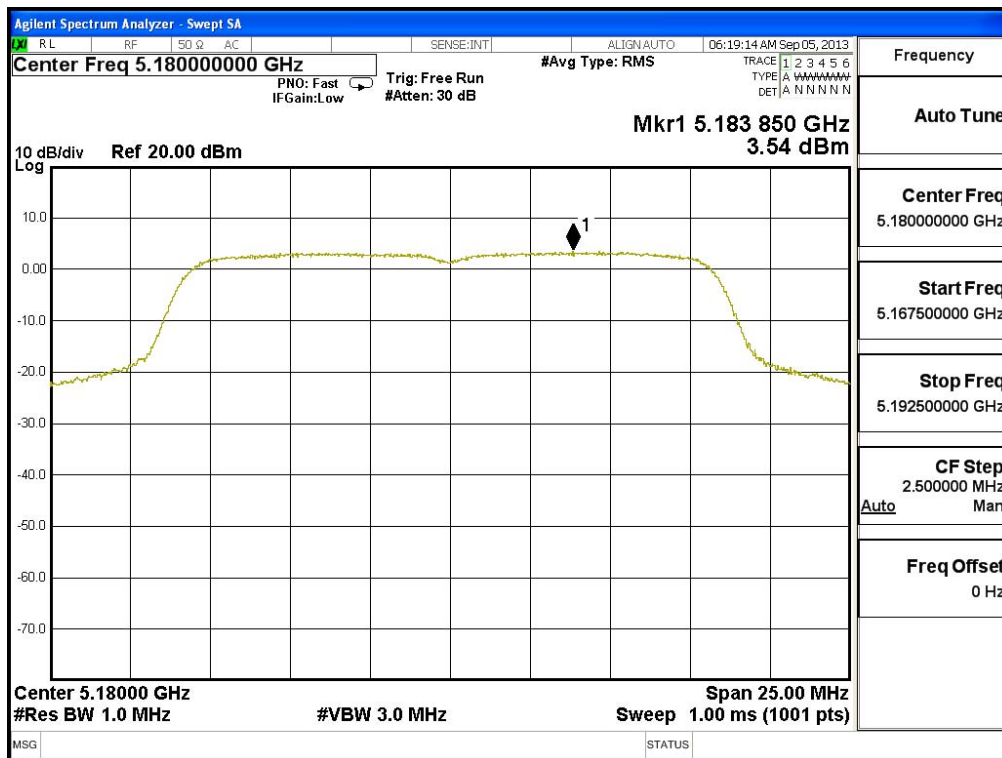
$\pm 1.27$  dB

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

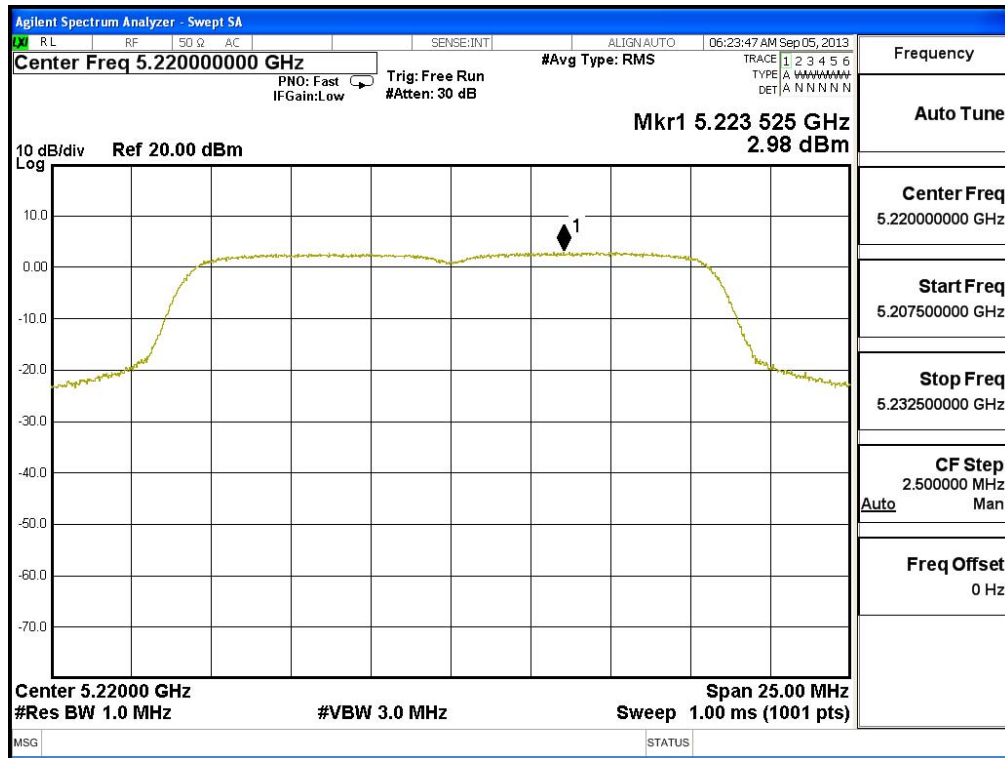
Product : ASUS Miracast Dongle  
 Test Item : Peak Power Spectral Density  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (802.11a-6Mbps)

Channel Number	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
36	5180	3.540	<4	Pass
44	5220	2.980	<4	Pass
48	5240	2.930	<4	Pass

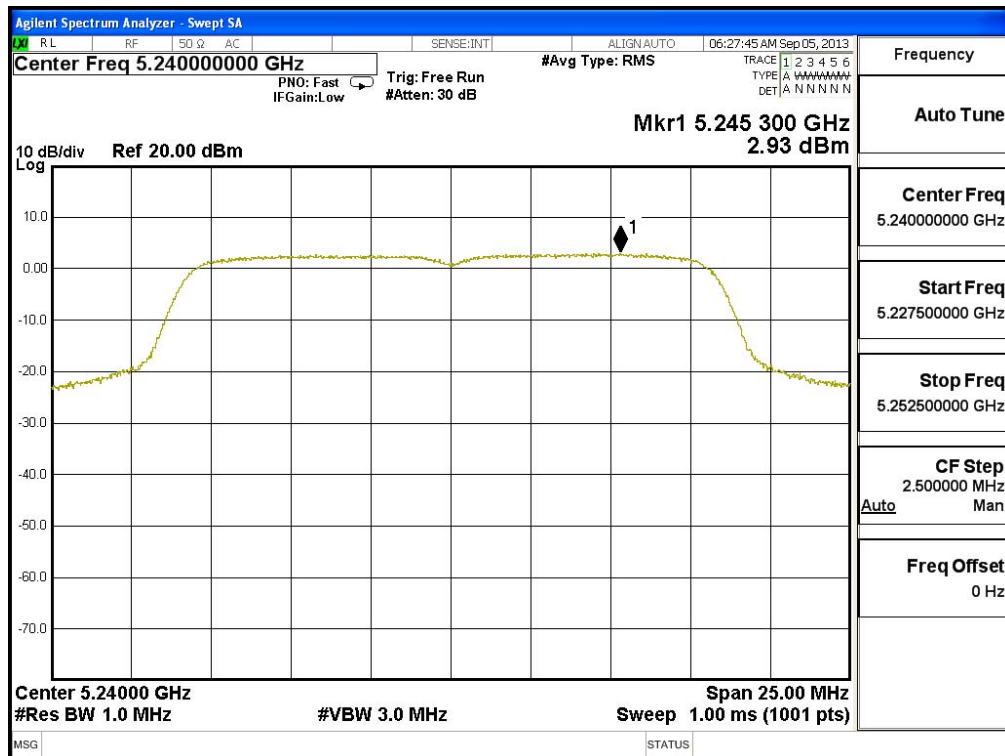
**Channel 36**



### Channel 44



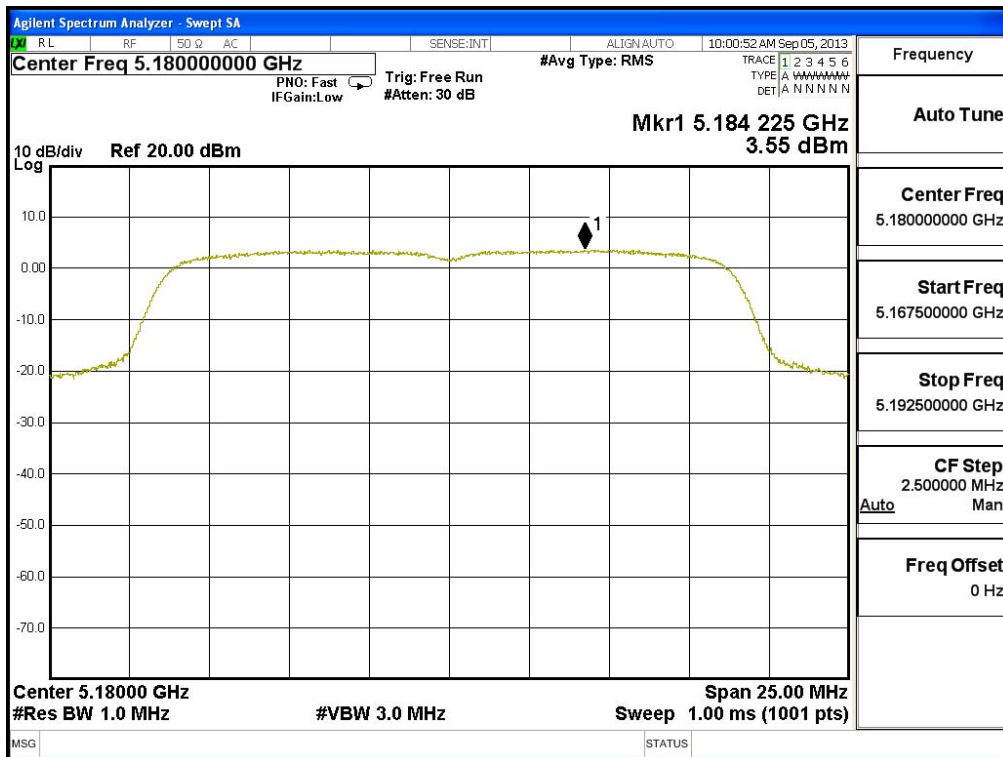
### Channel 48



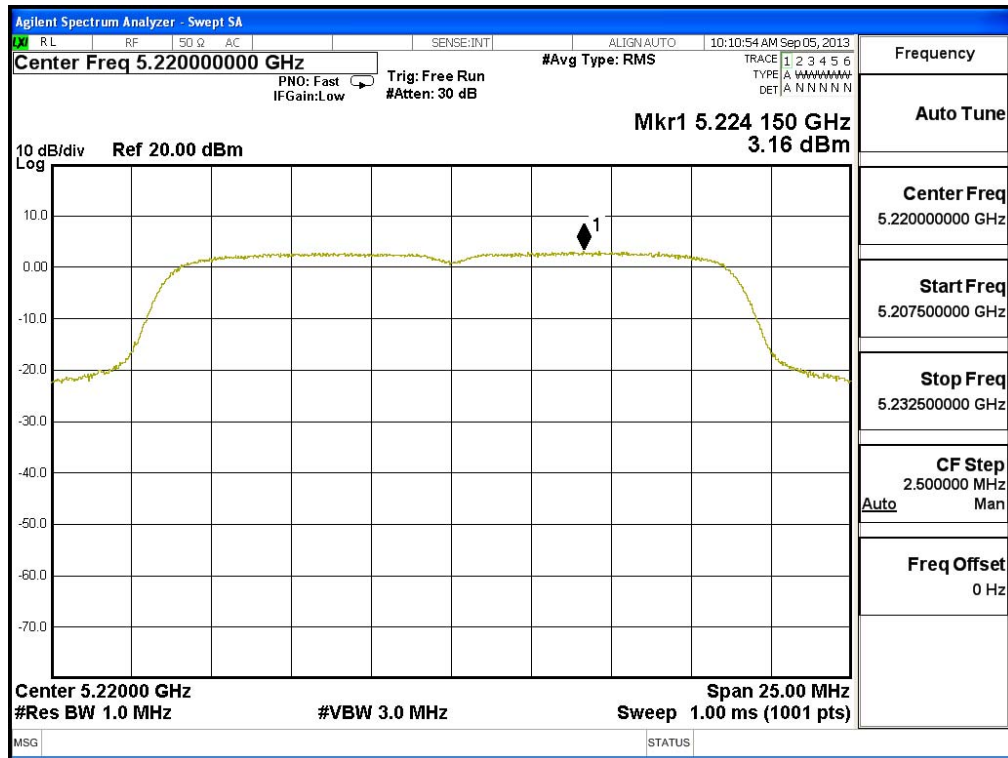
Product : ASUS Miracast Dongle  
 Test Item : Peak Power Spectral Density  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)

Channel Number	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
36	5180	3.550	<4	Pass
44	5220	3.160	<4	Pass
48	5240	3.360	<4	Pass

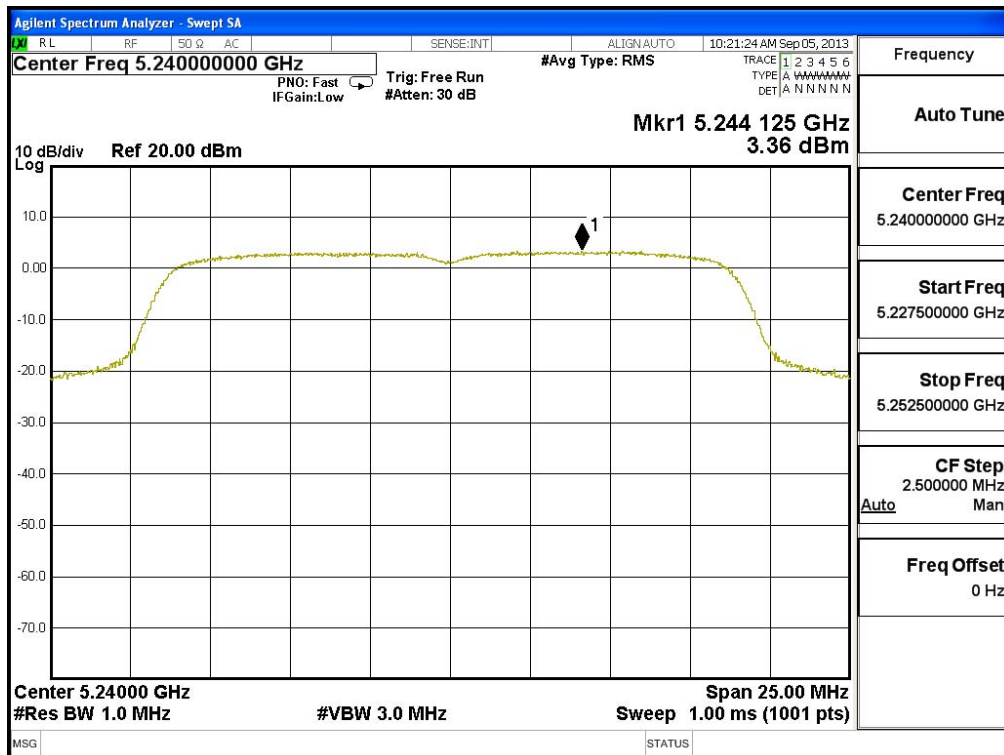
**Channel 36**



### Channel 44



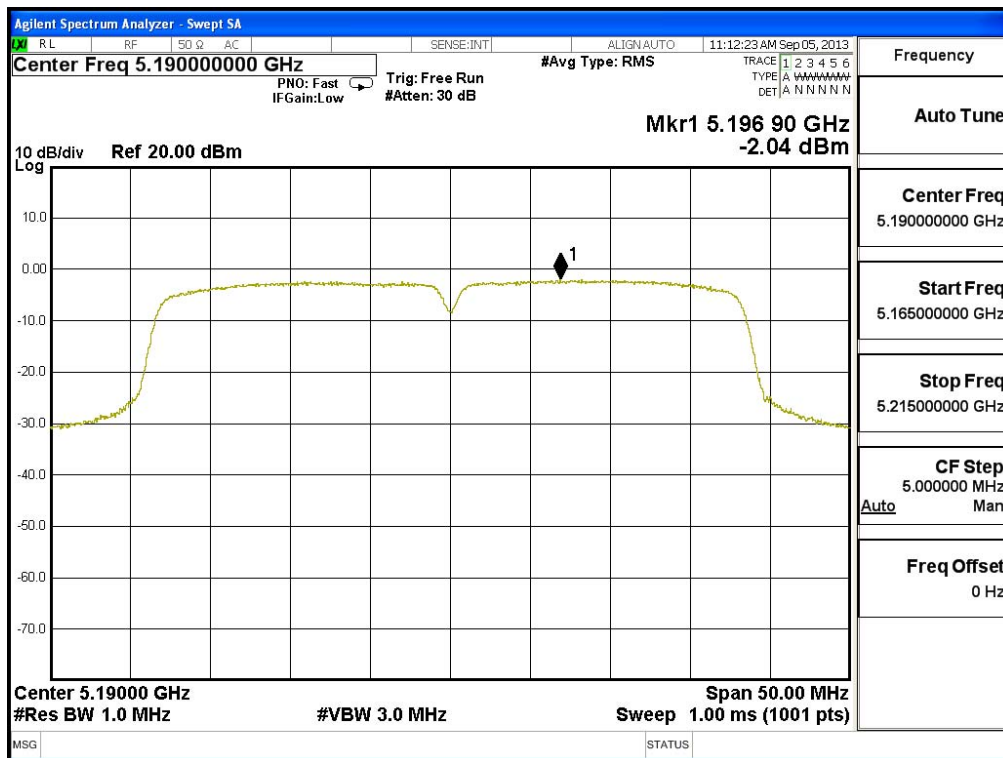
### Channel 48



Product : ASUS Miracast Dongle  
 Test Item : Peak Power Spectral Density  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)

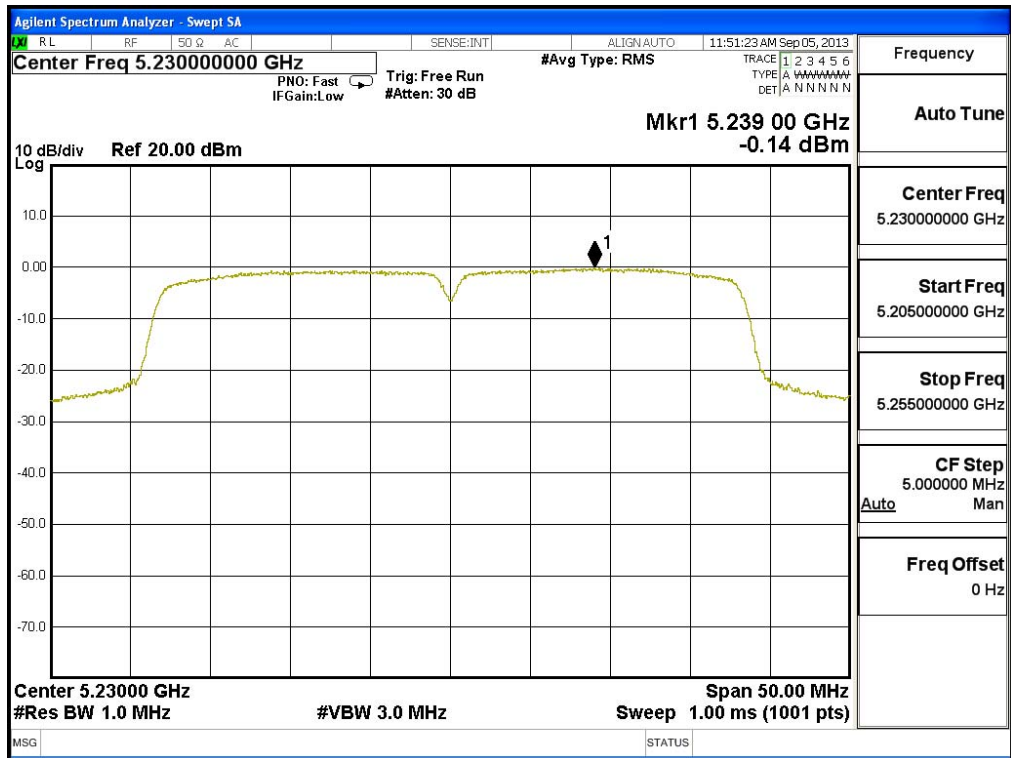
Channel Number	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
38	5190	-2.040	<4	Pass
46	5230	-0.140	<4	Pass

**Channel 38**





**Channel 46**



**5. Peak Excursion**

**5.1. Test Equipment**

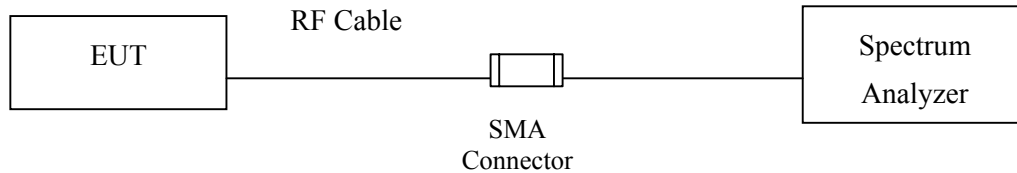
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2013
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2013
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

**5.2. Test Setup**

**Conduction Power Measurement**



**5.3. Limits**

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

#### 5.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

Step 1: Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth.

Step 2: Find the maximum of the peak-max-hold spectrum.

(Set RBW = 1 MHz, VBW  $\geq$  3 MHz, Detector = peak, Trace mode = max-hold, Allow the sweeps to continue until the trace stabilizes, Use the peak search function to find the peak of the spectrum.)

Step 3: Use the procedure found under KDB-789033 F) to measure the PPSD.

Step 4: Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

#### 5.5. Uncertainty

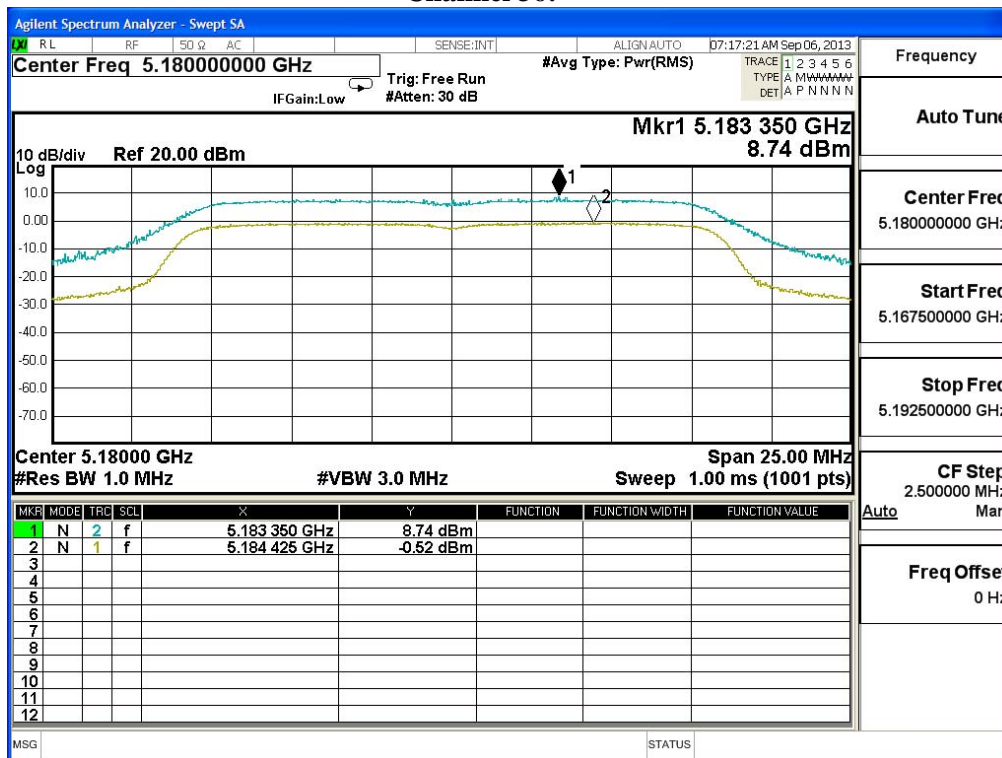
$\pm 1.27$  dB

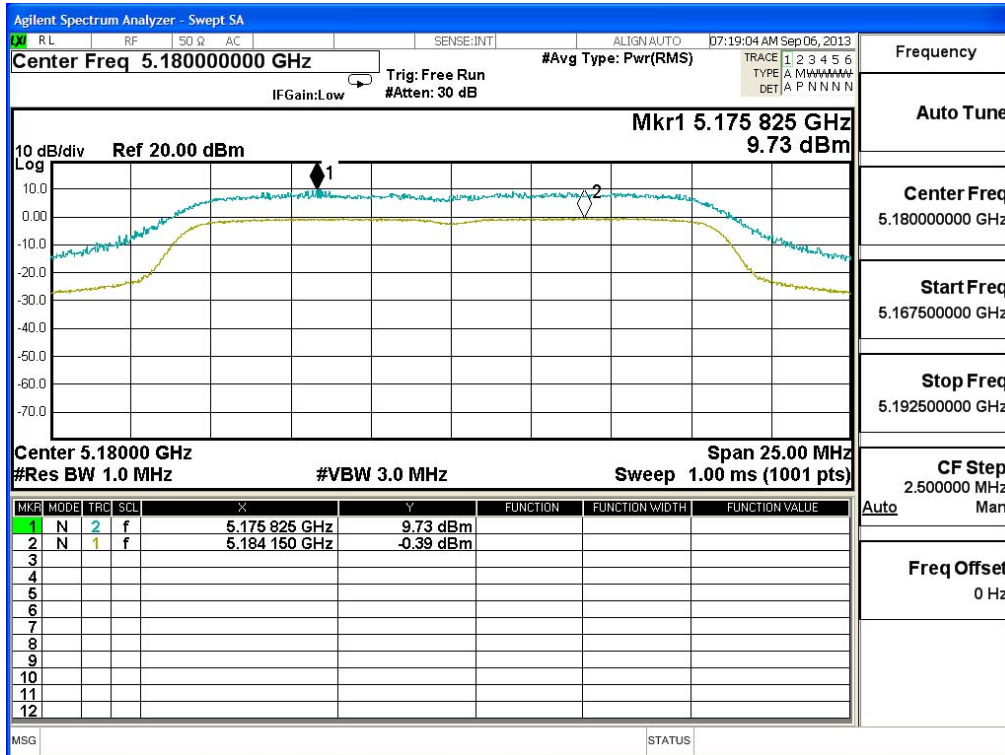
### 5.6. Test Result of Peak Excursion

Product : ASUS Miracast Dongle  
 Test Item : Peak Excursion  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (802.11a-6Mbps)

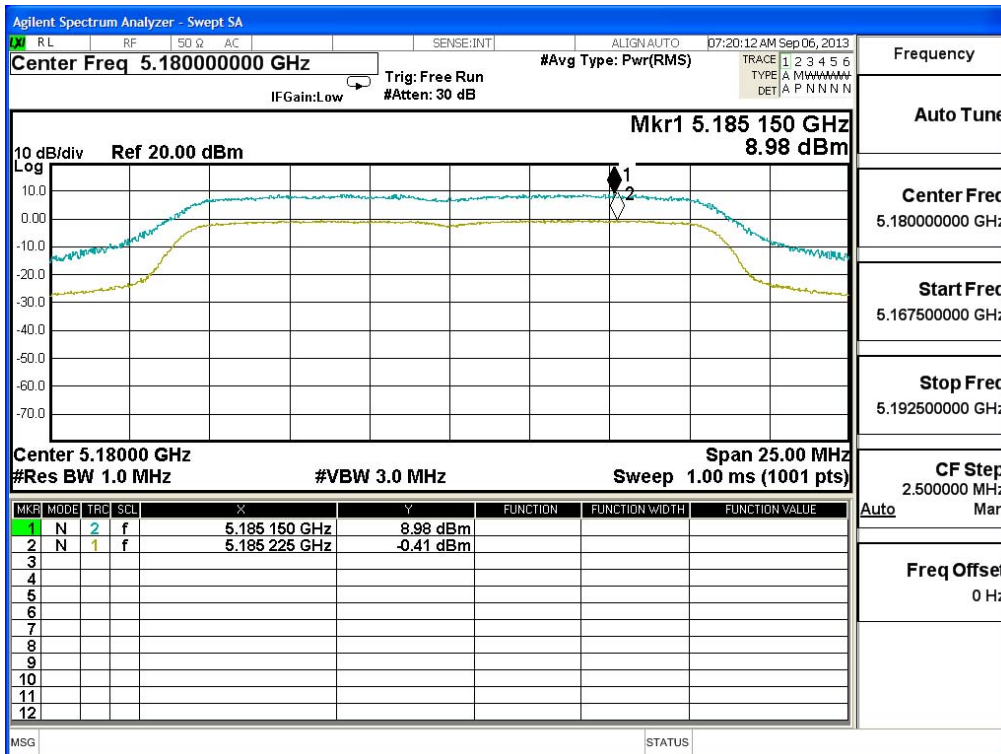
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Measurement Level (dB)	Required Limit (dB)	Result
36	5180	6	9.260	<13	Pass
		12	10.120	<13	Pass
		24	9.390	<13	Pass
		54	11.150	<13	Pass

Channel 36:

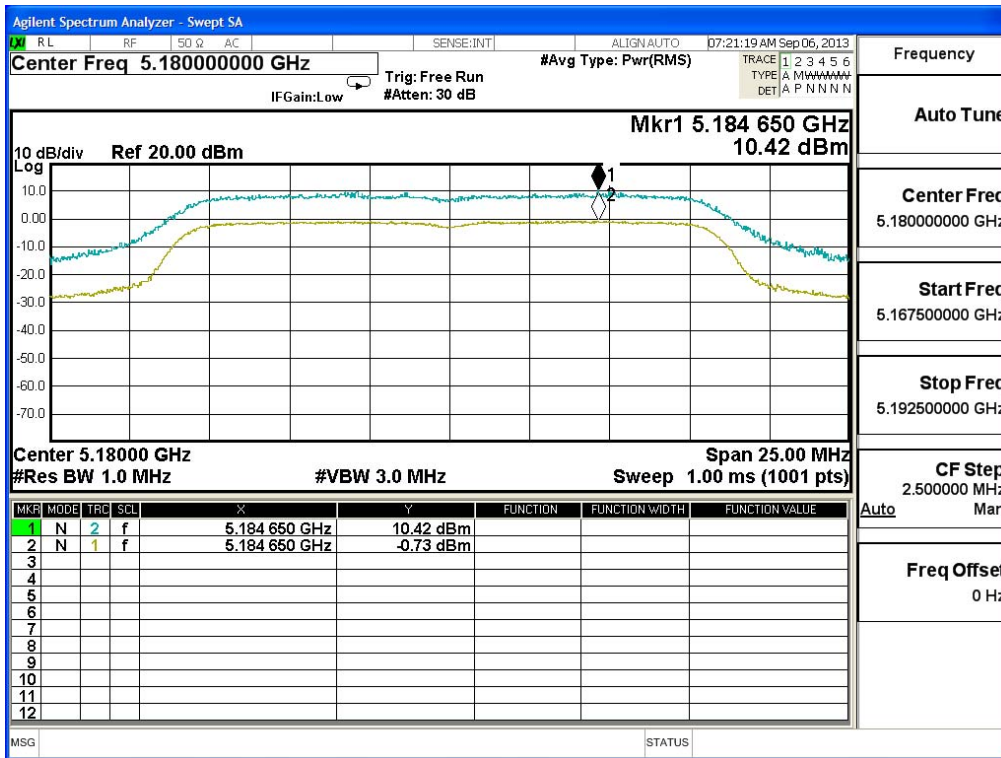




Frequency	Auto Tune
Center Freq	5.18000000 GHz
Start Freq	5.167500000 GHz
Stop Freq	5.192500000 GHz
CF Step	2.500000 MHz
Freq Offset	0 Hz



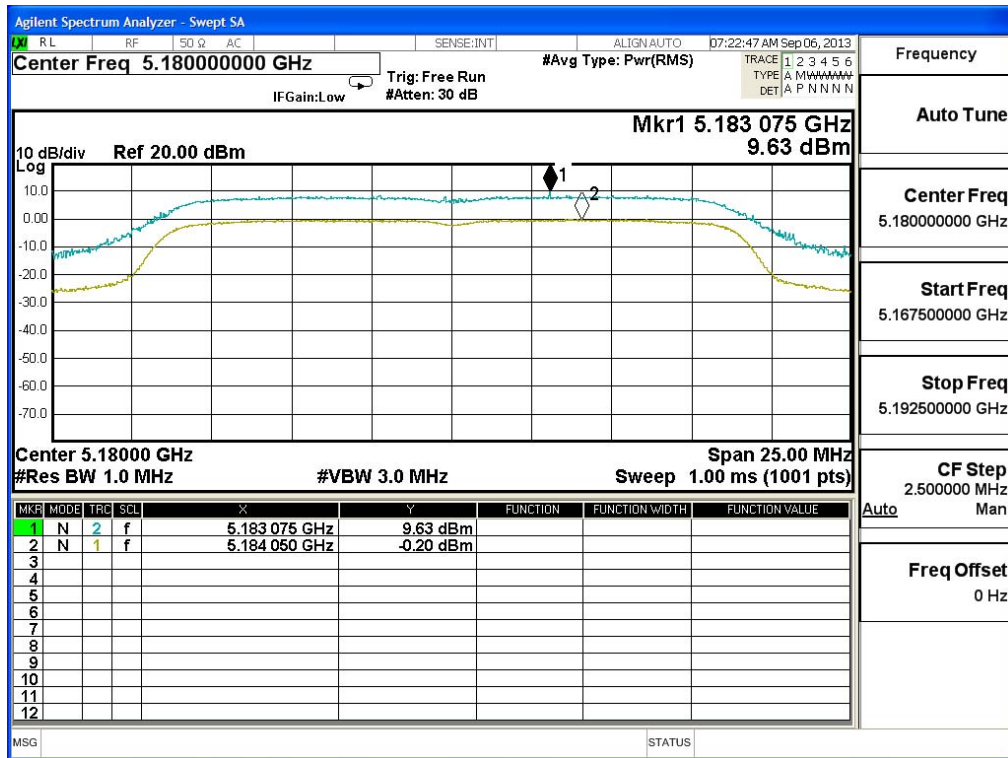
Frequency	Auto Tune
Center Freq	5.18000000 GHz
Start Freq	5.167500000 GHz
Stop Freq	5.192500000 GHz
CF Step	2.500000 MHz
Freq Offset	0 Hz

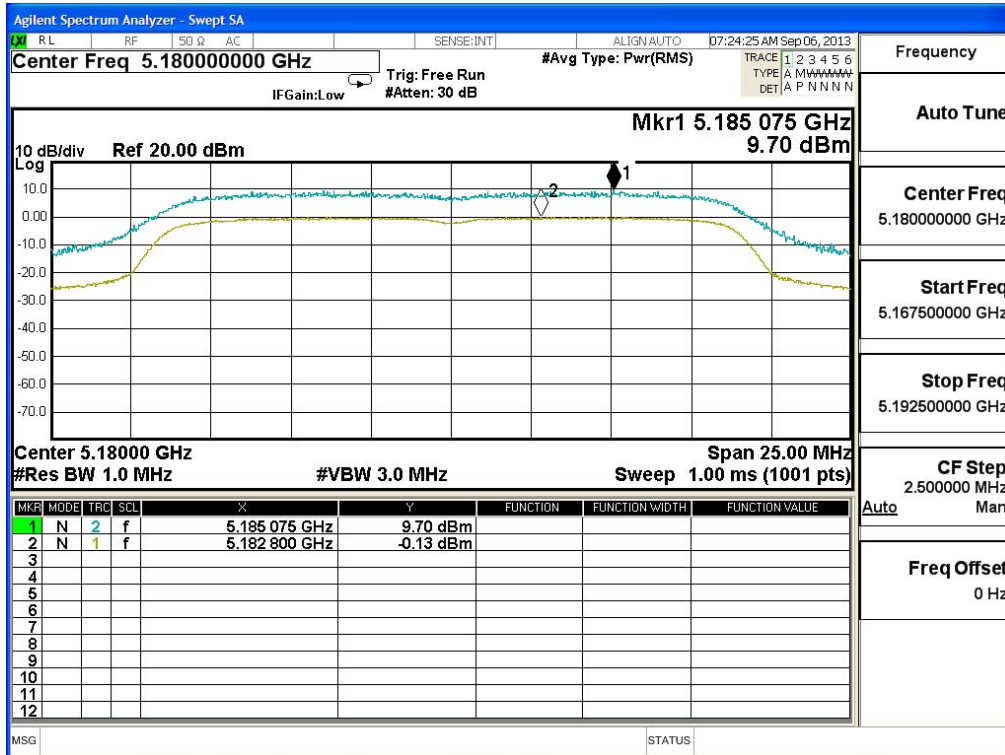


Product : ASUS Miracast Dongle  
 Test Item : Peak Excursion  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)

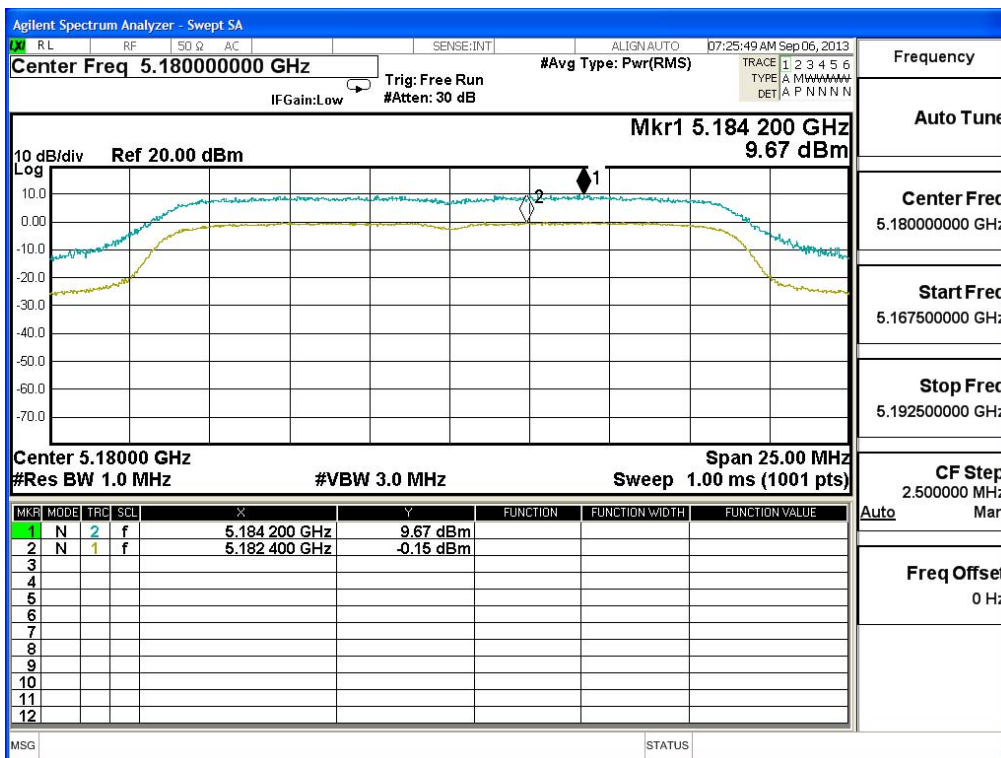
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Measurement Level (dB)	Required Limit (dB)	Result
36	5180	MCS (0)	9.830	<13	Pass
		MCS (2)	9.830	<13	Pass
		MCS (4)	9.820	<13	Pass
		MCS (7)	9.670	<13	Pass

Channel 36:



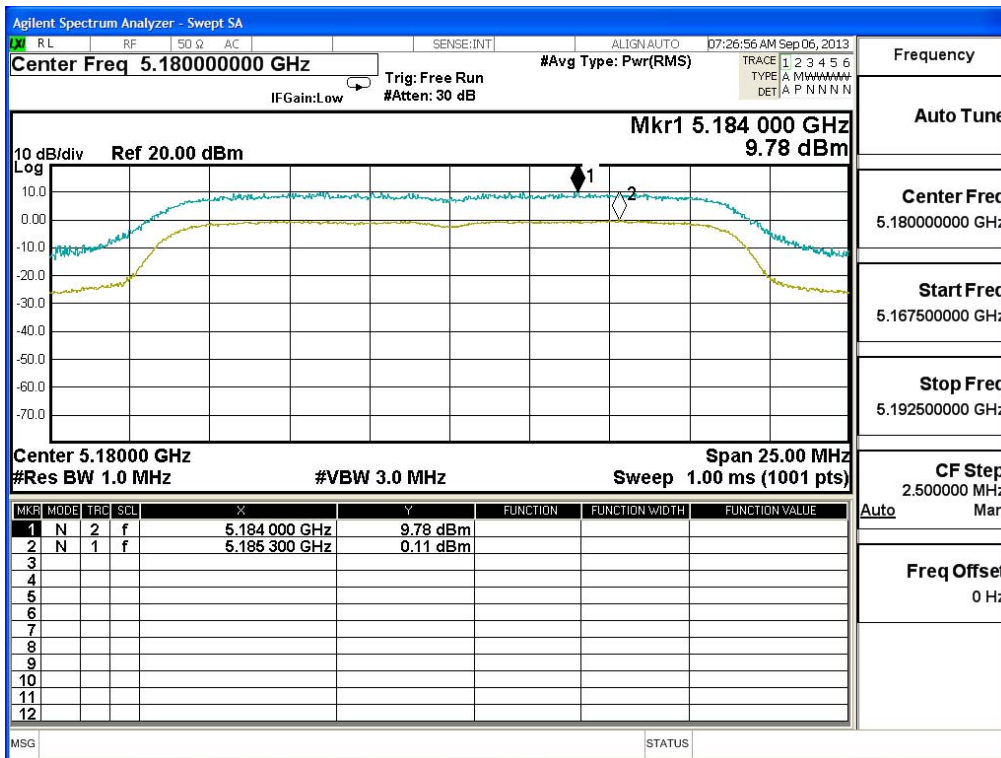


Frequency	Auto Tune
Center Freq	5.18000000 GHz
Start Freq	5.167500000 GHz
Stop Freq	5.192500000 GHz
CF Step	2.500000 MHz
Auto	Man
Freq Offset	0 Hz



Frequency	Auto Tune
Center Freq	5.18000000 GHz
Start Freq	5.167500000 GHz
Stop Freq	5.192500000 GHz
CF Step	2.500000 MHz
Auto	Man
Freq Offset	0 Hz

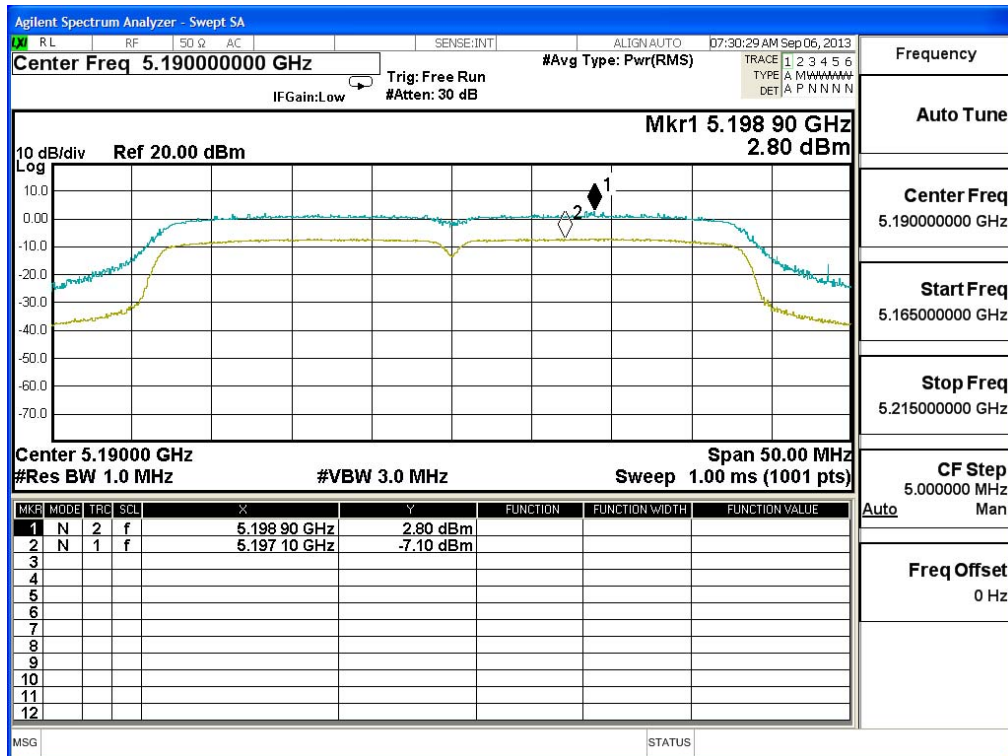


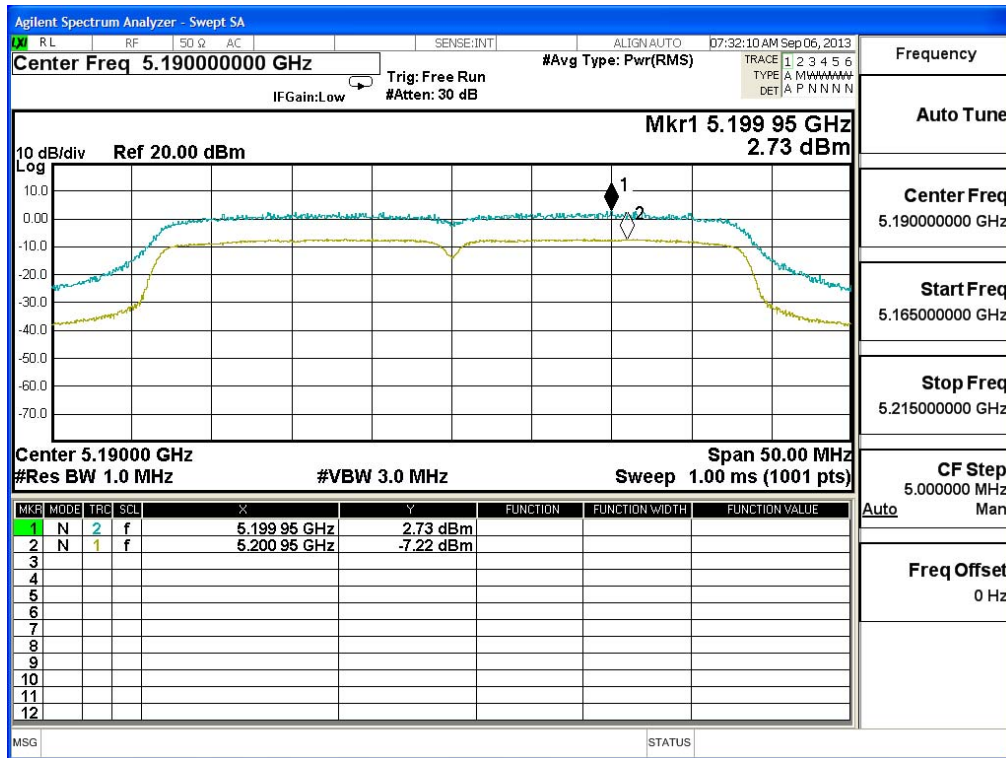


Product : ASUS Miracast Dongle  
 Test Item : Peak Excursion  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)

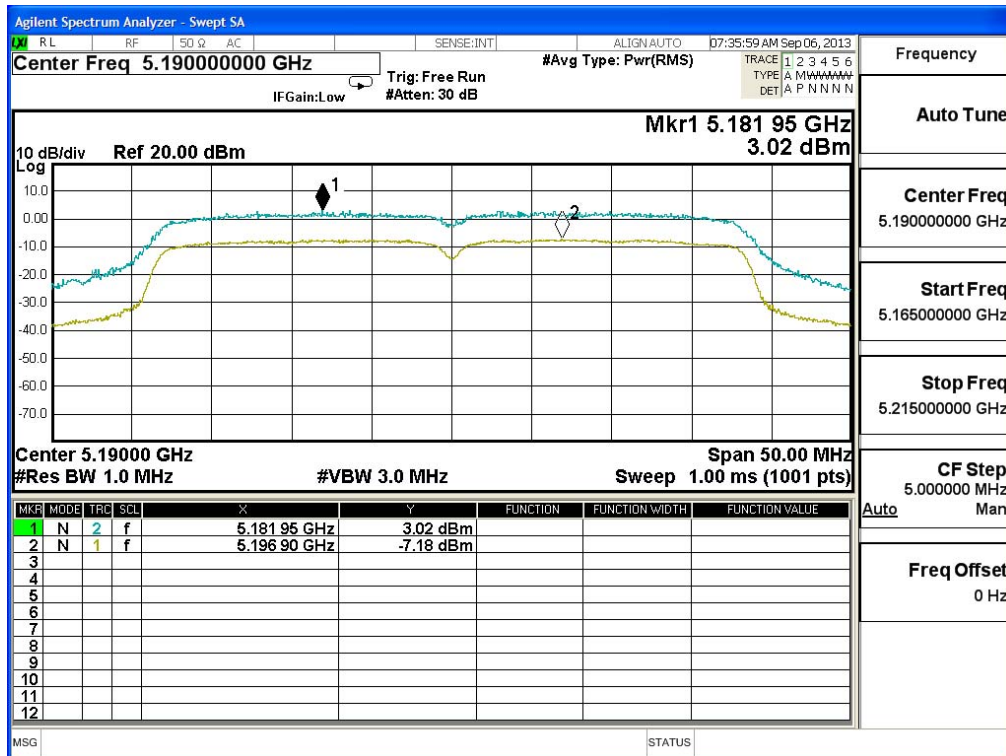
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Measurement Level (dB)	Required Limit (dB)	Result
38	5190	MCS (0)	9.900	<13	Pass
		MCS (2)	9.950	<13	Pass
		MCS (4)	10.200	<13	Pass
		MCS (7)	10.780	<13	Pass

Channel 38:

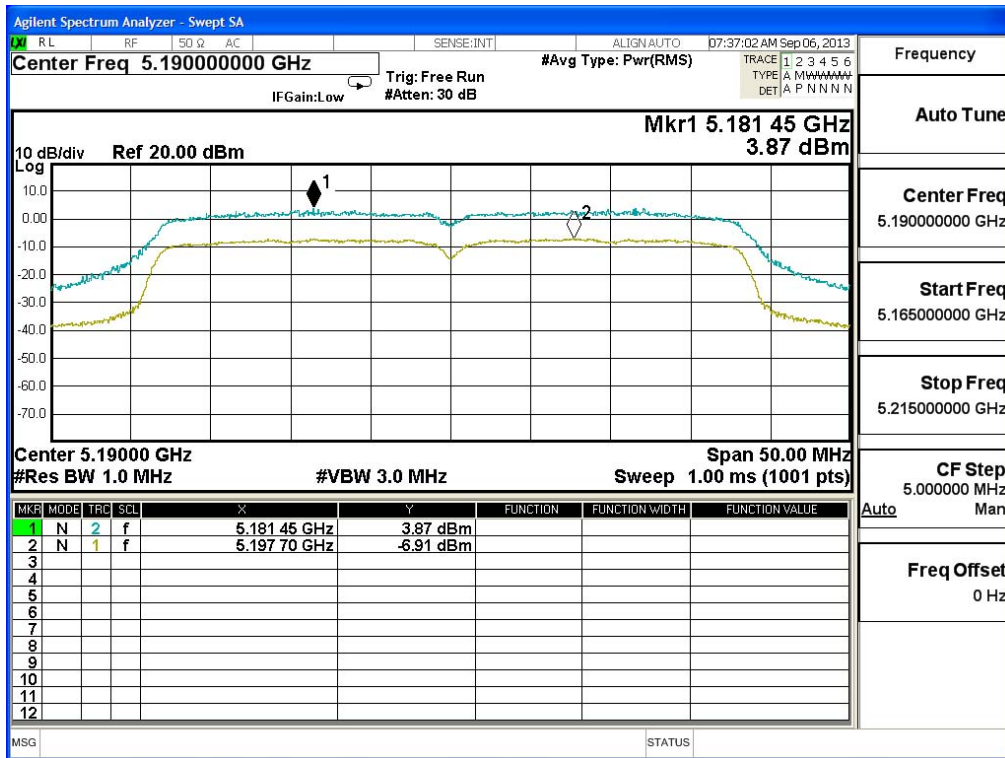




Frequency	
Auto Tune	
Center Freq	5.19000000 GHz
Start Freq	5.16500000 GHz
Stop Freq	5.21500000 GHz
CF Step	5.000000 MHz
Auto	Man
Freq Offset	0 Hz



Frequency	
Auto Tune	
Center Freq	5.19000000 GHz
Start Freq	5.16500000 GHz
Stop Freq	5.21500000 GHz
CF Step	5.000000 MHz
Auto	Man
Freq Offset	0 Hz



## 6. Radiated Emission

### 6.1. Test Equipment

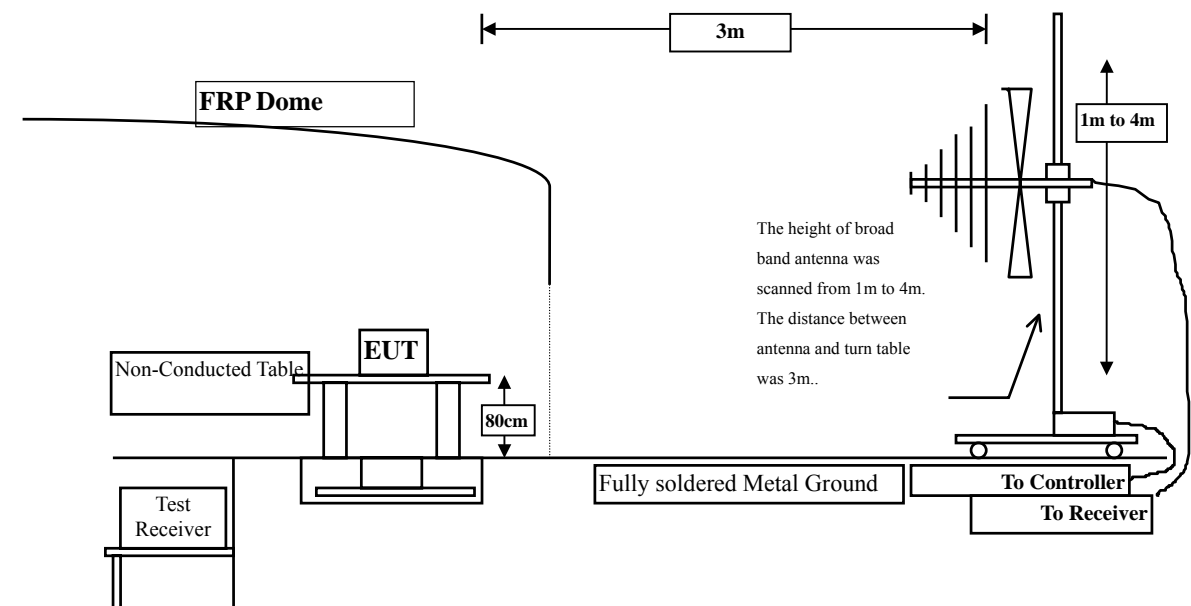
The following test equipments are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X Loop Antenna	Teseq	HLA6120 / 26739	Jul., 2013
	X Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2013
	X Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2013
	X Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2013
	X Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2013
	X Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2013
	X Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
	X Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2013
	X Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2013
	X Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X Coaxial Switch	Anritsu	MP59B/6200265729	N/A

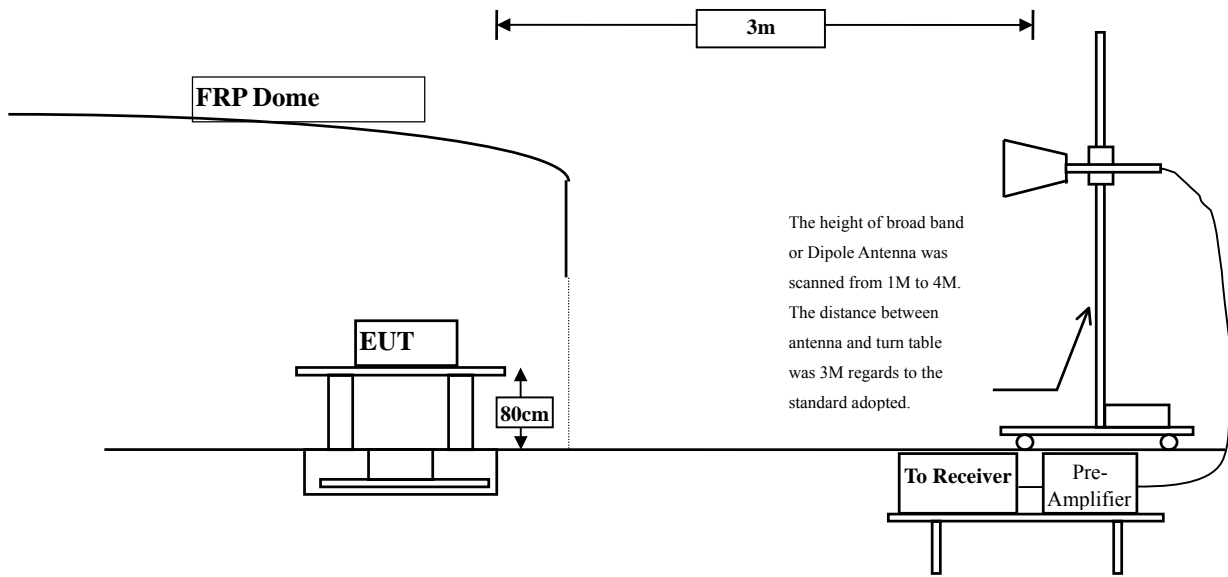
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
  2. The test instruments marked with "X" are used to measure the final test results.

### 6.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



**6.3. Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

#### **6.4. Test Procedure**

The EUT was setup according to ANSI C63.10, 2009 and tested according to FCC KDB-789033 test procedure for compliance to FCC 47CFR 15. 407 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10, 2009 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range form 9KHz - 10th Harmonic of fundamental was investigated.

#### **6.5. Uncertainty**

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

## 6.6. Test Result of Radiated Emission

Product : ASUS Miracast Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5180MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
10360.000	12.930	48.600	61.530	-12.470	74.000
15540.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
<b>Average</b>					
<b>Detector:</b>					
10360.000	12.930	33.880	46.810	-7.190	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
10360.000	13.724	50.230	63.954	-10.046	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
<b>Average</b>					
<b>Detector:</b>					
10360.000	13.724	35.230	48.954	-5.046	54.000

Note:

- All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- Measurement Level = Reading Level + Correct Factor.
- Correct Factor = Antenna factor + Cable loss – Amplifier gain.
- The average measurement was not performed when the peak measured data under the limit of average detection.
- The emission levels of other frequencies are very lower than the limit and not show in test report.



Product : ASUS Miracast Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5220MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
10440.000	13.322	48.260	61.582	-12.418	74.000
15600.000	*	*	*	*	74.000
20800.000	*	*	*	*	74.000
26000.000	*	*	*	*	74.000
31200.000	*	*	*	*	74.000
36400.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10440.000	13.322	35.230	48.552	-5.448	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
10440.000	14.245	51.260	65.505	-8.495	74.000
20800.000	*	*	*	*	74.000
26000.000	*	*	*	*	74.000
31200.000	*	*	*	*	74.000
36400.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10440.000	14.245	36.260	50.505	-3.495	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : ASUS Miracast Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5240MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
10480.000	13.693	49.650	63.344	-10.656	74.000
15720.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
31440000	*	*	*	*	74.000
36680.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10480.000	13.693	35.230	48.924	-5.076	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
10480.000	14.620	52.560	67.181	-6.819	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
31440000	*	*	*	*	74.000
36680.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10480.000	14.620	36.010	50.631	-3.369	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : ASUS Miracast Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
10360.000	12.930	47.560	60.490	-13.510	74.000
15540.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10360.000	12.930	33.590	46.520	-7.480	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
10360.000	13.724	52.160	65.884	-8.116	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10360.000	13.724	36.250	49.974	-4.026	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : ASUS Miracast Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5220MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
10440.000	13.322	48.290	61.612	-12.388	74.000
15660.000	*	*	*	*	74.000
20880.000	*	*	*	*	74.000
26100.000	*	*	*	*	74.000
31320.000	*	*	*	*	74.000
36540.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10440.000	13.322	34.560	47.882	-6.118	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
10440.000	14.245	51.260	65.505	-8.495	74.000
20880.000	*	*	*	*	74.000
26100.000	*	*	*	*	74.000
31320.000	*	*	*	*	74.000
36540.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10440.000	14.245	36.260	50.505	-3.495	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : ASUS Miracast Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5240MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
10480.000	13.693	48.260	61.954	-12.046	74.000
15720.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
31440.000	*	*	*	*	74.000
36680.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10480.000	13.693	35.230	48.924	-5.076	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
10480.000	14.620	50.290	64.911	-9.089	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
31440.000	*	*	*	*	74.000
36680.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10480.000	14.620	35.680	50.301	-3.699	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : ASUS Miracast Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
10380.000	12.939	48.230	61.169	-12.831	74.000
15570.000	*	*	*	*	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
31140.000	*	*	*	*	74.000
36330.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10380.000	12.939	33.240	46.179	-7.821	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
10380.000	13.796	50.480	64.276	-9.724	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
31140.000	*	*	*	*	74.000
36330.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10380.000	13.796	35.140	48.936	-5.064	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : ASUS Miracast Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5230MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
10460.000	13.508	47.040	60.548	-13.452	74.000
15690.000	*	*	*	*	74.000
20920.000	*	*	*	*	74.000
26150.000	*	*	*	*	74.000
31380.000	*	*	*	*	74.000
36610.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10460.000	13.508	34.010	47.518	-6.482	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
10460.000	14.433	50.480	64.913	-9.087	74.000
20920.000	*	*	*	*	74.000
26150.000	*	*	*	*	74.000
31380.000	*	*	*	*	74.000
36610.000	*	*	*	*	74.000
<b>Average Detector:</b>					
10460.000	14.433	36.020	50.453	-3.547	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : ASUS Miracast Dongle  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 4: Adapter mode

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector</b>					
148.500	-10.250	34.367	24.117	-19.383	43.500
297.000	-3.641	33.715	30.073	-15.927	46.000
445.500	-3.058	29.349	26.291	-19.709	46.000
594.000	3.882	23.182	27.064	-18.936	46.000
742.500	3.340	28.096	31.436	-14.564	46.000
891.000	5.977	24.713	30.690	-15.310	46.000
<b>Vertical</b>					
<b>Peak Detector</b>					
136.700	-5.143	29.513	24.370	-19.130	43.500
297.000	-7.263	27.836	20.573	-25.427	46.000
445.000	-8.012	37.503	29.491	-16.509	46.000
594.000	-4.068	32.232	28.164	-17.836	46.000
742.500	0.470	30.566	31.036	-14.964	46.000
891.000	2.285	25.305	27.590	-18.410	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.



Product : ASUS Miracast Dongle  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5220MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
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**Horizontal**
**Peak Detector**

97.900	-7.650	45.420	37.769	-5.731	43.500
241.460	-6.531	40.104	33.573	-12.427	46.000
377.260	-1.115	30.354	29.239	-16.761	46.000
499.480	0.048	32.896	32.944	-13.056	46.000
600.360	3.977	30.414	34.391	-11.609	46.000
798.240	5.148	27.563	32.711	-13.289	46.000

**Vertical**
**Peak Detector**

35.820	-2.159	34.452	32.293	-7.707	40.000
200.720	-7.835	41.199	33.364	-10.136	43.500
346.220	-3.093	28.084	24.991	-21.009	46.000
499.480	-0.852	38.644	37.792	-8.208	46.000
693.480	2.168	34.653	36.821	-9.179	46.000
804.060	3.587	28.725	32.312	-13.688	46.000

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : ASUS Miracast Dongle  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5220MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector</b>					
97.900	-7.650	44.468	36.817	-6.683	43.500
156.100	-10.461	42.511	32.049	-11.451	43.500
241.460	-6.531	40.036	33.505	-12.495	46.000
377.260	-1.115	29.955	28.840	-17.160	46.000
567.380	1.664	34.472	36.136	-9.864	46.000
710.940	3.596	31.356	34.952	-11.048	46.000
<b>Vertical</b>					
<b>Peak Detector</b>					
105.660	-0.253	33.404	33.151	-10.349	43.500
210.420	-7.882	39.538	31.657	-11.843	43.500
499.480	-0.852	34.508	33.656	-12.344	46.000
623.640	-2.631	25.974	23.343	-22.657	46.000
800.180	2.801	32.451	35.252	-10.748	46.000
932.100	6.152	24.763	30.915	-15.085	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : ASUS Miracast Dongle  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector</b>					
237.580	-7.700	39.641	31.941	-14.059	46.000
377.260	-1.115	31.279	30.164	-15.836	46.000
499.480	0.048	32.971	33.019	-12.981	46.000
567.380	1.664	33.241	34.905	-11.095	46.000
693.480	3.568	34.686	38.254	-7.746	46.000
798.240	5.148	30.453	35.601	-10.399	46.000
<b>Vertical</b>					
<b>Peak Detector</b>					
134.760	-4.648	34.772	30.124	-13.376	43.500
297.720	-7.143	34.095	26.953	-19.047	46.000
499.480	-0.852	33.694	32.842	-13.158	46.000
693.480	2.168	36.608	38.776	-7.224	46.000
800.180	2.801	30.456	33.257	-12.743	46.000
968.960	8.191	25.659	33.850	-20.150	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

## 7. Band Edge

### 7.1. Test Equipment

#### RF Conducted Measurement

The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2013
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2013
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

#### RF Radiated Measurement:

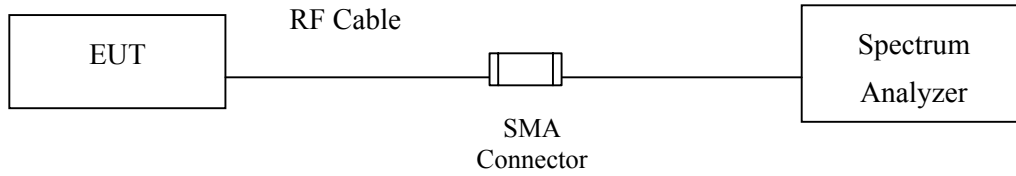
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	
☒ Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2013
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2013
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2013
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2013
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2013
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2013
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2013
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

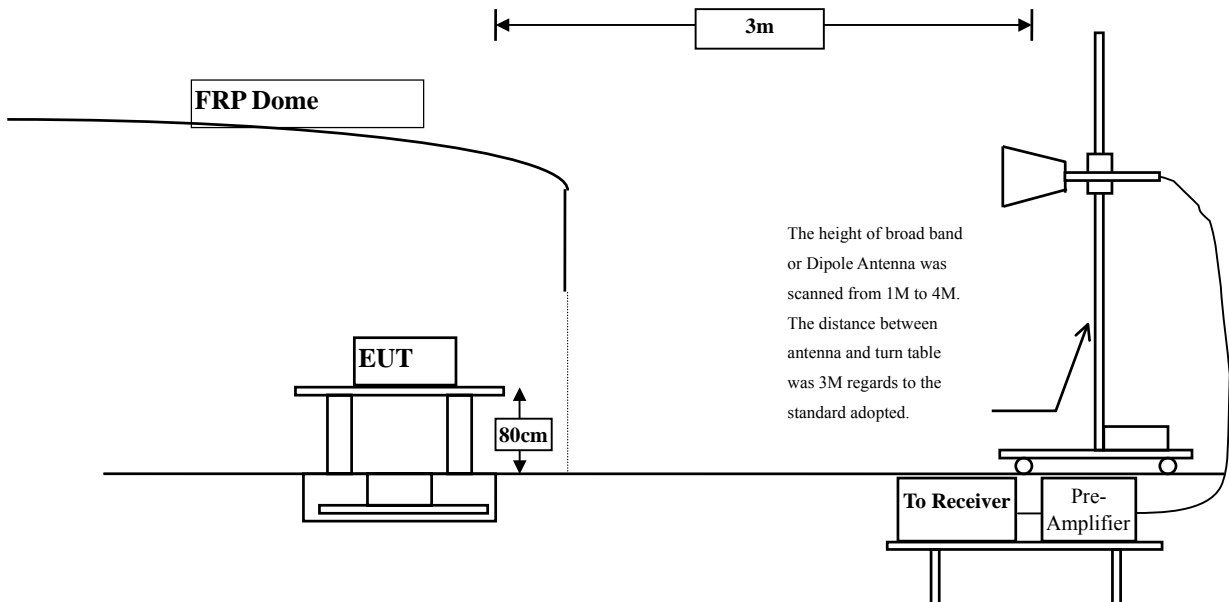
- Note:
1. All instruments are calibrated every one year.
  2. The test instruments marked by "X" are used to measure the final test results.

## 7.2. Test Setup

### RF Conducted Measurement:



### RF Radiated Measurement:



**7.3. Limits**

The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209:

<b>FCC Part 15 Subpart C Paragraph 15.209 Limits</b>		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

- Remarks :
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

**7.4. Test Procedure**

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2009 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz. The EUT was setup to ANSI C63.10, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

**7.5. Uncertainty**

- ± 3.8 dB below 1GHz
- ± 3.9 dB above 1GHz

### 7.6. Test Result of Band Edge

Product : ASUS Miracast Dongle  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (802.11a-6Mbps)-Channel 36

#### RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
36 (Peak)	5149.000	3.344	60.547	63.891	74.00	54.00	Pass
36 (Peak)	5150.000	3.340	59.600	62.940	74.00	54.00	Pass
36 (Peak)	5183.400	3.222	98.149	101.371	--	--	--
36 (Average)	5150.000	3.340	35.405	38.745	74.00	54.00	Pass
36 (Average)	5176.000	3.249	86.739	89.988	--	--	--

Figure Channel 36: Horizontal (Peak)

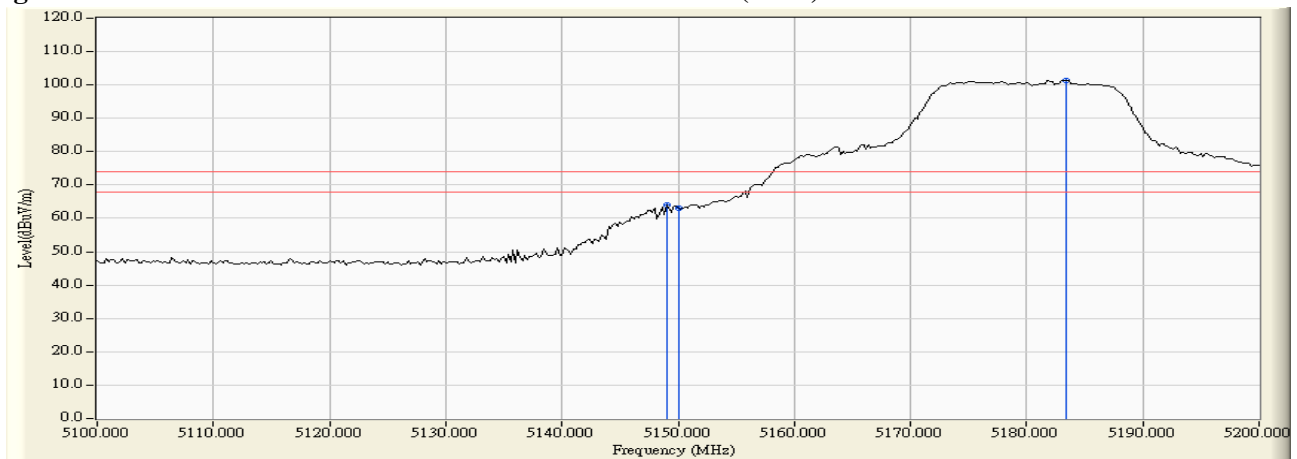
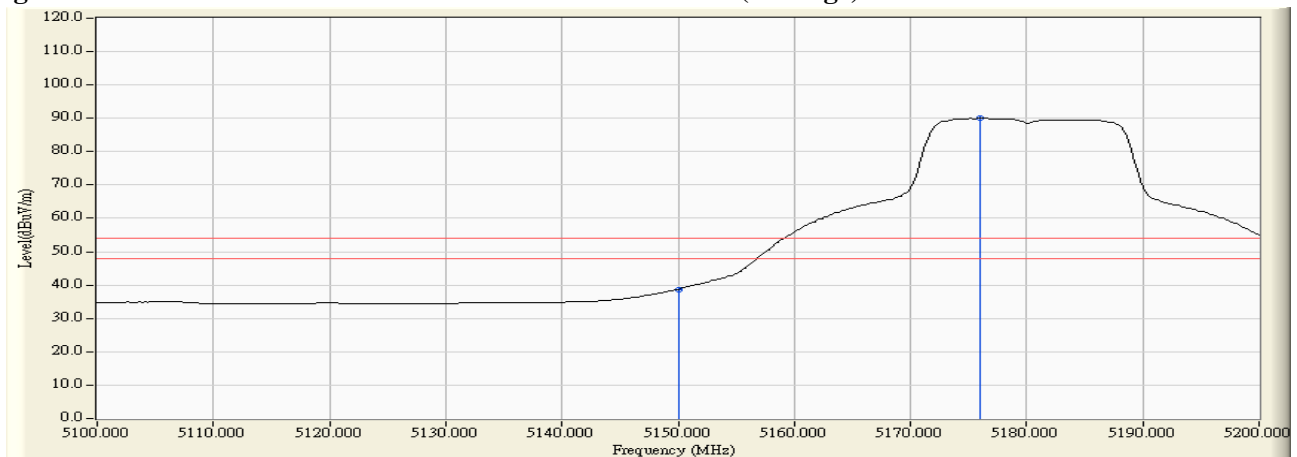


Figure Channel 36: Horizontal (Average)



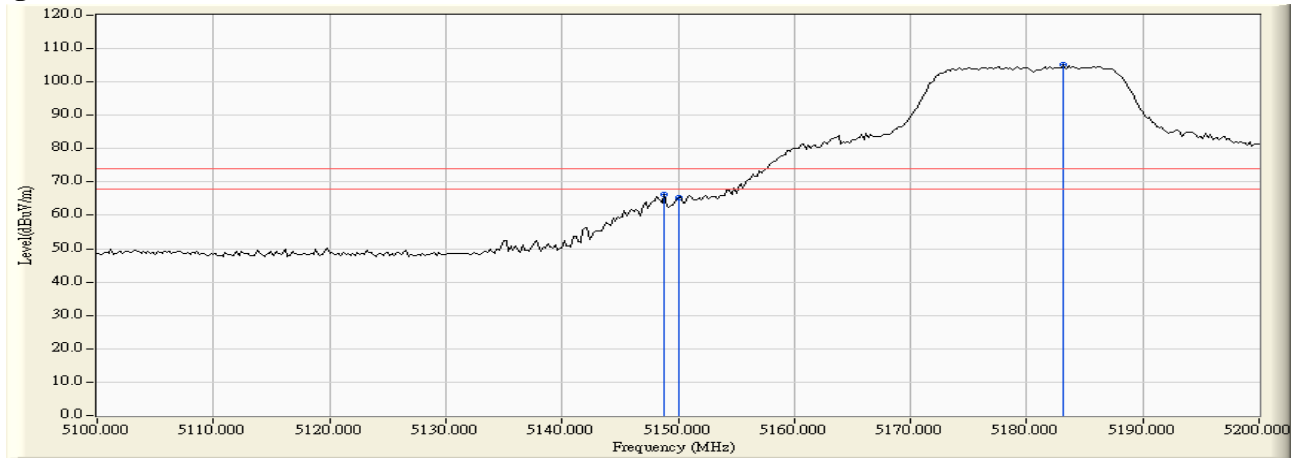
- Note: 1. All readings above 1GHz are performed with peak and/or average measurements as necessary.  
 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.  
 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.  
 4. “ \* ”, means this data is the worst emission level.  
 5. Measurement Level = Reading Level + Correct Factor.  
 6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : ASUS Miracast Dongle  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (802.11a-6Mbps)-Channel 36

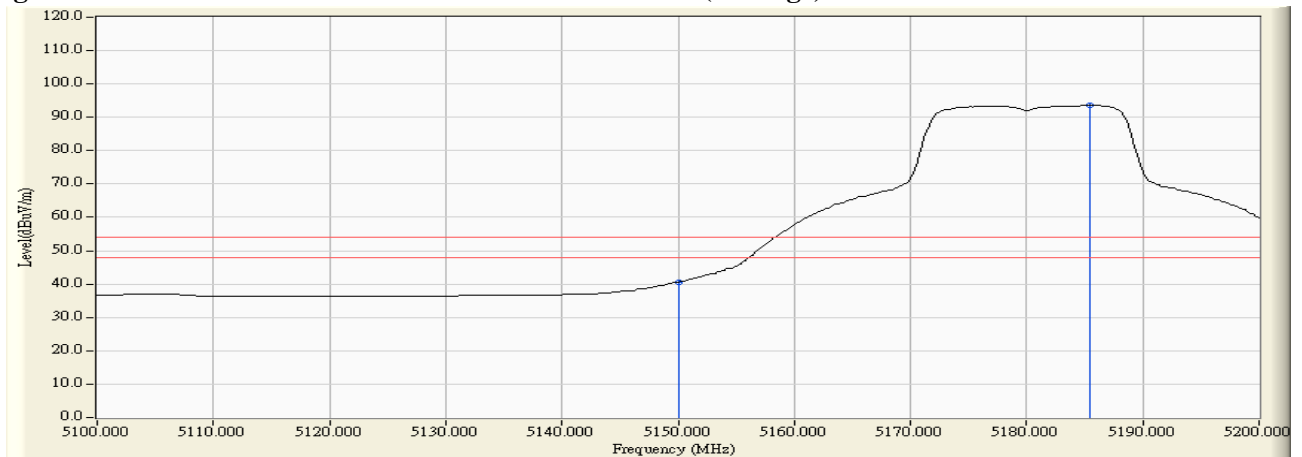
**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
36 (Peak)	5148.800	5.257	61.048	66.305	74.00	54.00	Pass
36 (Peak)	5150.000	5.260	59.890	65.150	74.00	54.00	Pass
36 (Peak)	5183.200	5.350	99.779	105.129	--	--	--
36 (Average)	5150.000	5.260	35.358	40.618	74.00	54.00	Pass
36 (Average)	5185.400	5.357	88.197	93.554	--	--	--

**Figure Channel 36: Vertical (Peak)**



**Figure Channel 36: Vertical (Average)**



**Note:**

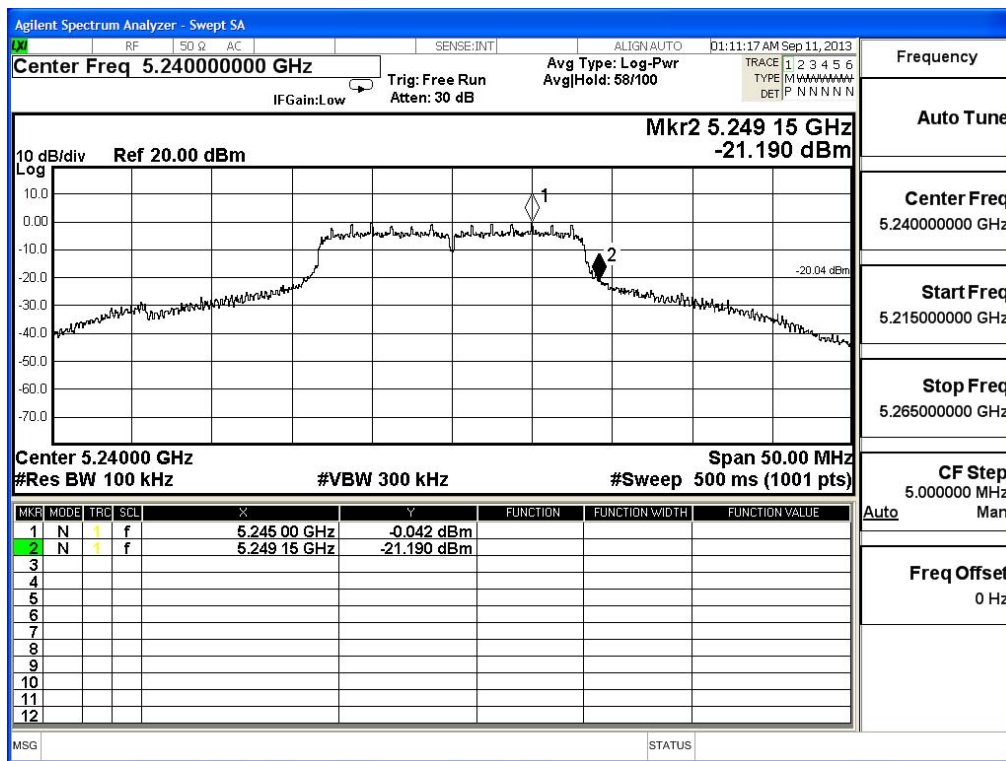
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product : ASUS Miracast Dongle  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (802.11a-6Mbps)-Channel 48

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5240	5249.15	<5250	PASS

NOTE: Accordance with 15.215 requirement.

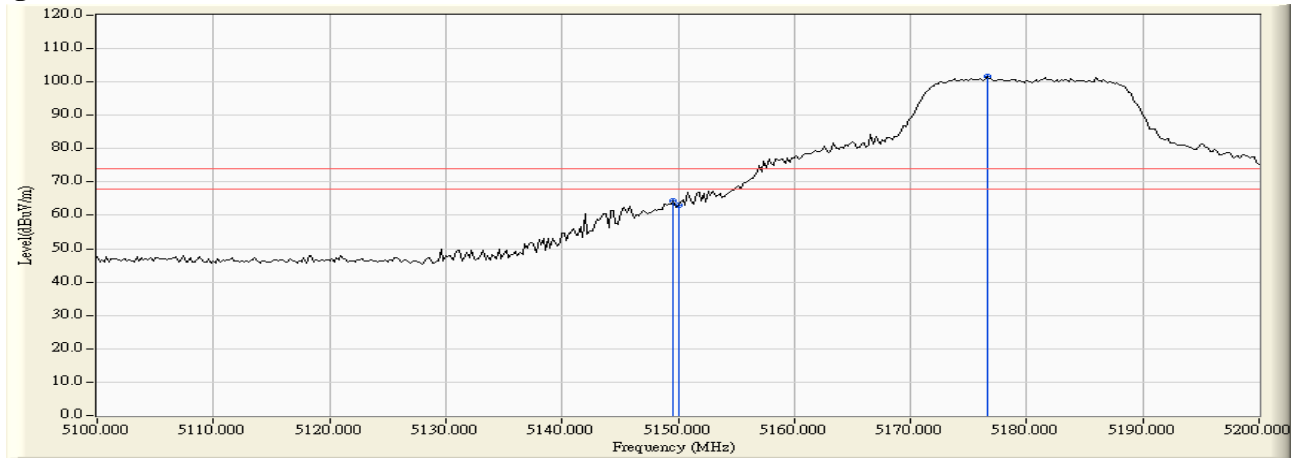


Product : ASUS Miracast Dongle  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) -Channel 36

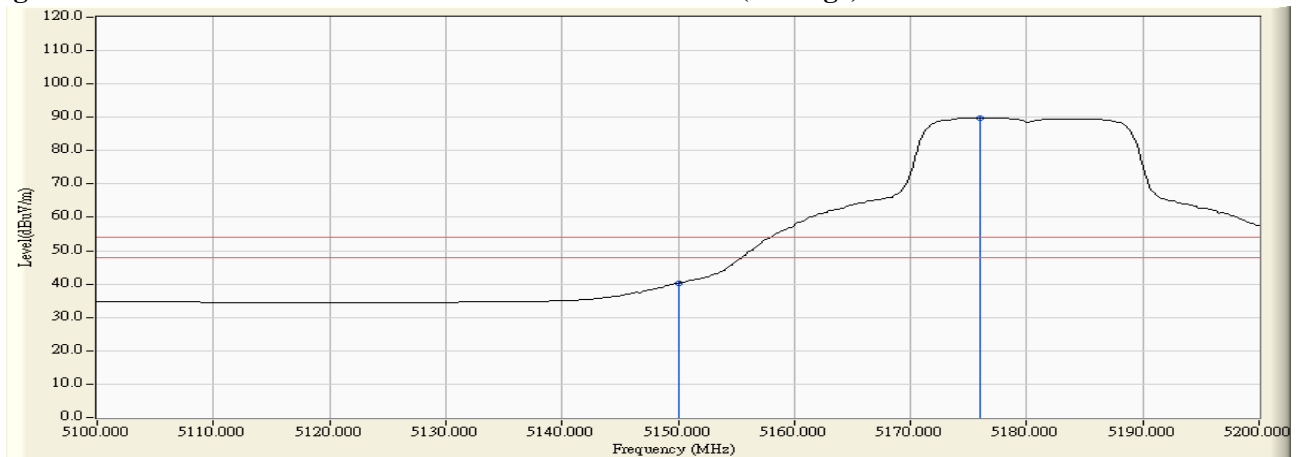
**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
36 (Peak)	5149.600	3.342	61.092	64.434	74.00	54.00	Pass
36 (Peak)	5150.000	3.340	59.794	63.134	74.00	54.00	Pass
36 (Peak)	5176.600	3.246	98.407	101.653	--	--	--
36 (Average)	5150.000	3.340	36.830	40.170	74.00	54.00	Pass
36 (Average)	5176.000	3.249	86.593	89.842	--	--	--

**Figure Channel 36: Horizontal (Peak)**



**Figure Channel 36: Horizontal (Average)**



**Note:**

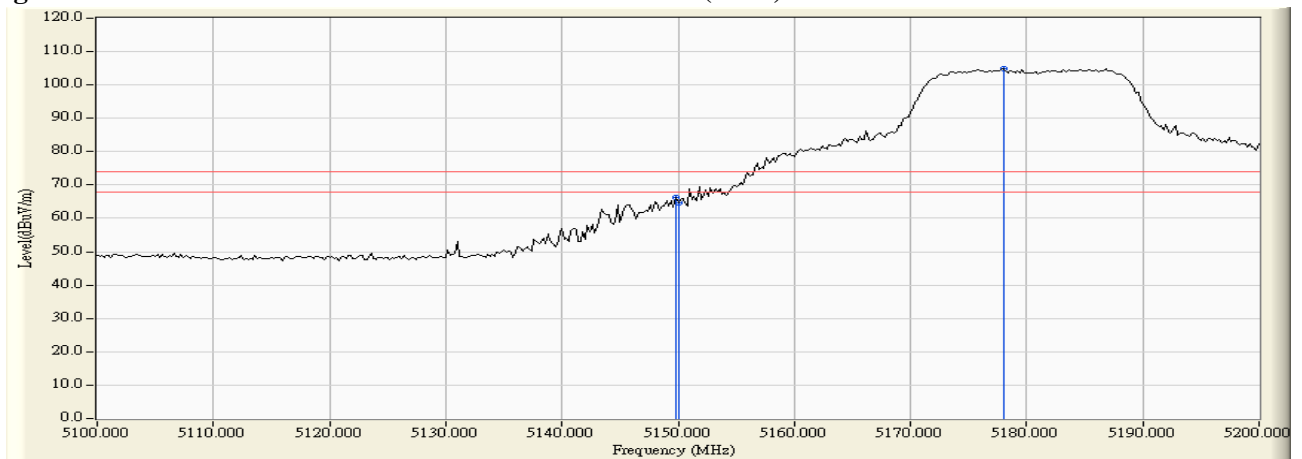
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : ASUS Miracast Dongle  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) -Channel 36

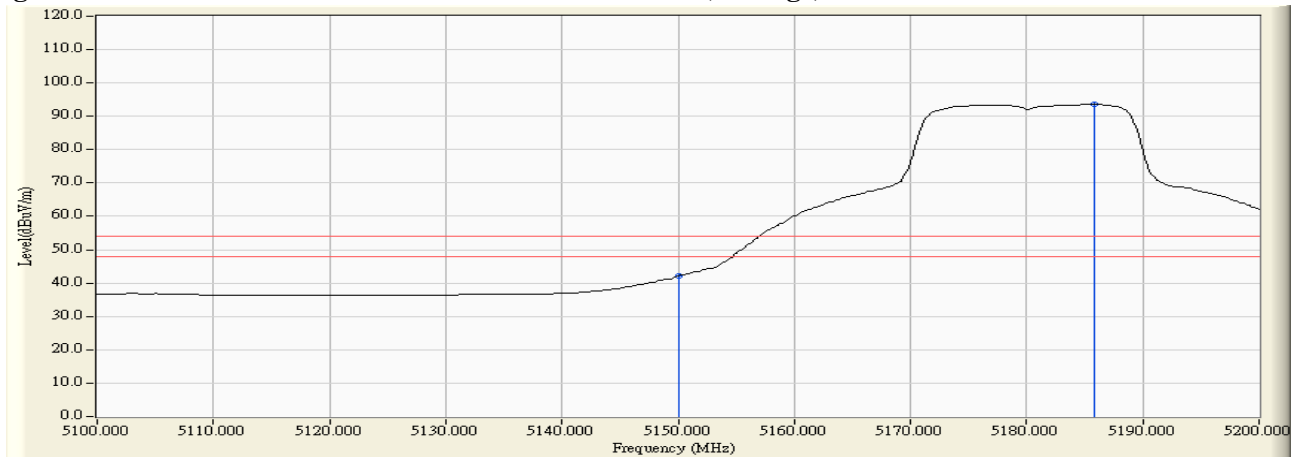
**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
36 (Peak)	5149.800	5.260	60.884	66.143	74.00	54.00	Pass
36 (Peak)	5150.000	5.260	59.331	64.591	74.00	54.00	Pass
36 (Peak)	5178.000	5.335	99.592	104.928	--	--	--
36 (Average)	5150.000	5.260	36.908	42.168	74.00	54.00	Pass
36 (Average)	5185.800	5.358	88.303	93.661	--	--	--

**Figure Channel 36: Vertical (Peak)**



**Figure Channel 36: Vertical (Average)**



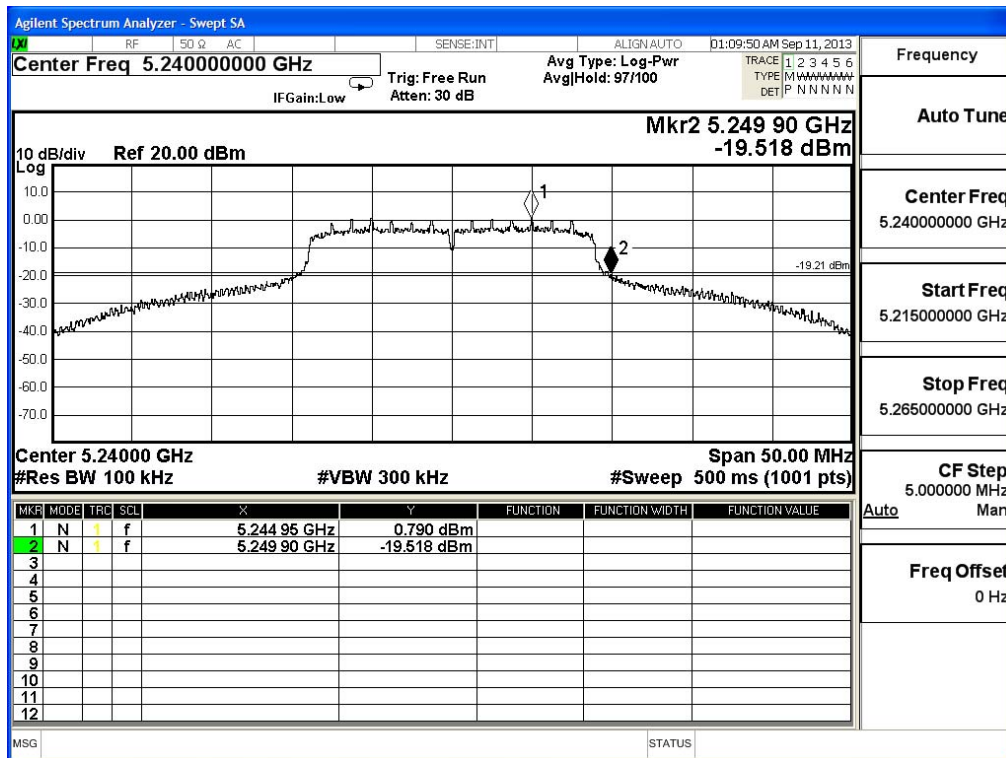
**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : ASUS Miracast Dongle  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) -Channel 48

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5240	5249.90	<5250	PASS

NOTE: Accordance with 15.215 requirement.



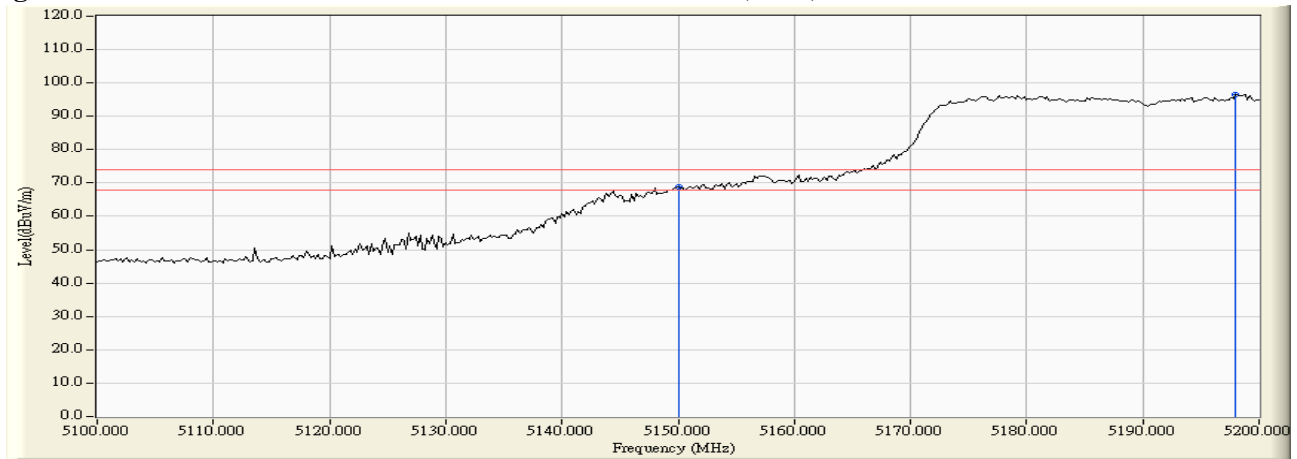
Product : ASUS Miracast Dongle

Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) -Channel 38

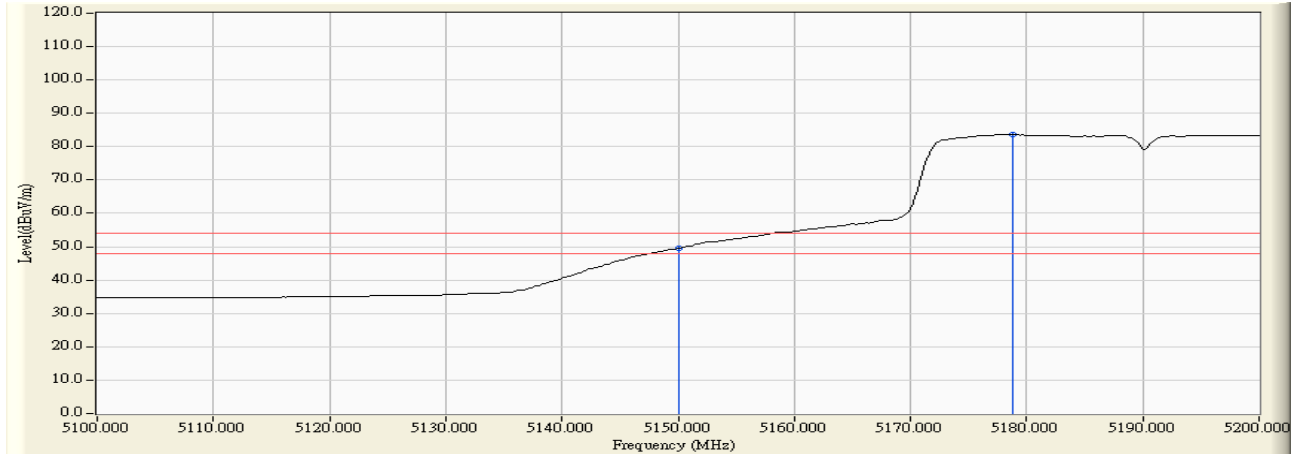
**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
38 (Peak)	5150.000	3.340	65.497	68.837	74.00	54.00	Pass
38 (Peak)	5198.000	3.160	93.482	96.642	--	--	--
38 (Average)	5150.000	3.340	46.272	49.612	74.00	54.00	Pass
38 (Average)	5178.800	3.238	80.389	83.627	--	--	--

**Figure Channel 38: Horizontal (Peak)**



**Figure Channel 38: Horizontal (Average)**



Note:

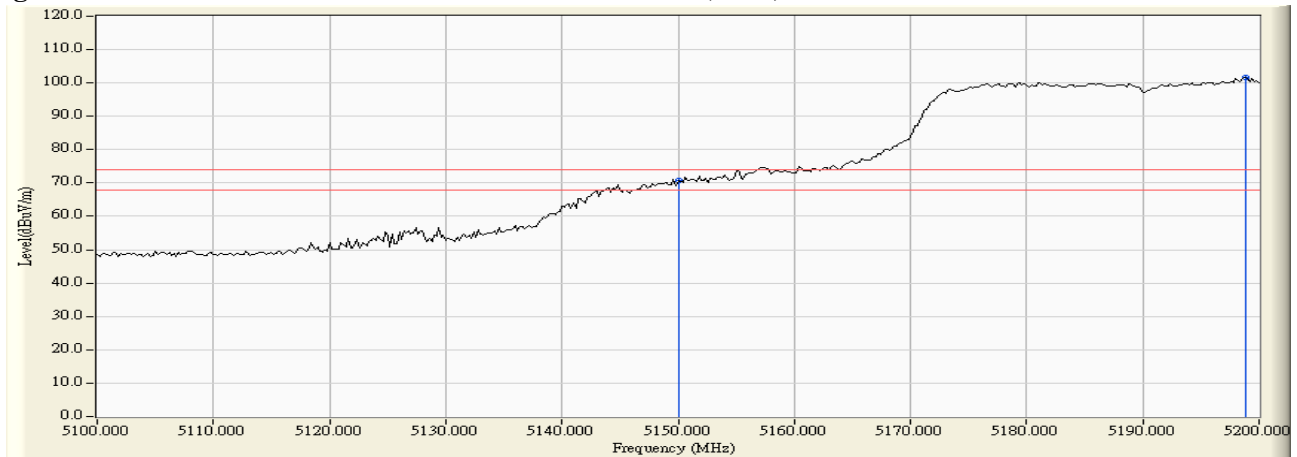
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : ASUS Miracast Dongle  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) -Channel 38

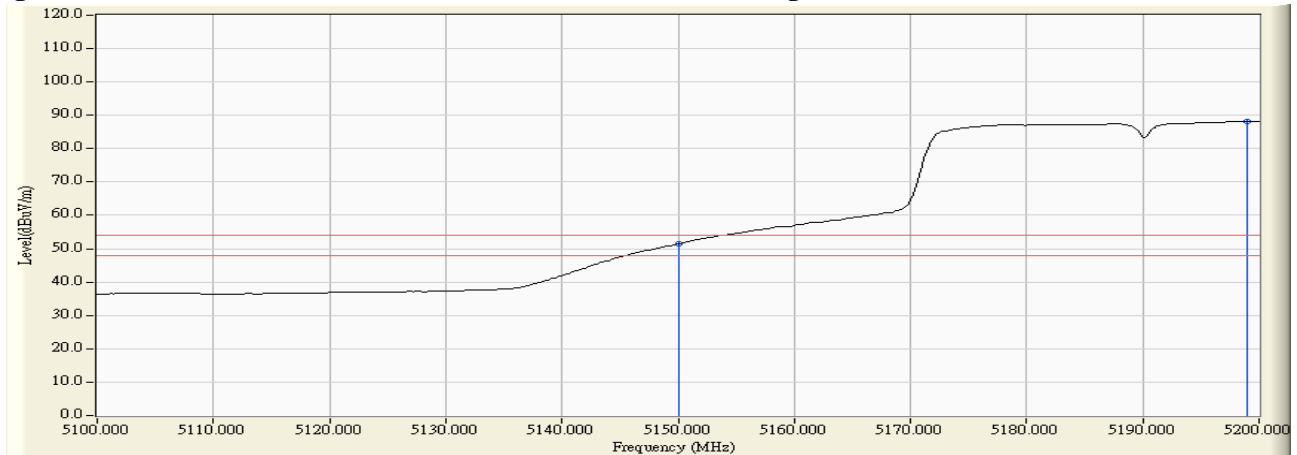
**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
38 (Peak)	5150.000	5.260	65.370	70.630	74.00	54.00	Pass
38 (Peak)	5198.800	5.383	96.142	101.525	--	--	--
38 (Average)	5150.000	5.260	46.069	51.329	74.00	54.00	Pass
38 (Average)	5199.000	5.383	82.922	88.305	--	--	--

**Figure Channel 38: Vertical (Peak)**



**Figure Channel 38: Vertical (Average)**



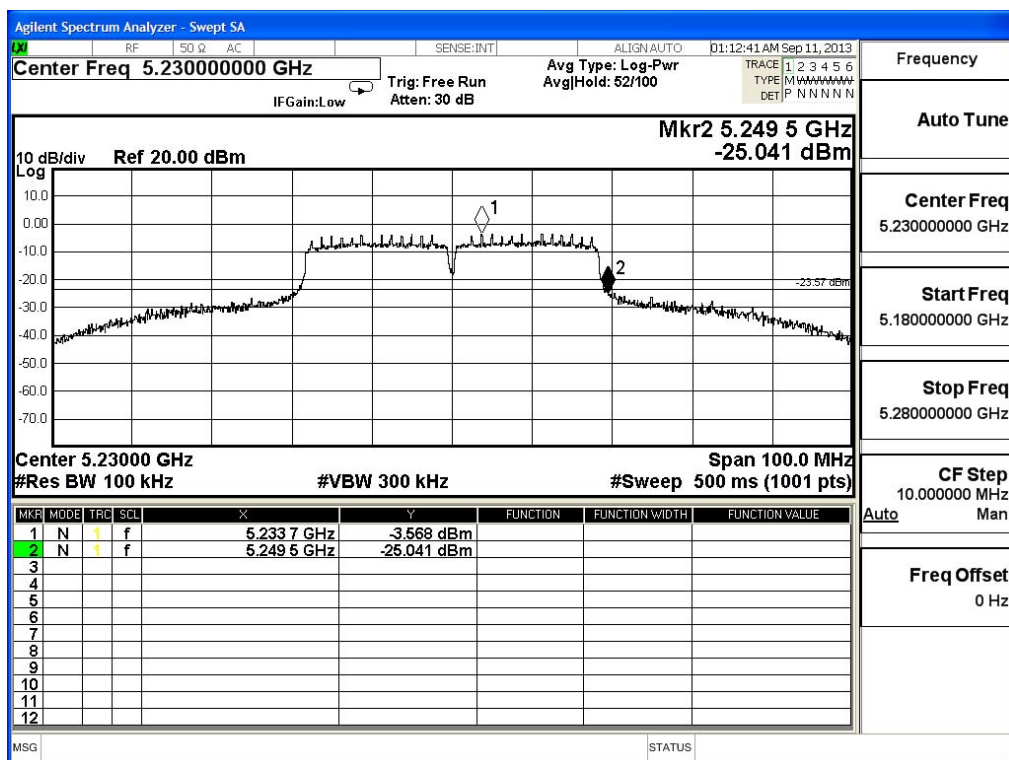
**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : ASUS Miracast Dongle  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)-Channel 46

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5230	5249.50	<5250	PASS

NOTE: Accordance with 15.215 requirement.



## 8. Frequency Stability

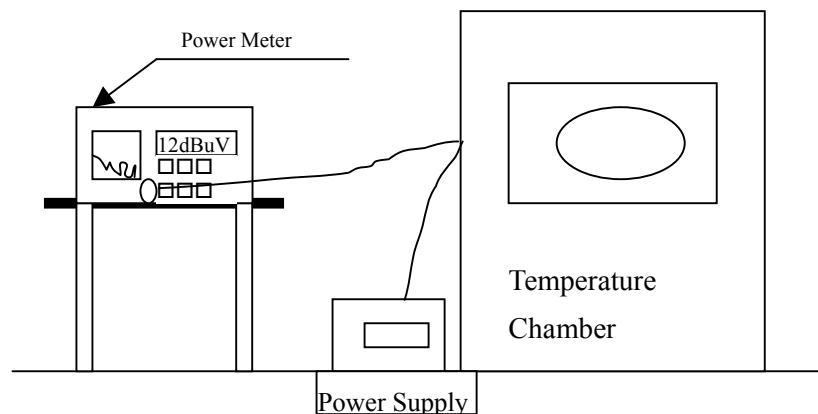
### 8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2013
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2013
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

### 8.2. Test Setup



### 8.3. Limits

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified

### 8.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

### 8.5. Uncertainty

± 150 Hz



### 8.6. Test Result of Frequency Stability

Product : ASUS Miracast Dongle  
 Test Item : Frequency Stability  
 Test Site : Temperature Chamber  
 Test Mode : Carrier Wave

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tnom (20) °C	Vnom (120)V	36	5180.0000	5180.0065	-0.0065
		38	5190.0000	5190.0095	-0.0095
		44	5220.0000	5220.0090	-0.0090
		46	5230.0000	5230.0085	-0.0085
		48	5240.0000	5240.0105	-0.0105
Tmax (50) °C	Vmax (138)V	36	5180.0000	5180.0050	-0.0050
		38	5190.0000	5190.0090	-0.0090
		44	5220.0000	5220.0095	-0.0095
		46	5230.0000	5230.0085	-0.0085
		48	5240.0000	5240.0090	-0.0090
Tmax (50) °C	Vmin (102)V	36	5180.0000	5180.0065	-0.0065
		38	5190.0000	5190.0090	-0.0090
		44	5220.0000	5220.0105	-0.0105
		46	5230.0000	5230.0080	-0.0080
		48	5240.0000	5240.0105	-0.0105
Tmin (0) °C	Vmax (138)V	36	5180.0000	5180.0055	-0.0055
		38	5190.0000	5190.0100	-0.0100
		44	5220.0000	5220.0095	-0.0095
		46	5230.0000	5230.0085	-0.0085
		48	5240.0000	5240.0100	-0.0100
Tmin (0) °C	Vmin (102)V	36	5180.0000	5180.0100	-0.0100
		38	5190.0000	5190.0085	-0.0085
		44	5220.0000	5220.0095	-0.0095
		46	5230.0000	5230.0090	-0.0090
		48	5240.0000	5240.0095	-0.0095

## 9. EMI Reduction Method During Compliance Testing

No modification was made during testing.