

**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 C63.4:2009 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 C63.4, 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 : WHDI Tx Stick  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 20BW -Channel 36

### Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Reading Level [dBuV]	Correction Factor [dB/m]	Emission Level [dBuV/m]	Detector
Horizontal	5180	40.725	59.13	99.855	Peak
Horizontal	5180	40.725	42.68	83.405	Average
Vertical	5180	42.832	57.33	100.163	Peak
Vertical	5180	42.832	41.24	84.073	Average

Note: 1: Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

### Band Edge Test Data (Chain A)

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Requiment Limit (dBuV/m)	Detector
Horizontal	5148.8	99.855	59.215	40.64	74.000	Peak
Horizontal	5150	83.405	56.397	27.008	54.000	Average
Vertical	5148.8	100.163	59.215	40.948	74.000	Peak
Vertical	5150	84.073	56.397	27.676	54.000	Average

### Band Edge Test Data (Chain B)

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Requiment Limit (dBuV/m)	Detector
Horizontal	5149.8	99.855	48.647	51.208	74.000	Peak
Horizontal	5150	83.405	56.297	27.108	54.000	Average
Vertical	5149.8	100.163	48.647	51.516	74.000	Peak
Vertical	5150	84.073	56.297	27.776	54.000	Average

Note:

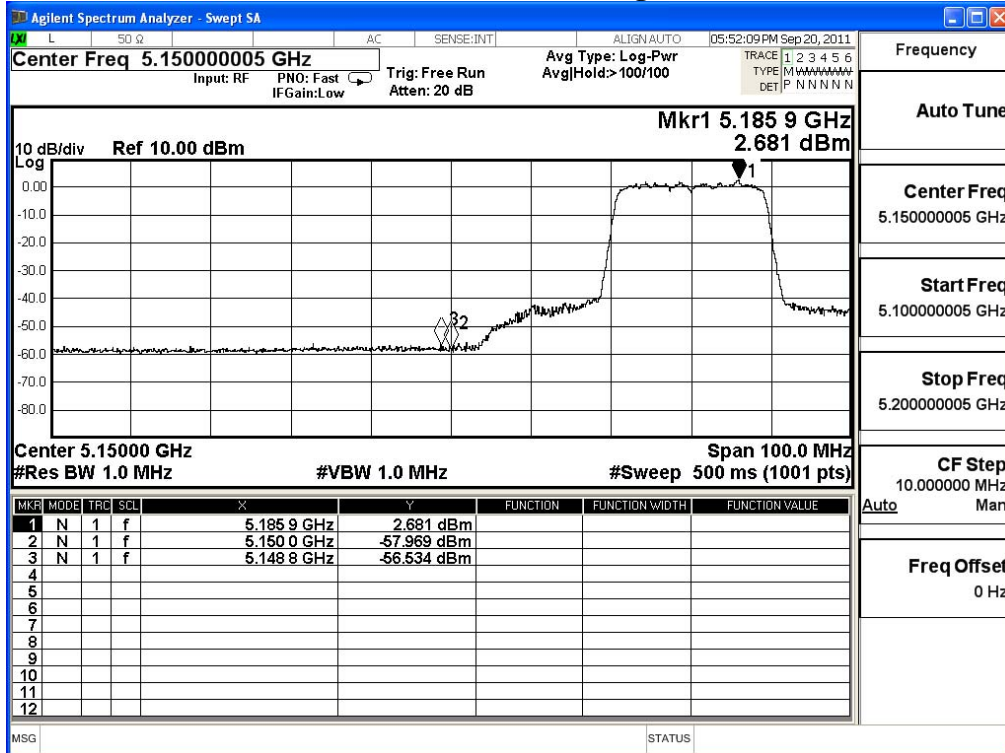
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$

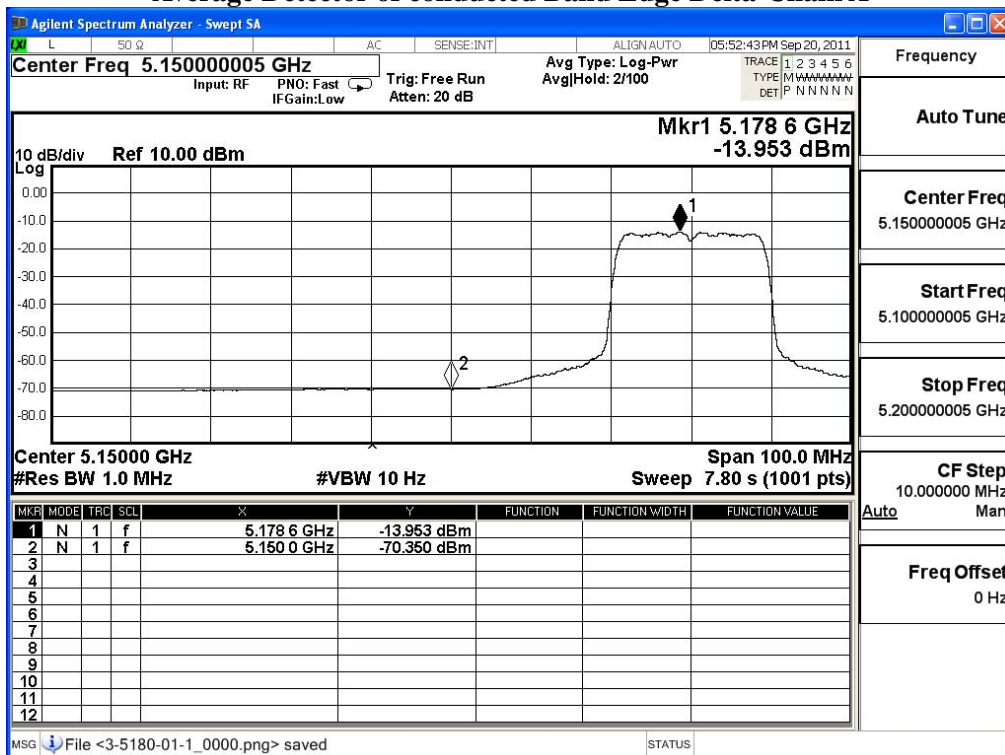
F = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

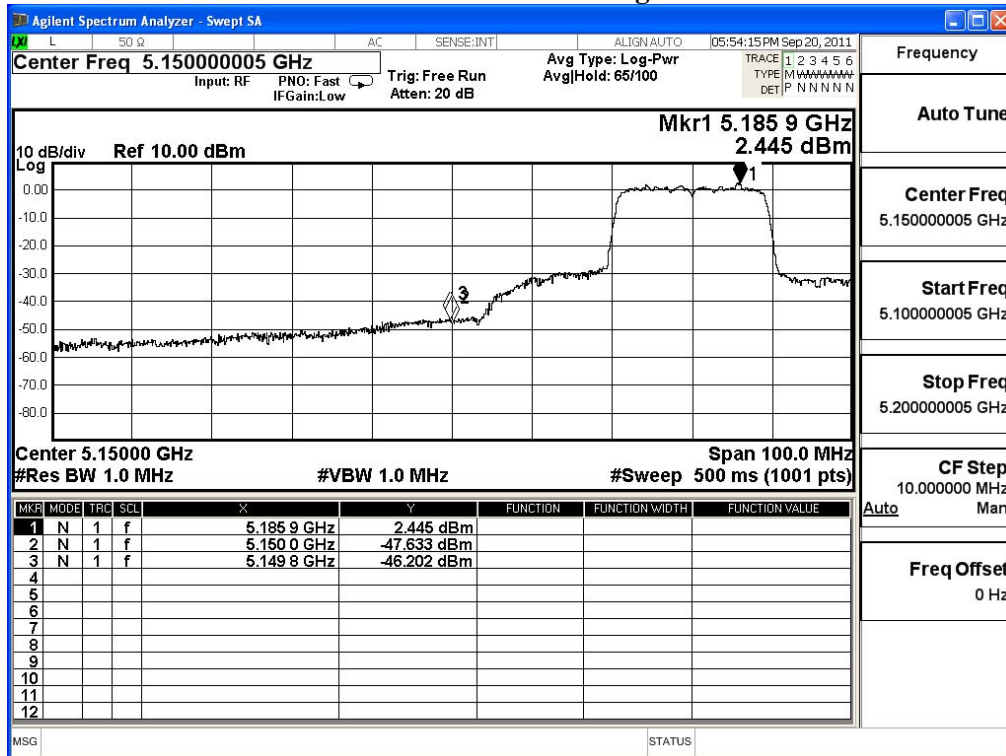
### Peak Detector of conducted Band Edge Delta-Chain A



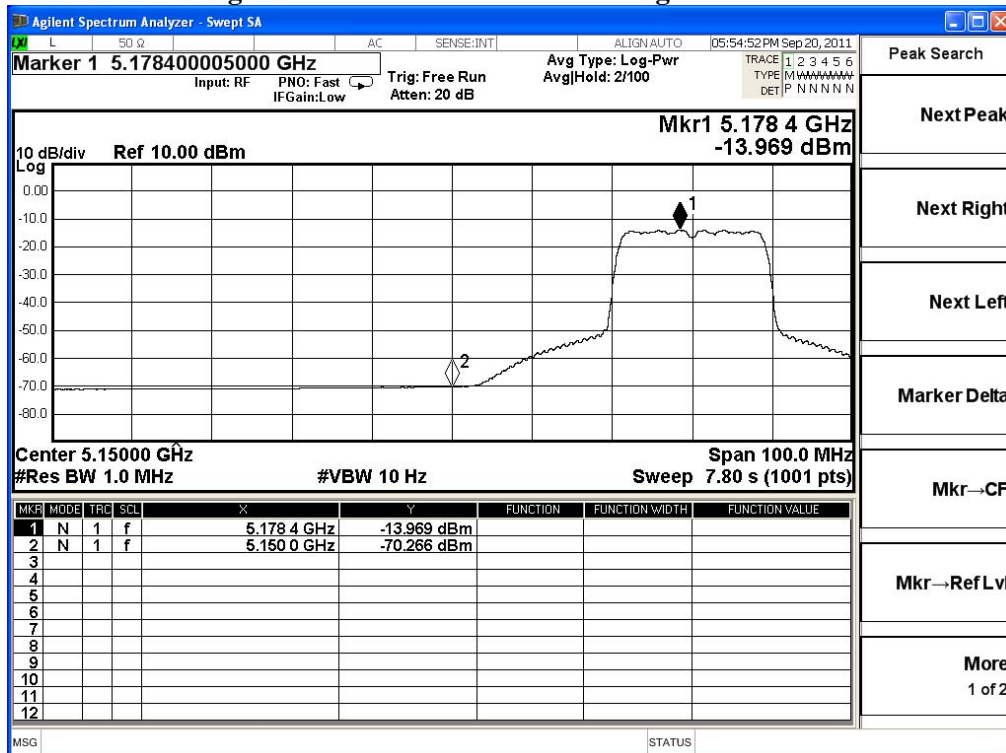
### Average Detector of conducted Band Edge Delta-Chain A



### Peak Detector of conducted Band Edge Delta-Chain B



### Average Detector of conducted Band Edge Delta-Chain B

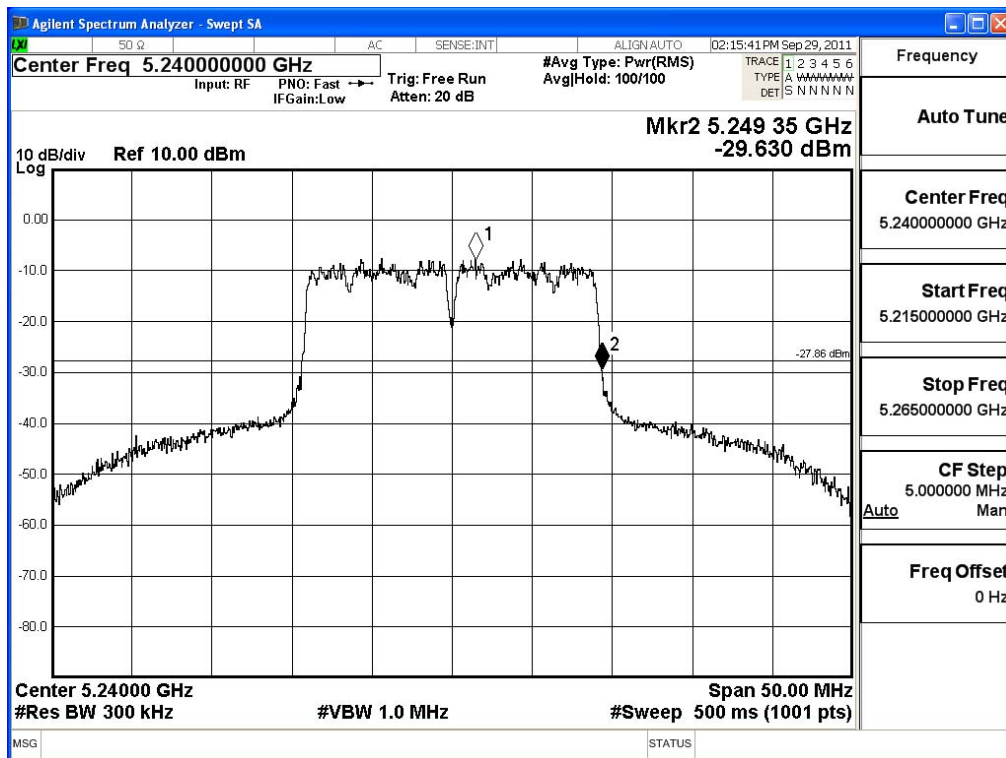


Product : WHDI Tx Stick  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 20BW-Channel 48

**Chain A**

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5240	5249.35	<5250	PASS

NOTE: Accordance with 15.215 requirement.

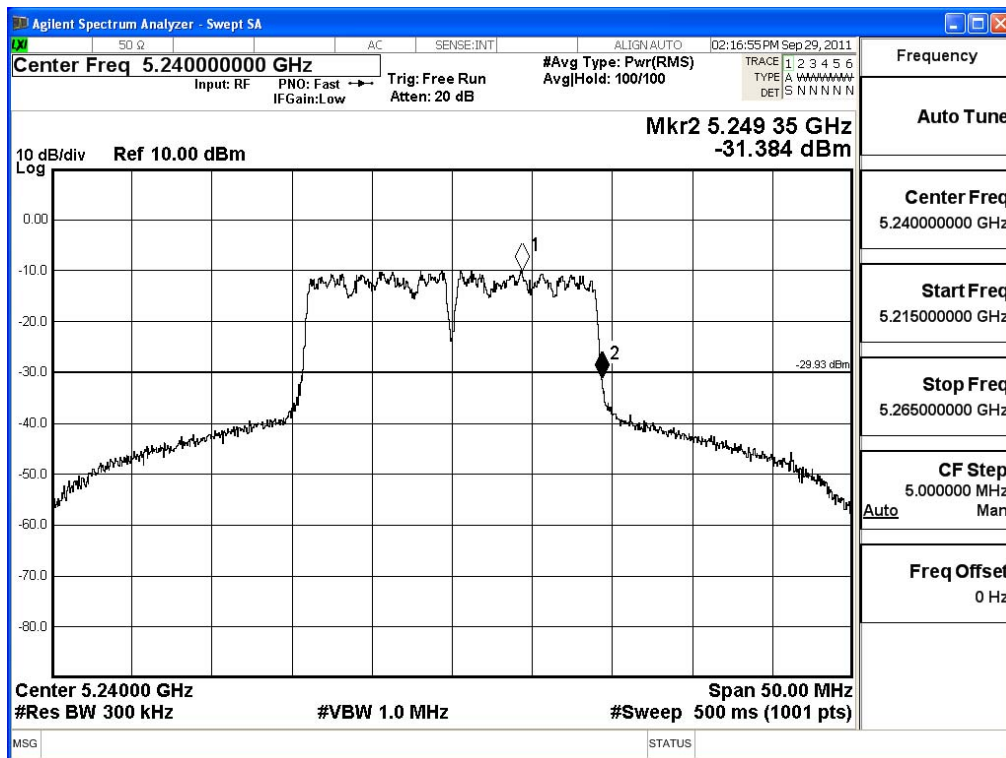


Product : WHDI Tx Stick  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 20BW-Channel 48

**Chain B**

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5240	5249.35	<5250	PASS

NOTE: Accordance with 15.215 requirement.



Product : WHDI Tx Stick  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmit - 40BW -Channel 38

**Fundamental Filed Strength**

Antenna Pole	Frequency [MHz]	Reading Level [dBuV]	Correction Factor [dB/m]	Emission Level [dBuV/m]	Detector
Horizontal	5190	40.562	56.02	96.582	Peak
Horizontal	5190	40.562	40.52	81.082	Average
Vertical	5190	42.732	54.39	97.123	Peak
Vertical	5190	42.732	39.87	82.603	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=30Hz

**Band Edge Test Data (Chain A)**

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Requiment Limit (dBuV/m)	Detector
Horizontal	5145	96.582	46.602	49.98	74.000	Peak
Horizontal	5150	81.082	50.416	30.666	54.000	Average
Vertical	5145	97.123	46.602	50.521	74.000	Peak
Vertical	5150	82.603	50.416	32.187	54.000	Average

**Band Edge Test Data (Chain B)**

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Requiment Limit (dBuV/m)	Detector
Horizontal	5148.6	96.582	36.882	59.7	74.000	Peak
Horizontal	5150	81.082	43.304	37.778	54.000	Average
Vertical	5148.6	97.123	36.882	60.241	74.000	Peak
Vertical	5150	82.603	43.304	39.299	54.000	Average

Note:

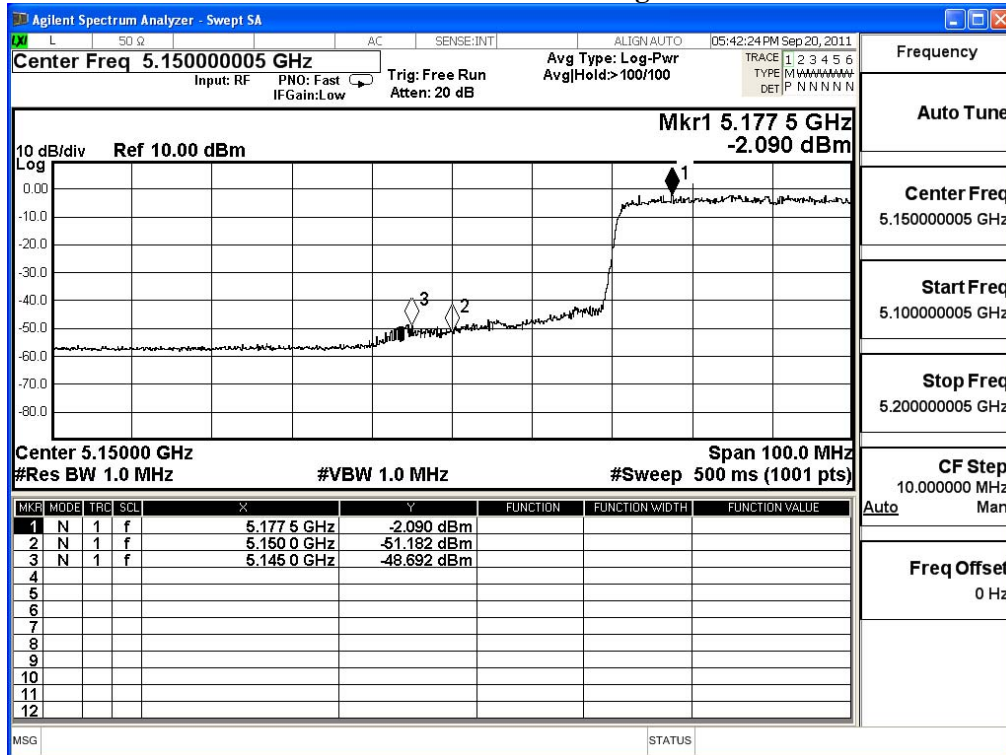
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$

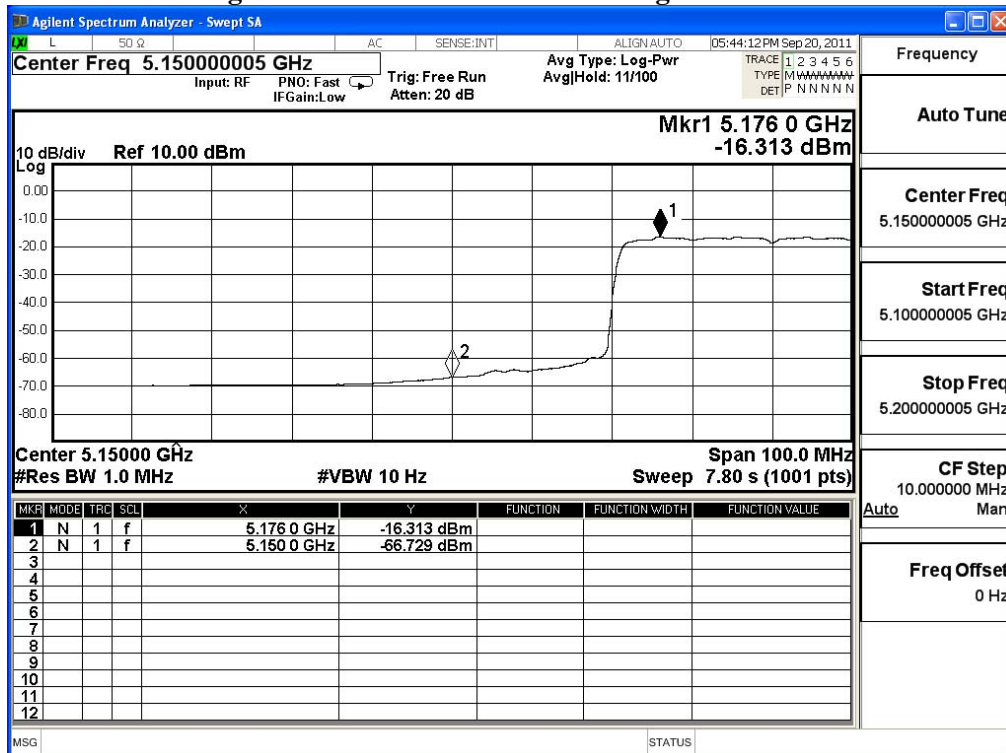
F = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

### Peak Detector of conducted Band Edge Delta-Chain A

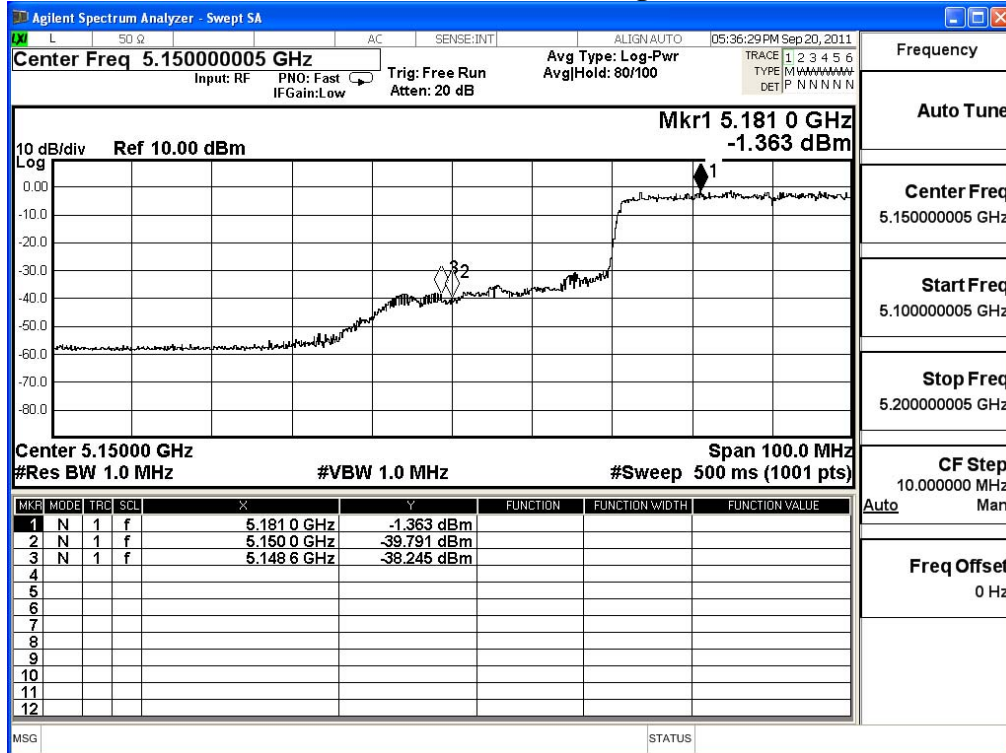


### Average Detector of conducted Band Edge Delta-Chain A

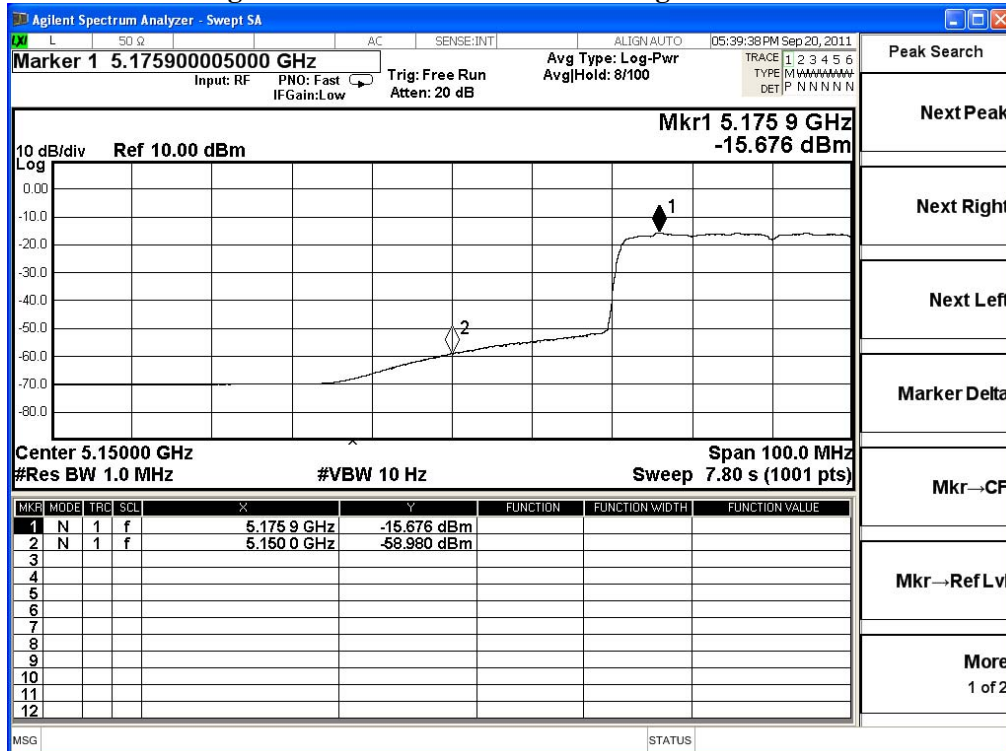




### Peak Detector of conducted Band Edge Delta-Chain B



### Average Detector of conducted Band Edge Delta-Chain B

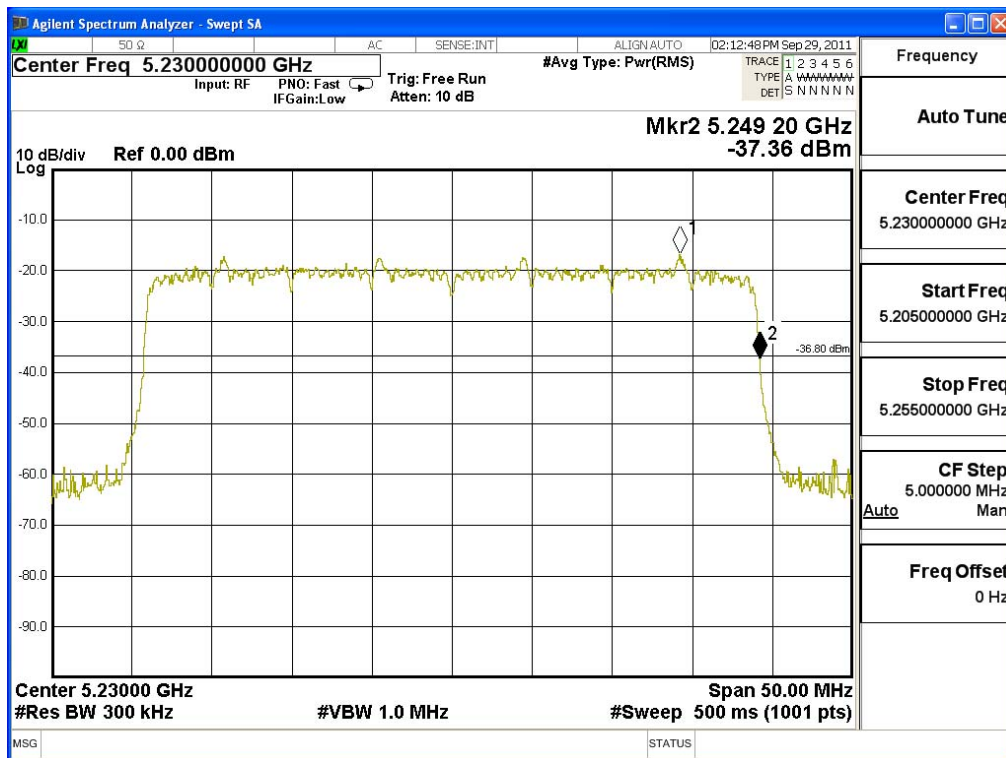


Product : WHDI Tx Stick  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 20BW-Channel 48

**Chain A**

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5230	5249.20	<5250	PASS

NOTE: Accordance with 15.215 requirement.

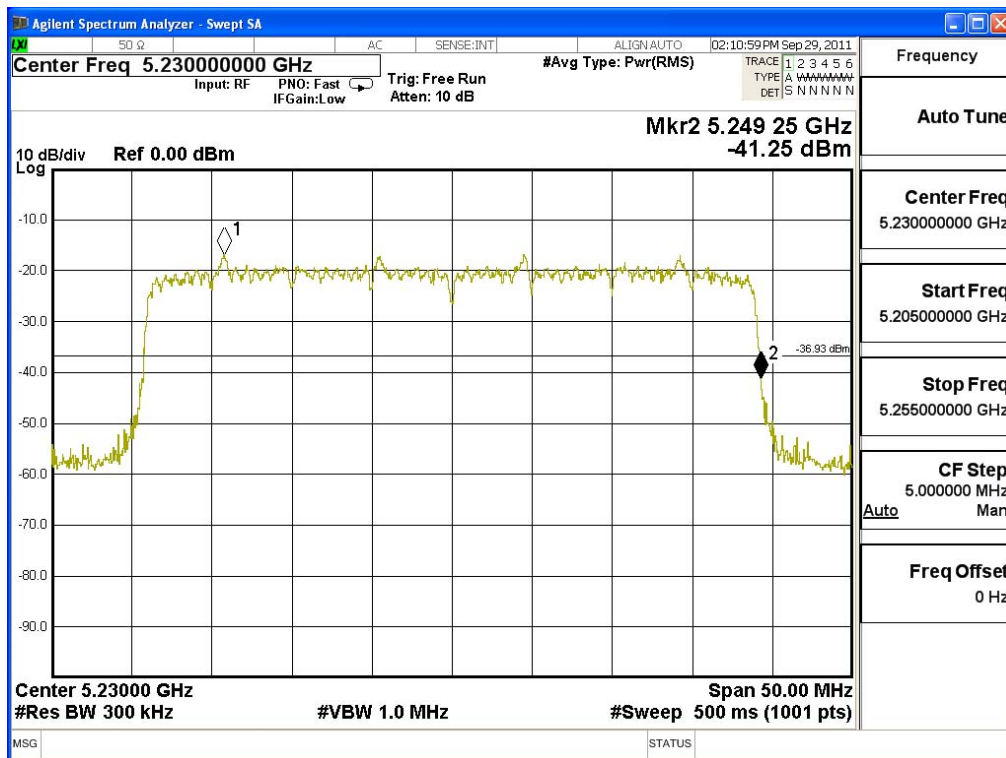


Product : WHDI Tx Stick  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit - 20BW-Channel 48

**Chain B**

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5230	5249.25	<5250	PASS

NOTE: Accordance with 15.215 requirement.



**8. Frequency Stability**

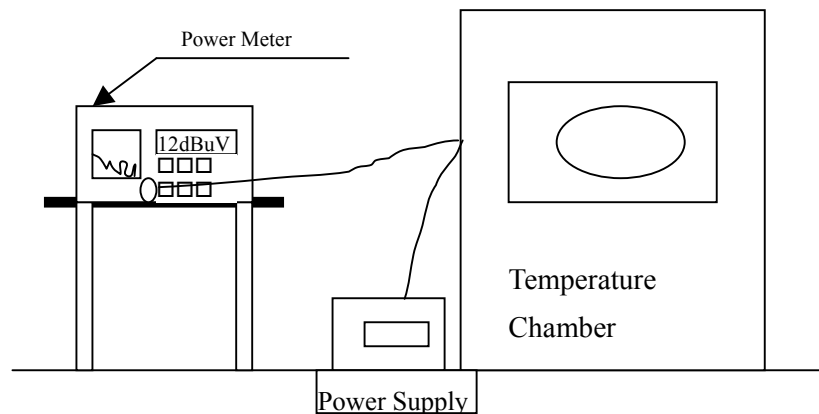
**8.1. Test Equipment**

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

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 C63.4, 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 : WHDI Tx Stick  
 Test Item : Frequency Stability  
 Test Site : Temperature Chamber  
 Test Mode : Carrier Wave

### Chain A

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tnom (20) °C	Vnom (110)V	36	5180.0000	5180.0002	-0.0002
		38	5190.0000	5190.0010	-0.0010
		44	5220.0000	5220.0008	-0.0008
		46	5230.0000	5230.0011	-0.0011
		48	5240.0000	5240.0004	-0.0004
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tmax (50) °C	Vmax (126.5)V	36	5180.0000	5180.0003	-0.0003
		38	5190.0000	5190.0010	-0.0010
		44	5220.0000	5220.0009	-0.0009
		46	5230.0000	5230.0007	-0.0007
		48	5240.0000	5240.0004	-0.0004
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tmax (50) °C	Vmin (93.5)V	36	5180.0000	5180.0004	-0.0004
		38	5190.0000	5190.0010	-0.0010
		44	5220.0000	5220.0010	-0.0010
		46	5230.0000	5230.0004	-0.0004
		48	5240.0000	5240.0005	-0.0005

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tmin (0) °C	Vmax (126.5)V	36	5180.0000	5180.0003	-0.0003
		38	5190.0000	5190.0010	-0.0010
		44	5220.0000	5220.0009	-0.0009
		46	5230.0000	5230.0005	-0.0005
		48	5240.0000	5240.0006	-0.0006
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tmin (0) °C	Vmin (93.5)V	36	5180.0000	5180.0003	-0.0003
		38	5190.0000	5190.0010	-0.0010
		44	5220.0000	5220.0009	-0.0009
		46	5230.0000	5230.0005	-0.0005
		48	5240.0000	5240.0006	-0.0006

**Chain B**

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tnom (20) °C	Vnom (110)V	36	5180.0003	5180.0003	-0.0003
		38	5190.0009	5190.0009	-0.0009
		44	5220.0005	5220.0005	-0.0005
		46	5230.0010	5230.0010	-0.0010
		48	5240.0004	5240.0004	-0.0004
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tmax (50) °C	Vmax (126.5)V	36	5180.0000	5180.0003	-0.0003
		38	5190.0000	5190.0009	-0.0009
		44	5220.0000	5220.0010	-0.0010
		46	5230.0000	5230.0006	-0.0006
		48	5240.0000	5240.0005	-0.0005
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tmax (50) °C	Vmin (93.5)V	36	5180.0000	5180.0006	-0.0006
		38	5190.0000	5190.0011	-0.0011
		44	5220.0000	5220.0010	-0.0010
		46	5230.0000	5230.0003	-0.0003
		48	5240.0000	5240.0005	-0.0005

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tmin (0) °C	Vmax (126.5)V	36	5180.0000	5180.0003	-0.0003
		38	5190.0000	5190.0010	-0.0010
		44	5220.0000	5220.0008	-0.0008
		46	5230.0000	5230.0006	-0.0006
		48	5240.0000	5240.0005	-0.0005
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	$\Delta F$ (MHz)
Tmin (0) °C	Vmin (93.5)V	36	5180.0000	5180.0005	-0.0005
		38	5190.0000	5190.0010	-0.0010
		44	5220.0000	5220.0008	-0.0008
		46	5230.0000	5230.0005	-0.0005
		48	5240.0000	5240.0005	-0.0005



## 9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

## Attachment 1: EUT Test Photographs

**Attachment 1: EUT Test Setup Photographs**

Front View of Conducted Test



Back View of Conducted Test



Front View of Radiated Test



Back View of Radiated Test



Front View of Radiated Test (Horn) 1-18GHz



Back View of Radiated Test (Horn) 1-18GHz



Front View of Radiated Test (Horn) 18-40GHz



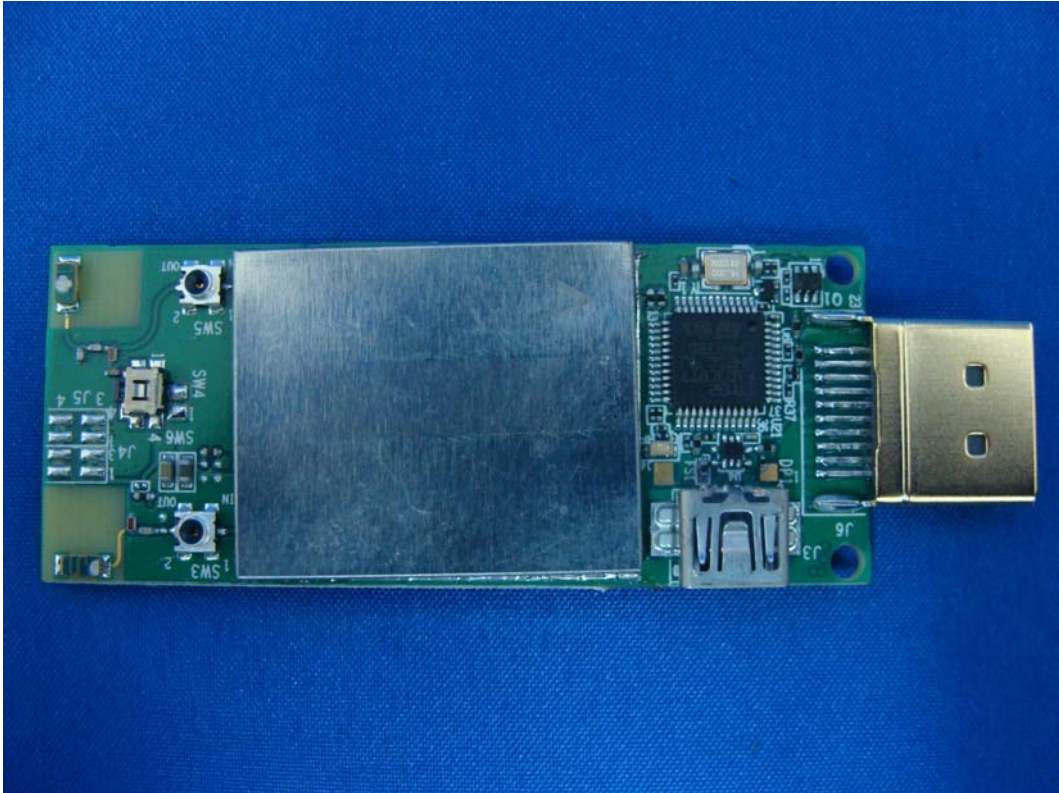
Back View of Radiated Test (Horn) 18-40GHz



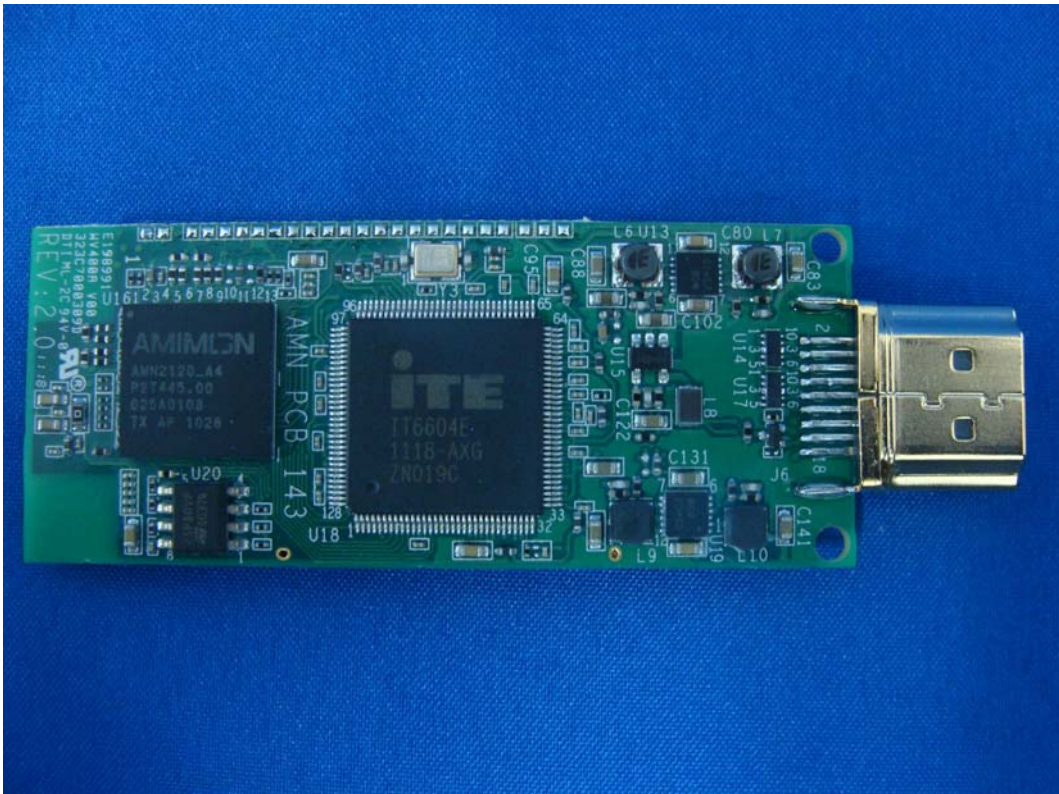
## Attachment 2: EUT Detailed Photographs

**Attachment 2 : EUT Detailed Photographs**

(1) EUT Photo

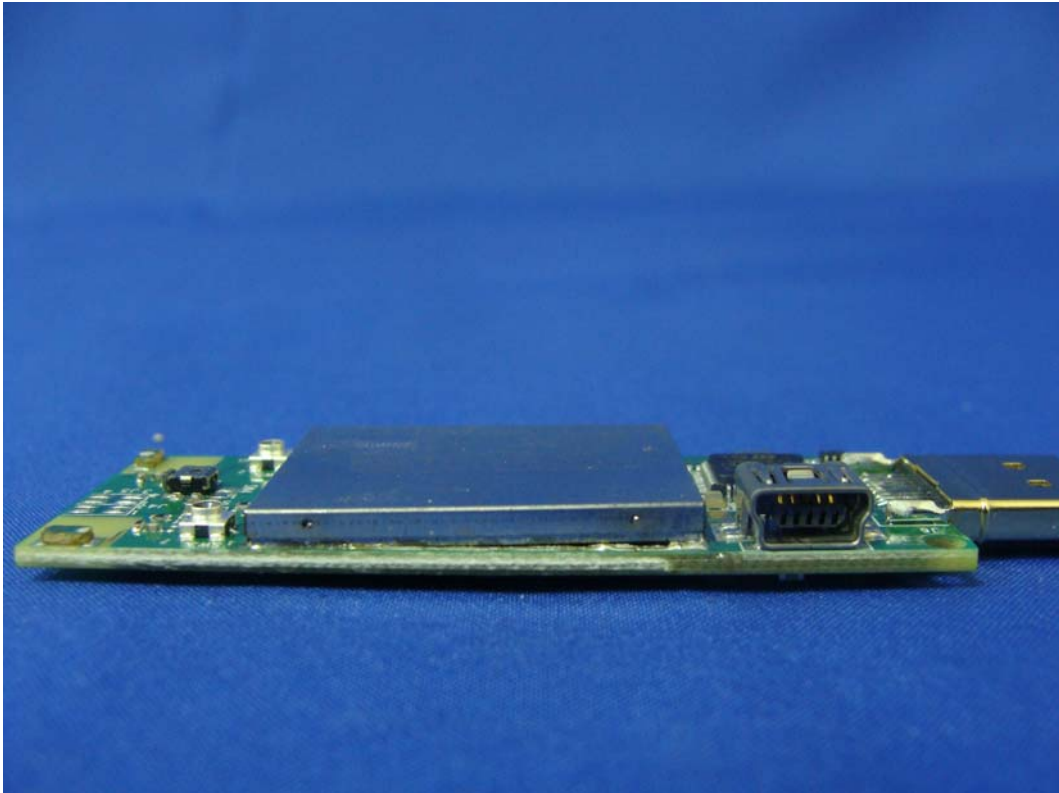


(2) EUT Photo

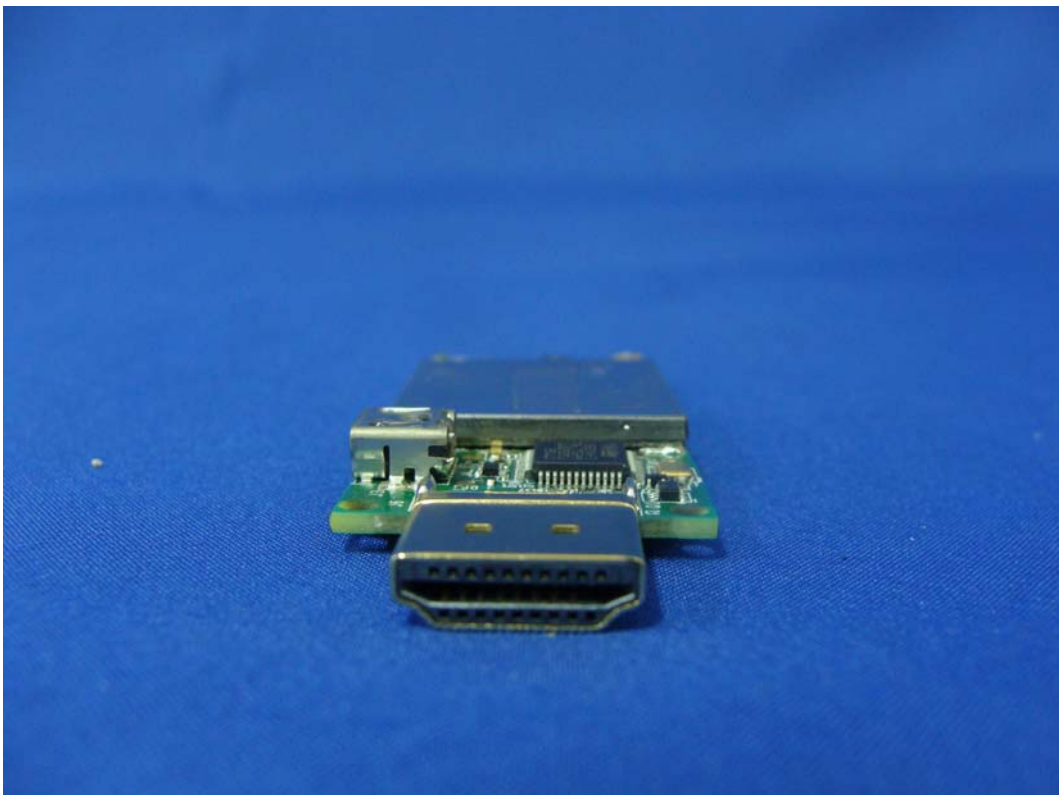




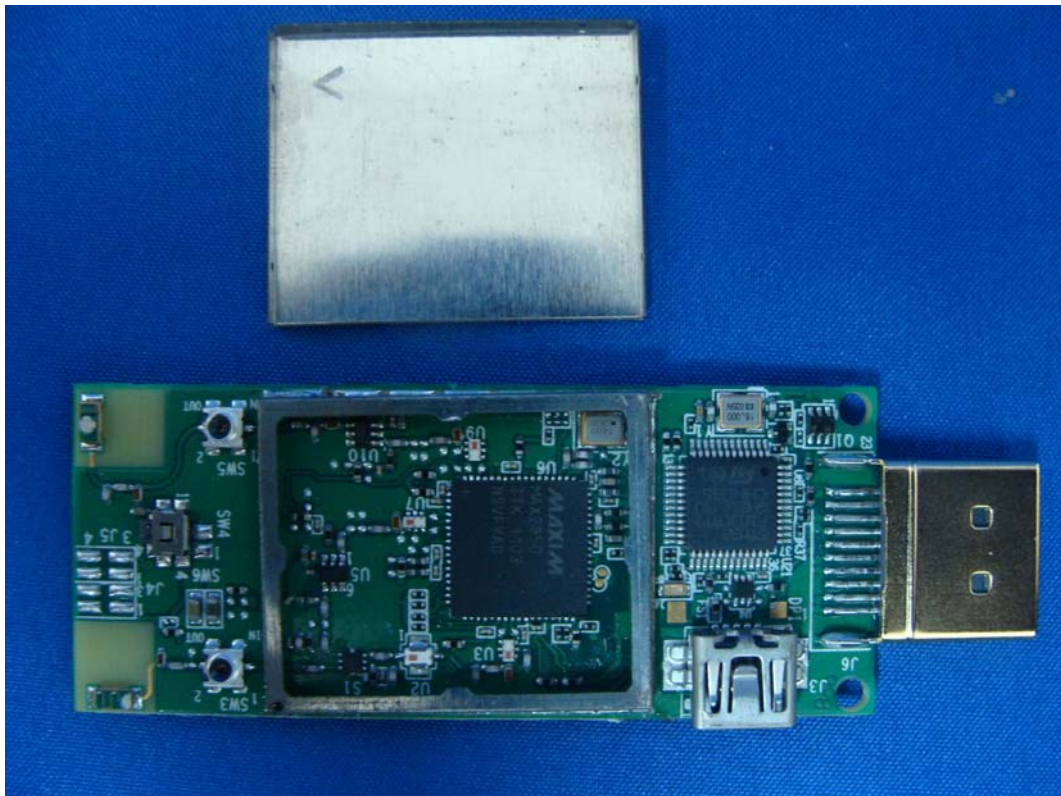
(3) EUT Photo



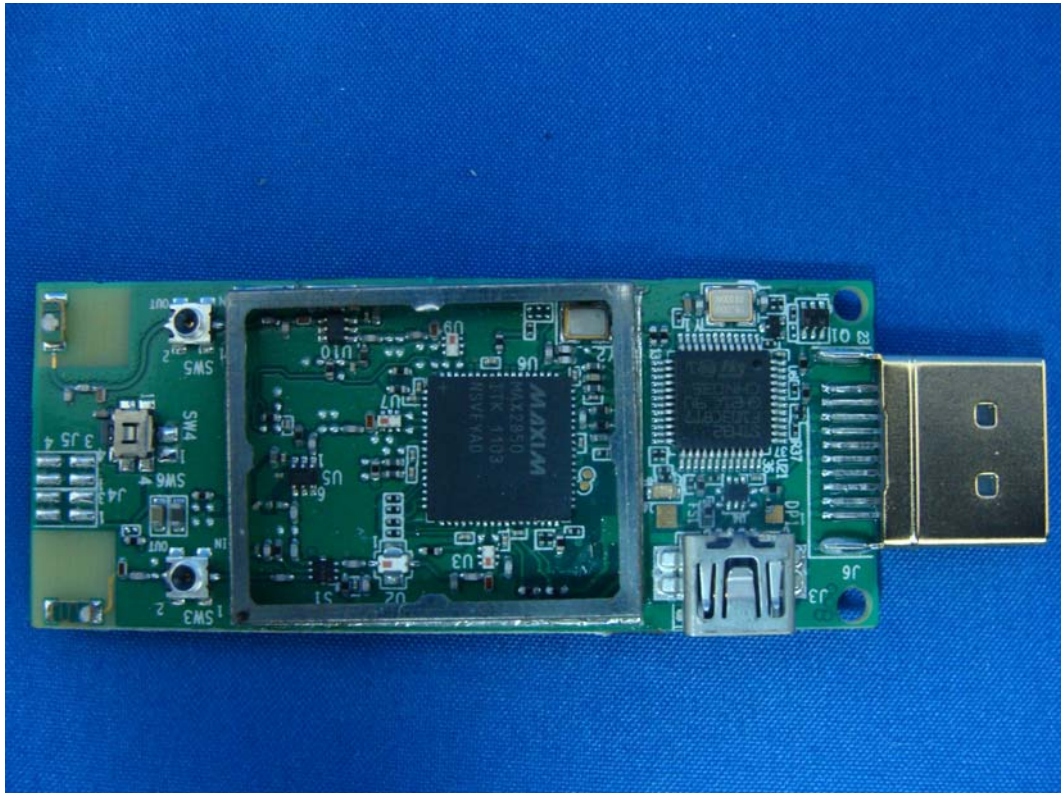
(4) EUT Photo



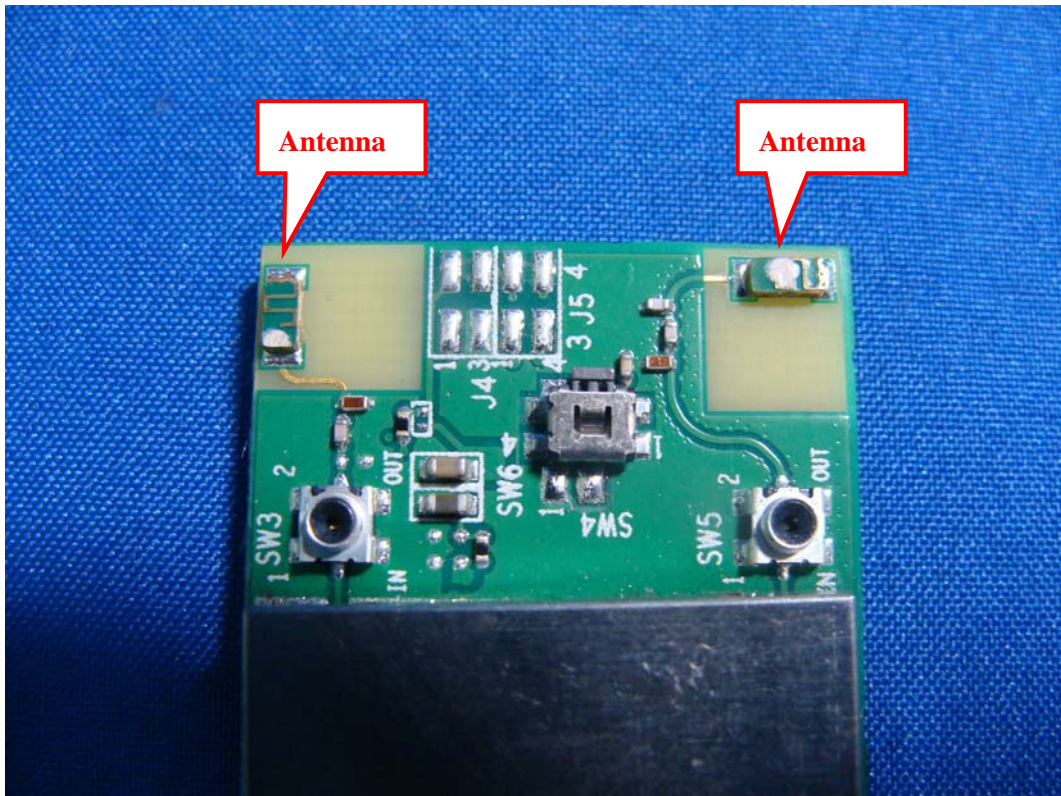
(5) EUT Photo



(6) EUT Photo



(7) EUT Photo



(8) EUT Photo

