

**3.7 Band Edge and Fundamental Emissions Measurement**

**3.7.1 Limit**

For transmitters operating in the 5.15~5.25 GHz band: all emissions outside of the 5.15~5.25 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.47~5.725 GHz band: all emissions outside of the 5.47~5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

<b>Frequencies (MHz)</b>	<b>Field Strength (micovolts/meter)</b>	<b>Measurement Distance (meters)</b>
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

**3.7.2 Measuring Instruments and Setting**

Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

<b>Spectrum Parameter</b>	<b>Setting</b>
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1 MHz /1 MHz for Peak

**3.7.3 Test Procedures**

1. The test procedure is the same as section 3.6.3; only the frequency range investigated is limited to 100MHz around band edges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

**3.7.4 Test Setup Layout**

This test setup layout is the same as that shown in section 3.6.4.

**3.7.5 Test Deviation**

There is no deviation with the original standard.

**3.7.6 EUT Operation during Test**

The EUT was programmed to be in continuously transmitting mode.

3.7.7 Test Result of Band Edge and Fundamental Emissions

For Single Chain:

Final Test Date	Apr. 09, 2012	Test Site No.	03CH02-HY
Temperature	23.9°C	Humidity	63%
Test Engineer	Streak	Configuration	802.11a Ch. 36, 40, 48

Channel 36

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5127.500	62.32	-1.22	63.54	22.66	34.88	4.78	0.00	Average	---	---
2 X	5181.900	110.74			71.03	34.91	4.80	0.00	Average	---	---
1	5148.300	73.86	-9.68	83.54	34.19	34.89	4.78	0.00	Peak	---	---
2 @	5181.800	120.11			80.40	34.91	4.80	0.00	Peak	---	---

The item 2 is fundamental emissions.

Channel 40

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5147.400	62.53	-1.01	63.54	22.86	34.89	4.78	0.00	Average	---	---
2 X	5196.600	111.92			72.19	34.92	4.81	0.00	Average	---	---
3	5352.900	56.40	-7.14	63.54	16.52	35.01	4.87	0.00	Average	---	---
1	5147.400	74.51	-9.03	83.54	34.84	34.89	4.78	0.00	Peak	---	---
2 @	5195.700	121.25			81.52	34.92	4.81	0.00	Peak	---	---
3	5356.500	69.12	-14.42	83.54	29.24	35.01	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

Channel 48

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5128.200	56.02	-7.52	63.54	16.36	34.88	4.78	0.00	Average	---	---
2 X	5238.900	103.43			63.67	34.94	4.82	0.00	Average	---	---
3	5355.300	55.76	-7.78	63.54	15.88	35.01	4.87	0.00	Average	---	---
1	5103.000	68.52	-15.02	83.54	28.89	34.86	4.77	0.00	Peak	---	---
2 X	5243.400	113.03			73.26	34.95	4.82	0.00	Peak	---	---
3	5353.800	68.24	-15.30	83.54	28.36	35.01	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

<b>Final Test Date</b>	Apr. 10, 2012	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	23.9°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Streak	<b>Configuration</b>	802.11a Ch. 52, 56, 64

**Channel 52**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5125.800	56.10	-7.44	63.54	16.44	34.88	4.78	0.00	Average	---	---
2 X	5256.600	102.25			62.48	34.95	4.82	0.00	Average	---	---
3	5353.800	55.79	-7.75	63.54	15.91	35.01	4.87	0.00	Average	---	---
1	5102.100	69.05	-14.49	83.54	29.42	34.86	4.77	0.00	Peak	---	---
2 X	5255.700	111.96			72.19	34.95	4.82	0.00	Peak	---	---
3	5360.100	69.04	-14.50	83.54	29.16	35.01	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 56**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5123.400	56.17	-7.37	63.54	16.51	34.88	4.78	0.00	Average	---	---
2 X	5274.900	101.32			61.52	34.96	4.84	0.00	Average	---	---
3	5351.400	55.80	-7.74	63.54	15.92	35.01	4.87	0.00	Average	---	---
1	5147.700	69.21	-14.33	83.54	29.54	34.89	4.78	0.00	Peak	---	---
2 X	5275.800	111.01			71.20	34.97	4.84	0.00	Peak	---	---
3	5361.000	68.49	-15.05	83.54	28.60	35.02	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 64**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 X	5318.260	113.79			73.95	34.99	4.85	0.00	Average	---	---
2	5372.580	62.36	-1.18	63.54	22.47	35.02	4.87	0.00	Average	---	---
1 @	5323.300	122.76			82.92	34.99	4.85	0.00	Peak	---	---
2	5351.020	75.49	-8.05	83.54	35.61	35.01	4.87	0.00	Peak	---	---

The item 1 is fundamental emissions.

<b>Final Test Date</b>	Apr. 09, 2012	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	23.9°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Streak	<b>Configuration</b>	802.11a Ch. 100, 116, 140

**Channel 100**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5447.520	61.98	-1.56	63.54	22.01	35.07	4.90	0.00	Average	---	---
2 X	5498.720	111.79			71.78	35.10	4.91	0.00	Average	---	---
1	5446.480	73.70	-9.84	83.54	33.73	35.07	4.90	0.00	Peak	---	---
2 @	5503.440	121.16			81.15	35.10	4.91	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 116**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5460.000	55.60	-7.94	63.54	15.63	35.07	4.90	0.00	Average	---	---
2 X	5582.960	99.19			59.04	35.17	4.98	0.00	Average	---	---
3	5726.640	56.28	-21.56	77.84	15.96	35.28	5.04	0.00	Average	---	---
1	5443.760	69.83	-13.71	83.54	29.87	35.06	4.90	0.00	Peak	---	---
2 X	5582.960	108.83			68.68	35.17	4.98	0.00	Peak	---	---
3	5731.440	69.43	-8.41	77.84	29.11	35.28	5.04	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 140**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 X	5699.000	96.64			56.37	35.25	5.02	0.00	Average	---	---
2	5733.140	56.55	-21.29	77.84	16.23	35.28	5.04	0.00	Average	---	---
1 X	5699.060	106.31			66.04	35.25	5.02	0.00	Peak	---	---
2	5729.780	70.18	-7.66	77.84	29.86	35.28	5.04	0.00	Peak	---	---

The item 1 is fundamental emissions and the item 2 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

For Two Chains:

<b>Final Test Date</b>	Apr. 10, 2012	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	23.9°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Streak	<b>Configuration</b>	802.11n (20MHz) Ch. 36, 40, 48

**Channel 36**

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5127.900	61.98	-1.56	63.54	22.32	34.88	4.78	0.00	Average	---	---
2 X	5179.100	109.25			69.54	34.91	4.80	0.00	Average	---	---
1	5128.200	74.19	-9.35	83.54	34.53	34.88	4.78	0.00	Peak	---	---
2 X	5182.700	120.08			80.37	34.91	4.80	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 40**

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5147.700	62.37	-1.17	63.54	22.70	34.89	4.78	0.00	Average	---	---
2 X	5199.000	110.23			70.50	34.92	4.81	0.00	Average	---	---
3	5350.200	56.50	-7.04	63.54	16.62	35.01	4.87	0.00	Average	---	---
1	5147.700	72.92	-10.62	83.54	33.25	34.89	4.78	0.00	Peak	---	---
2 @	5202.600	120.95			81.22	34.92	4.81	0.00	Peak	---	---
3	5380.500	69.07	-14.47	83.54	29.17	35.03	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 48**

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5100.600	60.00	-3.54	63.54	20.37	34.86	4.77	0.00	Average	---	---
2 X	5237.400	112.66			72.90	34.94	4.82	0.00	Average	---	---
3	5353.800	57.37	-6.17	63.54	17.49	35.01	4.87	0.00	Average	---	---
1	5103.000	72.07	-11.47	83.54	32.44	34.86	4.77	0.00	Peak	---	---
2 @	5238.600	121.63			81.87	34.94	4.82	0.00	Peak	---	---
3	5351.400	69.87	-13.67	83.54	29.99	35.01	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

<b>Final Test Date</b>	Apr. 10, 2012	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	23.9°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Streak	<b>Configuration</b>	802.11n (20MHz) Ch. 52, 56, 64

**Channel 52**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5101.800	61.29	-2.25	63.54	21.66	34.86	4.77	0.00	Average	---	---
2 X	5259.000	115.09			75.31	34.96	4.82	0.00	Average	---	---
3	5351.700	58.64	-4.90	63.54	18.76	35.01	4.87	0.00	Average	---	---
1	5103.300	73.30	-10.24	83.54	33.67	34.86	4.77	0.00	Peak	---	---
2 @	5258.100	124.08			84.31	34.95	4.82	0.00	Peak	---	---
3	5361.300	70.67	-12.87	83.54	30.78	35.02	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 56**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5103.000	60.84	-2.70	63.54	21.21	34.86	4.77	0.00	Average	---	---
2 X	5279.400	113.86			74.05	34.97	4.84	0.00	Average	---	---
3	5354.100	58.25	-5.29	63.54	18.37	35.01	4.87	0.00	Average	---	---
1	5123.700	73.56	-9.98	83.54	33.90	34.88	4.78	0.00	Peak	---	---
2 @	5283.000	124.09			84.28	34.97	4.84	0.00	Peak	---	---
3	5350.200	70.46	-13.08	83.54	30.58	35.01	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 64**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 X	5319.100	113.13			73.29	34.99	4.85	0.00	Average	---	---
2	5350.000	61.62	-1.92	63.54	21.74	35.01	4.87	0.00	Average	---	---
1 @	5323.300	122.67			82.83	34.99	4.85	0.00	Peak	---	---
2	5373.770	73.31	-10.23	83.54	33.42	35.02	4.87	0.00	Peak	---	---

The item 1 is fundamental emissions.

<b>Final Test Date</b>	Apr. 10, 2012	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	23.9°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Streak	<b>Configuration</b>	802.11n (20MHz) Ch. 100, 116, 140

**Channel 100**

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5448.160	62.00	-1.54	63.54	22.03	35.07	4.90	0.00	Average	---	---
2 X	5499.360	112.21			72.20	35.10	4.91	0.00	Average	---	---
1	5447.840	74.14	-9.40	83.54	34.17	35.07	4.90	0.00	Peak	---	---
2 @	5498.400	123.19			83.18	35.10	4.91	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 116**

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5457.520	60.14	-3.40	63.54	20.17	35.07	4.90	0.00	Average	---	---
2 X	5579.120	114.56			74.45	35.16	4.95	0.00	Average	---	---
3	5735.600	58.77	-19.07	77.84	18.44	35.29	5.04	0.00	Average	---	---
1	5433.200	71.73	-11.81	83.54	31.77	35.06	4.90	0.00	Peak	---	---
2 @	5578.160	123.66			83.55	35.16	4.95	0.00	Peak	---	---
3	5728.880	71.00	-6.84	77.84	30.68	35.28	5.04	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 140**

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	5701.460	114.99			74.68	35.27	5.04	0.00	Average	---	---
2	5725.160	70.83	-7.01	77.84	30.51	35.28	5.04	0.00	Average	---	---
1 @	5698.040	115.56			75.29	35.25	5.02	0.00	Peak	---	---
2	5725.400	76.23	-1.61	77.84	35.91	35.28	5.04	0.00	Peak	---	---

The item 1 is fundamental emissions.

<b>Final Test Date</b>	Apr. 10, 2012	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	23.9°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Streak	<b>Configuration</b>	802.11n (40MHz) Ch. 38, 46

**Channel 38**

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5150.000	61.97	-1.57	63.54	22.30	34.89	4.78	0.00	Average	---	---
2 X	5179.500	103.65			63.94	34.91	4.80	0.00	Average	---	---
1	5149.500	77.33	-6.21	83.54	37.66	34.89	4.78	0.00	Peak	---	---
2 X	5193.900	115.30			75.57	34.92	4.81	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 46**

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5126.500	61.95	-1.59	63.54	22.29	34.88	4.78	0.00	Average	---	---
2 X	5234.500	108.86			69.10	34.94	4.82	0.00	Average	---	---
3	5353.750	57.50	-6.04	63.54	17.62	35.01	4.87	0.00	Average	---	---
1	5127.750	73.38	-10.16	83.54	33.72	34.88	4.78	0.00	Peak	---	---
2 X	5233.750	119.65			79.89	34.94	4.82	0.00	Peak	---	---
3	5357.500	69.55	-13.99	83.54	29.67	35.01	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.



<b>Final Test Date</b>	Apr. 10, 2012	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	23.9°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Streak	<b>Configuration</b>	802.11n (40MHz) Ch. 54, 62

**Channel 54**

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5125.500	59.83	-3.71	63.54	20.17	34.88	4.78	0.00	Average	---	---
2 X	5267.500	108.61			68.83	34.96	4.82	0.00	Average	---	---
3	5355.750	57.63	-5.91	63.54	17.75	35.01	4.87	0.00	Average	---	---
1	5123.500	72.40	-11.14	83.54	32.74	34.88	4.78	0.00	Peak	---	---
2 X	5266.500	119.72			79.94	34.96	4.82	0.00	Peak	---	---
3	5350.750	70.04	-13.50	83.54	30.16	35.01	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 62**

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 X	5299.400	105.33			65.51	34.98	4.84	0.00	Average	---	---
2	5350.000	62.49	-1.05	63.54	22.61	35.01	4.87	0.00	Average	---	---
1 X	5306.600	116.99			77.17	34.98	4.84	0.00	Peak	---	---
2	5352.700	77.04	-6.50	83.54	37.16	35.01	4.87	0.00	Peak	---	---

The item 1 is fundamental emissions.

<b>Final Test Date</b>	Apr. 10, 2012	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	23.9°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Streak	<b>Configuration</b>	802.11n (40MHz) Ch. 102, 110, 134

**Channel 102**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5460.000	61.63	-1.91	63.54	21.66	35.07	4.90	0.00	Average	---	---
2 X	5499.500	108.35			68.34	35.10	4.91	0.00	Average	---	---
1	5459.800	73.05	-10.49	83.54	33.08	35.07	4.90	0.00	Peak	---	---
2 @	5514.200	119.85			79.81	35.11	4.93	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 110**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5446.600	61.00	-2.54	63.54	21.03	35.07	4.90	0.00	Average	---	---
2 X	5539.300	109.74			69.68	35.13	4.93	0.00	Average	---	---
3	5726.200	58.16	-19.68	77.84	17.84	35.28	5.04	0.00	Average	---	---
1	5443.300	72.75	-10.79	83.54	32.79	35.06	4.90	0.00	Peak	---	---
2 @	5553.700	120.35			80.26	35.14	4.95	0.00	Peak	---	---
3	5729.800	70.94	-6.90	77.84	30.62	35.28	5.04	0.00	Peak	---	---

The item 2 is fundamental emissions.

**Channel 134**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 X	5659.400	107.13			66.91	35.22	5.00	0.00	Average	0	0
2	5725.400	58.54	-19.30	77.84	18.22	35.28	5.04	0.00	Average	0	0
1 X	5673.900	118.52			78.26	35.24	5.02	0.00	Peak	---	---
2	5733.400	71.68	-6.16	77.84	31.36	35.28	5.04	0.00	Peak	---	---

The item 1 is fundamental emissions.

### 3.8 Frequency Stability Measurement

#### 3.8.1 Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emissions is maintained within the band of operation under all conditions of normal operation as specified in the user’s manual or  $\pm 20\text{ppm}$  (IEEE 802.11a specification).

#### 3.8.2 Measuring Instruments and Setting

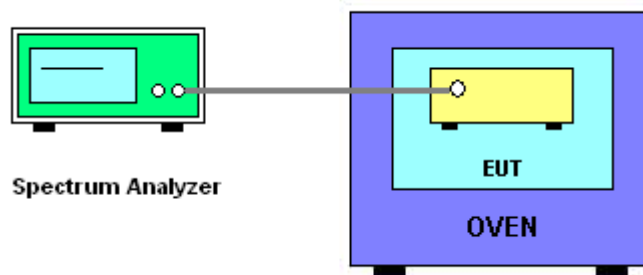
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RB	10 kHz
VB	10 kHz
Sweep Time	Auto

#### 3.8.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5.  $f_c$  is declaring of channel frequency. Then the frequency error formula is  $(f_c - f) / f_c \times 10^6$  ppm and the limit is less than  $\pm 20\text{ppm}$  (IEEE 802.11a specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is  $-20^\circ\text{C} \sim 50^\circ\text{C}$ .
8. Measuring multiple antennas, the connectors are required to link with Spectrum Analyzer through a combiner.

#### 3.8.4 Test Setup Layout



#### 3.8.5 Test Deviation

There is no deviation with the original standard.

#### 3.8.6 EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

**3.8.7 Test Result of Frequency Stability**

**Voltage vs. Frequency Stability**

<b>Voltage (V)</b>	<b>Measurement Frequency (MHz)</b>
	<b>5180 MHz</b>
110.00	5180.0000
93.50	5179.9994
126.50	5179.9994
<b>Max. Deviation (MHz)</b>	<b>0.0006</b>
<b>Max. Deviation (ppm)</b>	<b>0.12</b>

**Temperature vs. Frequency Stability**

<b>Temperature (°C)</b>	<b>Measurement Frequency (MHz)</b>
	<b>5180 MHz</b>
50	5179.9526
40	5179.9640
30	5179.9796
20	5180.0006
10	5180.0198
0	5180.0252
-10	5180.0288
-20	5180.0282
<b>Max. Deviation (MHz)</b>	<b>0.0474</b>
<b>Max. Deviation (ppm)</b>	<b>9.15</b>

### **3.9 Antenna Requirements**

#### **3.9.1 Limit**

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

#### **3.9.2 Antenna Connector Construction**

Please refer to section 2.2 in this test report; antenna connector complied with the requirements.

**4 LIST OF MEASURING EQUIPMENTS**

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100132	9kHz – 2.75GHz	Feb. 08, 2012	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001/004	9kHz – 30MHz	Jan. 12, 2012	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001/009	9kHz – 30MHz	Feb. 20, 2012	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450Hz	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 – 60Hz	N/A	Conduction (CO01-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832010001	9kHz – 30MHz	Mar. 02, 2012	Conduction (CO01-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP 40	100305	9 KHz ~ 40 GHz	Feb. 21, 2012	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Jun. 03, 2011	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20~100°C	Dec. 07, 2011	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10 MHz ~ 40 GHz	Jun. 07, 2011	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	1027452	300 MHz ~ 40 GHz	Jun. 16, 2011	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	1124009	300 MHz ~ 40 GHz	Jun. 20, 2011	Conducted (TH01-HY)
RF Cable-1m	Jye Bao	RG142	CB034-1m	20 MHz ~ 7 GHz	Dec. 03, 2011	Conducted (TH01-HY)
RF Cable-2m	Jye Bao	RG142	CB035-2m	20 MHz ~ 1 GHz	Dec. 03, 2011	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Jun. 09, 2011*	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is two year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100593	9 kHz ~ 40 GHz	Aug. 08, 2011	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30 MHz ~ 1 GHz 3m	May 11, 2011	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100 kHz ~ 1.3 GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1 GHz ~ 26.5 GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1 GHz ~ 18 GHz	Nov. 15, 2011	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz ~ 1 GHz	Nov. 11, 2011	Radiation (03CH02-HY)
RF Cable-high	SUHNER	SUCOFLEX106	03CH02-HY	1 GHz ~ 40 GHz	Mar. 06, 2012	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30 MHz ~ 2 GHz	Oct. 22, 2011	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0 - 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 m - 4 m	N/A	Radiation (03CH02-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 29, 2010*	Radiation (03CH02-HY)

Note: Calibration Interval of instruments listed above is two year.

**5 TEST LOCATION**

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei 221, Taiwan, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973
LINKOU	ADD : No. 30-2, Dingfu Vil., Linkou Dist., New Taipei City 244, Taiwan, R.O.C. TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei 114, Taiwan, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei 235, Taiwan, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 <sup>nd</sup> Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085



6 TAF CERTIFICATE OF ACCREDITATION



Certificate No. : L1190-111208

財團法人全國認證基金會  
Taiwan Accreditation Foundation

## Certificate of Accreditation

This is to certify that

**Sporton International Inc.**  
**EMC & Wireless Communications Laboratory**  
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,  
Taiwan, R.O.C.

**is accredited in respect of laboratory**

<b>Accreditation Criteria</b>	: ISO/IEC 17025:2005
<b>Accreditation Number</b>	: 1190
<b>Originally Accredited</b>	: December 15, 2003
<b>Effective Period</b>	: January 10, 2010 to January 09, 2013
<b>Accredited Scope</b>	: Testing Field, see described in the Appendix
<b>Specific Accreditation Program</b>	: Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangement with Foreign Authorities



Jay-San Chen  
President, Taiwan Accreditation Foundation  
Date : December 08, 2011

P1, total 24 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix

# **Appendix A. RF Exposure Evaluation**

# 1. Maximum Permissible Exposure

## 1.1. Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

## 1.2. MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

**1.3. Calculated Result and Limit**

Antenna Type : Dipole Antenna

For Single Chain:

Max Conducted Power for IEEE 802.11a: 17.21dBm

Test Frequency (MHz)	Min. User Distance (cm)	Gain (dBi)	Numeric Gain	Conducted Power (dBm)	Conducted Power (mW)	Power Density (mW/cm <sup>2</sup> )
5280	20	5.97	3.953666	17.21	52.6017	<b>0.0414</b>

For Two Chain:

Max Conducted Power for IEEE 802.11n: 19.82dBm

Test Frequency (MHz)	Min. User Distance (cm)	Gain (dBi)	Numeric Gain	Conducted Power (dBm)	Conducted Power (mW)	Power Density (mW/cm <sup>2</sup> )
5260	20	5.97	3.953666	19.82	95.9401	<b>0.0755</b>

## **Appendix B. Test Photos**

**1 Photographs of Conducted Emissions Test Configuration**

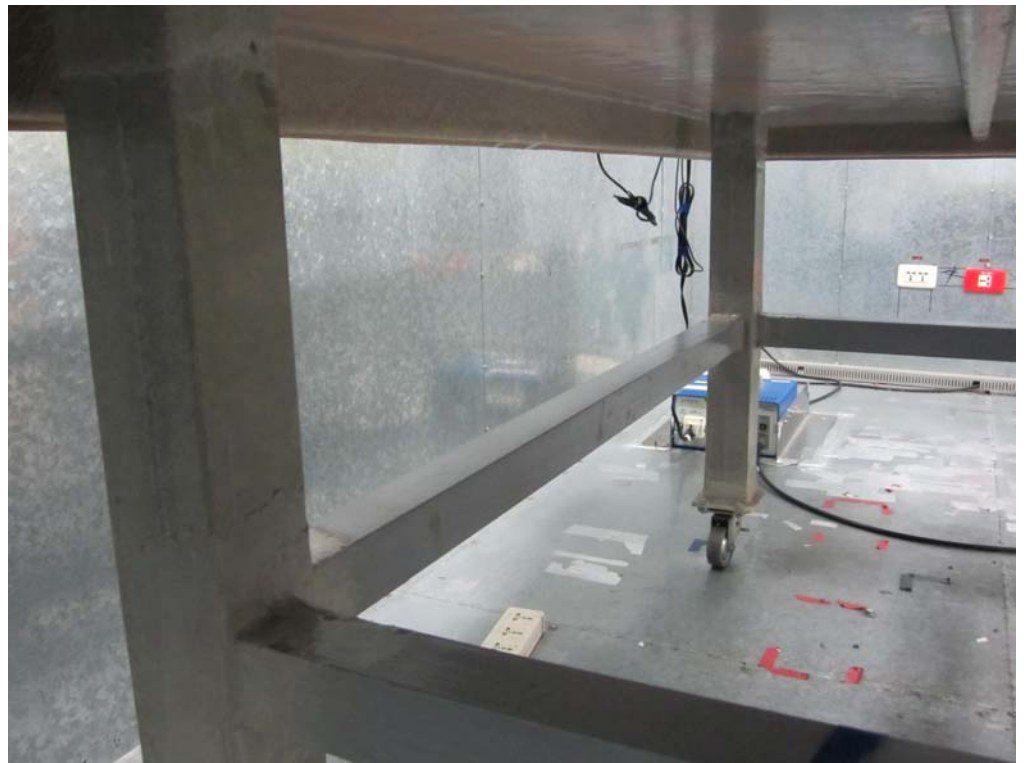
**FRONT VIEW**



**REAR VIEW**



**SIDE VIEW**

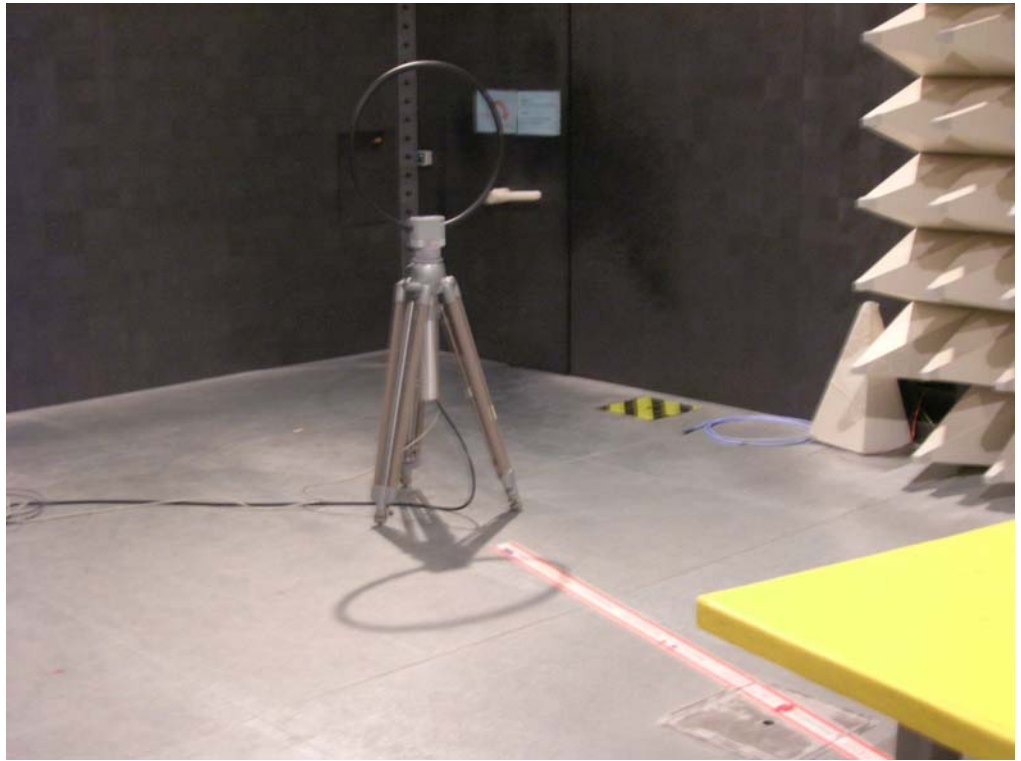




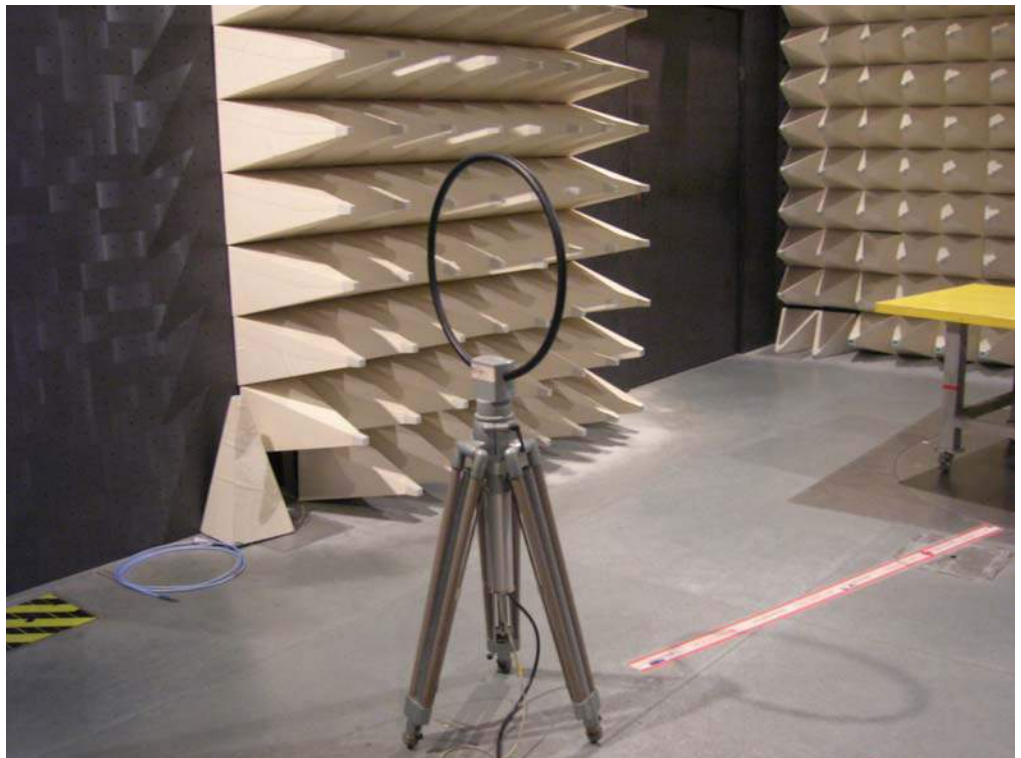
## **2 Photographs of Radiated Emissions Test Configuration**

**For radiated emissions 9kHz~30MHz**

**FRONT VIEW**



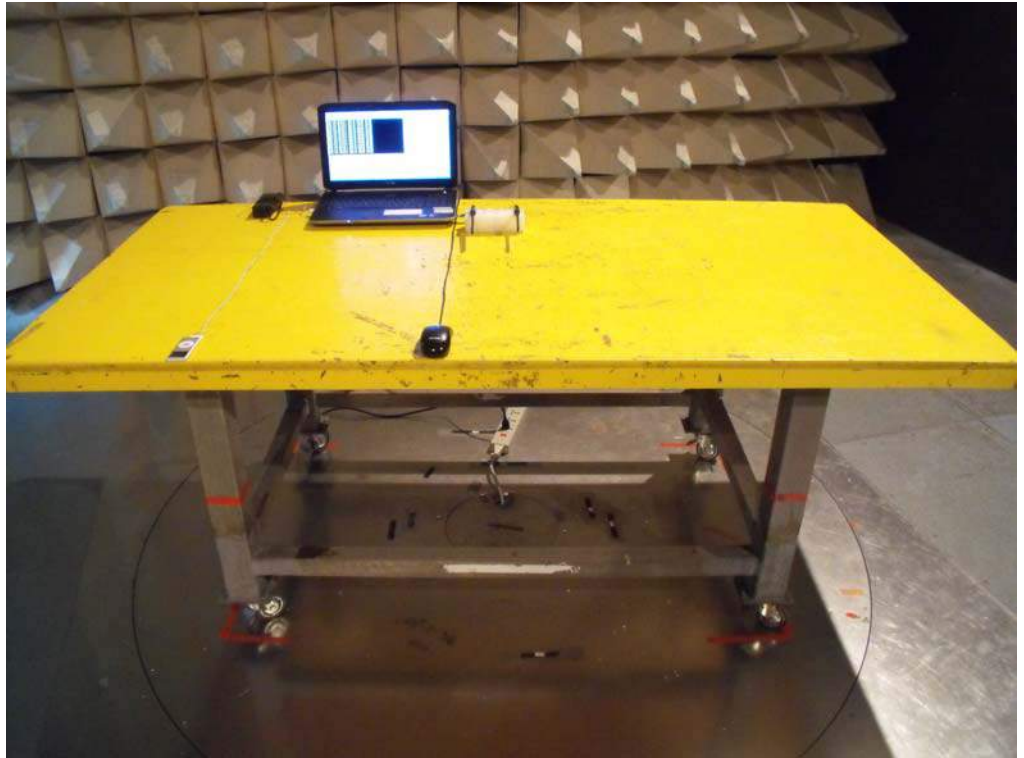
**REAR VIEW**



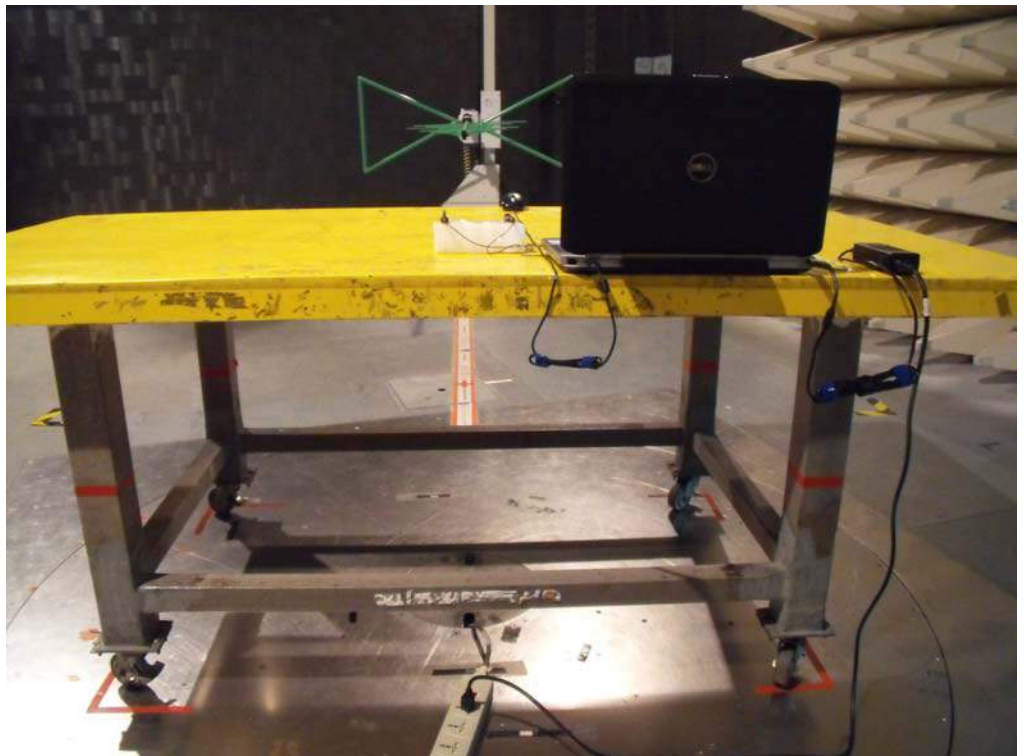


**For radiated emissions 30MHz~1GHz**

**FRONT VIEW**

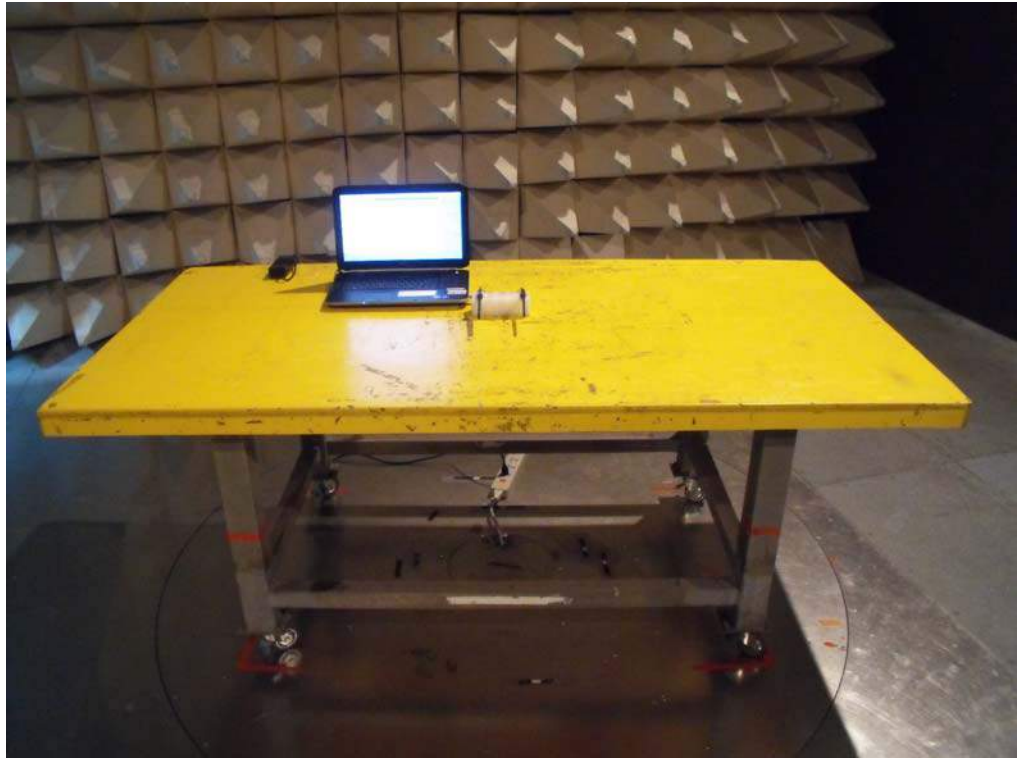


**REAR VIEW**

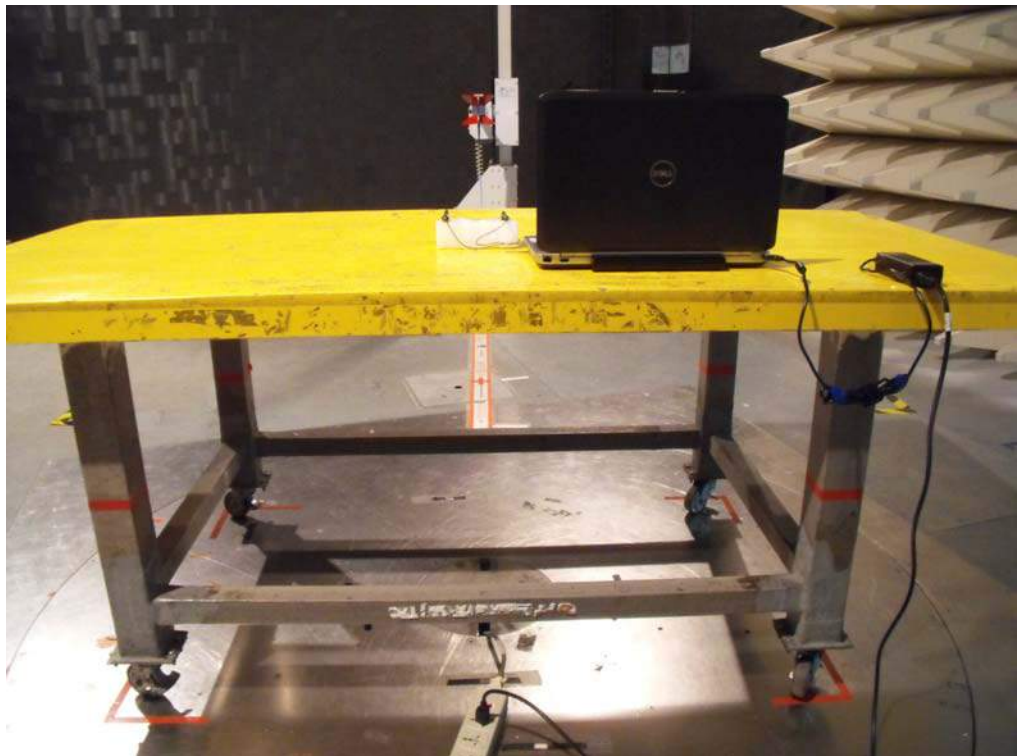


**For radiated emissions above 1GHz**

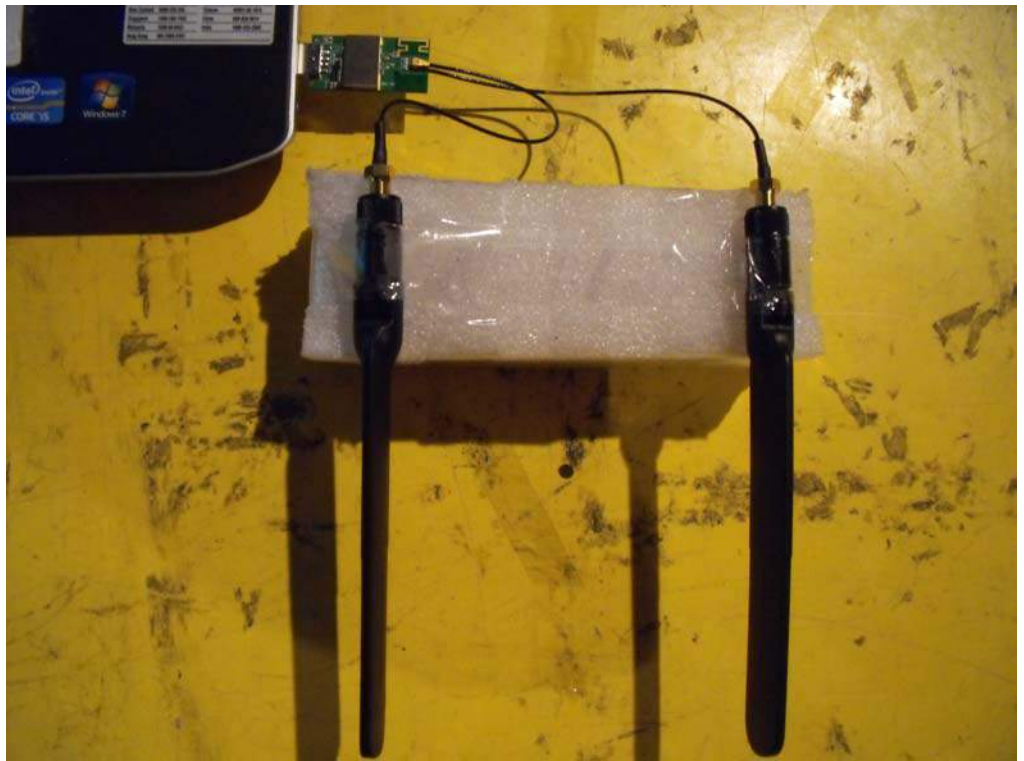
**FRONT VIEW**



**REAR VIEW**



**EUT take a close-up.**



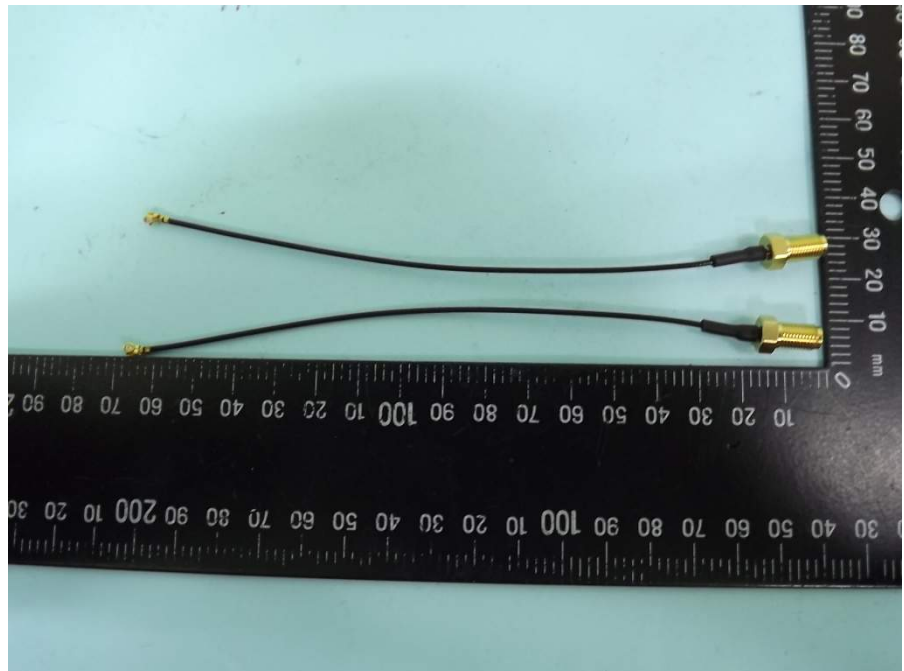
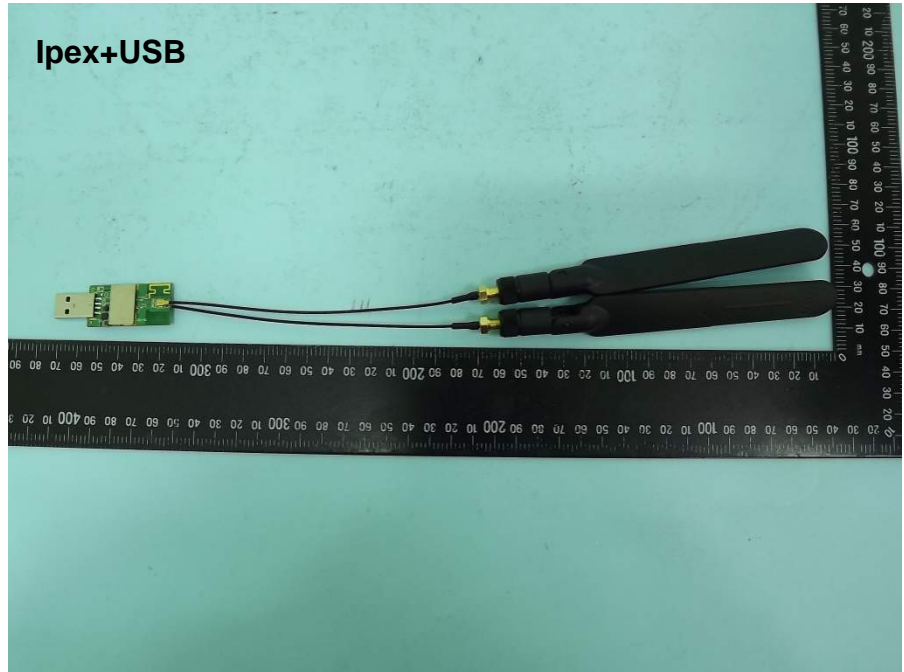
**FRONT VIEW**



**FCC TEST REPORT**

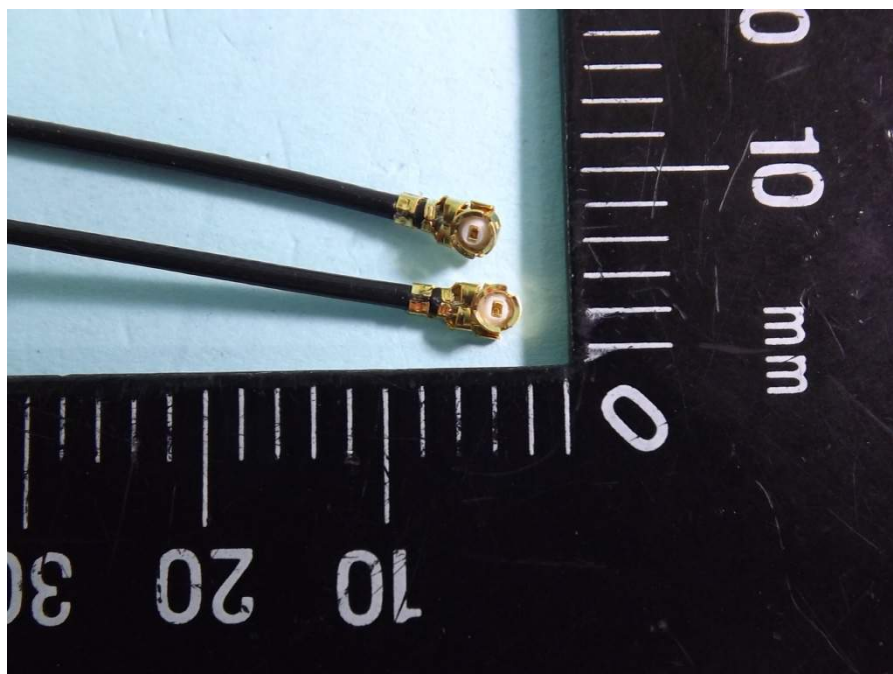
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APPENDIX C. Photographs of EUT



**FCC TEST REPORT**

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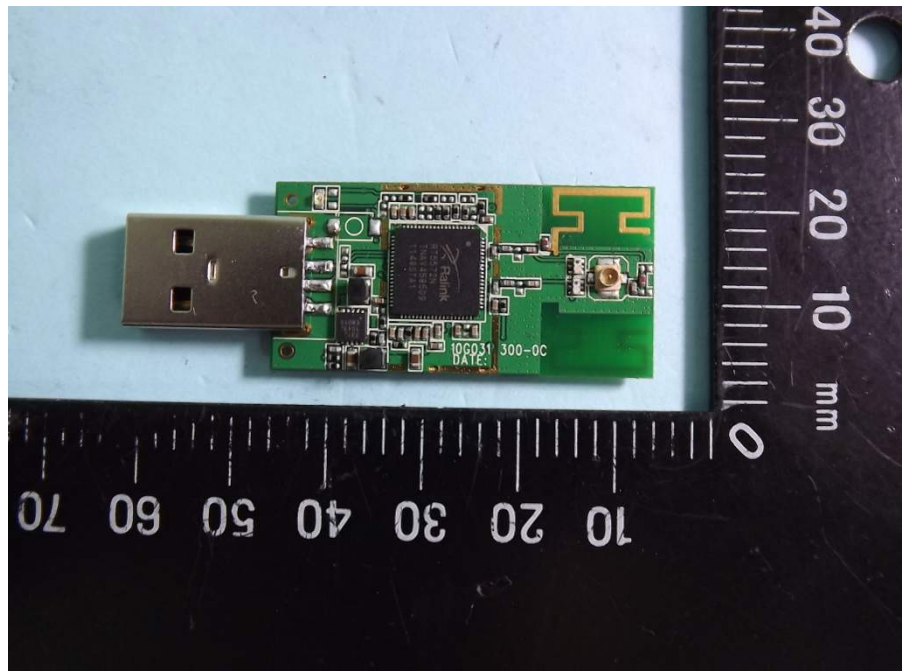
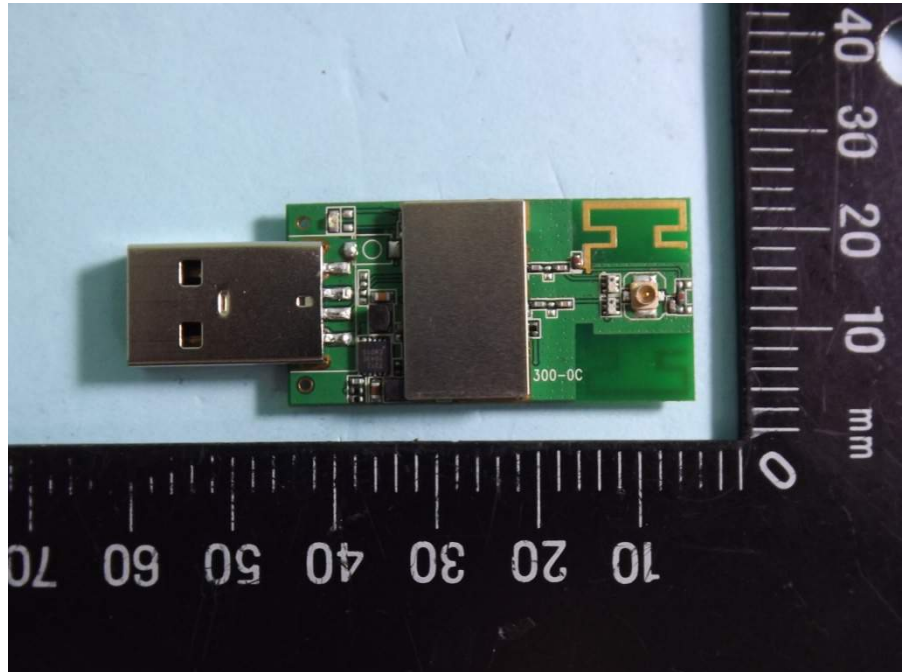
**FCC TEST REPORT**

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**FCC TEST REPORT**

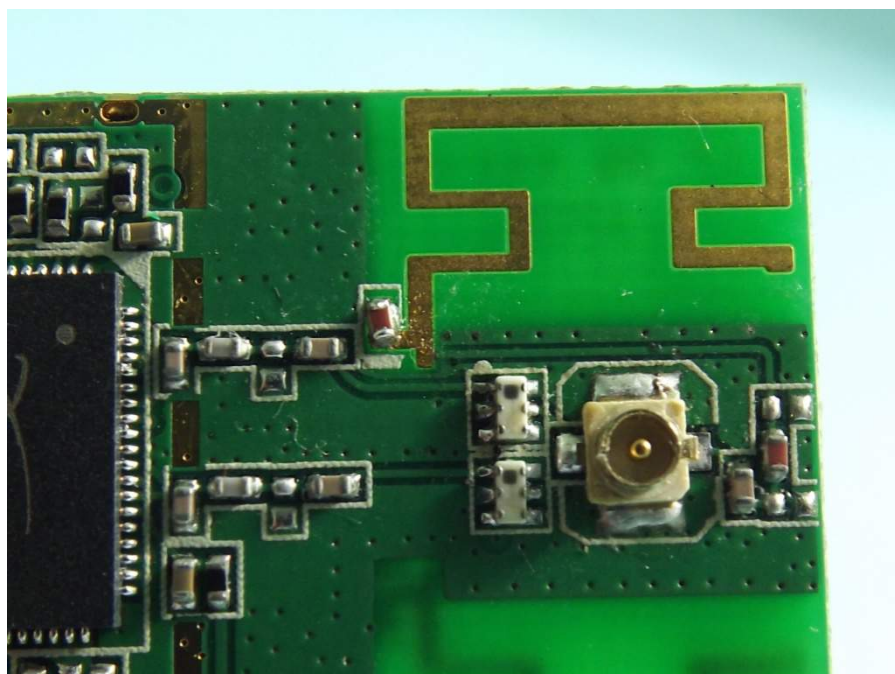
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**FCC TEST REPORT**

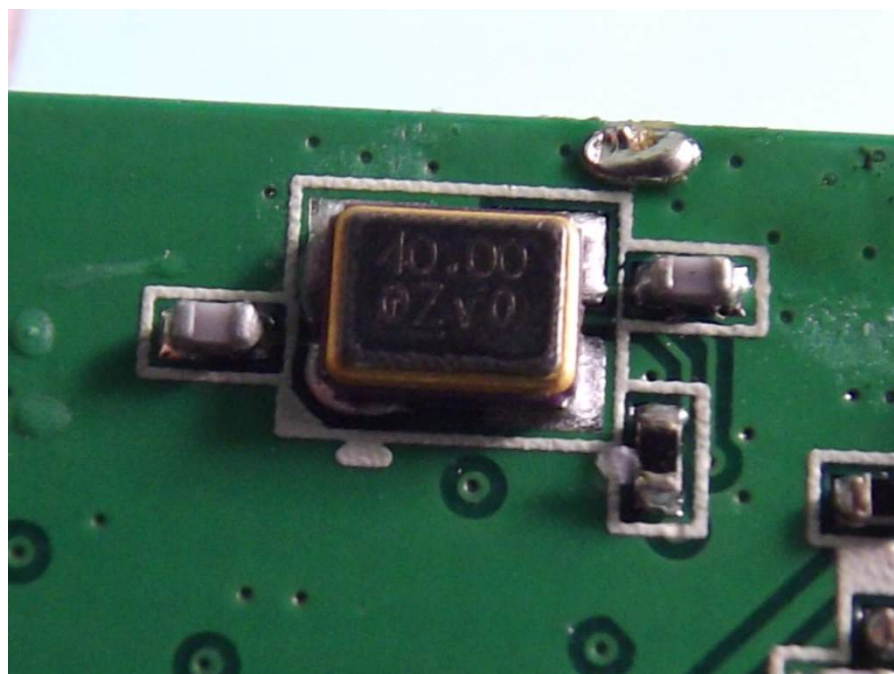
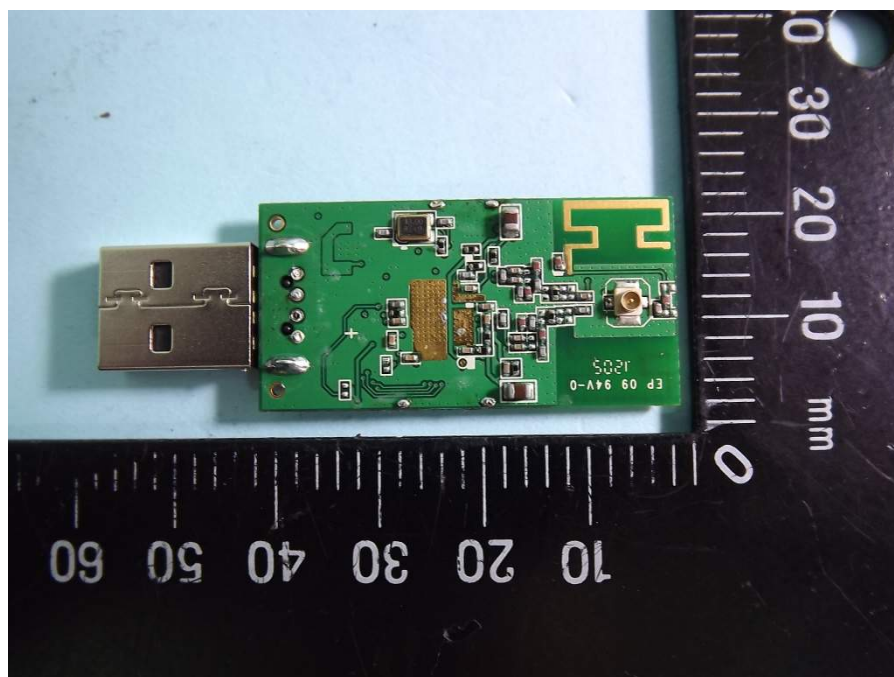
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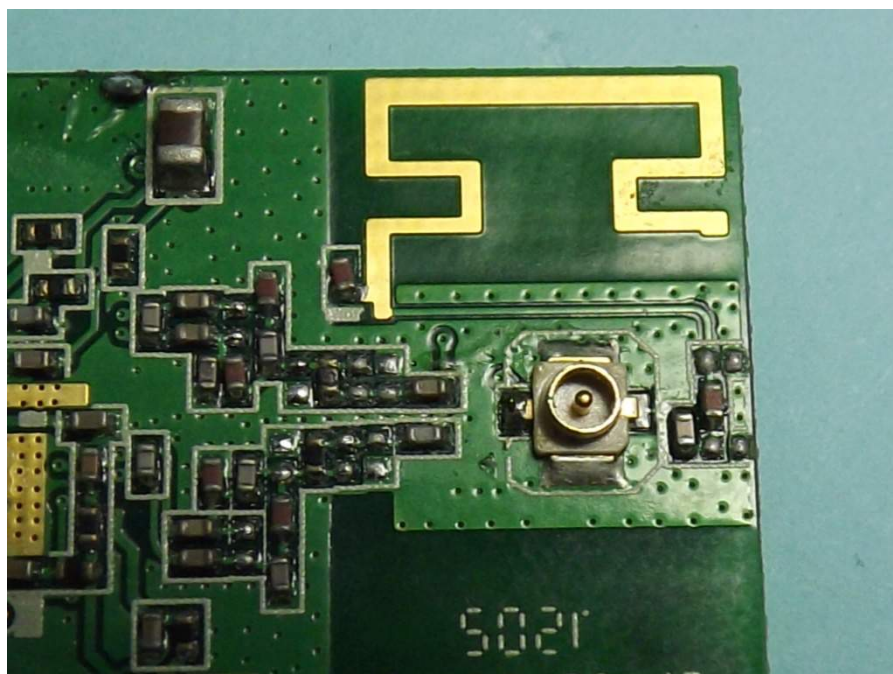
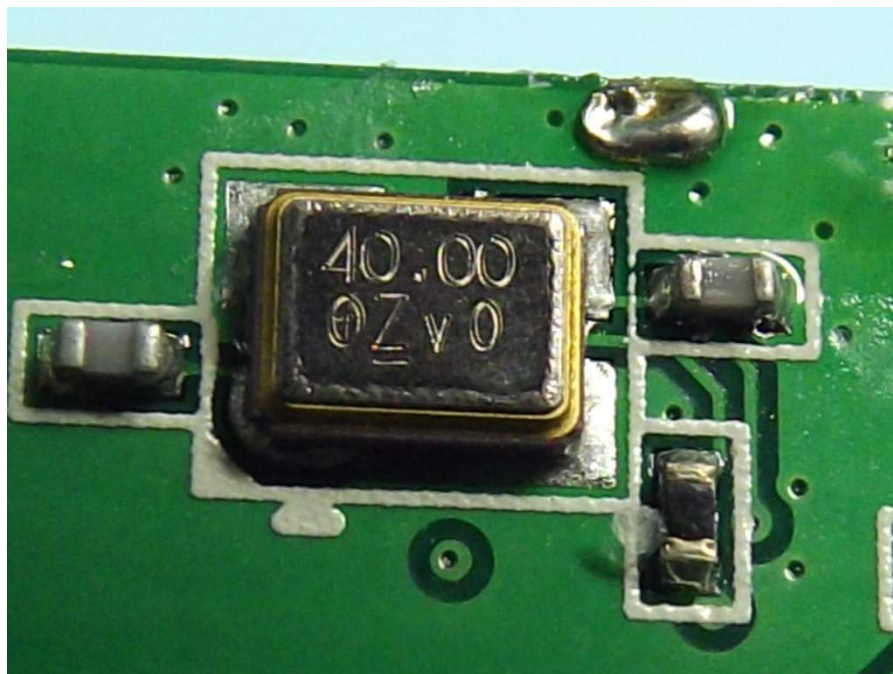
**FCC TEST REPORT**

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**FCC TEST REPORT**

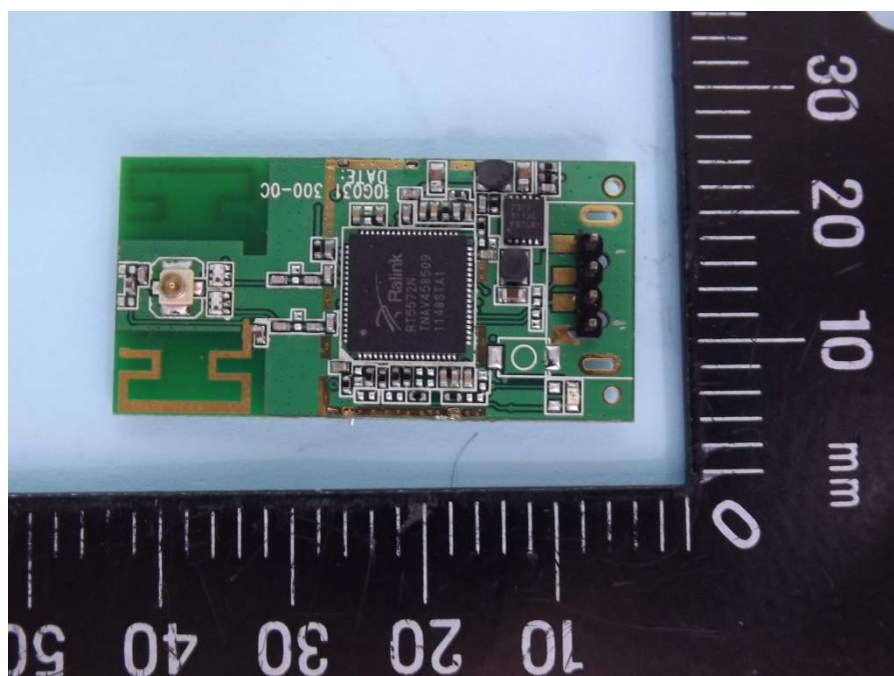
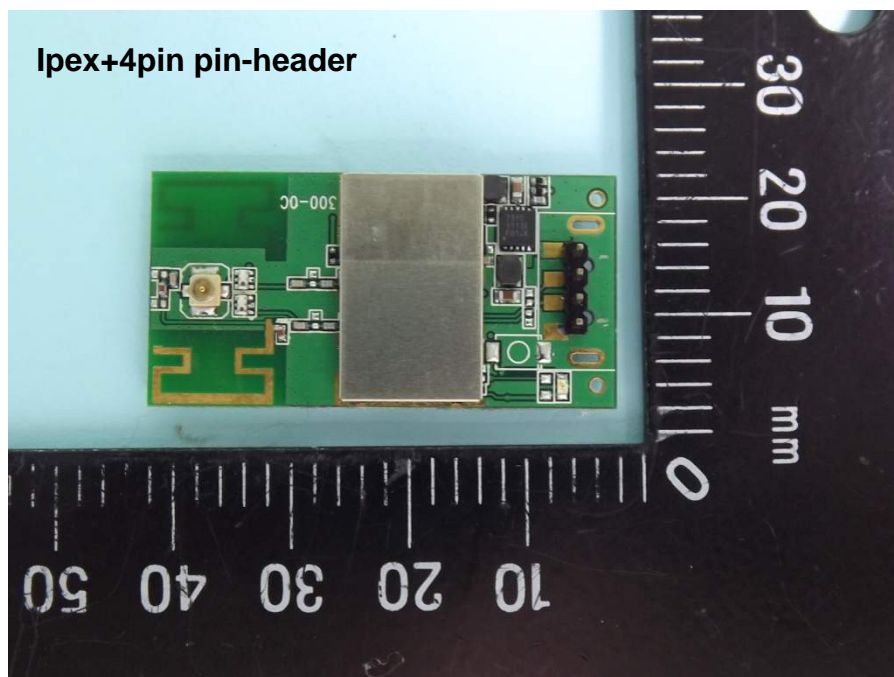
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**FCC TEST REPORT**

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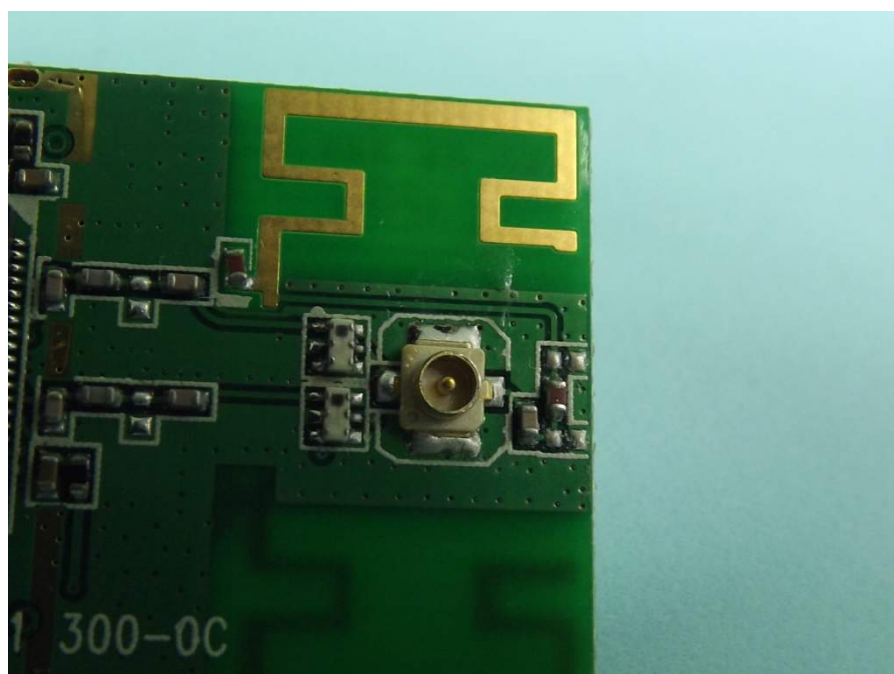
**Ipex+4pin pin-header**





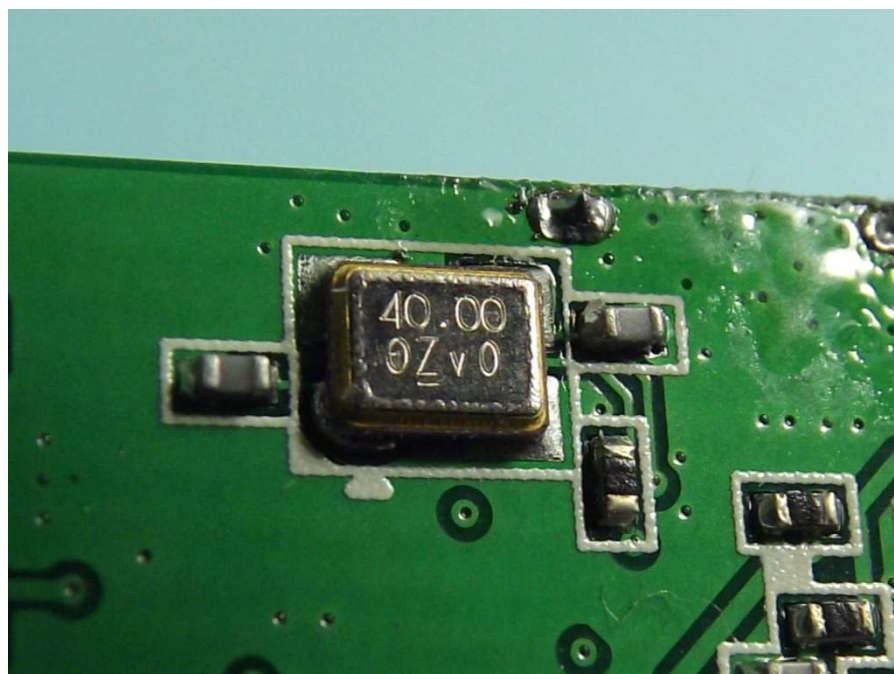
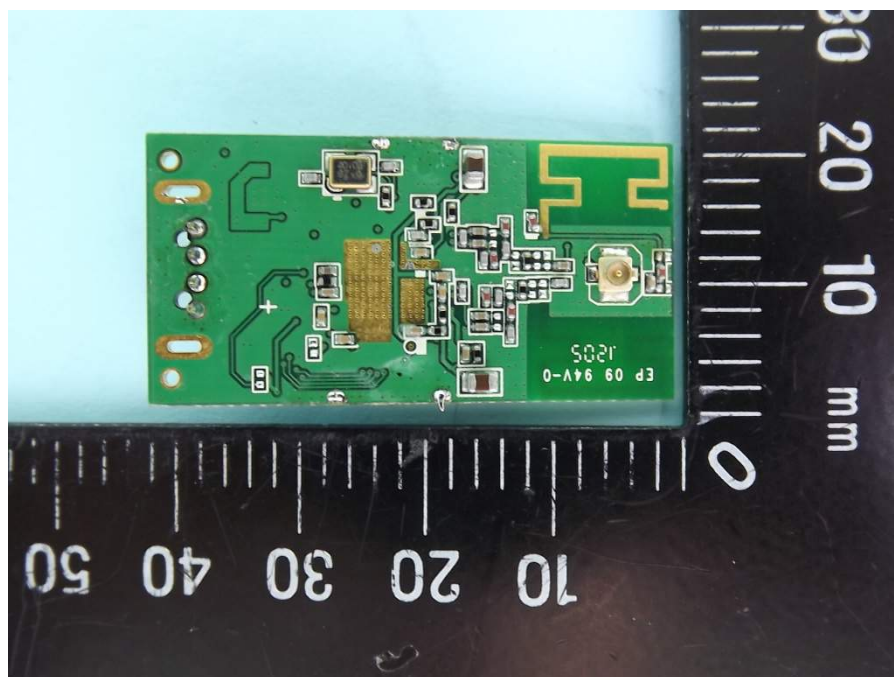
**FCC TEST REPORT**

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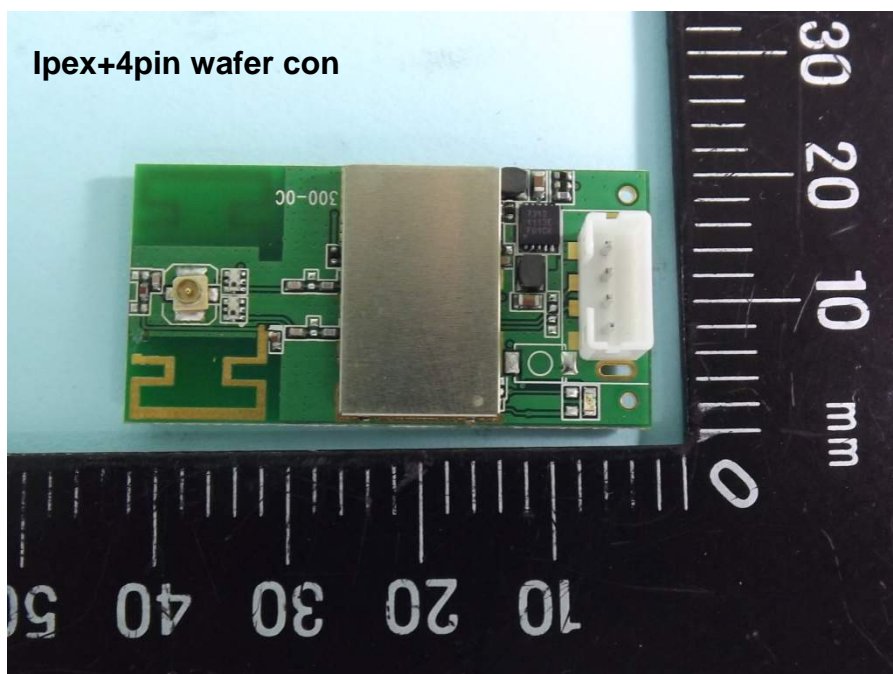
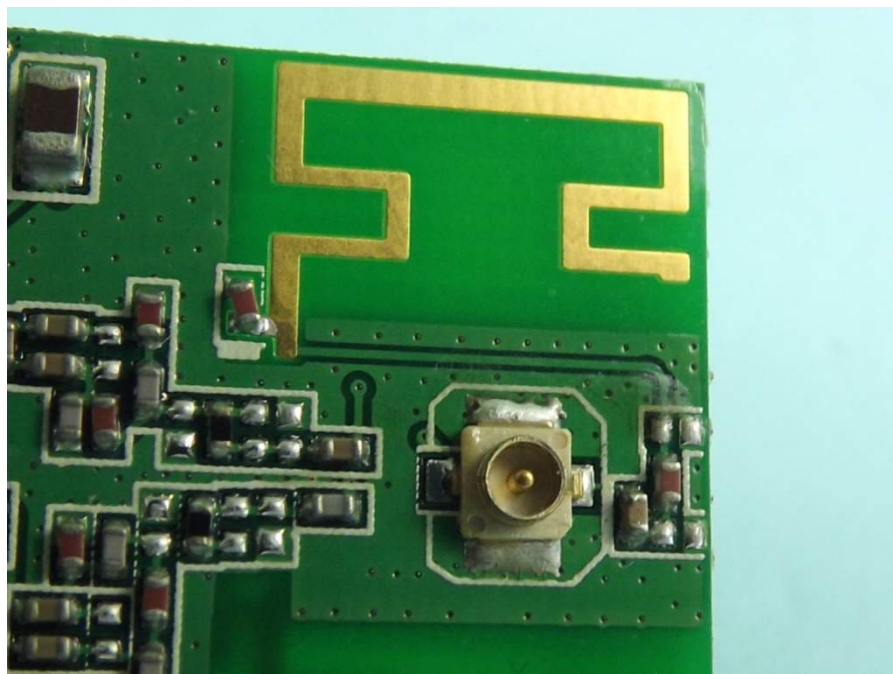
**FCC TEST REPORT**

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**FCC TEST REPORT**

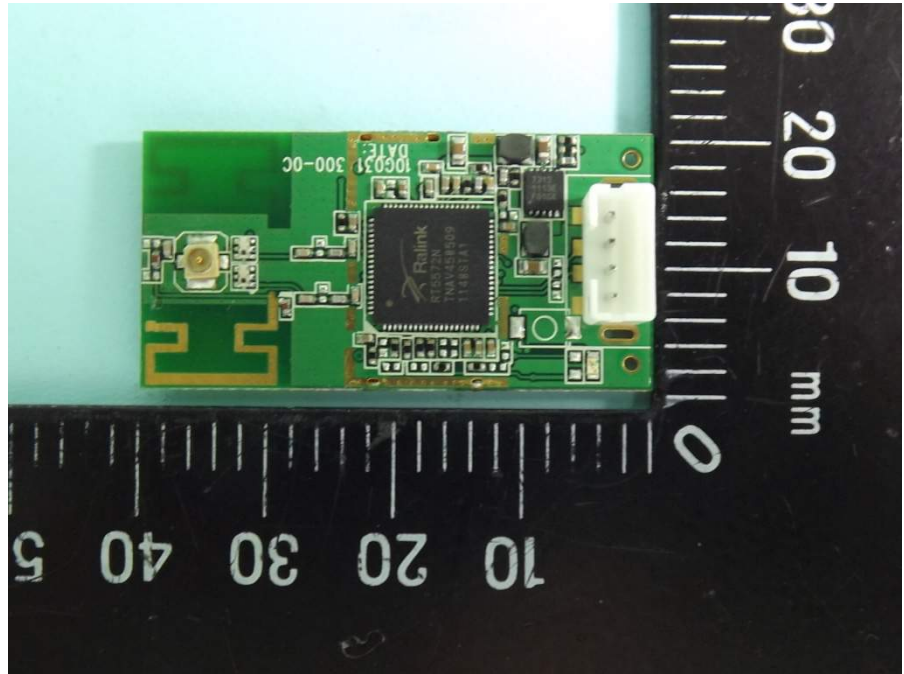
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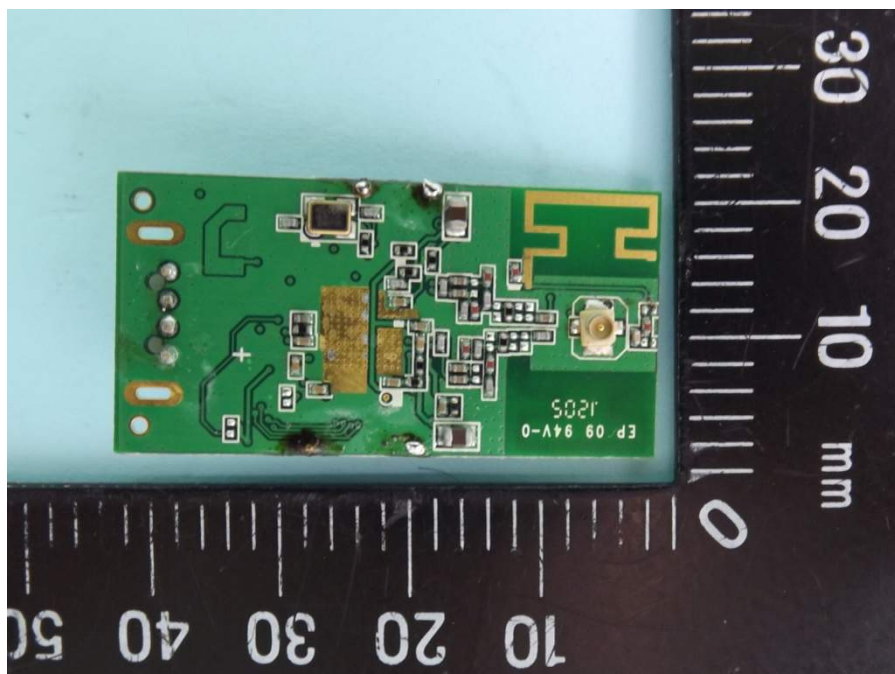
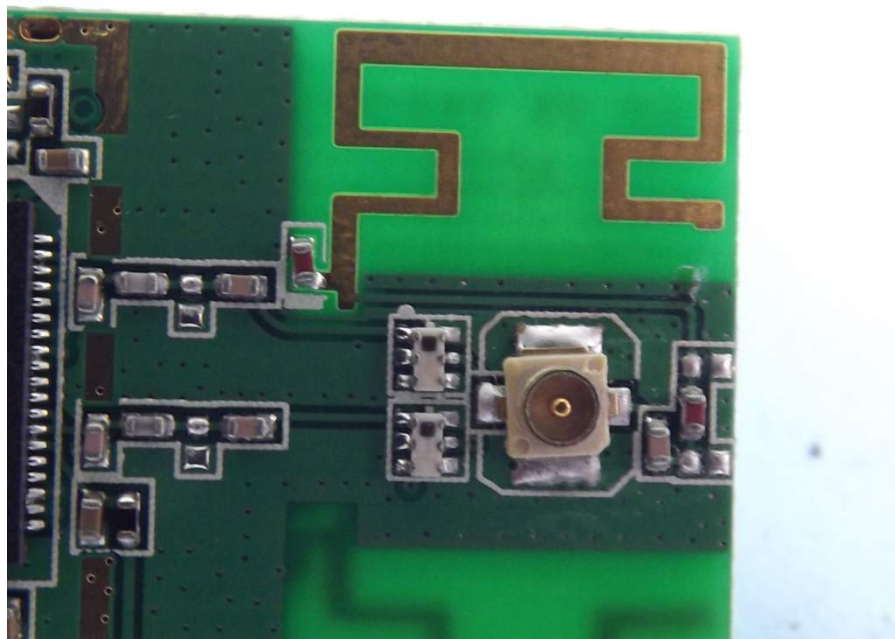
**FCC TEST REPORT**

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**FCC TEST REPORT**

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**FCC TEST REPORT**

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