

# FCC TEST REPORT (15.407)

**REPORT NO.:** RF950707H06A

**MODEL NO.:** WMP-D18

**RECEIVED:** April 23, 2007

**TESTED:** July 13 to 17, 2007

**ISSUED:** July 23, 2007

**APPLICANT:** Alpha Networks Inc.

**ADDRESS:** No.8 Li-shing 7th Rd., Science-based  
Industrial Park, Hsinchu, Taiwan, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

**TEST LOCATION:** No. 81-1, Lu Liao Keng, 9 Ling, Wu Lung  
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No. 2177-01

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## 1. CERTIFICATION

**PRODUCT:** IEEE 802.11a MiniPCI Card  
**BRAND NAME:** Alpha  
**MODEL NO.:** WMP-D18  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**TESTED:** July 13 to 17, 2007  
**APPLICANT:** Alpha Networks Inc.  
**STANDARDS:** FCC Part 15, Subpart E (Section 15.407)  
ANSI C63.4-2003

The above equipment (Model: WMP-D18) has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Claire Kuan , **DATE:** July 23, 2007  
( Claire Kuan, Specialist )

**TECHNICAL ACCEPTANCE :** Hank Chung , **DATE:** July 23, 2007  
Responsible for RF ( Hank Chung, Deputy Manager )

**APPROVED BY :** May Chen , **DATE:** July 23, 2007  
(May Chen, Deputy Manager)

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart E (Section 15.407)			
Standard Section	Test Type	Result	Remark
15.407(b/1/2/3) (b)(5)	Electric Field Strength Spurious Emissions, 30MHz ~ 40000MHz	PASS	Meet the requirement of limit. Minimum passing margin is -0.70dB at 5460.00MHz
15.407(a/1/2/3)	Peak Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.

### NOTE:

1. This report is prepared for FCC class II permissive change. Only radiated emission, Maximum Peak Output Power and Band Edge Measurement were presented in this test report.

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	IEEE 802.11a MiniPCI Card
<b>MODEL NO.</b>	WMP-D18
<b>FCC ID</b>	RRKWMPD18
<b>POWER SUPPLY</b>	DC 3.3V from host equipment
<b>MODULATION TYPE</b>	64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	OFDM
<b>TRANSFER RATE</b>	802.11a: 54/48/36/24/18/12/9/6Mbps
<b>FREQUENCY RANGE</b>	For 15.407 802.11a: 5.18 ~ 5.32GHz and 5.50 ~ 5.70GHz
	For 15.247 802.11a: 5.745 ~ 5.825GHz
<b>NUMBER OF CHANNEL</b>	For 15.407 802.11a (5.15 ~ 5.35GHz):8 802.11a (5.47 ~ 5.725GHz):11
	For 15.247 802.11a (5.725 ~ 5.850GHz):5
<b>CHANNEL SPACING</b>	802.11a: 20MHz
<b>OUTPUT POWER</b>	Please see note 3 (on next page)
<b>DATA CABLE</b>	NA
<b>ANTENNA TYPE</b>	Please see note 2 (on next page)
<b>I/O PORTS</b>	NA
<b>ASSOCIATED DEVICES</b>	NA

#### NOTE:

- This report is prepared for FCC class II permissive change. The difference compared with the Report No.:RF950707H06 design is as the following:
  - ⌘ Add new band: 5470~5725MHz (Only 5470~5725MHz test data was recorded in this test report)
  - ⌘ Cancel original FCC antenna of ANT70-1800.
  - ⌘ Cancel the turbo mode for original 5250-5350MHz band.
  - ⌘ Add DFS test (5250MHz~5350MHz and 5470MHz ~5725MHz)

2. There is one antenna provided to this EUT, please refer to the following table:

No.	Model No.	Gain (dBi)	Cable Loss (dB)	Net Gain (dB)	Antenna Type	Connector
1	SAA04-220080	5	1.8	3.2	Dipole	RP-N plug
Frequency Range						
5.15GHz~5.35GHz, 5.47~5.725GHz and 5.725GHz ~ 5.850GHz						

3. Peak output power (Unit : mW) :

No.	Model No. (Antenna)	Operating Frequency (MHz)			
		5150~5250	5250~5350	5470~5725	5725~5850
1	SAA04-220080	48.641	153.109	63.973	141.254

4. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

## 3.2 DESCRIPTION OF TEST MODES

Operated in 5470MHz ~ 5725MHz bands:

Eleven channels are provided to this EUT.

Channel	Frequency
9	5500 MHz
10	5520 MHz
11	5540 MHz
12	5560 MHz
13	5580 MHz
14	5600 MHz
15	5620 MHz
16	5640 MHz
17	5660 MHz
18	5680 MHz
19	5700 MHz



### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
-	X	√	√	√	NA

Where PLC: Power Line Conducted Emission

RE<1G RE: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

#### **Radiated Emission Test (Below 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	9 to 19	9	OFDM	BPSK	6

#### **Radiated Emission Test (Above 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	9 to 19	9, 14, 19	OFDM	BPSK	6

#### **Bandedge Measurement:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	9 to 19	9, 19	OFDM	BPSK	6

#### **Antenna Port Conducted Measurement:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	9 to 19	9, 14, 19	OFDM	BPSK	6

### **3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is an IEEE 802.11a MiniPCI Card. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart E (15.407)**

**ANSI C63.4-2003**

All test items have been performed and recorded as per the above standards.

### 3.4 DESCRIPTION OF SUPPORT UNITS

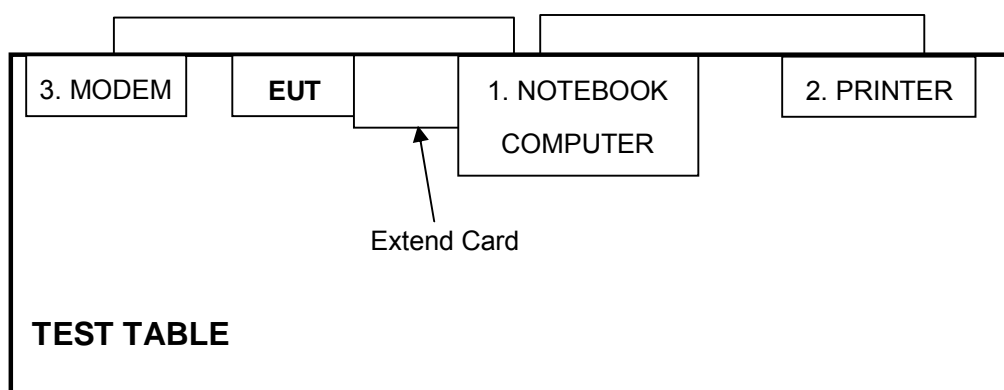
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	Dell	PP01L	TW-09c748-12800-1 65-3171	DoC
2	PRINTER	EPSON	LQ-300+	DCGY047261	B94C2642X
3	MODEM	ACEEX	1414	0206026775	IFAXDM1414
4	Extend Card	ADT	NA	NA	NA

No.	Signal cable description
1	NA
2	1.8m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core
3	1.3 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
4	NA

Note: 1. All power cords of the above support units are unshielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST



**NOTE:** 1. Please refer to the photos of test configuration in Item 5 also.

## 4. TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
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

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

#### 4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dBμV/m) *note 3
5150~5250	-27	68.3
5250~5350	-27	68.3
5725~5825	-27 *note 1	68.3
	-17 *note 2	78.3

**NOTE:**

1. For frequencies 10MHz or greater above or below the band edge.
2. All emissions within the frequency range from the band edge to 10MHz above or below the band edge.
3. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength

$$E = \frac{1000000\sqrt{30P}}{3} \quad \mu\text{V/m, where P is the eirp (Watts)}$$

#### 4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	R3271A	85060311	July 03, 2008
HP Pre_Amplifier	8449B	3008A01922	Sep. 18, 2007
ROHDE & SCHWARZ Test Receiver	ESCS30	100375	Sep. 20, 2007
CHASE Broadband Antenna	VULB9168	138	Dec. 10, 2007
Schwarzbeck Horn_Antenna	BBHA9120	D124	Jan. 01, 2008
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 04, 2008
SCHWARZBECK Biconical Antenna	VHBA9123	459	Jun. 08, 2009
SCHWARZBECK Periodic Antenna	UPA6108	1148	Jun. 08, 2009
R&S Loop Antenna	HFH2-Z2	881058/15	Nov. 29, 2007
RF Switches (ARNITSU)	CS-201	1565157	NA
RF CABLE (Chaintek)	SF102	22054-2	Nov. 14, 2007
RF Cable(RICHTEC)	9913-30M N-N Cable	STCCAB-30M-1 GHz	Jul. 15, 2008
Software	ADT_Radiated_V 5.14	NA	NA
CHANCE MOST Antenna Tower	AT-100	0203	NA
CHANCE MOST Turn Table	TT-100	0203	NA

- Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Biconical and Periodic Antenna) and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in ADT Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 4824A-3.
7. Loop antenna was used for all emissions below 30 MHz.

#### 4.1.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

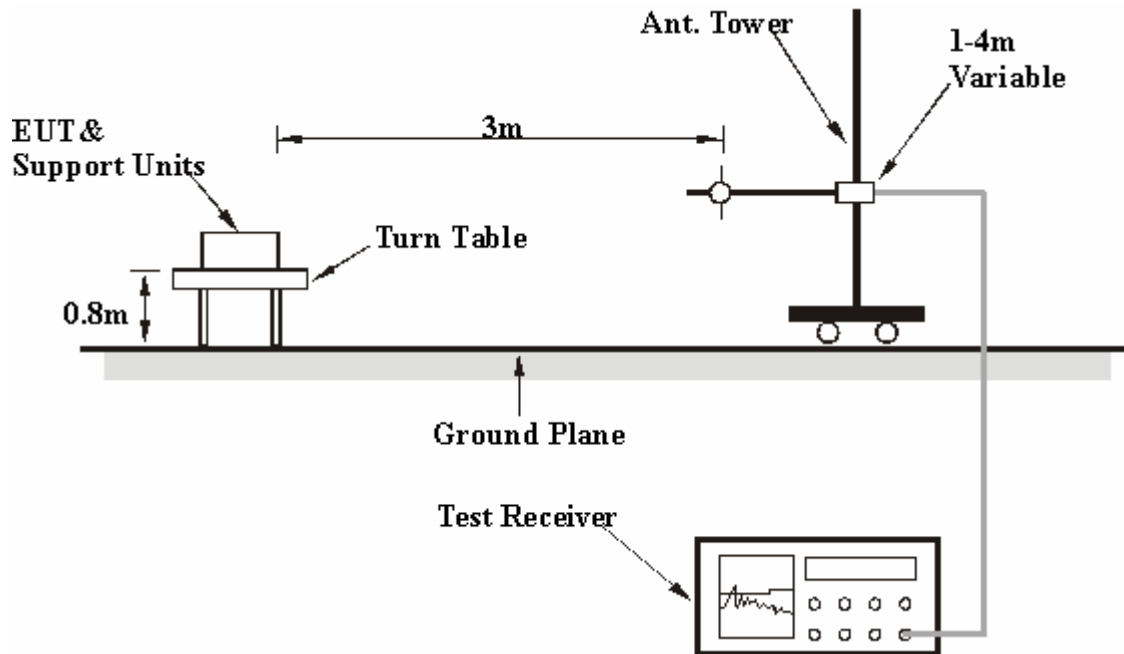
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

#### 4.1.5 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.6 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.1.7 EUT OPERATING CONDITION

- a. Plug the EUT into test board and placed on the testing table.
- b. The support unit 1 (Notebook computer) ran a test program “ART52 build58” to enable EUT under transmission condition continuously at specific channel frequency.



#### 4.1.8 TEST RESULTS

##### Below 1GHz Worst-Case Data

<b>MODE</b>	Channel 9	<b>FREQUENCY RANGE</b>	Below 1000MHz
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	27deg. C, 53%RH, 955hPa	<b>TESTED BY</b>	Rex Huang

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	133.87	34.30 QP	43.50	-9.20	2.31 H	82	21.40	12.90
2	200.85	36.60 QP	43.50	-6.90	2.27 H	96	25.00	11.60
3	233.64	40.20 QP	46.00	-5.80	1.82 H	117	27.10	13.10
4	300.27	37.90 QP	46.00	-8.10	1.84 H	234	21.10	16.80
5	400.30	34.70 QP	46.00	-11.30	1.31 H	209	15.70	19.00
6	466.38	29.00 QP	46.00	-17.00	1.06 H	315	8.10	20.90

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	133.43	33.70 QP	43.50	-9.80	1.41 V	27	20.80	12.90
2	200.23	37.20 QP	43.50	-6.30	1.06 V	314	25.60	11.60
3	233.47	36.80 QP	46.00	-9.20	1.00 V	293	23.70	13.10
4	300.06	32.30 QP	46.00	-13.70	1.00 V	216	15.50	16.80
5	400.88	30.70 QP	46.00	-15.30	1.00 V	71	11.70	19.00
6	466.86	30.60 QP	46.00	-15.40	1.00 V	149	9.70	20.90

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value

## 802.11a OFDM modulation

<b>MODE</b>	Channel 9	<b>FREQUENCY RANGE</b>	1 ~ 40 GHz
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	22deg. C, 65%RH, 959hPa	<b>TESTED BY</b>	Phoenix Huang

### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#3666.58	48.20 PK	74.00	-25.80	1.68 H	237	15.22	32.98
2	#3666.58	43.30 AV	54.00	-10.70	1.68 H	237	10.32	32.98
3	#5460.00	61.50 PK	74.00	-12.50	1.03 H	61	24.87	36.63
4	#5460.00	44.00 AV	54.00	-10.00	1.03 H	61	7.37	36.63
5	5470.00	67.50 PK	88.30	-20.80	1.04 H	55	30.86	36.64
6	5470.00	55.20 AV	68.30	-13.10	1.04 H	55	18.56	36.64
7	*5500.00	105.90 PK			1.04 H	55	69.24	36.66
8	*5500.00	94.30 AV			1.04 H	55	57.64	36.66
9	#11000.00	65.90 PK	74.00	-8.10	1.50 H	112	19.55	46.35
10	#11000.00	50.20 AV	54.00	-3.80	1.50 H	112	3.85	46.35

### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#3666.58	50.30 PK	74.00	-23.70	1.25 V	354	17.32	32.98
2	#3666.58	46.50 AV	54.00	-7.50	1.25 V	354	13.52	32.98
3	#5460.00	71.30 PK	74.00	-2.70	1.00 V	97	34.67	36.63
4	#5460.00	<b>53.30 AV</b>	<b>54.00</b>	<b>-0.70</b>	<b>1.00 V</b>	<b>97</b>	<b>16.67</b>	<b>36.63</b>
5	5470.00	77.40 PK	88.30	-10.90	1.36 V	271	40.76	36.64
6	5470.00	61.88 AV	68.30	-6.42	1.36 V	271	25.24	36.64
7	*5500.00	117.60 PK			1.00 V	100	80.94	36.66
8	*5500.00	109.20 AV			1.00 V	100	72.54	36.66
9	#11000.00	65.70 PK	74.00	-8.30	1.67 V	23	19.35	46.35
10	#11000.00	49.80 AV	54.00	-4.20	1.67 V	23	3.45	46.35

- NOTE:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value
  5. “\*” : Fundamental frequency
  6. “#”The radiated frequency falling in the restricted band.

<b>MODE</b>	Channel 14	<b>FREQUENCY RANGE</b>	1 ~ 40 GHz
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	22deg. C, 65%RH, 959hPa	<b>TESTED BY</b>	Phoenix Huang

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#3733.28	48.11 PK	74.00	-25.89	1.70 H	234	14.94	33.17
2	#3733.28	43.10 AV	54.00	-10.90	1.70 H	234	9.93	33.17
3	*5600.00	106.80 PK			1.00 H	56	69.96	36.84
4	*5600.00	95.00 AV			1.00 H	56	58.16	36.84
5	#11200.00	65.30 PK	74.00	-8.70	1.46 H	109	18.84	46.46
6	#11200.00	50.00 AV	54.00	-4.00	1.46 H	109	3.54	46.46

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#3733.28	50.00 PK	74.00	-24.00	1.07 V	6	16.83	33.17
2	#3733.28	46.40 AV	54.00	-7.60	1.07 V	6	13.23	33.17
3	*5600.00	116.80 PK			1.27 V	107	79.96	36.84
4	*5600.00	105.50 AV			1.27 V	107	68.66	36.84
5	#11200.00	64.00 PK	74.00	-10.00	1.48 V	121	17.54	46.46
6	#11200.00	48.80 AV	54.00	-5.20	1.48 V	121	2.34	46.46

- NOTE:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value
  5. “\*” : Fundamental frequency
  6. “#” The radiated frequency falling in the restricted band.

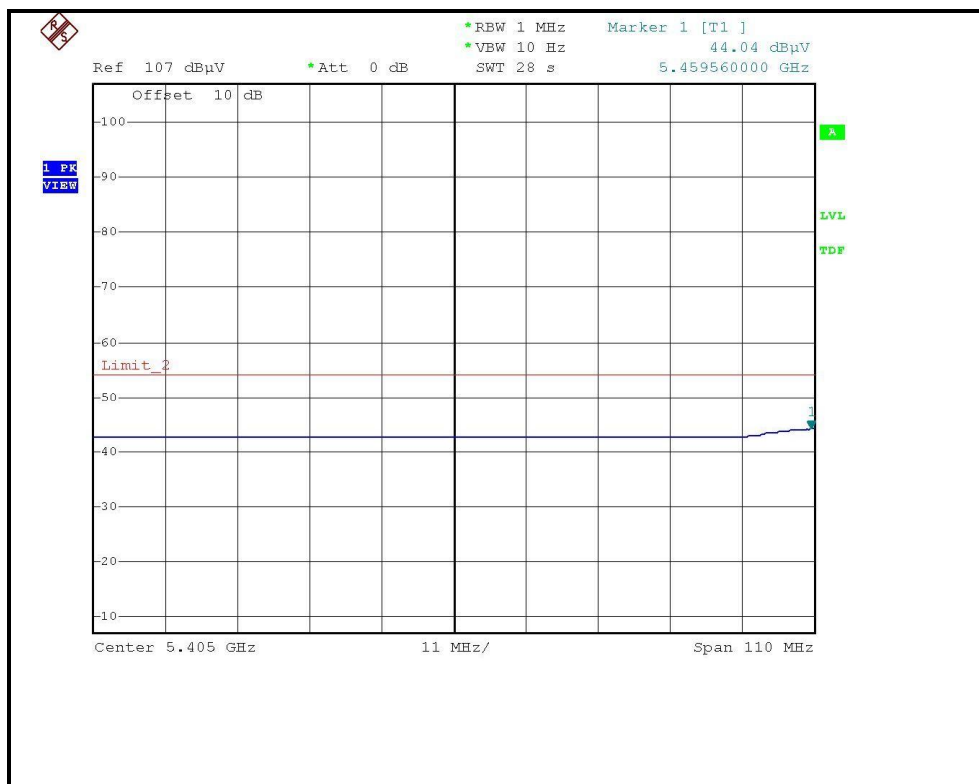
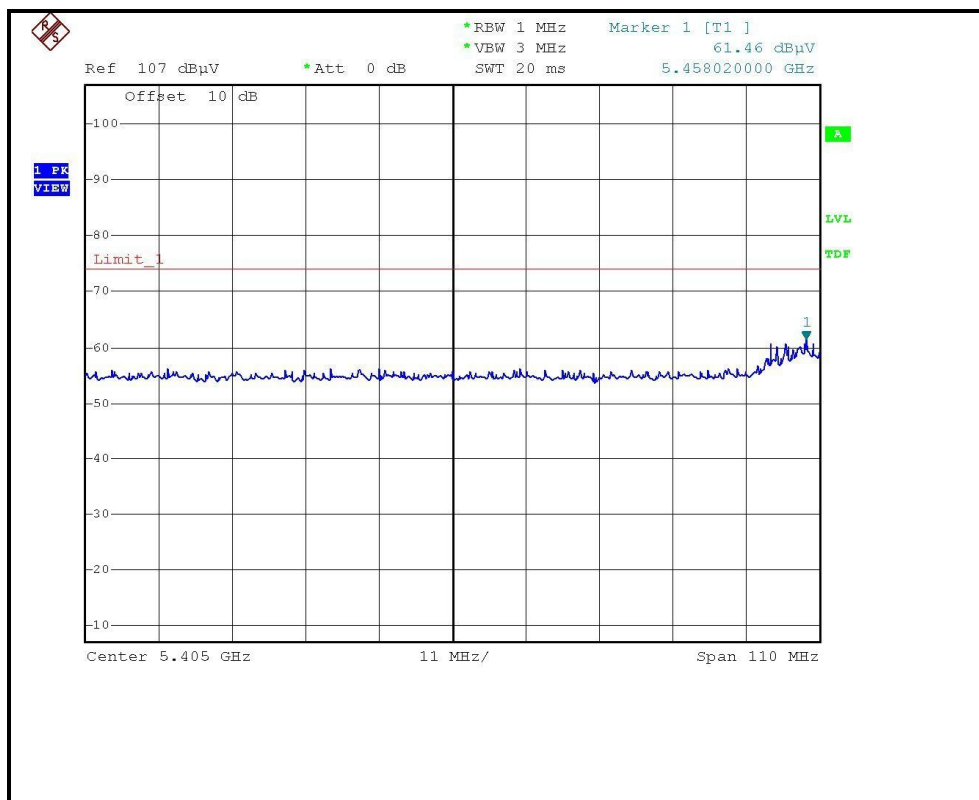
<b>MODE</b>	Channel 19	<b>FREQUENCY RANGE</b>	1 ~ 40 GHz
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	22deg. C, 65%RH, 959hPa	<b>TESTED BY</b>	Phoenix Huang

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#3800.00	47.80 PK	74.00	-26.20	1.74 H	243	14.44	33.36
2	#3800.00	42.50 AV	54.00	-11.50	1.74 H	243	9.14	33.36
3	*5700.00	107.50 PK			1.00 H	307	70.47	37.03
4	*5700.00	96.20 AV			1.00 H	307	59.17	37.03
5	5725.00	74.00 PK	88.30	-14.30	1.00 H	307	36.93	37.07
6	5725.00	57.00 AV	68.30	-11.30	1.00 H	307	19.93	37.07
7	#11400.00	63.90 PK	74.00	-10.10	1.50 H	107	17.33	46.57
8	#11400.00	50.00 AV	54.00	-4.00	1.50 H	107	3.43	46.57

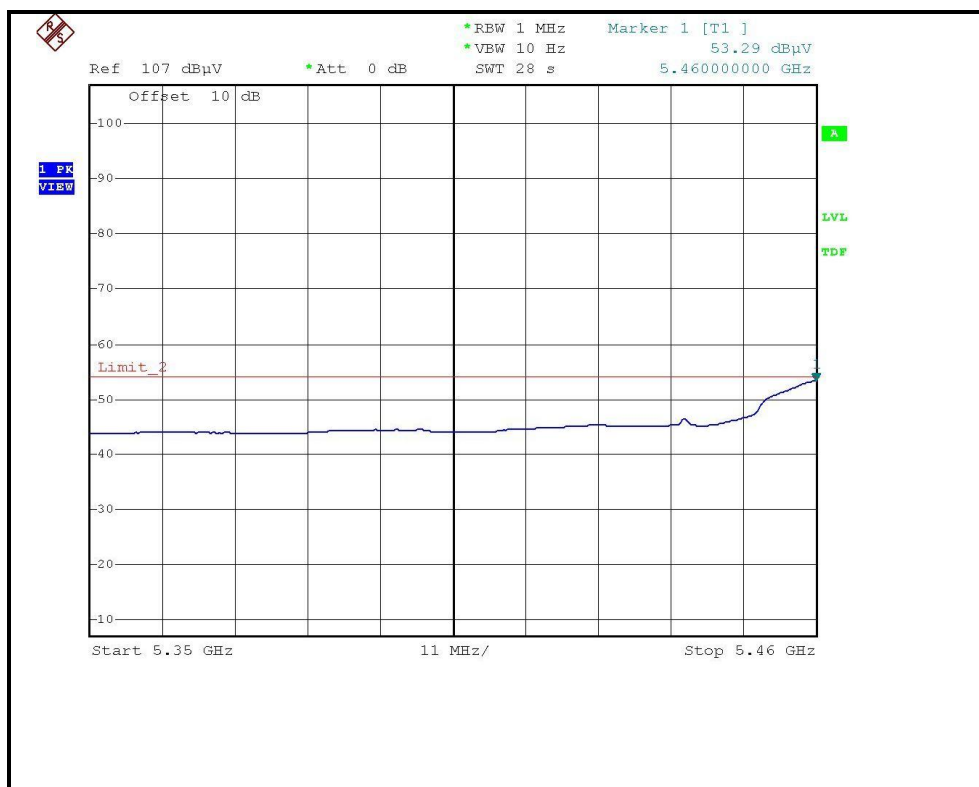
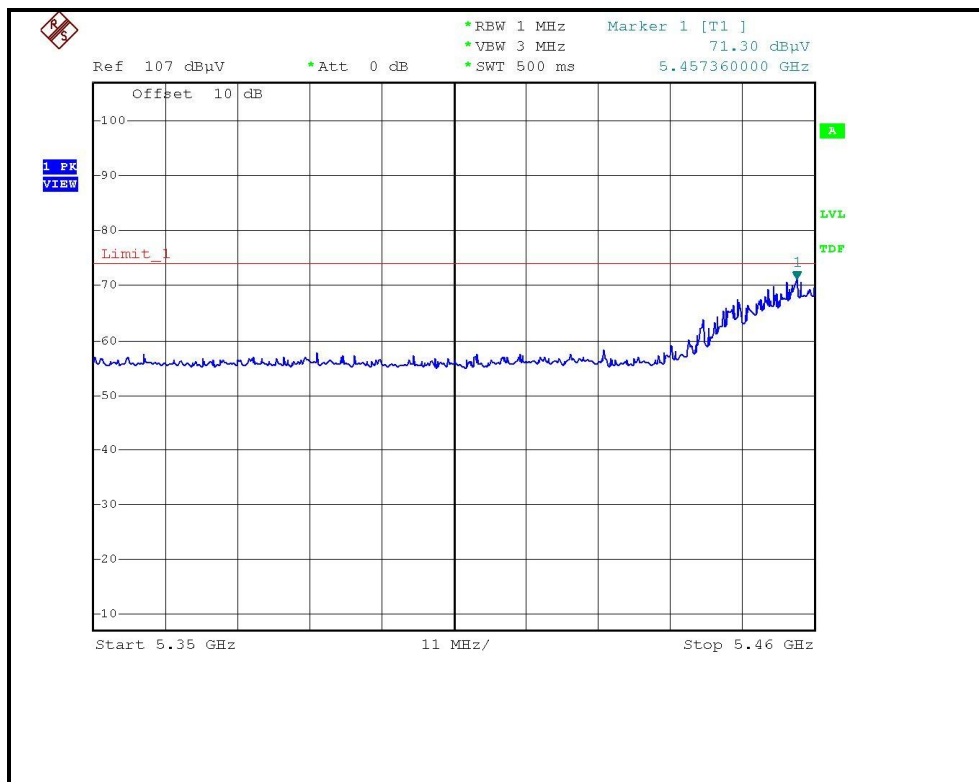
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#3800.00	50.00 PK	74.00	-24.00	1.21 V	353	16.64	33.36
2	#3800.00	46.00 AV	54.00	-8.00	1.21 V	353	12.64	33.36
3	*5700.00	117.33 PK			1.34 V	110	80.30	37.03
4	*5700.00	105.70 AV			1.34 V	110	68.67	37.03
5	5725.00	83.10 PK	88.30	-5.20	1.34 V	110	46.03	37.07
6	5725.00	64.20 AV	68.30	-4.10	1.34 V	110	27.13	37.07
7	#11400.00	64.90 PK	74.00	-9.10	1.57 V	28	18.33	46.57
8	#11400.00	50.30 AV	54.00	-3.70	1.57 V	28	3.73	46.57

- NOTE:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value
  5. "\*" : Fundamental frequency
  6. "#"The radiated frequency falling in the restricted band.

# RESTRICTED BANDEDGE (802.11a MODE, CH9, HORIZONTAL )



# RESTRICTED BANDEDGE (802.11a MODE, CH9, VERTICAL )



## 4.2 PEAK TRANSMIT POWER MEASUREMENT

### 4.2.1 LIMITS OF PEAK TRANSMIT POWER MEASUREMENT

Frequency Band	Limit
5.15 – 5.25GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB
5.25 – 5.35GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.47 – 5.725GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.725 – 5.825GHz	The lesser of 1W (30dBm) or 17dBm + 10logB

**NOTE:** Where B is the 26dB emission bandwidth in MHz.

### 4.2.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ADVANTEST SPECTRUM ANALYZER	U3772	160100280	April 10.2008

**NOTE:**

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.2.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set span to encompass the entire emission bandwidth of the signal.
3. Set RBW to 1MHz, VBW to 300kHz.
4. Using the spectrum analyzer's channel power measurement function to measure the output power.

**NOTE:**

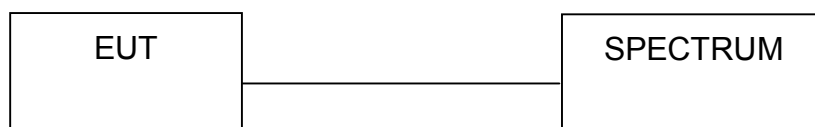
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.2.5 TEST SETUP



#### 4.2.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



## 4.2.7 TEST RESULTS

### 802.11a OFDM modulation

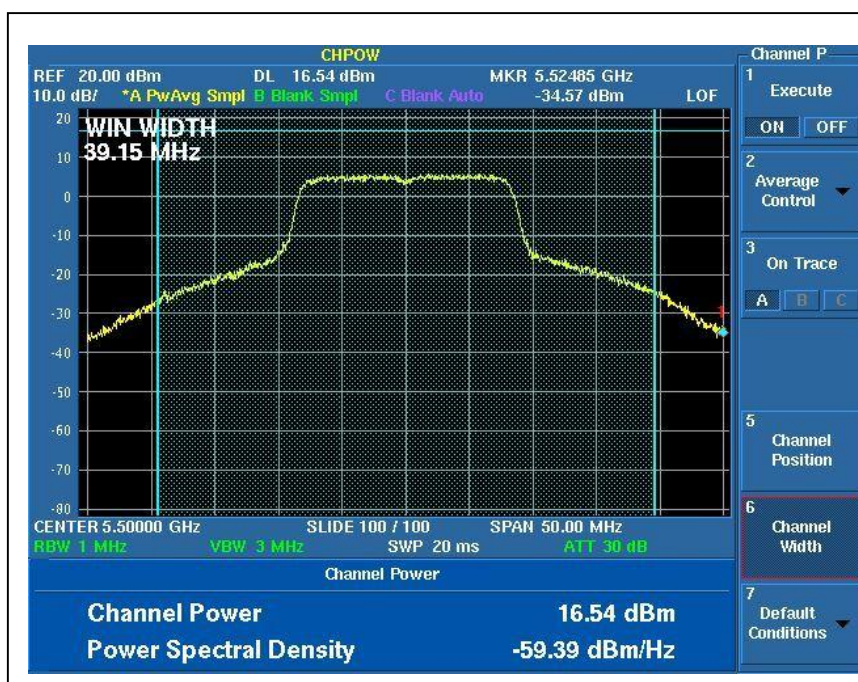
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	26deg.C, 68%RH, 959hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER OUTPUT (mW)	PEAK POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)	PASS/FAIL
9	5500	16.54	45.082	24	39.15	PASS
14	5600	16.67	46.452	24	38.55	PASS
19	5700	18.06	63.973	24	39.75	PASS

**NOTE:** The 26dBc Occupied Bandwidth plot, please refer to the following pages.

Peak Power Output:

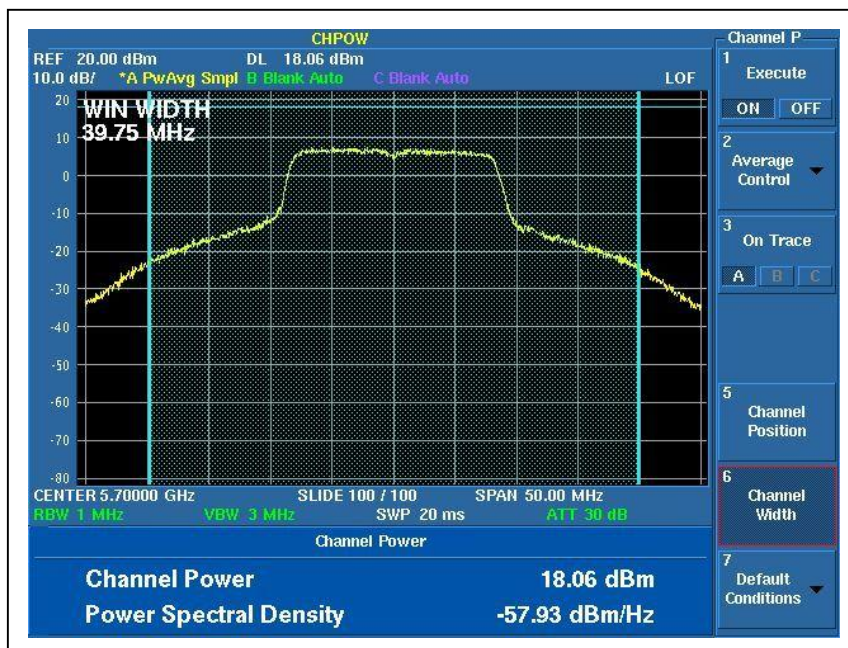
CH9



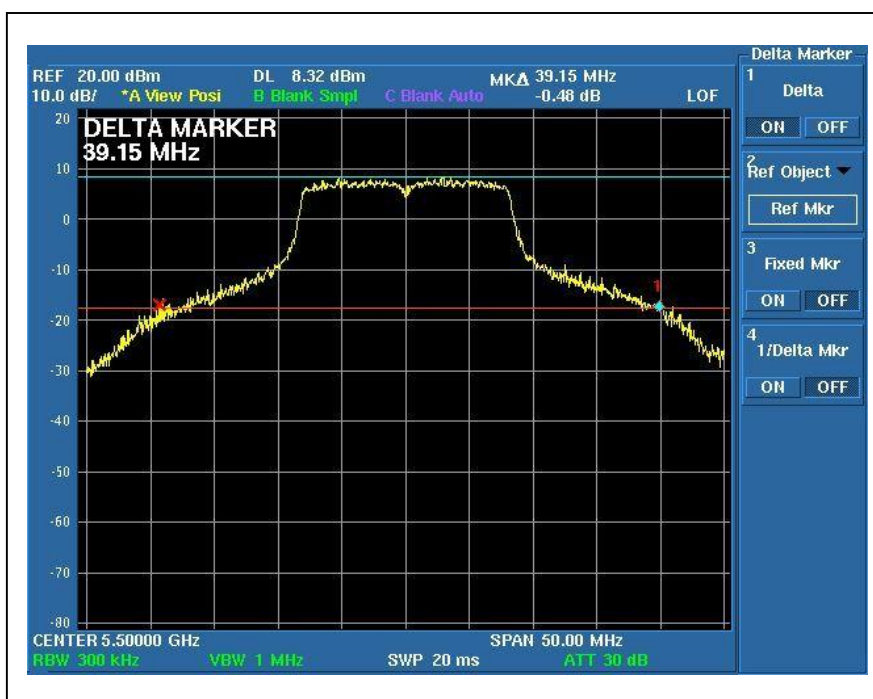
## CH14



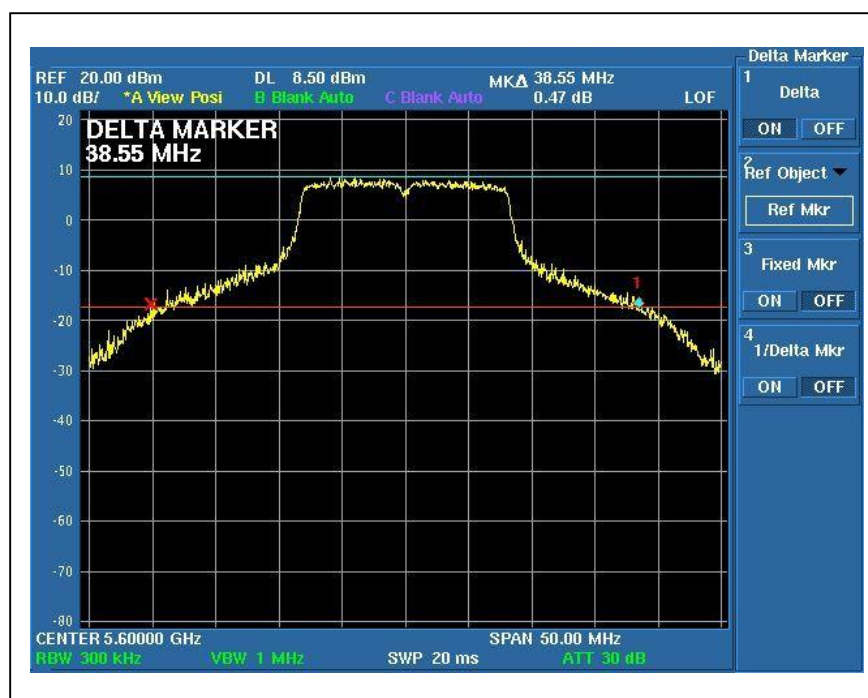
## CH19



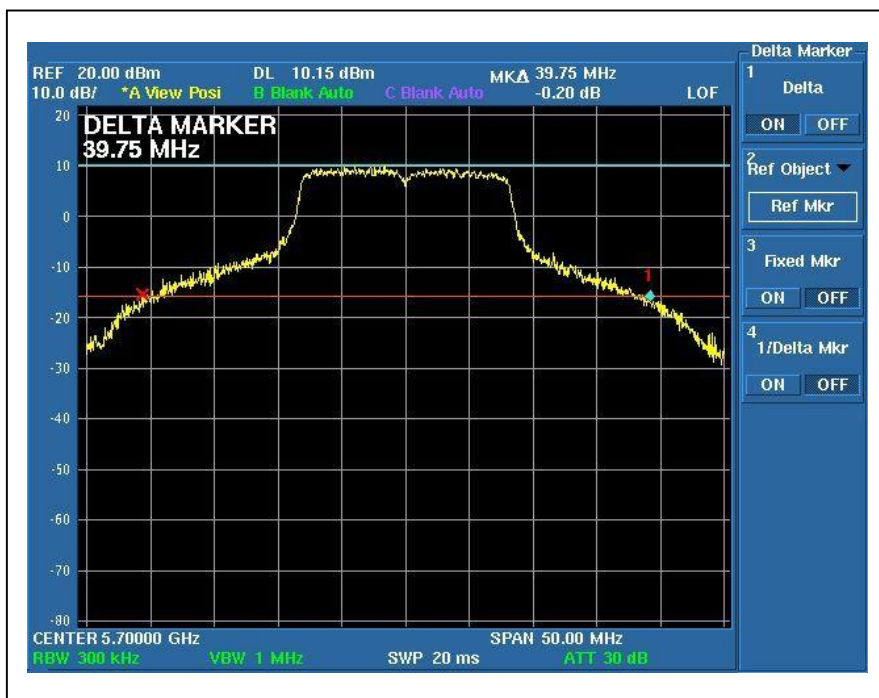
26dB Occupied Bandwidth:  
CH9



CH14



# CH19



### 4.3 PEAK POWER EXCURSION MEASUREMENT

#### 4.3.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Frequency Band	Limit
5.15 – 5.25 GHz	13dB
5.25 – 5.35 GHz	13dB
5.725 – 5.825 GHz	13dB

#### 4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ADVANTEST SPECTRUM ANALYZER	U3772	160100280	April 10.2008

**NOTE:**

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.3.3 TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer.
2. Set the spectrum bandwidth span to view the entire spectrum.
3. Using peak detector and Max-hold function for Trace 1 (RB=1MHz, VB=3MHz) and 2 (RB=1MHz, VB=300KHz).
4. The largest difference between Trace 1 and Trace 2 in any 1MHz band on any frequency was recorded.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



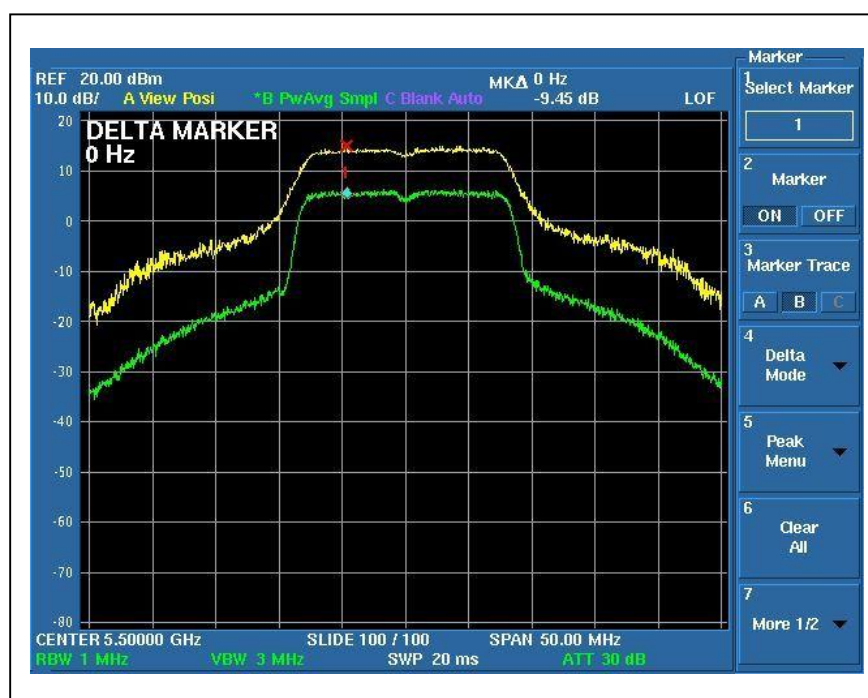
### 4.3.7 TEST RESULTS

#### 802.11a OFDM modulation

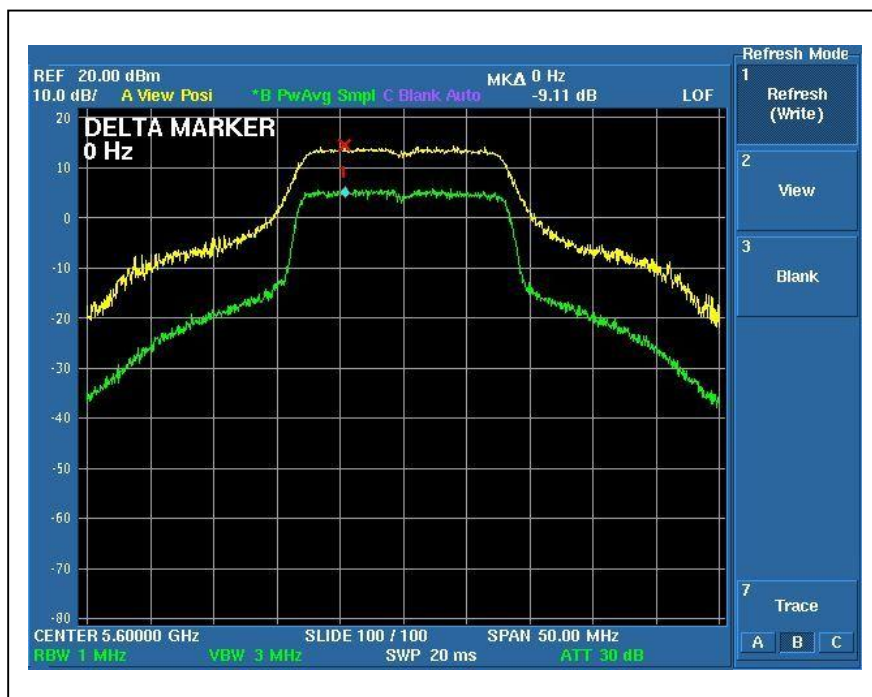
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	24deg.C, 62%RH, 955hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)	PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
9	5500	-9.45	13	PASS
14	5600	-9.11	13	PASS
19	5700	-9.47	13	PASS

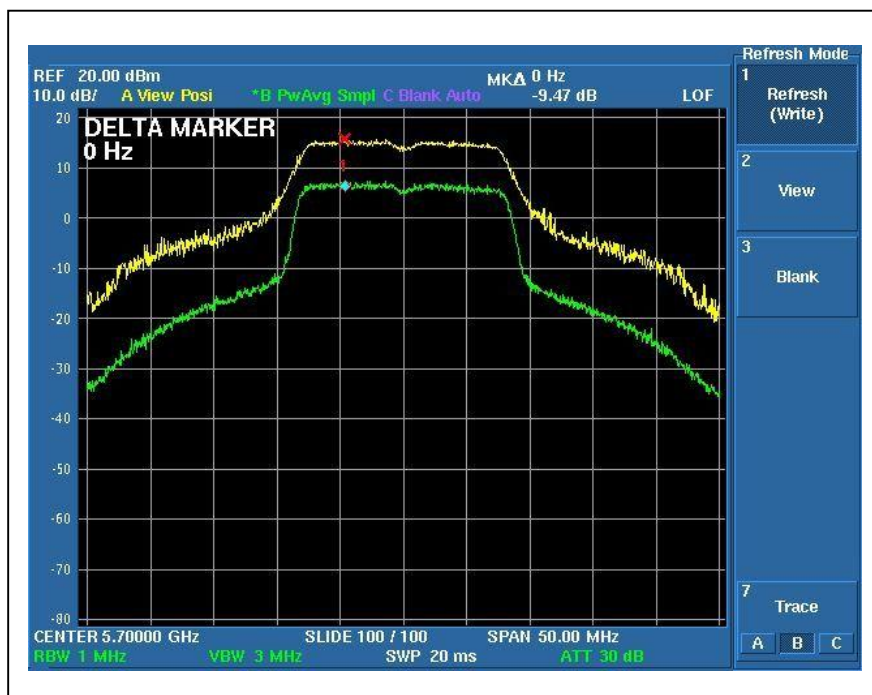
#### CH9



CH14



CH19





## 4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Frequency Band	Limit
5.15 ~ 5.25GHz	4dBm
5.25 ~ 5.35GHz	11dBm
5.725 ~ 5.825GHz	17dBm

### 4.4.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ADVANTEST SPECTRUM ANALYZER	U3772	160100280	April 10.2008

#### NOTE:

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

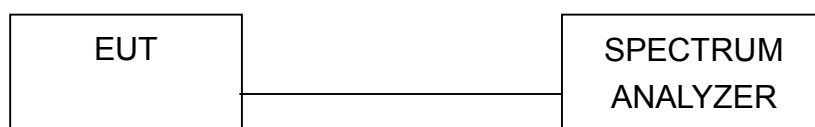
#### 4.4.3 TEST PROCEDURES

1. The transmitter output was connected to the spectrum analyzer.
2. Set RBW=1MHz, VBW=3MHz. The PPSD is the highest level found across the emission in any 1MHz band.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.5 TEST SETUP



#### 4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6

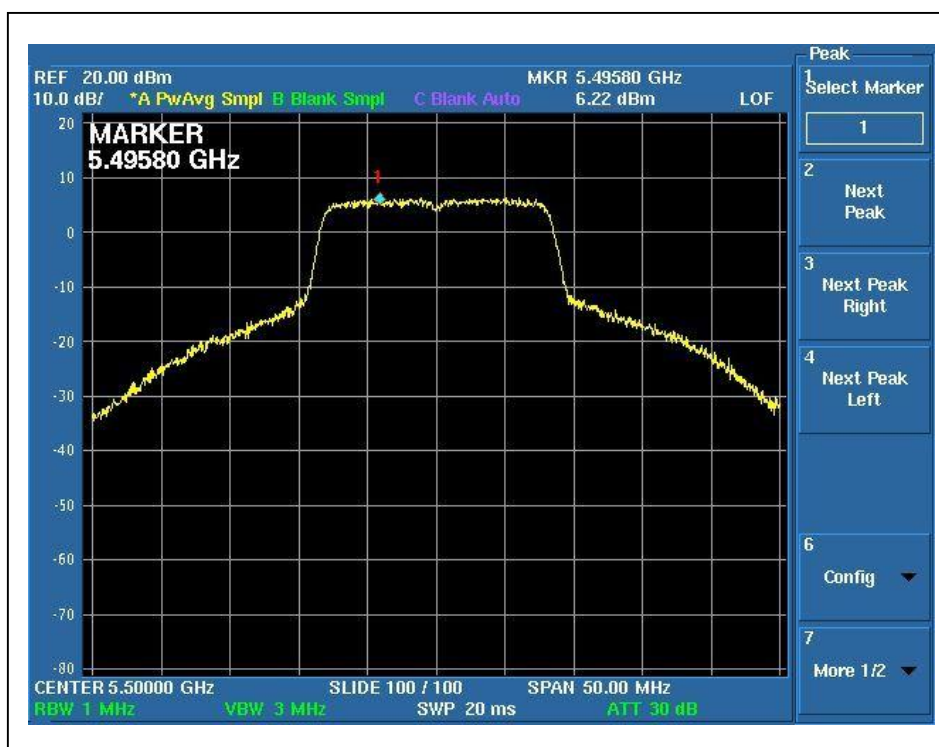
#### 4.4.7 TEST RESULTS

##### 802.11a OFDM modulation

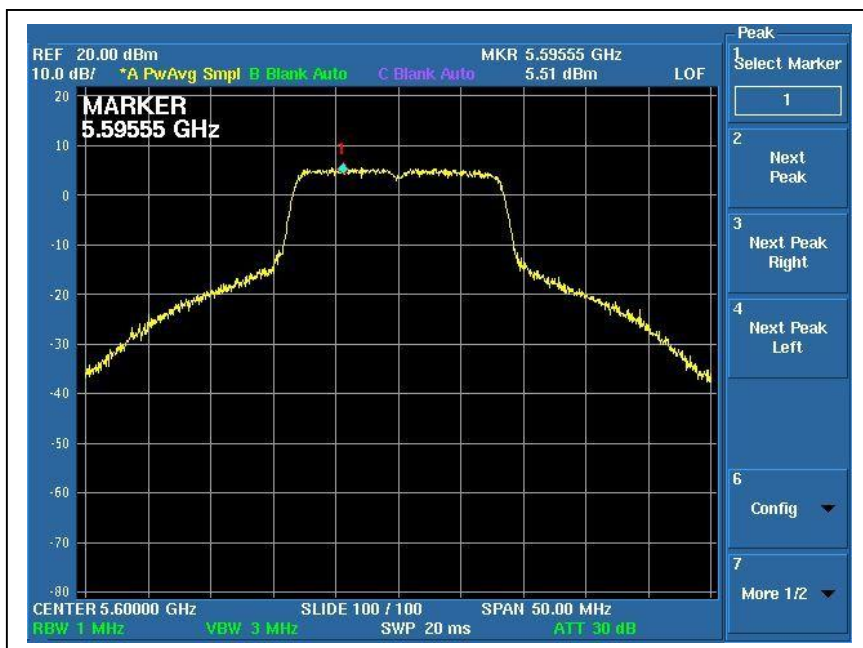
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	24deg.C, 62%RH, 955hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 1MHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
9	5500	6.22	11	PASS
14	5600	5.51	11	PASS
19	5700	7.35	11	PASS

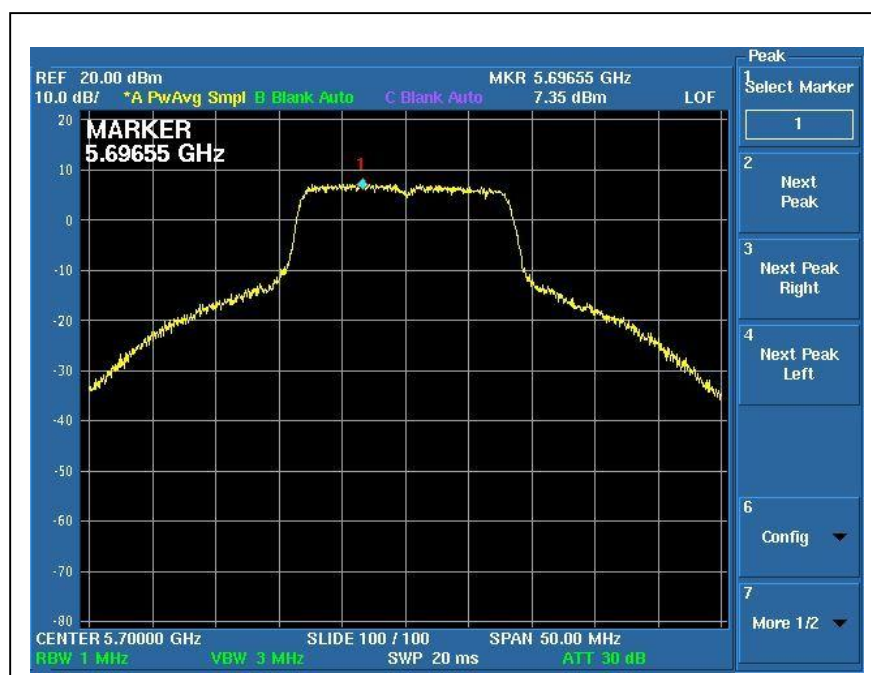
#### CH9



CH14



CH19



## 4.5 BAND EDGES MEASUREMENT

### 4.5.1 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2008

**NOTE:**

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.5.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 1MHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

### 4.5.3 EUT OPERATING CONDITION

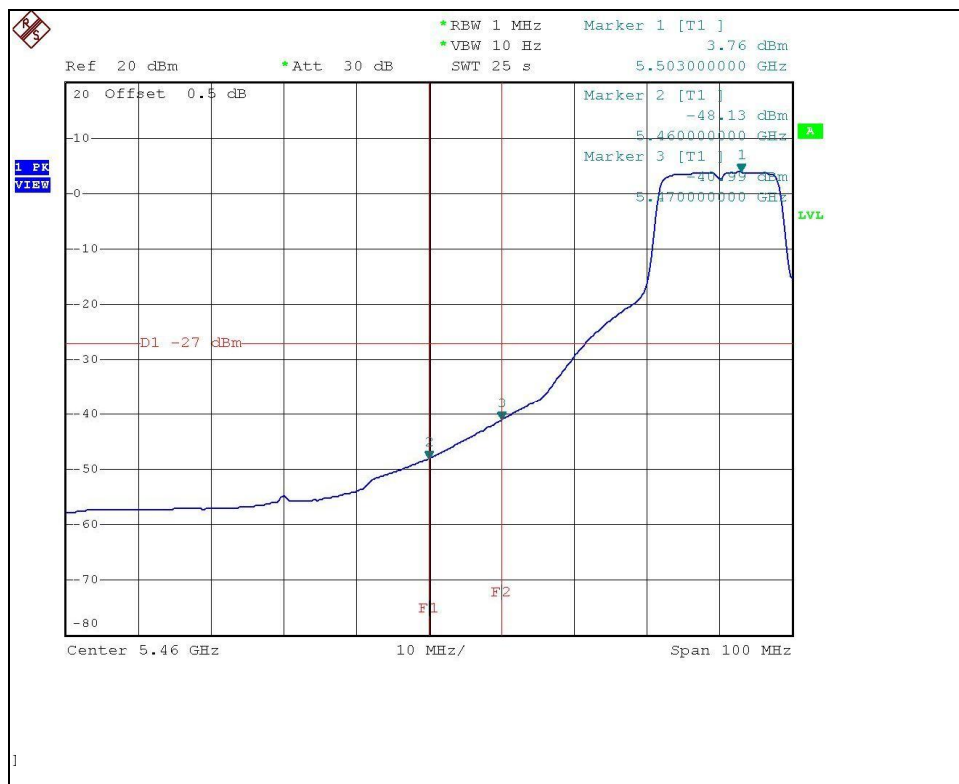
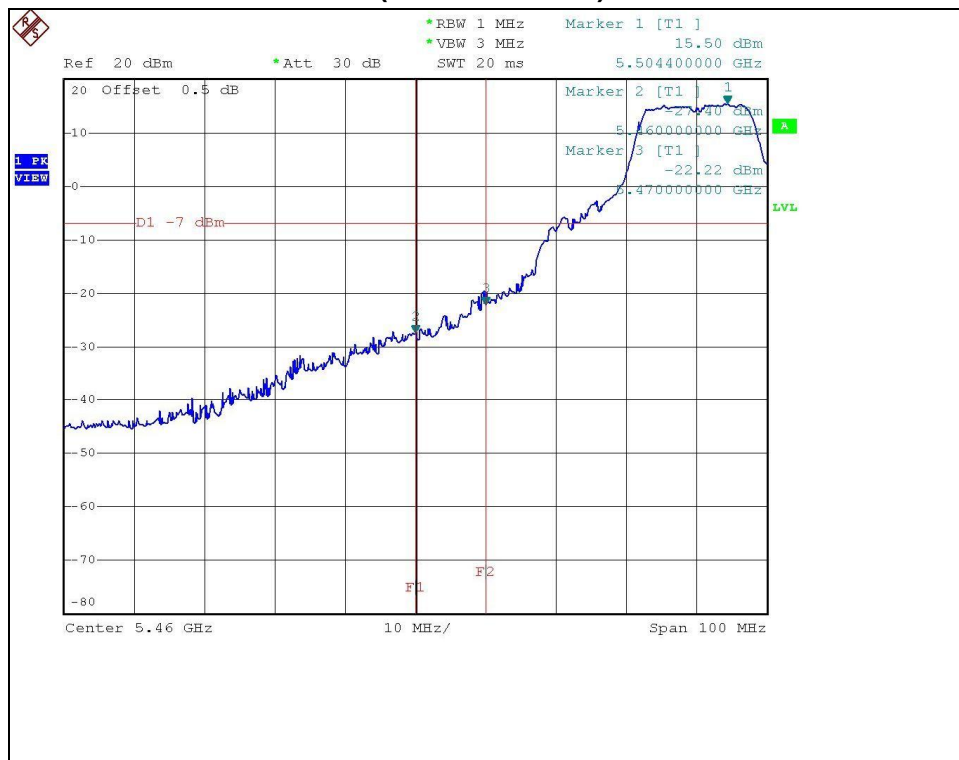
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

#### 4.5.4 TEST RESULTS

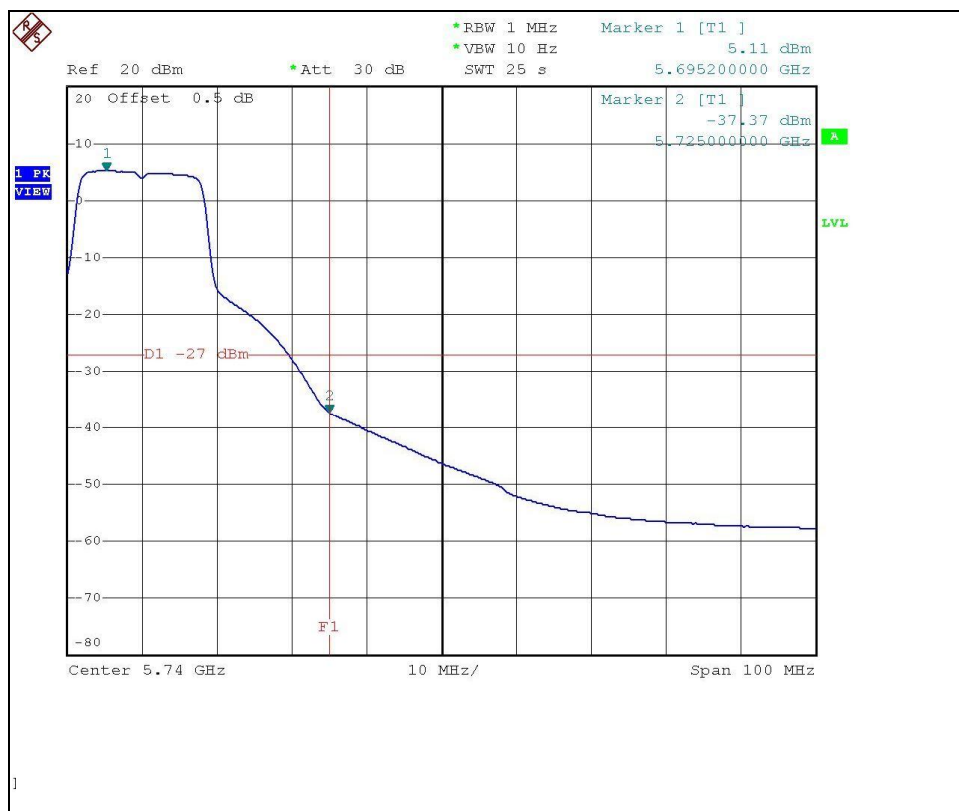
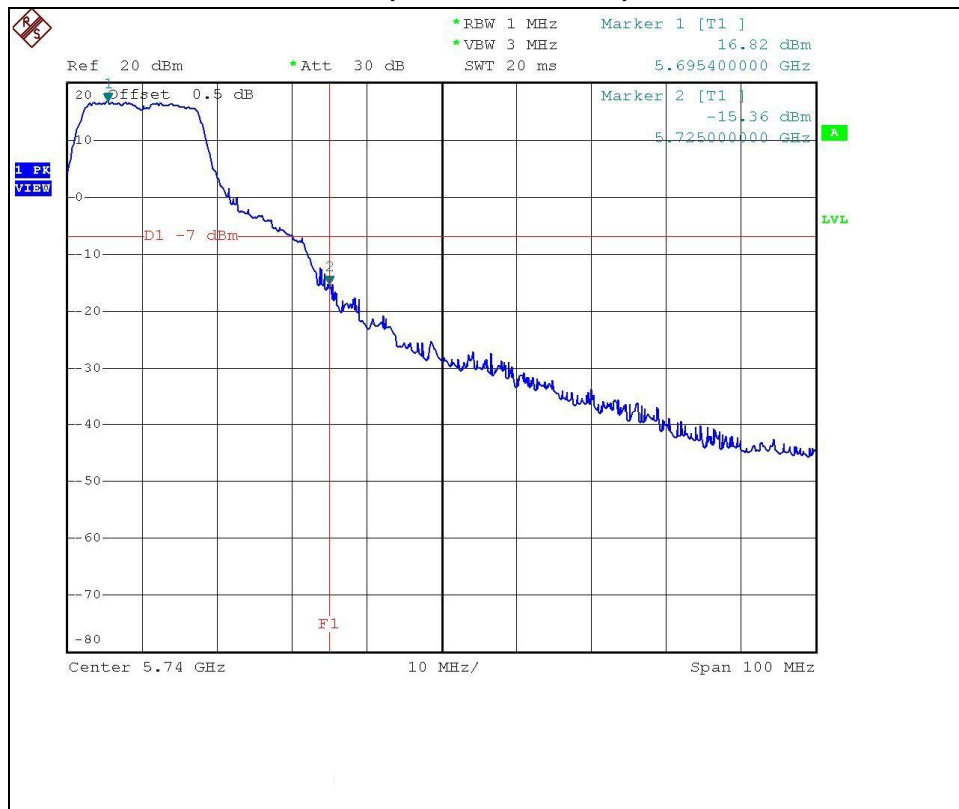
For signals in the restricted bands above and below the 5.47 to 5.725GHz allocated band a measurement was made of the amplitude of the spurious emissions with respect to the intentional signals. The relative amplitude, in dBc, was applied to the average and peak field strength of the intentional signal made on the OATS to calculate the field strength of the unintentional signals.

The spectrum plots (Peak RBW=1MHz, VBW=3MHz; Average RBW=1MHz, VBW=10Hz) are attached on the following pages.

## 802.11a OFDM modulation(CH 9: 5500MHz)



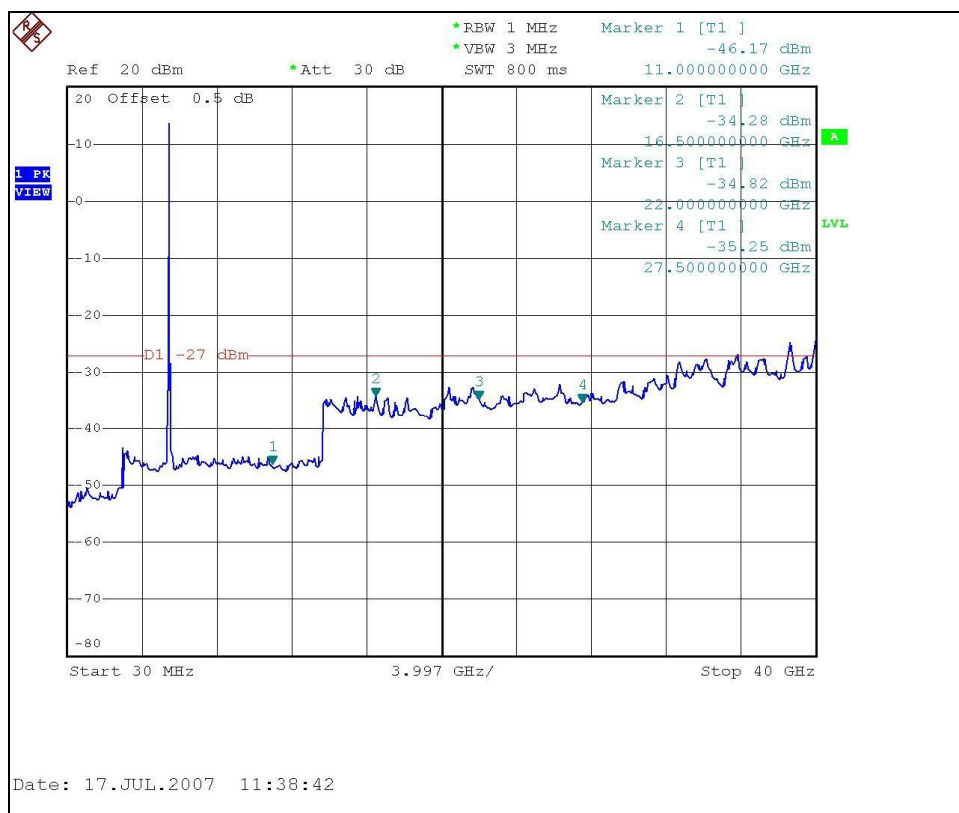
## 802.11a OFDM modulation (CH 19: 5700MHz)



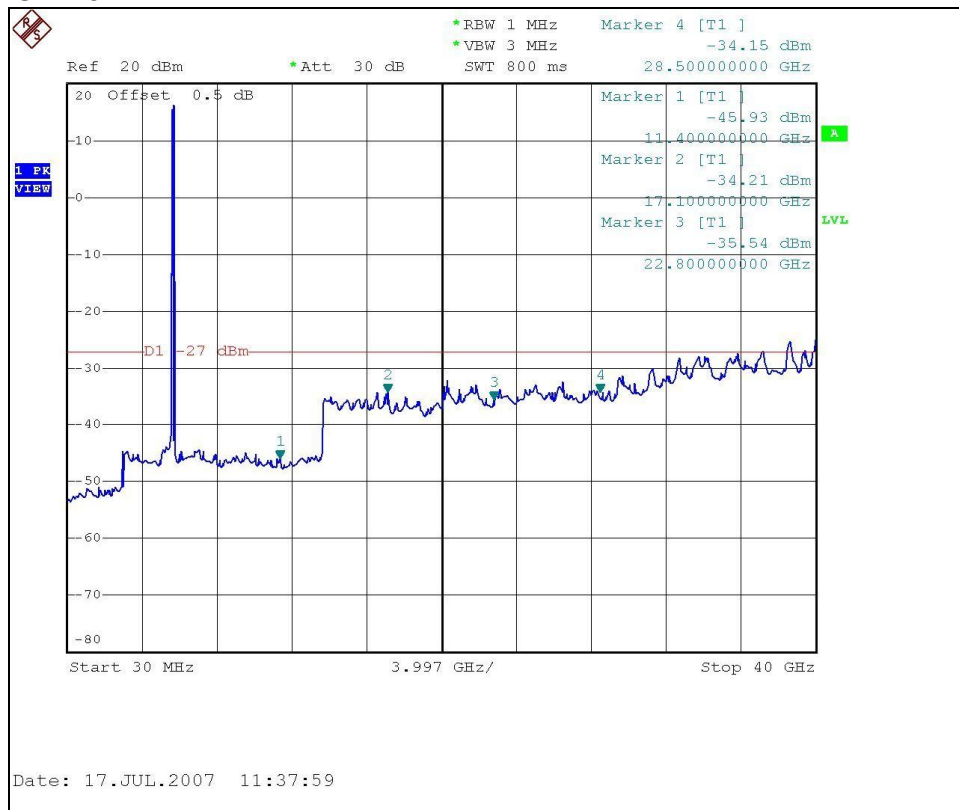


## 802.11a 10th conducted Harmonic

### CH 9



### CH 19



## 4.6 ANTENNA REQUIREMENT

### 4.6.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, 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.

And according to FCC 47 CFR Section 15.407(a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

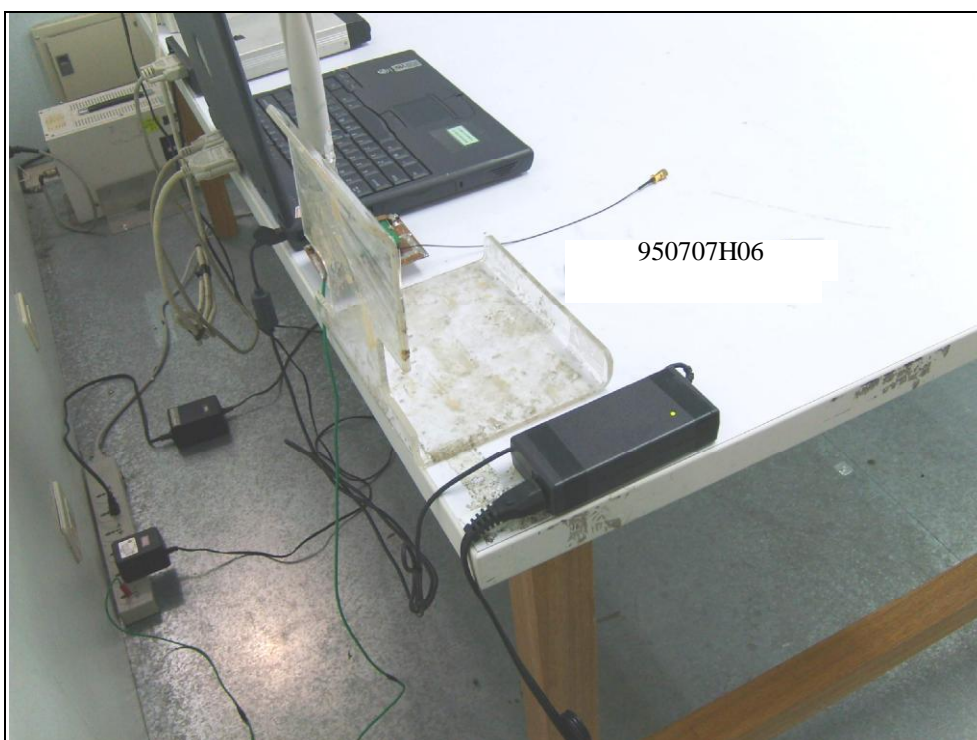
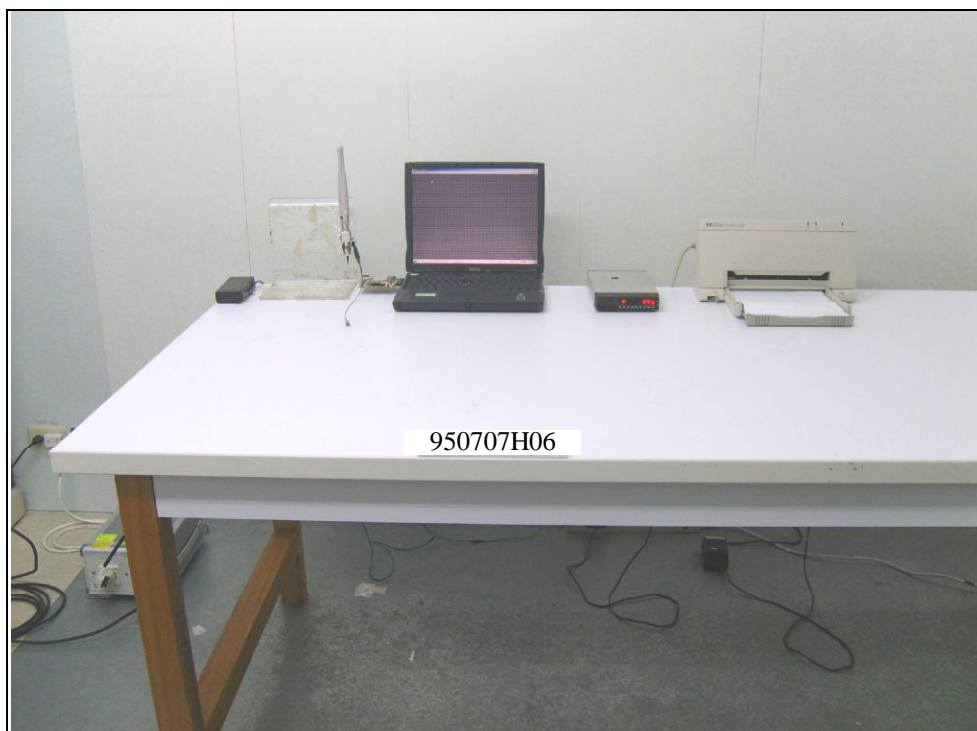
### 4.6.2 ANTENNA CONNECTED CONSTRUCTION

The antennas used in this product are as following:

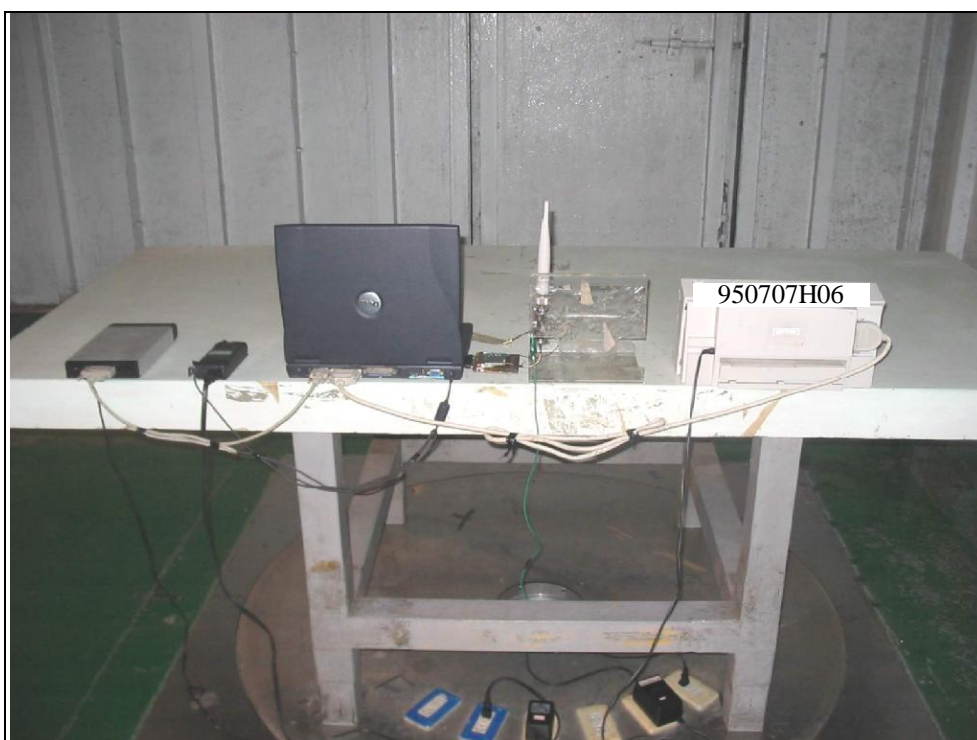
No.	Model No.	Gain (dBi)	Cable Loss (dB)	Net Gain (dB)	Antenna Type	Connector
1	SAA04-220080	5	1.8	3.2	Dipole	RP-N plug

## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

### CONDUCTED EMISSION TEST



## RADIATED EMISSION TEST



## 6. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

<b>USA</b>	FCC, UL, A2LA
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>Norway</b>	NEMKO
<b>Canada</b>	INDUSTRY CANADA , CSA
<b>R.O.C.</b>	TAF, BSMI, NCC
<b>Netherlands</b>	Telefication
<b>Singapore</b>	PSB , GOST-ASIA(MOU)
<b>Russia</b>	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

[www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml). If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26052943

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety Telecom Lab:**

Tel: 886-3-3183232

Fax: 886-3-3185050

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also

## **7. APPENDIX-A-MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.