

4.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Frequency Band	Limit
5.15 ~ 5.25GHz	4dBm
5.25 ~ 5.35GHz	11dBm
5.47 ~ 5.725GHz	11dBm
5.725 ~ 5.825GHz	17dBm

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ADVANTEST SPECTRUM ANALYZER	U3772	160100280	April. 10.2007

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.

4.5.3 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.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

Same as 4.3.6

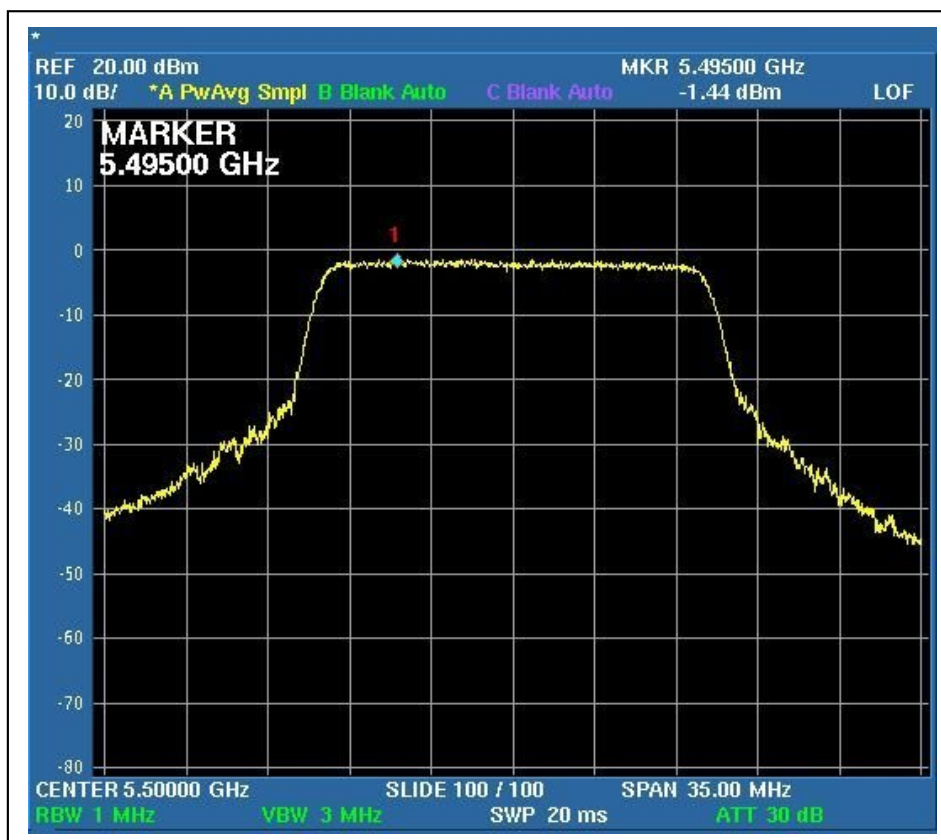
4.5.7 TEST RESULTS –ANTENNA 1

802.11a OFDM modulation

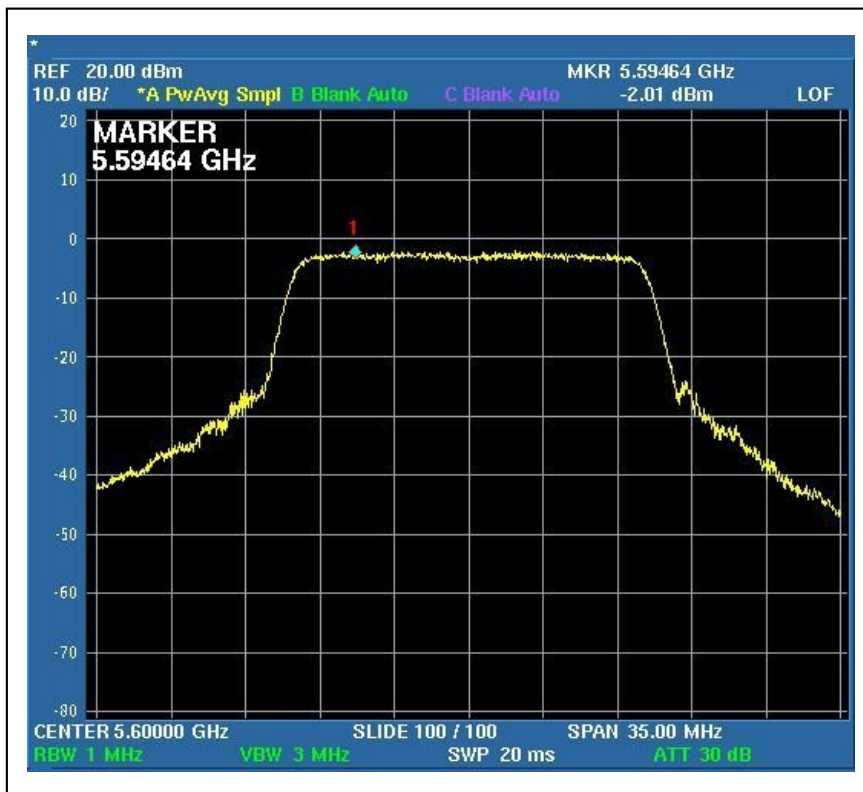
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	23deg.C, 56%RH, 972hPa
TESTED BY	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
5	5500	-1.44	0	PASS
10	5600	-2.01	0	PASS
15	5700	-3.16	0	PASS

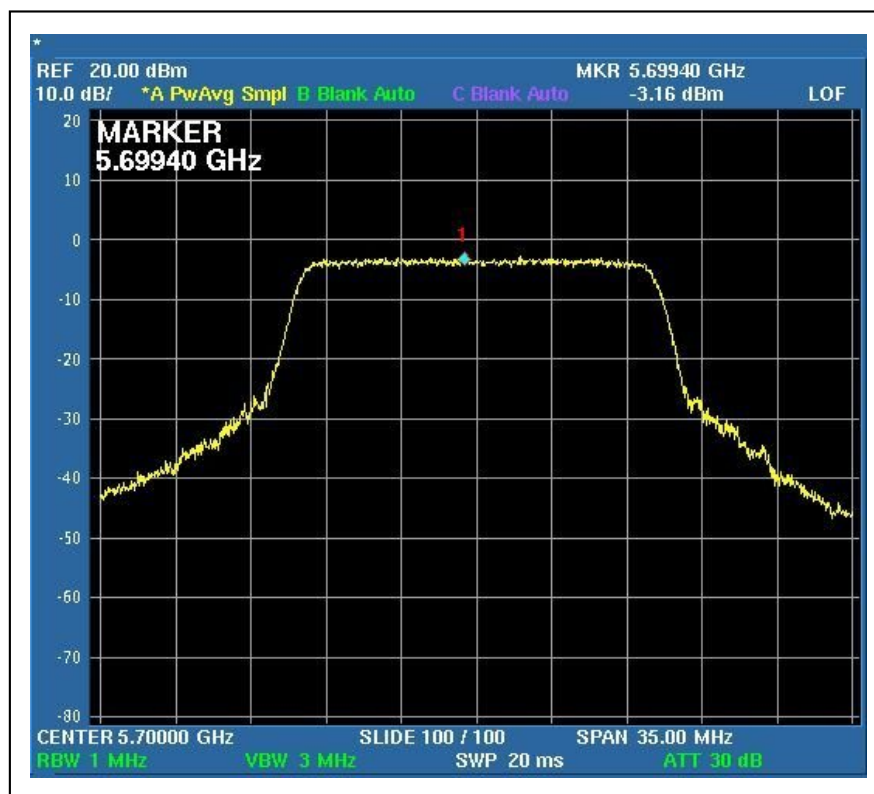
CH5



CH10



CH15



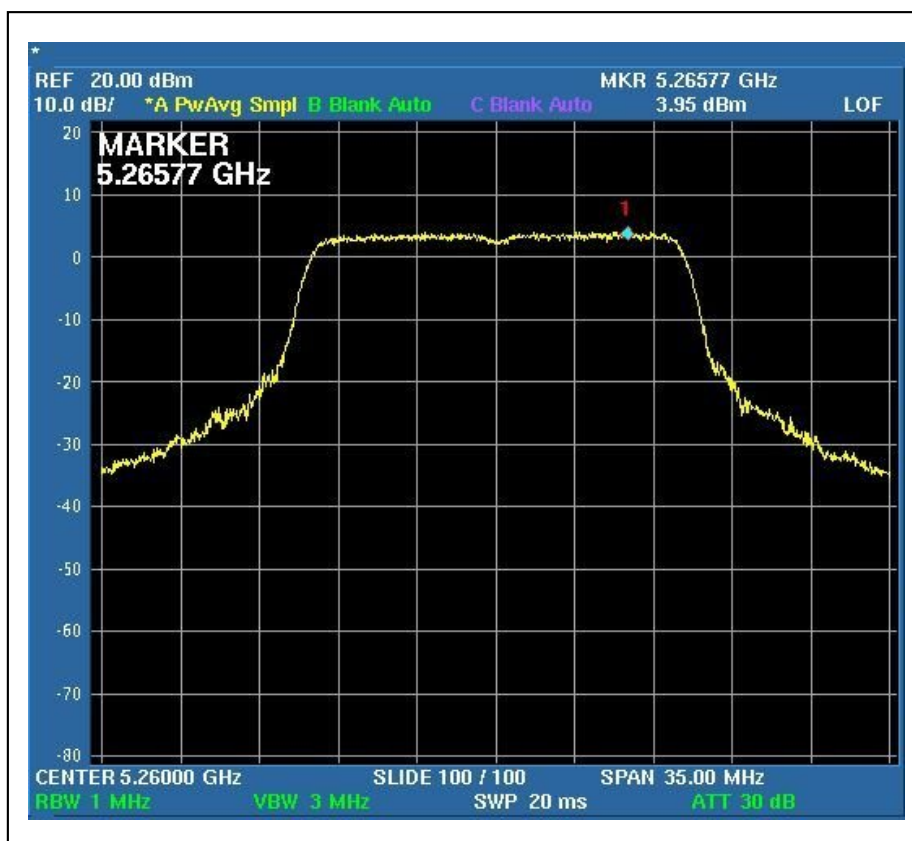
4.5.8 TEST RESULTS –ANTENNA A

802.11a OFDM modulation

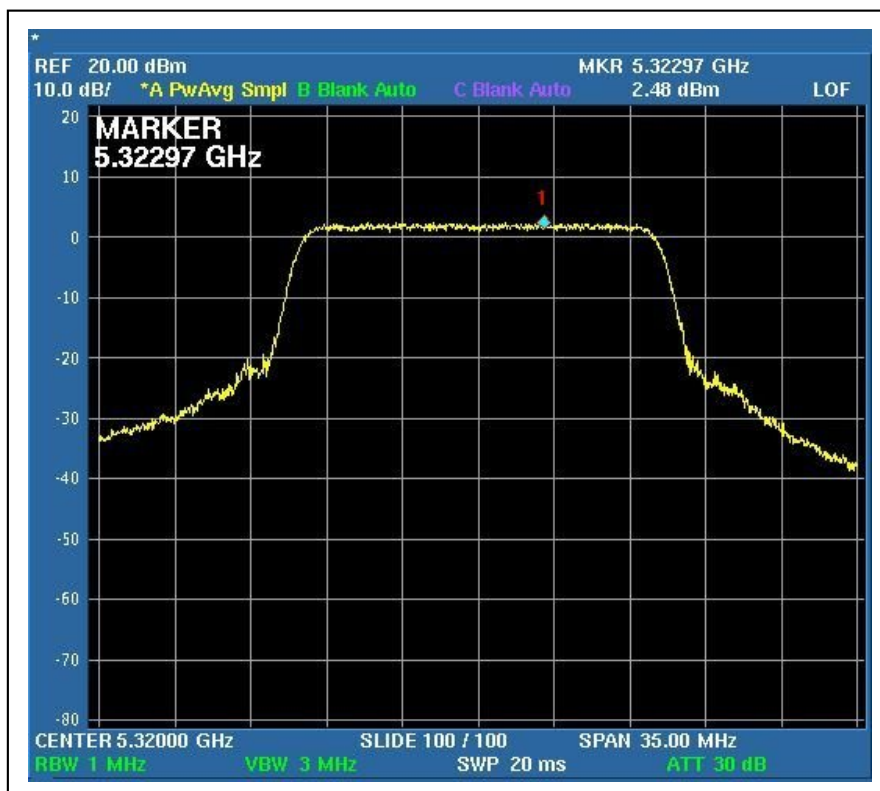
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	23deg.C, 56%RH, 972hPa
TESTED BY	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 1MHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	5260	3.95	8	PASS
4	5320	2.48	8	PASS
5	5500	4.79	8	PASS
10	5600	4.79	8	PASS
15	5700	2.48	8	PASS

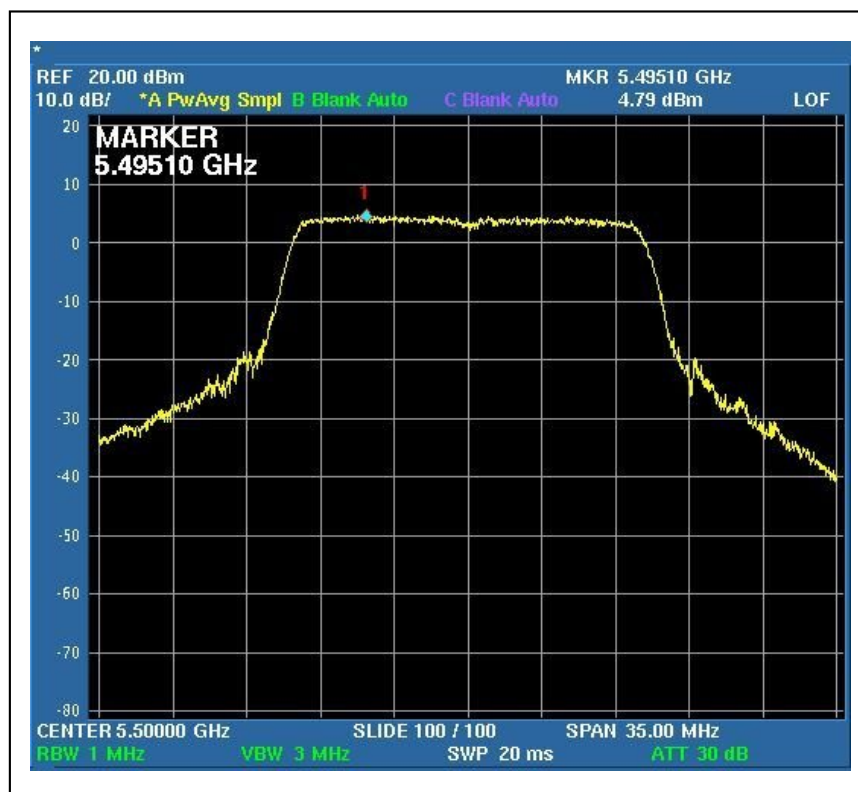
CH1



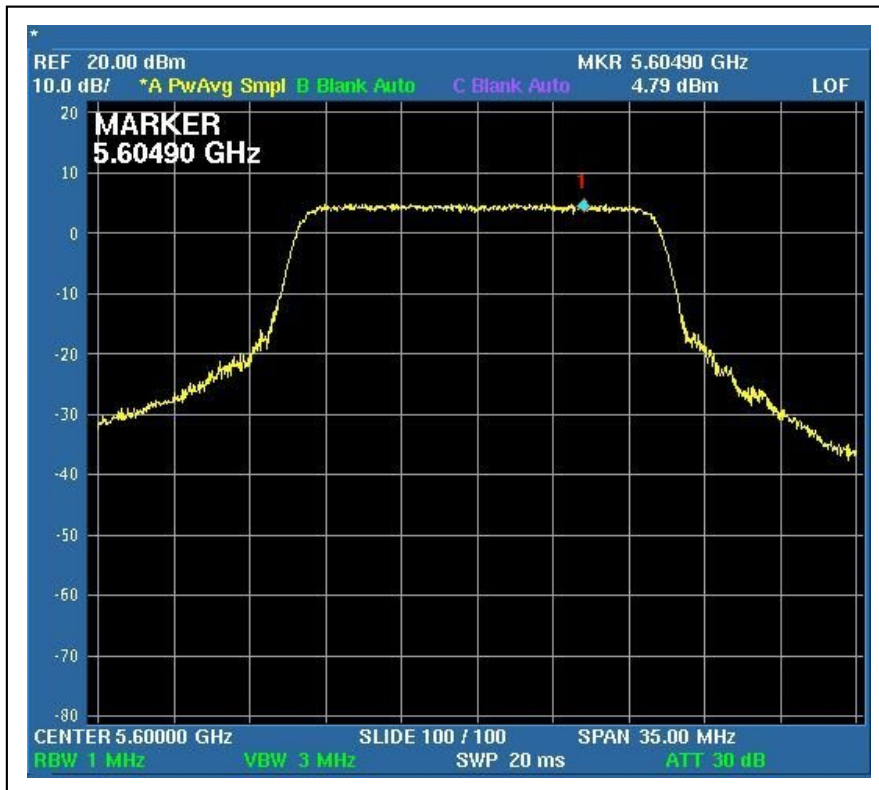
CH4



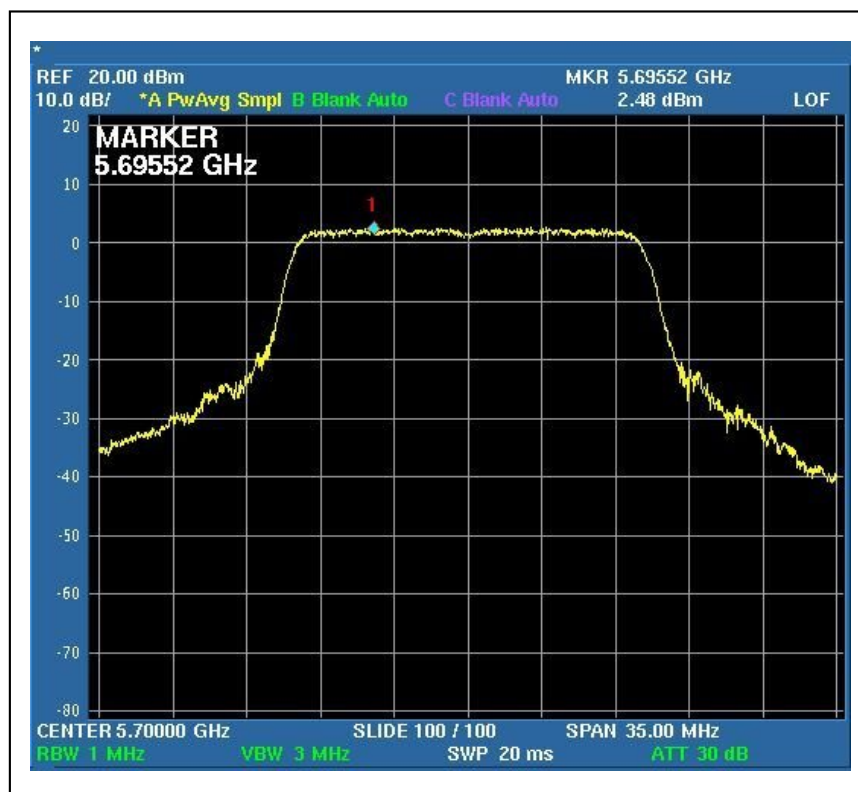
CH5



CH10



CH15



4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/- 0.02% of the operating frequency over a temperature variation of -30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

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.

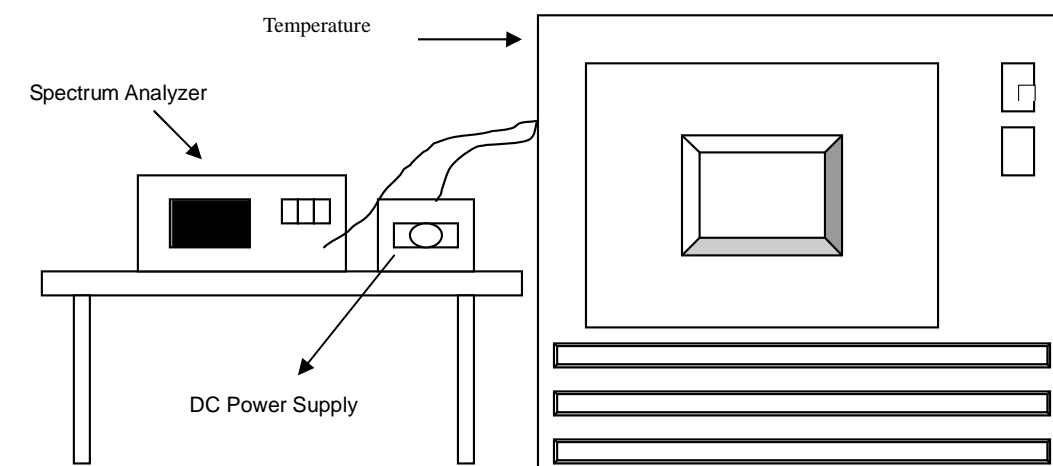
4.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

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

4.6.7 TEST RESULTS

		Operating frequency: 5320MHz				Limit : $\pm 0.02\%$	
Temp. (°C)	Power supply (VAC)	2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	126.5	5320.0364	0.000684	5320.0367	0.000690	5320.0368	0.000692
	110	5320.0364	0.000684	5320.0366	0.000688	5320.0368	0.000692
	93.5	5320.0366	0.000688	5320.0364	0.000684	5320.0368	0.000692
40	126.5	5319.9881	0.000224	5319.9976	0.000045	5319.9973	0.000051
	110	5319.9882	0.000222	5319.9976	0.000045	5319.9975	0.000047
	93.5	5319.9981	0.000036	5319.9979	0.000039	5319.9972	0.000053
30	126.5	5319.9922	0.000147	5319.9919	0.000152	5319.9917	0.000156
	110	5319.9922	0.000147	5319.9921	0.000148	5319.9918	0.000154
	93.5	5319.9922	0.000147	5319.9919	0.000152	5319.9916	0.000158
20	126.5	5320.0071	0.000133	5320.0068	0.000128	5320.0065	0.000122
	110	5320.0072	0.000135	5320.0072	0.000135	5320.0069	0.000130
	93.5	5320.0071	0.000133	5320.0068	0.000128	5320.0065	0.000122
10	126.5	5320.0124	0.000233	5320.0122	0.000229	5320.0119	0.000224
	110	5320.0124	0.000233	5320.0122	0.000229	5320.0121	0.000227
	93.5	5320.0124	0.000233	5320.0121	0.000227	5320.0118	0.000222
0	126.5	5320.023	0.000432	5320.0180	0.000338	5320.0180	0.000338
	110	5320.023	0.000432	5320.0210	0.000395	5320.0190	0.000357
	93.5	5320.021	0.000395	5320.0180	0.000338	5320.0180	0.000338
-10	126.5	5320.0306	0.000575	5320.0290	0.000545	5320.0270	0.000508
	110	5320.0304	0.000571	5320.0310	0.000583	5320.0290	0.000545
	93.5	5320.0304	0.000571	5320.0280	0.000526	5320.0270	0.000508
-20	126.5	5320.0300	0.000564	5320.0250	0.000470	5320.0210	0.000395
	110	5320.0300	0.000564	5320.0280	0.000526	5320.0240	0.000451
	93.5	5320.0300	0.000564	5320.0240	0.000451	5320.0220	0.000414
-30	126.5	5320.0116	0.000218	5320.0111	0.000209	5320.0108	0.000203
	110	5320.0116	0.000218	5320.0113	0.000212	5320.0111	0.000209
	93.5	5320.0116	0.000218	5320.0111	0.000209	5320.0108	0.000203

4.7 BAND EDGES MEASUREMENT

4.7.1 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

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.

4.7.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose 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.

4.7.3 EUT OPERATING CONDITION

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



4.7.4 TEST RESULTS –ANTENNA 1

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

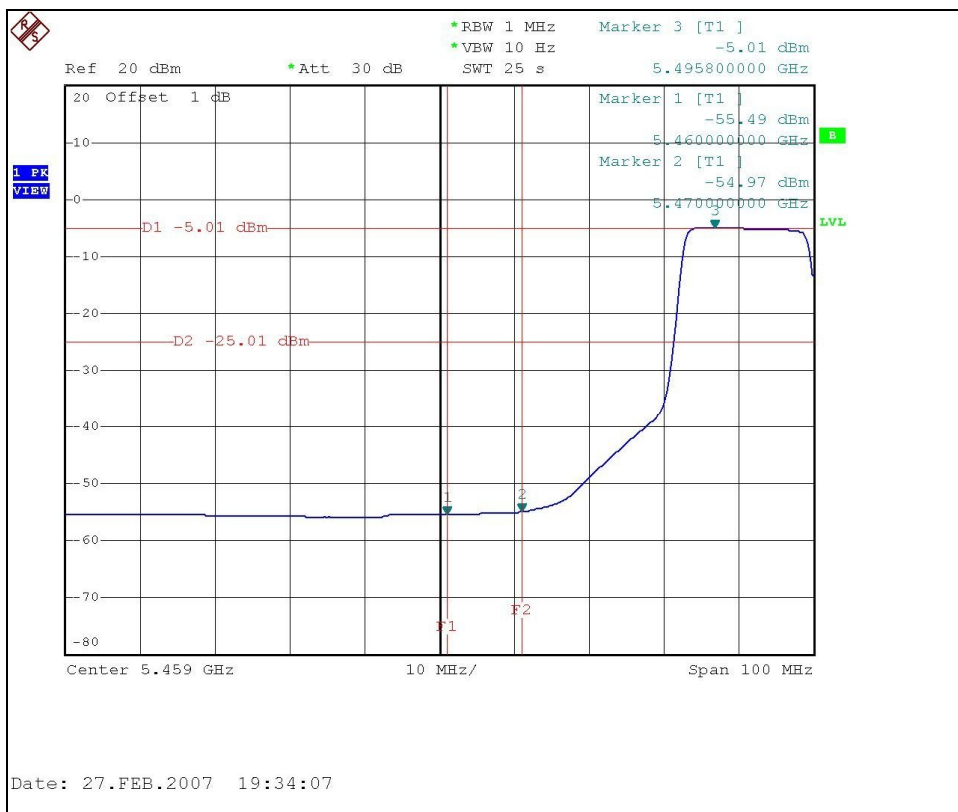
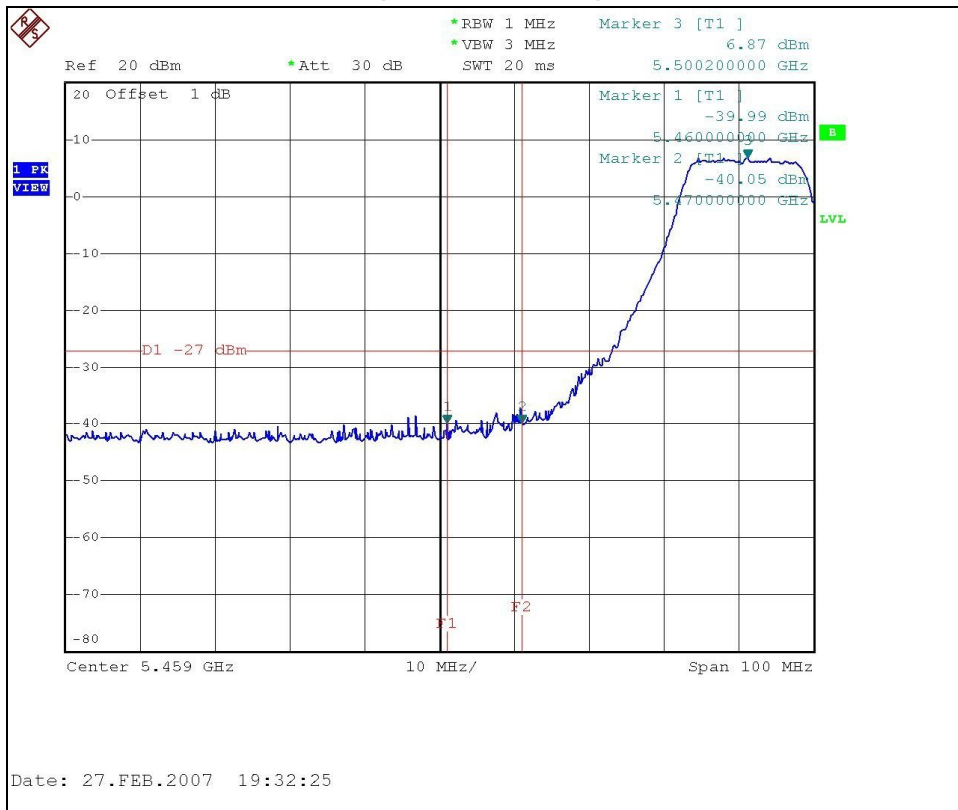
NOTE (Peak):

The band edge emission plot on the following first page shows 46.86dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 5 is 115.6dBuV/m (Peak), so the maximum field strength in restrict band is $115.6-46.86=68.74$ dBuV/m which is under 74dBuV/m limit.

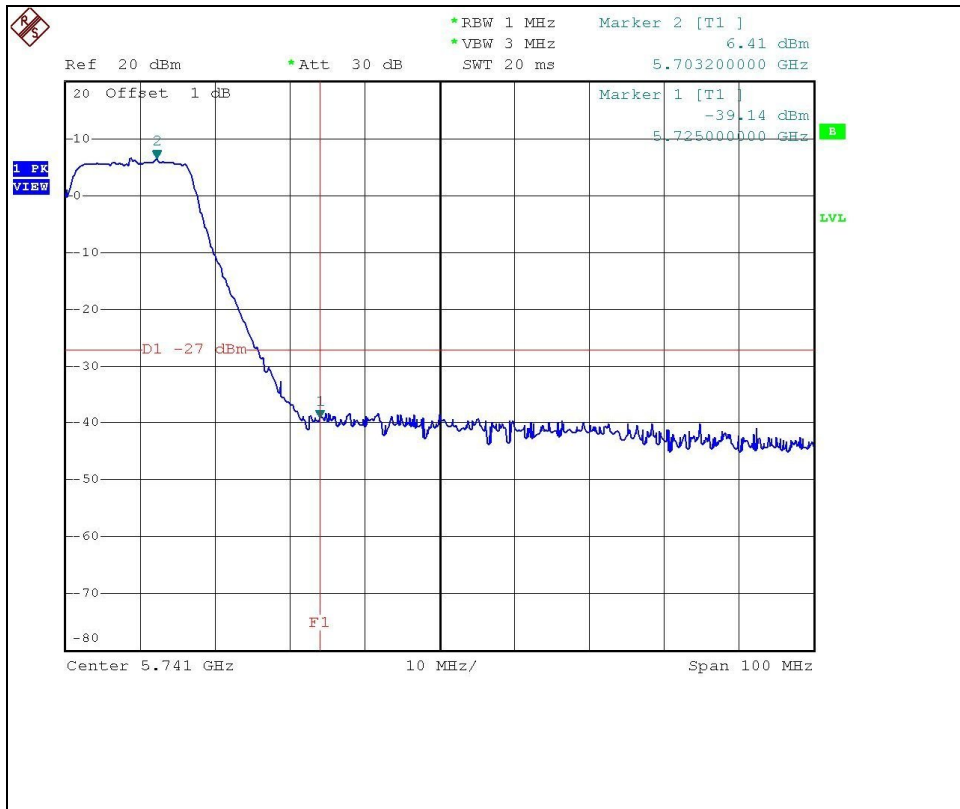
NOTE (Average):

The band edge emission plot on the following second page shows 50.48dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 5 is 104.0dBuV/m (Average), so the maximum field strength in restrict band is $104.0-50.48=53.52$ dBuV/m which is under 54dBuV/m limit.

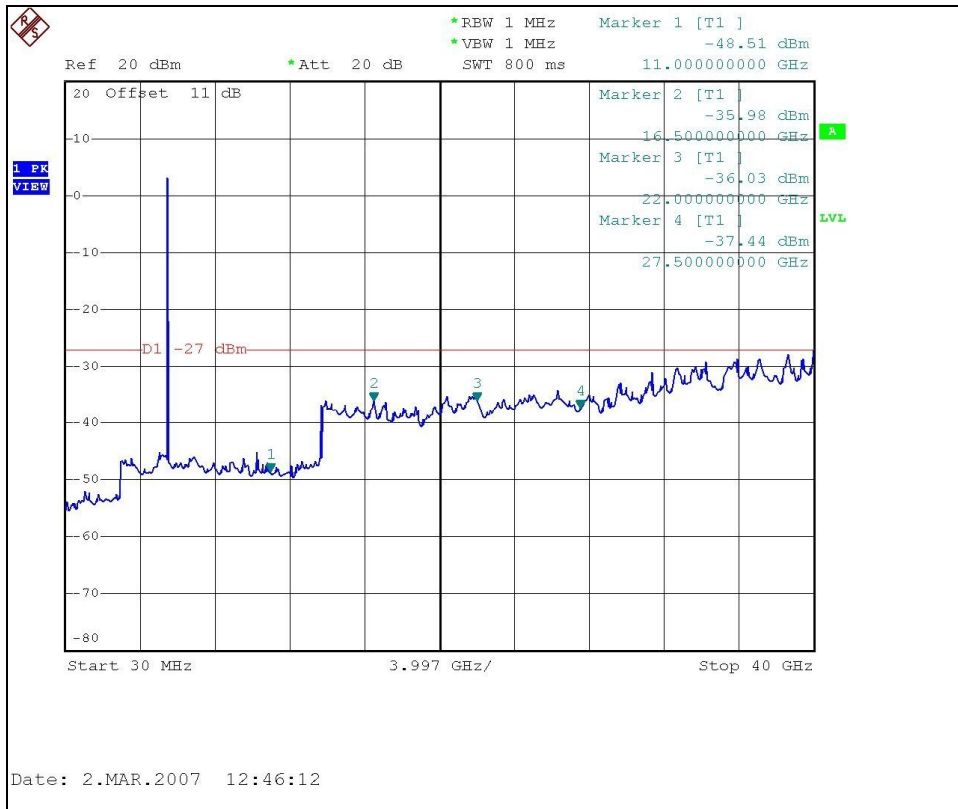
802.11a OFDM modulation(CH 5: 5500MHz)



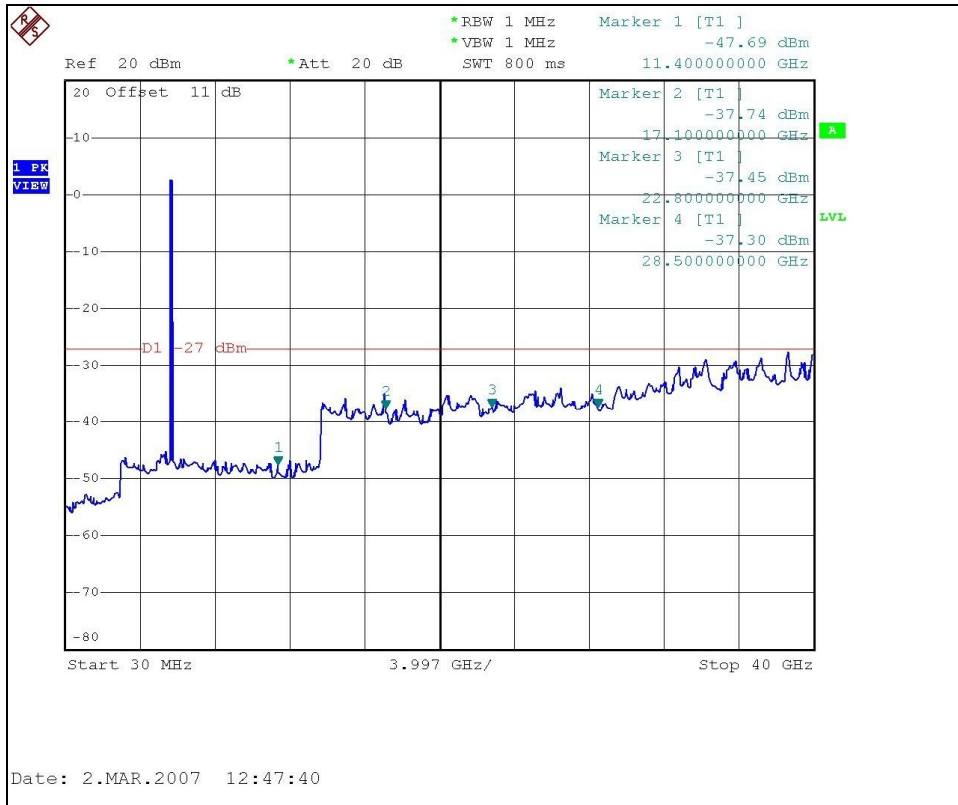
802.11a OFDM modulation (CH 15: 5700MHz)



CH 5



CH15



4.7.5 TEST RESULTS –ANTENNA A

For signals in the restricted bands above and below the 5.15 to 5.35GHz 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

NOTE (Peak):

The band edge emission plot on the following first page shows 57.84dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 1 is 119.2dBuV/m (Peak), so the maximum field strength in restrict band is $119.2-57.84=61.36$ dBuV/m which is under 74dBuV/m limit.

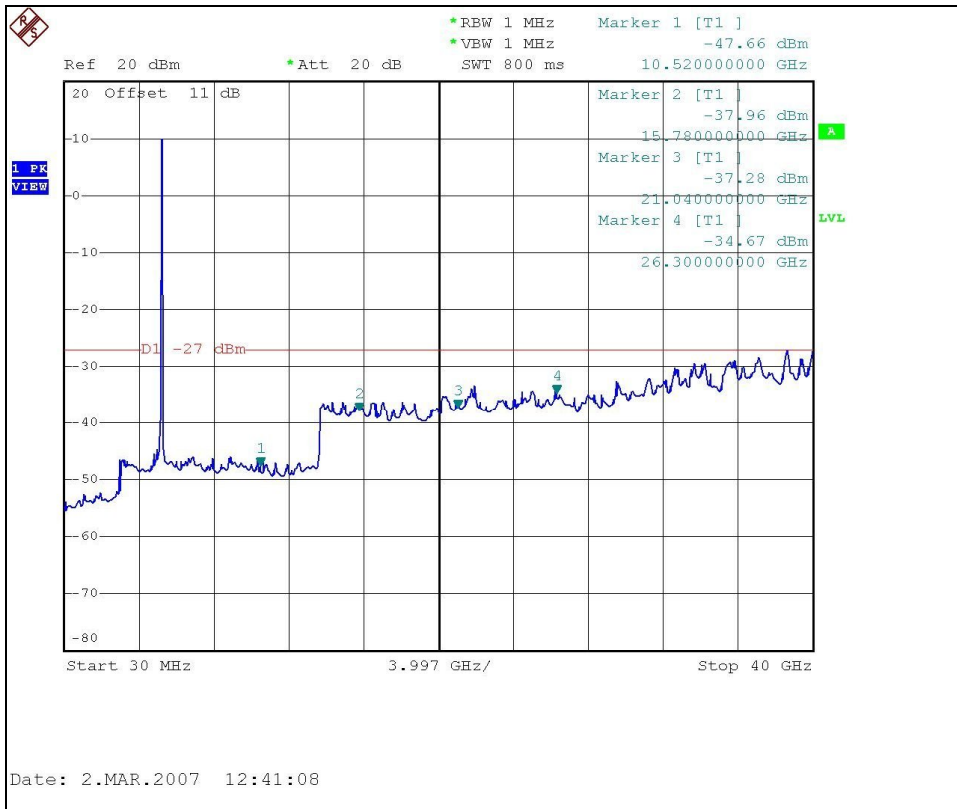
The band edge emission plot on the following first page shows 46.97dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 4 is 114.2dBuV/m (Peak), so the maximum field strength in restrict band is $114.2-46.97=67.23$ dBuV/m which is under 74dBuV/m limit.

NOTE (Average):

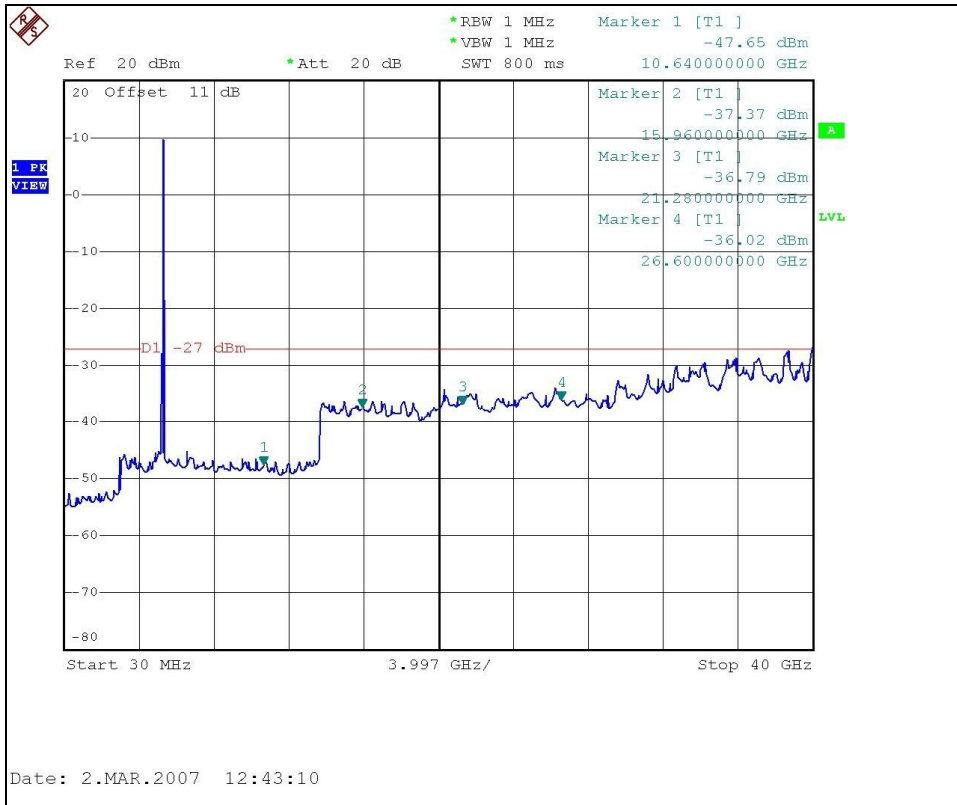
The band edge emission plot on the following second page shows 59.01dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 1 is 107.9dBuV/m (Average), so the maximum field strength in restrict band is $107.9-59.01=48.89$ dBuV/m which is under 54dBuV/m limit.

The band edge emission plot on the following second page shows 50.41dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 4 is 102.9dBuV/m (Average), so the maximum field strength in restrict band is $102.9-50.41=52.49$ dBuV/m which is under 54dBuV/m limit.

CH 1



CH 4



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

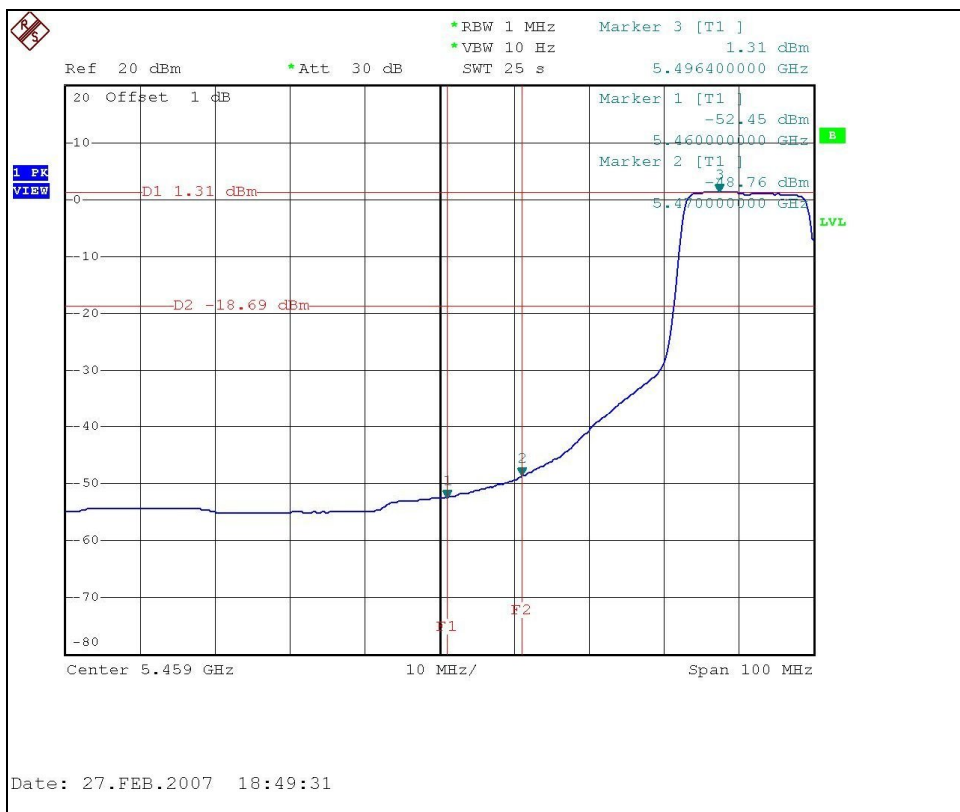
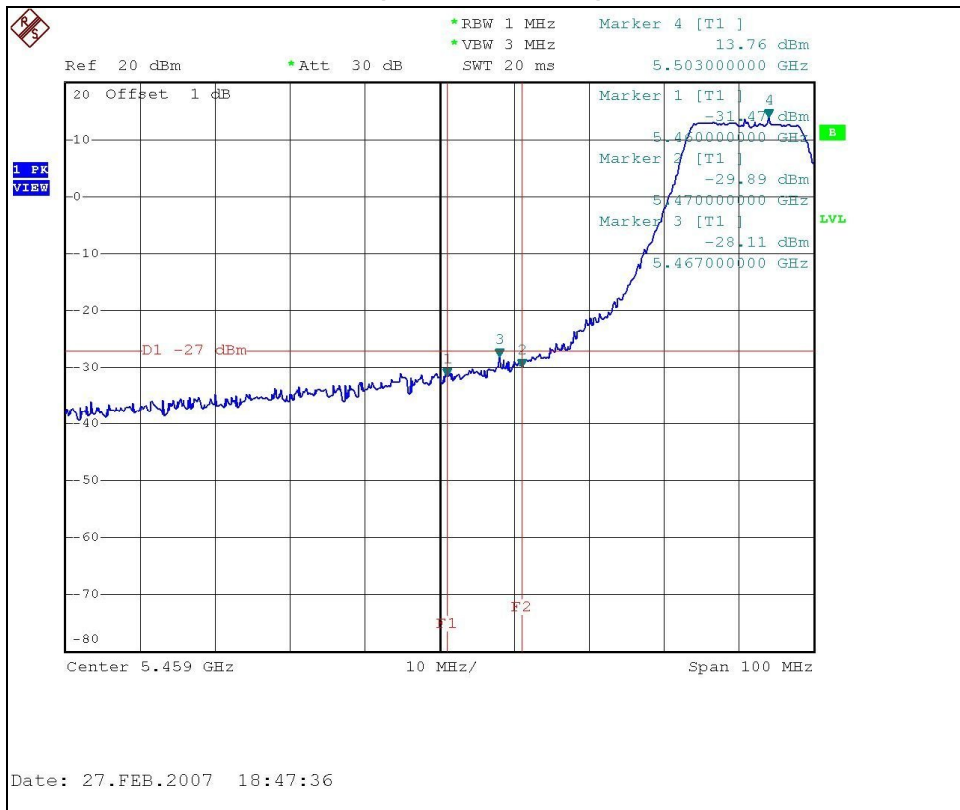
NOTE (Peak):

The band edge emission plot on the following first page shows 45.23dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 5 is 114.4dBuV/m (Peak), so the maximum field strength in restrict band is $114.4 - 45.23 = 69.17$ dBuV/m which is under 74dBuV/m limit.

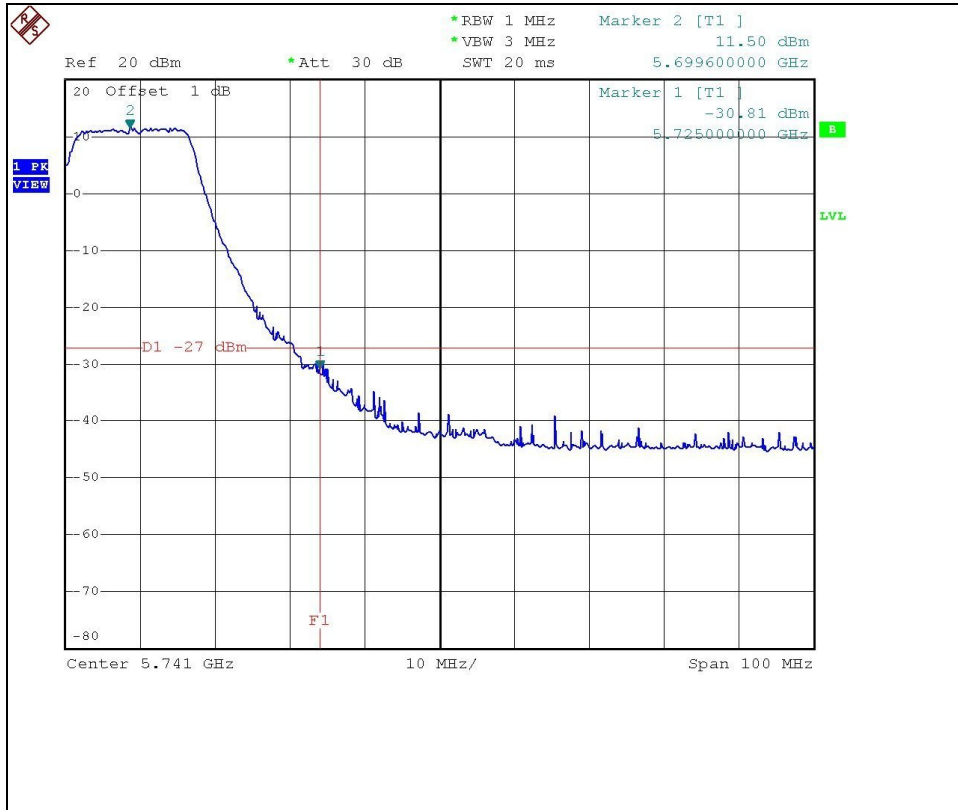
NOTE (Average):

The band edge emission plot on the following second page shows 35.76dBc between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 5 is 102.8dBuV/m (Average), so the maximum field strength in restrict band is $102.8 - 35.76 = 67.04$ dBuV/m which is under 54dBuV/m limit.

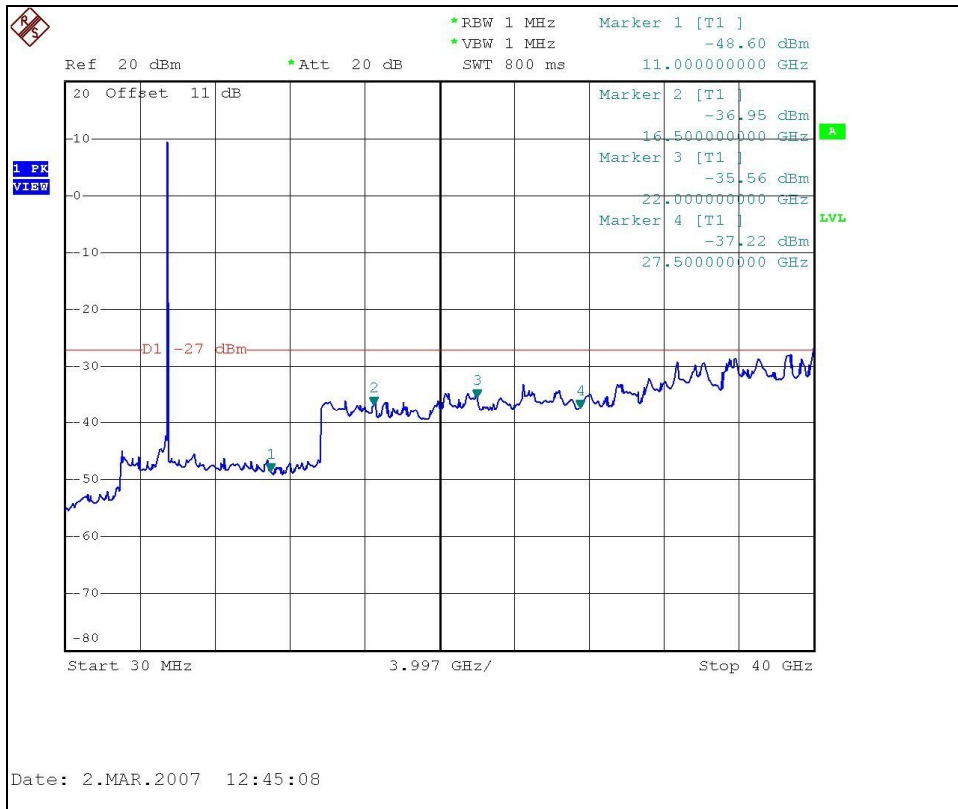
802.11a OFDM modulation(CH 5: 5500MHz)



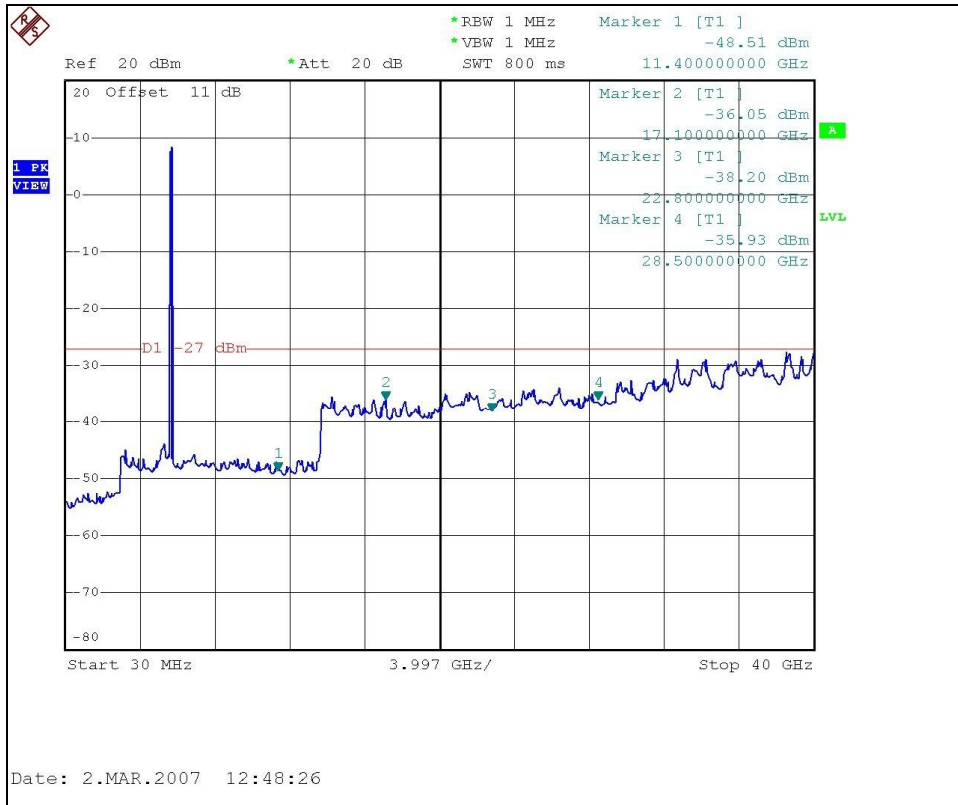
802.11a OFDM modulation (CH 15: 5700MHz)



CH 5



CH 15



4.8 ANTENNA REQUIREMENT

4.8.1 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.

4.8.2 ANTENNA CONNECTED CONSTRUCTION

The antennas used in this product are as following:

5GHz				
No.	Model No.	Gain (dBi)	Antenna Type	Antenna Connector
1	ANT05535	17.0dBi	Directional, Patch Panel (Internal Antenna)	Probe Pin
A	1GP-51809	9.0dBi	Dipole, Omni (External Antenna)	N female(Plug)



5. 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:

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

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



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.