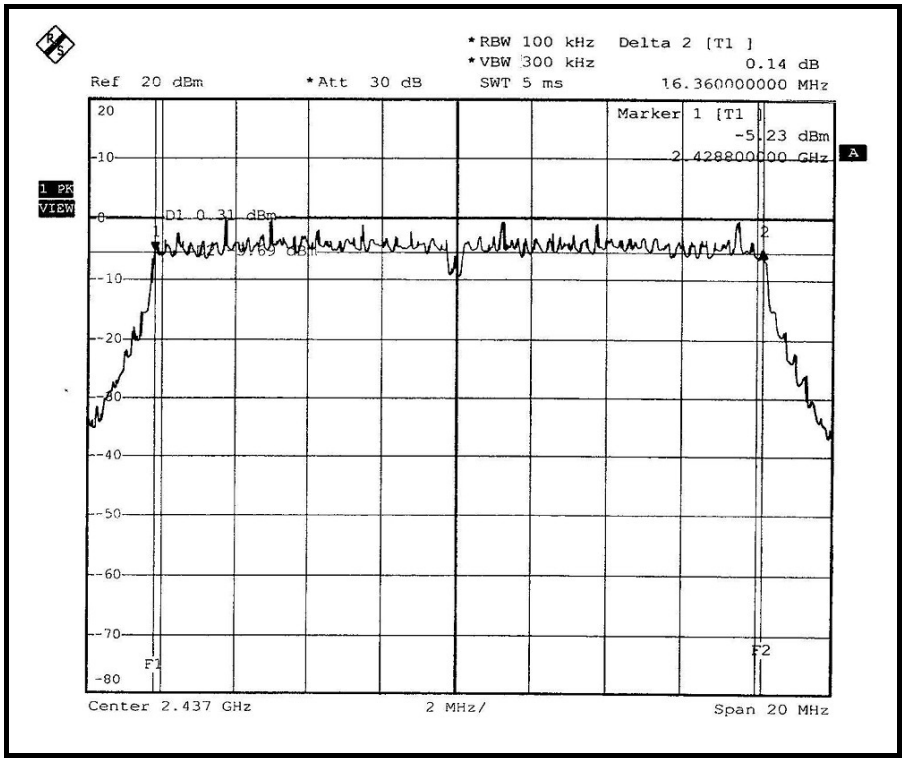
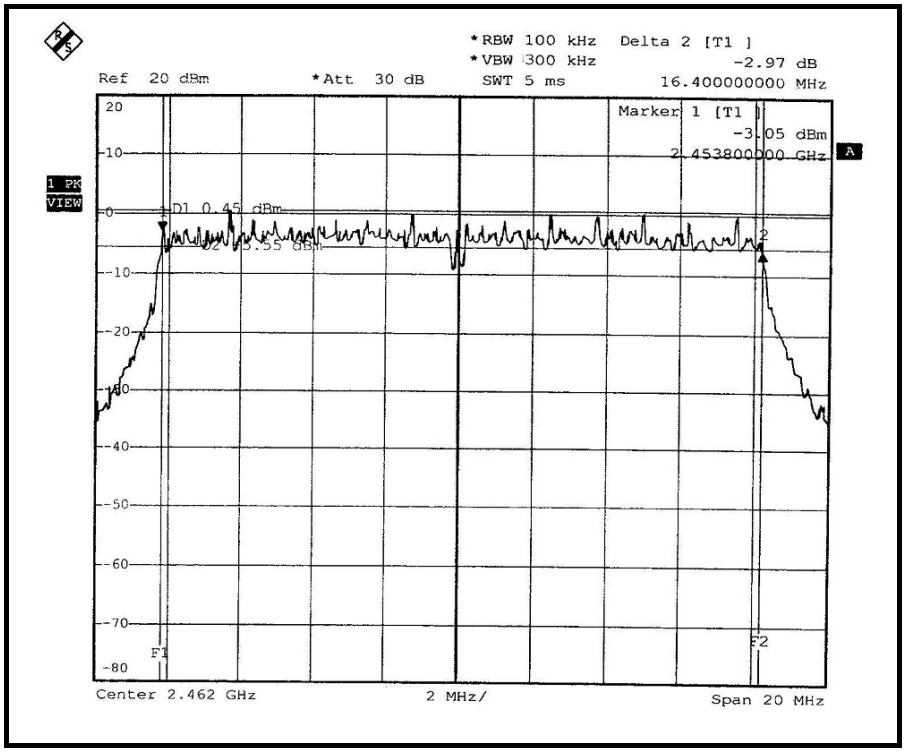
CH 6


*RBW 100 kHz
*VBW 300 kHz
SWT 5 ms
Delta 2 [T1]
0.14 dB
16.360000000 MHz
Ref 20 dBm
*Att 30 dB
Marker 1 [T1]
-5.23 dBm
2.428800000 GHz
1 PK
VIEW
D1 0.31 dBm
F1
F2
Center 2.437 GHz
2 MHz/
Span 20 MHz

CH 11


*RBW 100 kHz
*VBW 300 kHz
SWT 5 ms
Delta 2 [T1]
-2.97 dB
16.400000000 MHz
Ref 20 dBm
*Att 30 dB
Marker 1 [T1]
-3.05 dBm
2.453800000 GHz
1 PK
VIEW
D1 0.45 dBm
F1
F2
Center 2.462 GHz
2 MHz/
Span 20 MHz

4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.4.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008
Angilent Synthesized Signal Generator	E8257C	MY43320668	Dec. 28, 2007
TEKTRONIX OSCILLOSCOPE	TDS1012	C037299	Nov. 27, 2007
NARDA DETECTOR	4503A	FSCM99899	NA

NOTE:
The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

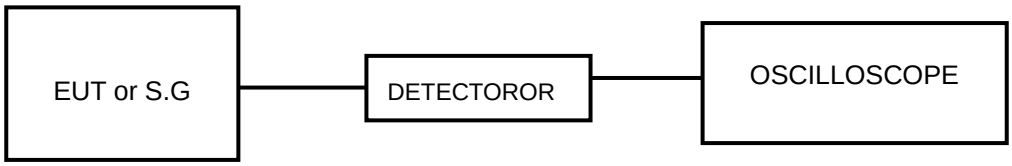
4.4.1 TEST PROCEDURES

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

4.4.2 DEVIATION FROM TEST STANDARD

No deviation

4.4.3 TEST SETUP



4.4.4 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.3 TEST RESULTS

802.11b DSSS MODULATION

MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	26deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	50.699	17.05	30	PASS
6	2437	50.816	17.06	30	PASS
11	2462	51.050	17.08	30	PASS

802.11g OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	26deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	50.466	17.03	30	PASS
6	2437	51.050	17.08	30	PASS
11	2462	50.350	17.02	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

NOTE:
The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

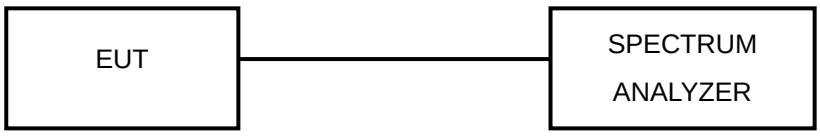
4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.
The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

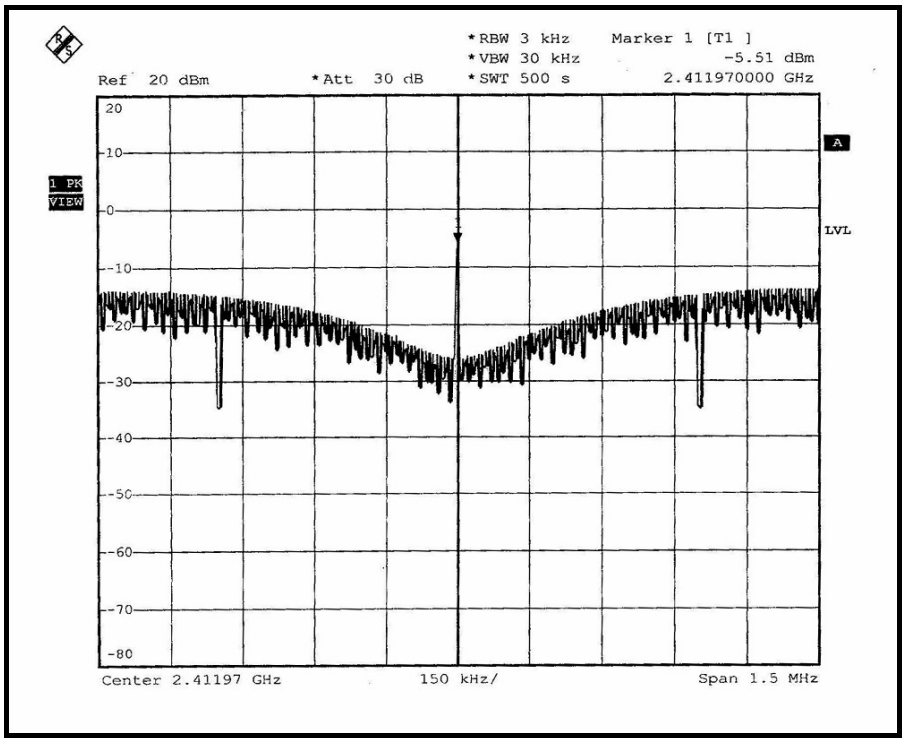
4.5.7 TEST RESULTS

802.11b DSSS MODULATION

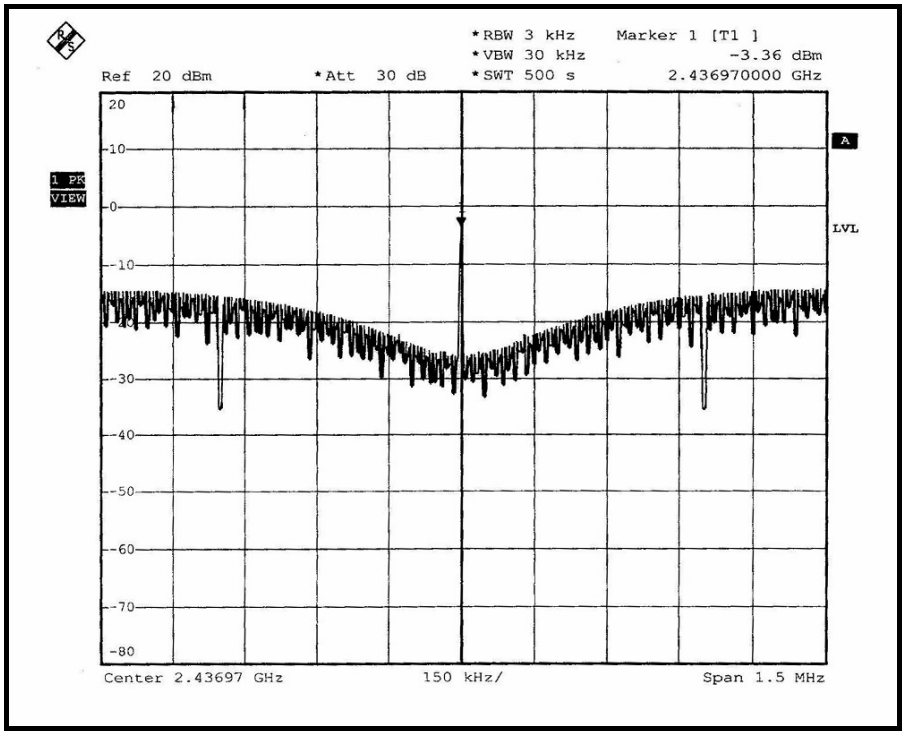
MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	26deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-5.51	8	PASS
6	2437	-3.36	8	PASS
11	2462	-3.83	8	PASS

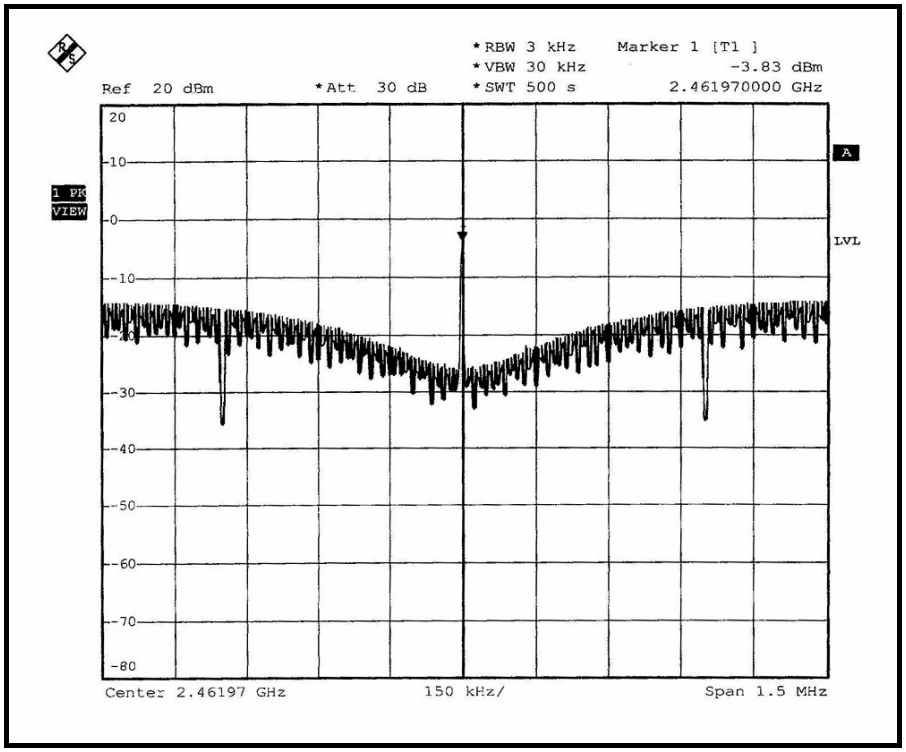
CH 1



CH 6


*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-3.36 dBm
2.436970000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
VIEW
A
LVL
20
10
0
-10
-30
-40
-50
-60
-70
-80
Center 2.43697 GHz
150 kHz/
Span 1.5 MHz

CH 11

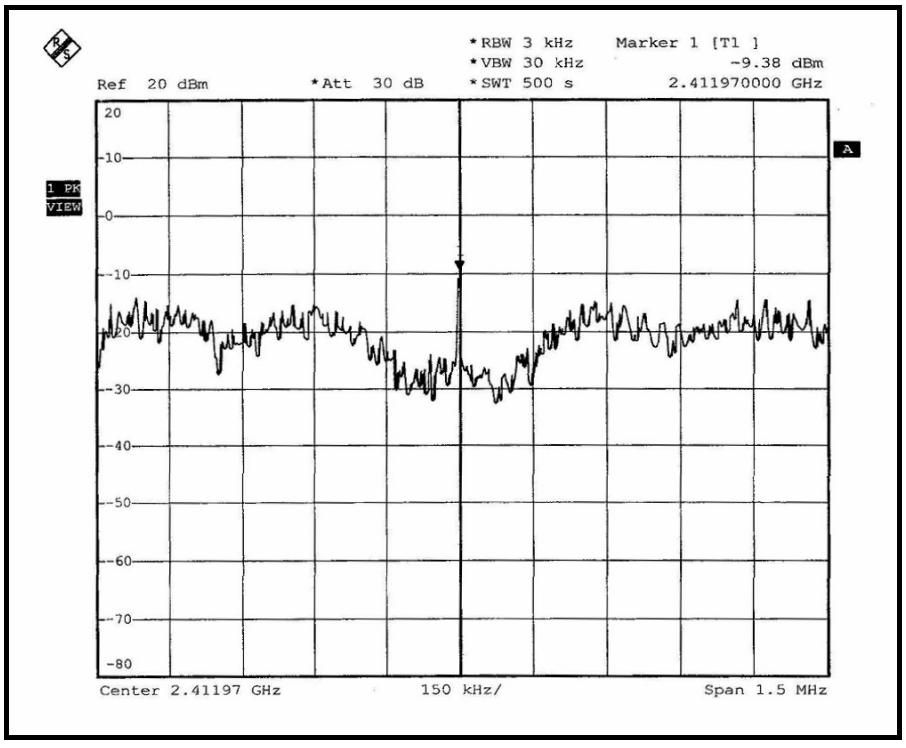

*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-3.83 dBm
2.461970000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
VIEW
A
LVL
20
10
0
-10
-30
-40
-50
-60
-70
-80
Center 2.46197 GHz
150 kHz/
Span 1.5 MHz

802.11g OFDM MODULATION

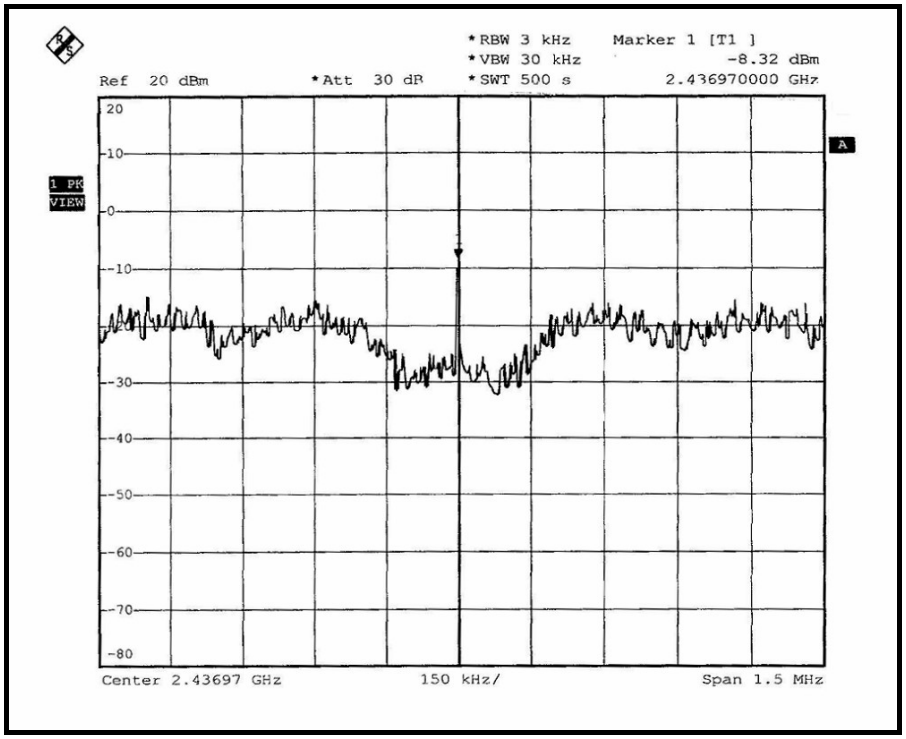
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	26deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-9.38	8	PASS
6	2437	-8.32	8	PASS
11	2462	-7.27	8	PASS

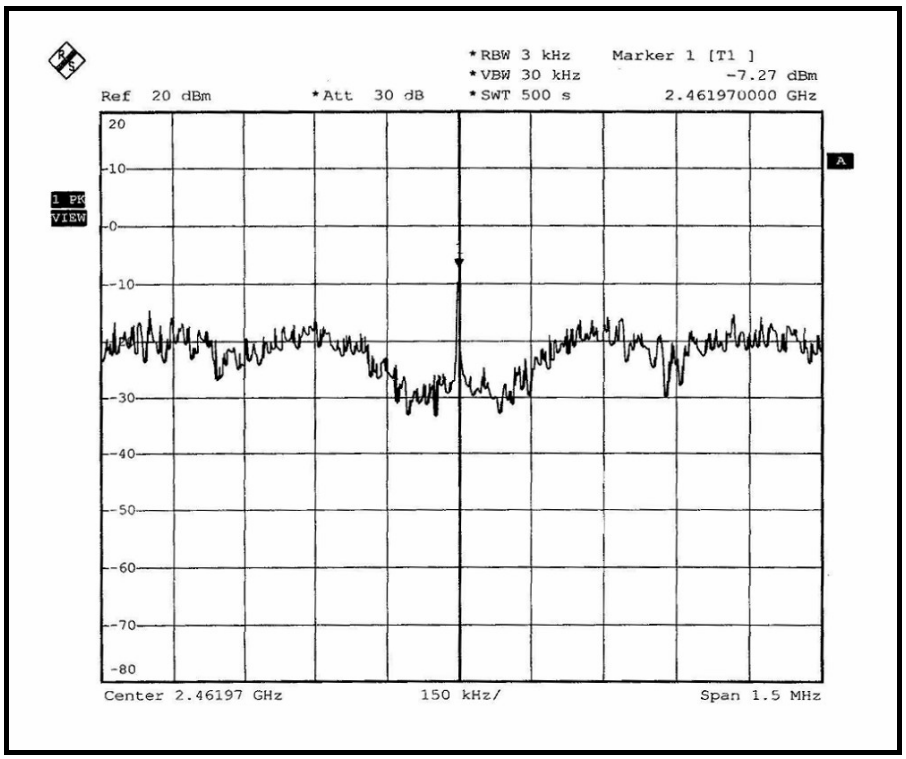
CH 1



CH 6


*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-8.32 dBm
2.436970000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
VIEW
A
20
10
0
-10
-30
-40
-50
-60
-70
-80
Center 2.43697 GHz
150 kHz/
Span 1.5 MHz

CH 11


*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-7.27 dBm
2.461970000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
VIEW
A
20
10
0
-10
-30
-40
-50
-60
-70
-80
Center 2.46197 GHz
150 kHz/
Span 1.5 MHz

4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

NOTE: 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

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100kHz and 300kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (Peak RBW=VBW=100kHz; Average RBW=1MHz, VBW= 10Hz (for 802.11b); Average RBW=1MHz, VBW= 1kHz (for 802.11g) are attached on the following pages.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.6 TEST RESULTS

The spectrum plots are attached on the following 12 images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

802.11b DSSS MODULATION

TEST MODE A: PIFA ANTENNA

NOTE 1: The band edge emission plot on the next second page shows 52.66dBc between carrier maximum power and local maximum emission in restrict band (2.36128GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 104.25dBuV/m (Peak), so the maximum field strength in restrict band is 104.25 – 52.66 = 51.59dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of on the next second page shows 61.55dBc between carrier maximum power and local maximum emission in restrict band (2.38768GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 100.36dBuV/m (Average), so the maximum field strength in restrict band is 100.36 – 61.55 = 38.81dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on the next third page shows 51.58dBc between carrier maximum power and local maximum emission in restrict band (2.49230GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 105.10dBuV/m (Peak), so the maximum field strength in restrict band is 105.10 – 51.58 = 53.52dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next fourth page shows 58.52dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 100.54dBuV/m (Average), so the maximum field strength in restrict band is 100.54 – 58.52 = 42.02dBuV/m which is under 54dBuV/m limit.

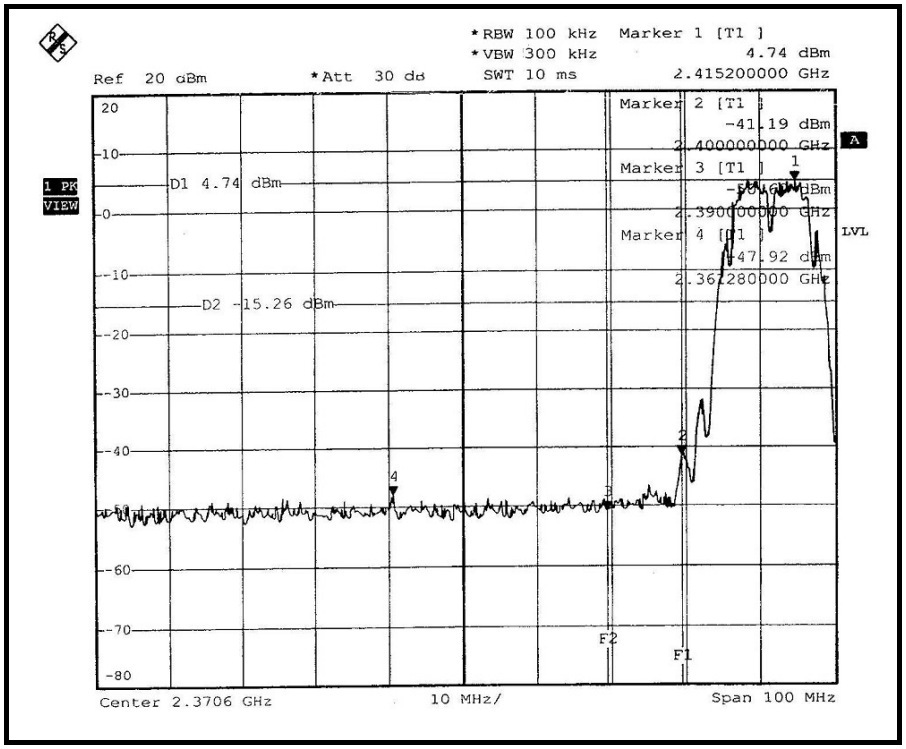
TEST MODE B: PCB ANTENNA

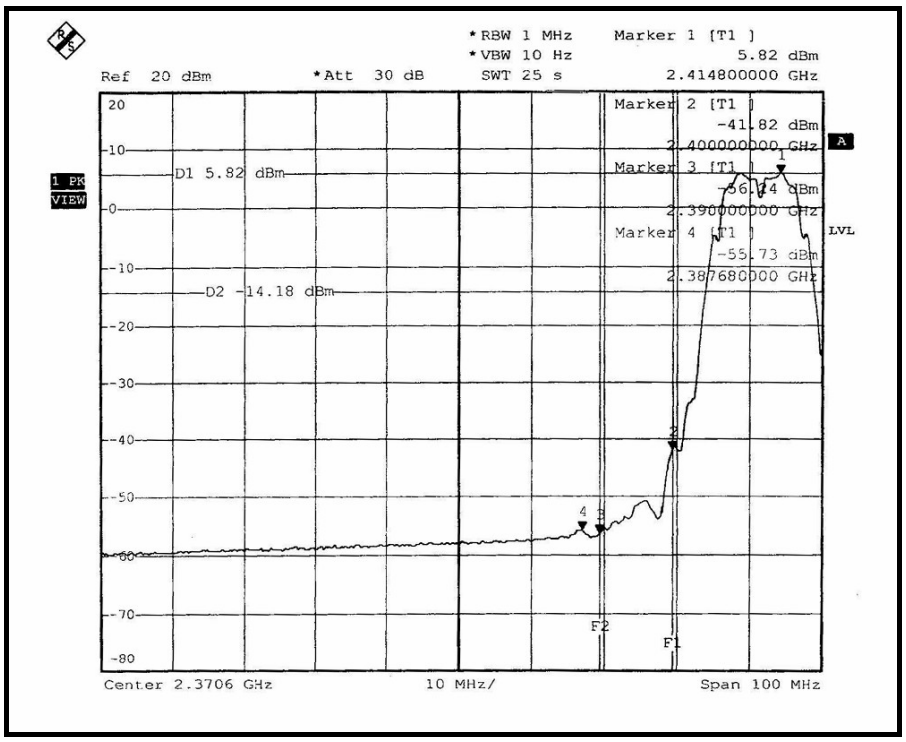
NOTE 1: The band edge emission plot on the next page shows 52.66dBc between carrier maximum power and local maximum emission in restrict band (2.36128GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 104.02dBuV/m (Peak), so the maximum field strength in restrict band is 104.02 – 52.66 = 51.36dBuV/m which is under 74dBuV/m limit.

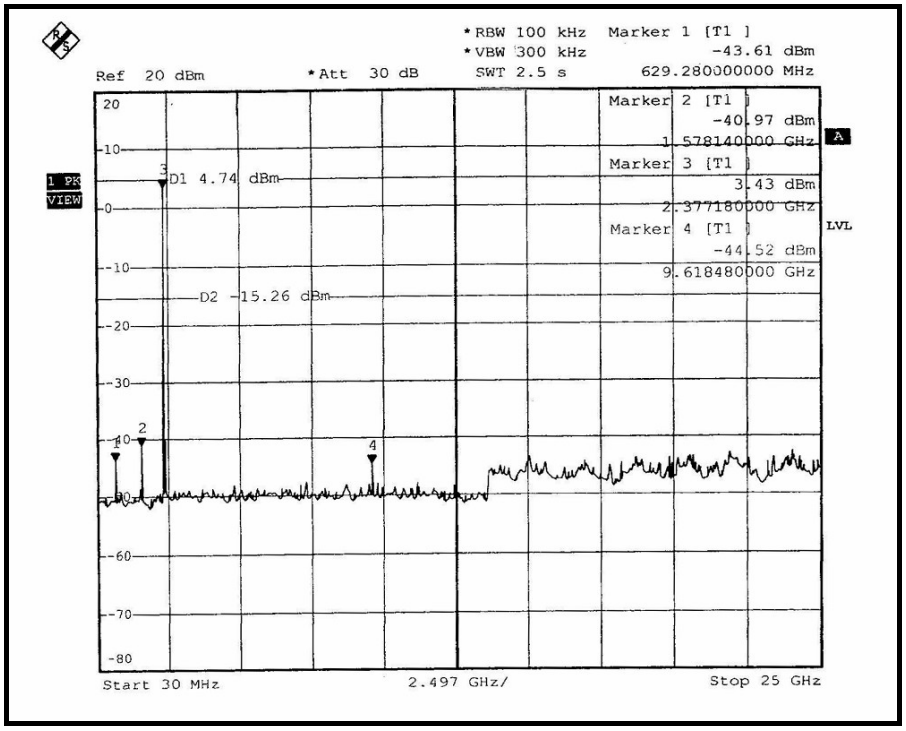
The band edge emission plot of on the next page shows 61.55dBc between carrier maximum power and local maximum emission in restrict band (2.38768GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 100.13dBuV/m (Average), so the maximum field strength in restrict band is 100.13 – 61.55 = 38.58dBuV/m which is under 54dBuV/m limit.

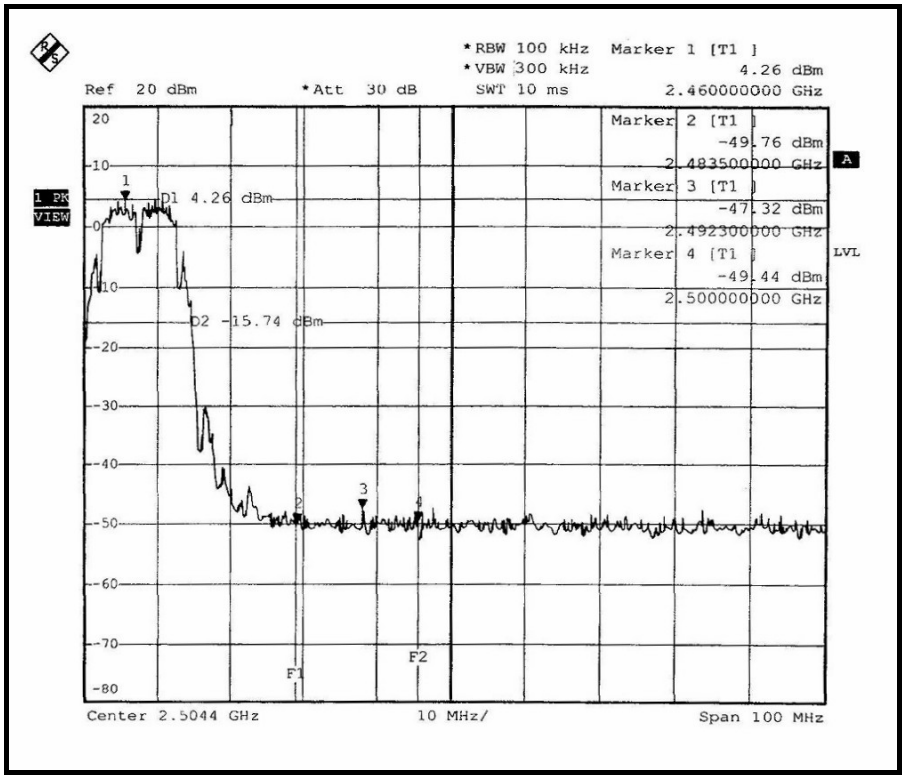
NOTE 2: The band edge emission plot on the next second page shows 51.58dBc between carrier maximum power and local maximum emission in restrict band (2.49230GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 104.03dBuV/m (Peak), so the maximum field strength in restrict band is 104.03 – 51.58 = 52.45dBuV/m which is under 74dBuV/m limit.

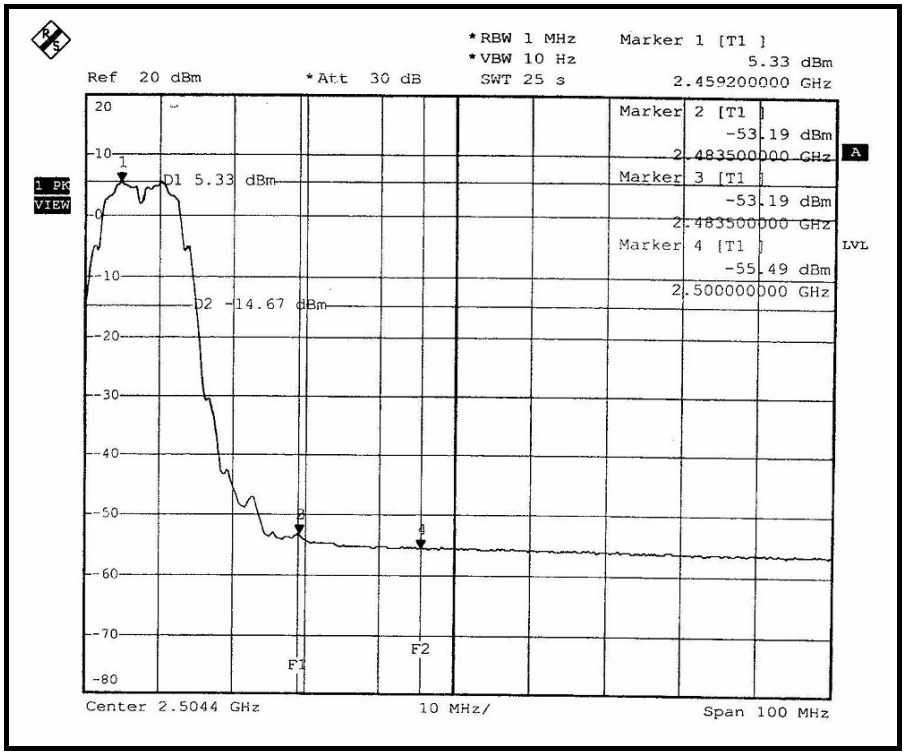
The band edge emission plot on the next third page shows 58.52dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 100.15dBuV/m (Average), so the maximum field strength in restrict band is 100.15 – 58.52 = 41.63dBuV/m which is under 54dBuV/m limit.

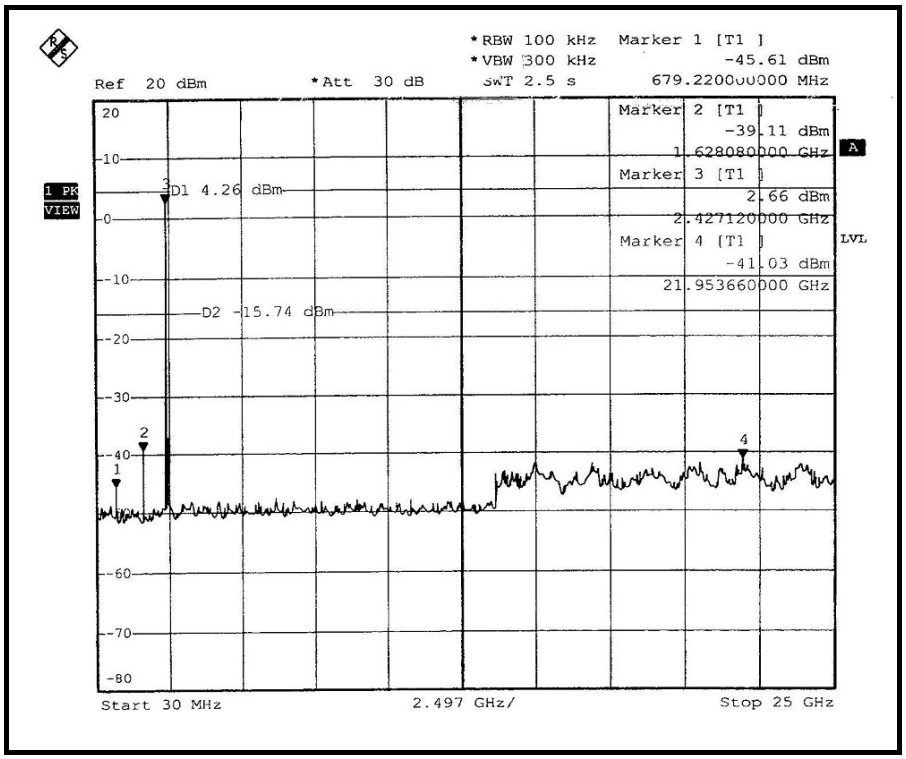

*RBW 100 kHz
*VBW 300 kHz
SWT 10 ms
Marker 1 [T1]
4.74 dBm
2.415200000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-41.19 dBm
2.400000000 GHz
Marker 3 [T1]
Marker 4 [T1]
-47.92 dBm
2.367280000 GHz
1 PK
VIEW
D1 4.74 dBm
D2 -15.26 dBm
A
LVL
F2
F1
Center 2.3706 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 10 Hz
SWT 25 s
Marker 1 [T1]
5.82 dBm
2.414800000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-41.82 dBm
2.400000000 GHz
Marker 3 [T1]
Marker 4 [T1]
-55.73 dBm
2.387680000 GHz
1 PK
VIEW
D1 5.82 dBm
D2 -14.18 dBm
A
LVL
F2
F1
Center 2.3706 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 300 kHz
SWT 2.5 s
Marker 1 [T1]
-43.61 dBm
629.280000000 MHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-40.97 dBm
1.578140000 GHz
Marker 3 [T1]
3.43 dBm
2.377180000 GHz
Marker 4 [T1]
-44.52 dBm
9.618480000 GHz
1 PK
VIEW
D1 4.74 dBm
D2 -15.26 dBm
A
LVL
Start 30 MHz
2.497 GHz/
Stop 25 GHz


*RBW 100 kHz
*VBW 300 kHz
SWT 10 ms
Marker 1 [T1]
4.26 dBm
2.460000000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-49.76 dBm
2.483500000 GHz
Marker 3 [T1]
-47.32 dBm
2.492300000 GHz
Marker 4 [T1]
-49.44 dBm
2.500000000 GHz
1 PK
VIEW
D1 4.26 dBm
D2 -15.74 dBm
A
LVL
F1
F2
Center 2.5044 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 10 Hz
SWT 25 s
Marker 1 [T1]
5.33 dBm
2.459200000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-53.19 dBm
2.483500000 GHz
Marker 3 [T1]
-53.19 dBm
2.483500000 GHz
Marker 4 [T1]
-55.49 dBm
2.500000000 GHz
1 PK
VIEW
D1 5.33 dBm
D2 -14.67 dBm
A
LVL
F1
F2
Center 2.5044 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 300 kHz
SWT 2.5 s
Marker 1 [T1]
-45.61 dBm
679.220000000 MHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-39.11 dBm
1.628080000 GHz
Marker 3 [T1]
2.66 dBm
2.427120000 GHz
Marker 4 [T1]
-41.03 dBm
21.953660000 GHz
1 PK
VIEW
D1 4.26 dBm
D2 -15.74 dBm
A
LVL
Start 30 MHz
2.497 GHz/
Stop 25 GHz

802.11g OFDM MODULATION

TEST MODE A: PIFA ANTENNA

NOTE 1: The band edge emission plot on the next second page shows 48.43dBc between carrier maximum power and local maximum emission in restrict band (2.38920GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 105.05dBuV/m (Peak), so the maximum field strength in restrict band is 105.05 – 48.43 = 56.62dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of on the next second page shows 53.26dBc between carrier maximum power and local maximum emission in restrict band (2.39000GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 94.82dBuV/m (Average), so the maximum field strength in restrict band is 94.82 – 53.26 = 41.56dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot on the next third page shows 47.83dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 105.56dBuV/m (Peak), so the maximum field strength in restrict band is 105.56 – 47.83 = 57.73dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next fourth page shows 50.63dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 95.64dBuV/m (Average), so the maximum field strength in restrict band is 95.64 – 50.63 = 45.01dBuV/m which is under 54dBuV/m limit.

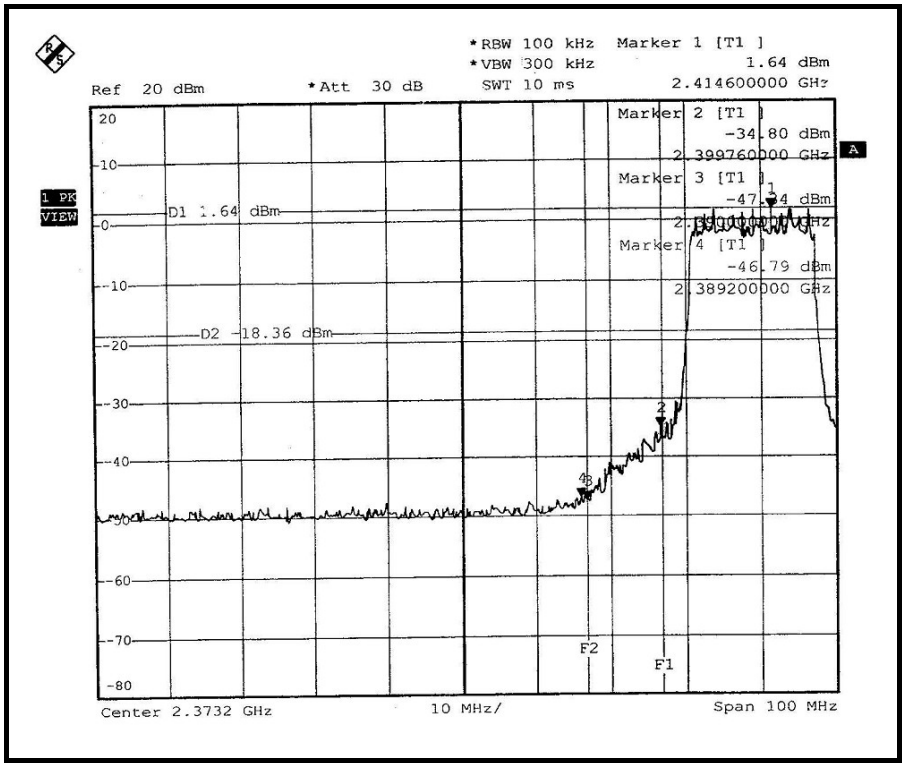
TEST MODE B: PCB ANTENNA

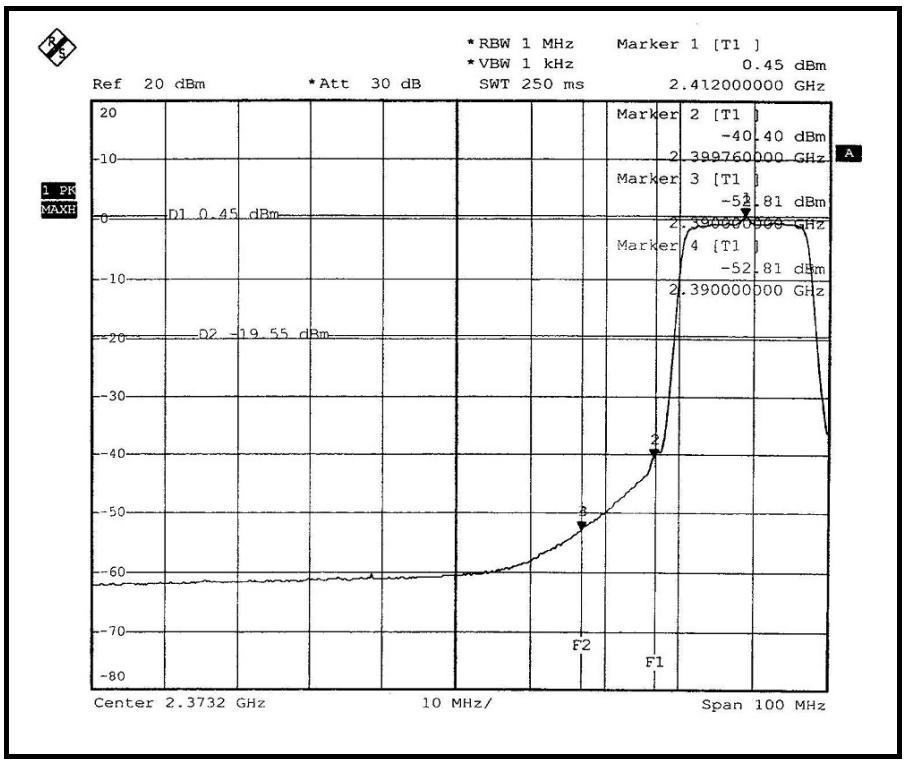
NOTE 1: The band edge emission plot on the next page shows 48.43dBc between carrier maximum power and local maximum emission in restrict band (2.38920GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 104.62dBuV/m (Peak), so the maximum field strength in restrict band is 104.62 – 48.43 = 56.19dBuV/m which is under 74dBuV/m limit.

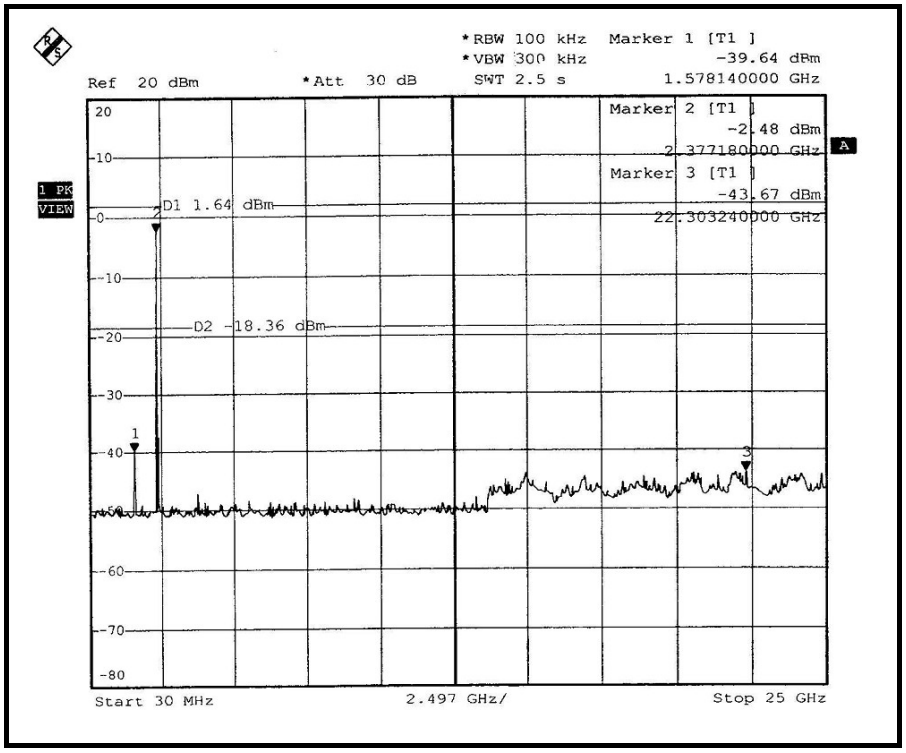
The band edge emission plot of on the next page shows 53.26dBc between carrier maximum power and local maximum emission in restrict band (2.39000GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 94.42dBuV/m (Average), so the maximum field strength in restrict band is 94.42 – 53.26 = 41.16dBuV/m which is under 54dBuV/m limit.

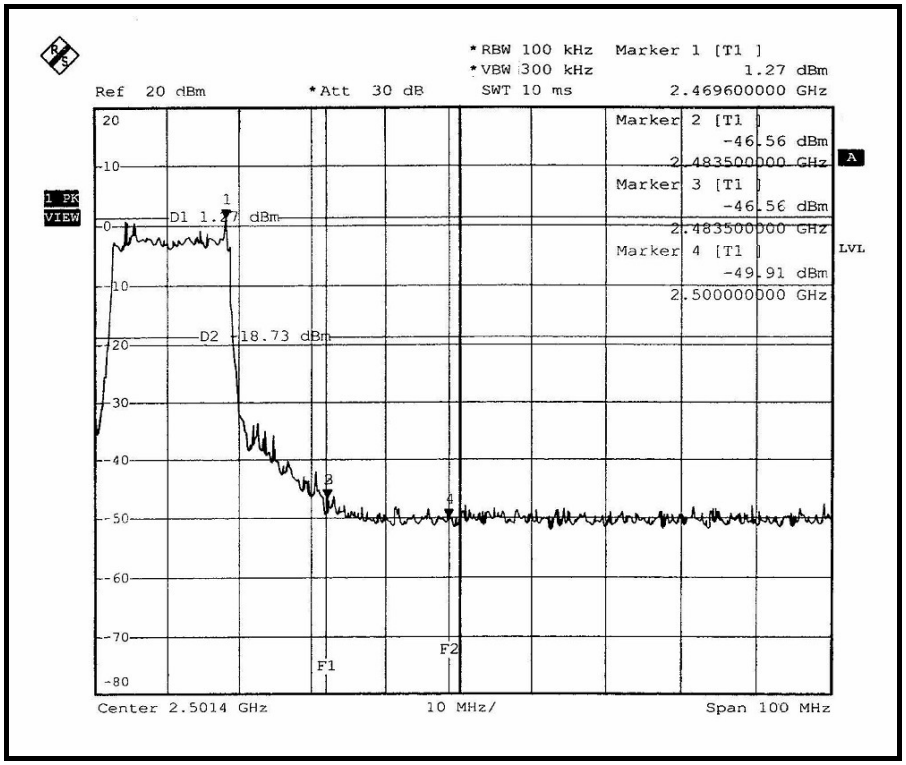
NOTE 2: The band edge emission plot on the next second page shows 47.83dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 104.71dBuV/m (Peak), so the maximum field strength in restrict band is 104.71 – 47.83 = 56.88dBuV/m which is under 74dBuV/m limit.

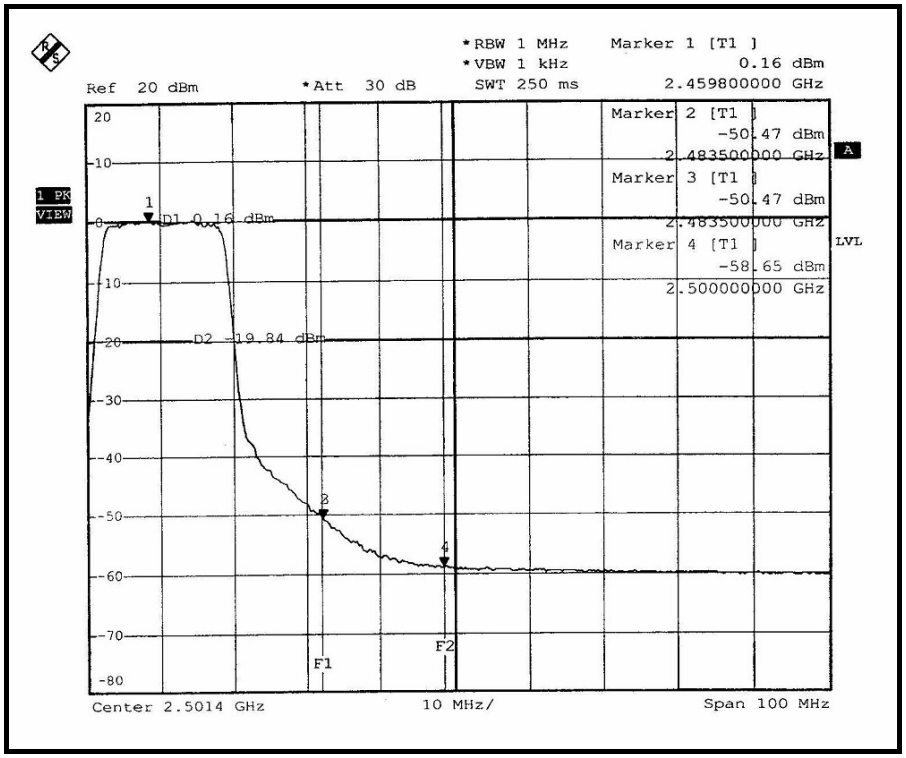
The band edge emission plot on the next third page shows 50.63dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 94.59dBuV/m (Average), so the maximum field strength in restrict band is 94.59 – 50.63 = 43.96dBuV/m which is under 54dBuV/m limit.

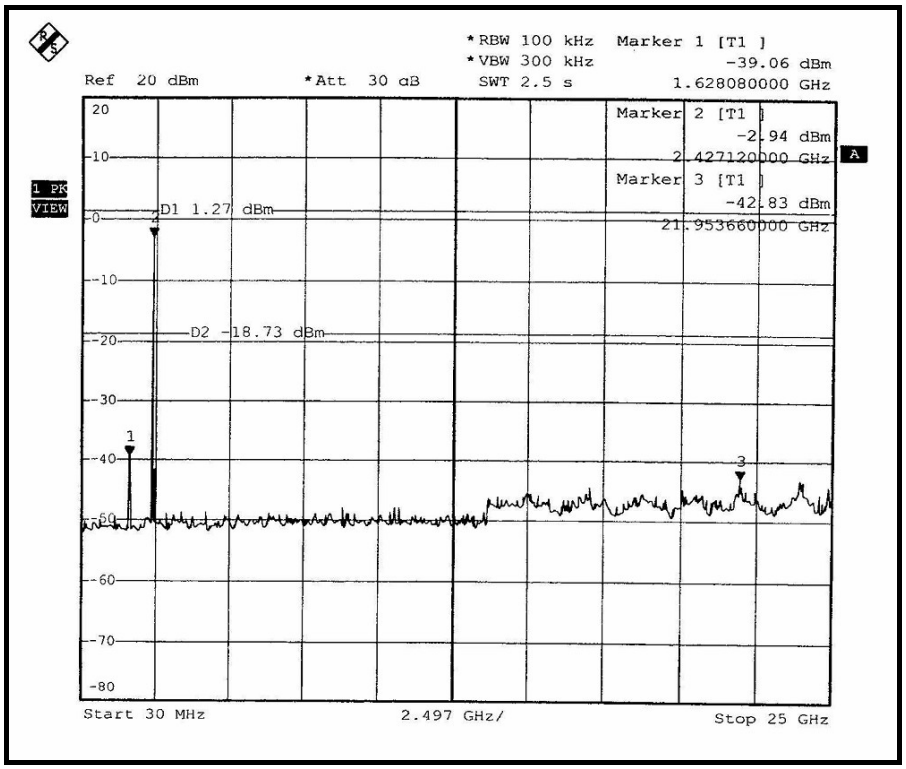

*RBW 100 kHz
*VBW 300 kHz
SWT 10 ms
Marker 1 [T1]
1.64 dBm
2.414600000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-34.80 dBm
2.399760000 GHz
Marker 3 [T1]
-47.34 dBm
Marker 4 [T1]
-46.79 dBm
2.389200000 GHz
1 PK
VIEW
D1 1.64 dBm
D2 -18.36 dBm
F2
F1
Center 2.3732 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 1 kHz
SWT 250 ms
Marker 1 [T1]
0.45 dBm
2.412000000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-40.40 dBm
2.399760000 GHz
Marker 3 [T1]
-52.81 dBm
Marker 4 [T1]
-52.81 dBm
2.390000000 GHz
1 PK
MAXH
D1 0.45 dBm
D2 -19.55 dBm
F2
F1
Center 2.3732 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 300 kHz
SWT 2.5 s
Marker 1 [T1]
-39.64 dBm
1.578140000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-2.48 dBm
2.377180000 GHz
Marker 3 [T1]
-43.67 dBm
22.303240000 GHz
1 PK
VIEW
D1 1.64 dBm
D2 -18.36 dBm
A
Start 30 MHz
2.497 GHz/
Stop 25 GHz


*RBW 100 kHz
*VBW 300 kHz
SWT 10 ms
Marker 1 [T1]
1.27 dBm
2.469600000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-46.56 dBm
2.483500000 GHz
Marker 3 [T1]
-46.56 dBm
2.483500000 GHz
Marker 4 [T1]
-49.91 dBm
2.500000000 GHz
1 PK
VIEW
D1 1.17 dBm
D2 -18.73 dBm
A
LVL
F1
F2
Center 2.5014 GHz
10 MHz/
Span 100 MHz


*RBW 1 MHz
*VBW 1 kHz
SWT 250 ms
Marker 1 [T1]
0.16 dBm
2.459800000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-50.47 dBm
2.483500000 GHz
Marker 3 [T1]
-50.47 dBm
2.483500000 GHz
Marker 4 [T1]
-58.65 dBm
2.500000000 GHz
1 PK
VIEW
D1 0.16 dBm
D2 -19.84 dBm
F1
F2
A
LVL
Center 2.5014 GHz
10 MHz/
Span 100 MHz


*RBW 100 kHz
*VBW 300 kHz
SWT 2.5 s
Marker 1 [T1]
-39.06 dBm
1.628080000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-2.94 dBm
2.427120000 GHz
Marker 3 [T1]
-42.83 dBm
21.953660000 GHz
1 PK
VIEW
D1 1.27 dBm
D2 -18.73 dBm
A
Start 30 MHz
2.497 GHz/
Stop 25 GHz

4.7 ANTENNA REQUIREMENT

4.7.1 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 15.247 (b), 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.

4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antennas used in this product are PIFA antenna with UFL connector and PCB antenna with UFL connector. The maximum Gain of the antenna is 2.69dBi.

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

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.

USA	FCC, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	TAF, BSMI, NCC
Netherlands	Telefication
Singapore	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: 886-2-26051924

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.

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.