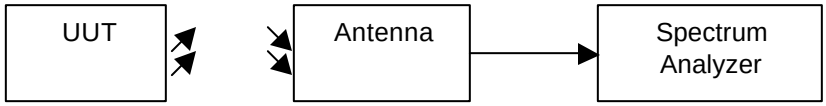
Name of Test: Radiated Spurious Emissions
Specification: 15.247(c), 15.209(a), 15.205
Spec. Limit -20 dBC and for restricted band 54 dBuV average and 74 dBuV peak
Test Equipment Utilized i00029, i00033, i00088, i00089, i00103

Test Procedure

The UUT was tested in an Anechoic Chamber set 3m from the receiving transducer. A spectrum analyzer was used to verify that the UUT met the requirements for Radiated Spurious Emissions. The antennas were tested in both the vertical and horizontal orientation and raised from 1 to 4 meters while rotating the UUT 360° to ensure the TX signal levels were maximized.

Test Setup



Settings
RBW = 100 KHz
VBW = 100KHz
Detector – Peak

Sample Calculations

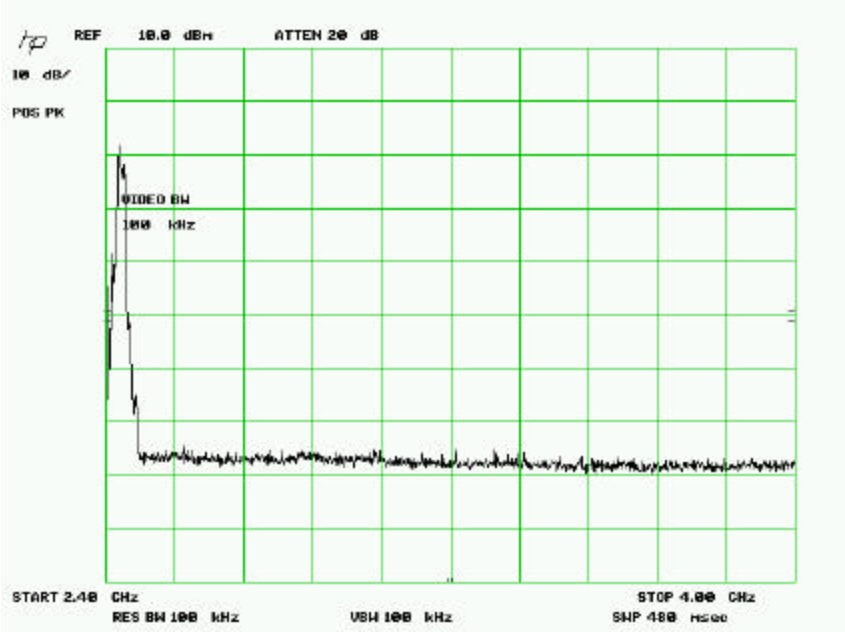
Corrected Level = Recorded Level + Correction factor

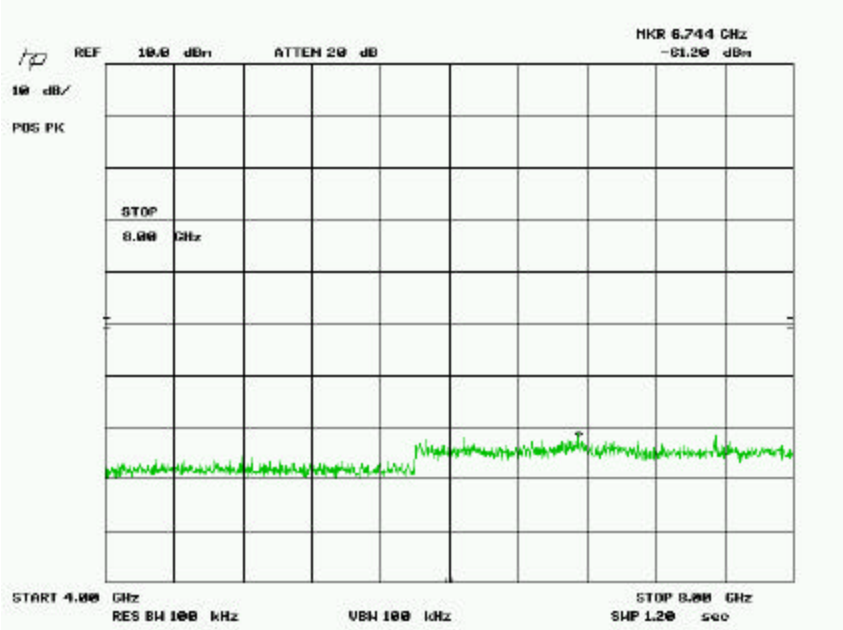
Correction factor = ACF + Cable loss + Distance Correction factor

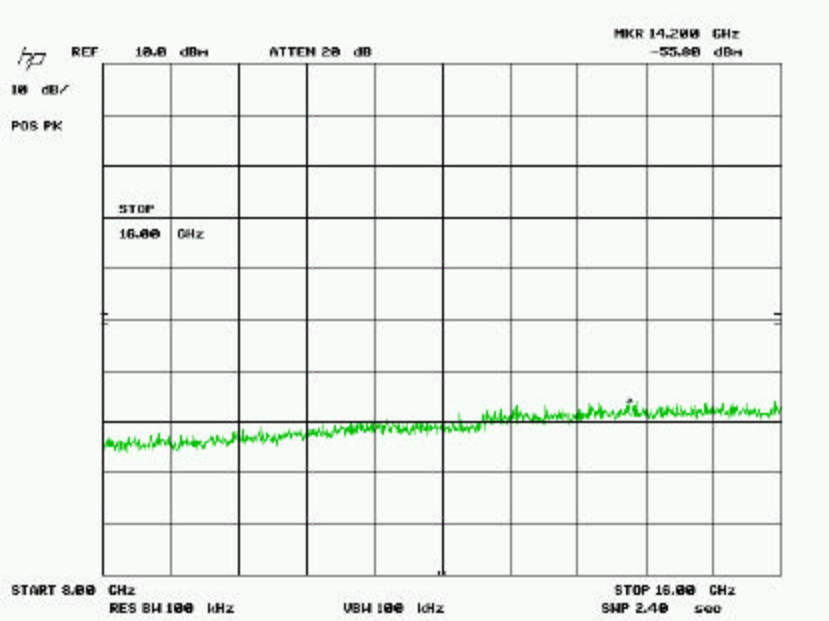
Distance Correction factor = 10 log D1/D2

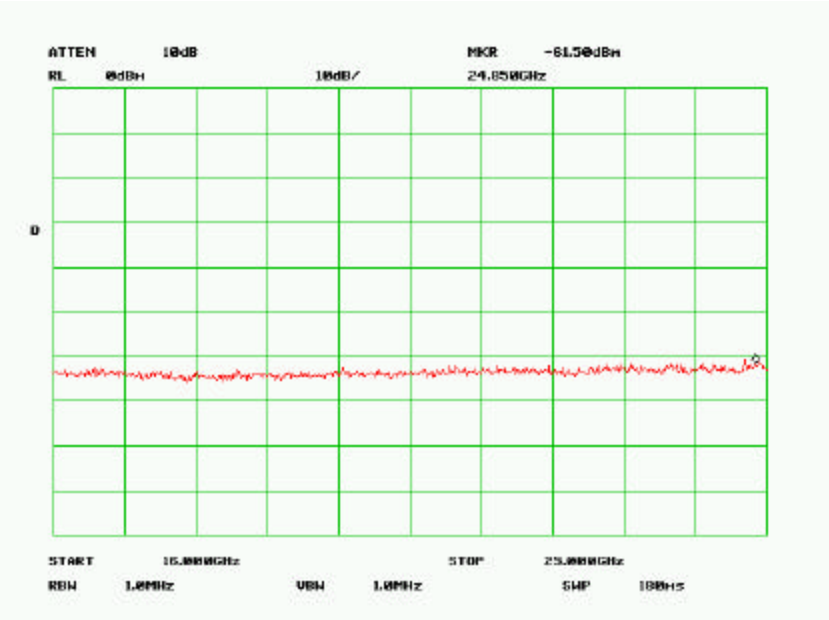
Radiated Spurious Emissions

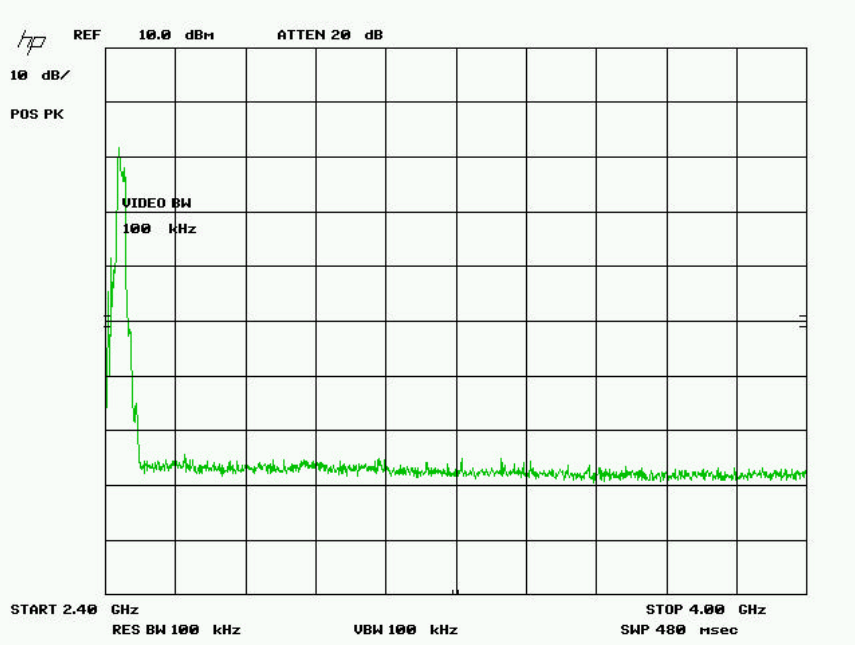
802.11b 11MB

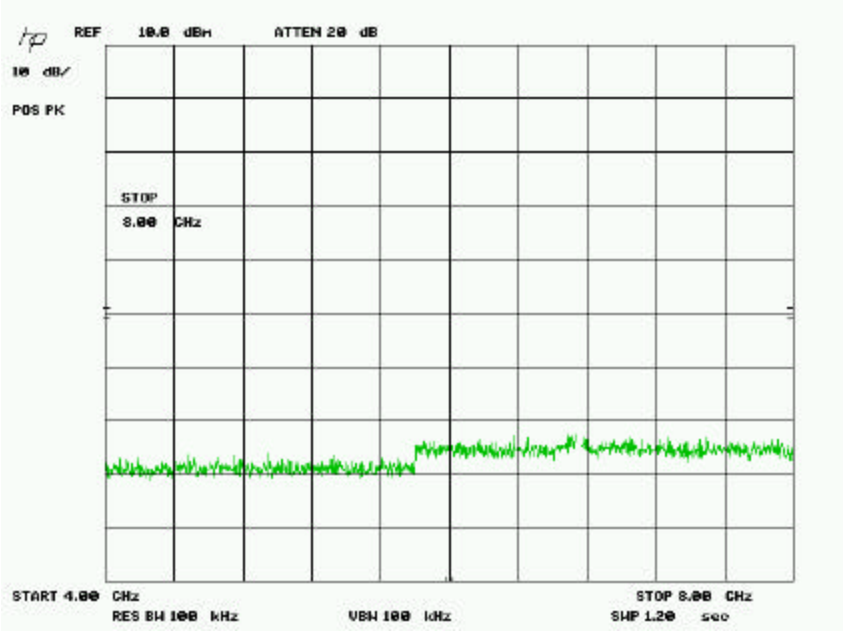


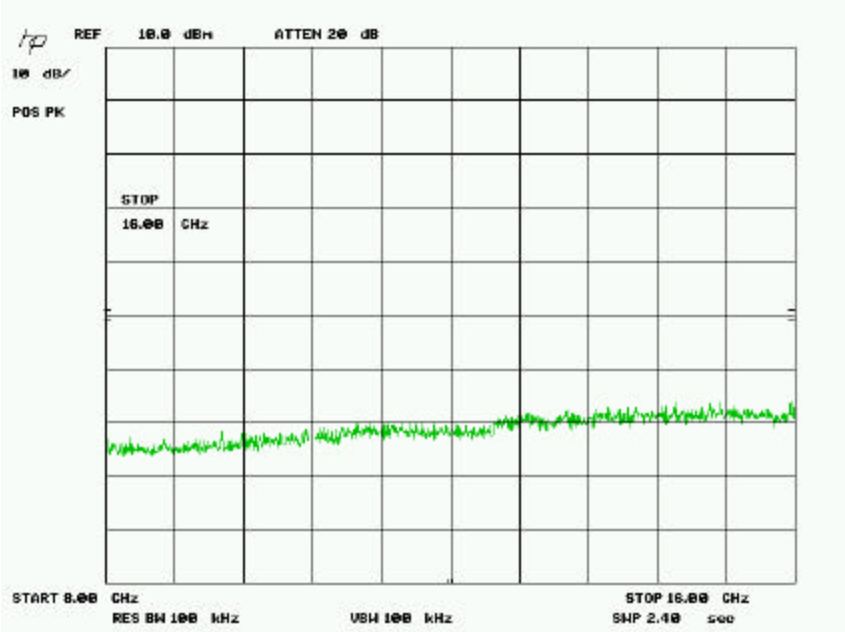


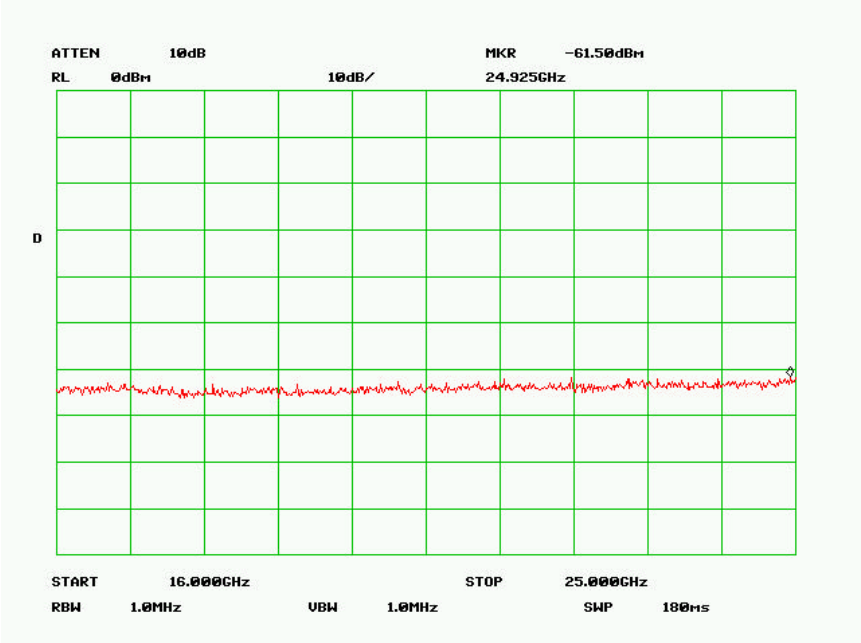

MKR 14.200 GHz
-55.00 dBm
REF 10.0 dBm
ATTEN 20 dB
10 dB/
POS PK
STOP
16.00 GHz
START 8.00 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 16.00 GHz
SWP 2.40 sec


ATTEN 10dB
MKR -61.50dBm
RL 0dBm
10dB/
24.850GHz
D
START 16.000GHz
STOP 25.000GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 100ms


REF 10.0 dBm
ATTEN 20 dB
10 dB/
POS PK
VIDEO BW
100 kHz
START 2.40 GHz
STOP 4.00 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 480 msec


REF 10.0 dBm
ATTEN 20 dB
10 dB/
POS PK
STOP
8.00 GHz
START 4.00 GHz
STOP 8.00 GHz
RES BW 100 kHz
VBW 100 kHz
SWP 1.20 sec


REF 10.0 dBm
ATTEN 20 dB
10 dB/
POS PK
STOP
16.00 GHz
START 8.00 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 16.00 GHz
SWP 2.40 sec

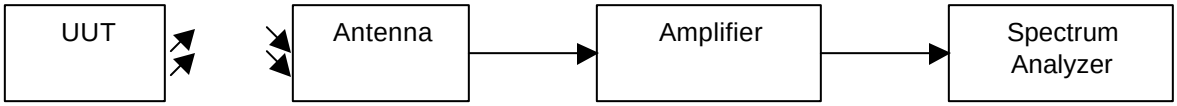

ATTEN 10dB
RL 0dBm
10dB/
MKR -61.50dBm
24.925GHz
D
START 16.000GHz
RBW 1.0MHz
VBW 1.0MHz
STOP 25.000GHz
SWP 180ms

Name of Test: Emissions At Band Edges
Specification: 15.247(c), 15.209(a), 15.205
Limit -20 dBC and for restricted band 54 dBuV average and 74 dBuV peak
Test Equipment Utilized i00028, i00271, i00290

Test Procedure

The UUT was tested in a semi-anechoic chamber set 3m from the receiving transducer. A spectrum analyzer was used to verify that the UUT met the requirements for band edge with both peak and average measurements. The cable and transducer correction factors were input into the analyzer as a reference level offset to ensure accurate readings were obtained.

Test Setup



Band Edge / Restricted Band Emissions Summary

802.11 b 11MB

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2412	2400	61.4	Peak	74	Pass
2462	2483.5	62.1	Peak	74	Pass

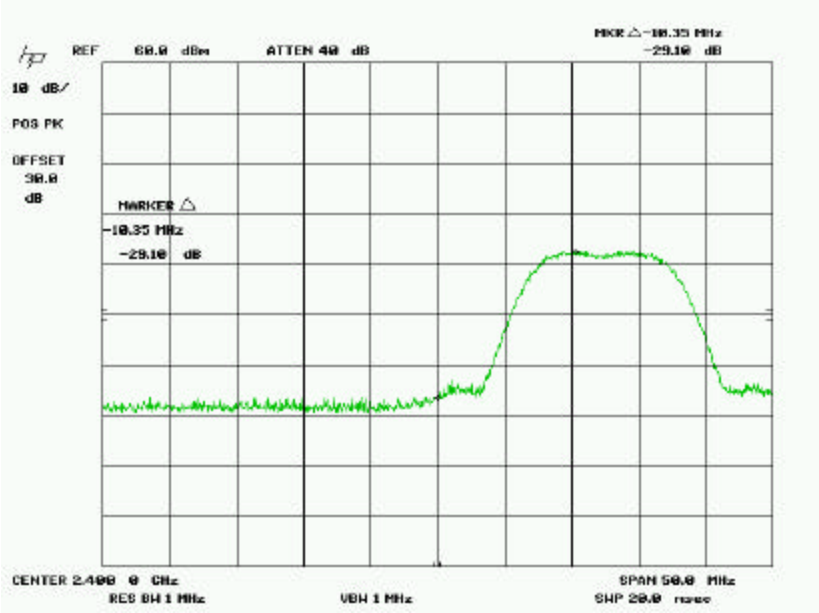
Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2412	2400	51.0	Avg.	54	Pass
2462	2483.5	51.2	Avg.	54	Pass

802.11 g 54MB

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2412	2400	63.1	Peak	74	Pass
2462	2483.5	61.4	Peak	74	Pass

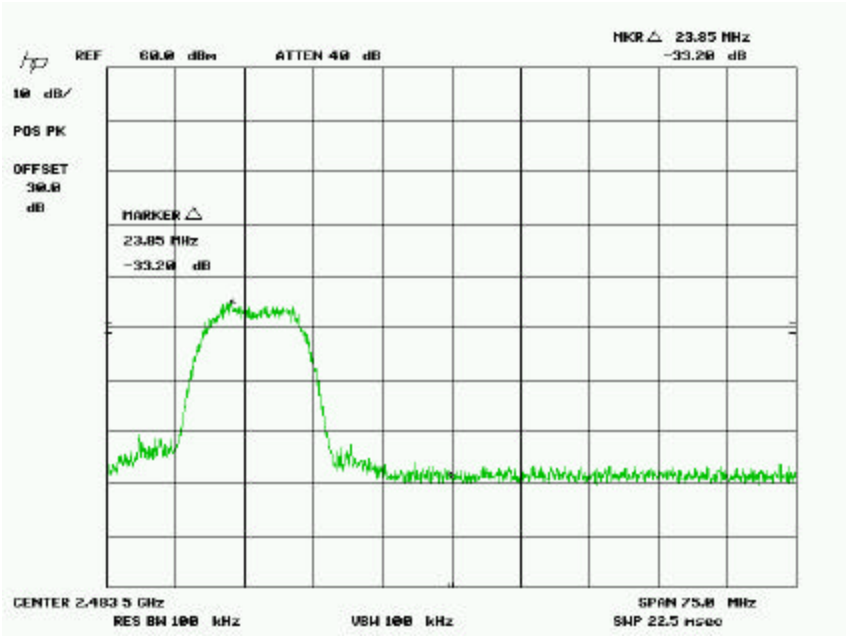
Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2412	2400	51.9	Avg.	54	Pass
2462	2483.5	51.5	Avg.	54	Pass

Lower Band Edge
802.11b 11MB



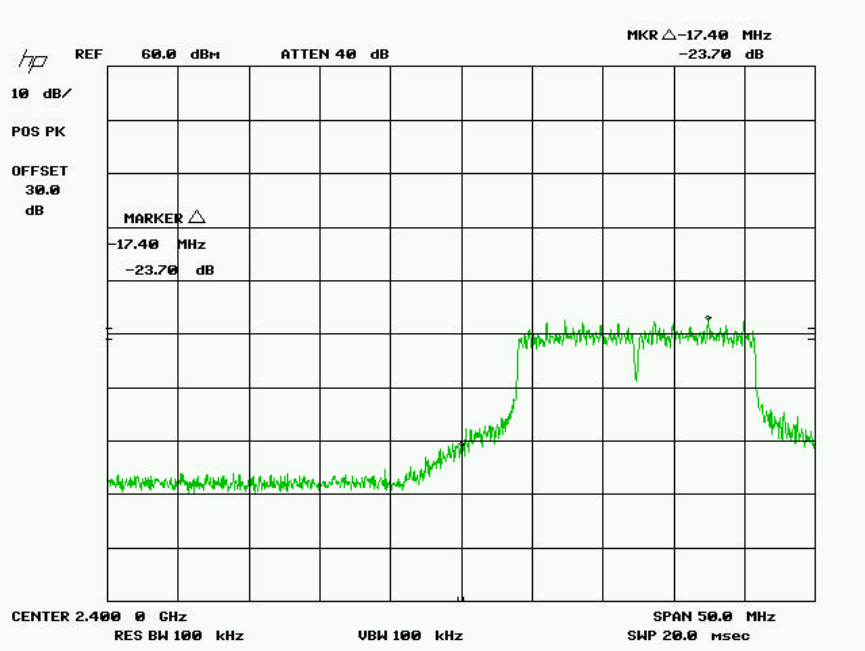
The marker frequency at the peak is 2410.4MHz. The delta between the peak value to the level at 2483.5 is 29.10 dB which is greater than 20 dB.

Upper Band Edge
802.11 b 11MB



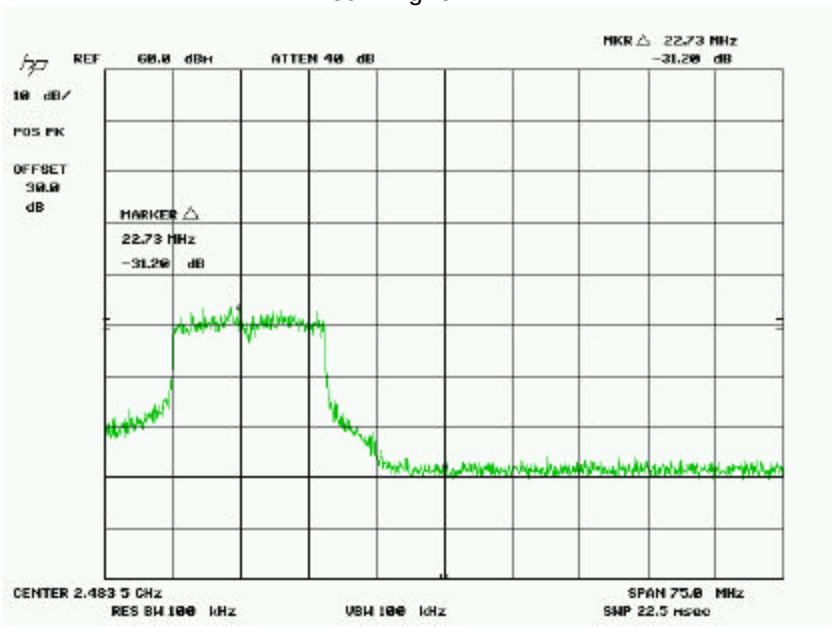
The marker frequency at the peak is 2459.7MHz. The delta between the peak value to the level at 2483.5 is 33.20 dB which is greater than 20 dB.

Lower Band Edge
802.11 g 54MB



The marker frequency at the peak is 2417.4MHz. The delta between the peak value to the level at 2400 is 23.70 dB which is greater than 20 dB.

Upper Band Edge
802.11g 54MB



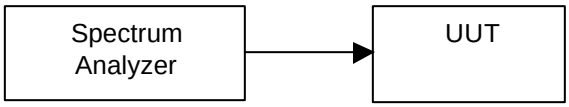
The marker frequency at the peak is 2460.8MHz. The delta between the peak value to the level at 2483.5 is 31.20 dB which is greater than 20 dB.

Name of Test: Occupied Bandwidth
Specification: 15.247(a)(2)
Limit BW = 500 KHz
Test Equipment Utilized i00329

Test Procedure

The UUT was connected directly to a spectrum analyzer. The Span was set wide enough to capture the entire transmit spectrum and the resolution bandwidth was set to at least 1% of the span. The analyzer was set to max hold and when the entire spectrum was captured the 6dB and 99% bandwidths were measured to verify the bandwidth met the specification.

Test Setup



Occupied Bandwidth Summary

802.11b 11MB

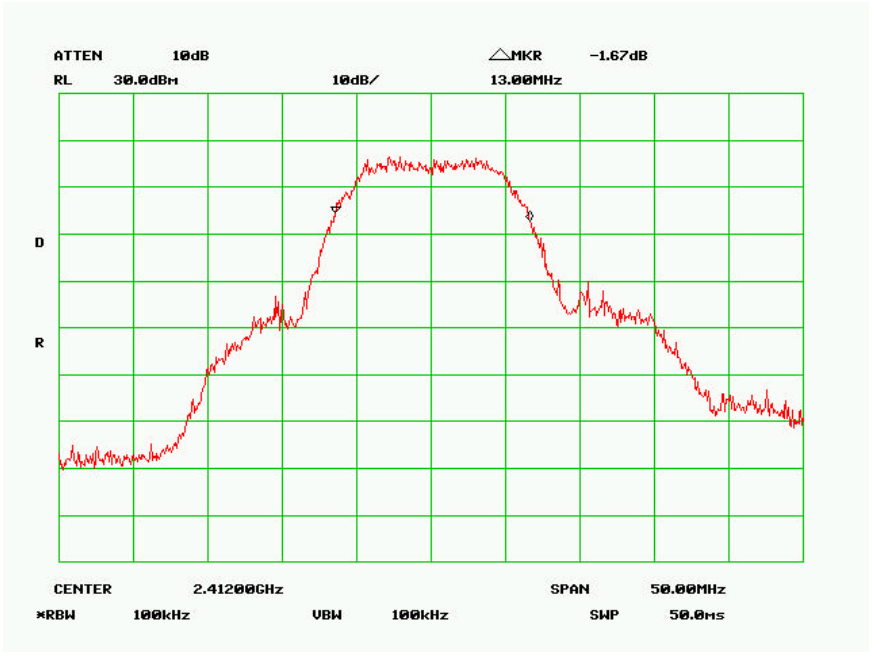
Frequency MHz	Recorded Measurement	Specification Limit	Result
2412	13.00MHz	= 500 KHz	Pass
2437	10.70MHz	= 500 KHz	Pass
2462	10.17MHz	= 500 KHz	Pass

802.11g 54MB

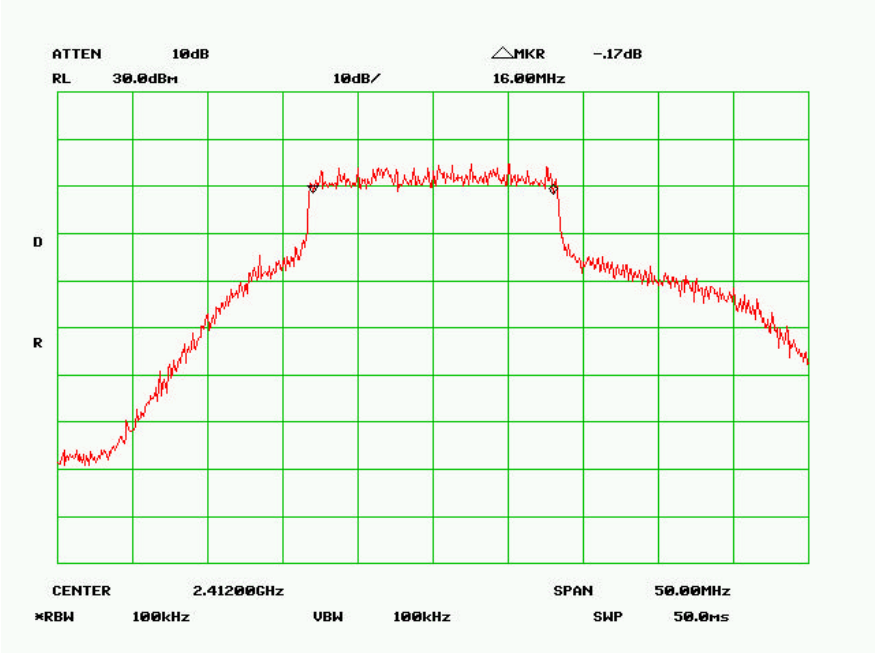
Frequency MHz	Recorded Measurement	Specification Limit	Result
2412	16.00MHz	= 500 KHz	Pass
2437	16.25MHz	= 500 KHz	Pass
2462	16.33MHz	= 500 KHz	Pass

6dB Bandwidth 2412 MHz

802.11 b 11MB

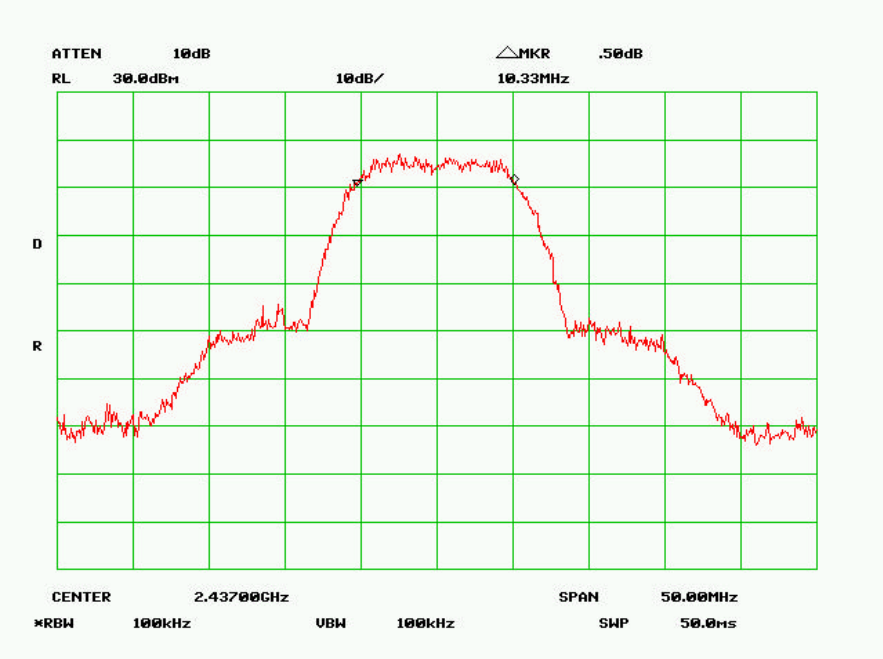


802.11 g 54MB

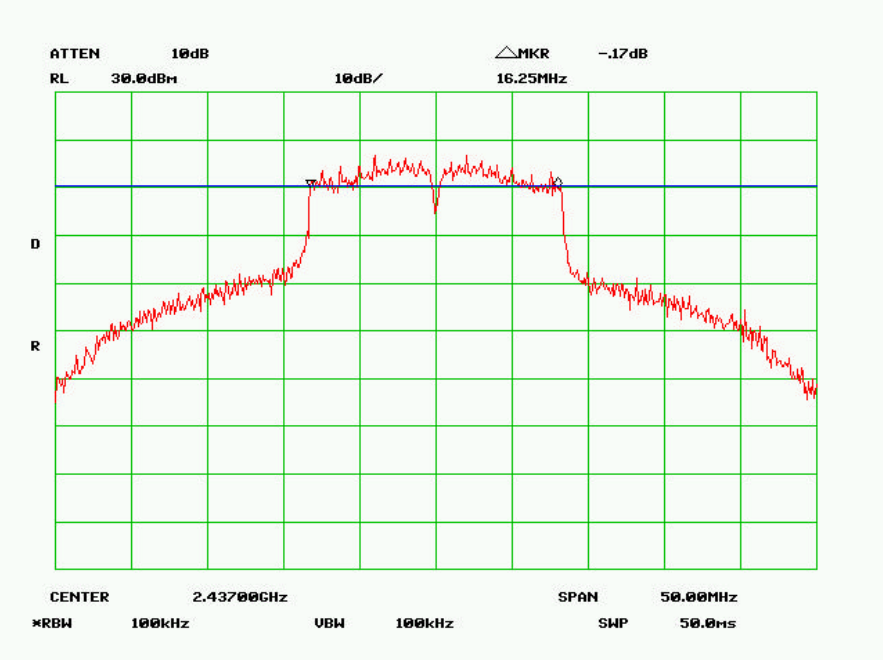


6dB Bandwidth 2437 MHz

802.11 b 11MB

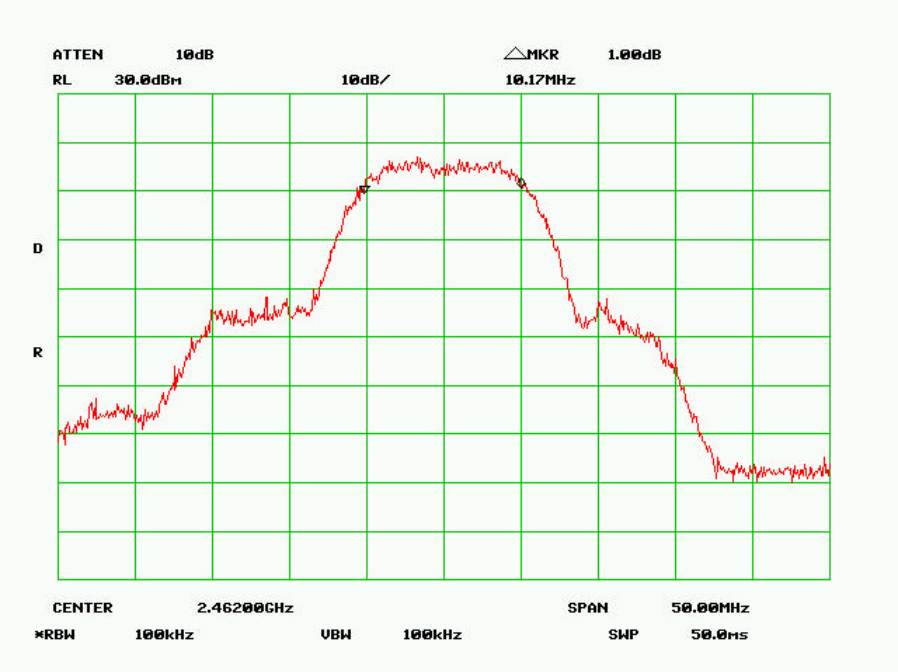


802.11g 54MB

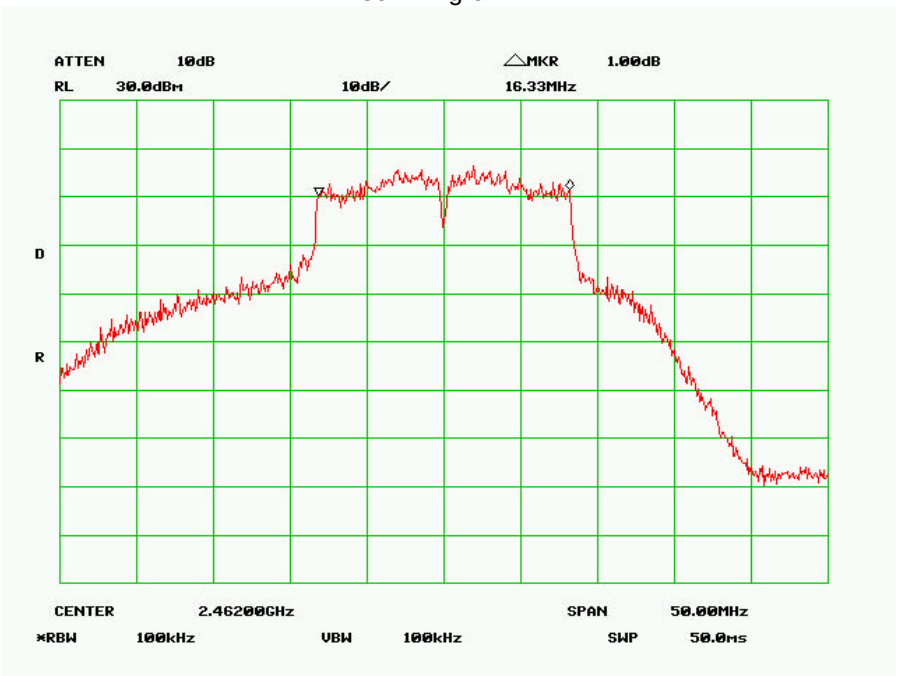


6dB Bandwidth 2462 MHz

802.11 b 11MB

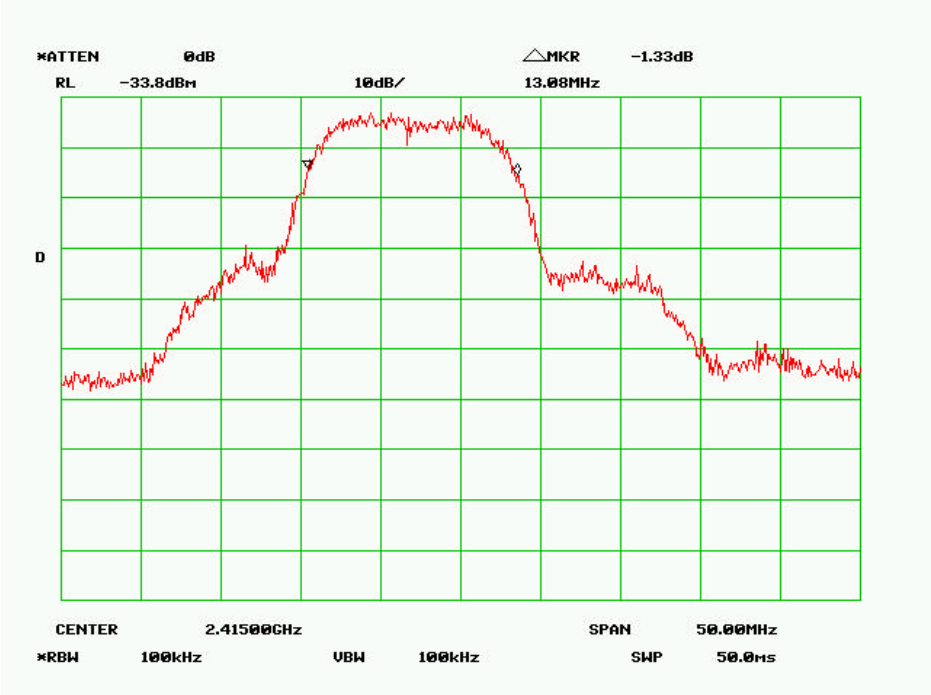


802.11 g 54MB

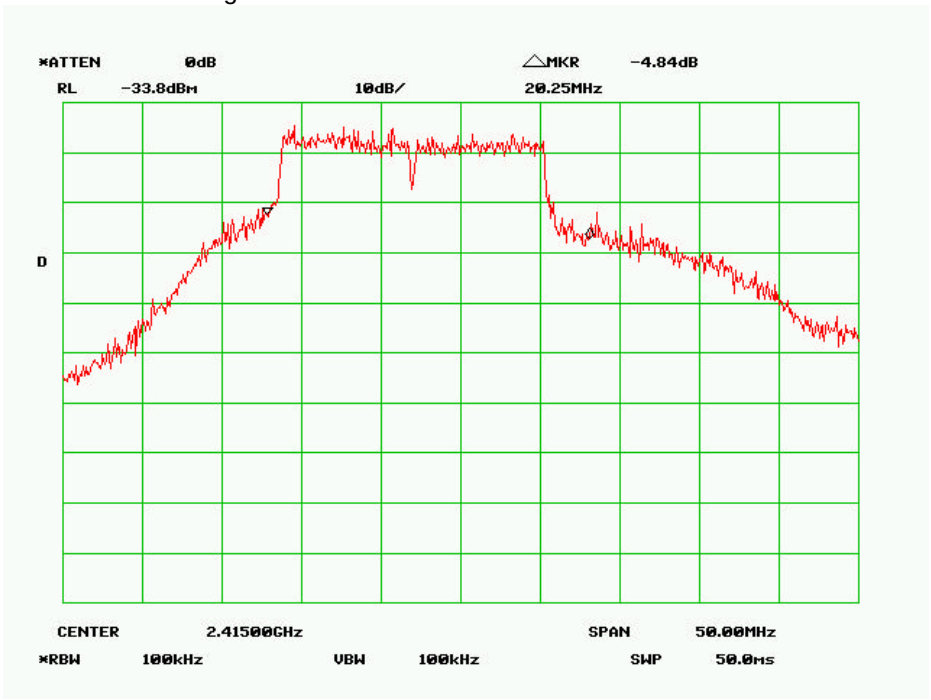


Name of Test: **99% Bandwidth (Industry Canada standards)**
Specification: IC RSS-210e A8.2 (1)
Limit
Test Equipment Utilized i00329

2412 MHz 802.11 b emission BW 13.00MHz

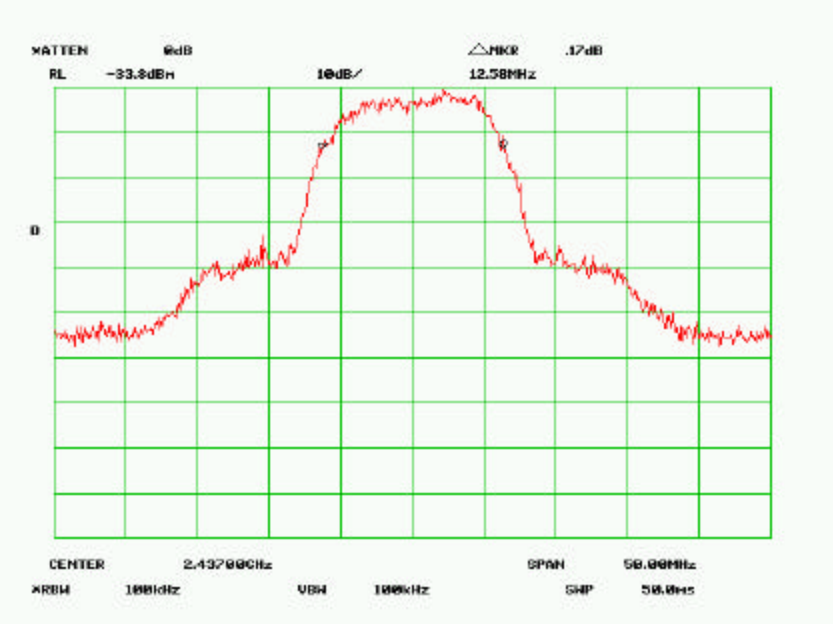


2412 MHz 802.11 g emission BW 20.25MHz

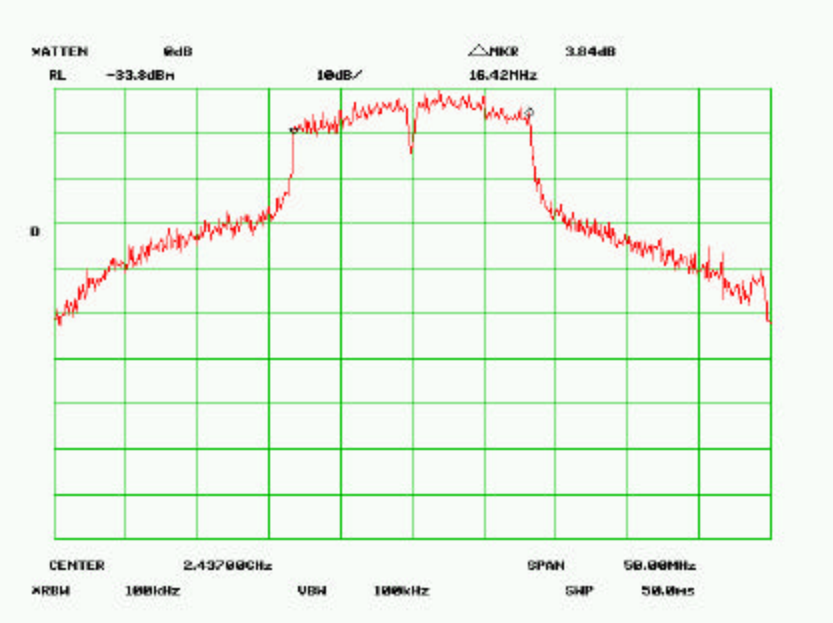


Name of Test: **99% Bandwidth (Industry Canada standards)**
Specification: IC RSS-210e A8.2 (1)
Limit
Test Equipment Utilized i00329

2437 MHz 802.11 b emission BW 12.90MHz

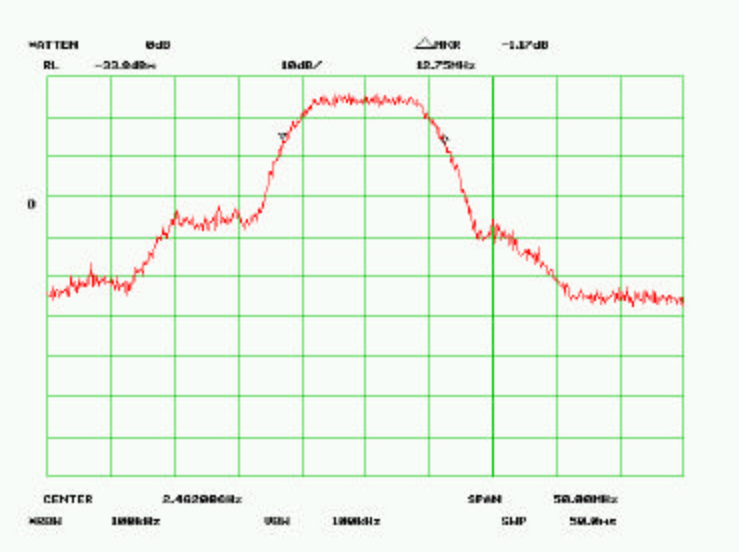


2437 MHz 802.11 g emission BW 16.42MHz

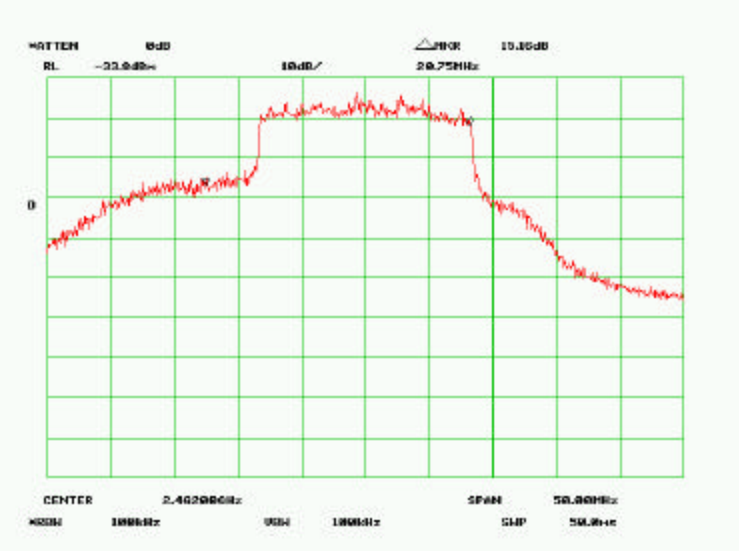


Name of Test: **99% Bandwidth (Industry Canada standards)**
Specification: IC RSS-210e A8.2 (1)
Limit
Test Equipment Utilized i00329

2462 MHz 802.11 b emission BW 12.75MHz



2462 MHz 802.11 g emission BW 20.75MHz

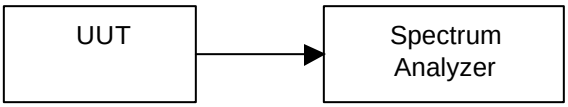


Name of Test: Transmitter Power Spectral Density (PSD)
Specification: 15.247(d)
Limit 8 dBm in any 3 kHz Bandwidth
Test Equipment Utilized i00329

Test Procedure

The UUT was connected directly to a spectrum analyzer. The Span was set to 1.5 MHz and the resolution bandwidth was set to 3 KHz. The analyzer was set for a sweep time of 500 seconds. When the entire spectrum was captured the marker peak function of the analyzer was utilized to verify the PSD met the specification.

Test Setup



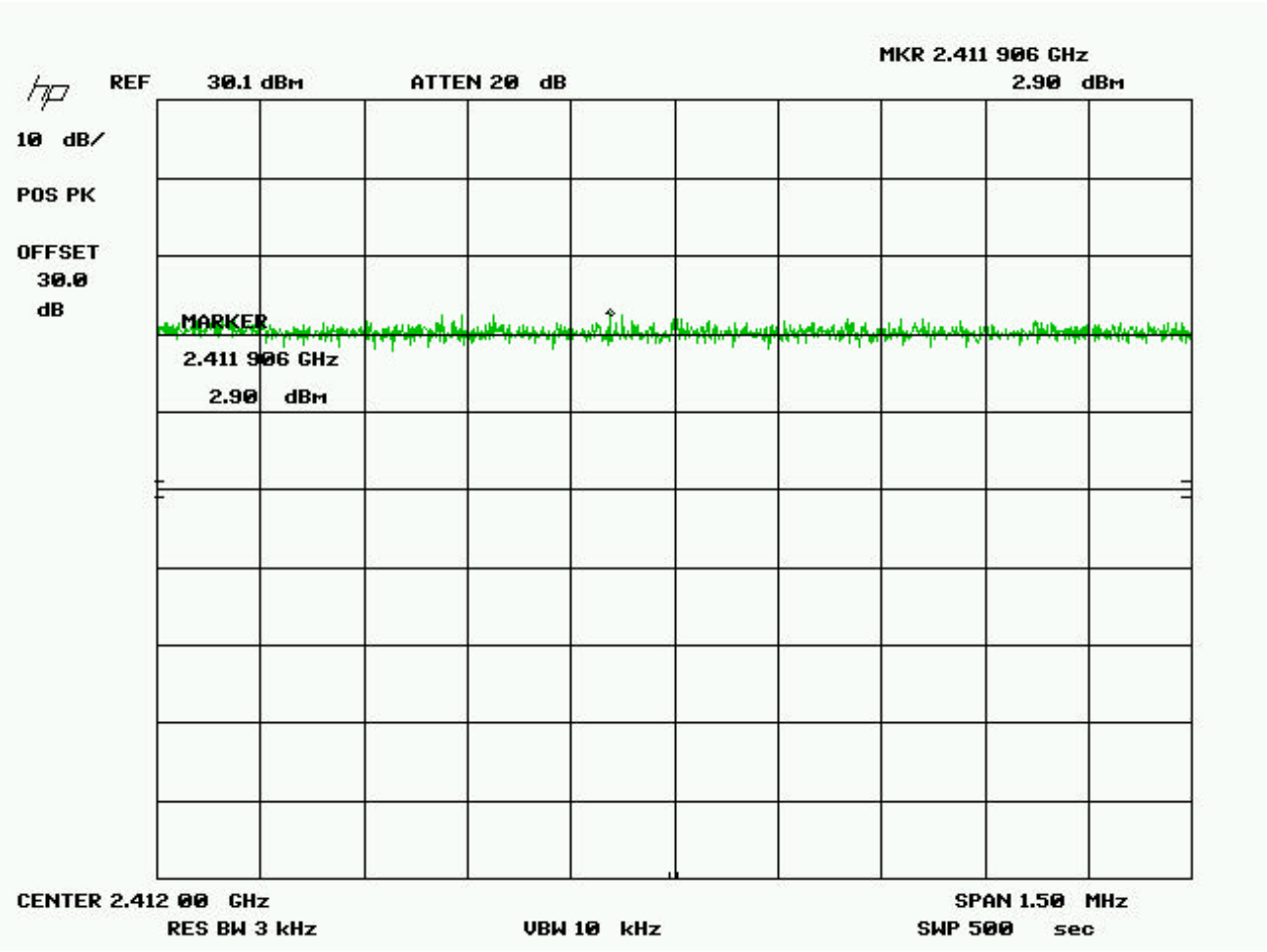
PSD Summary

802.11b 11MB

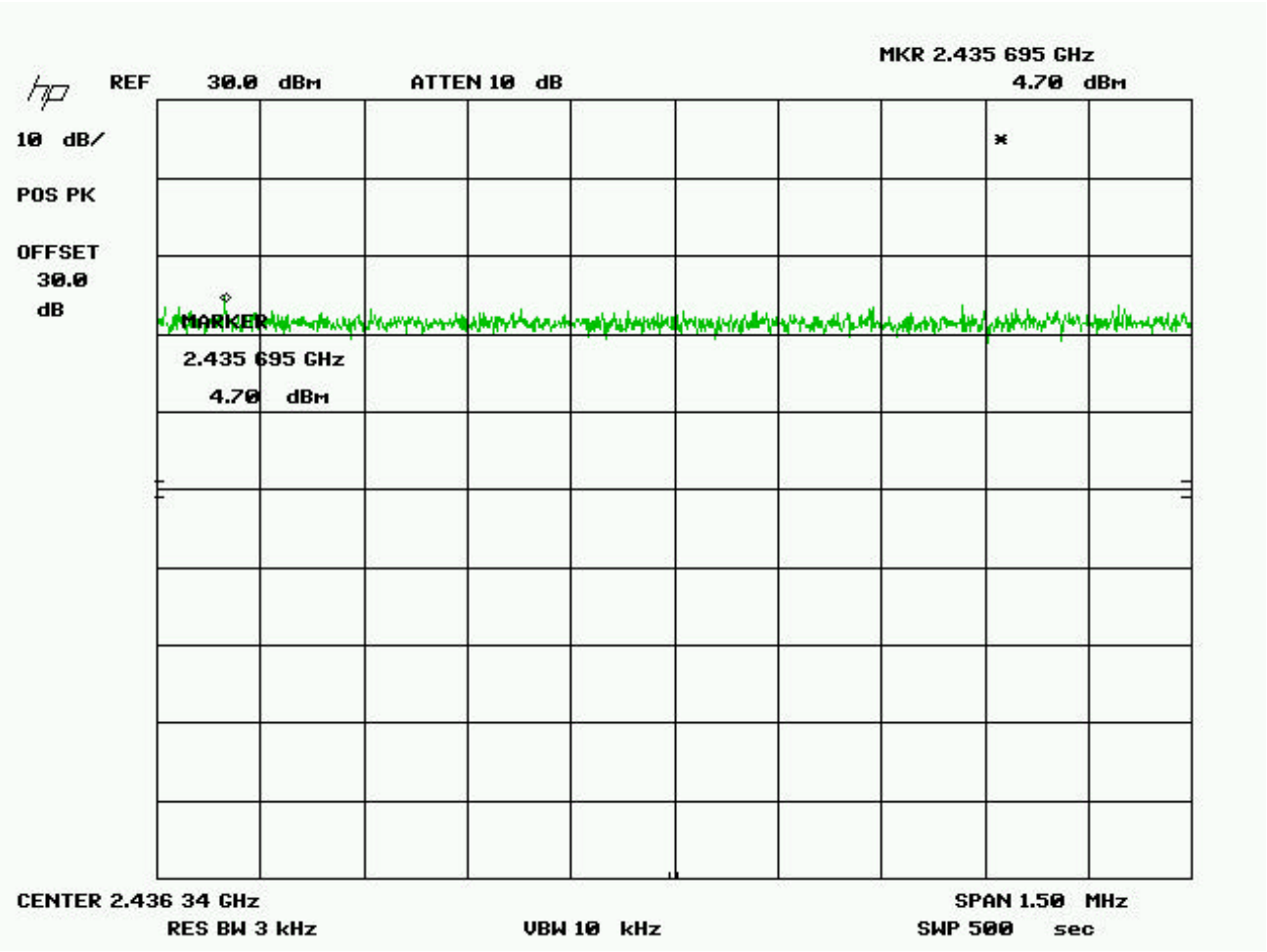
Frequency MHz	Recorded Measurement	Specification Limit	Result
2412	2.90 dBm	8 dBm	Pass
2437	4.70 dBm	8 dBm	Pass
2462	2.90 dBm	8 dBm	Pass

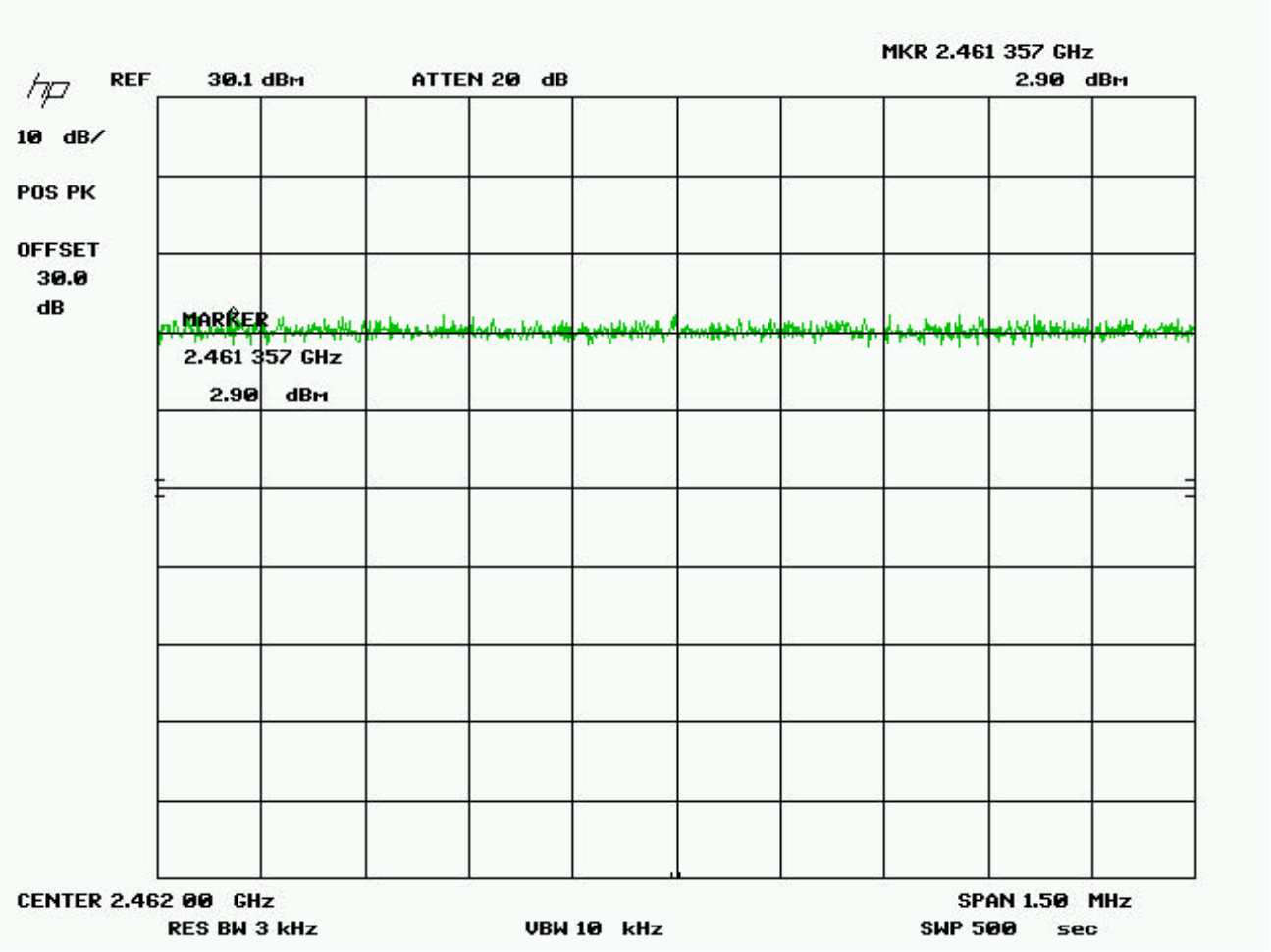
802.11g 54MB

Frequency MHz	Recorded Measurement	Specification Limit	Result
2412	4.40 dBm	8 dBm	Pass
2437	1.60 dBm	8 dBm	Pass
2462	3.10 dBm	8 dBm	Pass

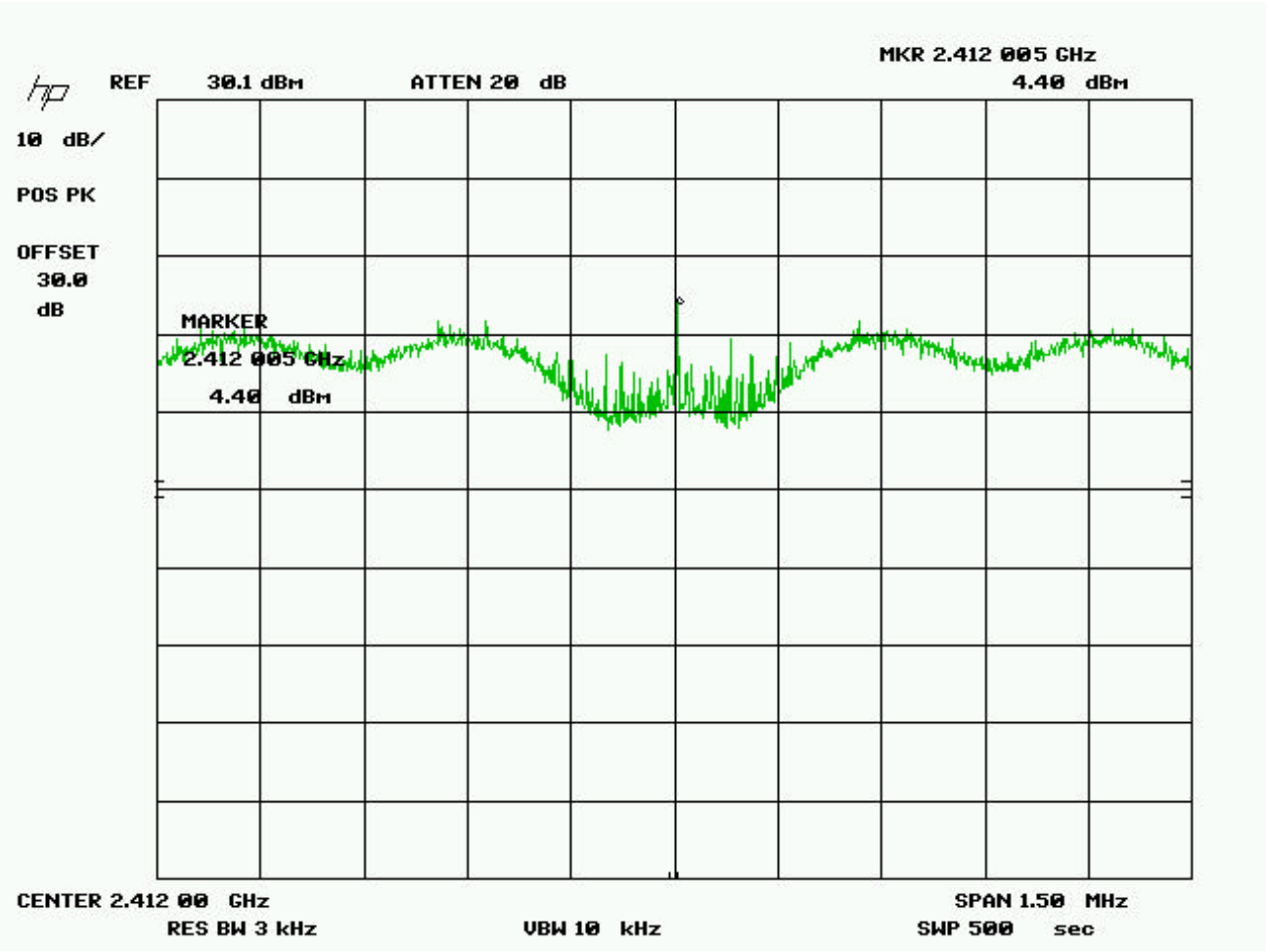

MKR 2.411 906 GHz
REF 30.1 dBm
ATTEN 20 dB
2.90 dBm
10 dB/
POS PK
OFFSET
30.0
dB
MARKER
2.411 906 GHz
2.90 dBm
CENTER 2.412 00 GHz
SPAN 1.50 MHz
RES BW 3 kHz
VBW 10 kHz
SWP 500 sec

Transmitter Power Spectral Density (PSD)
802.11 b

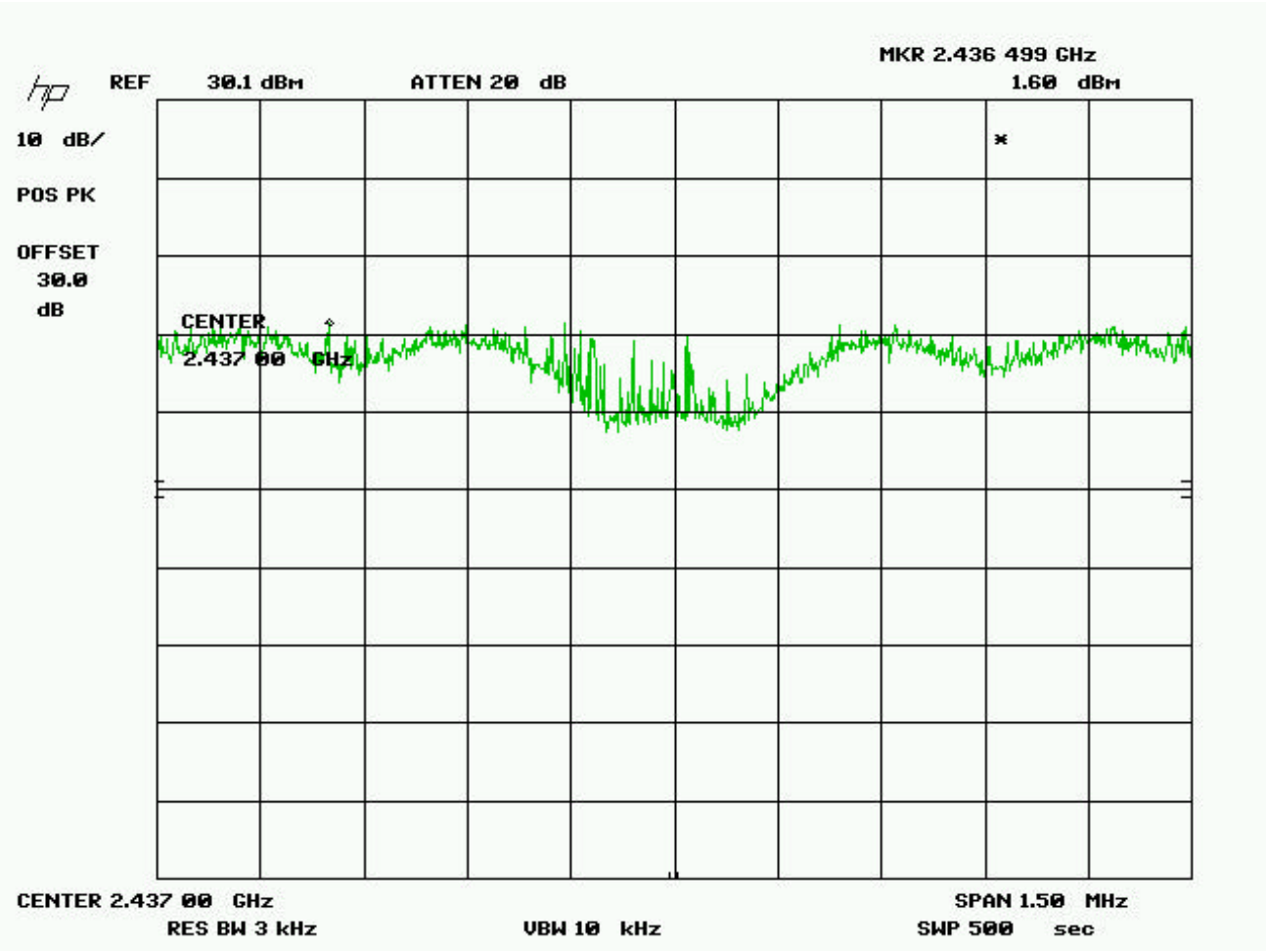



MKR 2.461 357 GHz
REF 30.1 dBm
ATTEN 20 dB
2.90 dBm
10 dB/
POS PK
OFFSET
30.0
dB
MARKER
2.461 357 GHz
2.90 dBm
CENTER 2.462 00 GHz
SPAN 1.50 MHz
RES BW 3 kHz
VBW 10 kHz
SWP 500 sec

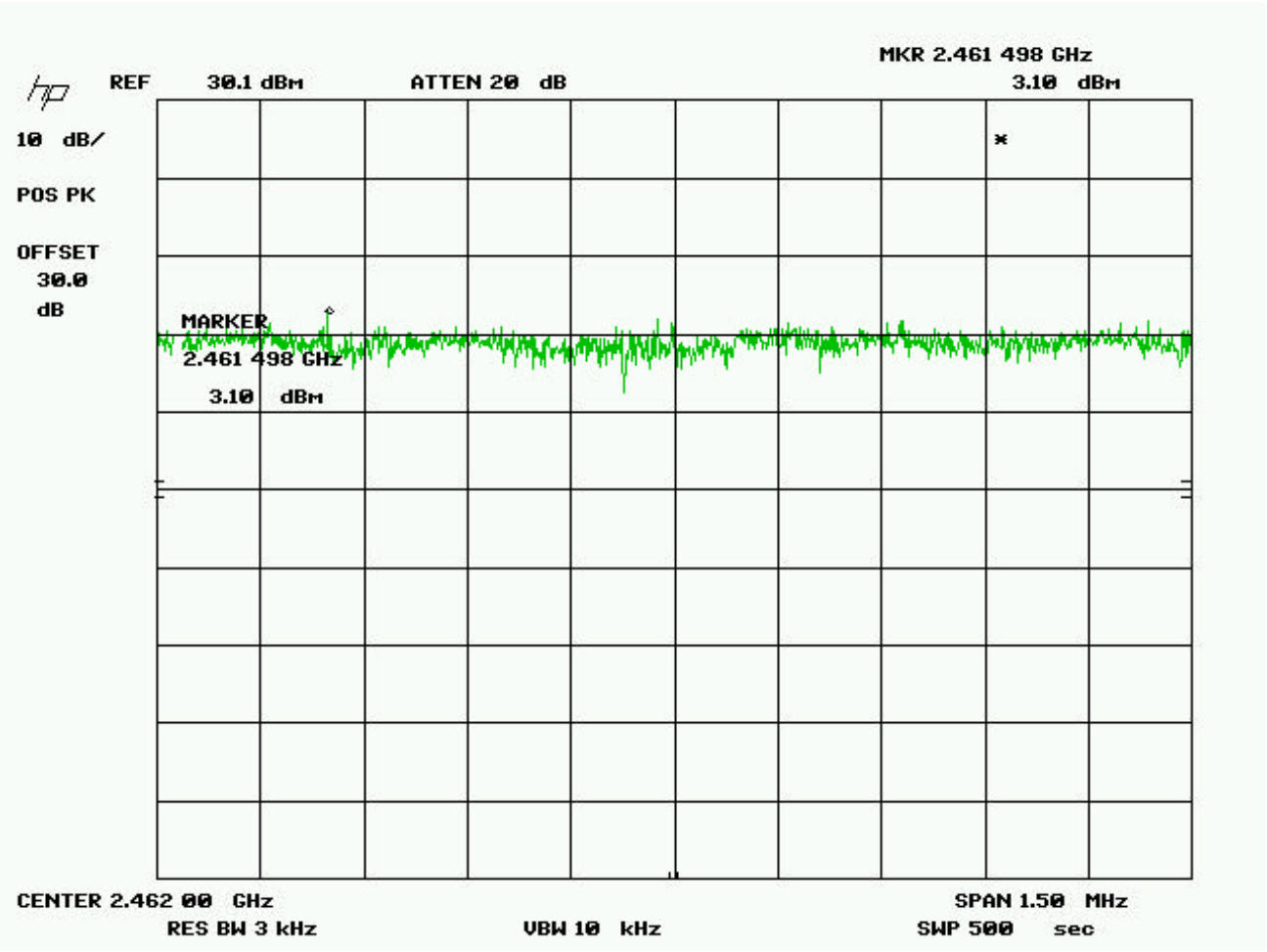
Transmitter Power Spectral Density (PSD)
802.11 g



Transmitter Power Spectral Density (PSD)
802.11 g



Transmitter Power Spectral Density (PSD)
802.11 g

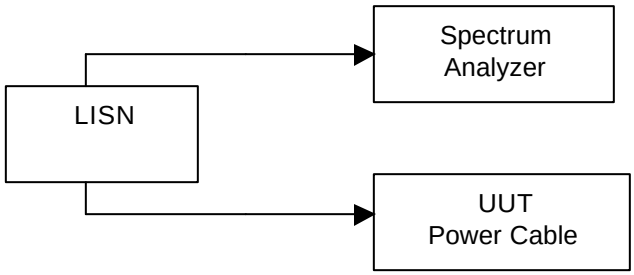


Name of Test: A/C Powerline Conducted Emissions
Specification: 15.207
Test Equipment Utilized i00033, i00270

Test Procedure

The UUT power cable connected to a LISN and the monitored output of the LISN was connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were monitored and compared to the specification limits. The average measurements were the worst-case and are recorded in the tables below.

Test Setup



L1 – Phase Test Results

802.11b 11MB

Emission Frequency	Monitored Level (dBuV/m)	LISN Factor (dB)	Cable Correction Factor	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Result
2.5038 MHz	29.53	0	0.26	10	39.79	56	Pass
2.3384 MHz	29.18	0	0.25	10	39.43	56	Pass
2.2793 MHz	29.38	0	0.25	10	39.63	56	Pass
2.1082 MHz	29.7	0	0.23	10	39.93	56	Pass
2.093 MHz	30.34	0	0.23	10	40.57	56	Pass
2.0104 MHz	29.53	0	0.23	10	39.76	56	Pass
168.02 KHz	43.76	0.2	0.03	10	53.99	65.49	Pass
167.36 KHz	43.24	0.2	0.03	10	53.47	65.5	Pass
161.3 KHz	44.39	0.2	0.02	10	54.61	65.68	Pass
150.07 KHz	44.35	0.3	0.02	10	54.67	66	Pass

L2 - Neutral Test Results

Emission Frequency	Monitored Level (dBuV/m)	LISN Factor (dB)	Cable Correction Factor	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Result
2.2371 MHz	29.2	0	0.24	10	39.44	56	Pass
2.1042 MHz	29.15	0	0.23	10	39.38	56	Pass
159.13 KHz	43.94	0.21	0.02	10	54.17	65.74	Pass
155.24 KHz	44.75	0.25	0.02	10	55.02	65.85	Pass
151.58 KHz	45.41	0.28	0.02	10	55.71	65.95	Pass
151.41 KHz	43.92	0.29	0.02	10	54.23	65.96	Pass
151.12 KHz	44.4	0.29	0.02	10	54.71	65.97	Pass
151.01 KHz	43.98	0.29	0.02	10	54.29	65.97	Pass
150.83 KHz	44.04	0.29	0.02	10	54.35	65.98	Pass
150.25 KHz	44.23	0.3	0.02	10	54.55	65.99	Pass

L1 – Phase Test Results

802.11g 54 MB

Emission Frequency	Monitored Level (dBuV/m)	LISN Factor (dB)	Cable Correction Factor	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Result
2.7741 MHz	29.42	0	0.27	10	39.69	56	Pass
2.4908 MHz	29.22	0	0.26	10	39.48	56	Pass
2.3526 MHz	29.54	0	0.25	10	39.79	56	Pass
2.3434 MHz	29.32	0	0.25	10	39.57	56	Pass
2.2364 MHz	29.42	0	0.24	10	39.66	56	Pass
2.1221 MHz	29.64	0	0.23	10	39.87	56	Pass
170.38 KHz	43.55	0.2	0.03	10	53.78	65.42	Pass
170.18 KHz	43.11	0.2	0.03	10	53.34	65.42	Pass
150.93 KHz	44.21	0.29	0.02	10	54.52	65.97	Pass
150.55 KHz	44.73	0.29	0.02	10	55.04	65.98	Pass

L2 - Neutral Test Results

Emission Frequency	Monitored Level (dBuV/m)	LISN Factor (dB)	Cable Correction Factor	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Result
2.4674 MHz	29.5	0	0.26	10	39.76	56	Pass
2.2118 MHz	29.71	0	0.23	10	39.94	56	Pass
2.1077 MHz	29.8	0	0.23	10	40.03	56	Pass
2.0976 MHz	29.32	0	0.23	10	39.55	56	Pass
162.21 KHz	43.52	0.2	0.02	10	53.74	65.65	Pass
157.7 KHz	44.35	0.22	0.02	10	54.60	65.78	Pass
155.05 KHz	43.72	0.25	0.02	10	53.99	65.86	Pass
154.29 KHz	43.94	0.26	0.02	10	54.22	65.88	Pass
154.19 KHz	44.65	0.26	0.02	10	54.93	65.88	Pass
150.05 KHz	43.8	0.3	0.02	10	54.12	66	Pass

Test Equipment Utilized

Description	MFG	Model Number	FTL Asset Number	Last Cal Date	Cal Due Date
RF Pre-Amplifier	HP	8449	i00028	1/23/07	1/23/09
Spectrum Analyzer	HP	8563E	i00029	1/26/06	1/26/07
Spectrum Analyzer	HP	85462A	i00033	11/03/06	11/03/07
Bi-conical Antenna	EMCO	3109B	i00088	10/14/05	10/14/07
Log Periodic Antenna	Aprel	2001	i00089	10/20/05	10/20/07
Horn Antenna	EMCO	3115	i00103	9/5/06	9/5/07
Power Sensor	HP	E4418B	i00228	8/1/06	8/1/07
LISN	FCC	FCC-LISN-50-32-2-01	i00270	10/25/05	10/25/07
Horn Antenna	ARA	DRG-1181A	i00271	2/1/04	2/1/07
Spectrum Analyzer	HP	8566B	i00290	6/16/06	6/16/07
Power Meter	HP	8481A	i00317	10/1/06	10/1/07
Spectrum Analyzer	HP	8566B	i00329	4/16/07	4/16/08
Test PC	Dell	Dimension 2400	SN/0932RY	N/A	N/A

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT