

Exhibit 6: Measured Data Report

Measurement Test Report
On the
Motorola
802.11a @ 4.9GHz and 802.11b/g
WDE1000 CardBus Adaptor
Model: F2889A

FCC ID NUMBER: AZ489FT7016

In Accordance With:
FCC CFR 47 Part 90
FCC CFR 47 Part 15.247

6.1 Tests required:

Section	Test Standard	Description	Pass / Fail
Tests required for 802.11a @ 4.9GHz			
6.2	EUT Description & Test Configuration for 802.11a @ 4.9GHz		
6.3	§90.1215 (a)	Peak Transmit Power	Pass
6.4	§90.1215 (a)	Peak Power Spectral Density	Pass
6.5	§90.210 (m)	Occupied Bandwidth: Emission Mask M	Pass
6.6	§90.210 (m)	Spurious Emissions at Antenna Terminal	Pass
6.7	§90.210 (m)	Radiated spurious Emissions	Pass
6.8	§2.1055 (a)(1); §90.213	Frequency Stability, Temperature Variations	Pass
6.9	§2.1055 (d)(1); §90.213	Frequency Stability; Voltage Variations	Pass
6.10	§15.109(a)	Radiated Emission	Pass
6.11	§15.107(a); §15.207(a)	Conducted Emissions on AC power line	Pass
Tests required for 802.11b/g			
6.12	EUT Description & Test Configuration for 802.11b/g		
6.13	§15.247(b)(3)	Peak output power	Pass
6.14	§15.247(a)(2)	6dB Bandwidth	Pass
6.15	§15.247(d)	Peak Power Spectral Density	Pass
6.16	§15.247(c)	Conducted Spurious Emissions	Pass
6.17	§15.247(c)	Radiated Spurious Emissions	Pass
6.18	§15.109(a)	Radiated Emission	Pass
6.19	§15.107(a); §15.207(a)	Conducted Emission at AC power line	Pass

6.2 EUT Description & Test Configuration for 802.11a @ 4.9GHz:6.2.1 Equipment used as local support for testing:

Table 6.2.1: EUT Support Equipment.

Description	Manufacturer	Model	Serial Number	Notes
Laptop	HP	Compaq nc8230	CNU5111RTB	
Laptop	Motorola	ML900	343CEN0366	Used for Frequency Stability tests only

No Remote support equipment was used during tests.

6.2.2 I/O port configuration during testing:

Table 6.2.2: EUT I/O Ports.

Port Type	Port Description	Connected From/to		Connector Type	Quantity	Cable Type	Cable Length
RF in/out	4.9GHz External Antenna	EUT	External Antenna	MMCX	1	Termination	2cm
RF in/out	2.4GHz External Antenna	Not Used in Part 90 Tests		MMCX	1	N/A	N/A

6.2.3 EUT operating mode During Tests:

EUT was transmitting at duty cycle of 99% at the Bandwidth stated in each test.
The Rate used for each Bandwidth was the highest rate.
For Frequency stability the EUT was placed into a CW mode.

6.2.4 802.11a @ 4.9GHz Transmitter description

Type of equipment					
Stand-alone (Equipment with or without its own control provisions)					
Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)					
V	Plug-in card (Equipment intended for a variety of host systems)				
Intended use		Condition of use			
fixed		Always at a distance more than 2 m from all people			
mobile		Always at a distance more than 20 cm from all people			
V	portable	May operate at a distance closer than 20 cm to human body			
Equipment code		TNB			
Assigned frequency range		4940 – 4990 MHz			
Operating frequency range		4950 – 4980 MHz for 20MHz BW 4945 – 4985 MHz for 10MHz BW 4942.5 – 4987.5 MHz for 5MHz BW			
RF channel spacing		20, 10, 5 MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector		126mW	
		Effective radiated power (for equipment with no RF connector)		269mW	
Is transmitter output power variable?		No			
		Continuous variable			
		V	Yes	Stepped variable with step size	41%
		Minimum RF power			50.1mW
		Nominal RF power			100mW
Antenna connection					
Unique coupling	V	Standard connector	V	Integral	With temporary RF connector
				V	Without temporary RF connector
Antenna/s technical characteristics					
Type	Manufacturer		Model number		Gain
ON BOARD PIFA ANTENNA (INTEGRAL ANTENNA)	Motorola Israel South		Motorola P/N: 6487848V61		3.3dBi (Peak Gain)
Transmitter 99% power bandwidth		16.5MHz(20MHz), 8.25MHz(10MHz), 4.125MHz(5MHz)			
Transmitter aggregate data rate/s (Data rates According to 802.11a sec 17.3.2.2)		6, 9, 12, 18, 24, 36, 48, 54 Mbps for 20MHz BW 3, 4.5, 6, 9, 12, 18, 24, 27 Mbps for 10MHz BW 1.5, 2.25, 3, 4.5, 6, 9, 12, 13.5 Mbps for 5MHz BW			
Transmitter aggregate symbol (baud) rate/s (According to 802.11a sec 17.3.2.2)		6, 9, 6, 9, 6, 9, 8, 9 Msps respectively to data rate at 20MHz BW 3, 4.5, 3, 4.5, 3, 4.5, 4, 4.5 Msps respectively to data rate at 10MHz BW 1.5, 2.25, 1.5, 2.25, 1.5, 2.25, 2, 2.25 Msps respectively to data rate at 5MHz BW			
Type of modulation		48 subcarriers modulated with BPSK,/QPSK /16-QAM/ 64-QAM + 4 pilot sub carriers modulated with BPSK			
Type of multiplexing		TDD OFDM			
Modulating test signal (base band)		PN9			
Maximum transmitter duty cycle in normal use		60%	Tx ON time	Period	
1.5Mbps @ 5MHz			21.936mSec	36.56mSec	
13.5Mbps @ 5MHz			2.512mSec	4.186mSec	
3Mbps @ 10MHz			10.968mSec	18.28mSec	
27Mbps @ 10MHz			1.256mSec	2.093mSec	
6Mbps @ 20MHz			5.484mSec	9.14mSec	
54Mbps @ 20MHz		628uSec	1.046mSec		
Transmitter duty cycle supplied for test		99%	Tx ON time	Period	
1.5Mbps @ 5MHz			12.42mSec	12.55mSec	
13.5Mbps @ 5MHz			1.472mSec	1.492mSec	
3Mbps @ 10MHz			6.217mSec	6.28mSec	
27Mbps @ 10MHz			736uSec	746uSec	
6Mbps @ 20MHz			3.1mSec	3.14mSec	
54Mbps @ 20MHz		368uSec	373uSec		
Transmitter power source					
	Battery	Nominal rated voltage	VDC	Battery type	Ni- Cd, Lithium, Lead- Acid, other
V	DC	Nominal rated voltage	3.3 VDC $\pm$ 10%		
	AC mains	Nominal rated voltage	VAC	Frequency	Hz
Is there common power source for transmitter and receiver V yes no					
Emission designator 2M0X1D, 10M0X1D, 5M00X1D					

6.3 Peak Transmit Power - Pursuant to 47 CFR §90.1215 (a)6.3.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- The EUT 4.9GHz RF Output Connector was connected through Calibrated Attenuators to a Power Meter with a sensor capable of measuring the entire bandwidth of the signal.
- The EUT power was adjusted at the maximum and the minimum output power level.
- Procedure was repeated for the 5MHz, 10MHz and 20MHz bandwidths at lower, mid and upper channels and at highest data rate.
- Transmitter Frequencies for 802.11a @ 4.9GHz are according to Channel BW and will be referred as low, mid and high in 802.1a @ 4.9GHz section.

6.3.2 Results:

Channel Bandwidth [MHz]	Data Rate [MHz]	Transmit Frequency [MHz]	Peak Power [dBm]	Power Peak Limit [dBm]
High Output Power Level				
5	13.5	4942.5	20.95	27
		4962.5	20.94	27
		4987.5	20.85	27
10	27	4945.0	20.99	30
		4965.0	20.97	30
		4985.0	20.78	30
20	54	4950.0	20.80	33
		4965.0	20.95	33
		4980.0	20.77	33
Low Output Power Level				
5	13.5	4942.5	17.6	27
		4962.5	17.51	27
		4987.5	17.5	27
10	27	4945.0	17.7	30
		4965.0	17.63	30
		4985.0	17.4	30
20	54	4950.0	17.4	33
		4965.0	17.45	33
		4980.0	17.41	33

6.4 Peak Power Spectral Density - Pursuant to 47 CFR §90.1215 (a)

6.4.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- The EUT 4.9GHz RF Output Connector was connected through Calibrated Attenuators to a Spectrum Analyzer (E4440A).
- The Spectrum Analyzer was to RBW = 1MHz, VBW = 3MHz, then the highest amplitude was taken.
- The EUT power was adjusted at the maximum output power level.
- Procedure was repeated for the 5MHz, 10MHz and 20MHz bandwidths at lower, mid and upper channels and at highest data rate.

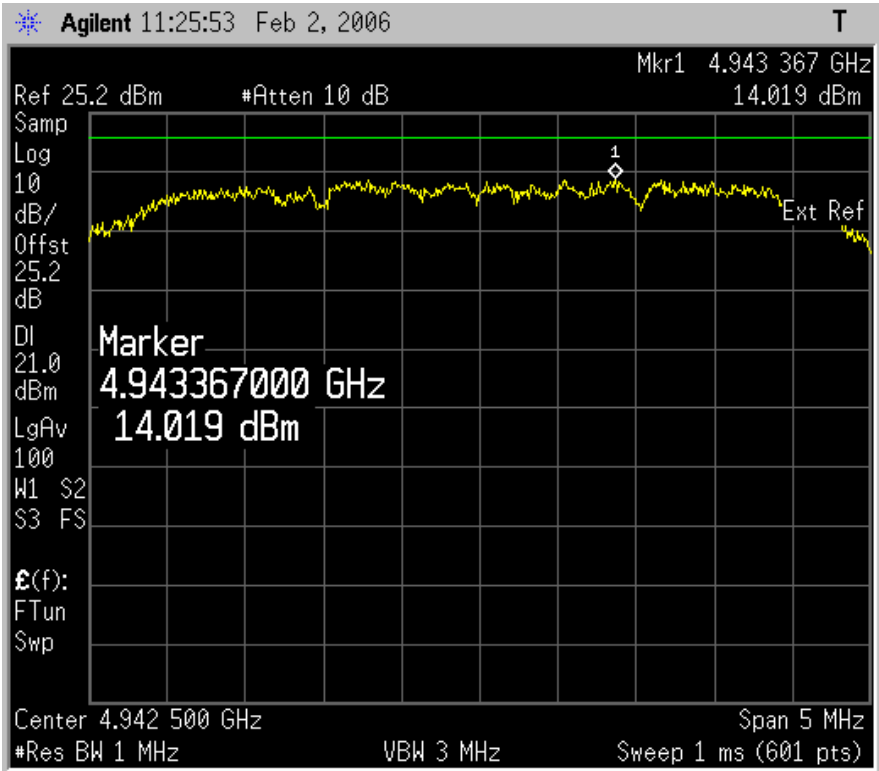
6.4.2 Results:

- Test Results are provided in Table 6.4.1 and associated plots.

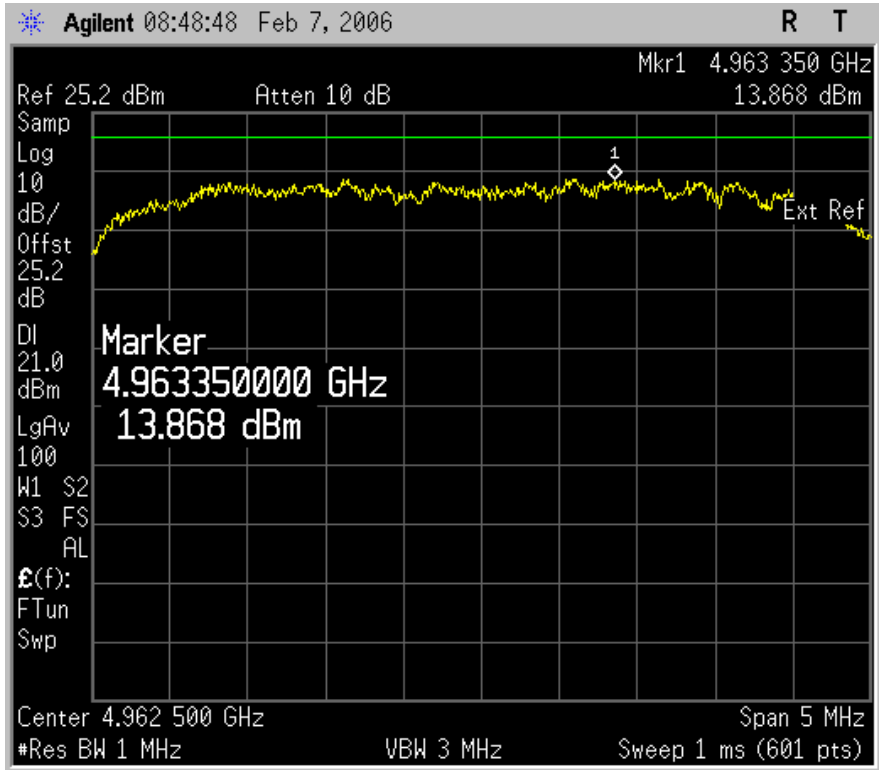
Table 6.4.1: spurious emission test results.

Plot #	Channel Bandwidth [MHz]	Data Rate [MHz]	Frequency [MHz]	Peak Power Spectral Density [dBm]	Limit [dBm]	Margin [dB]
6.4.1	5	13.5	4942.5	14.019	21	6.981
6.4.2			4962.5	13.868	21	7.132
6.4.3			4987.5	13.429	21	7.571
6.4.4	10	27	4945.0	11.245	21	9.755
6.4.5			4965.0	11.251	21	9.749
6.4.6			4985.0	10.643	21	10.357
6.4.7	20	54	4950.0	8.585	21	12.415
6.4.8			4965.0	7.824	21	13.176
6.4.9			4970.0	8.292	21	12.708

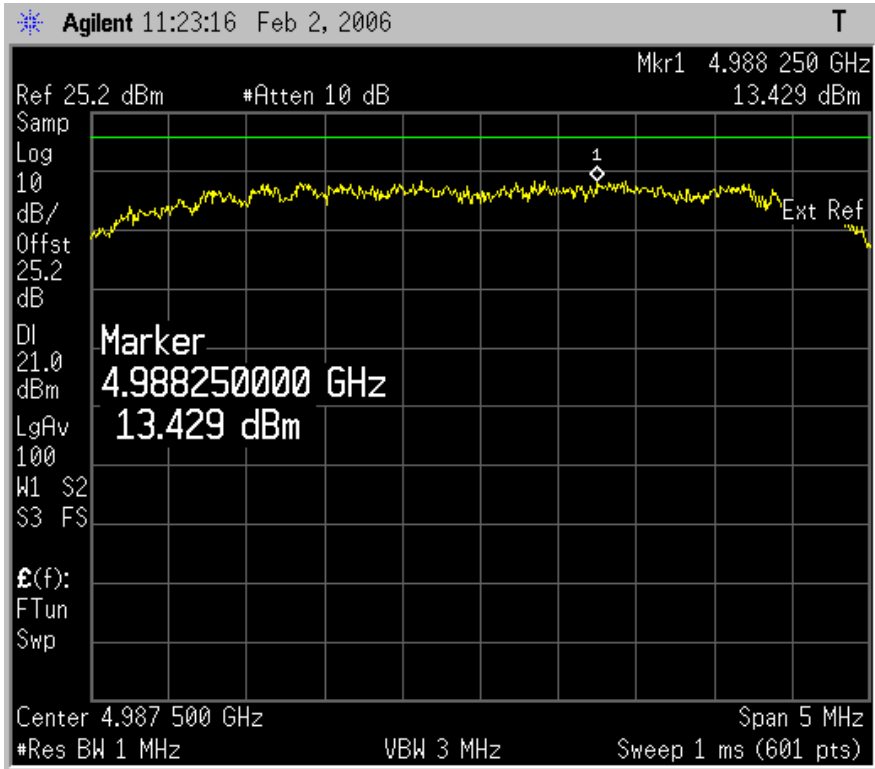
Plot 6.4.1: Peak Power Spectral Density, at low carrier frequency, OBW 5 MHz.



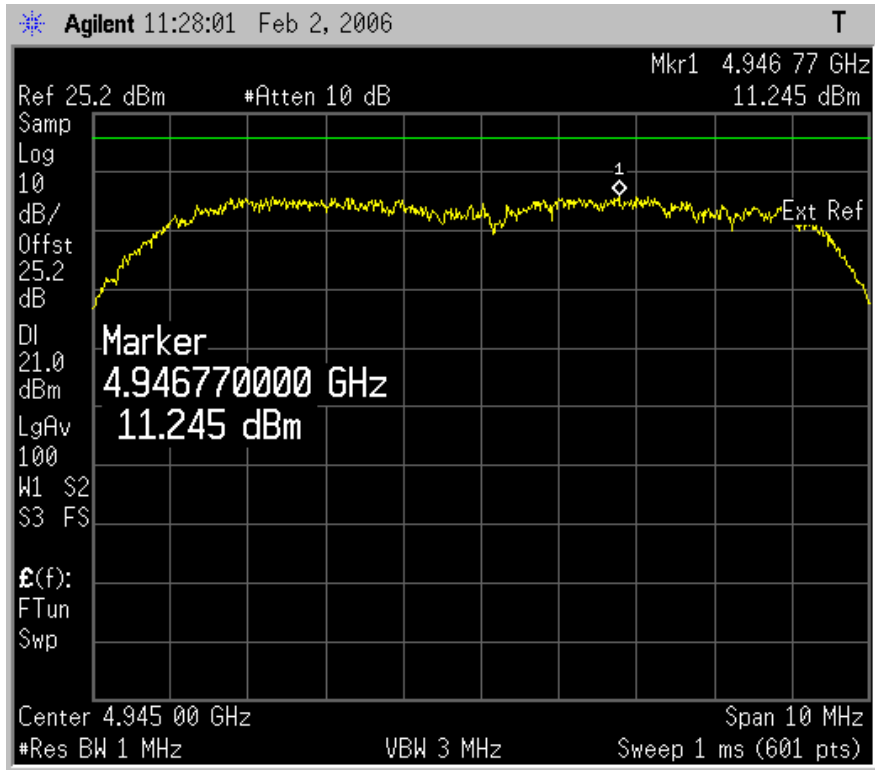
Plot 6.4.2: Peak Power Spectral Density, at mid carrier frequency, OBW 5 MHz.



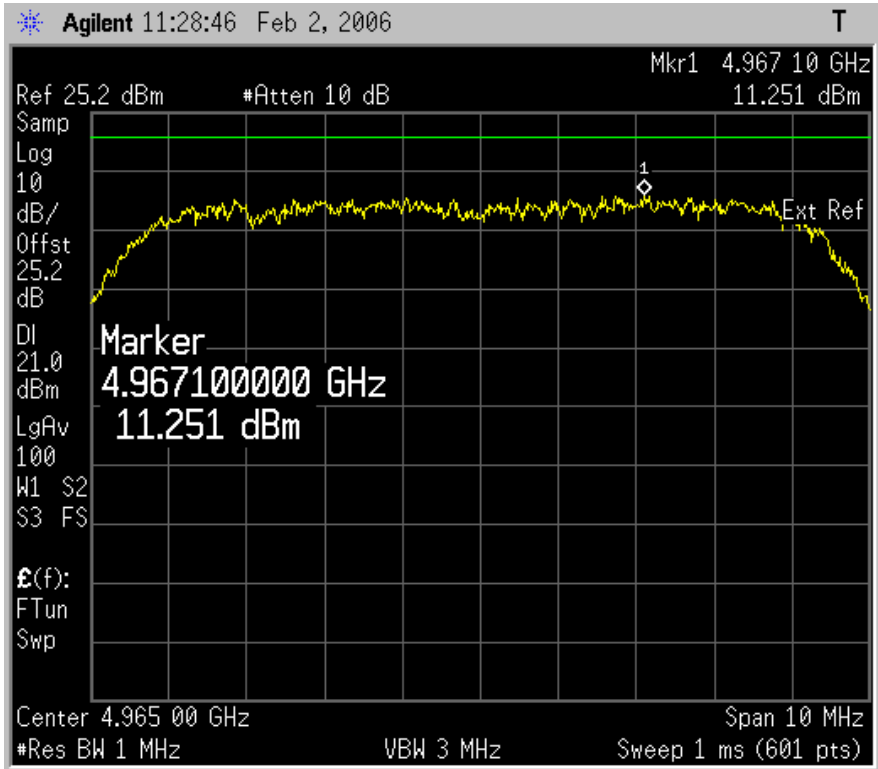
Plot 6.4.3: Peak Power Spectral Density, at high carrier frequency, OBW 5 MHz.



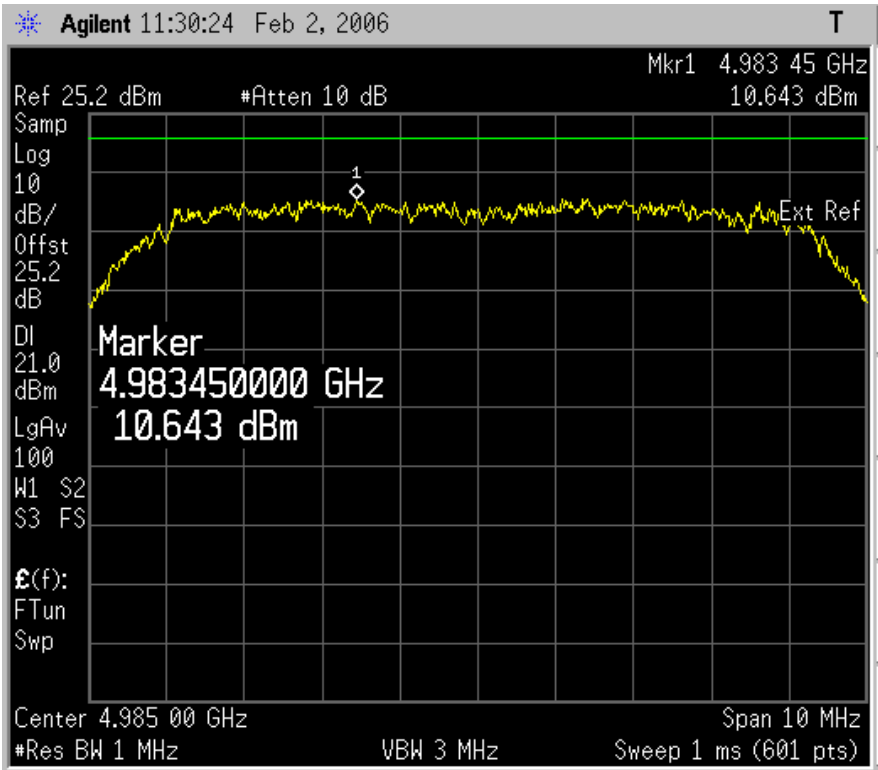
Plot 6.4.4: Peak Power Spectral Density, at low carrier frequency, OBW 10 MHz.



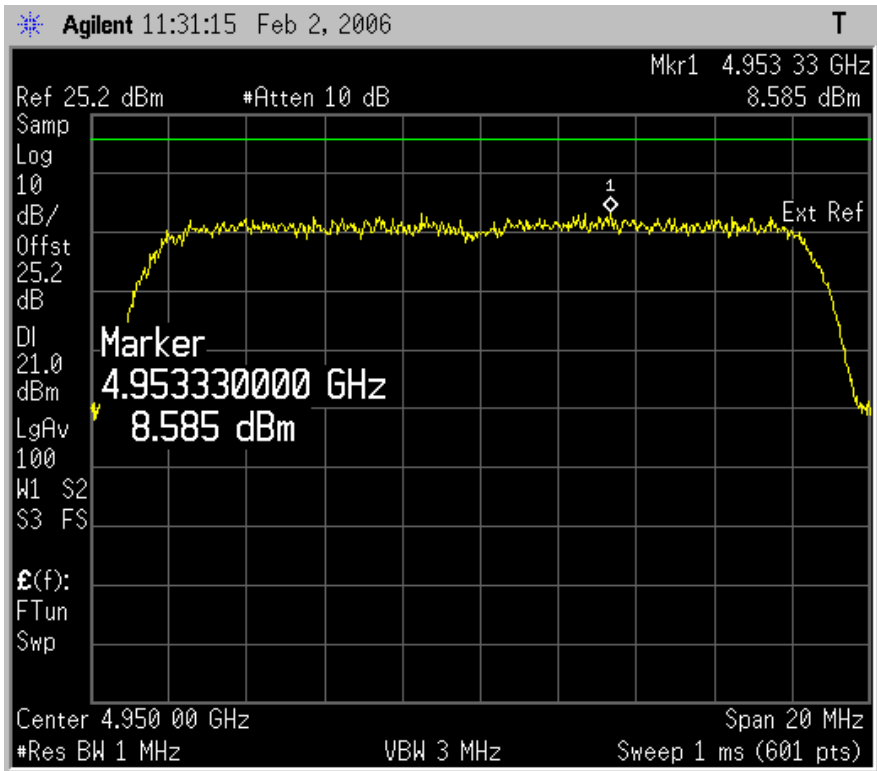
Plot 6.4.5: Peak Power Spectral Density, at mid carrier frequency, OBW 10 MHz.



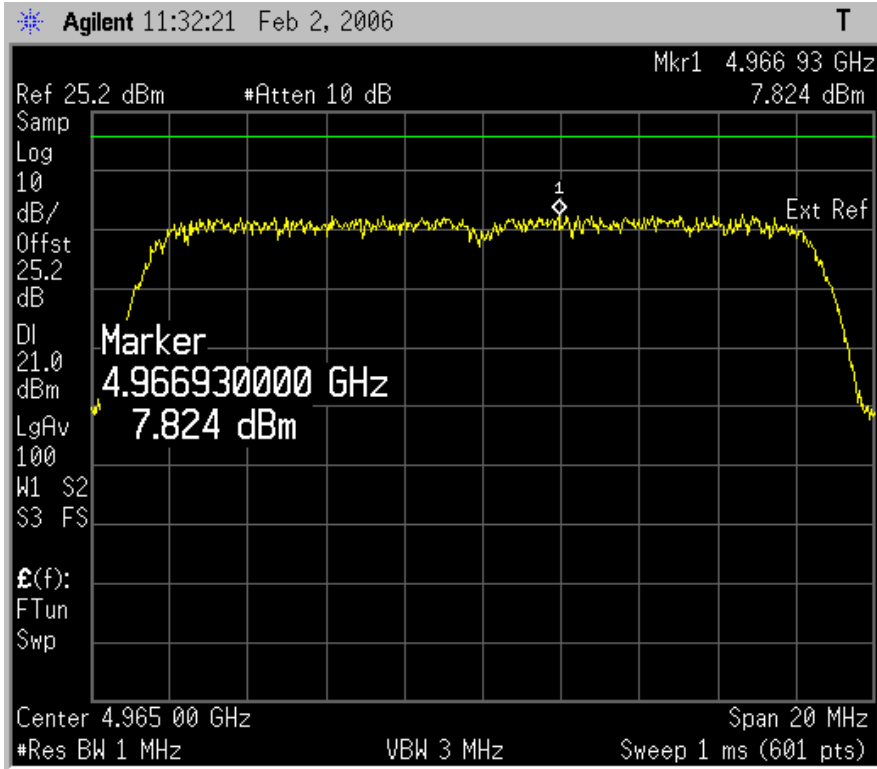
Plot 6.4.6: Peak Power Spectral Density, at high carrier frequency, OBW 10 MHz.



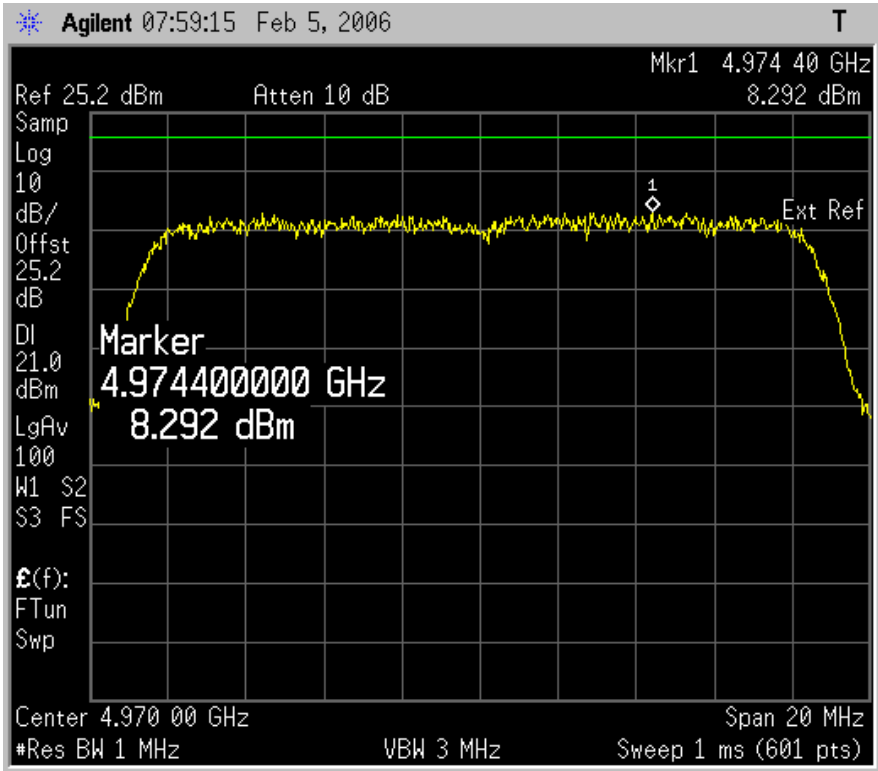
Plot 6.4.7: Peak Power Spectral Density, at low carrier frequency, OBW 20 MHz.



Plot 6.4.8: Peak Power Spectral Density, at mid carrier frequency, OBW 20 MHz.



Plot 6.4.9: Peak Power Spectral Density, at high carrier frequency, OBW 20 MHz.



6.5 Occupied Bandwidth; Emission masks - Pursuant to 47 CFR §90.210 (m)

6.5.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- The EUT 4.9GHz RF Output Connector was connected through Calibrated Attenuators to a Spectrum Analyzer (E4440A).
- The Spectrum Analyzer Resolution Bandwidth was set to at least one percent of the Occupied Bandwidth.
- The EUT power was adjusted at the maximum output power level.
- Procedure was repeated for the 5MHz, 10MHz and 20MHz bandwidths at lower, mid and upper channels and at highest data rate.

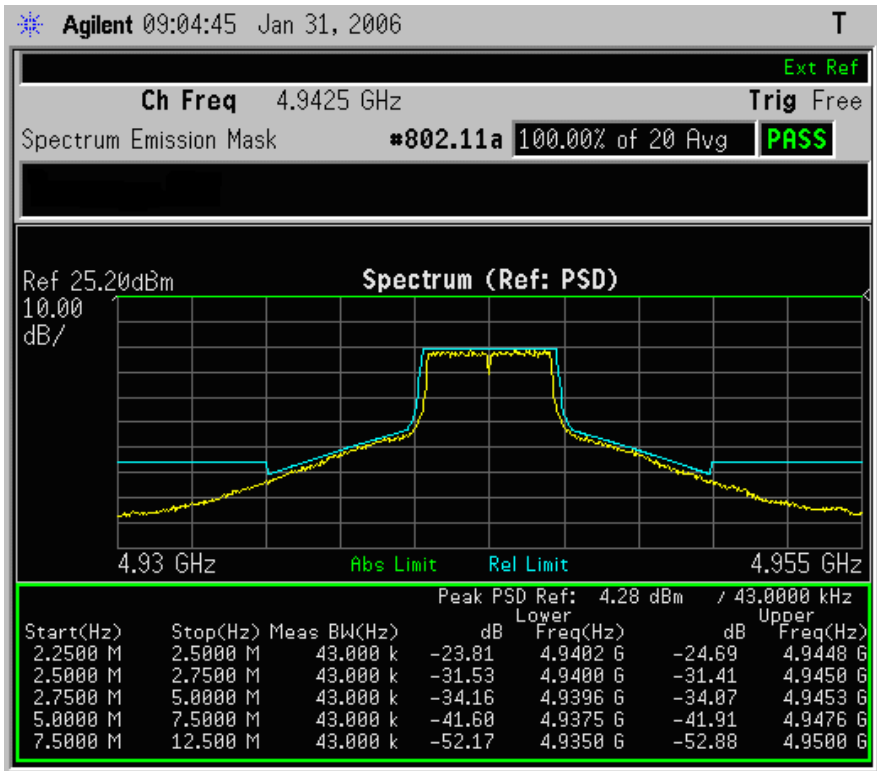
6.5.2 Results:

- Test Results are provided in Table 6.5.1 and associated plots.

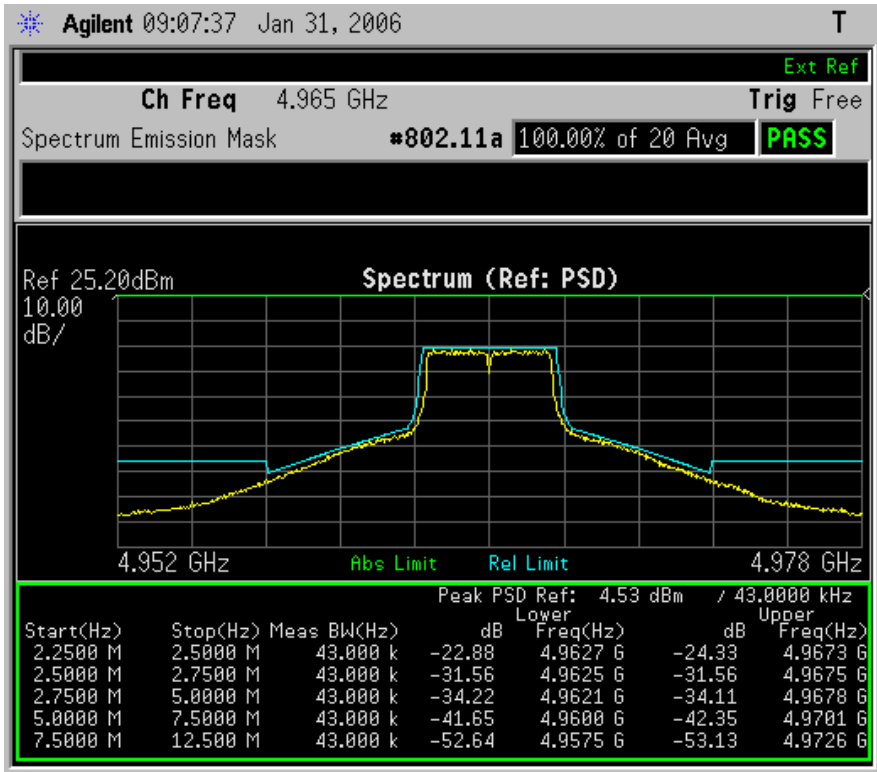
Table 6.5.1: Emission masks test results.

Plot #	Channel Bandwidth [MHz]	Data Rate [MHz]	Frequency [MHz]	Limit	Pass/fail
6.5.1	5	13.5	4942.5	§90.210 (m)	Pass
6.5.2			4962.5	§90.210 (m)	Pass
6.5.3			4987.5	§90.210 (m)	Pass
6.5.4	10	27	4945.0	§90.210 (m)	Pass
6.5.5			4965.0	§90.210 (m)	Pass
6.5.6			4985.0	§90.210 (m)	Pass
6.5.7	20	54	4950.0	§90.210 (m)	Pass
6.5.8			4965.0	§90.210 (m)	Pass
6.5.9			4970.0	§90.210 (m)	Pass

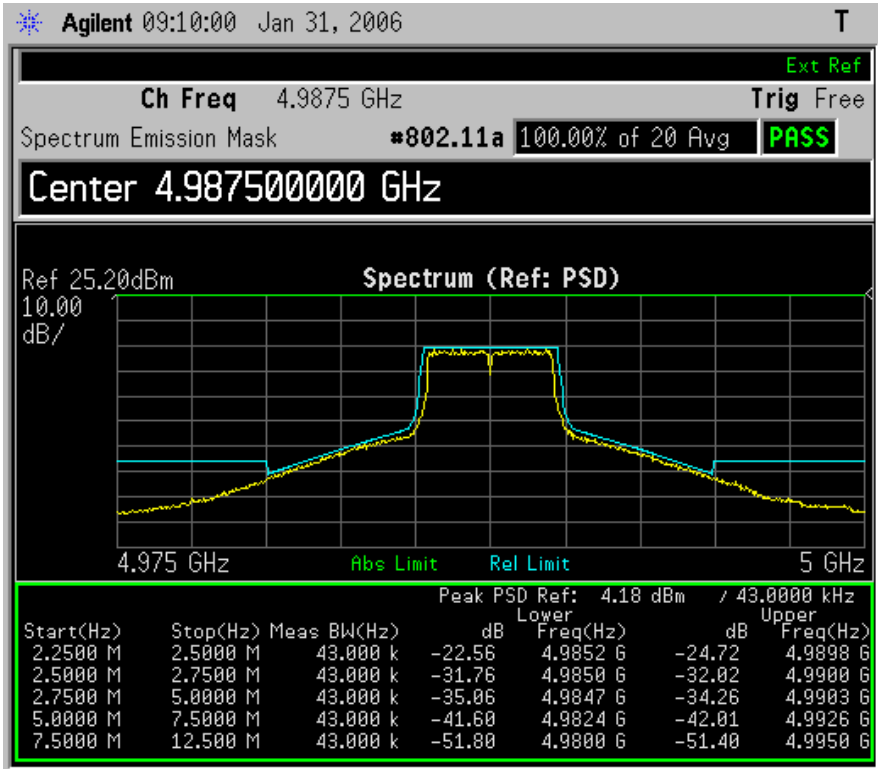
Plot 6.5.1: Emission Mask M, OBW 5MHz, lower Frequency



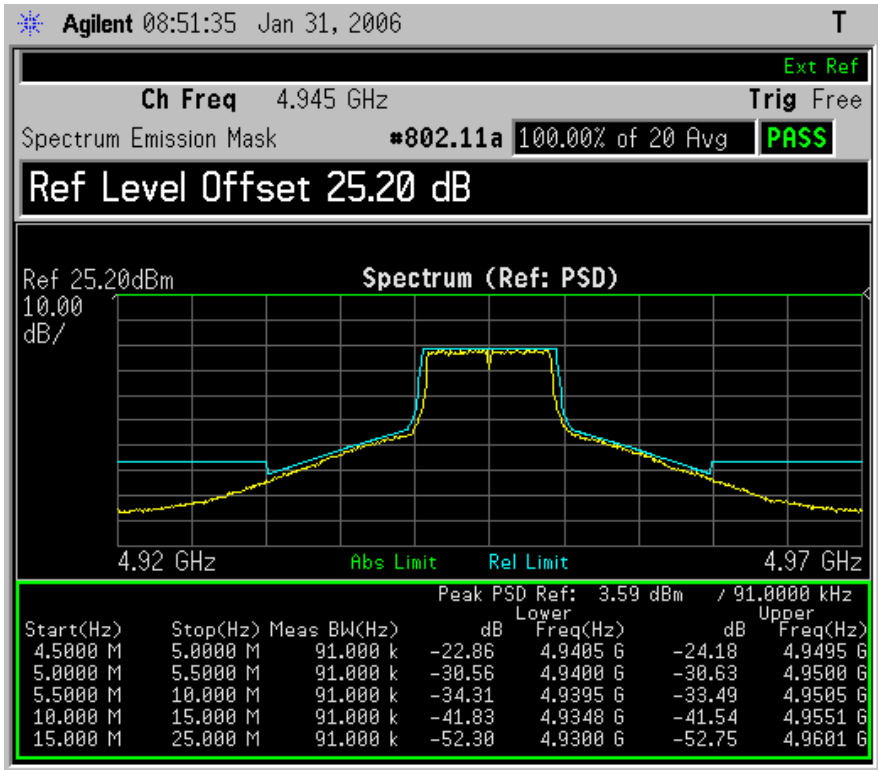
Plot 6.5.2: Emission Mask M, OBW 5MHz, Mid Frequency



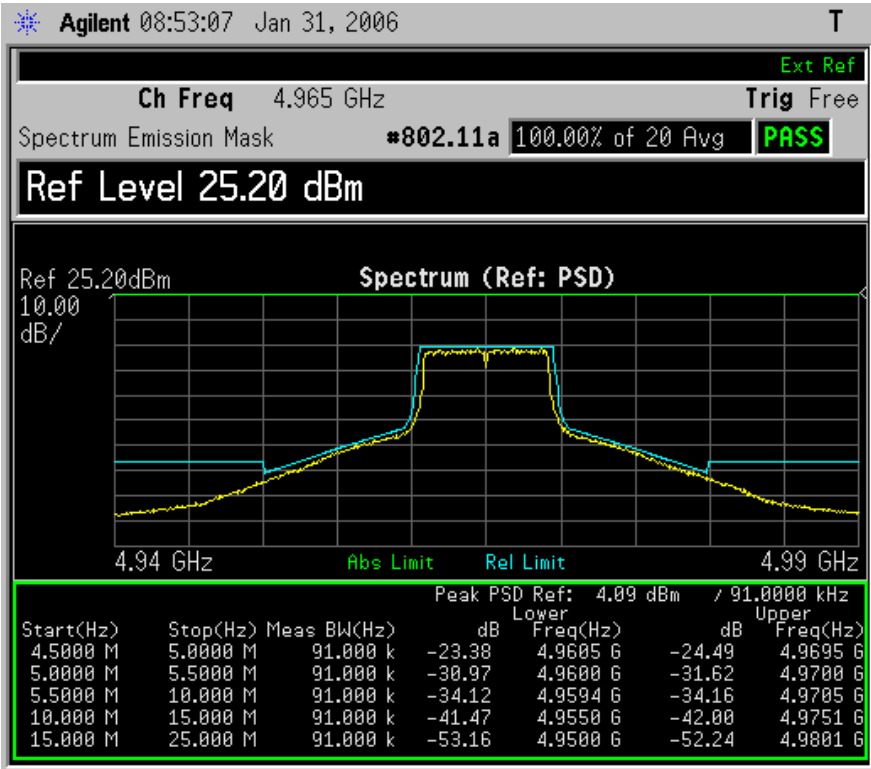
Plot 6.5.3: Emission Mask M, OBW 5MHz, Upper Frequency



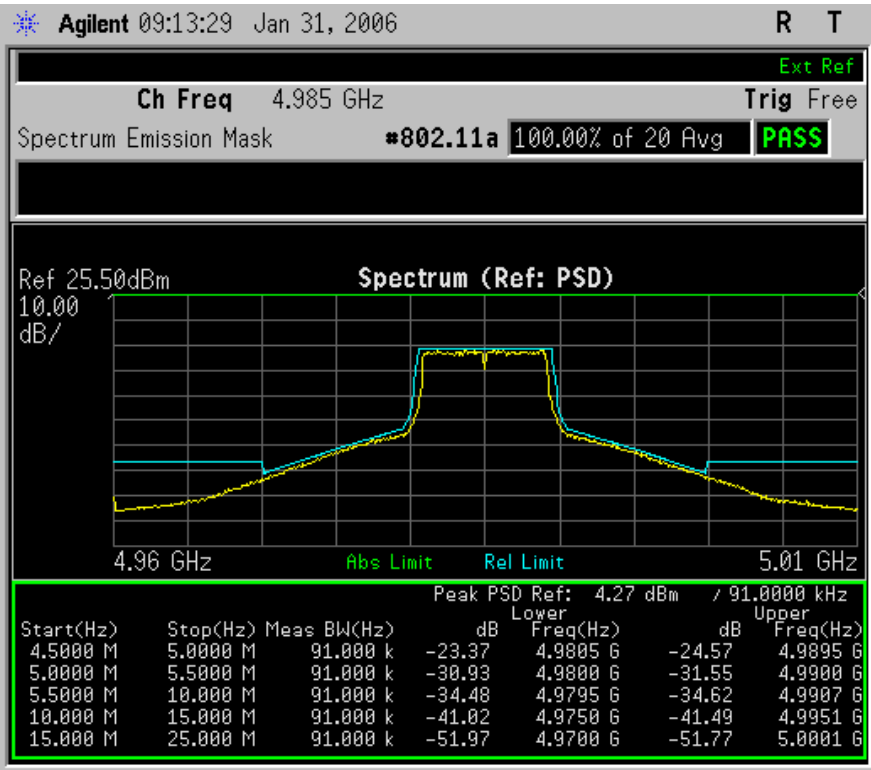
Plot 6.5.4: Emission Mask M, OBW 10MHz, lower Frequency



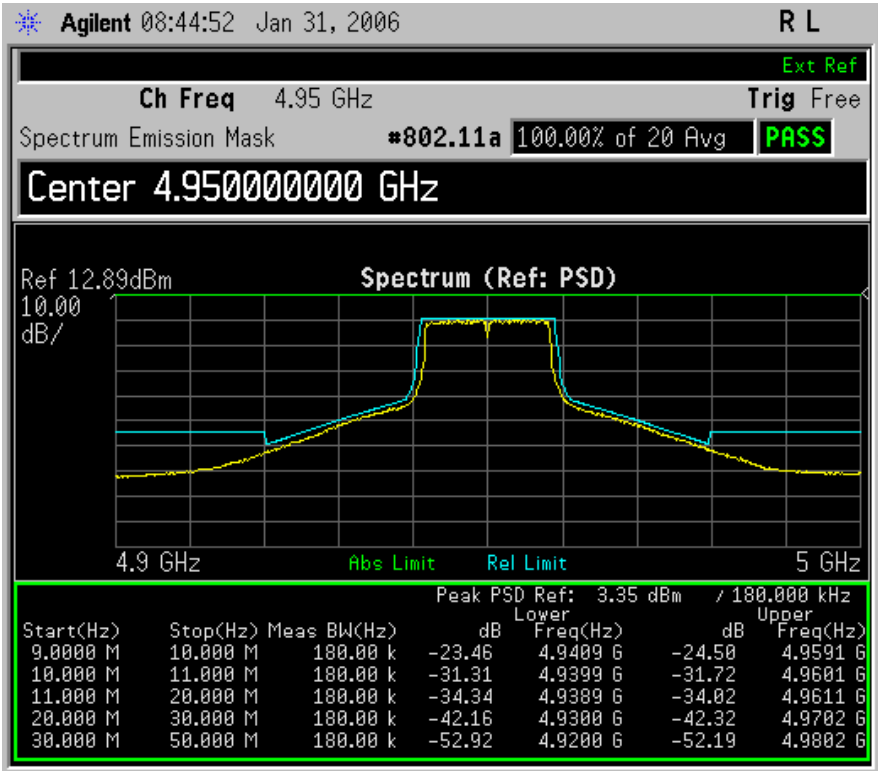
Plot 6.5.5: Emission Mask M, OBW 10MHz, Mid Frequency



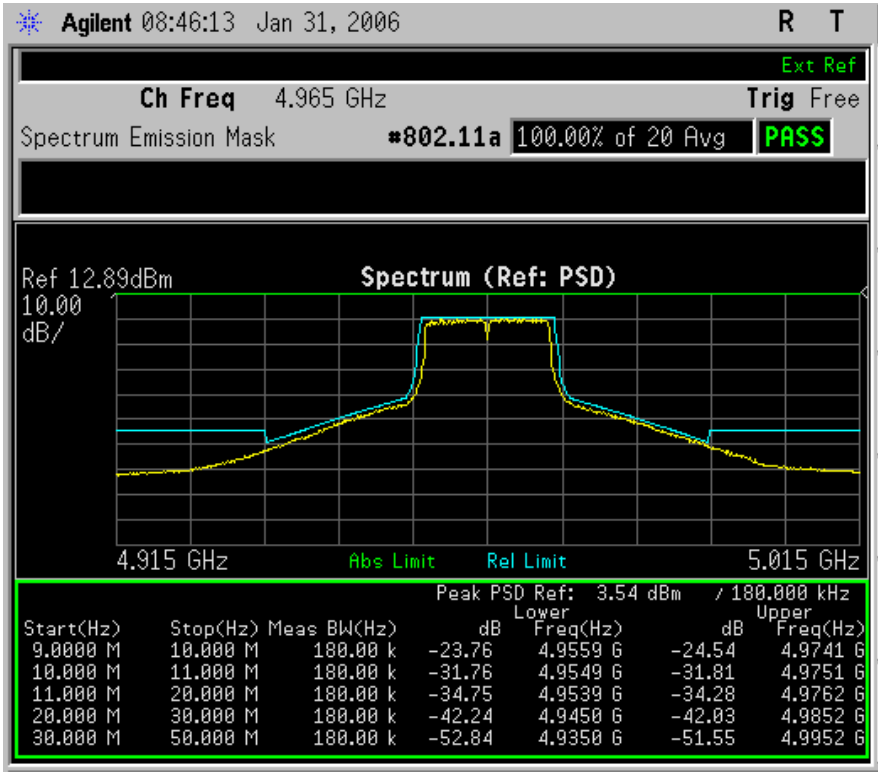
Plot 6.5.6: Emission Mask M, OBW 10MHz, Upper Frequency



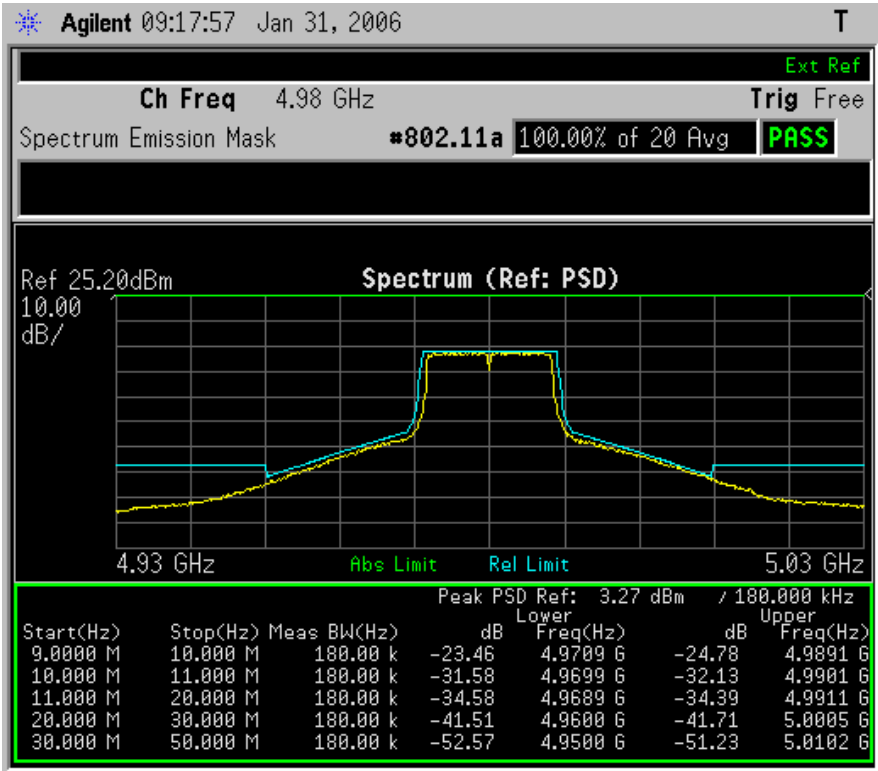
Plot 6.5.7: Emission Mask M, OBW 20MHz, lower Frequency



Plot 6.5.8: Emission Mask M, OBW 20MHz, Mid Frequency



Plot 6.5.9: Emission Mask M, OBW 20MHz, upper Frequency



6.6 Spurious Emissions at Antenna Terminals - Pursuant to 47 CFR §90.210 (m)6.6.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- The EUT 4.9GHz RF Output Connector was connected through Calibrated Attenuators to a Spectrum Analyzer.
- The Spectrum Analyzer RBW and VBW were set according to Frequency Range and Max Hold was activated.
- The EUT power was adjusted at the maximum output power level.
- 5MHz bandwidth, which has the worst case in band peak power spectral density, was chosen for this test.
- Procedure was repeated at lower, mid and upper channels and at highest data rate.
- All bandwidths are shown at frequency range 4900-5030[MHz].

6.6.2 Spurious Emission Limit:

- Specification test limit for maximum output power is given according to:

$$\text{Limit} = 21\text{dBm} - (55 + 10\log(0.126) [\text{dB}]) = 21\text{dBm} - 46\text{dB}$$

$$\text{Limit} = -25\text{dBm}^*$$

* Spurious emission limit do not apply to the in band emission within ± 250 % of the authorized bandwidth from the carrier;

In band Emission within ± 250 % is presented in Emission Mask test.

6.6.3 Results:

- Test Results are provided in Table 6.6.1 and associated plots.

Table 6.6.1: Spurious emission test results.

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency									
9885.00	-47.17	Included	Included	100	-47.17	68.17	46.00	22.17	Pass
14828.70	-45.00	Included	Included	100	-45.00	66.00	46.00	20.00	Pass
19771.20	-50.17	Included	Included	100	-50.17	71.17	46.00	25.17	Pass
Mid carrier frequency									
9930.00	-45.83	Included	Included	100	-45.83	66.83	46.00	20.83	Pass
14895.52	-46.00	Included	Included	100	-46.00	67.00	46.00	21.00	Pass
19858.70	-49.17	Included	Included	100	-49.17	70.17	46.00	24.17	Pass
High carrier frequency									
9974.80	-46.00	Included	Included	100	-46.00	67.00	46.00	21.00	Pass
14961.80	-48.17	Included	Included	100	-48.17	69.17	46.00	23.17	Pass
19951.30	-49.17	Included	Included	100	-49.17	70.17	46.00	24.17	Pass

*- Margin = Spurious emission – specification limit.

Table 6.6.2: Spurious emission plots summary.

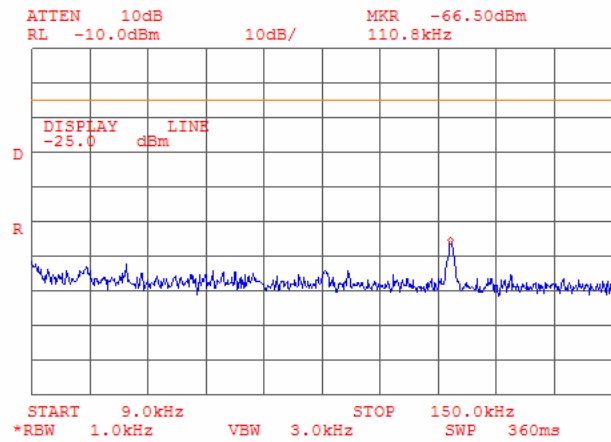
Plot #	Frequency [MHz]	Channel Bandwidth [MHz]	Freq Sweep	Pass/Fail
6.6.1÷3	Low, mid, high	5	9 – 150 [KHz]	Pass
6.6.4÷6	Low, mid, high	5	0.15 - 30 [MHz]	Pass
6.6.7÷9	Low, mid, high	5	30 – 1000 [MHz]	Pass
6.6.10÷12	Low, mid, high	5	1000 – 4900 [MHz]	Pass
6.6.13÷15	Low, mid, high	5	4900[MHz] – in band	Pass
6.6.16÷18	Low, mid, high	10	4900[MHz] – in band	Pass
6.6.19÷21	Low, mid, high	20	4900[MHz] – in band	Pass
6.6.22÷24	Low, mid, high	5	in band - 5030[MHz]	Pass
6.6.25÷27	Low, mid, high	10	in band - 5030[MHz]	Pass
6.6.28÷30	Low, mid, high	20	in band - 5030[MHz]	Pass
6.6.31÷33	Low, mid, high	5	5030 - 40000[MHz]	Pass
6.6.34÷36	Low, mid, high	5	2 nd Harmonic	Pass
6.6.37÷39	Low, mid, high	5	3 rd Harmonic	Pass
6.6.40÷42	Low, mid, high	5	4 th Harmonic	Pass
6.6.43÷45	Low, mid, high	5	5 th Harmonic	Pass
6.6.46÷48	Low, mid, high	5	6 th Harmonic	Pass
6.6.49÷51	Low, mid, high	5	7 th Harmonic	Pass

Plot 6.6.1: Tx Spurious emission measurements in 9 - 150 KHz range at low carrier frequency, OBW 5 MHz



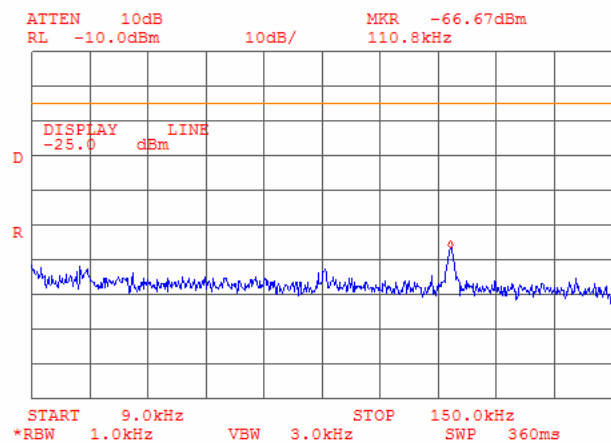
Note: 110 kHz – ambient noise

Plot 6.6.2: Tx Spurious emission measurements in 9 - 150 KHz range at mid carrier frequency, OBW 5 MHz



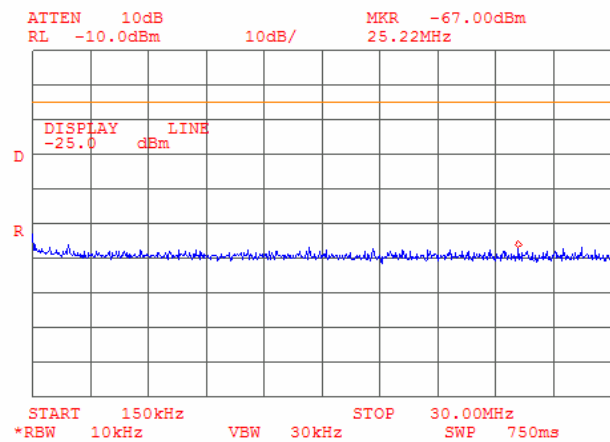
Note: 110 kHz – ambient noise

Plot 6.6.3: Tx Spurious emission measurements in 9 - 150 KHz range at high carrier frequency, OBW 5 MHz

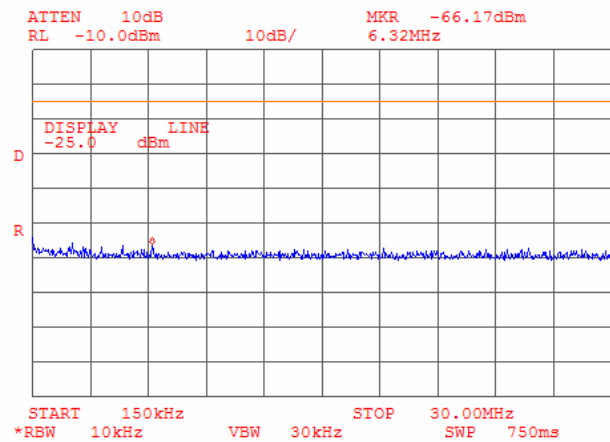


Note: 110 kHz – ambient noise

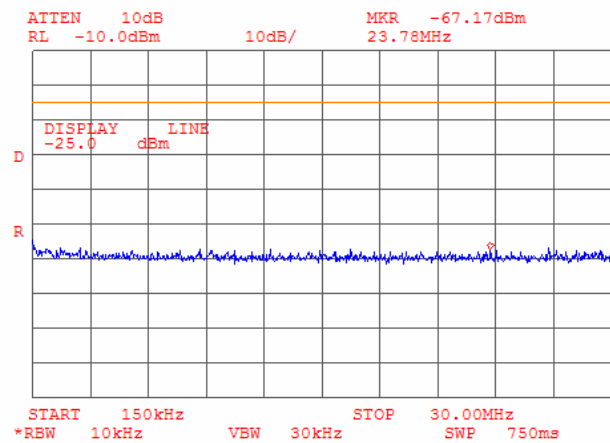
Plot 6.6.4: Tx Spurious emission measurements in 0.15 - 30.0 MHz range at low carrier frequency, OBW 5 MHz



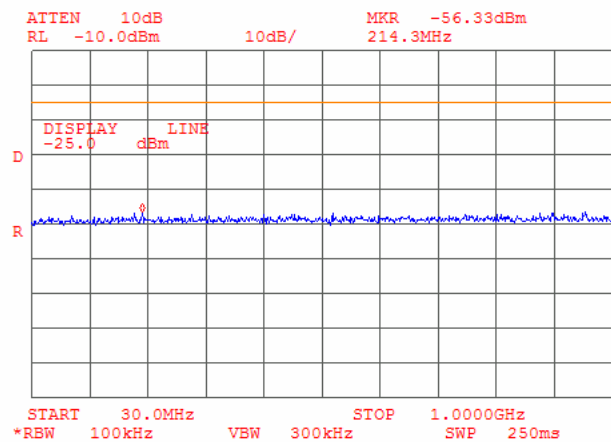
Plot 6.6.5: Tx Spurious emission measurements in 0.15 - 30.0 MHz range at mid carrier frequency, OBW 5 MHz



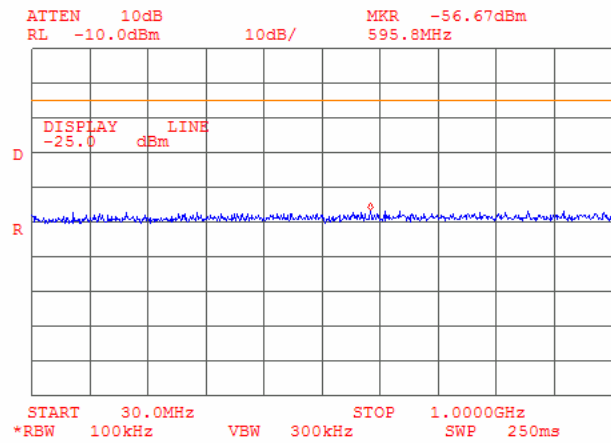
Plot 6.6.6: Tx Spurious emission measurements in 0.15 - 30.0 MHz range at high carrier frequency, OBW 5 MHz



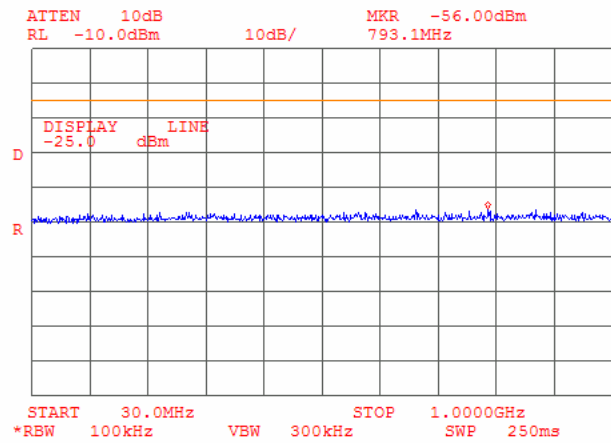
Plot 6.6.7: Tx Spurious emission measurements in 30.0 - 1000 MHz range at low carrier frequency, OBW 5 MHz



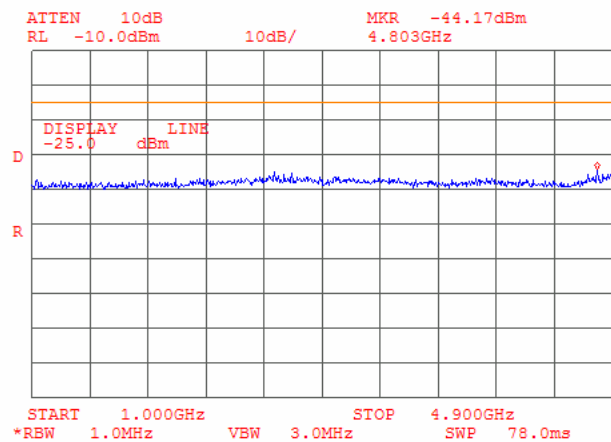
Plot 6.6.8: Tx Spurious emission measurements in 30.0 - 1000 MHz range at mid carrier frequency, OBW 5 MHz



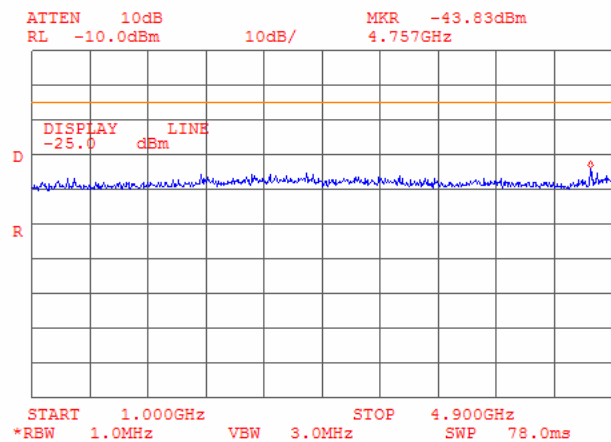
Plot 6.6.9: Tx Spurious emission measurements in 30.0 - 1000 MHz range at high carrier frequency, OBW 5 MHz



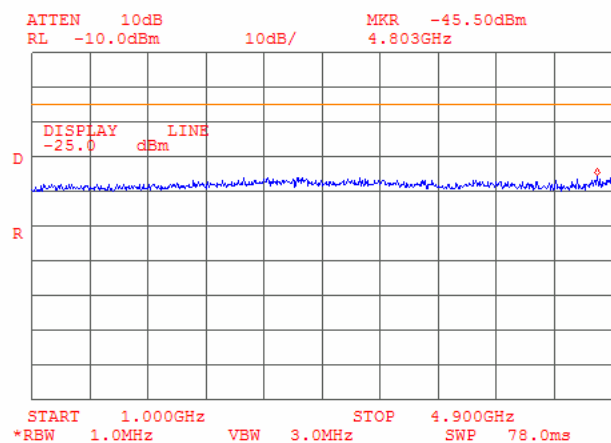
Plot 6.6.10: Tx Spurious emission measurements in 1000 - 4900 MHz range at low carrier frequency, OBW 5 MHz



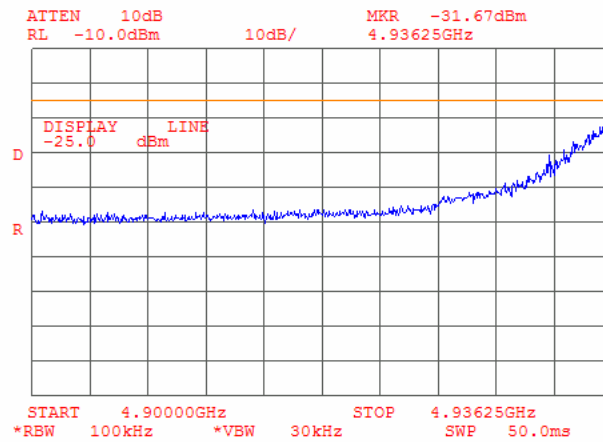
Plot 6.6.11: Tx Spurious emission measurements in 1000 - 4900 MHz range at mid carrier frequency, OBW 5 MHz



Plot 6.6.12: Tx Spurious emission measurements in 1000 - 4900 MHz range at high carrier frequency, OBW 5 MHz

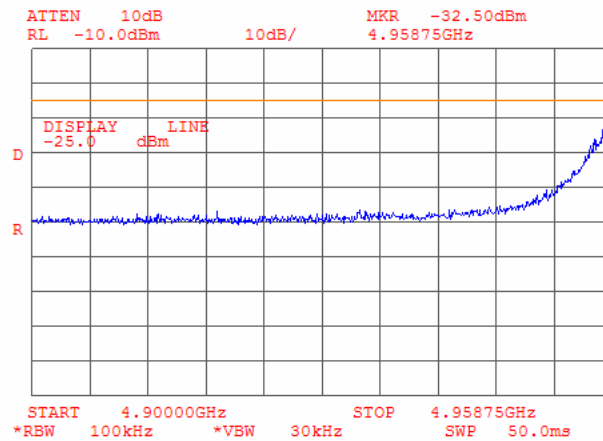


Plot 6.6.13: Tx Spurious emission measurements in 4900 – 4936.25 MHz range at low carrier frequency, OBW 5 MHz



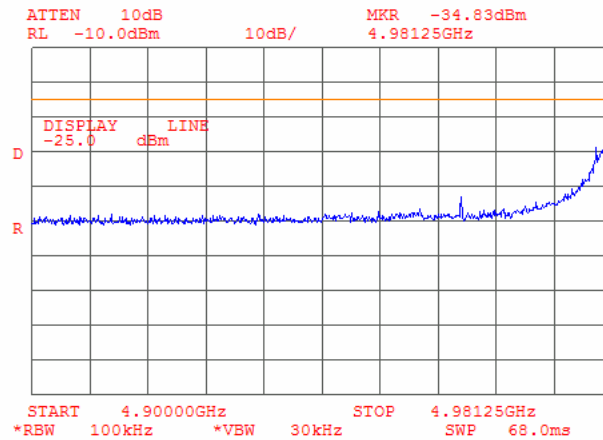
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.14: Tx Spurious emission measurements in 4900 – 4958.75 MHz range at mid carrier frequency, OBW 5 MHz



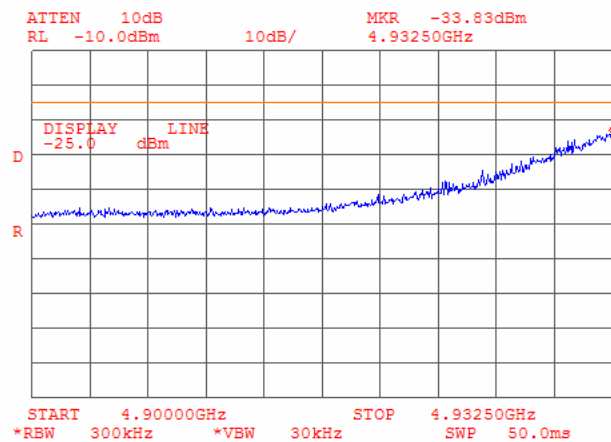
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.15 Tx Spurious emission measurements in 4900 – 4981.25 MHz range at high carrier frequency, OBW 5 MHz



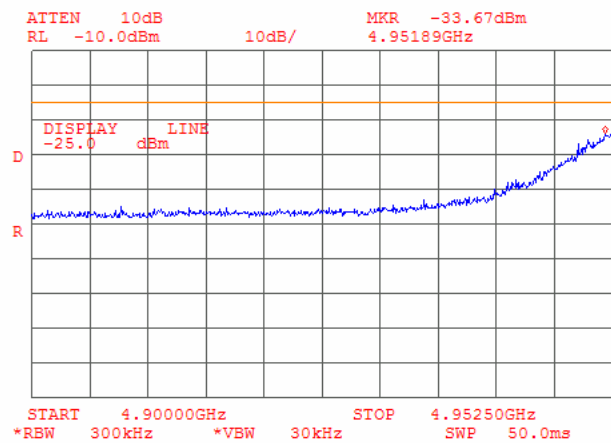
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.16: Tx Spurious emission measurements in 4900 – 4932.5 MHz range at low carrier frequency, OBW 10 MHz



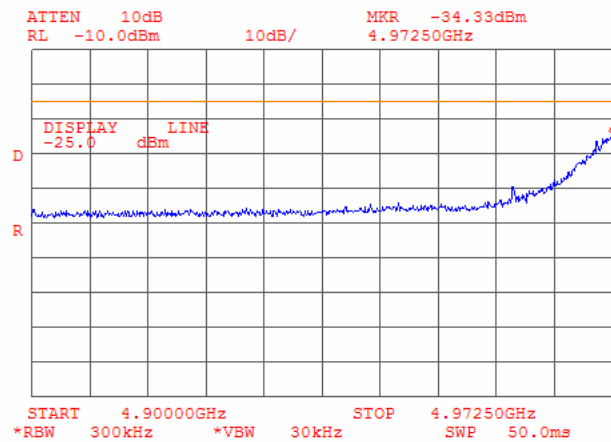
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.17: Tx Spurious emission measurements in 4900 – 4952.5 MHz range at mid carrier frequency, OBW 10 MHz

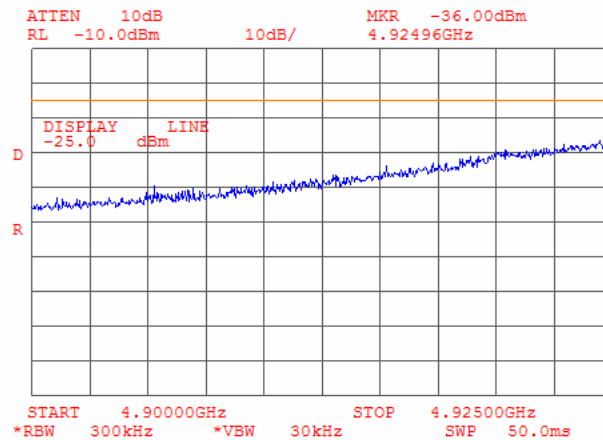


Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

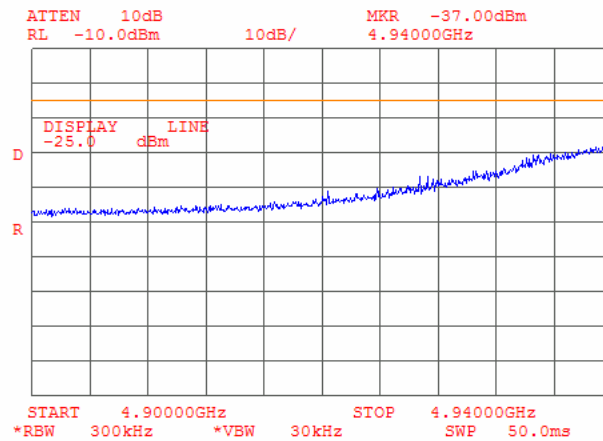
Plot 6.6.18 Tx Spurious emission measurements in 4900 – 4972.5 MHz range at high carrier frequency, OBW 10 MHz



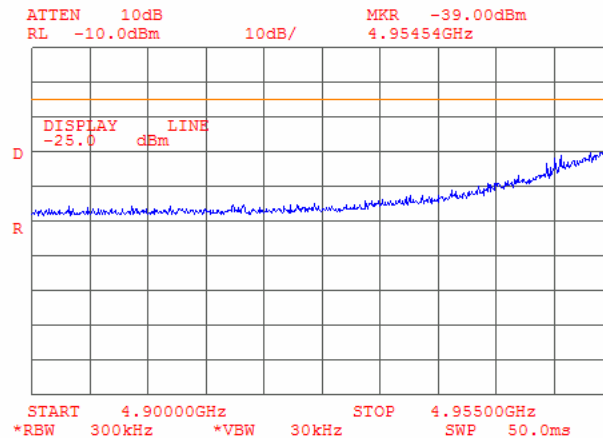
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.19: Tx Spurious emission measurements in 4900 – 4925 MHz range at low carrier frequency, OBW 20 MHz

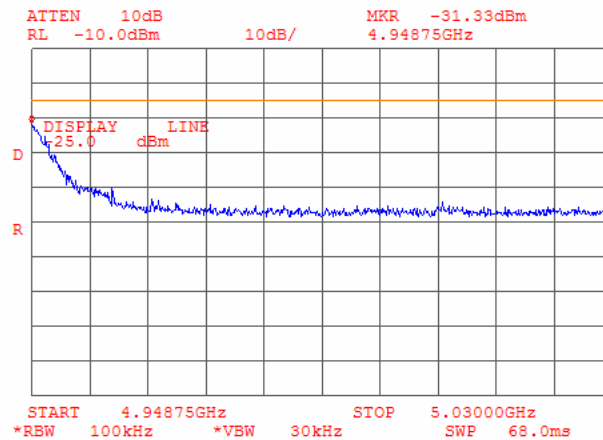
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.20: Tx Spurious emission measurements in 4900 – 4940 MHz range at mid carrier frequency, OBW 20 MHz

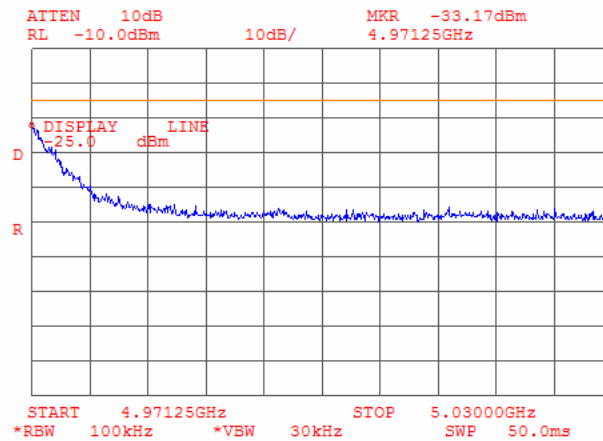
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.21: Tx Spurious emission measurements in 4900 – 4955 MHz range at high carrier frequency, OBW 20 MHz

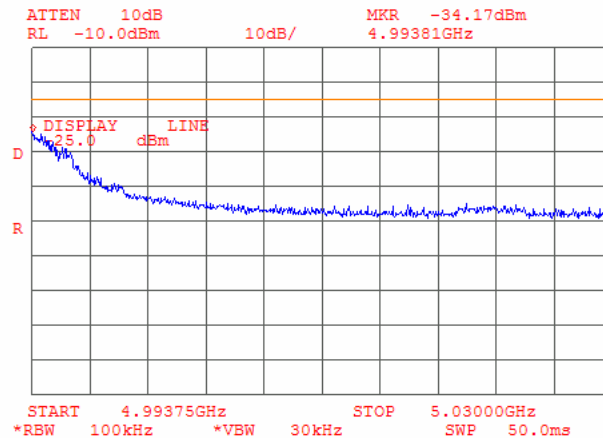
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.22: Tx Spurious emission measurements in 4948.75 – 5030 MHz range at low carrier frequency, OBW 5 MHz

Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

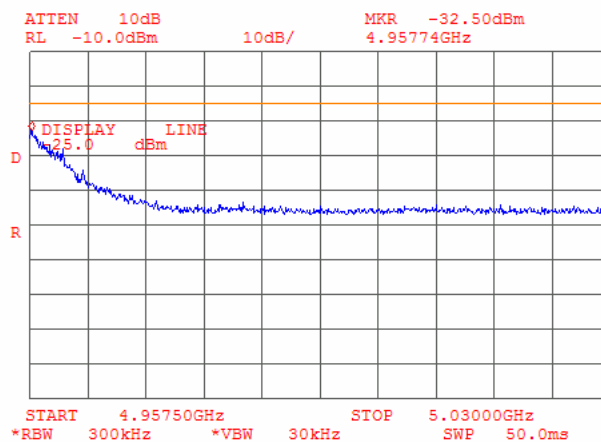
Plot 6.6.23: Tx Spurious emission measurements in 4971.25 – 5030 MHz range at mid carrier frequency, OBW 5 MHz

Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.24: Tx Spurious emission measurements in 4993.75 – 5030 MHz range at high carrier frequency, OBW 5 MHz

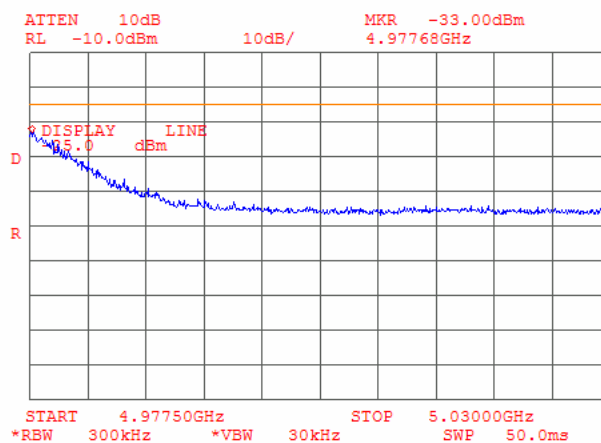
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.25: Tx Spurious emission measurements in 4957.5 – 5030 MHz range at low carrier frequency, OBW 10 MHz



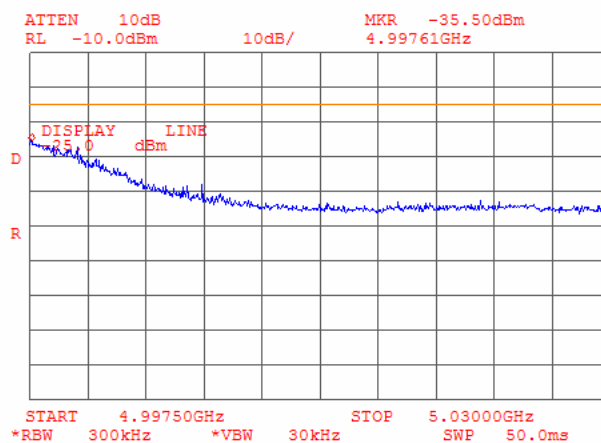
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.26: Tx Spurious emission measurements in 4977.5 – 5030 MHz range at mid carrier frequency, OBW 10 MHz



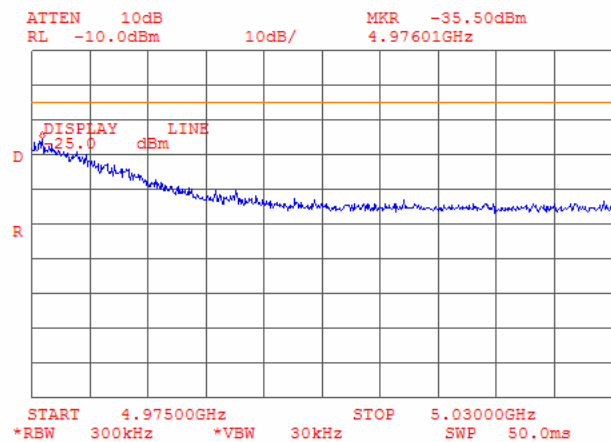
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.27: Tx Spurious emission measurements in 4997.5 – 5030 MHz range at high carrier frequency, OBW 10 MHz



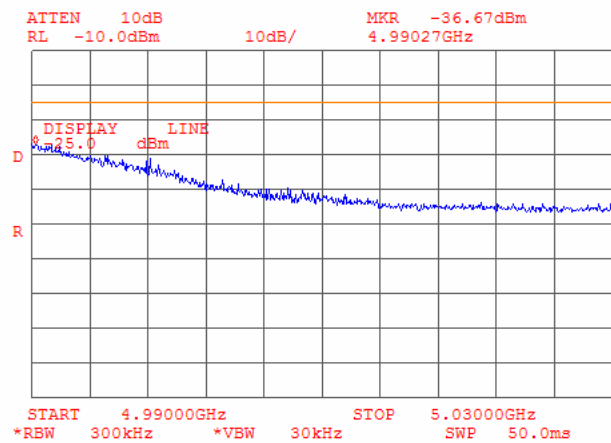
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.28: Tx Spurious emission measurements in 4975 – 5030 MHz range at low carrier frequency, OBW 20 MHz



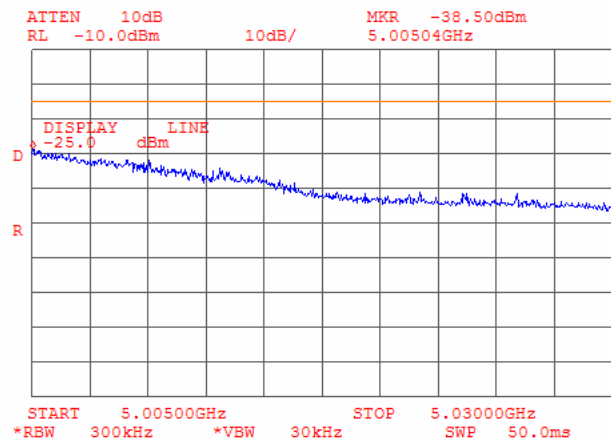
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.29: Tx Spurious emission measurements in 4990 – 5030 MHz range at mid carrier frequency, OBW 20 MHz



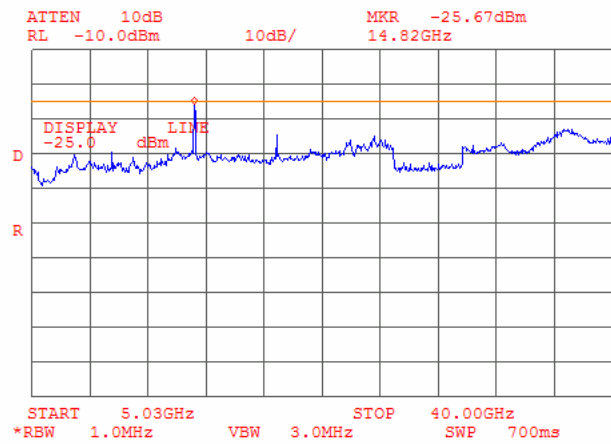
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.30: Tx Spurious emission measurements in 5005 – 5030 MHz range at high carrier frequency, OBW 20 MHz

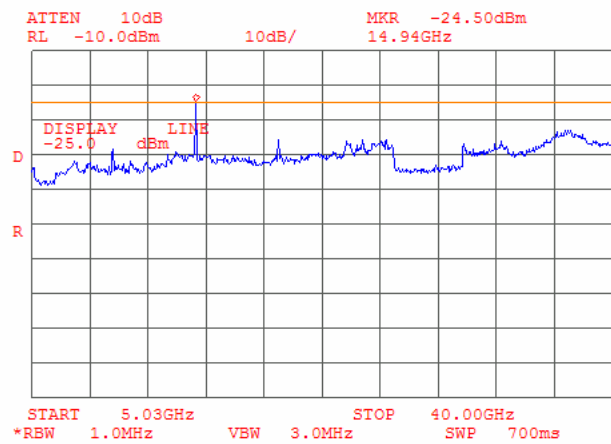


Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

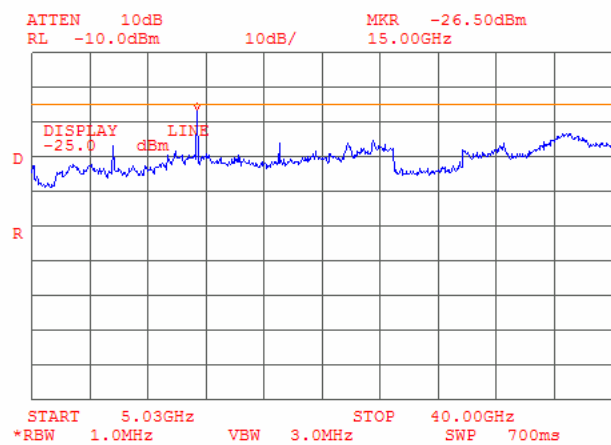
Plot 6.6.31: Tx Spurious emission measurements in 5030 – 40000 MHz range at low carrier frequency, OBW 5 MHz

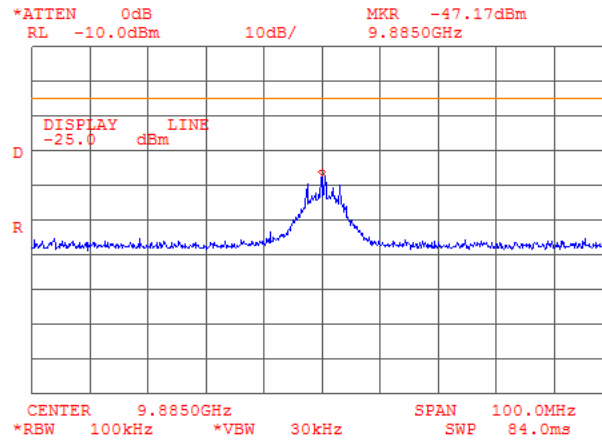


Plot 6.6.32: Tx Spurious emission measurements in 5030 – 40000 MHz range at mid carrier frequency, OBW 5 MHz

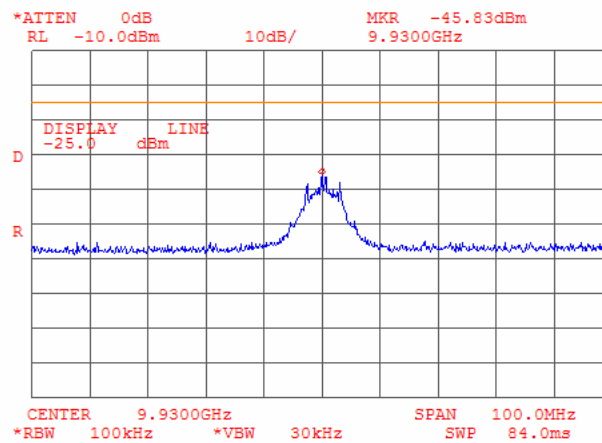


Plot 6.6.33: Tx Spurious emission measurements in 5030 – 40000 MHz range at high carrier frequency, OBW 5 MHz

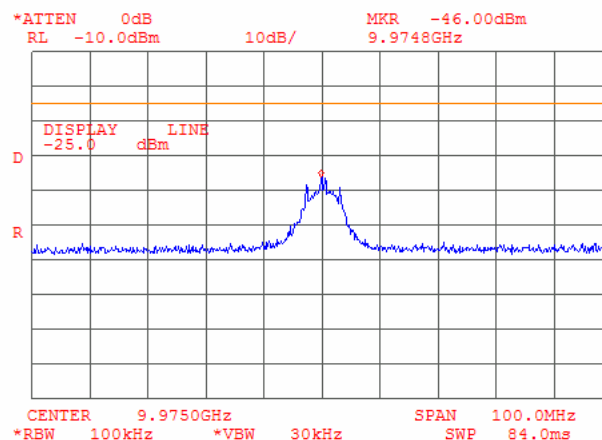


Plot 6.6.34: Tx Conducted spurious emission measurements at the 2nd harmonic of low carrier frequency, OBW 5 MHz

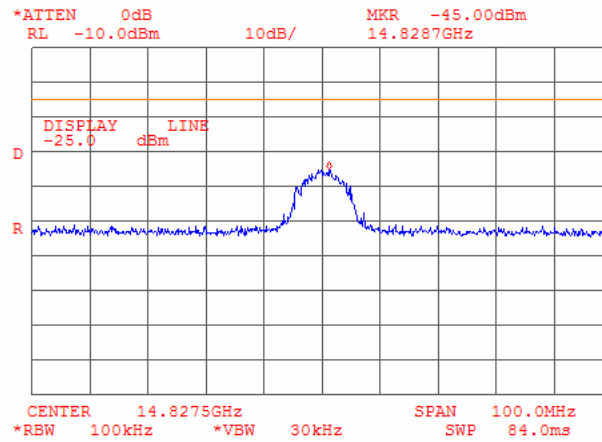
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.35: Tx Conducted spurious emission measurements at the 2nd harmonic of mid carrier frequency, OBW 5 MHz

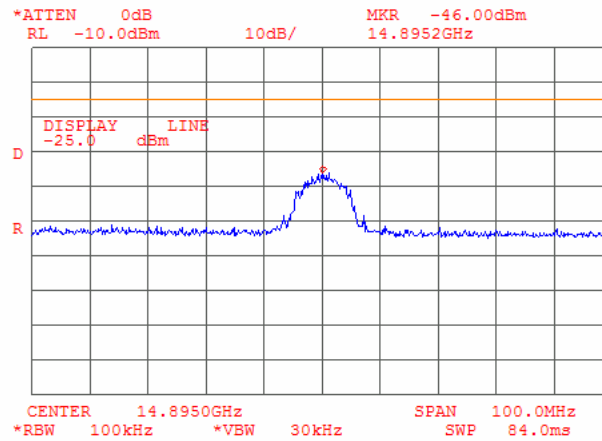
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.36: Tx Conducted spurious emission measurements at the 2nd harmonic of high carrier frequency, OBW 5 MHz

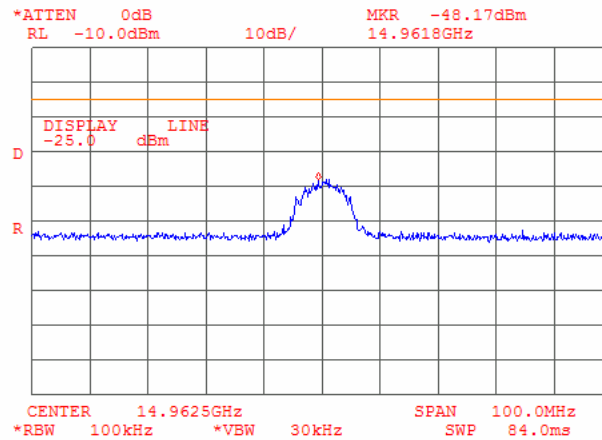
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.37: Tx Conducted spurious emission measurements at the 3rd harmonic of low carrier frequency, OBW 5 MHz

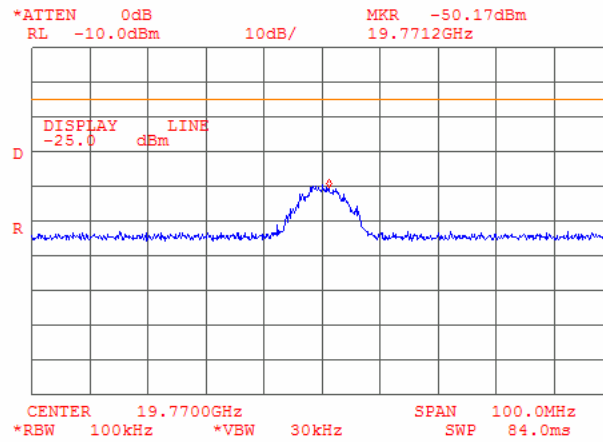
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.38: Tx Conducted spurious emission measurements at the 3rd harmonic of mid carrier frequency, OBW 5 MHz

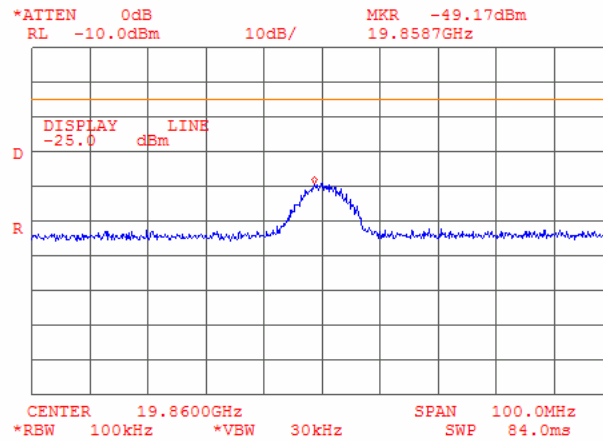
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.39: Tx Conducted spurious emission measurements at the 3rd harmonic of high carrier frequency, OBW 5 MHz

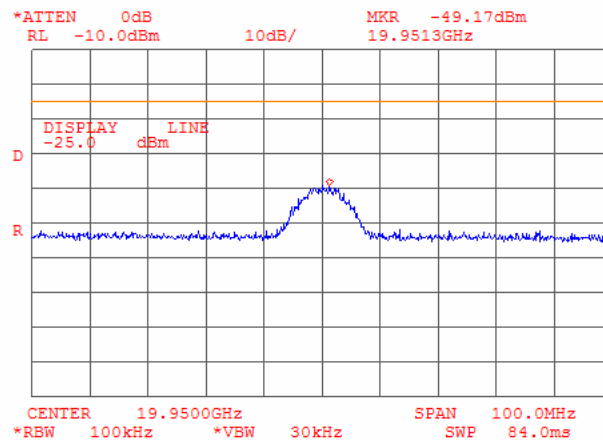
Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

Plot 6.6.40: Tx Conducted spurious emission measurements at the 4th harmonic of low carrier frequency, OBW 5 MHz

Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

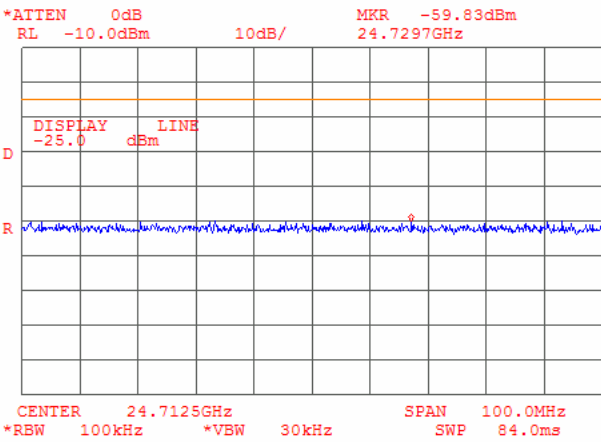
Plot 6.6.41: Tx Conducted spurious emission measurements at the 4th harmonic of mid carrier frequency, OBW 5 MHz

Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

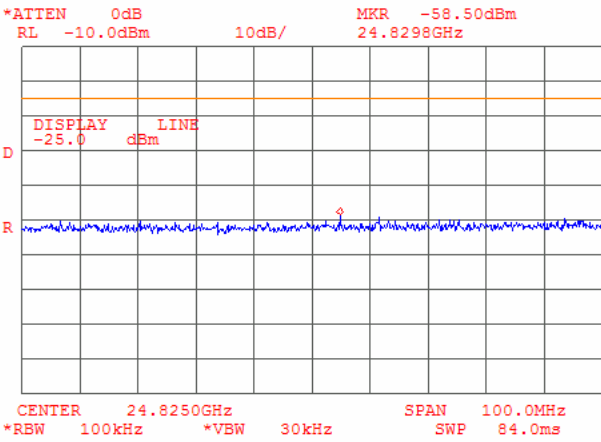
Plot 6.6.42: Tx Conducted spurious emission measurements at the 4th harmonic of high carrier frequency, OBW 5 MHz

Note: according to 90.210(m)(7) RBW shall be at least 1% of OBW and VBW = 30 kHz.

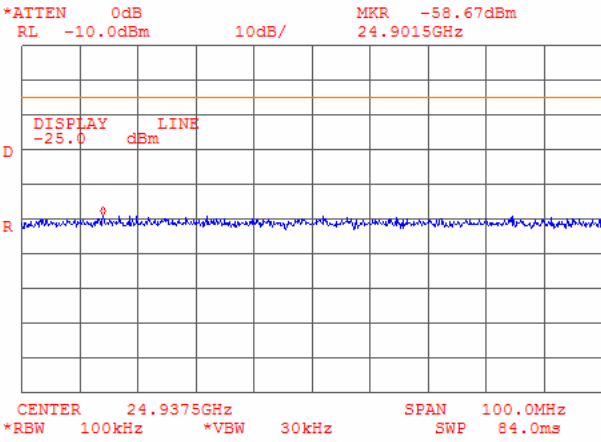
Plot 6.6.43: Tx Conducted spurious emission measurements at the 5th harmonic of low carrier frequency, OBW 5 MHz



Plot 6.6.44: Tx Conducted spurious emission measurements at the 5th harmonic of mid carrier frequency, OBW 5 MHz



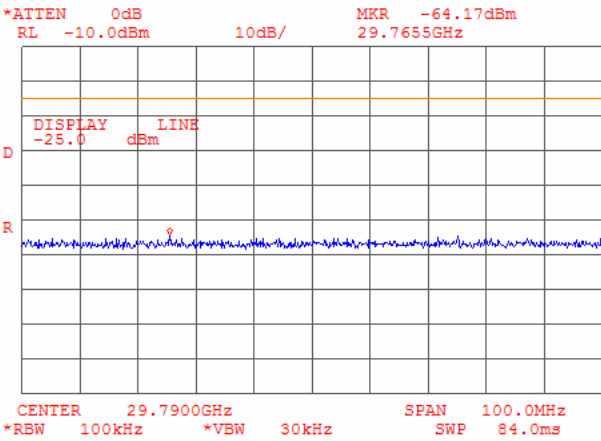
Plot 6.6.45: Tx Conducted spurious emission measurements at the 5th harmonic of high carrier frequency, OBW 5 MHz



Plot 6.6.46: Tx Conducted spurious emission measurements at the 6th harmonic of low carrier frequency, OBW 5 MHz



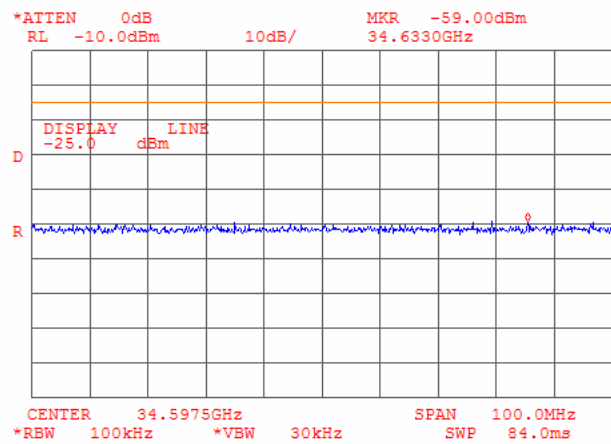
Plot 6.6.47: Tx Conducted spurious emission measurements at the 6th harmonic of mid carrier frequency, OBW 5 MHz



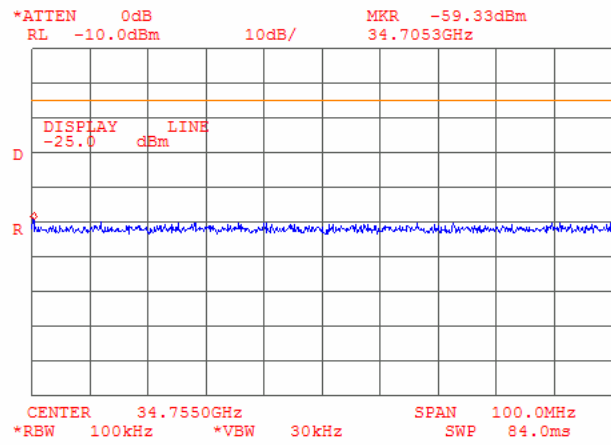
Plot 6.6.48: Tx Conducted spurious emission measurements at the 6th harmonic of high carrier frequency, OBW 5 MHz



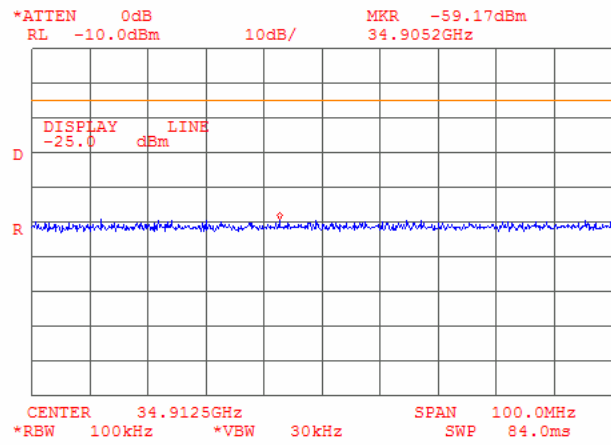
Plot 6.6.49: Tx Conducted spurious emission measurements at the 7th harmonic of low carrier frequency, OBW 5 MHz



Plot 6.6.50: Tx Conducted spurious emission measurements at the 7th harmonic of mid carrier frequency, OBW 5 MHz



Plot 6.6.51: Tx Conducted spurious emission measurements at the 7th harmonic of high carrier frequency, OBW 5 MHz



6.7 Radiated spurious Emissions - Pursuant to 47 CFR §90.210 (m)6.7.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- Laptop was placed on the top of a rotating table 0.8 meters above the ground.
- The EUT power was adjusted at the maximum output power level.
- The table was rotated 360 degree to determine the position of the highest radiation.
- A receiving antenna was set 3 meters away from the EUT and was mounted on a variable height antenna tower.
- The Field strength of radiated spurious emissions was measured..
- Both Horizontal and Vertical Polarization of receiving antenna were tested.
- The EUT 4.9GHz RF Output Connector was terminated with a 50Ω load termination.
- Procedure was repeated for the 5MHz bandwidth, which has the worst case peak power spectral density at lower, mid and upper channels and at highest data rate.
- Test was taken at Semi anechoic chamber and OATS located at “Hermon Labs”.

6.7.2 Limit:

- Specification test limit is given in Table 6.7.1.

Table 6.7.1: Radiated spurious emission limit.

Frequency* [MHz]	Attenuation below Carrier** [dBc]	ERP of spurious [dBm]	Equivalent Field Strength Limit @3m [dBuV/m] ***
0.009-4000	46	-25	72.38

* Excluding the in band emission within $\pm 250\%$ of the authorized bandwidth from the carrier

** Attenuation is calculated according to:

$$55 + 10 * \log(P) = 55 + 10 * \log(0.126)$$

P is transmitter output power in Watts.

*** Equivalent field strength limit was calculated from the maximum allowed ERP of spurious as follows:

$$E = \frac{\sqrt{30 * P * 1.64}}{r}$$

Where: P - ERP in Watts

1.64 - numeric gain of ideal dipole

r – Antenna to EUT distance in Meters.

6.7.3 Results:

- Test Results are provided in Table 6.7.2÷3 and associated plots.

Table 6.7.2: Spurious emission field strength test results

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Low carrier frequency MHz							
9885.00	75.67	72.38	3.29	1000	V	1.1	188
14830.00	73.17	72.38	0.79	1000	V	1.0	219
19768.17	58.83	72.38	-13.55	1000	V	1.1	67
Mid carrier frequency MHz							
9927.75	74.00	72.38	1.62	1000	V	1.1	188
14894.25	73.17	72.38	0.79	1000	V	1.0	219
19862.83	59.33	72.38	-13.05	1000	V	1.1	67
High carrier frequency MHz							
9975.25	72.50	72.38	0.12	1000	V	1.1	188
14961.25	74.00	72.38	1.62	1000	V	1.0	219
19949.33	58.50	72.38	-13.88	1000	V	1.1	67

*- Margin = Field strength of spurious – calculated field strength limit.

** - EUT front panel refers to 0 degrees position of turntable.

Table 6.7.3: Substitution ERP of spurious test results

ASSIGNED FREQUENCY RANGE: 4940 – 4990 MHz
 TEST SITE: OATS
 TEST DISTANCE: 3 m
 SUBSTITUTION ANTENNA HEIGHT: 0.8 m
 DETECTOR USED: Peak
 VIDEO BANDWIDTH: > Resolution bandwidth
 SUBSTITUTION ANTENNA TYPE: Double ridged guide (1000 MHz – 18000 MHz)
 Standard gain horn (above 18000 MHz)

Frequency, MHz	Field strength, dB(μV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain, dBd	Cable loss, dB	ERP, dBm	Attenuation below carrier, dBc	Limit, dBc	Margin, dB*	Verdict
Low carrier frequency											
9885.00	75.67	1000	Vertical	-34.03	9.65	2.00	-26.38	47.38	46.0	1.38	Pass
14830.00	73.17	1000	Vertical	-34.66	10.77	2.65	-26.54	47.54	46.0	1.54	Pass
19768.17	58.83	1000	Vertical	-50.17	21.55	3.06	-31.68	52.68	46.0	6.68	Pass
Mid carrier frequency											
9927.75	74.00	1000	Vertical	-34.83	9.29	2.03	-27.57	48.57	46.0	2.57	Pass
14894.25	73.17	1000	Vertical	-34.03	10.81	2.65	-25.87	46.87	46.0	0.87	Pass
19862.83	59.33	1000	Vertical	-49.67	21.75	3.08	-31.00	52.00	46.0	6.00	Pass
High carrier frequency											
9975.25	72.50	1000	Vertical	-35.83	9.33	2.03	-28.53	49.53	46.0	3.53	Pass
14961.25	74.00	1000	Vertical	-34.67	11.35	2.68	-26.00	47.00	46.0	1.00	Pass
19949.33	58.50	1000	Vertical	-50.83	21.75	3.10	-32.18	53.18	46.0	7.18	Pass

*- Margin = Spurious emission – specification limit.

6.8 Frequency Stability, Temperature Variations - Pursuant to 47 CFR §2.1055(a)(1); §90.2136.8.1 Test Procedure:

- The EUT was connected to a host computer.
- EUT only was placed inside an environmental chamber.
- The EUT 4.9GHz RF Output Connector was connected through Attenuators to Frequency measurement equipment.
- Output signal was set to CW.
- Procedure was made at center frequency.
- Limit : +/- 1ppm over Temperature range

6.8.2 Results:

Temperature [°C]	Ref Frequency [MHz]	Frequency at T [MHz]	Drift [Hz]	Drift [ppm]
-30	4965.004420	4965.003943	-477	-0.096
-20	4965.004420	4965.005283	863	0.173
-10	4965.004420	4965.005587	1167	0.235
0	4965.004420	4965.003926	-494	-0.099
10	4965.004420	4965.005599	1179	0.237
20	4965.004420	4965.004420	0	0
30	4965.004420	4965.002678	-1742	-0.350
40	4965.004420	4965.002128	-2292	-0.461
50	4965.004420	4965.002977	-1443	-0.290
Frequency Drift			+1179/-2292	+0.237/-0.461

- Note: Reference Frequency measured at 20°C and nominal voltage.

6.9 Frequency Stability, Voltage Variations - Pursuant to 47 CFR §2.1055(d)(1); §90.2136.9.1 Test Procedure:

- The EUT was connected to a Laptop via extender card.
- The EUT 4.9GHz RF Output Connector was connected through Attenuators to Frequency measurement equipment.
- The EUT input Voltage was connected to external power supply and the voltage was varied from +/- 15% of the nominal.
- Output signal was set to CW.
- Procedure was made at center frequency.
- Limit : +/- 1 ppm over Voltage range

6.9.2 Results:

Voltage [V]	Ref Frequency [MHz]	Frequency at V [MHz]	Drift [Hz]	Drift [ppm]
2.805	4965.002139	4965.002132	-7	-0.0014
3.3	4965.002139	4965.002139	0	0
3.795	4965.002139	4965.002158	19	0.0038

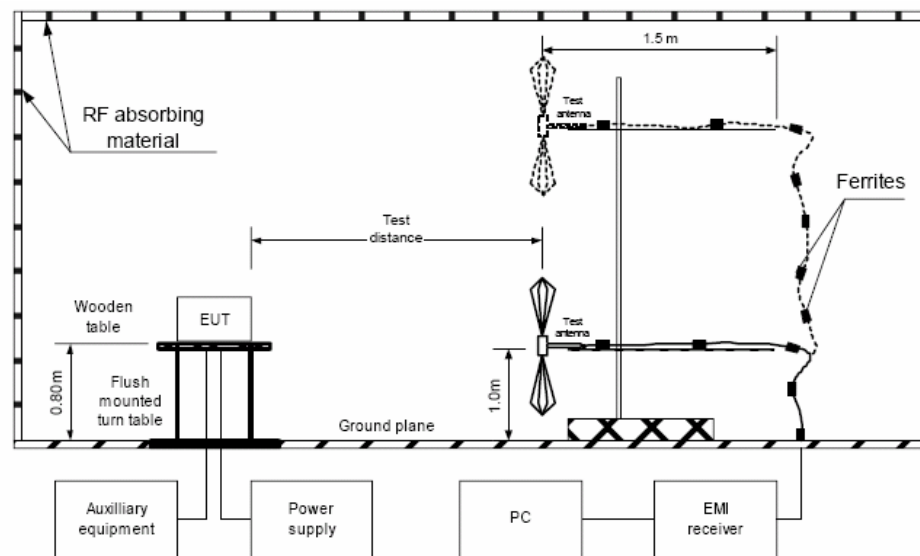
- Note: Reference Frequency measured at room temperature and nominal voltage.

6.10 Radiated Emission, General requirements – pursuant to §15.109(a)

6.10.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- EUT and Laptop were set up as shown in plot 6.10.1.
- The EUT was adjusted to receive/standby at 802.11a @ 4.9GHz mode.
- The table was rotated 360 degree to determine the position of the highest radiation.
- A receiving antenna was set 3 meters away from the EUT and was mounted on a variable height antenna tower.
- The Field strength of radiated spurious emissions was measured.
- The Tested Frequency range was 30 ÷ 16625MHz.
- Both Horizontal and Vertical Polarization of receiving antenna were tested.
- Test was taken at Semi anechoic chamber located at “Hermon Labs”.

Plot 6.10.1: Setup for Radiated Emission Measurement.



6.10.2 Limits:

- Specification Class B limits is given in table 6.10.1.

Table 6.10.1: Limits for Radiated emissions

Frequency, MHz	Class B limit, dB(μV/m)
	3 m distance
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0

6.10.3 Results:

- Test Results are provided in Table 6.10.2 and associated plots.

Table 6.10.2: Radiated emission test results below 1GHz.

LIMIT: Class B
 TEST DISTANCE: 3 m
 DETECTORS USED: PEAK / QUASI-PEAK
 FREQUENCY RANGE: 30 MHz – 1000 MHz
 RESOLUTION BANDWIDTH: 120 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
233.164663	37.46	33.83	46.00	-12.17	Horizontal	1.4	260	Pass
299.787500	35.86	33.47	46.00	-12.53	Horizontal	1.1	229	
366.410618	45.53	43.31	46.00	-2.69	Horizontal	1.0	190	
433.050000	35.46	32.51	46.00	-13.49	Horizontal	1.0	137	
489.425000	33.96	29.94	46.00	-16.06	Vertical	1.0	220	
732.900000	37.34	34.45	46.00	-11.55	Vertical	1.0	327	

Table 6.10.3: Radiated emission test results above 1GHz.

TEST DISTANCE: 3 m
 DETECTORS USED: PEAK / AVERAGE
 FREQUENCY RANGE: 1000 MHz – 16625 MHz***
 RESOLUTION BANDWIDTH: 1000 kHz

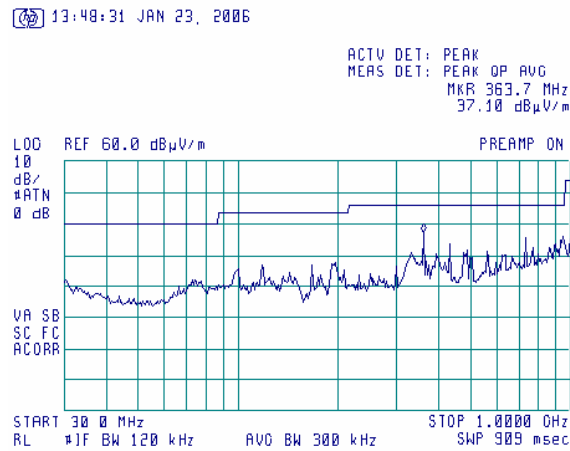
Frequency, MHz	Peak emission, dB(μV/m)	Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
1062.50000	44.97	25.67	54.00	-28.33	Vertical	1.0	209	Pass
1348.00000	52.07	31.37	54.00	-22.63	Vertical	1.0	291	
1429.25000	46.71	28.06	54.00	-25.94	Vertical	1.0	260	
1615.75000	52.92	28.84	54.00	-25.16	Vertical	1.1	170	
2490.50000	51.27	35.50	54.00	-18.50	Vertical	1.0	0	

*- Margin = Measured emission - specification limit.

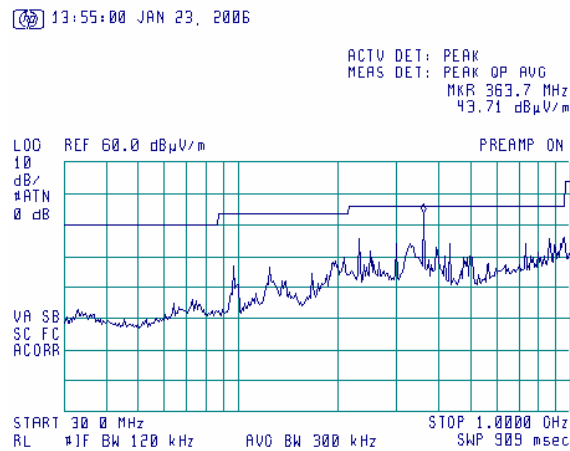
** - EUT front panel refer to 0 degrees position of turntable.

*** - The fifth harmonic of highest LO frequency is: 5 x 3325 MHz = 16625 MHz

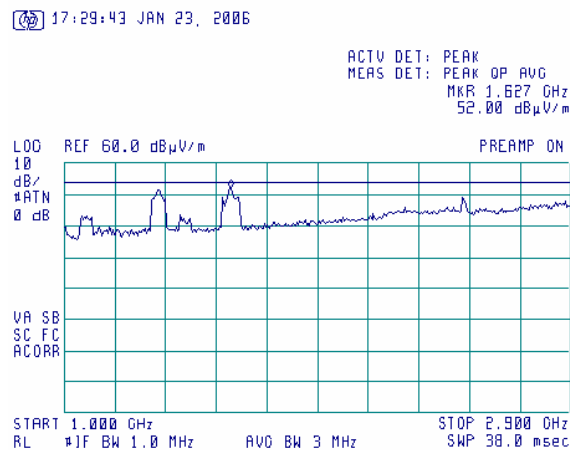
Plot 6.10.2: Rx Radiated Emission measurements in 30-1000 MHz range, Vertical Antenna polarization.



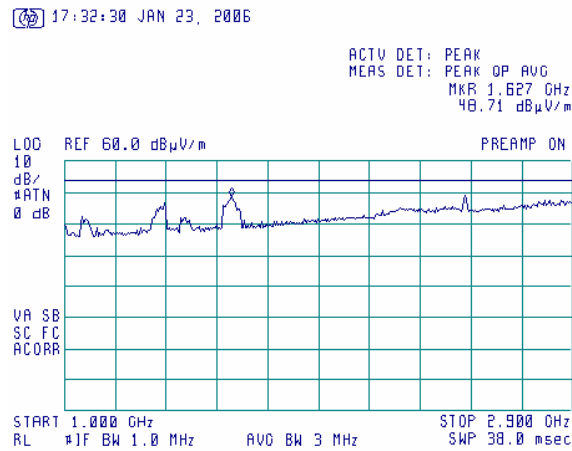
Plot 6.10.3: Rx Radiated Emission measurements in 30-1000 MHz range, Horizontal Antenna polarization.



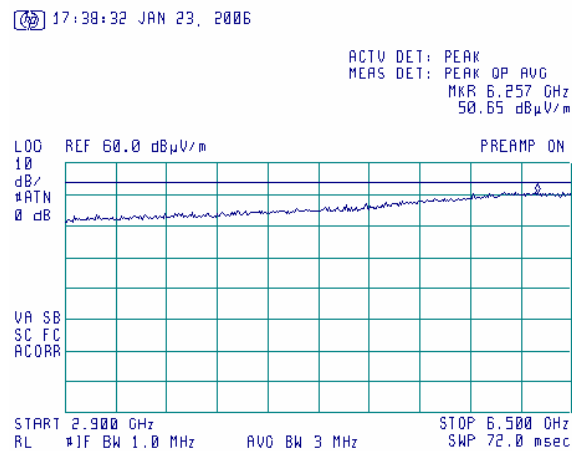
Plot 6.10.4: Rx Radiated Emission measurements in 1000-2900MHz range, Vertical Antenna polarization.



Plot 6.10.5: Rx Radiated Emission measurements in 1000-2900MHz range, Horizontal Antenna polarization.



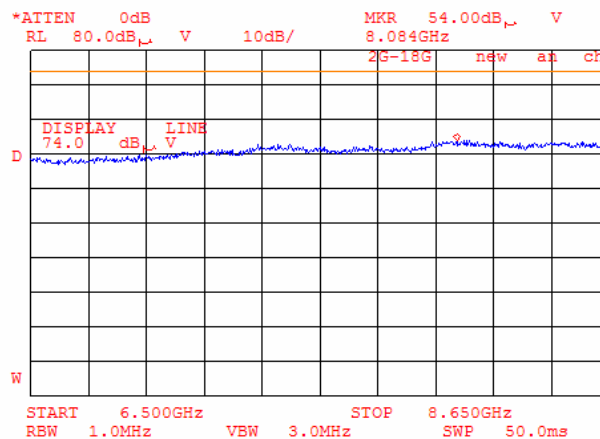
Plot 6.10.6: Rx Radiated Emission measurements in 2900-6500MHz range, Vertical & Horizontal Antenna polarization.



Plot 6.10.7: Rx Radiated Emission measurements in 6500-8650 MHz range, Vertical & Horizontal Antenna polarization.

LIMIT:

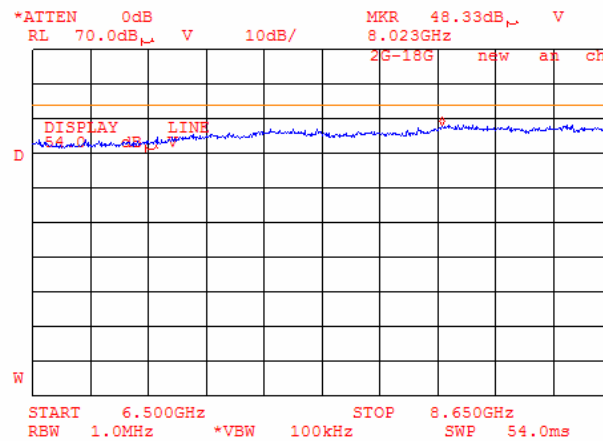
PEAK



Plot 6.10.8: Rx Radiated Emission measurements in 6500-8650 MHz range,
Vertical & Horizontal Antenna polarization.

LIMIT:

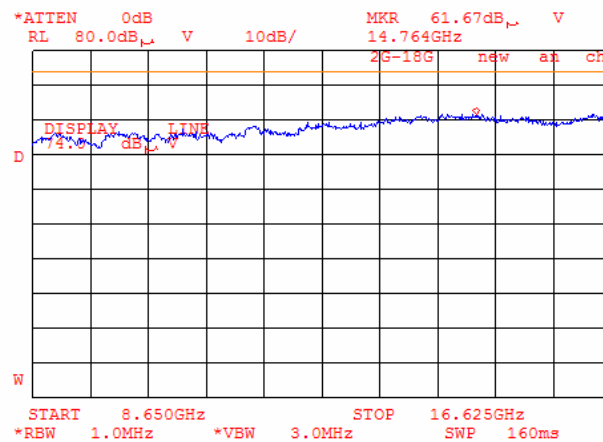
AVERAGE



Plot 6.10.9: Rx Radiated Emission measurements in 8650-16625 MHz range,
Vertical & Horizontal Antenna polarization.

LIMIT:

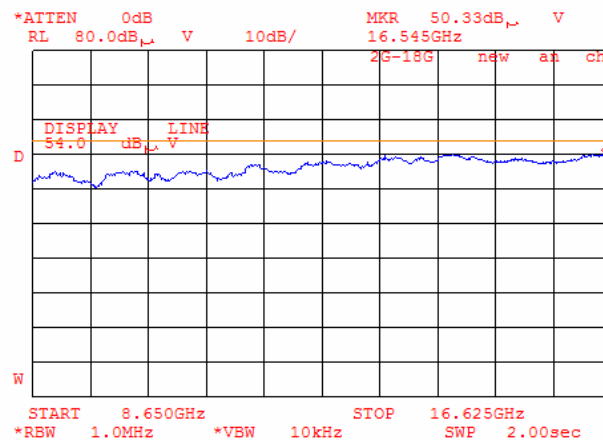
PEAK



Plot 6.10.10: Rx Radiated Emission measurements in 8650-16625 MHz range,
Vertical & Horizontal Antenna polarization.

LIMIT:

AVERAGE

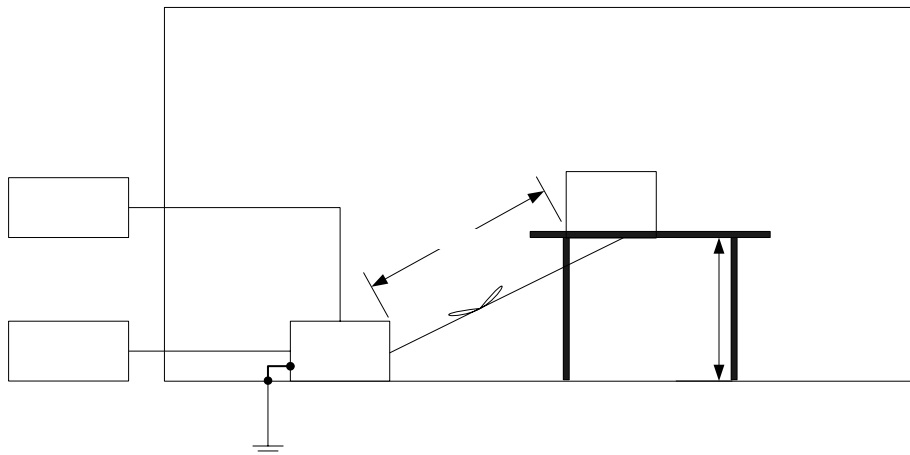


6.11 Conducted Emission at AC power line - Pursuant to 47 CFR §15.107(a); §15.207(a)

6.11.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- The EUT was set up as shown in plot 6.10.1.
- The EUT 4.9GHz RF Output Connector was terminated with a 50Ω load termination.
- The EUT power was adjusted at the maximum output power level.
- The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range 150 KHz to 30MHz.
- Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.
- The position of the device cables was varied to determine maximum emission level.
- Laptop's AC conducted data was recorded for both NEUTRAL and HOT lines.
- Data was recorder for 802.11a @ 4.9GHz Rx/Stand-by mode and Tx mode.
- Test was taken at Shielded room located at “Hermon Labs”.

Plot 6.11.1: Conducted emission measurements setup.



6.11.2 Limits:

- Specification Class B limits is given in table 6.11.1.

Table 6.11.1: Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5.0	56	46
5.0 - 30	60	50

* The limit decreases linearly with the logarithm of frequency.

6.11.3 Results:

- Results are shown in Table 6.11.2 and the associated plots.

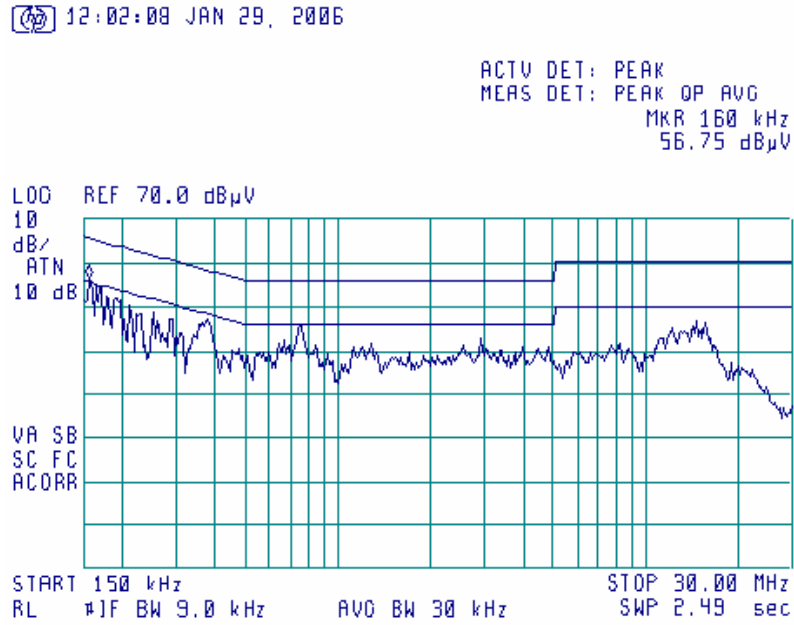
Table 6.11.2: Conducted emission test results.

LINE: AC mains
 LIMIT: Class B
 DETECTORS USED: QUASI-PEAK / AVERAGE
 FREQUENCY RANGE: 150 kHz - 30 MHz
 RESOLUTION BANDWIDTH: 9 kHz

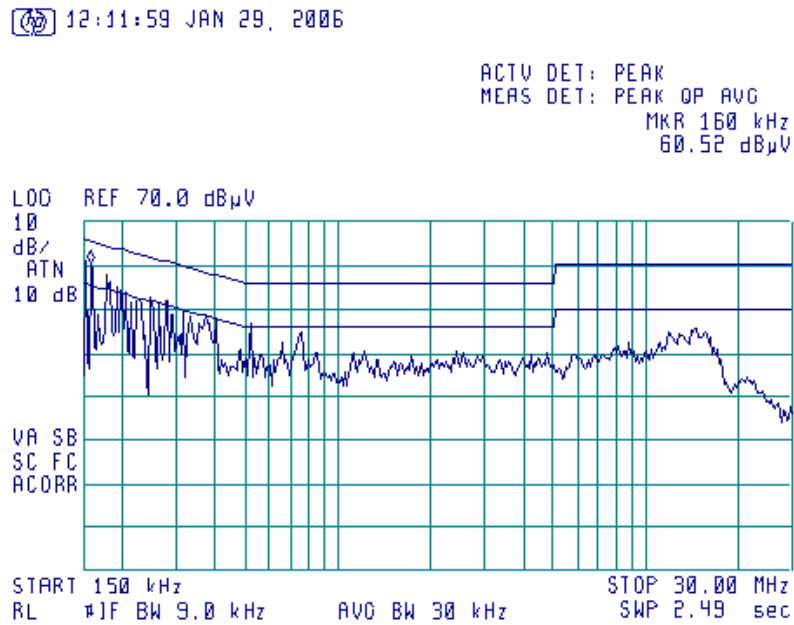
Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin , dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin , dB*		
Receive / Stand-by mode									
0.156665	57.72	52.33	65.67	-13.34	27.54	55.67	-28.13	L1	Pass
0.201675	52.54	44.15	63.59	-19.44	37.23	53.59	-16.36		
0.361159	48.91	43.71	58.76	-15.05	40.14	48.76	-8.62		
0.760455	47.08	45.78	56.00	-10.22	40.73	46.00	-5.27		
2.924713	42.41	38.65	56.00	-17.35	31.69	46.00	-14.31		
14.382477	45.77	42.03	60.00	-17.97	36.16	50.00	-13.84		
0.179955	59.28	51.56	64.54	-12.98	39.76	54.54	-14.78	L2	Pass
0.192108	57.88	49.33	63.96	-14.63	38.75	53.96	-15.21		
0.307285	50.70	45.42	60.05	-14.63	30.04	50.05	-20.01		
0.516463	47.43	41.54	56.00	-14.46	23.22	46.00	-22.78		
0.758687	47.49	44.49	56.00	-11.51	39.35	46.00	-6.65		
14.289544	46.99	42.38	60.00	-17.62	35.87	50.00	-14.13		
Transmit mode									
0.160997	59.67	53.66	65.46	-11.80	30.71	55.46	-24.75	L1	
0.183921	55.97	47.90	64.35	-16.45	41.67	54.35	-12.68		
0.380105	47.18	44.31	58.31	-14.00	39.30	48.31	-9.01		
0.767465	45.90	43.68	56.00	-12.32	38.53	46.00	-7.47		
1.130941	43.73	40.13	56.00	-15.87	34.49	46.00	-11.51		
14.745593	46.04	41.32	60.00	-18.68	35.33	50.00	-14.67		
0.163258	60.45	54.64	65.35	-10.71	31.47	55.35	-23.88	L2	Pass
0.200579	56.73	48.56	63.63	-15.07	38.86	53.63	-14.77		
0.282707	52.85	47.39	60.80	-13.41	35.46	50.80	-15.34		
0.526165	48.04	45.60	56.00	-10.40	28.39	46.00	-17.61		
0.752187	45.36	41.04	56.00	-14.96	37.17	46.00	-8.83		
14.384616	46.77	43.10	60.00	-16.90	37.17	50.00	-12.83		

*- Margin = Measured emission - specification limit.

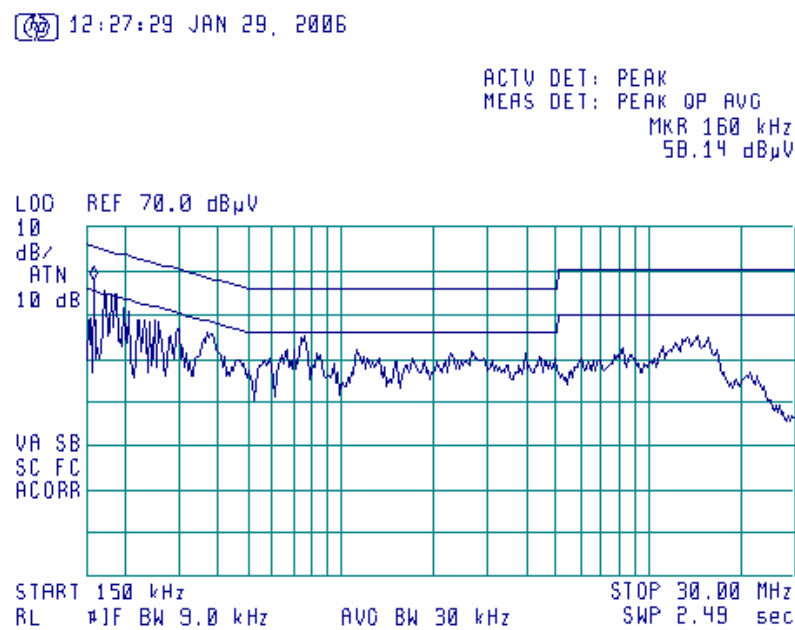
Plot 6.11.2: Conducted emission measurements, Rx/Stand-by mode, Line L1, Quasi-Peak & Average Limits.



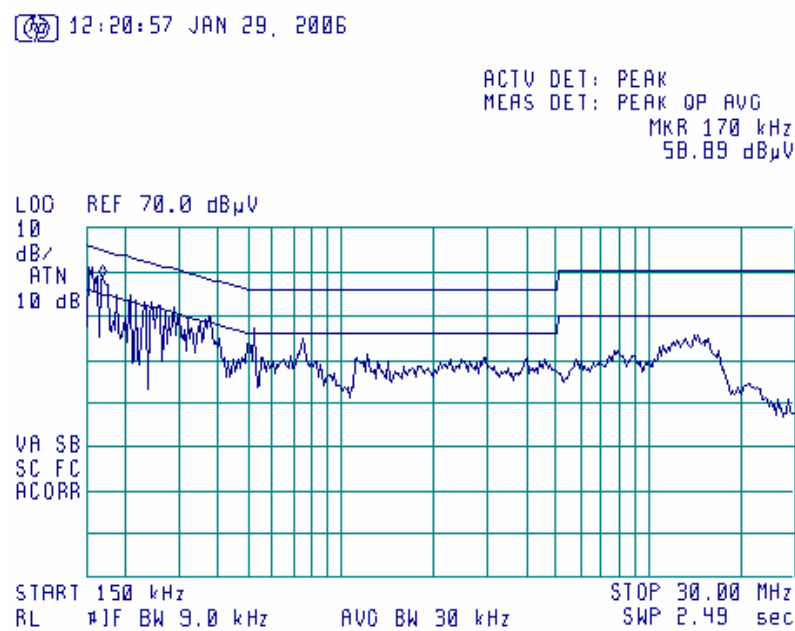
Plot 6.11.3: Conducted emission measurements, Rx/Stand by mode, Line L2, Quasi-Peak & Average Limits.



Plot 6.11.4: Conducted emission measurements, Transmit mode, Line L1, Quasi-Peak & Average Limits.



Plot 6.11.5: Conducted emission measurements, Transmit mode, Line L2, Quasi-Peak & Average Limits.



6.12 EUT Description & Test Configuration for 802.11b/g:6.12.1 Equipment used as local support for testing:

Table 6.12.1 EUT Support Equipment

Description	Manufacturer	Model	Serial Number	Notes
Laptop	HP	Compaq nc8230	CNU5111RTB	

No Remote support equipment was used during tests.

6.12.2 I/O port configuration during testing:

Table 6.12.2 EUT I/O Ports

Port Type	Port Description	Connected From/to		Connector Type	Quantity	Cable Type	Cable Length
RF in/out	4.9GHz External Antenna	Not Used in Part 15 Tests		MMCX	1	N/A	N/A
RF in/out	2.4GHz External Antenna	EUT	External Antenna	MMCX	1	Termination	?cm

6.12.3 EUT operating mode During Tests:

EUT was transmitting at duty cycle of 99% at the Bandwidth stated in each test.
The Rate used for each Bandwidth was the highest rate.

6.12.4 802.11b/g Transmitter description

Type of equipment											
Stand-alone (Equipment with or without its own control provisions)											
Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)											
V Plug-in card (Equipment intended for a variety of host systems)											
Intended use					Condition of use						
Fixed					Always at a distance more than 2 m from all people						
Mobile					Always at a distance more than 20 cm from all people						
V Portable					May operate at a distance closer than 20 cm to human body						
Assigned frequency range					2400 – 2483.5 MHz						
Operating frequency range					2412 – 2462 MHz						
RF channel spacing					22MHz (802.11b), 20MHz (802.11g)						
Maximum rated output power					At transmitter 50 Ω RF output connector			79mW			
					Effective radiated power (for equipment with no RF connector)			143mW			
Is transmitter output power variable?					No						
					Continuous variable						
					V Yes						
					Stepped variable with stepsize						
					58%						
					Minimum RF power					25.1mW	
					Nominal RF power					63.1mW	
Antenna connection											
Unique coupling			V		Standard connector		V		Integral		
							V		With temporary RF connector		
									Without temporary RF connector		
Antenna/s technical characteristics											
Type		Manufacturer		Model number		Gain					
ON BOARD PIFA ANTENNA (INTEGRAL ANTENNA)		Motorola Israel South		Motorola P/N: 6487848V60		2.56dBi (Peak Gain)					
Transmitter 99% power bandwidth				15.6 MHz for 802.11b, 16.4 MHz for 802.11g							
Transmitter aggregate data rate/s				1, 2, 5.5, 11 Mbps for 802.11b 6, 9, 12, 18, 24, 36, 48, 54 Mbps for 802.11g							
Transmitter aggregate symbol (baud) rate/s				1, 1, 1.375, 1.375 Msps respectively to data rate at 802.11b 6, 9, 6, 9, 6, 9, 8, 9 Msps respectively to data rate at 802.11g							
Type of modulation				802.11b: DSSS: 1M-DBPSK, 2M-DQPSK, CCK: 5.5M-DQPSK, 11M QPSK 802.11g: BPSK, QPSK, 16QAM, 64QAM							
Type of multiplexing				802.11b: TDD DSSS/CCK 802.11g: TDD OFDM							
Modulating test signal (baseband)				PN9							
Maximum transmitter duty cycle in normal use				Tx ON time		Period					
802.11g : 54Mbps				60%		628uSec		1.0466mSec			
6Mbps						5.484mSec		9.14mSec			
802.11b : 11Mbps						3.17mSec		5.283mSec			
1Mbps						32.952mSec		54.92mSec			
Transmitter duty cycle supplied for test				Tx ON time		Period					
802.11g : 54Mbps				99%		374uSec		378uSec			
6Mbps						3.10mSec		3.14mSec			
802.11b : 11Mbps						1.881mSec		1.9mSec			
1Mbps						1.881mSec		1.9mSec			
Transmitter power source											
Battery		Nominal rated voltage		VDC		Battery type		Ni- Cd, Lithium, Lead- Acid, other			
V DC		Nominal rated voltage		3.3 VDC $\pm$ 10%							
AC mains		Nominal rated voltage		VAC		Frequency		Hz			
Is there common power source for transmitter and receiver											
yes V no											
Spread spectrum technique used					Frequency hopping (FHSS)						
					V Digital transmission system (DTS)						
					Hybrid						
Spread spectrum parameters for transmitters tested per FCC 15.247 only											
DSSS		chip sequence length			11bits (Apply to 802.11b only)						
		spectrum width			22MHz						

6.13 Peak output power - Pursuant to 47 CFR §15.247(b)(3)

6.13.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- The EUT 2.4GHz RF Output Connector was connected through Calibrated Attenuators to a Power Meter with a sensor capable of measuring the entire bandwidth of the signal.
- The EUT power was adjusted at the maximum and minimum output power level.
- Procedure was made for the 802.11b and 802.11g at highest data rate and at low, med and high Frequency.
- Transmitter Frequencies for 802.11b/g are as in table 6.13.1 and will be referred as low, mid and high in 802.11b/g section.

6.13.2 Results:

- Test Results are presented in Table 6.13.1.

Table 6.13.1: Output power results.

Channel #	Frequency [MHz]	Rate [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
High Power Level					
802.11b Mode					
1	2412	11	18.84	30	11.16
6	2437	11	18.85	30	11.15
11	2462	11	18.74	30	11.26
802.11g Mode					
1	2412	54	18.92	30	11.08
6	2437	54	18.87	30	11.13
11	2462	54	18.77	30	11.23
Low Power Level					
802.11b Mode					
1	2412	11	14.16	30	15.84
6	2437	11	14.05	30	15.95
11	2462	11	14.10	30	15.9
802.11g Mode					
1	2412	54	14.26	30	15.74
6	2437	54	14.22	30	15.78
11	2462	54	14.13	30	15.87

6.14 6dB Bandwidth - Pursuant to 47 CFR §15.247(a)(2)

6.14.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- The EUT 2.4GHz RF Output Connector was connected through Calibrated Attenuators to a Spectrum Analyzer (E4440A) and RBW, VBW were set to 100 KHz.
- The EUT power was adjusted at the maximum output power level.
- Procedure was made for the 802.11b and 802.11g at highest data rate.
- Procedure was made at low, mid and high Frequency for 802.11b and 802.11g.

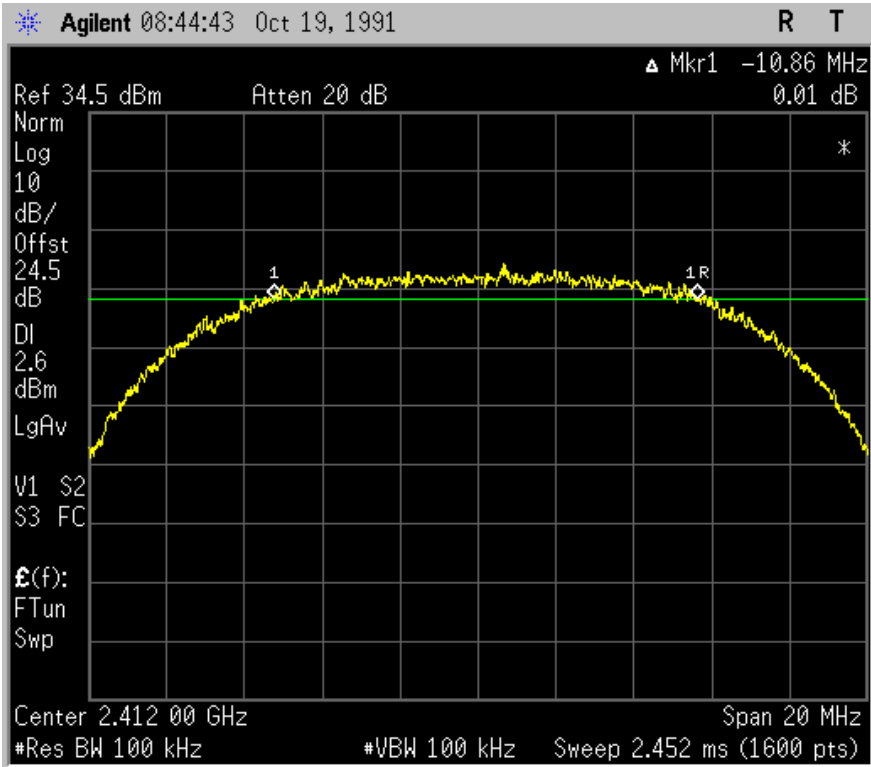
6.14.2 Results:

- Test Results are presented in Table 6.14.1 and associated plots.

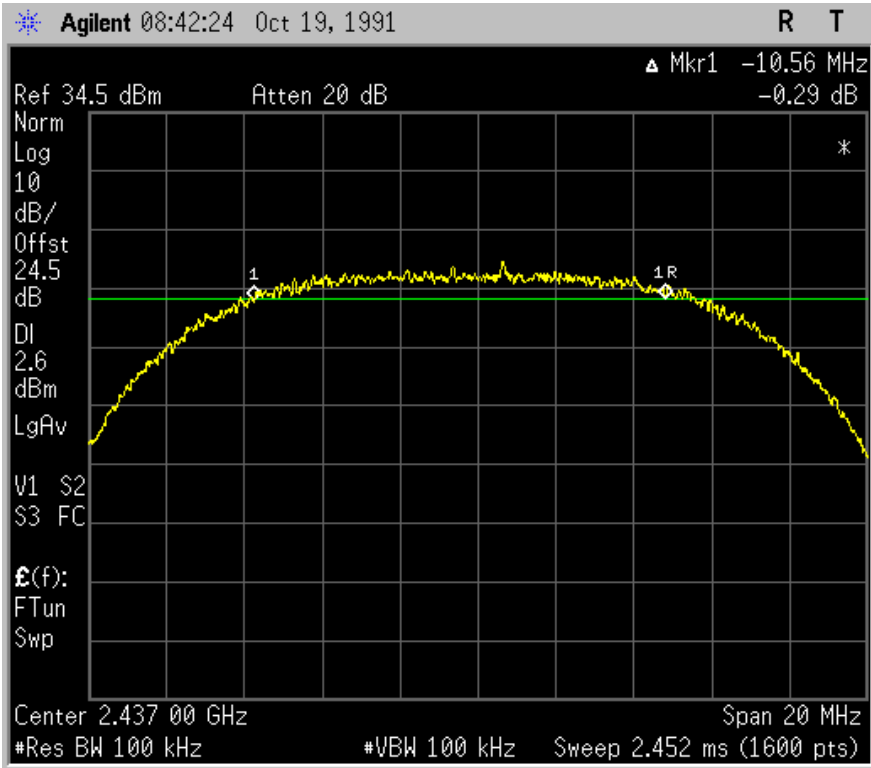
Table 6.14.1: 6dB Bandwidth results.

Plot #	Channel #	Frequency [MHz]	Rate [MHz]	6dB Bandwidth [KHz]	Minimum Limit [KHz]	Margin [KHz]
802.11b Mode						
6.13.1	1	2412	11	10860	500	10560
6.13.2	6	2437	11	10560	500	10060
6.13.3	11	2462	11	10810	500	10310
802.11g Mode						
6.13.4	1	2412	54	16510	500	16010
6.13.5	6	2437	54	16540	500	16040
6.13.6	11	2462	54	16490	500	15990

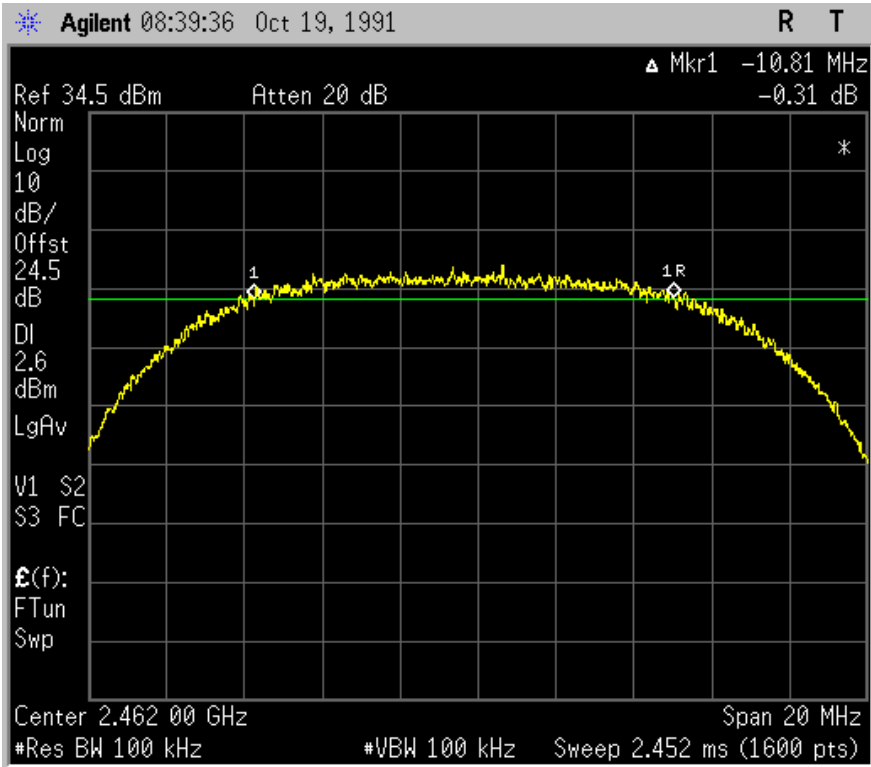
Plot 6.14.1: 6dB Bandwidth at CH1, 11Mbps, 802.11b mode



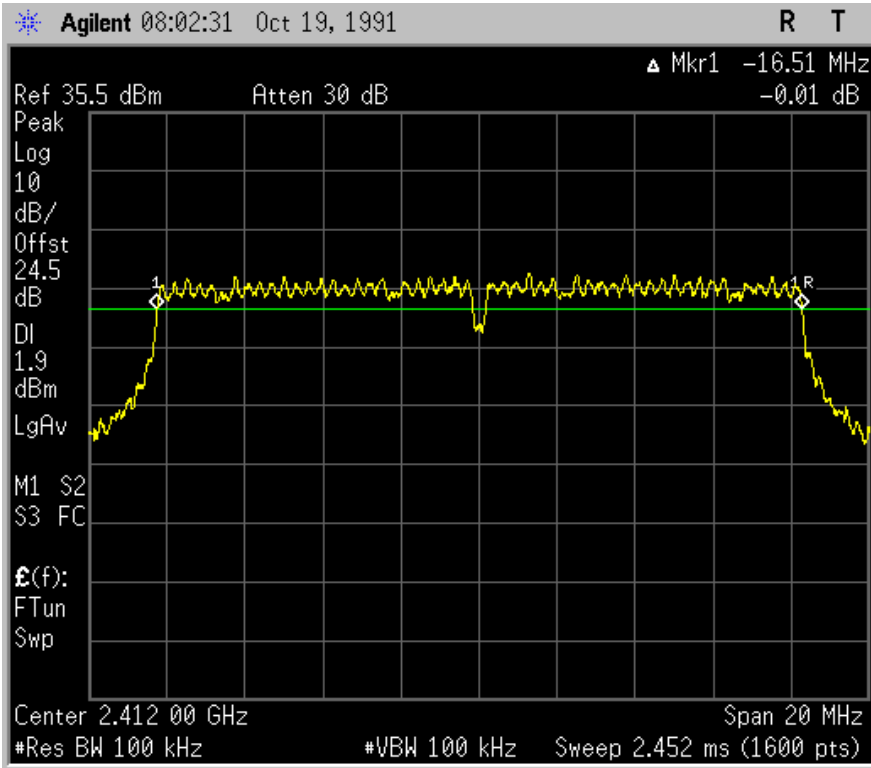
Plot 6.14.2: 6dB Bandwidth at CH6, 11Mbps, 802.11b mode



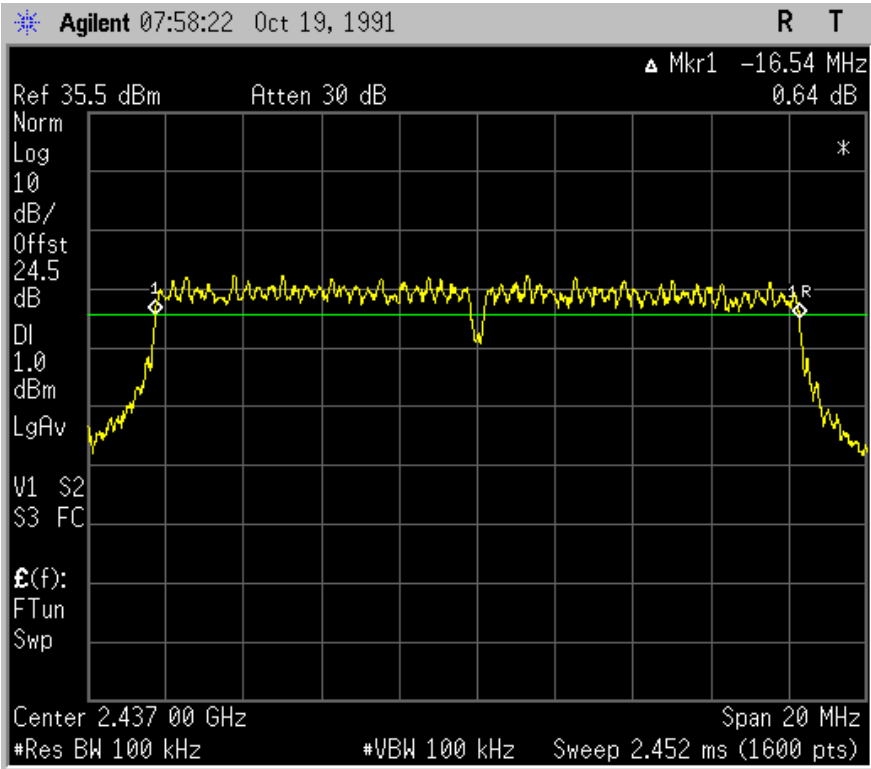
Plot 6.14.3: 6dB Bandwidth at CH11, 11Mbps, 802.11b mode



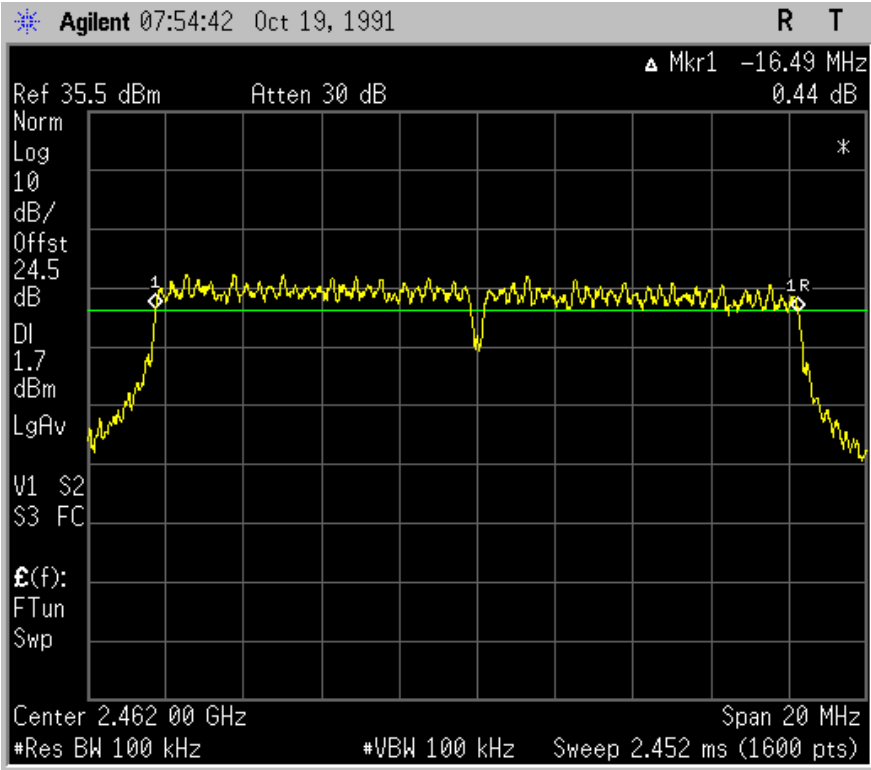
Plot 6.14.4: 6dB Bandwidth at CH1, 54Mbps, 802.11g mode



Plot 6.14.5: 6dB Bandwidth at CH6, 54Mbps, 802.11g mode



Plot 6.14.6: 6dB Bandwidth at CH11, 54Mbps, 802.11g mode



6.15 Peak Power Spectral Density - Pursuant to 47 CFR §15.247(d)

6.15.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- The EUT 2.4GHz RF Output Connector was connected through Calibrated Attenuators to a Spectrum analyzer.
- The Maximum level in a 3 KHz bandwidth is measured with the spectrum analyzer using RBW = 3 KHz, VBW = 10 KHz.
- The Spectrum Analyzer was put in max hold mode to recall the highest PPSD level found across the emission in any 3 KHz band.
- The EUT power was adjusted at the maximum output power level.
- Procedure was made for the 802.11b and 802.11g at highest data rate and at low, mid and high Frequency.

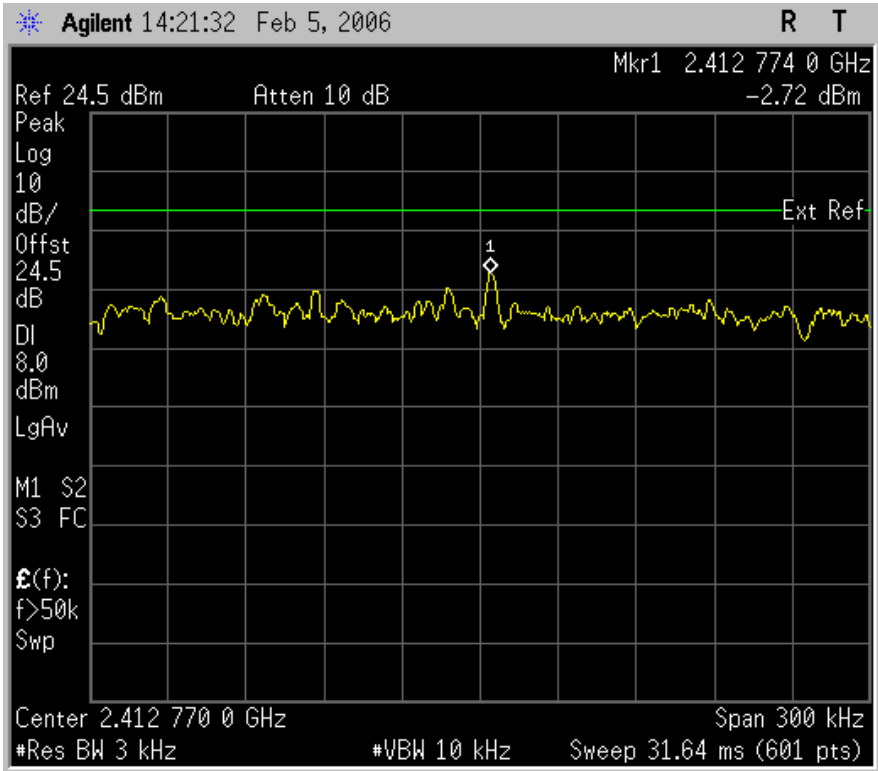
6.15.2 Results:

- Results are shown in Table 6.14.1 and the associated plots.

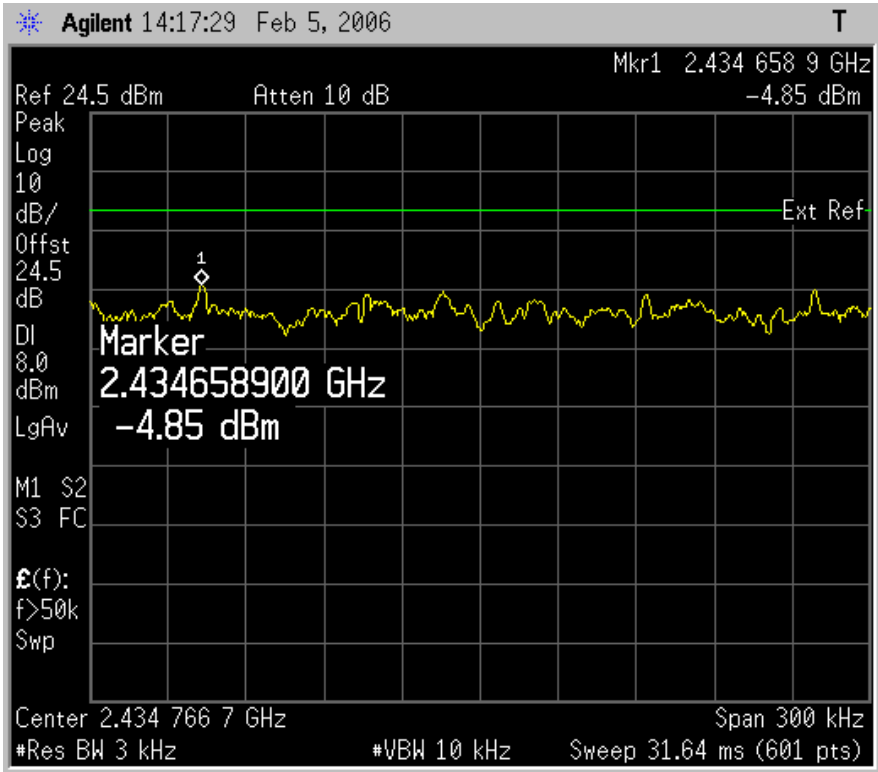
Table 6.14.1: Peak Power Spectral Density Results.

Plot #	Channel #	Frequency [MHz]	Rate [MHz]	PPSD [dBm]	Limit [dBm]	Margin [dB]
802.11b Mode						
6.15.1	1	2412	11	-2.72	8	10.72
6.15.2	6	2437	11	-4.85	8	12.85
6.15.3	11	2462	11	-4.21	8	12.21
802.11g Mode						
6.15.4	1	2412	54	-5.65	8	13.65
6.15.5	6	2437	54	-5.77	8	13.77
6.15.6	11	2462	54	-5.11	8	13.11

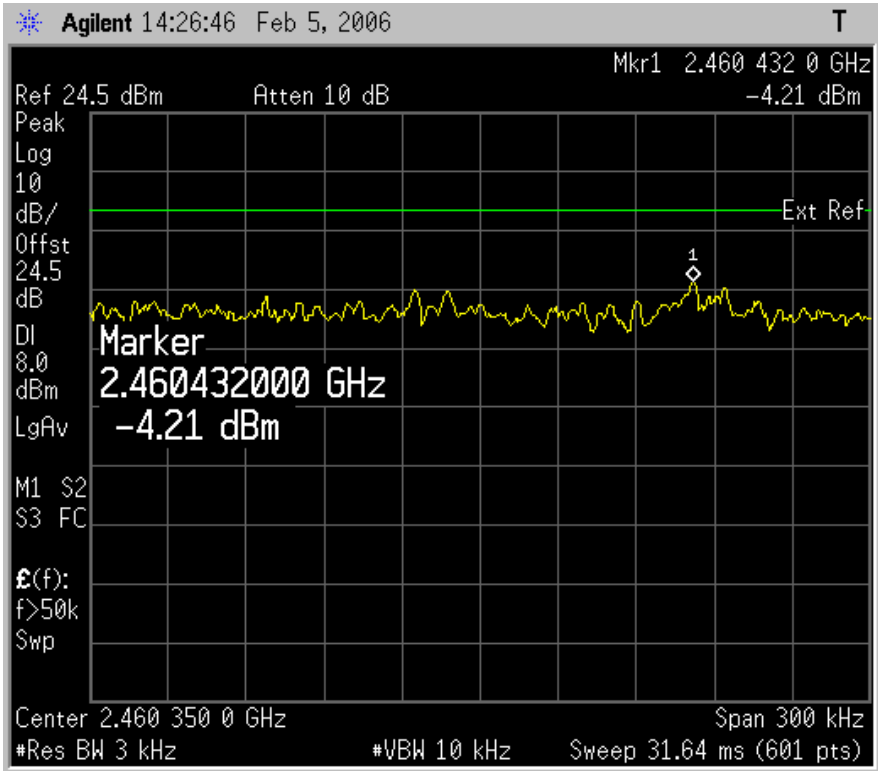
Plot 6.15.1: Peak Power Spectral Density at low carrier frequency, 11Mbps, 802.11b mode



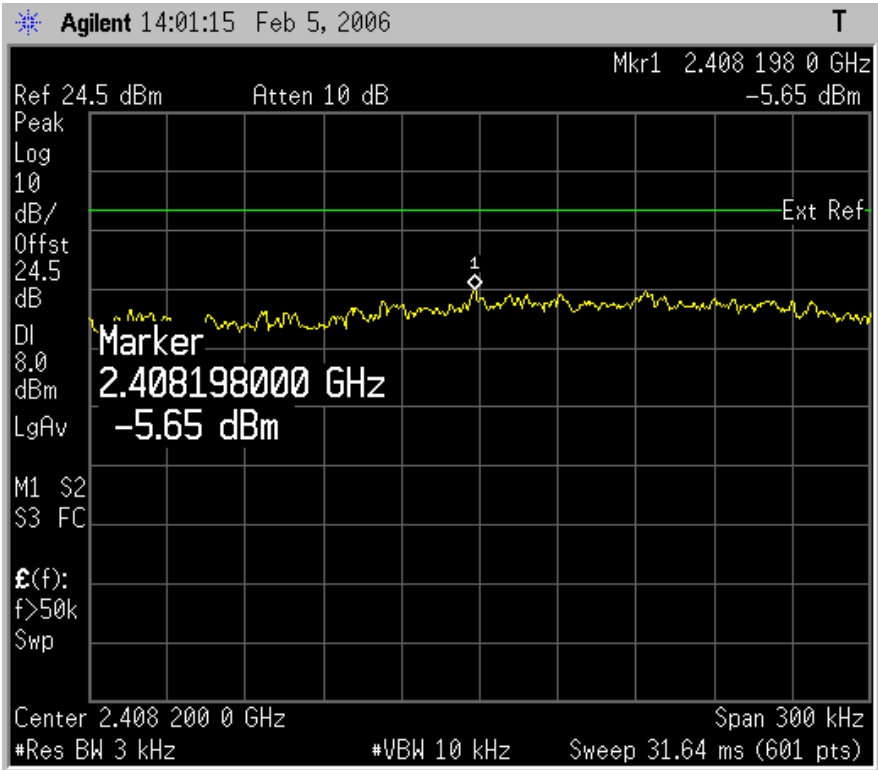
Plot 6.15.2: Peak Power Spectral Density at mid carrier frequency, 11Mbps, 802.11b mode



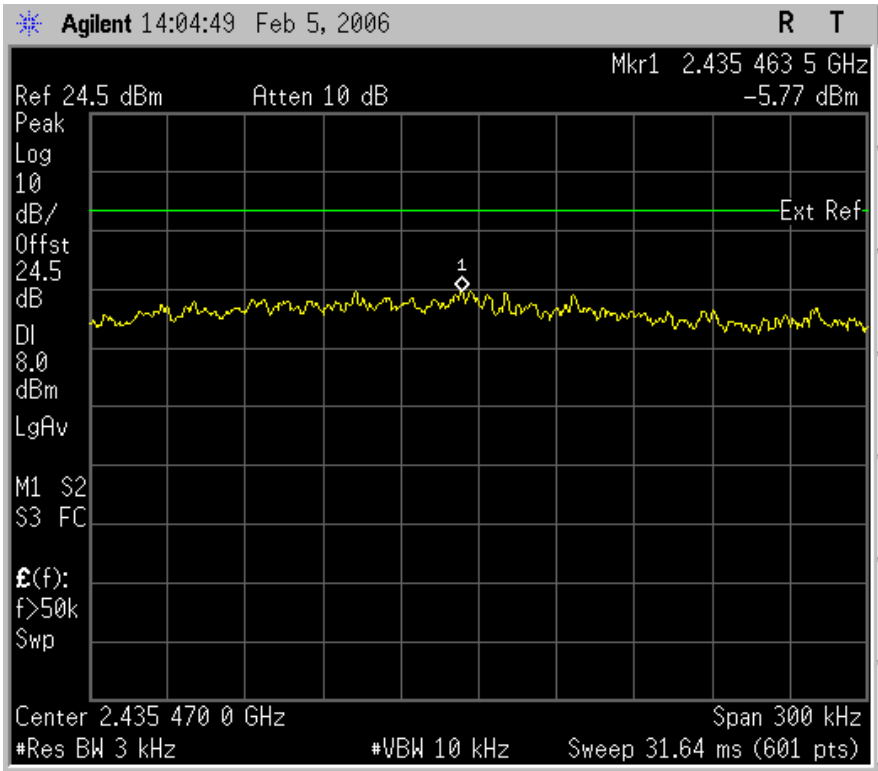
Plot 6.15.3: Peak Power Spectral Density at high carrier frequency, 11Mbps, 802.11b mode



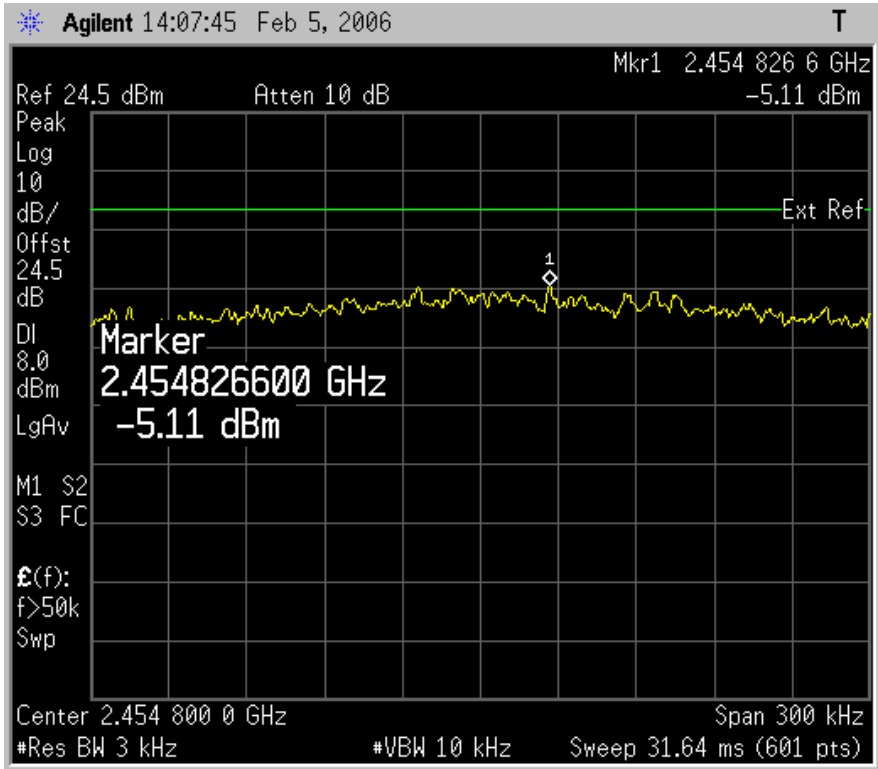
Plot 6.15.4: Peak Power Spectral Density at low carrier frequency, 54Mbps, 802.11g mode



Plot 6.15.5: Peak Power Spectral Density at mid carrier frequency, 54Mbps, 802.11g mode



Plot 6.15.6: Peak Power Spectral Density at high carrier frequency, 54Mbps, 802.11g mode



6.16 Conducted Spurious Emissions - Pursuant to 47 CFR §15.247(c)6.16.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- The EUT 2.4GHz RF Output Connector was connected through Calibrated Attenuators to a Spectrum Analyzer.
- The Spectrum Analyzer was set to RBW=100 KHz and VBW=100 KHz and Max hold was activated.
- The EUT power was adjusted at the maximum output power level.
- Procedure was repeated at both 802.11b and 802.11g standards.
- Procedure was repeated at lower, mid and upper channels and at highest data rate.
- Tested Frequency range: 0.03-26.5GHz.

6.16.2 Limit:

- Specification test limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

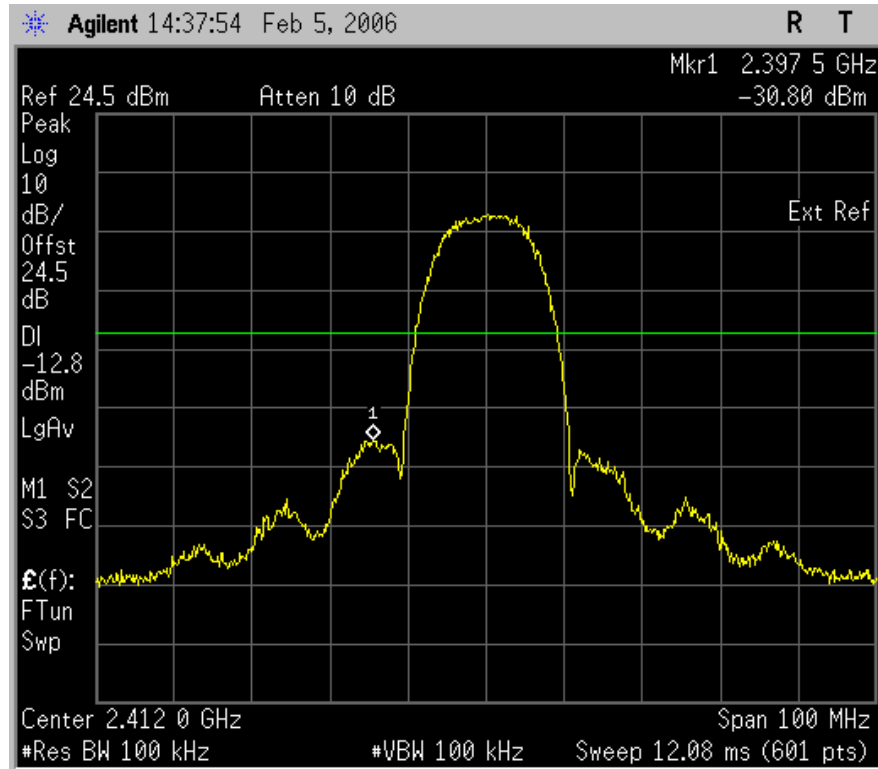
6.16.3 Results:

- Test Results are provided in Table 6.16.1 and the associated plots.

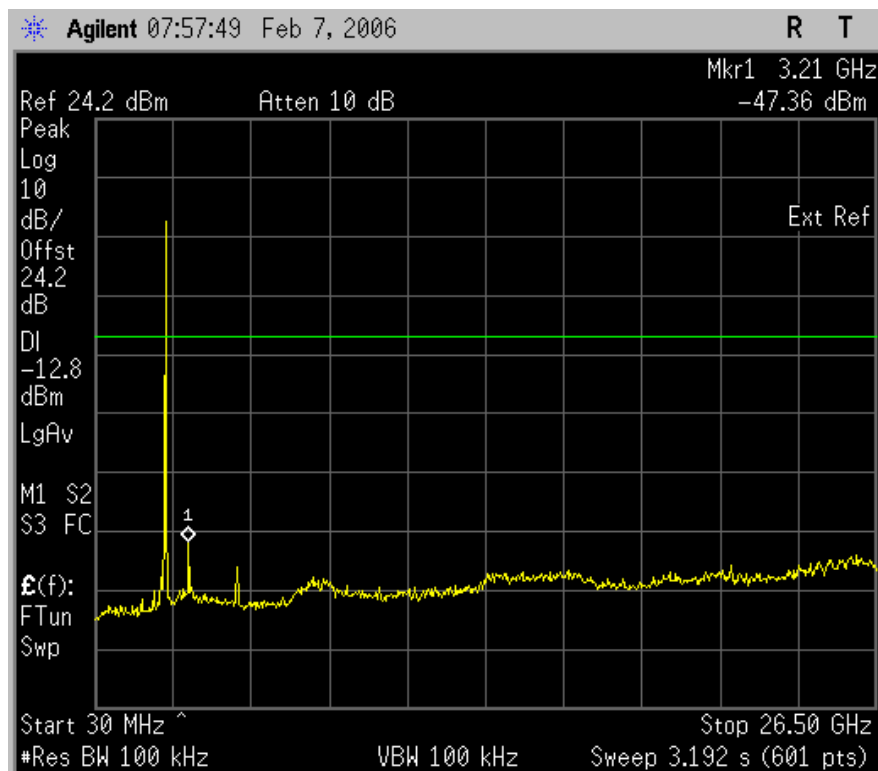
Table 6.16.1: Conducted emission plots summary.

Plot #	Frequency [MHz]	Standard	Freq Sweep	Pass/Fail
6.16.1÷6	Low, mid, high	802.11b	0.03 – 26.5 [GHz]	Pass
6.16.7÷12	Low, mid, high	802.11g	0.03 – 26.5 [GHz]	Pass

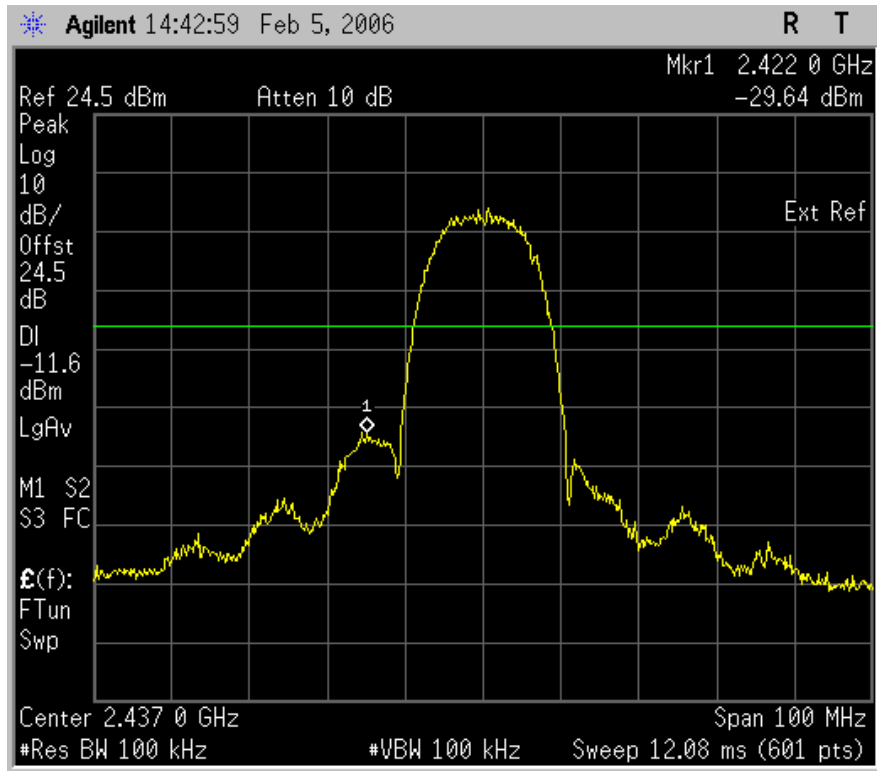
Plot 6.16.1: Tx Conducted emission measurement at the low carrier frequency, low band edge, 802.11b mode.



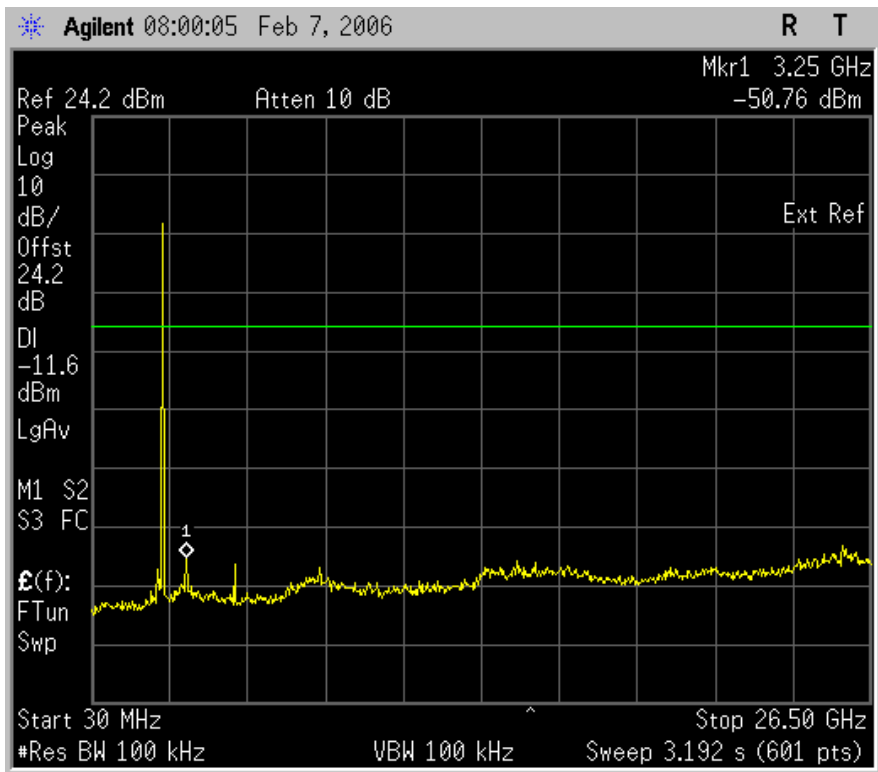
Plot 6.16.2: Tx Conducted emission measurements 0.03-26.5GHz at the low carrier frequency, 802.11b mode,

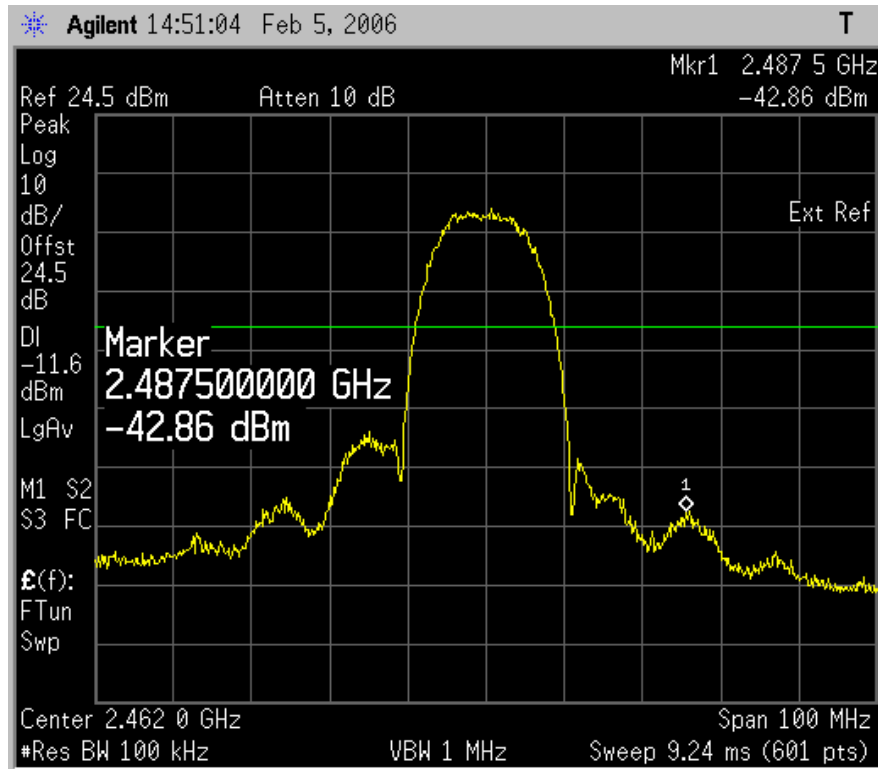
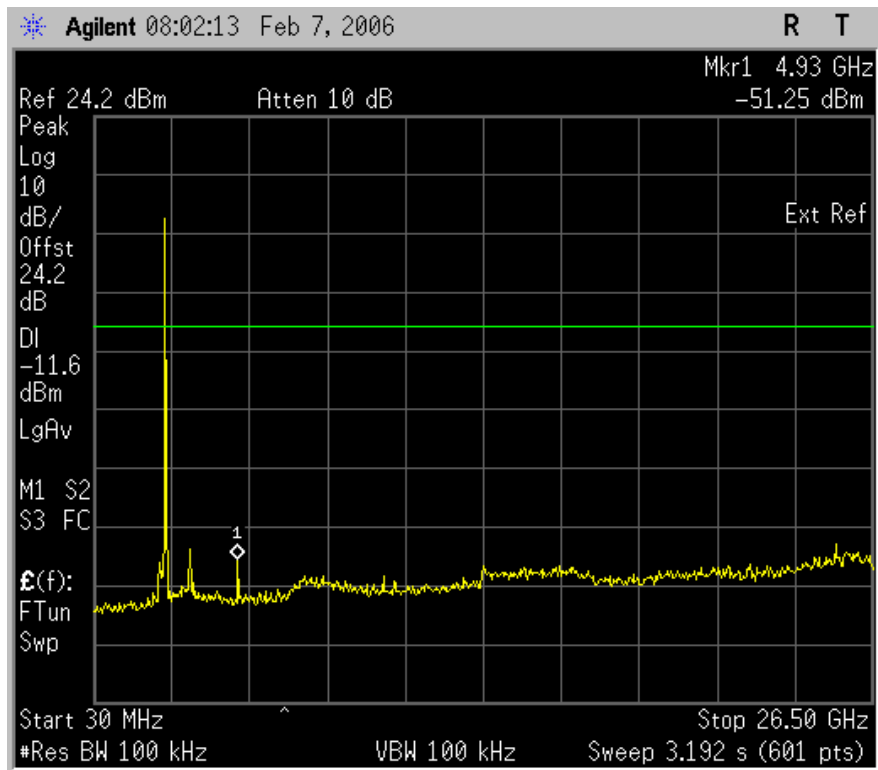


Plot 6.16.3: Tx Conducted emission measurement at the mid carrier frequency, 802.11b mode.

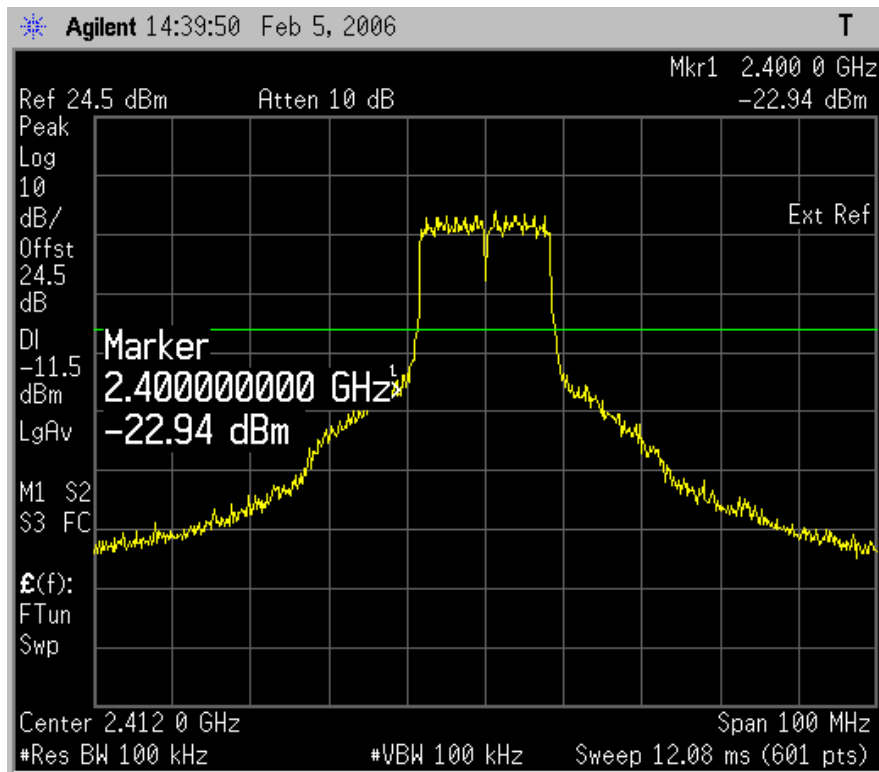


Plot 6.16.4: Tx Conducted emission measurements 0.03-26.5GHz at the mid carrier frequency, 802.11b mode,

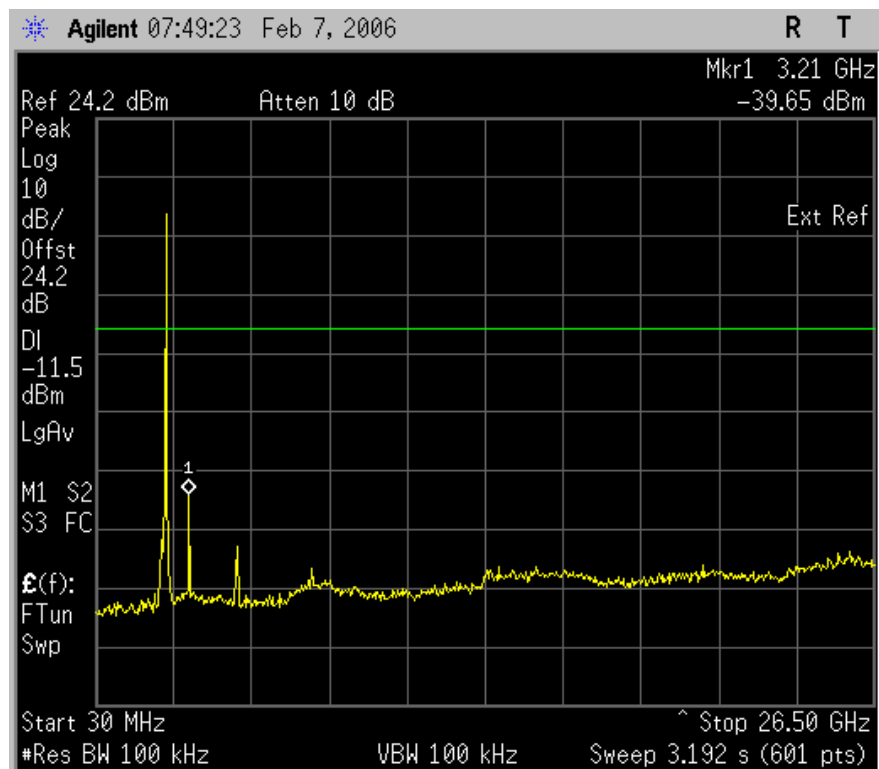


Plot 6.16.5: Tx Conducted emission measurement at the high carrier frequency, high band edge, 802.11b mode.**Plot 6.16.6: Tx Conducted emission measurements 0.03-26.5GHz at the high carrier frequency, 802.11b mode,**

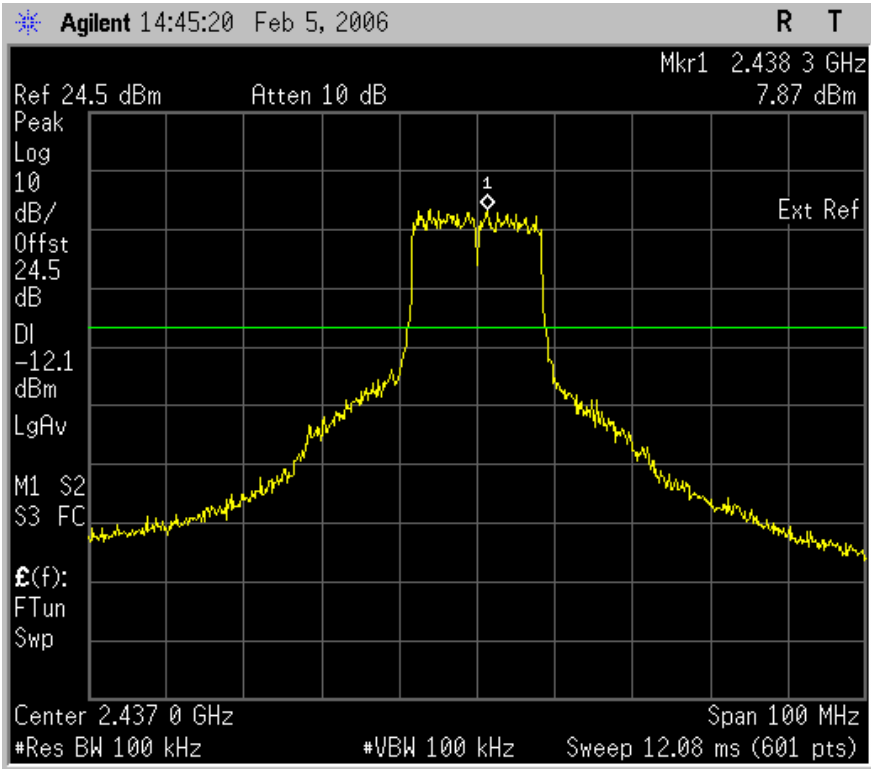
Plot 6.16.7: Tx Conducted emission measurement at the low carrier frequency, low band edge, 802.11g mode.



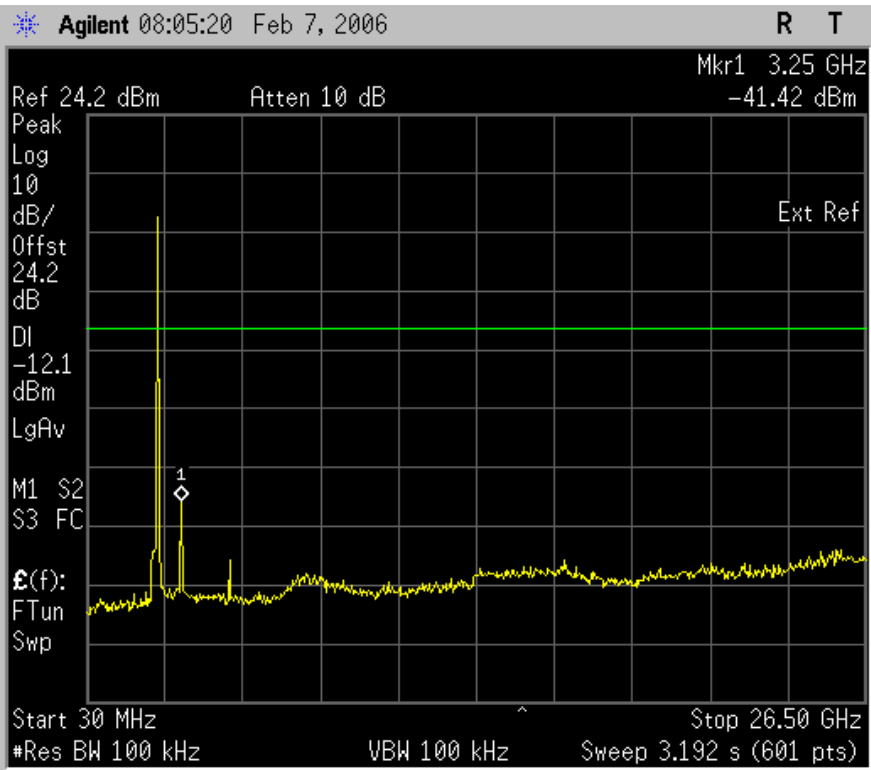
Plot 6.16.8: Tx Conducted emission measurements 0.03-26.5GHz at the low carrier frequency, 802.11g mode,



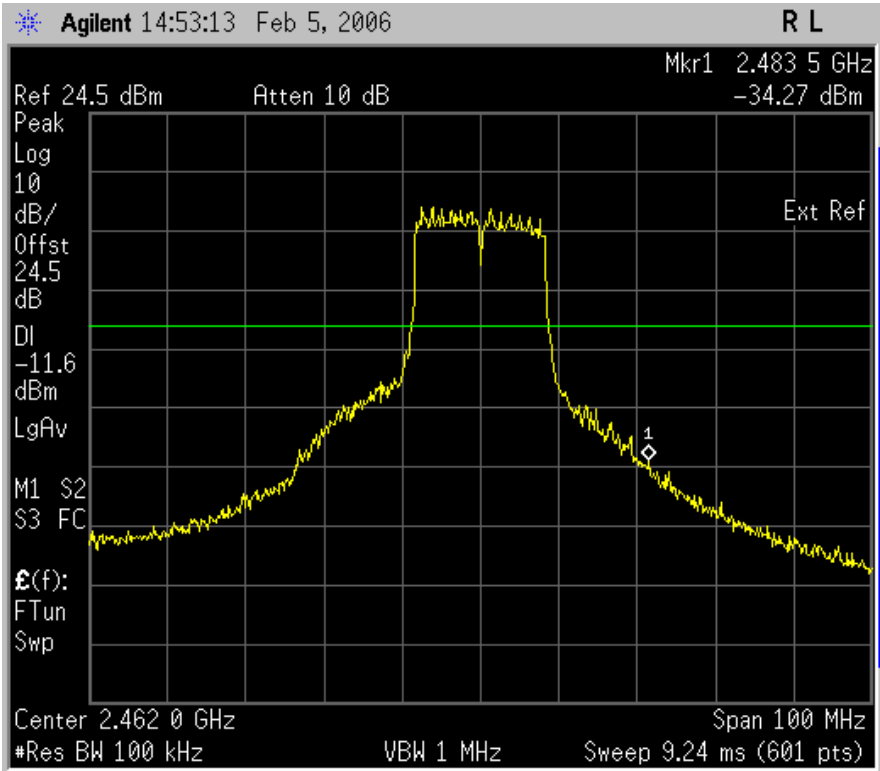
Plot 6.16.9: Tx Conducted emission measurement at the mid carrier frequency, 802.11g mode.



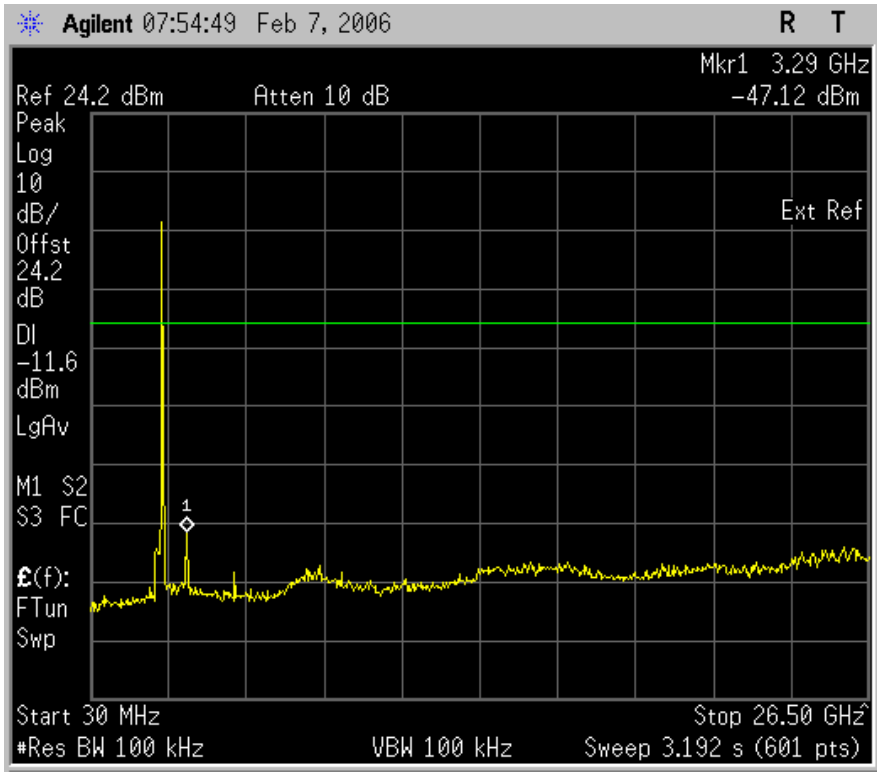
Plot 6.16.10: Tx Conducted emission measurements 0.03-26.5GHz at the mid carrier frequency, 802.11g mode,



Plot 6.16.11: Tx Conducted emission measurement at the high carrier frequency, high band edge, 802.11g mode.



Plot 6.16.12: Tx Conducted emission measurements 0.03-26.5GHz at the high carrier frequency, 802.11g mode,



6.17 Radiated Spurious Emissions - Pursuant to 47 CFR §15.247(c)

6.17.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- Laptop was placed on the top of a rotating table 0.8 meters above the ground.
- The table was rotated 360 degree to determine the position of the highest radiation.
- A receiving antenna was set 3 meters away from the EUT and was mounted on a variable height antenna tower.
- The Field strength of radiated spurious emissions was measured.
- Both Horizontal and Vertical Polarization of receiving antenna were tested.
- The EUT 2.4GHz was set to transmit via its on board antenna.
- The EUT power was adjusted at the maximum output power level.
- Standard 802.11g was chosen as worst case for this test, except for 30÷4000 MHz ranges.
- Procedure was made at highest data rate and at low, mid and high Frequency.
- Tested Frequency Range: 9KHz to 26.5GHz
- Test was taken at Semi anechoic chamber and OATS located at “Hermon Labs”.

6.17.2 Limits:

- Specification test limits are given in Table 6.17.1.

Table 6.17.1: Radiated Field strength limit

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)***			Attenuation of field strength of spurious versus carrier outside restricted bands, dBc***
	Peak	Quasi-peak	Average	
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	20.0
0.090 – 0.110	NA	108.5 – 106.8**	NA	
0.110 – 0.490	126.8 – 113.8	NA	106.8 – 93.8**	
0.490 – 1.705	NA	73.8 – 63.0**	NA	
1.705 – 30.0		69.5		
30 - 88		40.0		
88 - 216		43.5		
216 - 960		46.0		
960 - 1000		54.0		
1000 – 10 th harmonic	74.0	NA	54.0	

*- The limit for 3m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$\text{Lim}_{S_2} = \text{Lim}_{S_1} + 40 \log (S_1/S_2),$$

Where S_1 and S_2 – standard defined and test distance respectively in meters.

** - The limit decreases linearly with the logarithm of frequency.

*** - The field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.

6.17.3 Results:

- Test results are described at tables 6.17.2 ÷ 5 and the associated plots.
- Results describe emission outside restricted bands and within restricted bands.

Table 6.17.2: Field strength of emissions outside restricted bands

ASSIGNED FREQUENCY: 2400 – 2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 - 26500 MHz
 TEST DISTANCE: 3 m
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Field strength of spurious, dB(μV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	Field strength of carrier, dB(μV/m)	Attenuation below carrier, dBc	Limit, dBc	Margin, dB**	Verdict
802.11g									
Low carrier frequency									
3216.00	61.67	Vertical	1.2	256	98.28	36.61	20.0	-16.61	Pass
9648.30	54.17	Vertical	1.1	118		44.11		-24.11	
Mid carrier frequency									
9748.20	52.83	Vertical	1.0	120	98.93	46.10	20.0	-26.10	Pass
High carrier frequency									
3282.67	57.00	Vertical	1.2	255	100.06	43.06	20.0	-23.06	Pass
9848.30	50.67	Vertical	1.0	122		49.93		-29.93	

*- EUT front panel refers to 0 degrees position of turntable.

** - Margin = Attenuation below carrier – specification limit.

Table 6.17.3: Restricted bands.

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.37625 - 8.38675	73 - 74.6	399.9 - 410	2655 - 2900	10.6 - 12.7
0.495 - 0.505	8.41425 - 8.41475	74.8 - 75.2	608 - 614	3260 - 3267	13.25 - 13.4
2.1735 - 2.1905	12.29 - 12.293	108 - 121.94	960 - 1240	3332 - 3339	14.47 - 14.5
4.125 - 4.128	12.51975 - 12.52025	123 - 138	1300 - 1427	3345.8 - 3358	15.35 - 16.2
4.17725 - 4.17775	12.57675 - 12.57725	149.9 - 150.05	1435 - 1626.5	3600 - 4400	17.7 - 21.4
4.20725 - 4.20775	13.36 - 13.41	156.52475 - 156.52525	1645.5 - 1646.5	4500 - 5150	22.01 - 23.12
6.215 - 6.218	16.42 - 16.423	156.7 - 156.9	1660 - 1710	5350 - 5460	23.6 - 24
6.26775 - 6.26825	16.69475 - 16.69525	162.0125 - 167.17	1718.8 - 1722.2	7250 - 7750	31.2 - 31.8
6.31175 - 6.31225	16.80425 - 16.80475	167.72 - 173.2	2200 - 2300	8025 - 8500	36.43 - 36.5
8.291 - 8.294	25.5 - 25.67	240 - 285	2310 - 2390	9000 - 9200	Above 38.6
8.362 - 8.366	37.5 - 38.25	322 - 335.4	2483.5 - 2500	9300 - 9500	

Table 6.17.4: Field strength of spurious emissions below 1GHz within restricted bands

ASSIGNED FREQUENCY: 2400 – 2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz
 TEST DISTANCE: 3 m
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

TRANSMITTER OUTPUT POWER SETTINGS:					Maximum			
Frequency, MHz	Peak emission, dB(µV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(µV/m)	Limit, dB(µV/m)	Margin, dB*				
No spurious emission from RF module were found								Pass

Table 6.17.5: Field strength of spurious emissions above 1GHz within restricted bands

ASSIGNED FREQUENCY: 2400 – 2483.5 MHz
 INVESTIGATED FREQUENCY RANGE: 1000 - 26500 MHz
 TEST DISTANCE: 3 m
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength(VBW=3 MHz)			Average field strength(VBW=10 Hz)				Verdict
	Polarization	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Calculated, dB(μV/m)	Limit, dB(μV/m)	Margin, dB***	
802.11 b											
Low carrier frequency											
2385.00	Vertical	1.2	260	60.55	74.00	-13.45	49.20	49.20	54.00	-4.80	Pass
2493.57	Vertical	1.2	255	54.28	74.00	-19.72	44.73	44.73	54.00	-9.17	
Mid carrier frequency											
2494.39	Vertical	1.2	257	54.13	74.00	-19.87	45.17	45.17	54.00	-8.83	Pass
High carrier frequency											
2488.16	Vertical	1.2	256	59.64	74.00	-14.36	48.43	48.43	54.00	-5.57	Pass
802.11 g											
Low carrier frequency											
1658.75	Vertical	1.2	255	57.67	74.00	-16.33	40.66	40.66	54.00	-13.34	Pass
2390.00	Vertical	1.2	256	72.60	74.00	-1.40	53.52	53.52	54.00	-0.48	
2494.89	Vertical	1.2	255	54.35	74.00	-19.65	44.89	44.89	54.00	-9.11	
4823.00	Vertical	1.1	269	64.50	74.00	-9.50	50.14	50.17	54.00	-3.83	
Mid carrier frequency											
1694.83	Vertical	1.2	255	56.43	74.00	-17.57	40.70	40.70	54.00	-13.30	Pass
2487.96	Vertical	1.2	253	57.96	74.00	-16.04	47.39	47.39	54.00	-6.61	
3262.58	Vertical	1.2	254	57.33	74.00	-16.67	53.17	53.17	54.00	-0.83	
4892.83	Vertical	1.0	270	66.17	74.00	-7.83	49.67	49.67	54.00	-4.33	
High carrier frequency											
1725.98	Vertical	1.2	256	53.13	74.00	-20.87	37.38	37.38	54.00	-16.62	Pass
2483.50	Vertical	1.2	260	73.87	74.00	-0.13	52.34	52.34	54.00	-1.66	
4917.92	Vertical	1.0	266	64.83	74.00	-9.17	50.33	50.33	54.00	-3.67	

** - Margin = Measured field strength - specification limit.

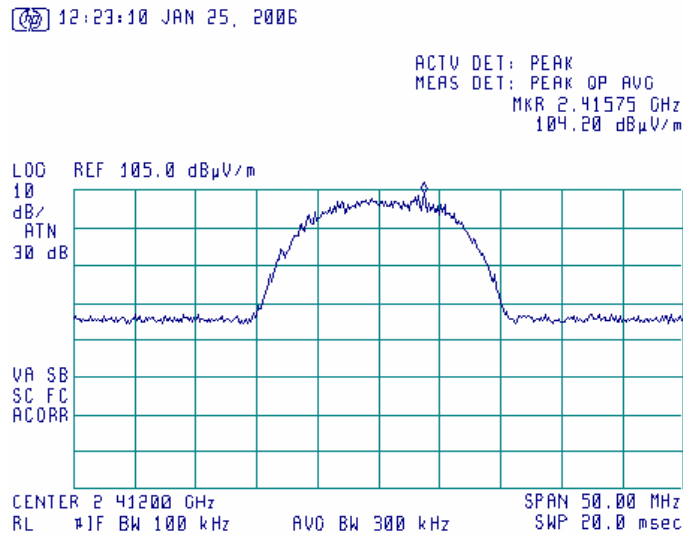
*** - Margin = Calculated field strength - specification limit,

Where Calculated field strength = Measured field strength + average factor.

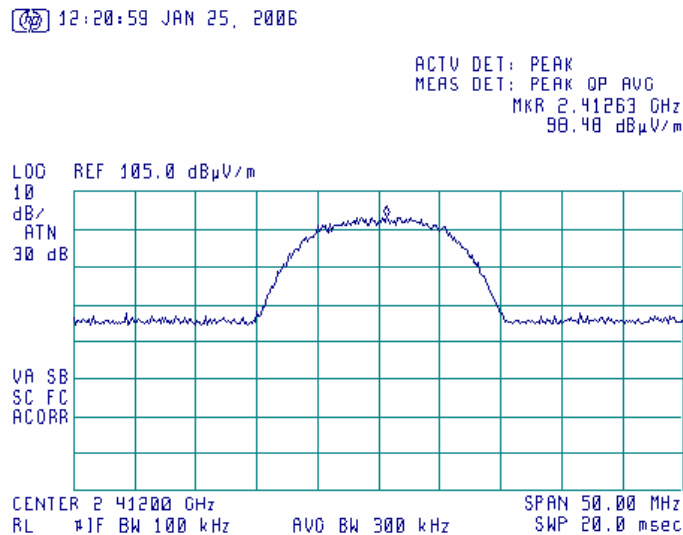
Table 6.17.2 Radiated Spurious emission plots summary

Plot #	Frequency [MHz]	Mode	Freq Sweep	Pass/Fail
6.17.1÷6	low, mid, high	802.11b	Ref Channel	
6.17.7÷12	low, mid, high	802.11g	Ref Channel	
6.17.13÷15	low, mid, high	802.11g	9 ÷ 150 KHz	Pass
6.17.16÷18	low, mid, high	802.11g	0.15÷30 MHz	Pass
6.17.19÷21	low, mid, high	802.11b	30÷1000 MHz	Pass
6.17.22÷24	low, mid, high	802.11g	30÷1000 MHz	Pass
6.17.25÷28	low	802.11b	1000÷2400 MHz	Pass
6.17.29÷30	mid	802.11b	1000÷2400 MHz	Pass
6.17.31	high	802.11b	1000÷2400 MHz	Pass
6.17.32÷37	low	802.11g	1000÷2400 MHz	Pass
6.17.38÷43	mid	802.11g	1000÷2400 MHz	Pass
6.17.44÷48	high	802.11g	1000÷2400 MHz	Pass
6.17.49÷54	low, mid, high	802.11b	2483.5÷2500 MHz	Pass
6.17.55÷60	low, mid, high	802.11g	2483.5÷2500 MHz	Pass
6.17.61÷63	low, mid, high	802.11b	2500÷4000 MHz	Pass
6.17.64÷65	low	802.11g	2500÷4000 MHz	Pass
6.17.66÷68	mid*	802.11g	2500÷4000 MHz	Pass
* mid Freq set to 2447MHz to show compliance with restricted band				
6.17.69÷70	high	802.11g	2500÷4000 MHz	Pass
6.17.71÷82	low, mid, high	802.11g	4000÷8000 MHz	Pass
6.17.83÷91	low, mid, high	802.11g	8÷14 GHz	Pass
6.17.92÷97	low, mid, high	802.11g	14÷18 GHz	Pass
6.17.98÷100	low, mid, high	802.11g	18÷26.5 GHz	Pass

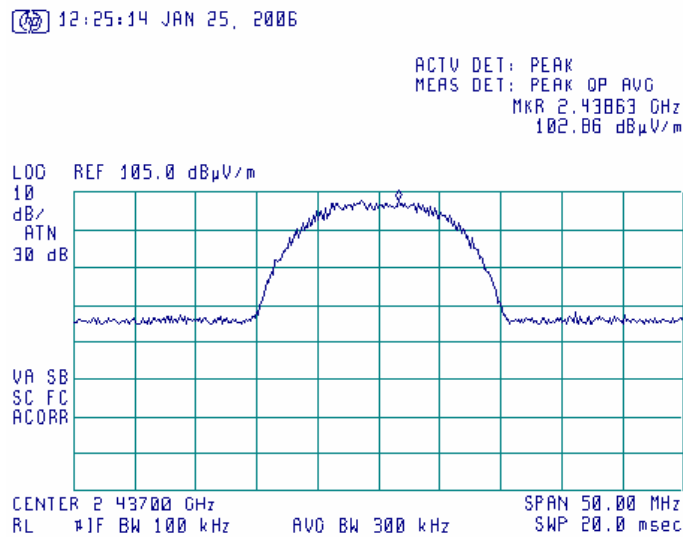
Plot 6.17.1: Tx Radiated emission measurements at the low carrier frequency, 11Mbps, 802.11b mode, Vertical polarization.



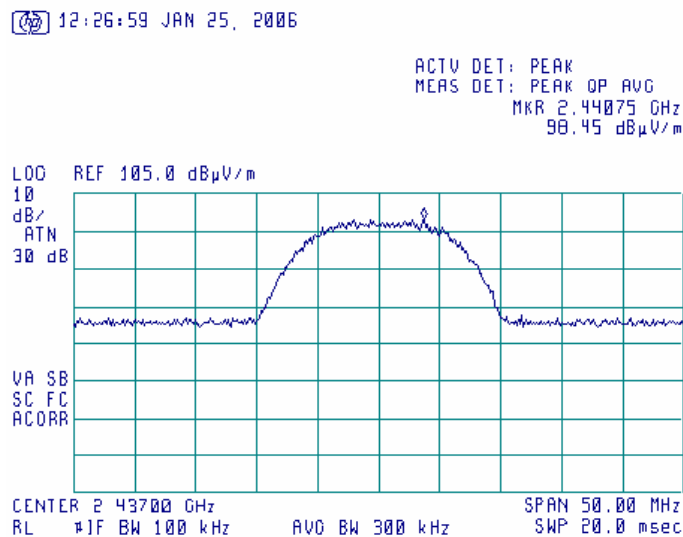
Plot 6.17.2: Tx Radiated emission measurements at the low carrier frequency, 11Mbps, 802.11b mode, Horizontal polarization.



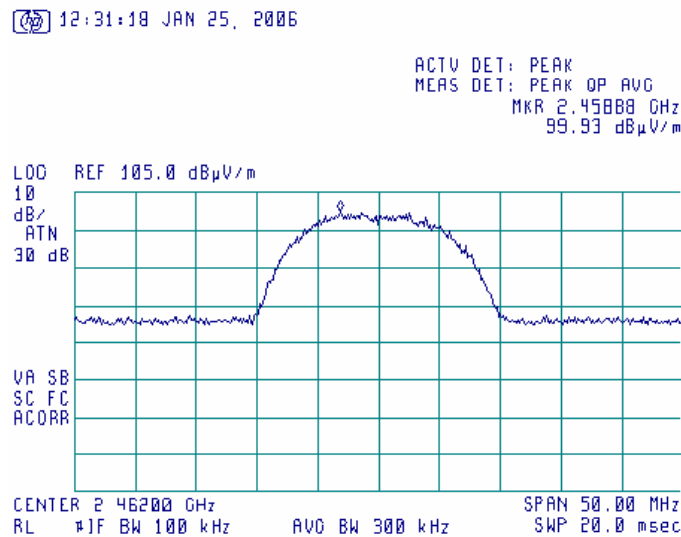
Plot 6.17.3: Tx Radiated emission measurements at the mid carrier frequency, 11Mbps, 802.11b mode, Vertical polarization.



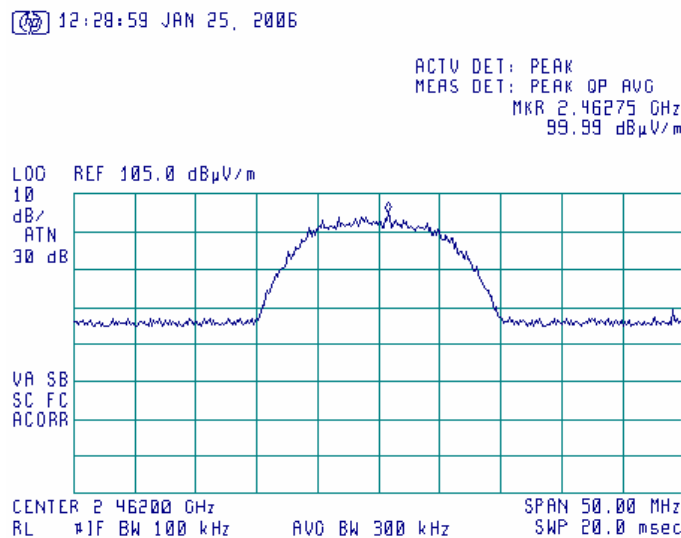
Plot 6.17.4: Tx Radiated emission measurements at the mid carrier frequency, 11Mbps, 802.11b mode, Horizontal polarization.



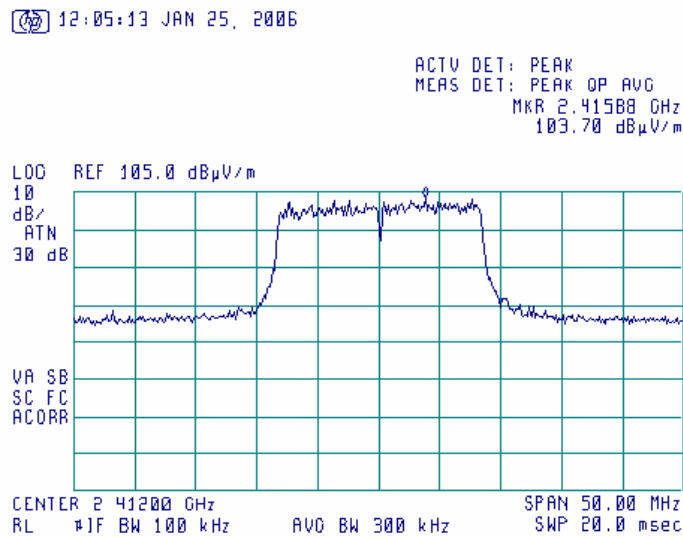
Plot 6.17.5: Tx Radiated emission measurements at the high carrier frequency, 11Mbps, 802.11b mode, Vertical polarization.



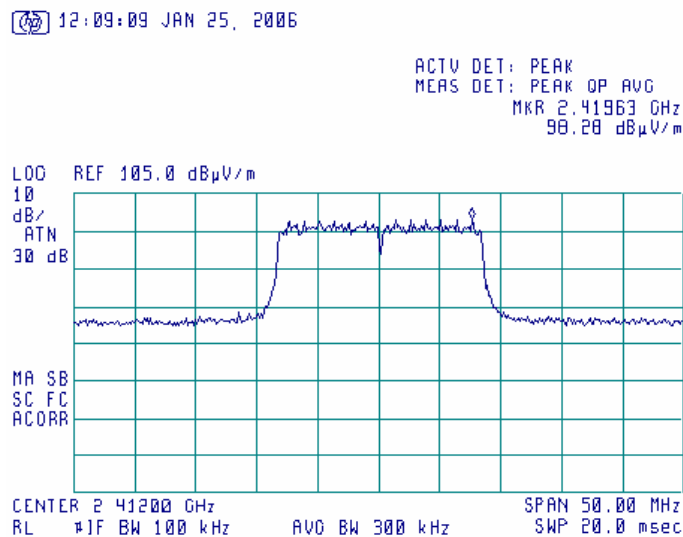
Plot 6.17.6: Tx Radiated emission measurements at the high carrier frequency, 11Mbps, 802.11b mode, Horizontal polarization.



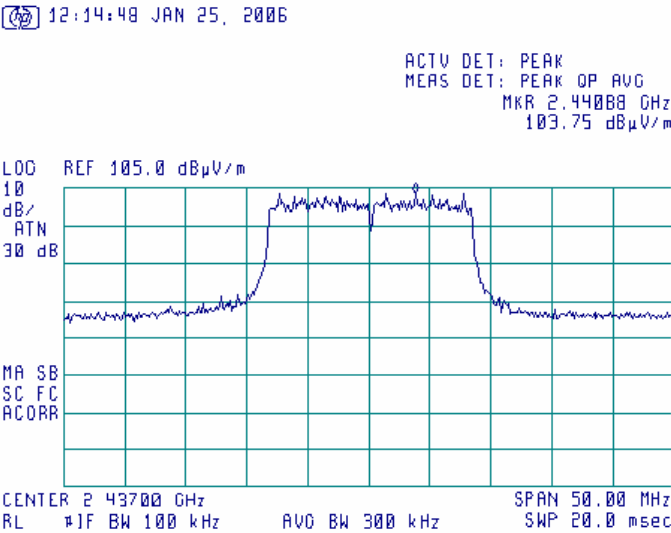
Plot 6.17.7: Tx Radiated emission measurements at the low carrier frequency, 54Mbps, 802.11g mode, Vertical polarization.



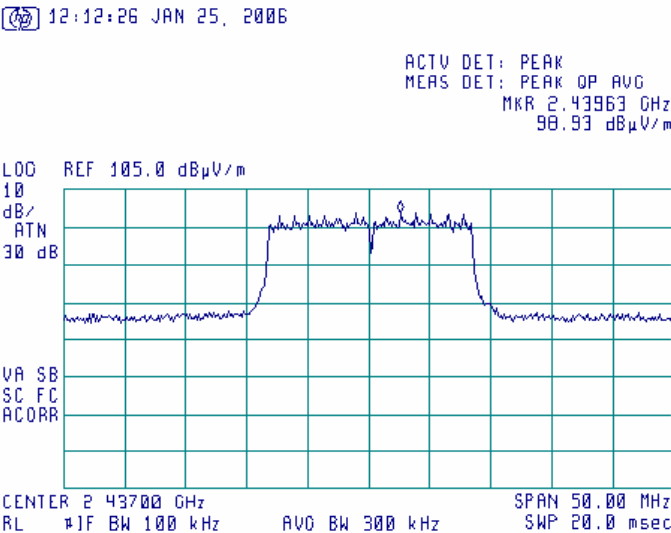
Plot 6.17.8: Tx Radiated emission measurements at the low carrier frequency, 54Mbps, 802.11g mode, Horizontal polarization.



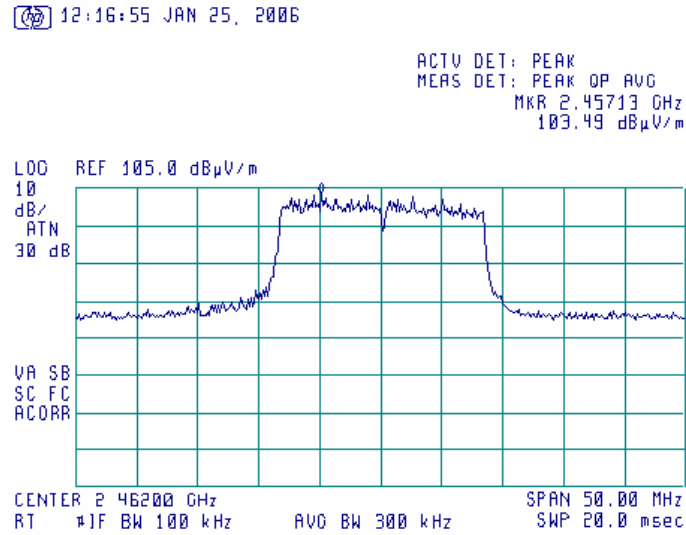
Plot 6.17.9: Tx Radiated emission measurements at the mid carrier frequency, 54Mbps, 802.11g mode, Vertical polarization.



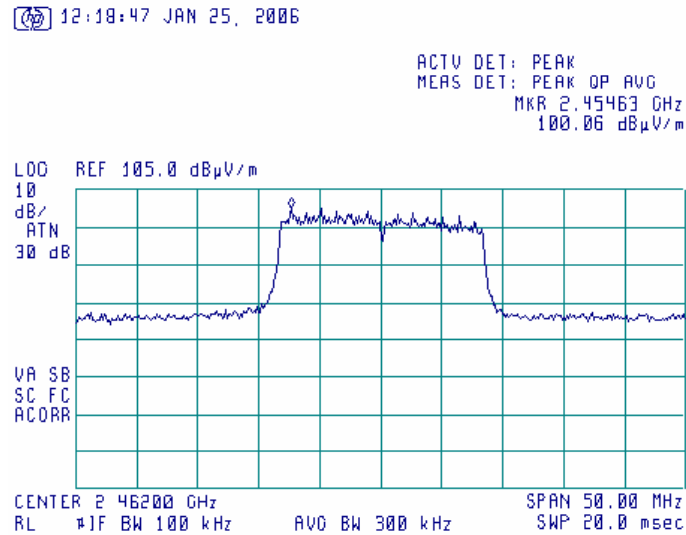
Plot 6.17.10: Tx Radiated emission measurements at the mid carrier frequency, 54Mbps, 802.11g mode, Horizontal polarization.



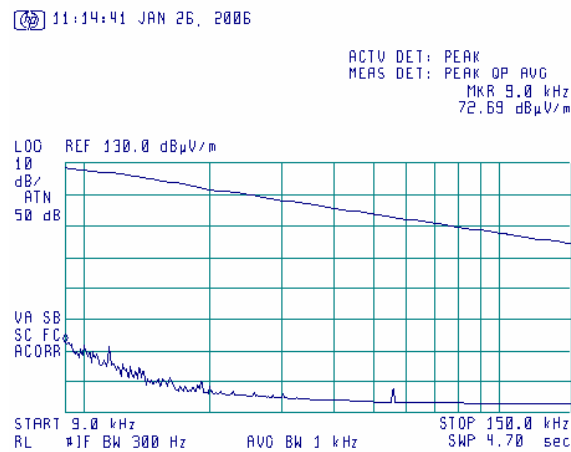
Plot 6.17.11: Tx Radiated emission measurements at the high carrier frequency, 54Mbps, 802.11g mode, Vertical polarization.



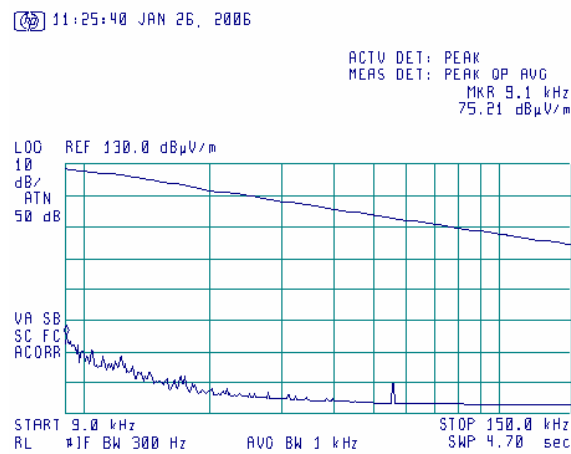
Plot 6.17.12: Tx Radiated emission measurements at the high carrier frequency, 54Mbps, 802.11g mode, Horizontal polarization.



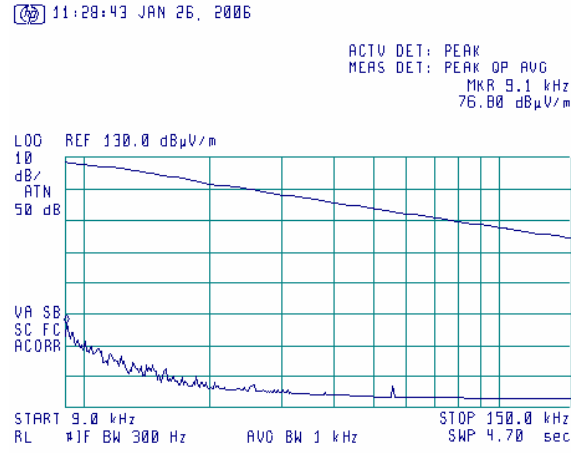
Plot 6.17.13: Tx Radiated emission measurements, 9-150 kHz at the low carrier frequency, 802.11g mode.



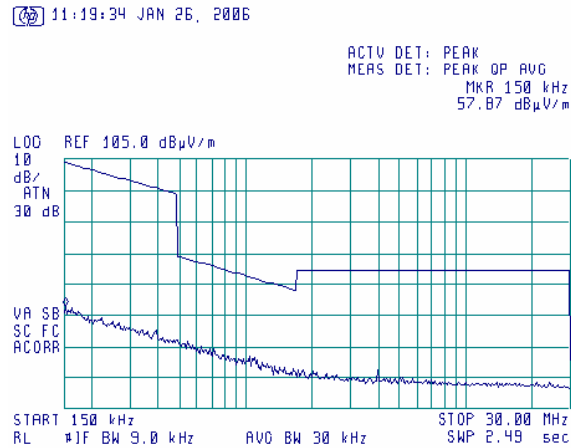
Plot 6.17.14: Tx Radiated emission measurements, 9-150 kHz at the mid carrier frequency, 802.11g mode.



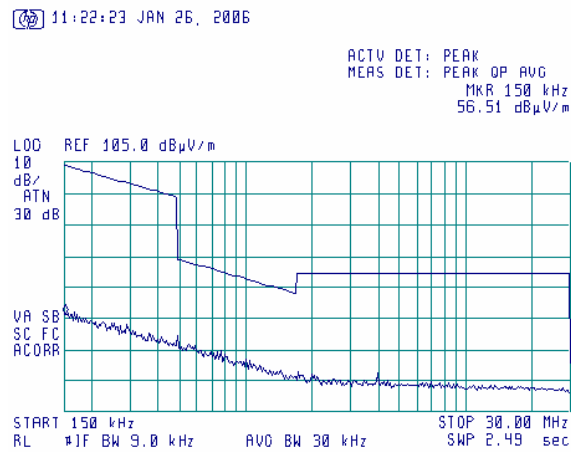
Plot 6.17.15: Tx Radiated emission measurements, 9-150 kHz at the high carrier frequency, 802.11g mode.



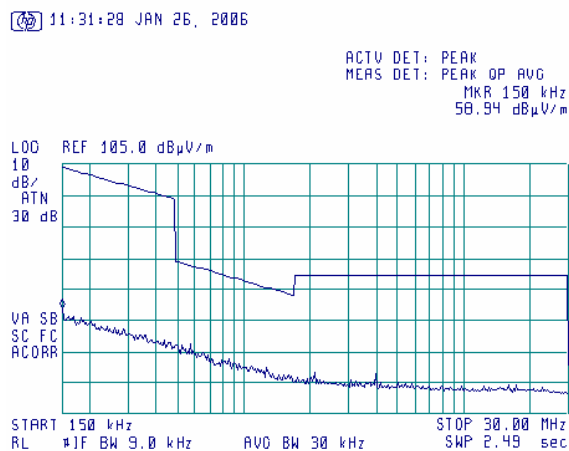
Plot 6.17.16: Tx Radiated emission measurements, 0.15 - 30 MHz at the low carrier frequency, 802.11g mode.



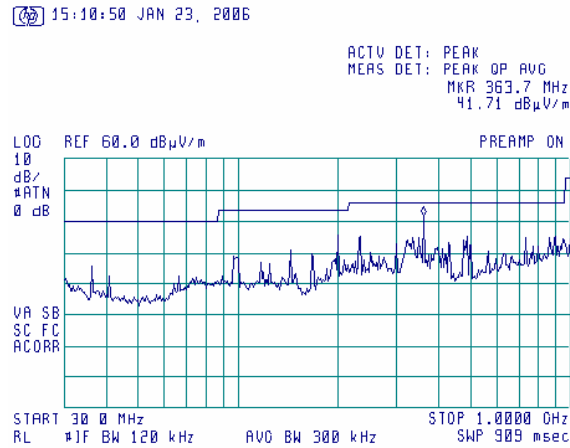
Plot 6.17.17: Tx Radiated emission measurements, 0.15 - 30 MHz at the high carrier frequency, 802.11g mode.



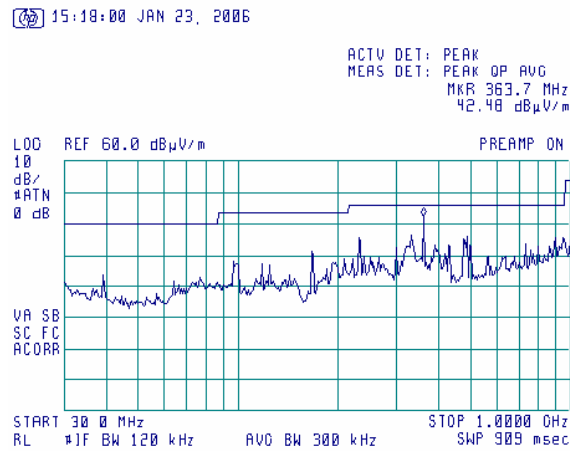
Plot 6.17.18: Tx Radiated emission measurements, 0.15 - 30 MHz at the high carrier frequency, 802.11g mode.



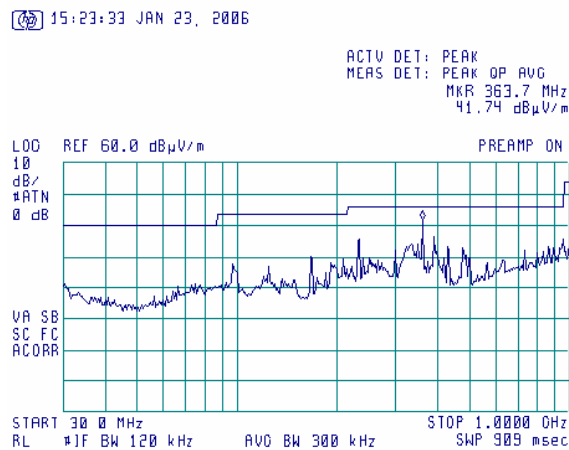
Plot 6.17.19: Tx Radiated emission measurements, 30 - 1000 MHz at the low carrier frequency, 802.11b mode.



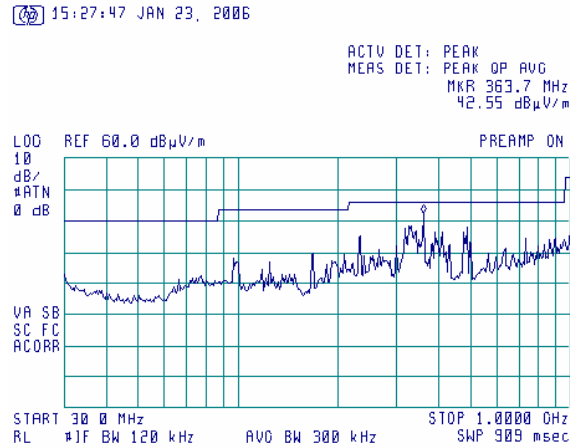
Plot 6.17.20: Tx Radiated emission measurements, 30 - 1000 MHz at the mid carrier frequency, 802.11b mode.



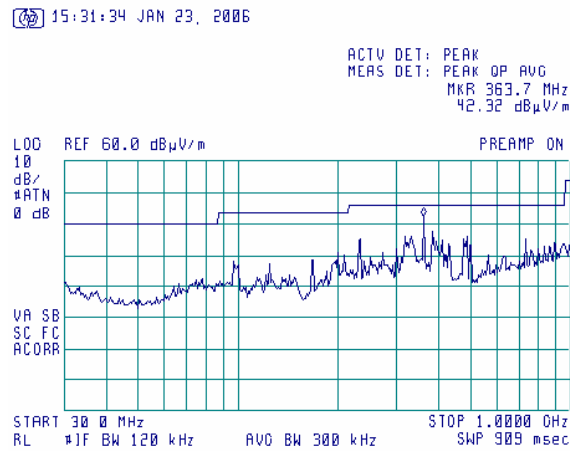
Plot 6.17.21: Tx Radiated emission measurements, 30 - 1000 MHz at the high carrier frequency, 802.11b mode.



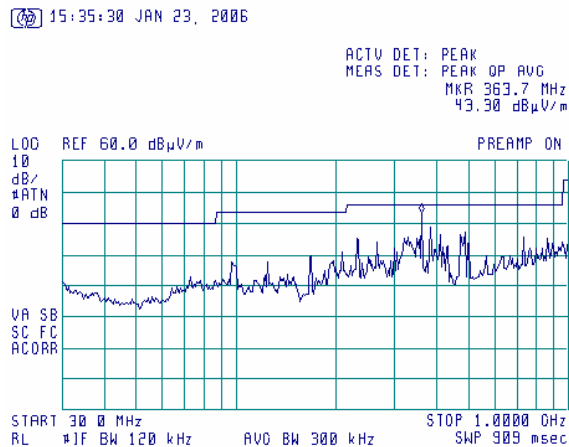
Plot 6.17.22: Tx Radiated emission measurements, 30 - 1000 MHz at the low carrier frequency, 802.11g mode.

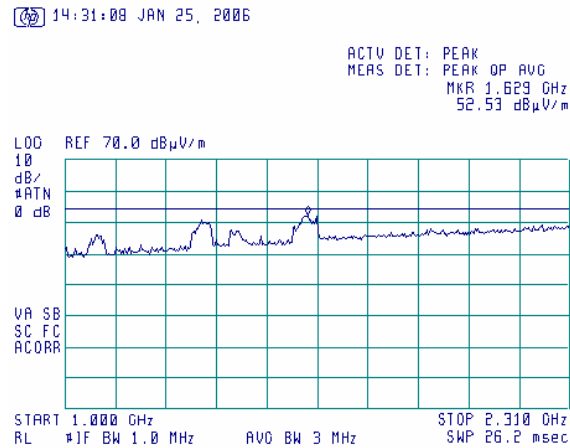


Plot 6.17.23: Tx Radiated emission measurements, 30 - 1000 MHz at the mid carrier frequency, 802.11g mode.

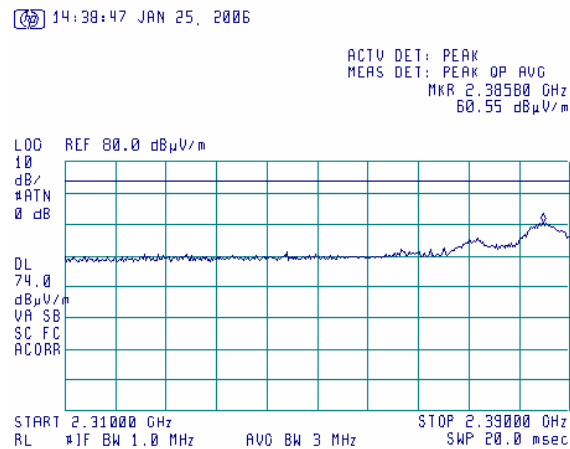


Plot 6.17.24: Tx Radiated emission measurements, 30 - 1000 MHz at the high carrier frequency, 802.11g mode.

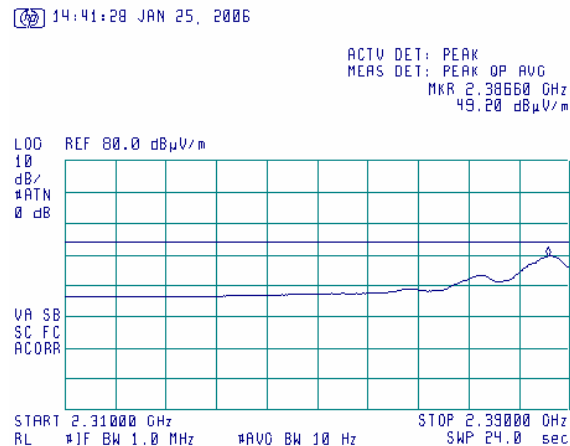


Plot 6.17.25: Tx Radiated emission measurements, 1000 - 2310 MHz at the low carrier frequency, 802.11b mode.**Plot 6.17.26: Tx Radiated emission measurements, 2310 - 2390 MHz at the low carrier frequency, 802.11b mode.**

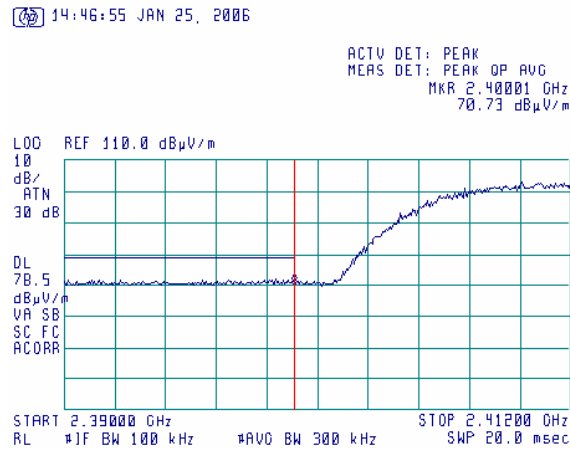
DETECTOR: PEAK

**Plot 6.17.27: Tx Radiated emission measurements, 2310 - 2390 MHz at the low carrier frequency, 802.11b mode.**

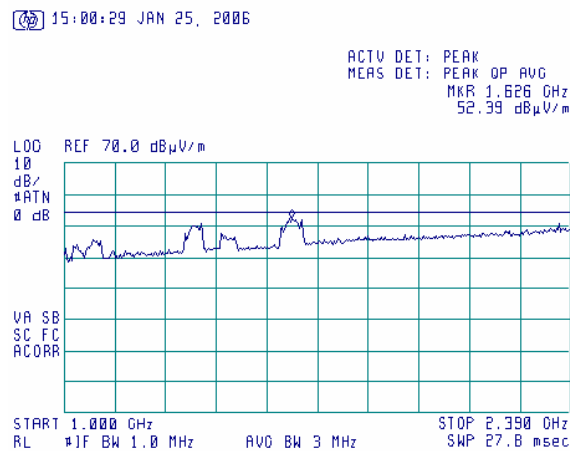
DETECTOR: AVERAGE



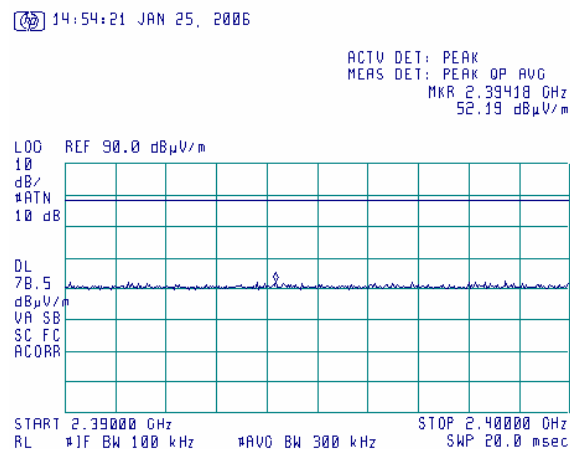
Plot 6.17.28: Tx Radiated emission measurements, 2390 - 2412 MHz at the low carrier frequency, 802.11b mode.



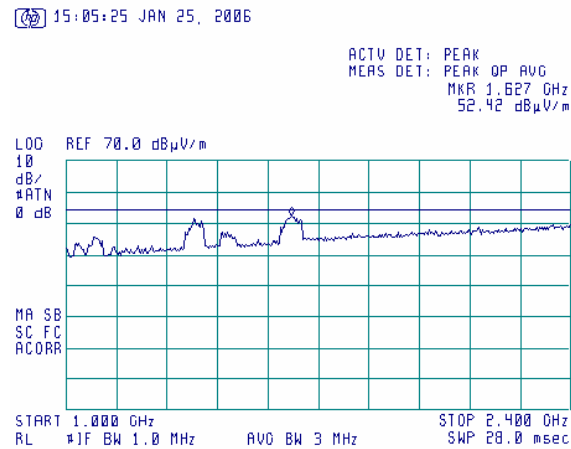
Plot 6.17.29: Tx Radiated emission measurements, 1000 - 2390 MHz at the mid carrier frequency, 802.11b mode.



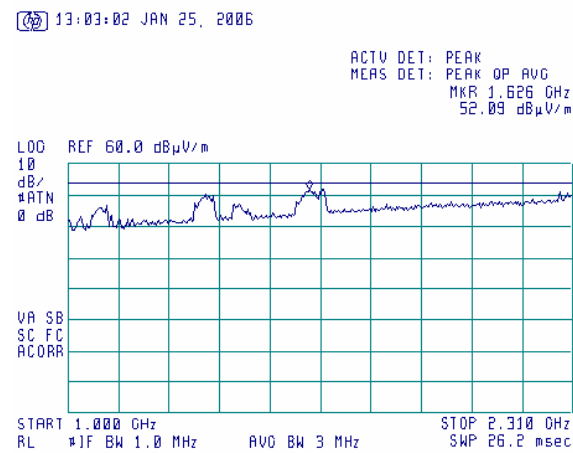
Plot 6.17.30: Tx Radiated emission measurements, 2390 - 2400 MHz at the mid carrier frequency, 802.11b mode.



Plot 6.17.31: Tx Radiated emission measurements, 1000 - 2400 MHz at the high carrier frequency, 802.11b mode.

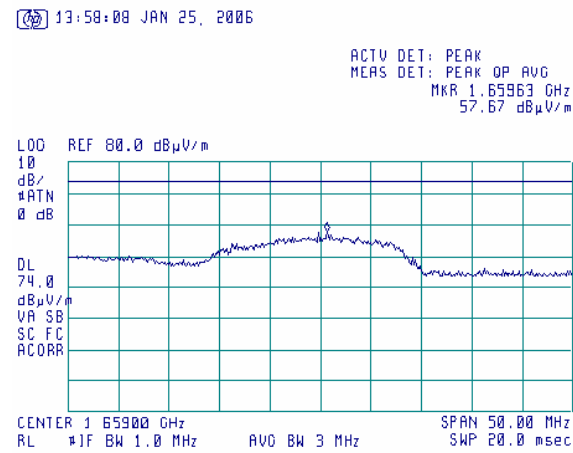


Plot 6.17.32: Tx Radiated emission measurements, 1000 - 2310 MHz at the low carrier frequency, 802.11g mode.



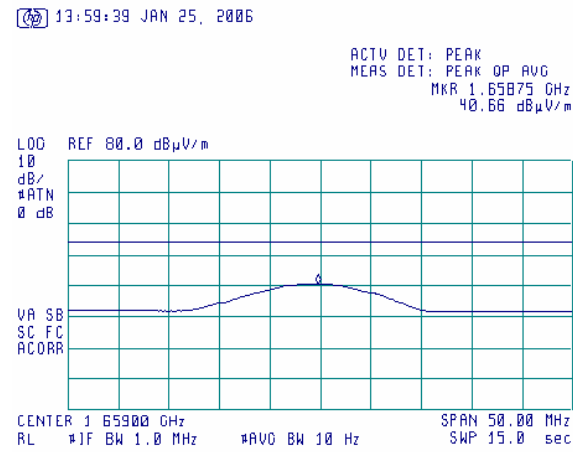
Plot 6.17.33: Tx Radiated emission measurement at 1659MHz, at the low carrier frequency, 802.11g mode.

DETECTOR: PEAK



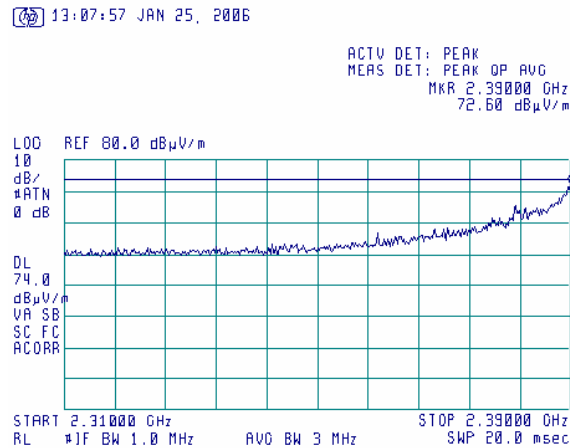
Plot 6.17.34: Tx Radiated emission measurement at 1659MHz, at the low carrier frequency, 802.11g mode.

DETECTOR: AVERAGE



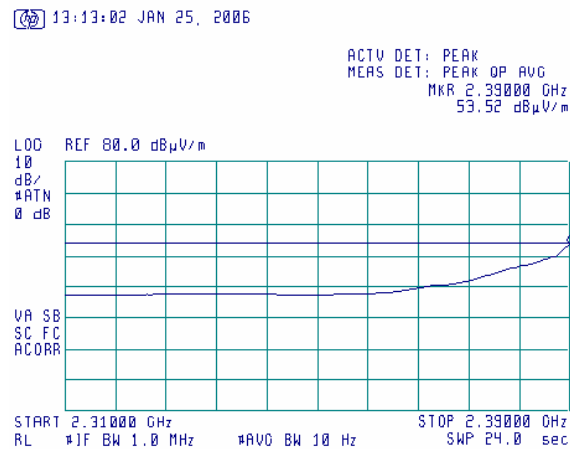
Plot 6.17.35: Tx Radiated emission measurements, 2310 - 2390 MHz, at the low carrier frequency, 802.11g mode.

DETECTOR: PEAK

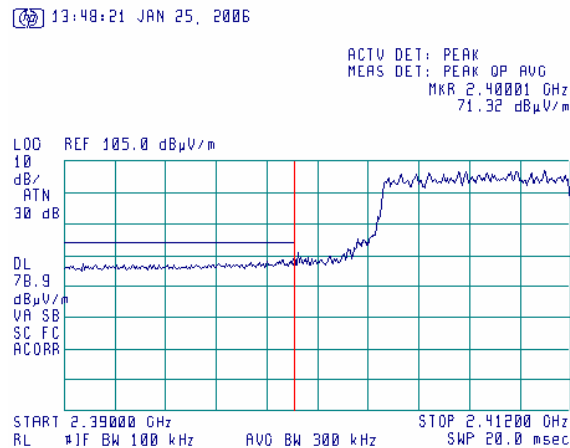


Plot 6.17.36: Tx Radiated emission measurements, 2310 - 2390 MHz, at the low carrier frequency, 802.11g mode.

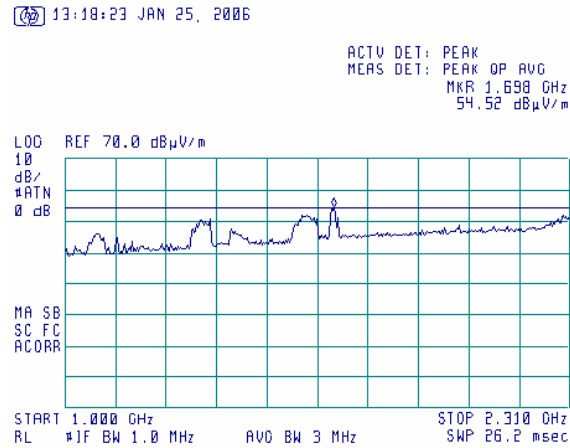
DETECTOR: AVERAGE



Plot 6.17.37: Tx Radiated emission measurements, 2390 - 2412 MHz, at the low carrier frequency, 802.11g mode.

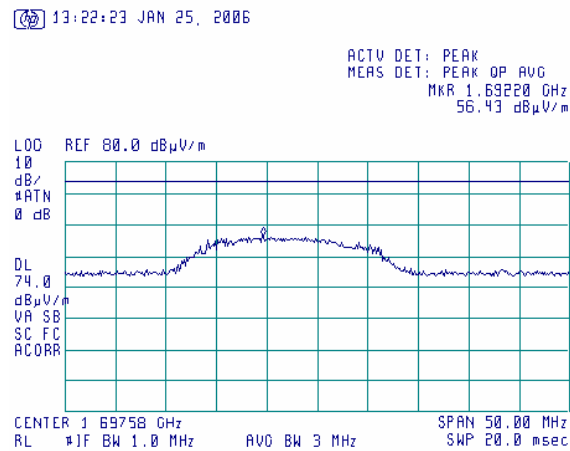


Plot 6.17.38: Tx Radiated emission measurements, 1000 - 2310 MHz, at the mid carrier frequency, 802.11g mode.



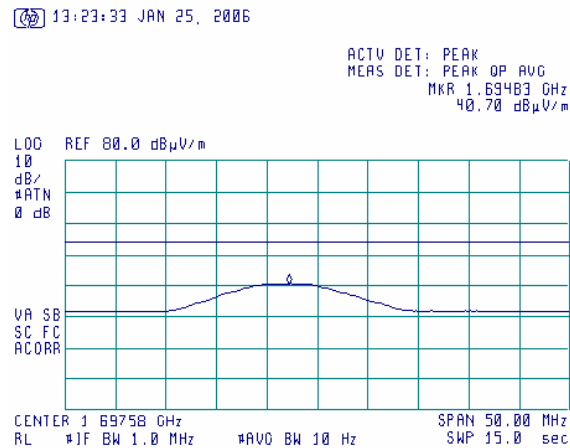
Plot 6.17.39: Tx Radiated emission measurement at 1698 MHz, at the mid carrier frequency, 802.11g mode.

DETECTOR: PEAK



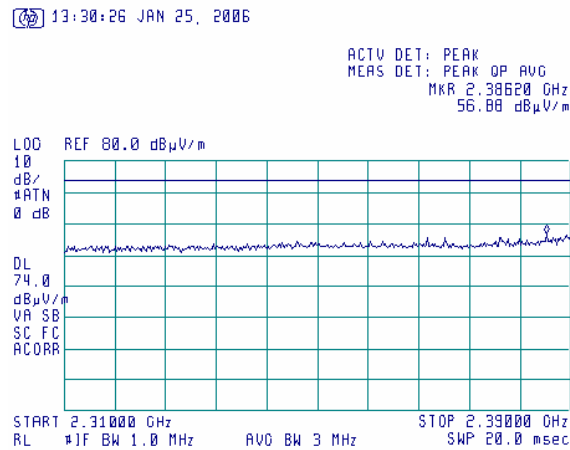
Plot 6.17.40: Tx Radiated emission measurement at 1698 MHz, at the mid carrier frequency, 802.11g mode.

DETECTOR: AVERAGE



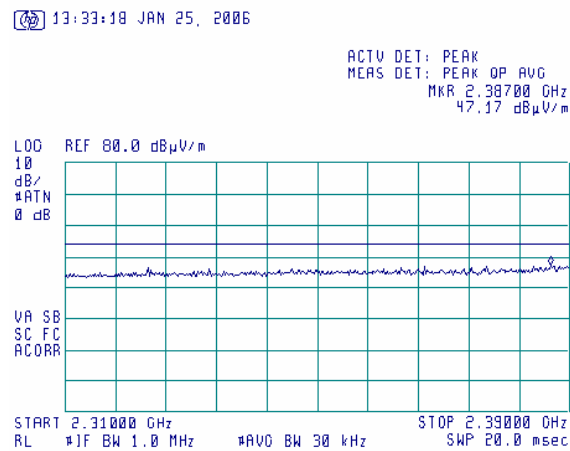
Plot 6.17.41: Tx Radiated emission measurements, 2310 - 2390MHz, at the mid carrier frequency, 802.11g mode.

DETECTOR: PEAK

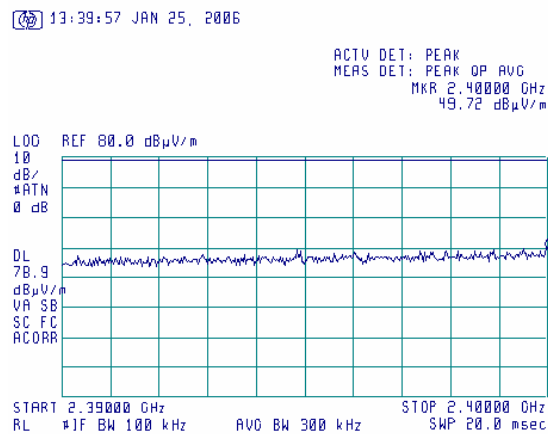


Plot 6.17.42: Tx Radiated emission measurements, 2310 - 2390MHz, at the mid carrier frequency, 802.11g mode.

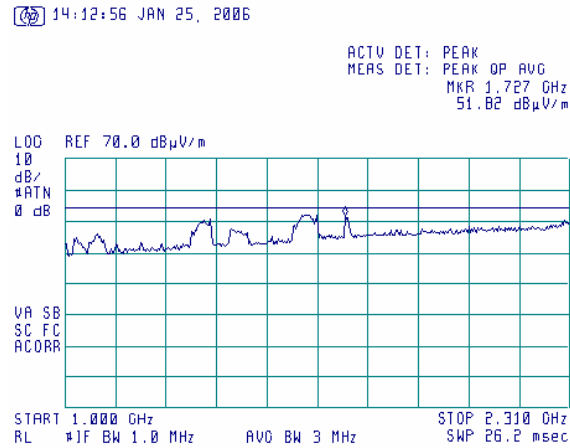
DETECTOR: AVERAGE



Plot 6.17.43: Tx Radiated emission measurements, 2390 - 2400MHz, at the mid carrier frequency, 802.11g mode.

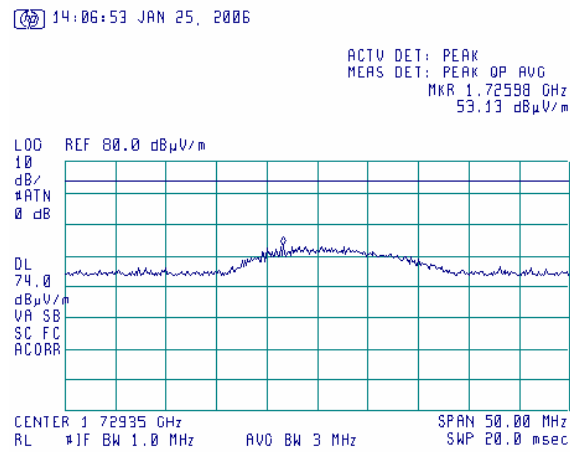


Plot 6.17.44: Tx Radiated emission measurements, 1000 - 2310 MHz, at the high carrier frequency, 802.11g mode.



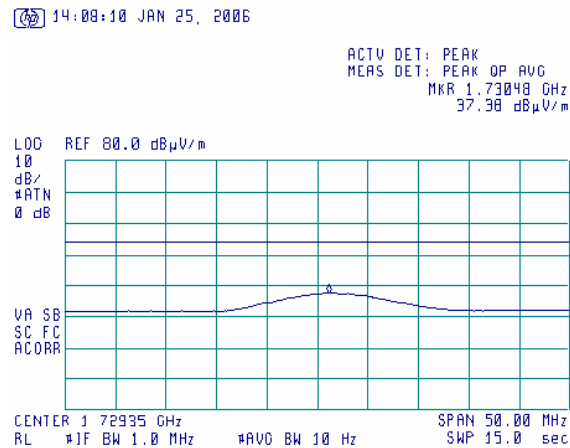
Plot 6.17.45: Tx Radiated emission measurement at 1729 MHz, at the high carrier frequency, 802.11g mode.

DETECTOR: PEAK

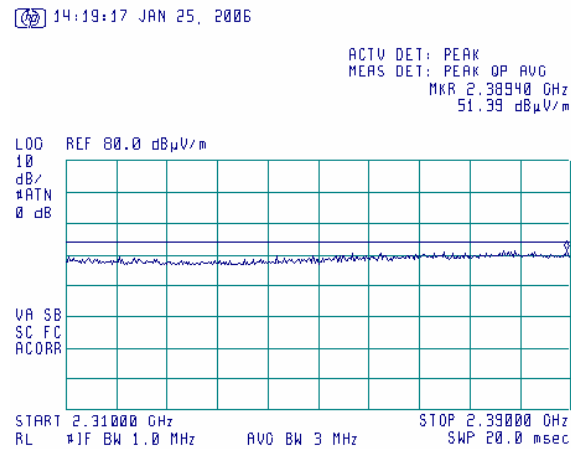


Plot 6.17.46: Tx Radiated emission measurement at 1729 MHz, at the high carrier frequency, 802.11g mode.

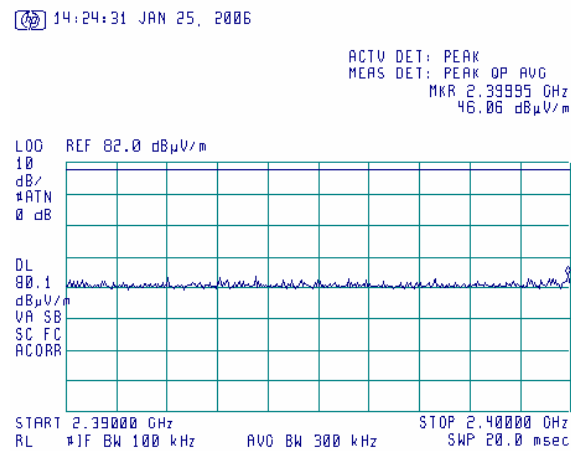
DETECTOR: AVERAGE



Plot 6.17.47: Tx Radiated emission measurements, 2310 - 2390MHz, at the high carrier frequency, 802.11g mode.

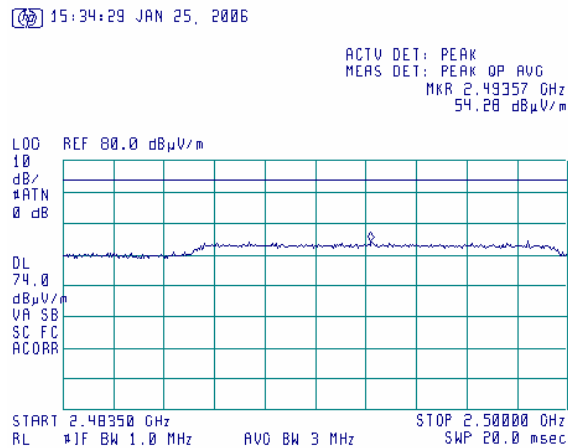


Plot 6.17.48: Tx Radiated emission measurements, 2390 - 2400MHz, at the high carrier frequency, 802.11g mode.



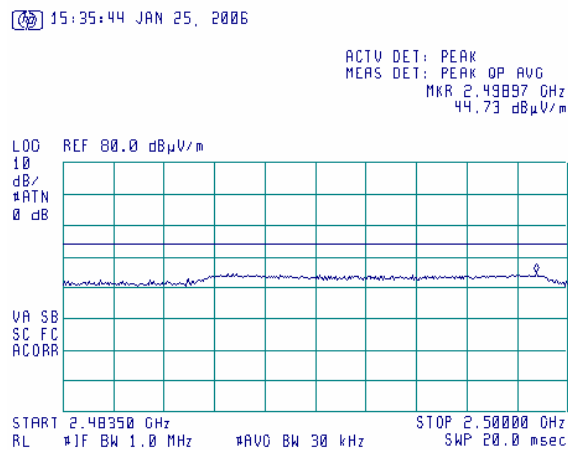
Plot 6.17.49: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the low carrier frequency, 802.11b mode.

DETECTOR: PEAK



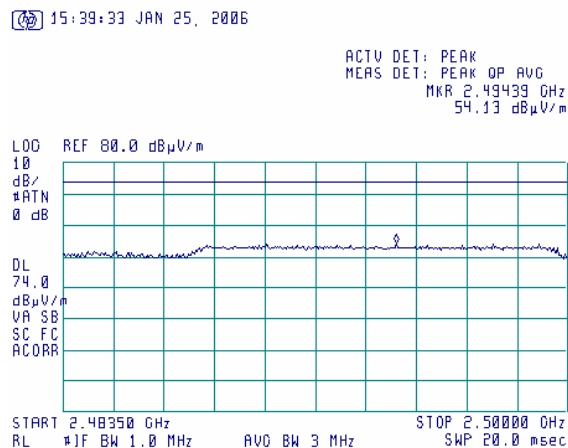
Plot 6.17.50: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the low carrier frequency, 802.11b mode.

DETECTOR: AVERAGE



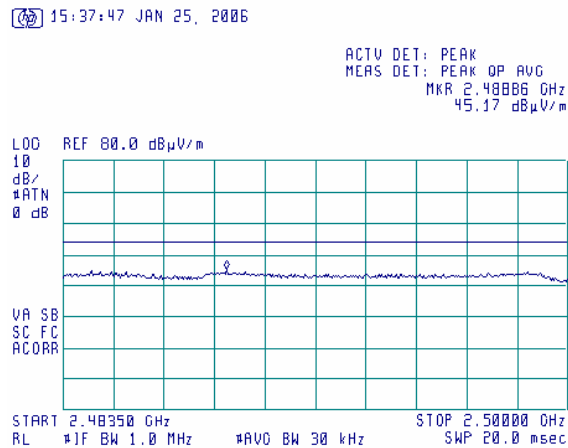
Plot 6.17.51: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the mid carrier frequency, 802.11b mode.

DETECTOR: PEAK



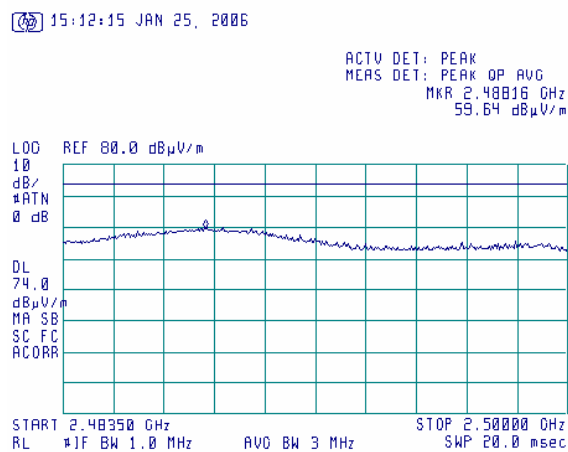
Plot 6.17.52: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the mid carrier frequency, 802.11b mode.

DETECTOR: AVERAGE



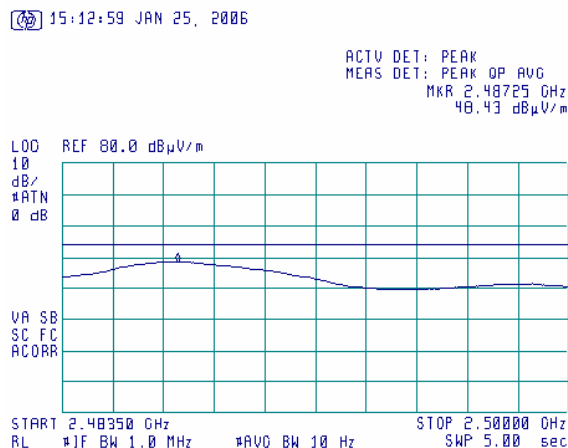
Plot 6.17.53: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the high carrier frequency, 802.11b mode.

DETECTOR: PEAK



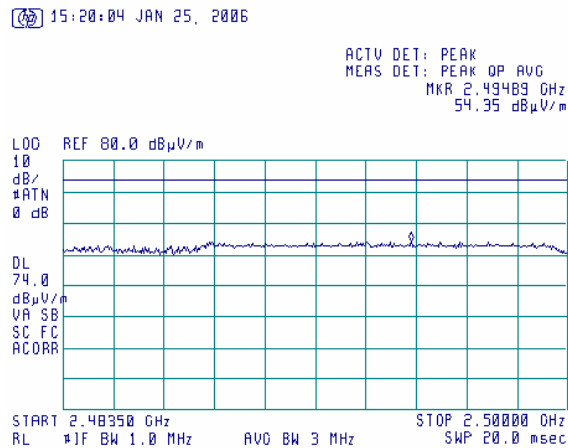
Plot 6.17.54: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the high carrier frequency, 802.11b mode.

DETECTOR: AVERAGE



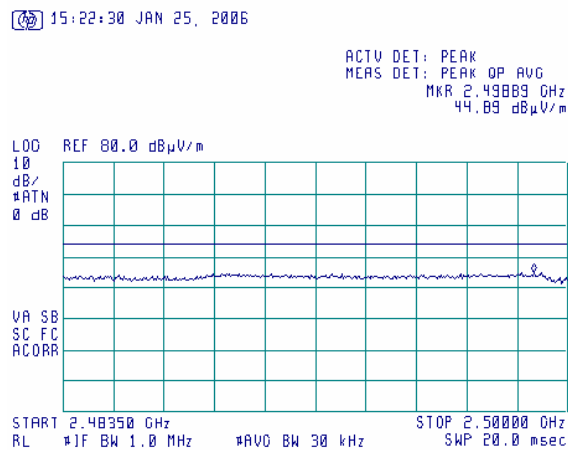
Plot 6.17.55: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the low carrier frequency, 802.11g mode.

DETECTOR: PEAK



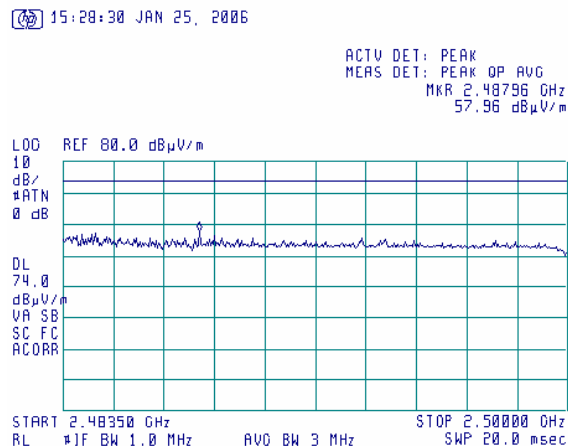
Plot 6.17.56: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the low carrier frequency, 802.11g mode.

DETECTOR: AVERAGE



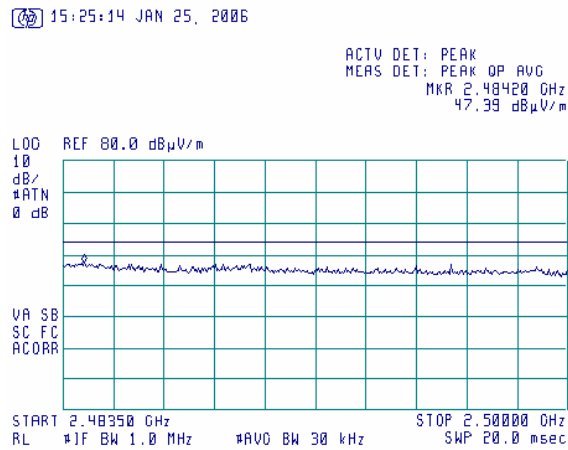
Plot 6.17.57: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the mid carrier frequency, 802.11g mode.

DETECTOR: PEAK



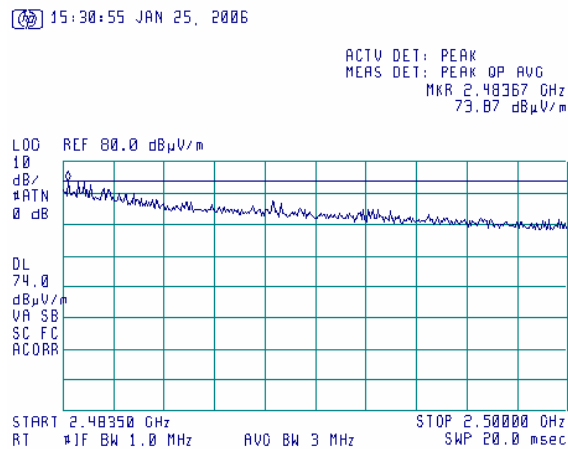
Plot 6.17.58: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the mid carrier frequency, 802.11g mode.

DETECTOR: AVERAGE



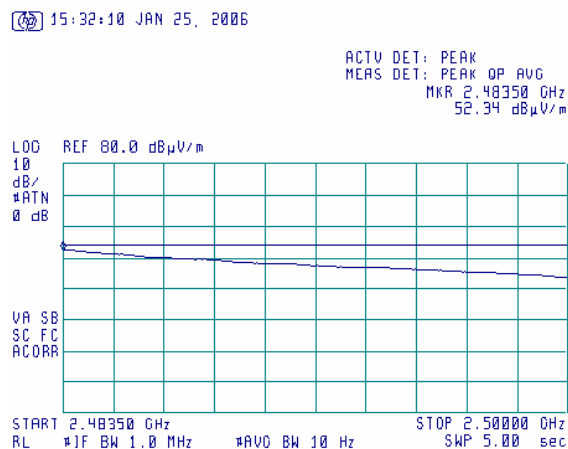
Plot 6.17.59: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the high carrier frequency, 802.11g mode.

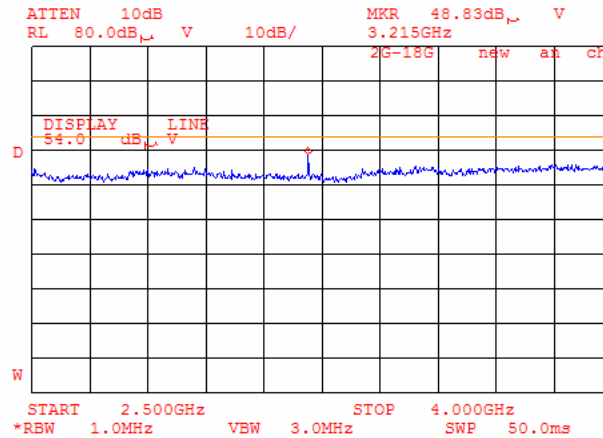
DETECTOR: PEAK



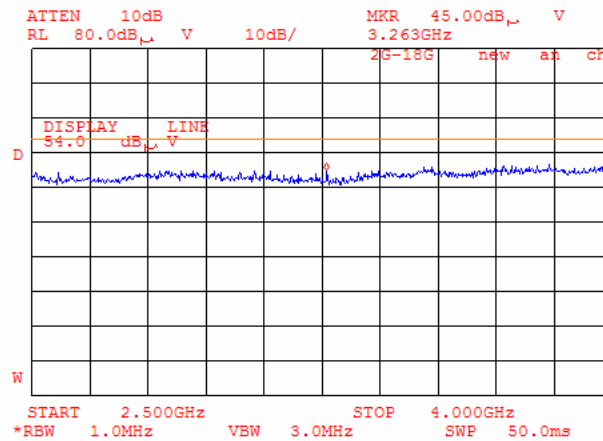
Plot 6.17.60: Tx Radiated emission measurements, 2483.5 - 2500MHz, at the high carrier frequency, 802.11g mode.

DETECTOR: AVERAGE

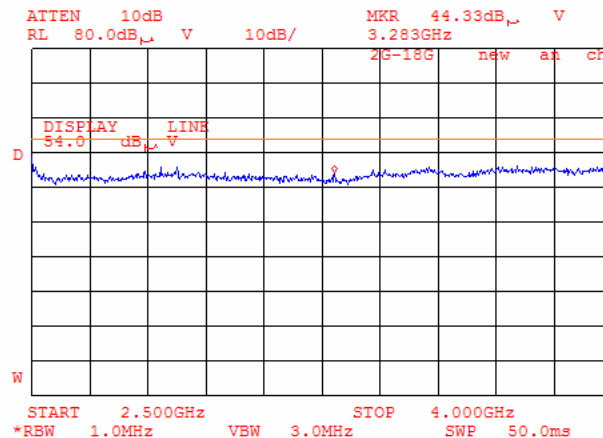


Plot 6.17.61: Tx Radiated emission measurements, 2500 - 4000MHz, at the low carrier frequency, 802.11b mode.

Note: 3216 MHz – second harmonic of LO*.

Plot 6.17.62: Tx Radiated emission measurements, 2500 - 4000MHz, at the mid carrier frequency, 802.11b mode.

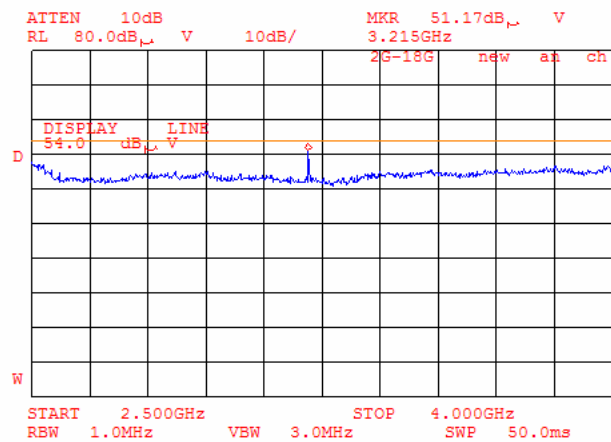
Note: 3262.6 MHz – second harmonic of LO*.

Plot 6.17.63: Tx Radiated emission measurements, 2500 - 4000MHz, at the high carrier frequency, 802.11b mode.

Note: 3282.6 MHz – second harmonic of LO*.

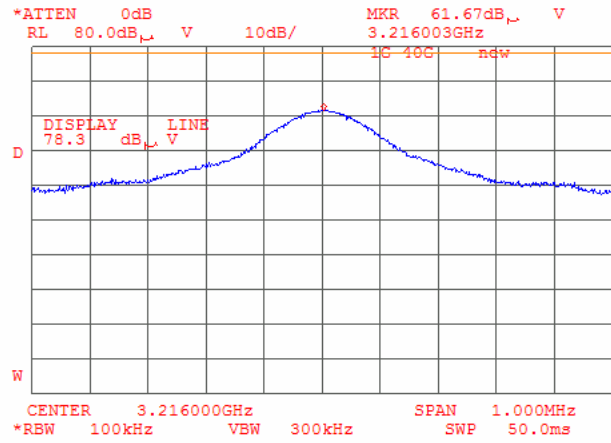
*Measurements of the second harmonic of LO were taken under 802.11 g standard, which is the worst case

Plot 6.17.64: Tx Radiated emission measurements, 2500 - 4000MHz, at the low carrier frequency, 802.11g mode.

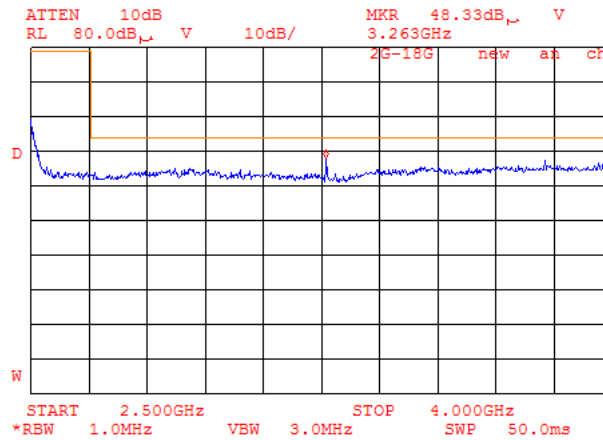


Note: 3216 MHz – second harmonic of LO

Plot 6.17.65: Tx Radiated emission measurement at 3216MHz, at the low carrier frequency, 802.11g mode.



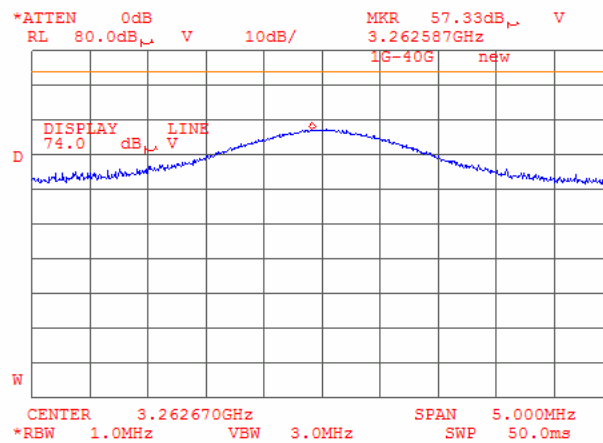
Plot 6.17.66: Tx Radiated emission measurements, 2500 - 4000MHz, at the mid* carrier frequency, 802.11g mode.



Note: 3262.6 MHz – second harmonic of LO

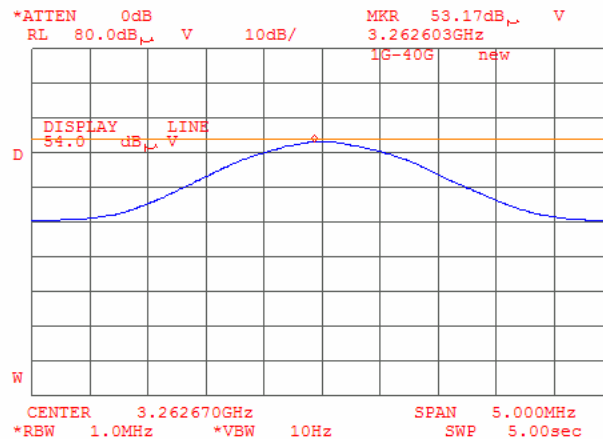
Plot 6.17.67: Tx Radiated emission measurement at 3262MHz, at the mid* carrier frequency, 802.11g mode.

DETECTOR: PEAK



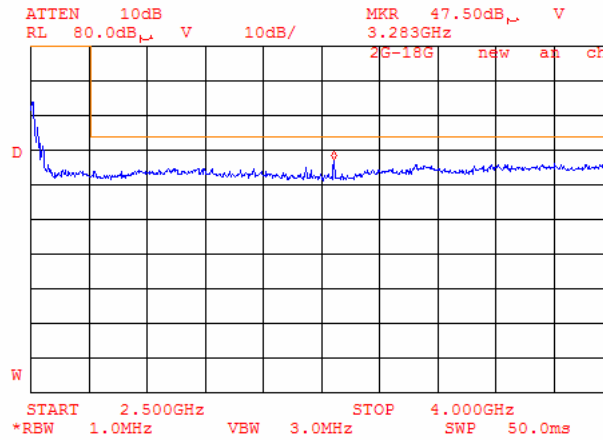
Plot 6.17.68: Tx Radiated emission measurement at 3262MHz, at the mid* carrier frequency, 802.11g mode.

DETECTOR: AVERAGE



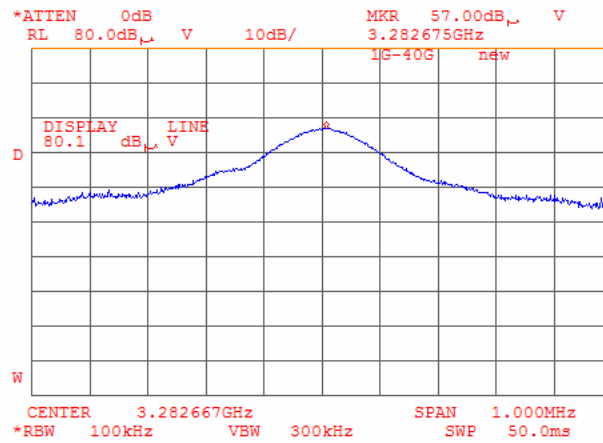
* – This carrier frequency was chosen to show compliance of second harmonic of LO with restricted band limits.

Plot 6.17.69: Tx Radiated emission measurements, 2500 - 4000MHz, at the high carrier frequency, 802.11g mode.



Note: 3282.6 MHz – second harmonic of LO

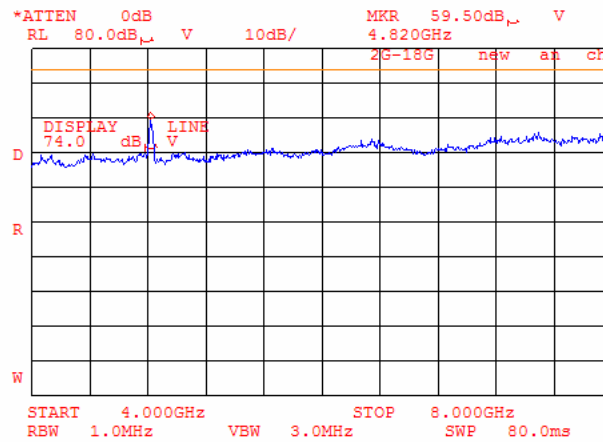
Plot 6.17.70: Tx Radiated emission measurement at 3283MHz, at the high carrier frequency, 802.11g mode.



Plot 6.17.71: Tx Radiated emission measurements, 4000 - 8000MHz, at the low carrier frequency, 802.11g mode.

DETECTOR:

PEAK

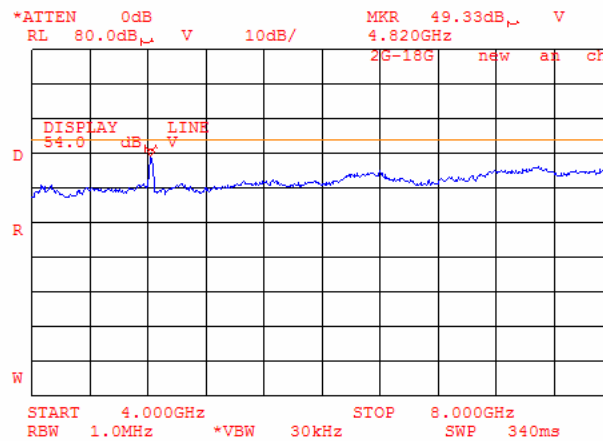


Note: 4824 MHz – second harmonic of RF module

Plot 6.17.72: Tx Radiated emission measurements, 4000 - 8000MHz, at the low carrier frequency, 802.11g mode.

DETECTOR:

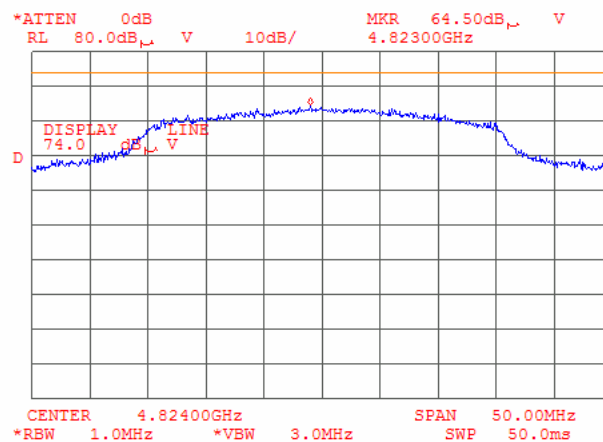
AVERAGE



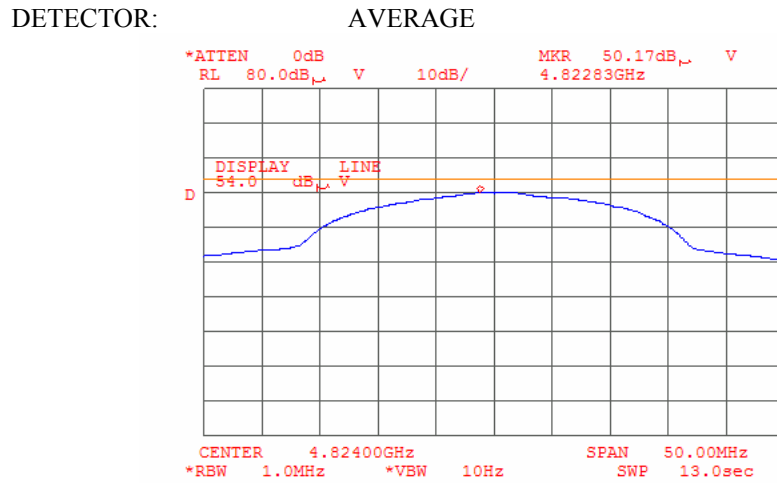
Plot 6.17.73: Tx Radiated emission measurement, at 4824MHz, at the low carrier frequency, 802.11g mode.

DETECTOR:

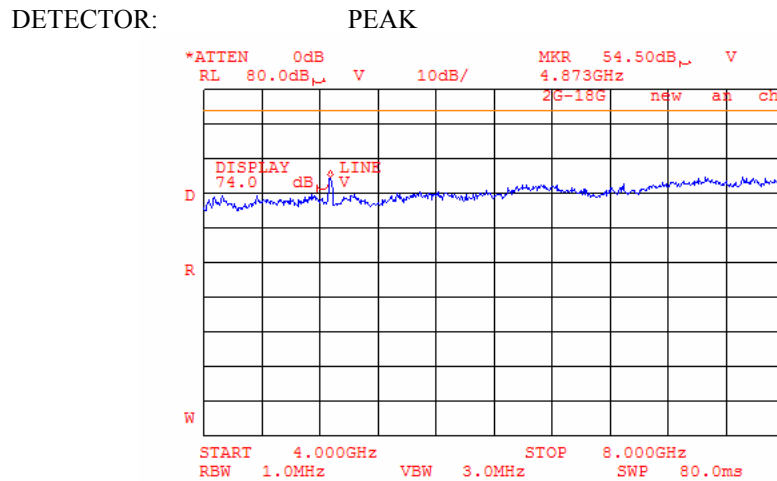
PEAK



Plot 6.17.74: Tx Radiated emission measurement, at 4824MHz, at the low carrier frequency, 802.11g mode.

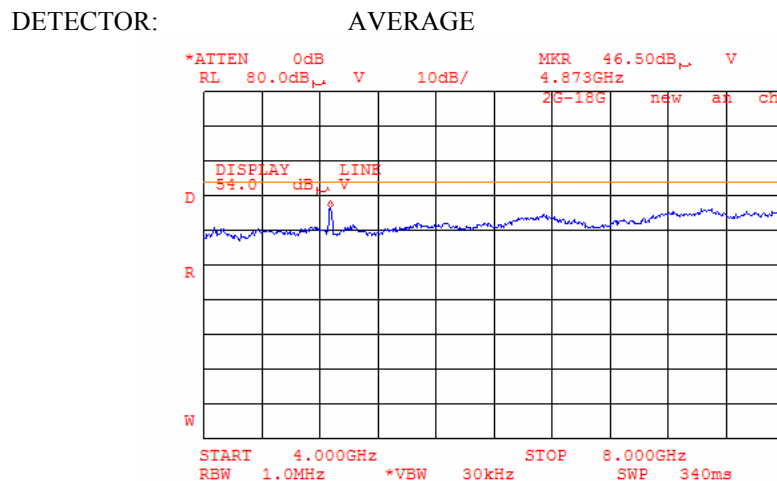


Plot 6.17.75: Tx Radiated emission measurements, 4000 - 8000MHz, at the mid carrier frequency, 802.11g mode.



Note: 4874 MHz – second harmonic of RF module

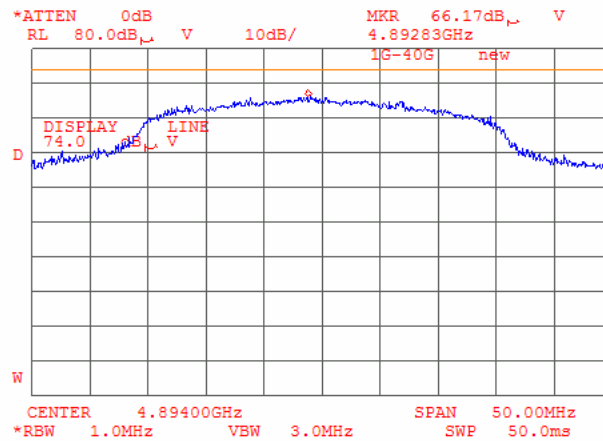
Plot 6.17.76: Tx Radiated emission measurements, 4000 - 8000MHz, at the mid carrier frequency, 802.11g mode.



Plot 6.17.77: Tx Radiated emission measurement, at 4894MHz, at the mid carrier frequency, 802.11g mode.

DETECTOR:

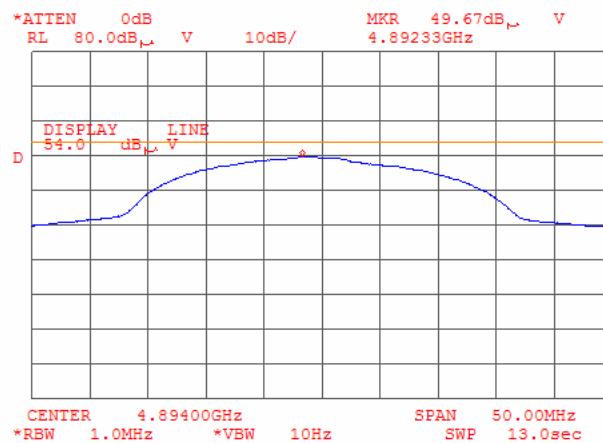
PEAK



Plot 6.17.78: Tx Radiated emission measurement, at 4894MHz, at the mid carrier frequency, 802.11g mode.

DETECTOR:

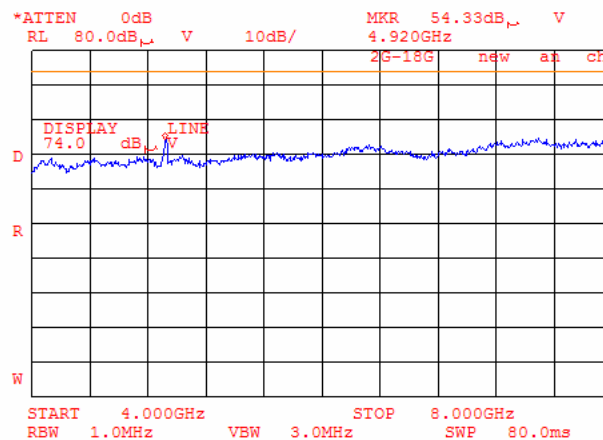
AVERAGE



Plot 6.17.79: Tx Radiated emission measurements, 4000 - 8000MHz, at the high carrier frequency, 802.11g mode.

DETECTOR:

PEAK

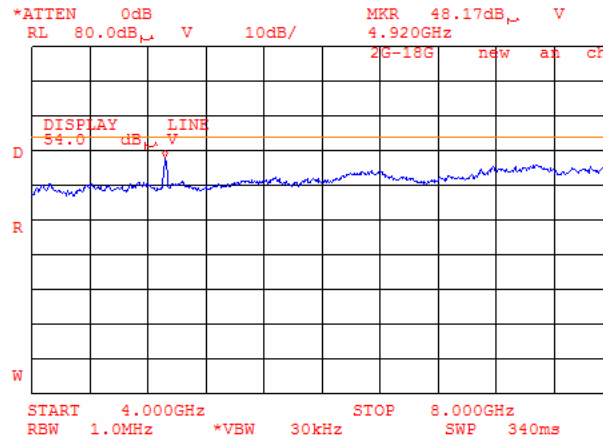


Note: 4924 MHz – second harmonic of RF module

Plot 6.17.80: Tx Radiated emission measurements, 4000 - 8000MHz, at the high carrier frequency, 802.11g mode.

DETECTOR:

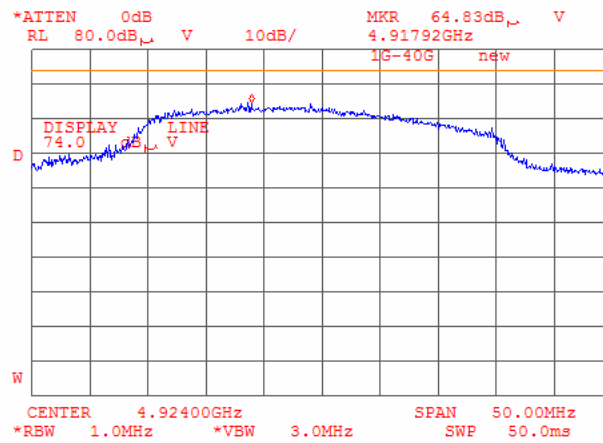
AVERAGE



Plot 6.17.81: Tx Radiated emission measurement, at 4924MHz, at the high carrier frequency, 802.11g mode.

DETECTOR:

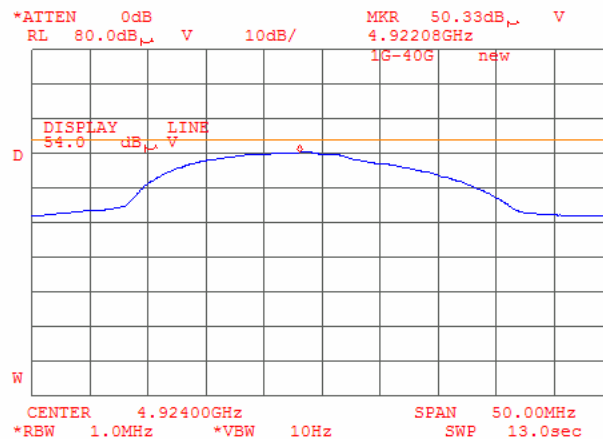
PEAK



Plot 6.17.82: Tx Radiated emission measurement, at 4924MHz, at the high carrier frequency, 802.11g mode.

DETECTOR:

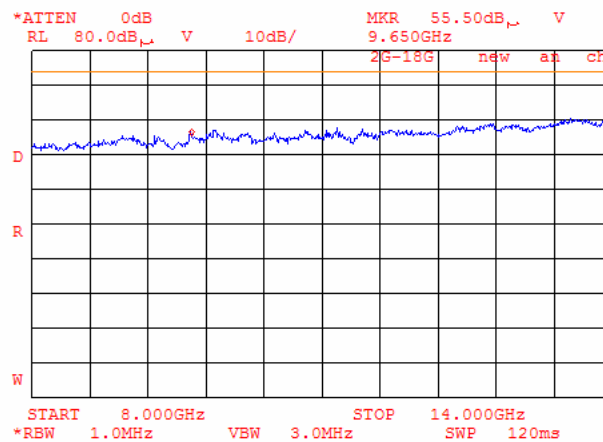
AVERAGE



Plot 6.17.83: Tx Radiated emission measurements, 8000 - 14000MHz, at the low carrier frequency, 802.11g mode.

DETECTOR:

PEAK

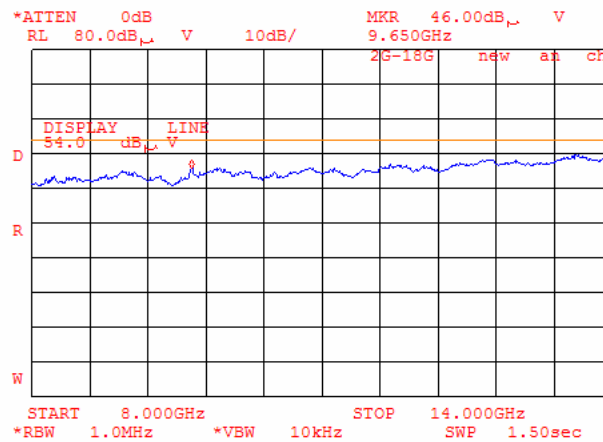
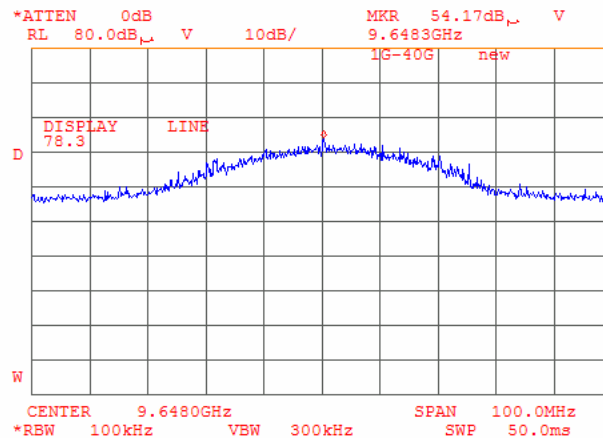


Note: 9648 MHz – forth harmonic of RF module

Plot 6.17.84: Tx Radiated emission measurements, 8000 - 14000MHz, at the low carrier frequency, 802.11g mode.

DETECTOR:

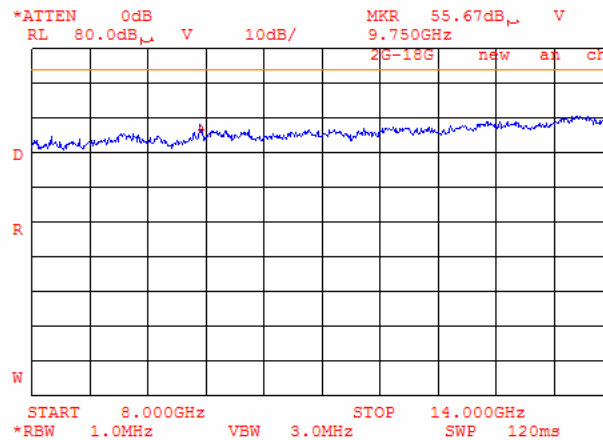
AVERAGE

**Plot 6.17.85: Tx Radiated emission measurement at 9648MHz, at the low carrier frequency, 802.11g mode.**

Plot 6.17.86: Tx Radiated emission measurements, 8000 - 14000MHz, at the mid carrier frequency, 802.11g mode.

DETECTOR:

PEAK

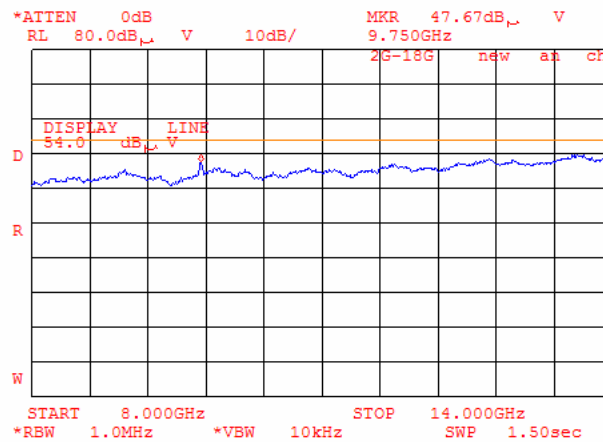


Note: 9748 MHz – forth harmonic of RF module

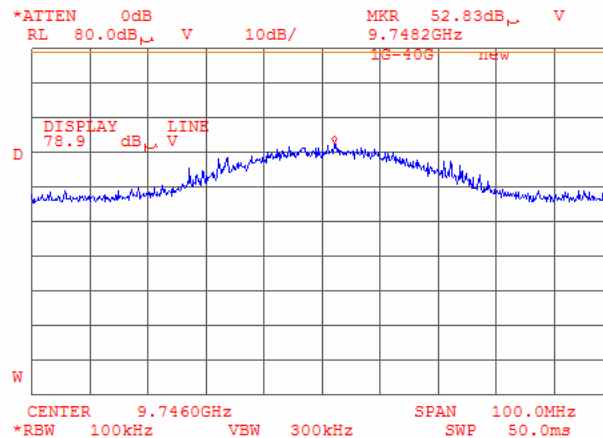
Plot 6.17.87: Tx Radiated emission measurements, 8000 - 14000MHz, at the mid carrier frequency, 802.11g mode.

DETECTOR:

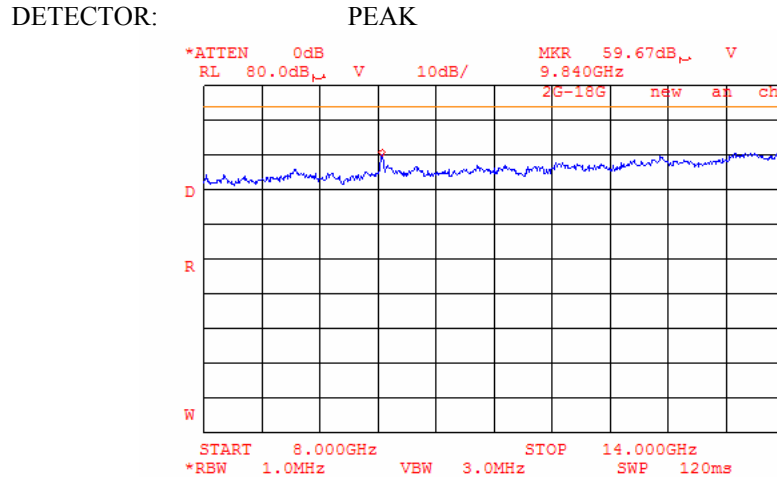
AVERAGE



Plot 6.17.88: Tx Radiated emission measurement at 9748MHz, at the mid carrier frequency, 802.11g mode.

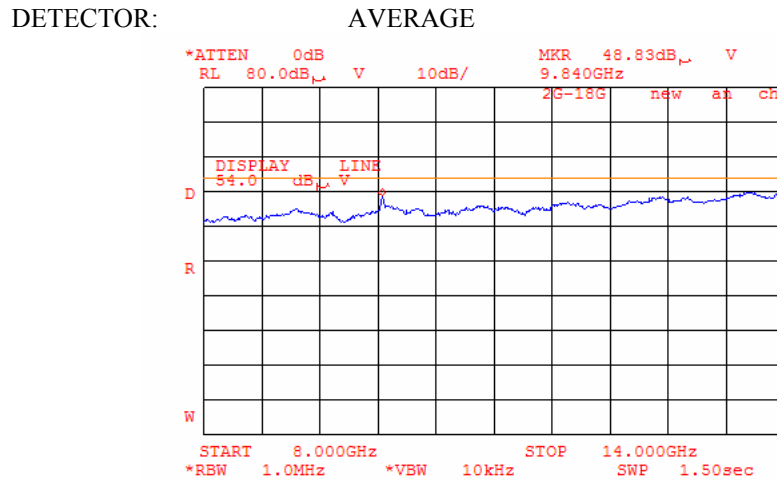


Plot 6.17.89: Tx Radiated emission measurements, 8000 - 14000MHz, at the high carrier frequency, 802.11g mode.

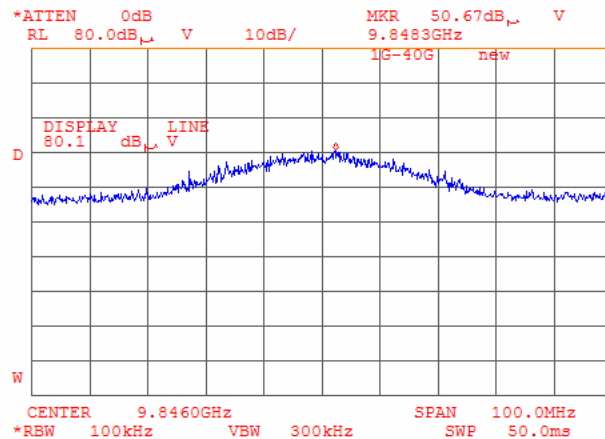


Note: 9848 MHz – forth harmonic of RF module

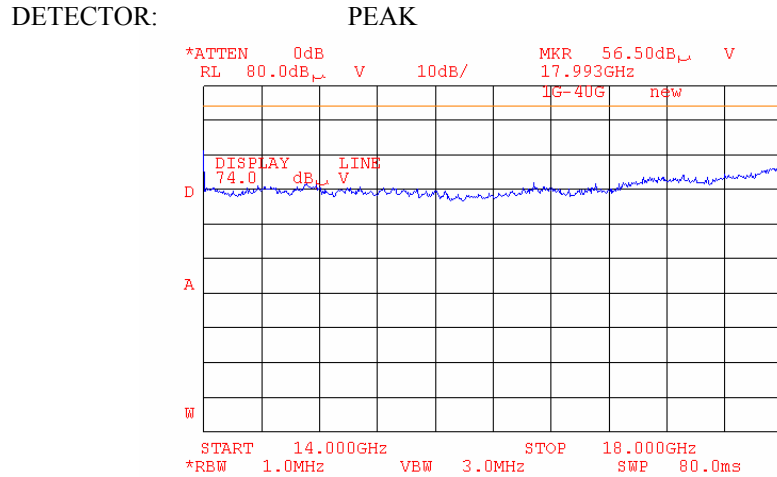
Plot 6.17.90: Tx Radiated emission measurements, 8000 - 14000MHz, at the high carrier frequency, 802.11g mode.



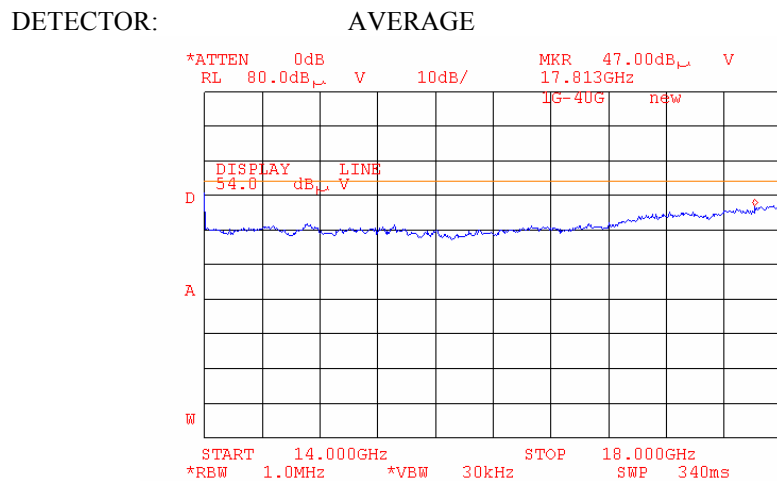
Plot 6.17.91: Tx Radiated emission measurement at 9848MHz, at the high carrier frequency, 802.11g mode.



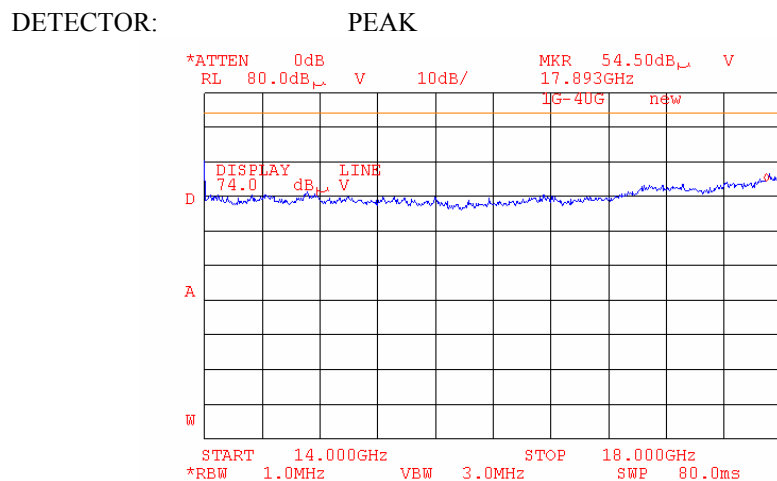
Plot 6.17.92: Tx Radiated emission measurements, 14 - 18GHz, at the low carrier frequency, 802.11g mode.



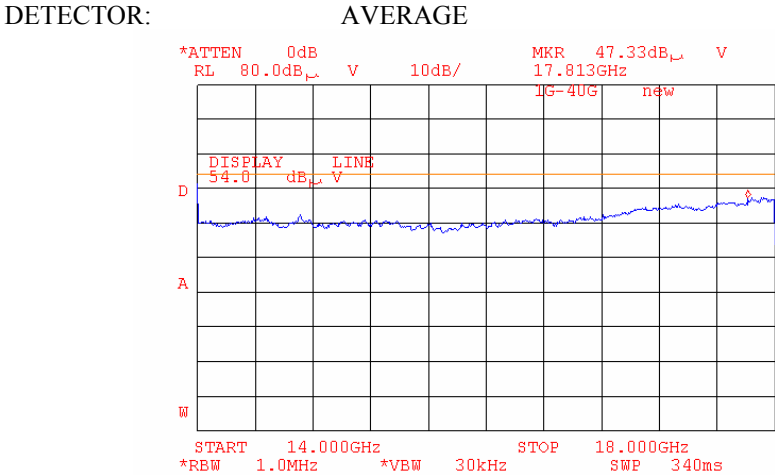
Plot 6.17.93: Tx Radiated emission measurements, 14 - 18GHz, at the low carrier frequency, 802.11g mode.



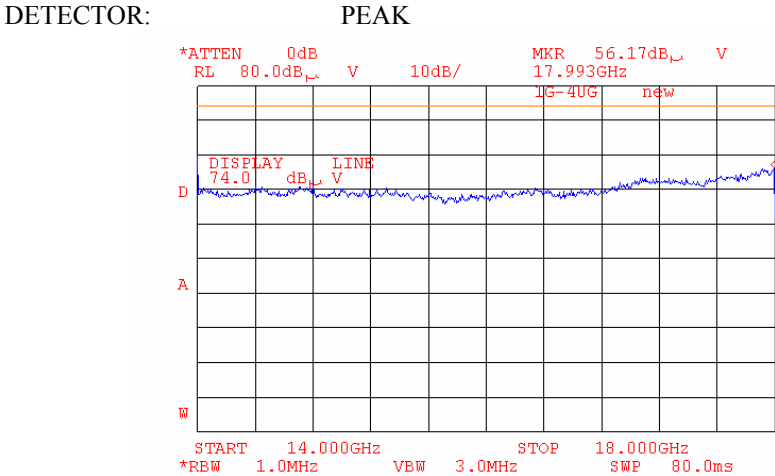
Plot 6.17.94: Tx Radiated emission measurements, 14 - 18GHz, at the mid carrier frequency, 802.11g mode.



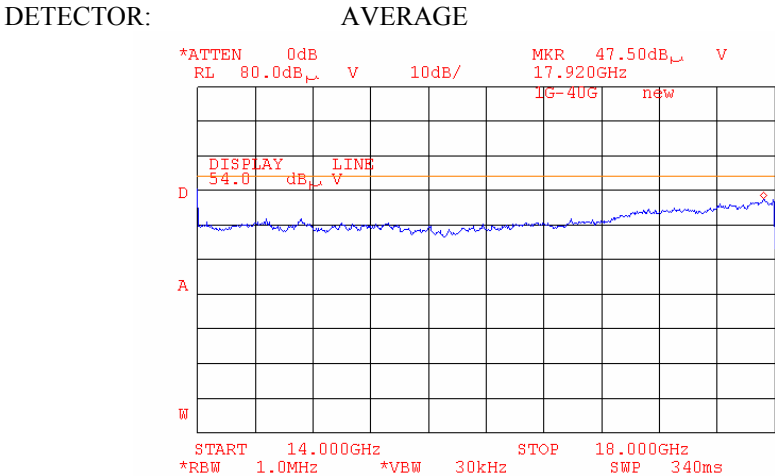
Plot 6.17.95: Tx Radiated emission measurements, 14 - 18GHz, at the mid carrier frequency, 802.11g mode.



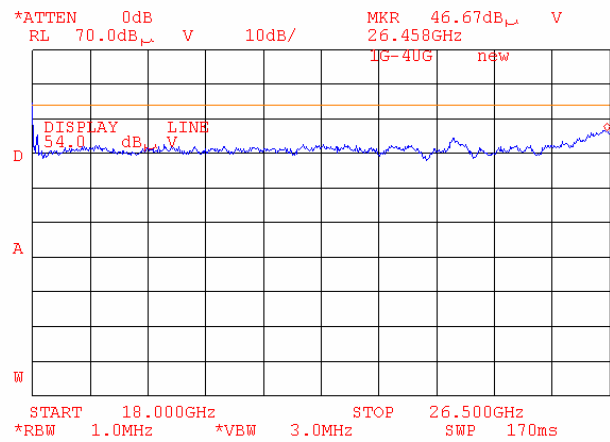
Plot 6.17.96: Tx Radiated emission measurements, 14 - 18GHz, at the high carrier frequency, 802.11g mode.



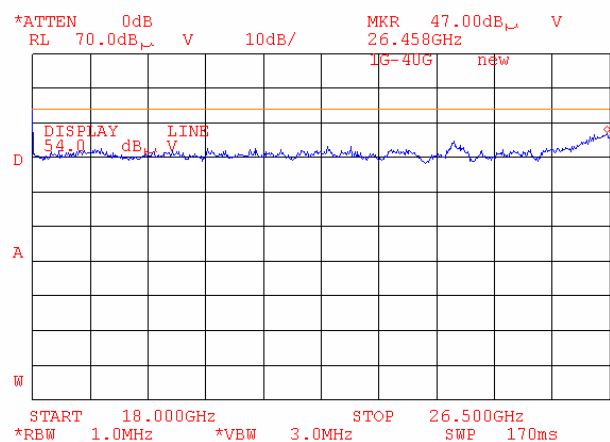
Plot 6.17.97: Tx Radiated emission measurements, 14 - 18GHz, at the high carrier frequency, 802.11g mode.



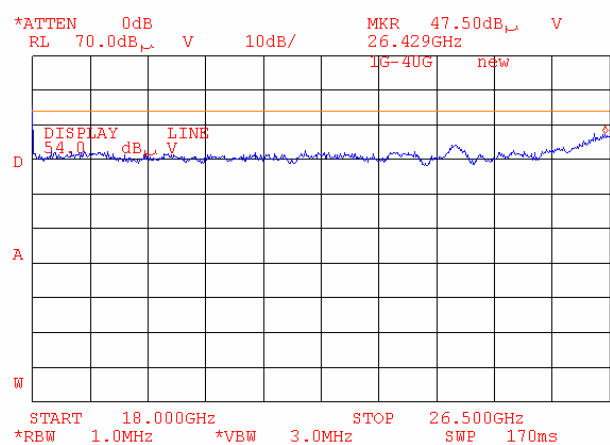
Plot 6.17.98: Tx Radiated emission measurements, 18 - 26.5GHz, at the low carrier frequency, 802.11g mode.



Plot 6.17.99: Tx Radiated emission measurements, 18 - 26.5GHz, at the mid carrier frequency, 802.11g mode.



Plot 6.17.100: Tx Radiated emission measurements, 18 - 26.5GHz, at the high carrier frequency, 802.11g mode.

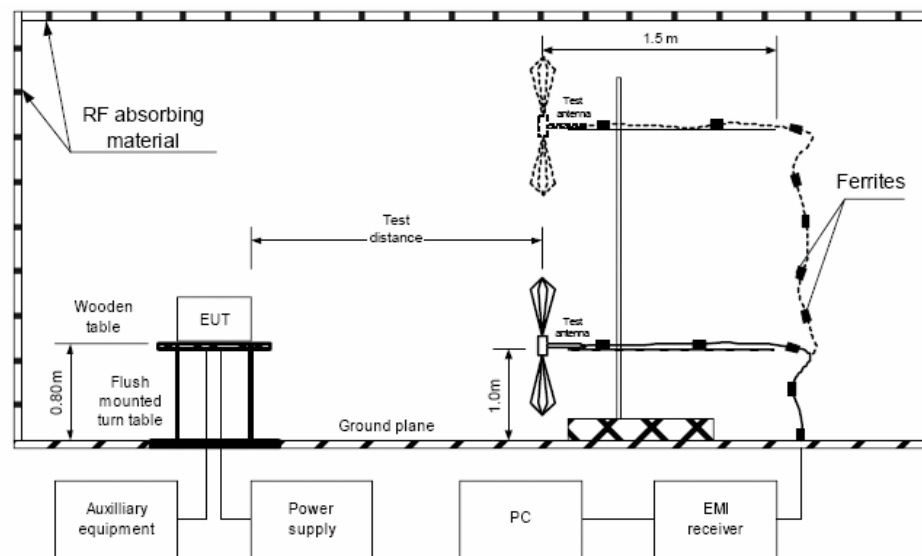


6.18 Radiated Emission, General requirements – pursuant to §15.109(a)

6.18.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- EUT and Laptop were set up as shown in plot 6.18.1.
- The EUT was adjusted to receive/standby at 802.11b/g mode.
- The table was rotated 360 degree to determine the position of the highest radiation.
- A receiving antenna was set 3 meters away from the EUT and was mounted on a variable height antenna tower.
- The Field strength of radiated spurious emissions was measured.
- The Tested Frequency range was 30 ÷ 8650MHz.
- Both Horizontal and Vertical Polarization of receiving antenna were tested.
- Test was taken at Semi anechoic chamber located at “Hermon Labs”.

Plot 6.18.1: Setup for Radiated Emission Measurement.



6.18.2 Limits:

- Specification Class B limits is given in table 6.18.1.

Table 6.18.1: Limits for Radiated emissions

Frequency, MHz	Class B limit, dB(μV/m)
	3 m distance
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0

6.18.3 Results:

- Test Results are provided in Table 6.18.2÷3 and associated plots.

Table 6.18.2 Radiated emission test results below 1GHz

LIMIT: Class B
 TEST DISTANCE: 3 m
 DETECTORS USED: PEAK / QUASI-PEAK
 FREQUENCY RANGE: 30 MHz – 1000 MHz
 RESOLUTION BANDWIDTH: 120 kHz

Frequency, MHz	Peak emission, dB(μV/m)	Quasi-peak			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
233.164663	37.46	33.83	46.00	-12.17	Horizontal	1.4	260	Pass
299.787500	35.86	33.47	46.00	-12.53	Horizontal	1.1	229	
366.410618	45.53	43.31	46.00	-2.69	Horizontal	1.0	190	
433.050000	35.46	32.51	46.00	-13.49	Horizontal	1.0	137	
489.425000	33.96	29.94	46.00	-16.06	Vertical	1.0	220	
732.900000	37.34	34.45	46.00	-11.55	Vertical	1.0	327	

Table 6.18.3 Radiated emission test results above 1GHz

TEST DISTANCE: 3 m
 DETECTORS USED: PEAK / AVERAGE
 FREQUENCY RANGE: 1000 MHz – 8650 MHz
 RESOLUTION BANDWIDTH: 1000 kHz

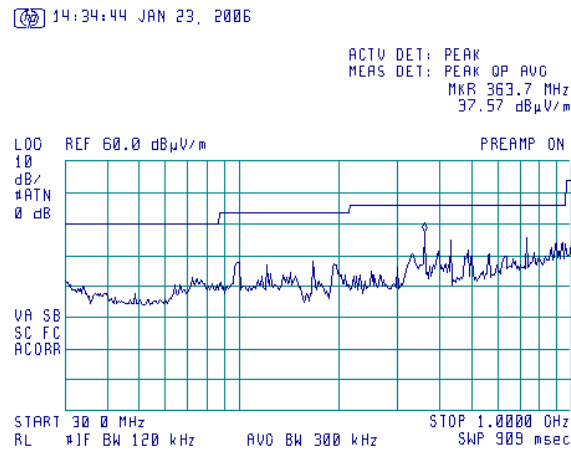
Frequency, MHz	Peak emission, dB(μV/m)	Average			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
		Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
1062.50000	44.97	25.67	54.00	-28.33	Vertical	1.0	209	Pass
1348.00000	52.07	31.37	54.00	-22.63	Vertical	1.0	291	
1429.25000	46.71	28.06	54.00	-25.94	Vertical	1.0	260	
1615.75000	52.92	28.84	54.00	-25.16	Vertical	1.1	170	
2490.50000	51.27	35.50	54.00	-18.50	Vertical	1.0	0	

*- Margin = Measured emission - specification limit.

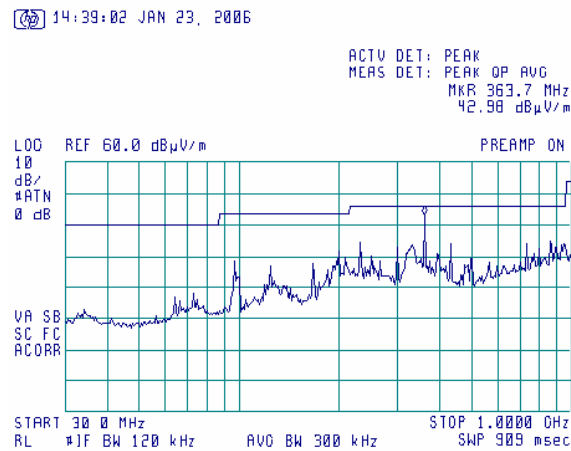
** - EUT front panel refer to 0 degrees position of turntable.

*** - The fifth harmonic of highest LO frequency is: 5 x 1641.33 MHz = 8206.66 MHz

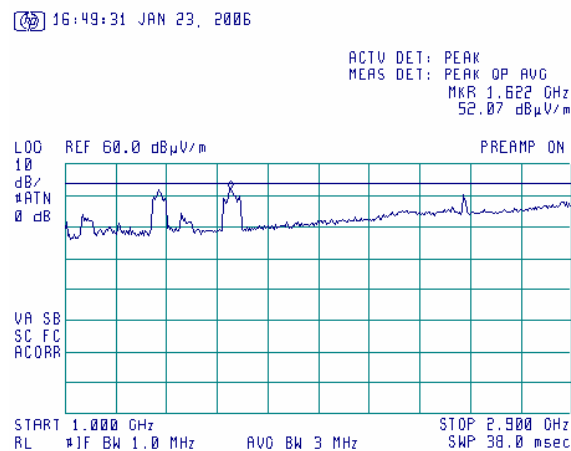
Plot 6.18.2: Rx Radiated Emission measurements in 30 - 1000 MHz range, Vertical Antenna polarization.



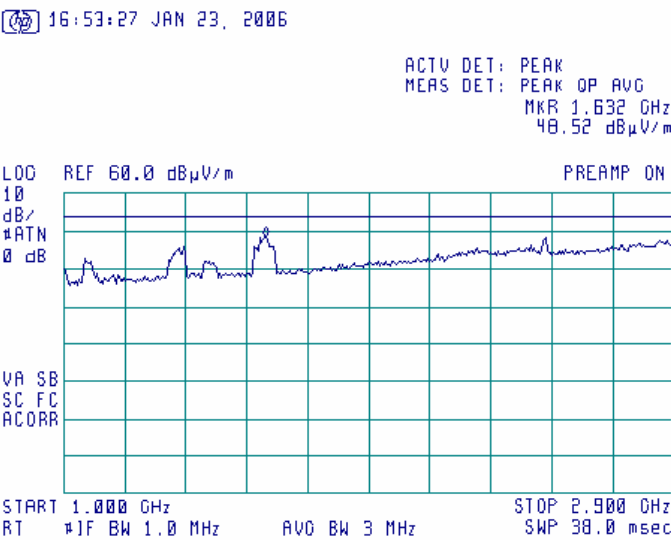
Plot 6.18.3: Rx Radiated Emission measurements in 30 - 1000 MHz range, Horizontal Antenna polarization.



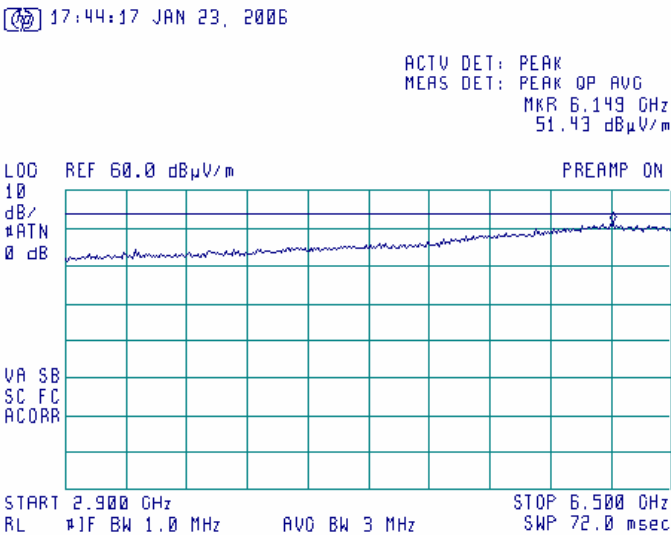
Plot 6.18.4: Rx Radiated Emission measurements in 1000 - 2900 MHz range, Vertical Antenna polarization.



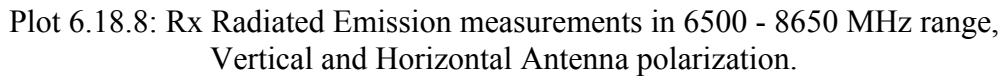
Plot 6.18.5: Rx Radiated Emission measurements in 1000 - 2900 MHz range,
Horizontal Antenna polarization.



Plot 6.18.6: Rx Radiated Emission measurements in 2900 - 6500 MHz range,
Vertical and Horizontal Antenna polarization.



LIMIT: PEAK



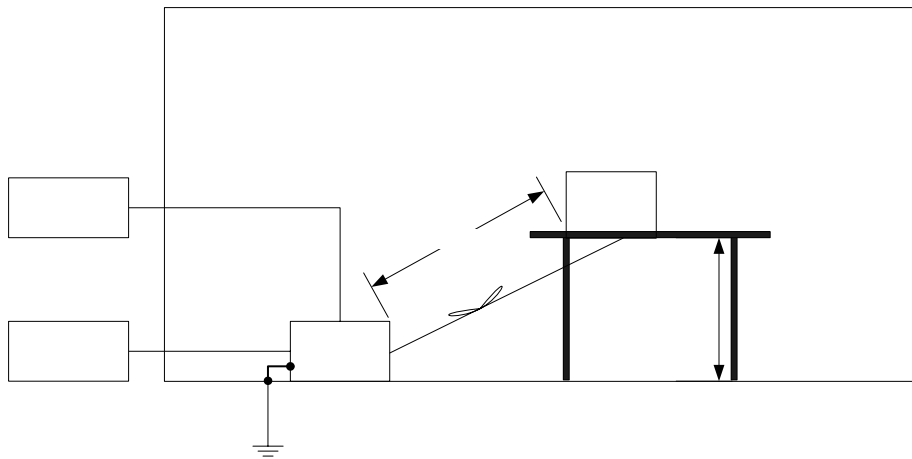
LIMIT: AVERAGE



6.19 Conducted Emissions on AC power line - Pursuant to 47 CFR §15.107(a); §15.207(a)6.19.1 Test Procedure:

- A laptop was connected to the EUT to control the RF output power and Frequency.
- The EUT was set up as shown in plot 6.19.1.
- The EUT power was adjusted at the maximum output power level.
- The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer in the frequency range 150 KHz to 30MHz.
- Unused coaxial connector of the LISN was terminated with 50 Ohm. Quasi-peak and average detectors were used throughout the testing.
- The position of the device cables was varied to determine maximum emission level.
- Laptop's AC conducted data was recorded for both NEUTRAL and HOT lines.
- Data was recorder for 802.11b/g Rx/Stand-by mode and Tx mode.
- Test was taken at Shielded room located at “Hermon Labs”.

Plot 6.19.1: Conducted emission measurements setup.

6.19.2 Limits:

- Specification Class B limits is given in table 6.19.1.

Table 6.19.1: Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5.0	56	46
5.0 - 30	60	50

* The limit decreases linearly with the logarithm of frequency.

6.19.3 Results:

- Results are shown in Table 6.19.2 and the associated plots.

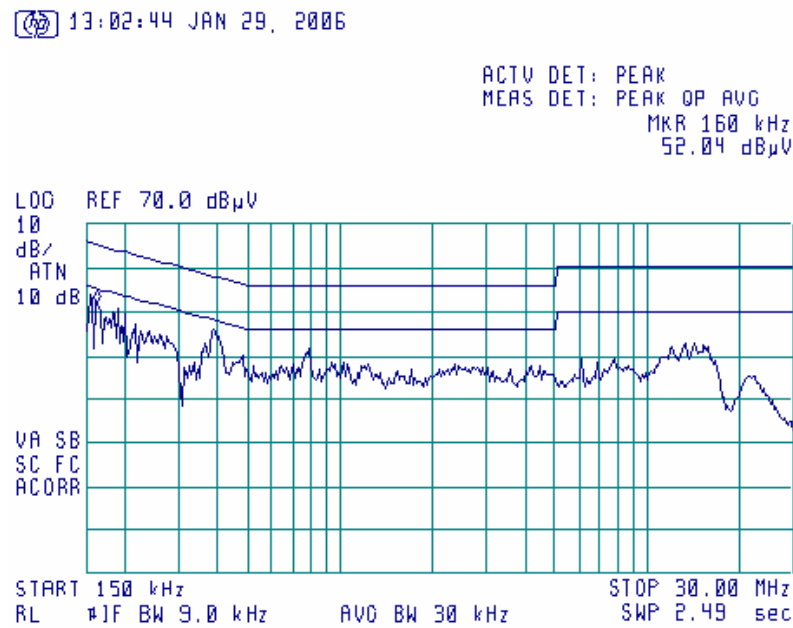
Table 6.19.2: Conducted emission test results

LINE: AC mains
LIMIT: Class B
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

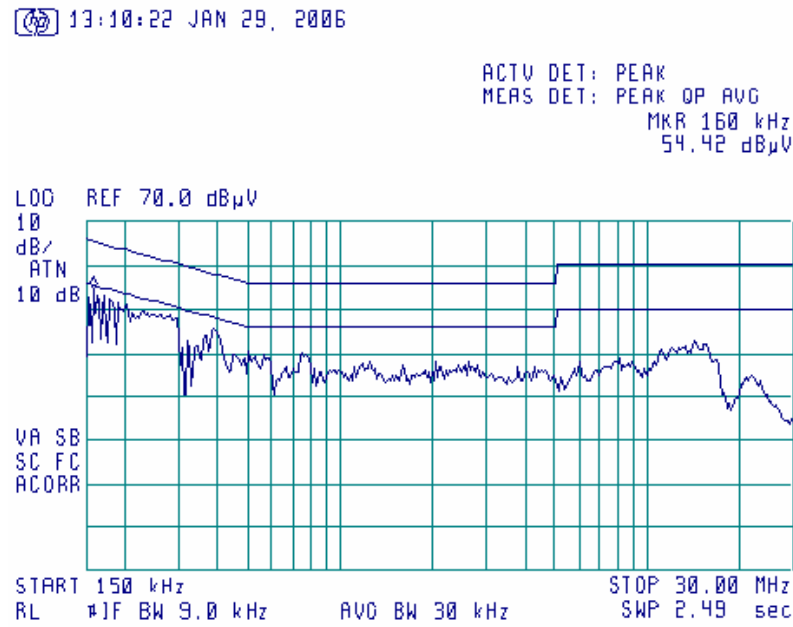
Frequency, MHz	Peak emission , dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin , dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin , dB*		
Receive / Stand-by mode									
0.157276	54.42	51.80	65.65	-13.85	35.81	55.65	-19.84	L1	Pass
0.185346	51.52	45.87	64.28	-18.41	36.51	54.28	-17.77		
0.191615	50.66	45.82	63.98	-18.16	37.45	53.98	-16.53		
0.392168	48.09	45.70	58.02	-12.32	41.38	48.02	-6.64		
0.788148	43.79	40.38	56.00	-15.62	34.58	46.00	-11.42		
14.311646	42.68	37.85	60.00	-22.15	31.90	50.00	-18.10		
0.156256	55.93	53.51	65.69	-12.18	36.30	55.69	-19.39	L2	Pass
0.164596	54.97	51.76	65.29	-13.53	36.96	55.29	-18.33		
0.277676	48.98	45.69	60.95	-15.26	28.07	50.95	-22.88		
0.392595	48.43	44.76	58.01	-13.25	40.26	48.01	-7.75		
0.788245	42.34	39.19	56.00	-16.81	33.45	46.00	-12.55		
14.308897	42.79	38.27	60.00	-21.73	32.27	50.00	-17.73		
Transmit mode									
0.152418	55.61	53.30	65.88	-12.58	36.05	55.88	-19.83	L1	Pass
0.174948	53.79	47.08	64.78	-17.70	39.14	54.78	-15.64		
0.397167	46.53	43.35	57.92	-14.57	40.41	47.92	-7.51		
0.785256	43.13	38.34	56.00	-17.66	31.97	46.00	-14.03		
3.071886	38.86	34.30	56.00	-21.70	28.20	46.00	-17.80		
13.323778	43.35	38.76	60.00	-21.24	32.55	50.00	-17.45		
0.155995	56.62	54.01	65.71	-11.70	38.80	55.71	-16.91	L2	Pass
0.174653	53.97	49.07	64.80	-15.73	37.54	54.80	-17.26		
0.247591	49.51	45.54	61.86	-16.32	30.03	51.86	-21.83		
0.394050	45.77	42.84	57.98	-15.14	37.04	47.98	-10.94		
1.224020	38.39	34.09	56.00	-21.91	27.96	46.00	-18.04		
12.384059	42.85	37.48	60.00	-22.52	31.30	50.00	-18.70		

*- Margin = Measured emission - specification limit.

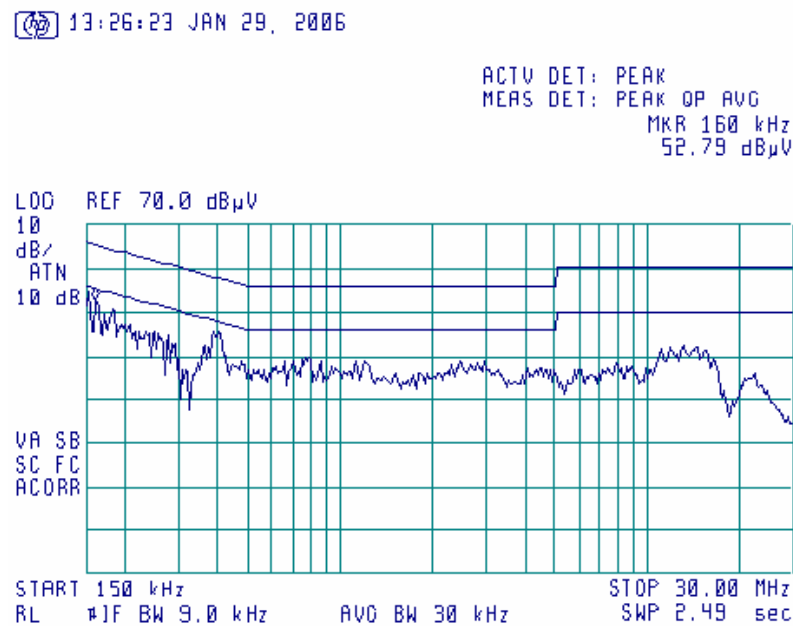
Plot 6.19.2: Conducted emission measurements, Rx/Stand-by mode, Line L1, Quasi-Peak & Average Limits.



Plot 6.19.3: Conducted emission measurements, Rx/Stand-by mode, Line L2, Quasi-Peak & Average Limits.



Plot 6.19.3: Conducted emission measurements, Transmit mode, Line L1, Quasi-Peak & Average Limits.



Plot 6.19.3: Conducted emission measurements, Transmit mode, Line L2, Quasi-Peak & Average Limits.

