



Engineering and Testing for EMC and Safety Compliance

APPLICATION FOR FCC CERTIFICATION

DIRECT SEQUENCE SPREAD SPECTRUM TRANSMITTER

Samsung Electronics
416, Maetan-3Dong, Paldal-Gu
Suwon City, Kyunggi-Do, Korea, 442-743
+82-31-200-7925

Model: Wireless LAN Card (Solo 5350)

FCC ID: A3L5350WL

July 30, 2001

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 1999	RADIO FREQUENCY DEVICES
FCC 97-114	GUIDANCE ON MEASUREMENTS FOR DIRECT SEQUENCE SPREAD SPECTRUM SYSTEMS
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
RSS-210; ISSUE 5 (DRAFT 3)	LOW POWER LICENCE-EXEMPT RADIOCOMMUNICATION DEVICES (ALL FREQUENCY BANDS)
RSS-102; ISSUE 1 (PROVISIONAL)	EVALUATION PROCEDURE FOR MOBILE AND PORTABLE RADIO TRANSMITTERS WITH RESPECT TO HEALTH CANADA'S SAFETY CODE 6 FOR EXPOSURE OF HUMANS TO RADIO FREQUENCY FIELDS

Frequency Range	Conducted Output Power (W)	Freq. Tolerance	Emission Designator
2410 to 2463 MHz	0.031		

REPORT PREPARED BY:

EMC Engineer: Rachid Sehb
Supervising Engineer: Bruno Clavier

Document Number: 2001201 / QRTL01-196

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360 Herndon Parkway, Suite 1400
Herndon, VA 20170
Phone: 703-689-0368; Fax: 703-689-2056; Metro: 703-471-6441



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360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

1 INTRODUCTION

The following Application for FCC Certification and Industry Canada for a Direct Sequence Spread Spectrum transmitter is prepared on behalf of *Samsung Electronics* in accordance with Part 15.247 of the Federal Communications Commissions and RSS-210 for Industry Canada. The Equipment Under Test (EUT) was the Samsung MPC13A-20, FCC ID: A3L5350WL. The test results reported in this document relate only to the item that was tested.

All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated and conducted emissions measurement were performed manually at Rhein Tech, Incorporated. The radiated emissions measurements required by the rules were performed on the three meter, open field, test range maintained by Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the Herndon, Virginia facility. Rhein Tech, Labs, Inc. is on the FCC accepted lab list as a Facility available to do measurement work for others on a contract basis.

1.1 RELATED SUBMITTAL (S)/GRANT (S)

This is an original application for certification.

1.2 TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of 3 meters. Emissions above 1 GHz were video averaged.

1.3 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).



2 SYSTEM TEST CONFIGURATION

2.1 JUSTIFICATION

The EUT was tested in all three orthogonal planes in order to determine worst-case emission. Channel 1 at 2.410 GHz, Channel 6 at 2.437 GHz and Channel 11 at 2.463 GHz were tested and investigated from 9kHz to 24GHz. All three channels were investigated and tested. Data for all three channels are presented in this report.

To complete the configuration required by the FCC, the transmitter was tested in a note computer with an internal antenna connected to the antenna port similar to its intended use.

The EUT was investigated with the external antenna. The worst-case data taken in this report represents the highest data rate at 11 MBPS. Data rates of 5.5MBPS, 2 MBPS and 1 MBPS were investigated and found to be in compliance. The change in envelope did not cause the EUT to be non-compliant in any of the aforementioned modes.

2.2 EUT EXERCISE SOFTWARE

The EUT was provided with the software to continuously transmit during testing. The carrier was also checked to verify that the information was being transmitted.

2.3 SPECIAL ACCESSORIES

N/A.

2.4 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

TABLE 2-1: EQUIPMENT UNDER TEST (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
MINI PCI WIRELESS WLAN	SAMSUNG	MPCI3A-20	N/A	A3LS590	N/A	13517

TABLE 2-2: EXTERNAL COMPONENTS USED IN TEST CONFIGURATION

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
COMPUTER	SAMUNG	SOLO	5350PR102	A3L5350015318	AC/DC CONVERTER	



2.5 CONFIGURATION OF TESTED SYSTEM

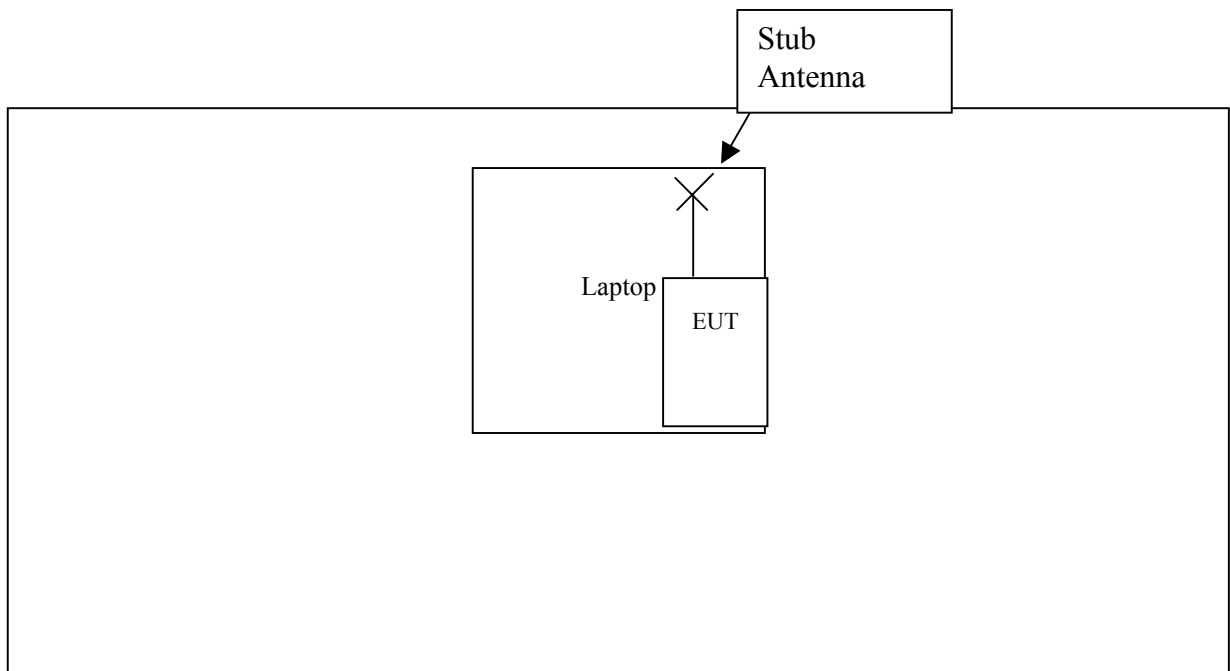


FIGURE 2-1: CONFIGURATION OF TESTED SYSTEM



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3 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 1999	RADIO FREQUENCY DEVICES
FCC 97-114	GUIDANCE ON MEASUREMENTS FOR DIRECT SEQUENCE SPREAD SPECTRUM SYSTEMS
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
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Frequency Range	Conducted Output Power (W)	Freq. Tolerance	Emission Designator
2410 to 2463 MHz	0.031		

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described above. Modifications were not made during testing to the equipment in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the ANSI C63.4 test methodology.

Signature: 

Date: July 30, 2001

Typed/Printed Name: Bruno Clavier

Position: Vice President of Operation
(NVLAP Signatory)

Signature: 

Date: July 30, 2001

Typed/Printed Name: Rachid Sehb

Position: Test Engineer / Technician

NVLAP Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.



4 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FI(\text{dBuV/m}) = \text{SAR}(\text{dBuV}) + \text{SCF}(\text{dB/m})$$

FI = Field Intensity

SAR = Spectrum Analyzer Reading

SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$\text{SCF}(\text{dB/m}) = -\text{PG}(\text{dB}) + \text{AF}(\text{dB/m}) + \text{CL}(\text{dB})$$

SCF = Site Correction Factor

PG = Pre-amplifier Gain

AF = Antenna Factor

CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(\text{uV/m}) = 10^{FI(\text{dBuV/m})/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3 \text{ dBuV} - 11.5 \text{ dB/m} = 37.8 \text{ dBuV/m}$$

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$

EIRP calculation: Power from power meter in (dBm) + antenna gain in (dBi)



5 CONDUCTED EMISSIONS MEASUREMENTS

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 7 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 7 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or average mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The range of the frequency spectrum to be investigated is specified in FCC Part 15. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

5.1 CONDUCTED EMISSIONS TEST

The following table lists worst-case conducted emission data. Specifically: Emission Frequency, Test Detector, Analyzer Reading, Site Correction Factor, corrected Emission Level, Quasi Peak Limit and Margin, and the Average Limit and Margin.

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the NEUTRAL SIDE and HOT SIDE, herein referred to as L1 and L2, respectively.



5.1.1 FCC PART 15 §15.107 CONDUCTED EMISSIONS TEST DATA

TABLE 5-1: FCC PART 15 §15.107 CONDUCTED EMISSIONS: NEUTRAL SIDE (LINE 1)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	Limit (dBuV)	Margin (dBuV)
0.789	Pk	44.9	0.7	45.6	48.0	-2.4
1.096	Pk	44.8	0.8	45.6	48.0	-2.4
1.344	Pk	44.4	0.9	45.3	48.0	-2.7
1.363	Pk	43.6	0.9	44.5	48.0	-3.5
2.904	Pk	40.9	1.4	42.3	48.0	-5.7
5.800	Pk	33.8	1.9	35.7	48.0	-12.3

(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

SIGNATURE

JULY 30, 2001
DATE OF TEST

TABLE 5-2: FCC PART 15 §15.107 CONDUCTED EMISSIONS: HOT SIDE (LINE 2)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	Limit (dBuV)	Margin (dBuV)
0.465	Pk	45.7	0.8	46.5	48.0	-1.5
0.776	Pk	45.3	0.8	46.1	48.0	-1.9
0.828	Pk	44.5	0.7	45.2	48.0	-2.8
1.068	Pk	44.1	0.8	44.9	48.0	-3.1
1.964	Pk	43.1	1.2	44.3	48.0	-3.7
5.850	Pk	37.5	1.9	39.4	48.0	-8.6
11.150	Pk	36.4	2.4	38.8	48.0	-9.2

(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

SIGNATURE

JULY 30, 2001
DATE OF TEST

TABLE 5-3: TEST EQUIPMENT USED FOR TESTING (CONDUCTED EMISSIONS)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771
900070	Solar		LISN	



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6 FCC PART 15 §15.109 RADIATED EMISSIONS MEASUREMENTS

Before final measurements of radiated emissions were made on the open-field three/ten meter range; the EUT was scanned indoor at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The range of the frequency spectrum to be investigated is specified in FCC Part 15. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report. . **For radiated measurements above 1 GHz, a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz are used.**

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.



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6.1 FCC PART 15 §15.109 RADIATED EMISSIONS TEST

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, plus the limit.

6.1.1 FCC PART 15 §15.109 RADIATED EMISSION DIGITAL NOISE

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
89.501	Qp	V	265	1.0	43.6	-21.6	22.0	43.5	-21.5
132.821	Qp	V	180	1.0	39.5	-17.3	22.2	43.5	-21.3
138.385	Qp	V	225	1.0	43.2	-18.5	24.7	43.5	-18.8
152.481	Qp	H	180	1.0	31.2	-20.0	11.2	43.5	-32.3
219.388	Qp	V	270	1.0	35.9	-16.9	19.0	46.0	-27.0
418.000	Qp	H	215	1.0	35.7	-9.7	26.0	46.0	-20.0
849.936	Qp	V	270	1.0	33.2	-3.8	29.4	46.0	-16.6

QUASI PEAK =120 KHZ

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

SIGNATURE

JULY 30, 2001
DATE OF TEST

TABLE 6-1: TEST EQUIPMENT USED FOR TESTING (RADIATED EMISSIONS)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771
901053	Schaffner@Chase	CBL6112B	Bilog antenna (20 MHz - 2 GHz)	2648
900323	EMCO	3161-03	Horn Antennas (4-8,2GHz)	9508-1020
900889	HP	85685A	RF Preselector for HP 8566B or 8568B (20Hz-2GHz)	3146A01309



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7 FCC PART 15 §15.247(A)(2) MODULATED BANDWIDTH

The minimum 6 dB bandwidth per FCC 15.247(a)(2) was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The Minimum 6 dB modulated bandwidths are the following:

TABLE 7-1: FCC PART 15 §15.247(A)(2) MODULATED BANDWIDTH

Channel	6(dB) Bandwidth (MHz)
1	10.3
6	10.3
11	10.3

The 6dB bandwidth is listed in figures part 26.

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER


SIGNATURE

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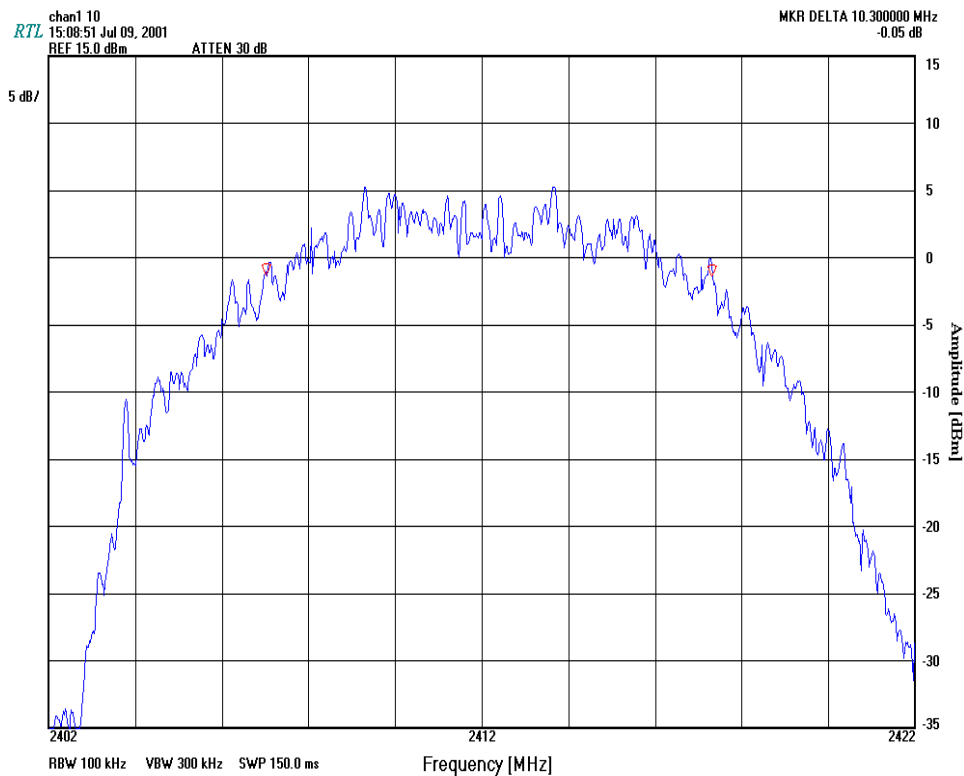
TABLE 7-2: TEST EQUIPMENT USED FOR TESTING (MODULATED BANDWIDTH)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771



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PLOT 7-1: FCC PART 15 §15.247(A)(2) MODULATED BANDWIDTH: CHANNEL 1



TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

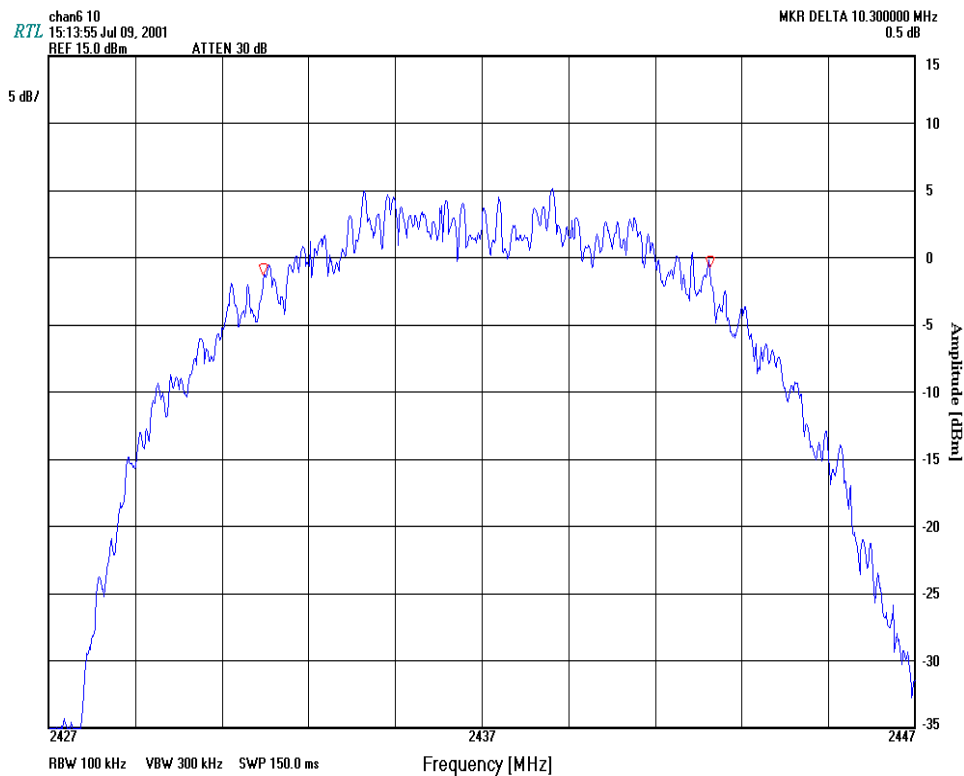

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PLOT 7-2: FCC PART 15 §15.247(A)(2) MODULATED BANDWIDTH: CHANNEL 6



TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

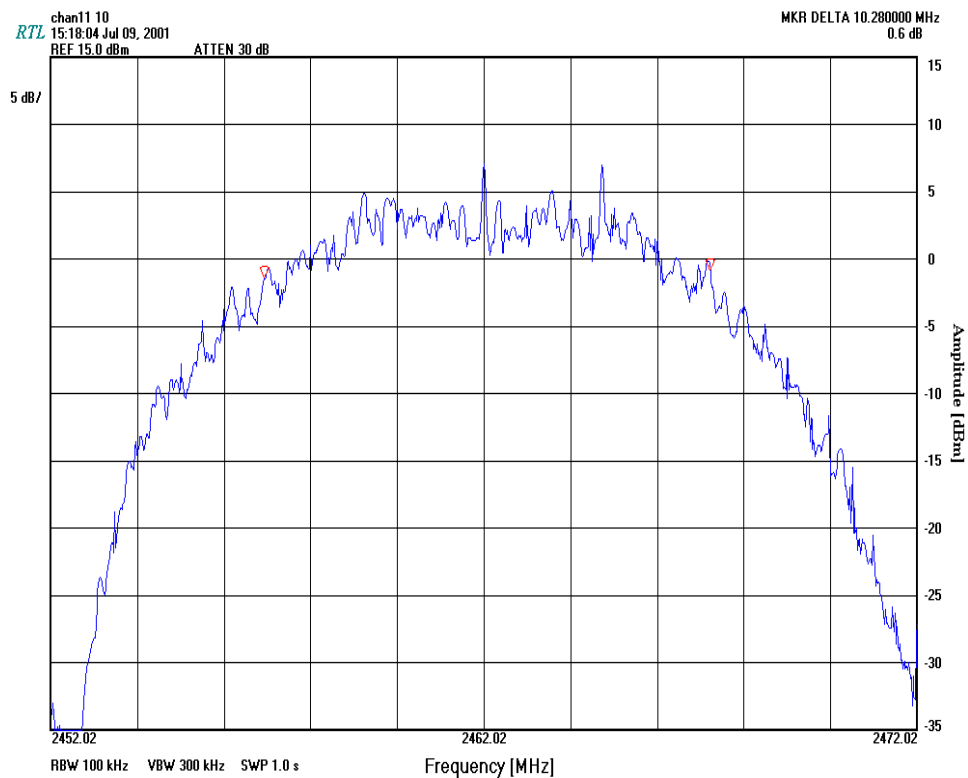
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PLOT 7-3: FCC PART 15 §15.247(A)(2) MODULATED BANDWIDTH: CHANNEL 11



TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

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8 FCC PART 15 §15.247(B) POWER OUTPUT

The power output per FCC 15.247(b) was measured on the EUT using an HP peak power meter. EIRP measurement was performed as a radiated test (substitution test).

TABLE 8-1: FCC PART 15 §15.247(B) POWER OUTPUT

Channel	EIRP (dBm)*	Power conducted output (dBm)
1	14.5	15.0
6	13.5	14.8
11	13.6	15.0

*Measurement accuracy is +/- 1.5 dB

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

SIGNATURE

JULY 30, 2001
DATE OF TEST

TABLE 8-2: TEST EQUIPMENT USED FOR TESTING (RADIATED RF OUTPUT - EIRP)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771
901186	Agilent Technologies	E9323A (50MHz-6GHz)	Peak & Avg. Power Sensor	US40410380
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573
900772	EMCO	3161-02	Horn ANTENNA (2-4 GHz)	900772
900723	Miteq	NA	AMP 100MHz-26GHz	NA
900814	Electro-Metrics	RGA-60	Double Ridges Guide Antenna (1-18 GHz)	2310



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9 FCC PART 15 §15.247(C) ANTENNA CONDUCTED SPURIOUS EMISSIONS

Antenna spurious emission per FCC 15.247(c) was measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The modulated carrier was identified at 2.410GHz for Channel 1, 2.437GHz for Channel 6 and 2.463GHz for Channel 11. No other harmonics or spurs were found within 20 dB of the carrier level, and from 9kHz to the carriers 10th harmonic. See antenna conducted spurious noise table. Channels 1, 6, and 11 were investigated and tested.

TABLE 9-1: FCC PART 15 §15.247(C) ANTENNA CONDUCTED SPURIOUS EMISSIONS: CHANNEL 1

Frequency (MHz)	Spurious level (dBm)	FCC Margin (dB)
22.1	-44.1	-28.4
33.1	-54.1	-38.4
349.5	-59.2	-43.5
432.4	-47.1	-31.4
704.0	-46.1	-30.4
886.0	-43.1	-27.4
1295.0	-45.9	-30.2
1868.0	-54.5	-38.8
48220.0	-56.2	-40.5
72380.0	-58.6	-42.9

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

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TABLE 9-2: FCC PART 15 §15.247(C) ANTENNA CONDUCTED SPURIOUS EMISSIONS: CHANNEL 6

Frequency (GHz)	Spurious level (dBm)	FCC Margin (dB)
350.1	-59.4	-43.7
428.6	-47.2	-31.5
464.0	-47.8	-32.1
704.0	-47.1	-31.4
885.0	-43.4	-27.7
1298.0	-46.5	-30.8
1403.0	-48.9	-33.2
1870.0	-56.0	-40.3
2395.2	-58.0	-42.3
4872.0	-53.0	-37.3
7307.0	-57.7	-42.0

TEST PERSONNEL:

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TABLE 9-3: FCC PART 15 §15.247(C) ANTENNA CONDUCTED SPURIOUS EMISSIONS: CHANNEL 11

Frequency (GHz)	Spurious level (dBm)	FCC Margin (dB)
350.1	-59.1	-43.1
436.4	-46.7	-30.7
704.2	-48.2	32.2
885.5	-43.5	-27.5
1305.0	-46.9	-30.9
1432.0	-49.4	-33.4
1662.0	-57.8	-41.8
1860.0	-56.4	-40.4
2370.0	-59.3	-43.3
4923.0	-45.0	-29.0
7368.0	-49.7	-33.7

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

SIGNATURE

JULY 30, 2001
DATE OF TEST

TABLE 9-4: TEST EQUIPMENT USED FOR TESTING (ANTENNA CONDUCTED SPURIOUS EMISSIONS)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771



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10 FCC PART 15 §15.209(C) RADIATED SPURIOUS EMISSIONS

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. The restricted bands are listed in Section 15.205. The maximum permitted average field strength for the restricted band is listed in Section 15.209. The EUT was tested in the X-Y, X-Z and Y-Z plan.

TABLE 10-1: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 1)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
2333.60	Av	V	90	1.2	31.0	0.0	31.0	54.0
2333.60	PK	V	90	1.2	42.0	0.0	42.0	
2342.60	Av	V	100	1.3	32.3	0.0	32.3	54.0
2342.60	PK	V	100	1.3	41.1	0.0	41.1	
2410.63	Av	V	90	1.2	90.2	0.0	90.2	Fundamental
2410.63	PK	V	90	1.2	98.1	0.0	98.1	
4822.50	Av	H	80	1.0	28.4	14.3	42.7	54.0
4822.50	PK	H	80	1.0	40.3	14.3	54.6	
7238.50	Av	H	90	1.0	32.7	20.3	53.0	54.0
7238.50	PK	H	90	1.0	45.2	20.3	65.5	
9648.00	Av	H	90	1.0	32.3		NF	54.0
9648.00	PK	H	90	1.0	43.0		NF	
12060.00	Av	H	90	1.0	35.4		NF	54.0
12060.00	PK	H	90	1.0	47.1		NF	

AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TEST PERSONNEL:

RACHID SEHB
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DATE OF TEST



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TABLE 10-2: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 6)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
2437.00	AV	V	95	1.5	89.9	0.0	89.9	Fundamental
2437.00	PK	V	95	1.5	98.6	0.0	98.6	
4872.00	AV	V	95	1.0	27.1	14.3	41.4	54.0
4872.00	PK	V	95	1.0	39.1	14.3	53.4	
7401.50	AV	H	10	1.0	33.5	20.3	53.8	54.0
7401.50	PK	H	10	1.0	45.3	20.3	65.6	
97512.00	AV	H	10	1.0	32.1		NF	54.0
97512.00	PK	H	10	1.0	43.5		NF	
12185.00	AV	H	10	1.0	35.4		NF	54.0
12185.00	PK	H	10	1.0	46.5		NF	

AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

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TABLE 10-3: RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 11)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)
2351.60	Av	V	90	1.2	92.2	0.0	33.6	54.0
2351.60	PK	V	90	1.2	101.1	0.0	44.7	
2462.25	Av	V	270	1.2	33.6	0.0	92.2	FUNDAMENTAL
2462.25	PK	V	270	1.2	44.7	0.0	101.1	
4929.37	Av	H	90	1.0	28.0	14.3	42.3	54.0
4929.37	PK	H	90	1.0	37.7	14.3	52.0	
7394.07	Av	H	90	1.0	33.0	20.3	53.3	54.0
7394.07	PK	H	90	1.0	42.0	20.3	62.3	
9851.52	Av	H	90	1.0	33.6		NF	54.0
9851.52	PK	H	135	1.0	43.8		NF	
12314.40	Av	H	90	1.0	36.5		NF	54.0
12314.40	PK	H	90	1.0	47.8		NF	

AVERAGE: RES. =1 MHz, VID= 10Hz; NF = NOISE FLOOR

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

SIGNATURE

JULY 30, 2001
DATE OF TEST

TABLE 10-4: TEST EQUIPMENT USED FOR TESTING (RADIATED SPURIOUS EMISSIONS)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771
900772	EMCO	3161-02	Horn ANTENNA (2-4 GHz)	900772
900321	EMCO	3161-03	Horn Antennas (4-8,2GHz)	9508-1020
900323	EMCO	3160-7	Horn Antennas (8,2-12,4 GHz)	9605-1054
900325	EMCO	3160-9	Horn Antennas (18 - 26.5 GHz)	9605-1051
900723	Miteq	NA	AMP 100MHz-26GHz	NA
900791	Schaffner - Chase	CBL6112	Antenna (25 MHz - 2 GHz)	2099



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11 FCC PART 15 §15.247(D) POWER SPECTRAL DENSITY

The Power spectral density per FCC 15.247(d) was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 3kHz, and the sweep time set at 17 second. The spectral lines were resolved for the modulated carriers at 2.410GHz, 2.437GHz and 2.463GHz respectively. These levels are well below the +8 dBm limit. See power spectral density table and plots.

TABLE 11-1: FCC PART 15 §15.247(D) POWER SPECTRAL DENSITY

Channel	Power Spectral Density limit = +8dBm
1	-1.2
6	-1.3
11	-2.2

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

SIGNATURE

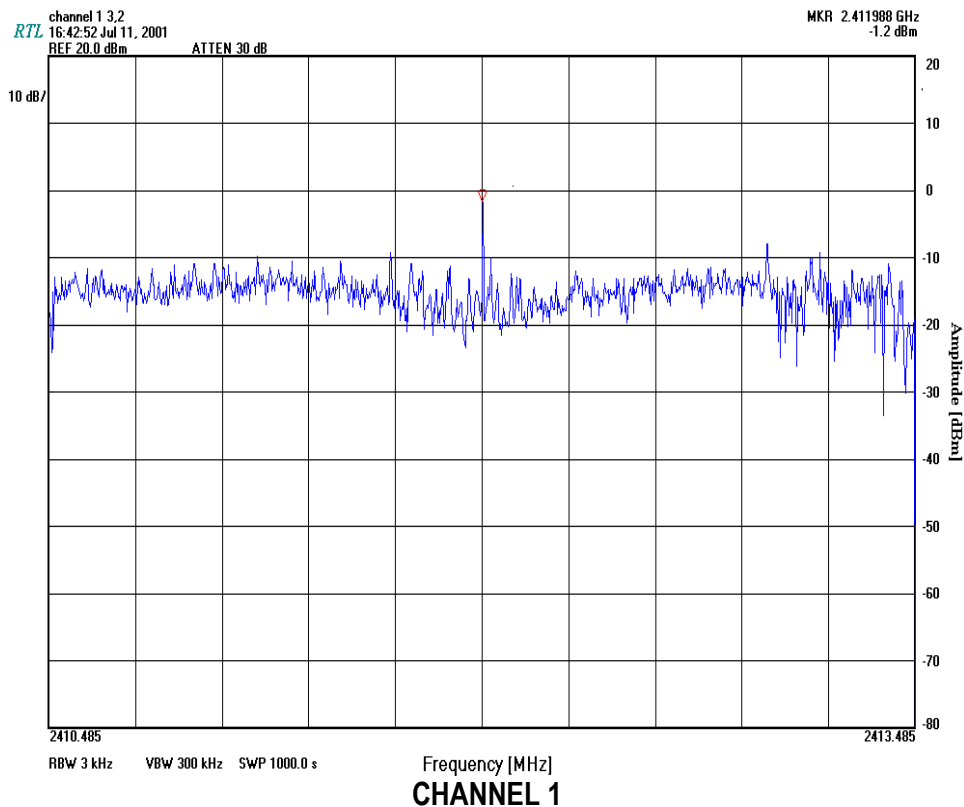
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12 SPECTRAL DENSITY PLOTS



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PLOT 12-1: FCC PART 15 §15.247(D) POWER SPECTRAL DENSITY: CHANNEL 1



TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

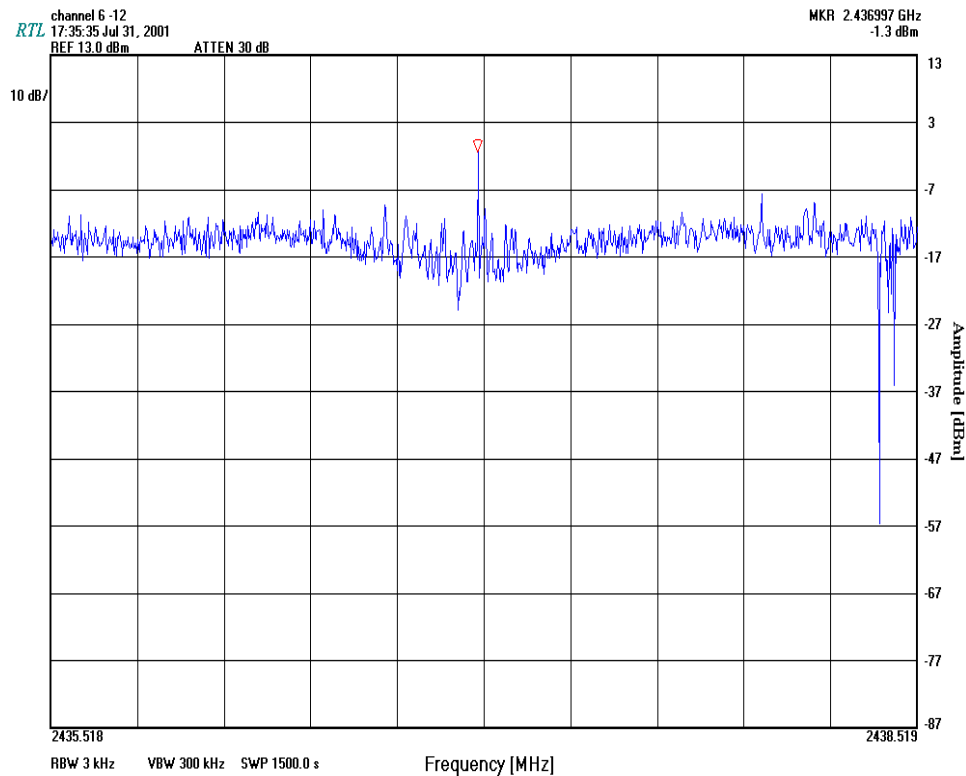
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PLOT 12-2: FCC PART 15 §15.247(D) POWER SPECTRAL DENSITY: CHANNEL 6



TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

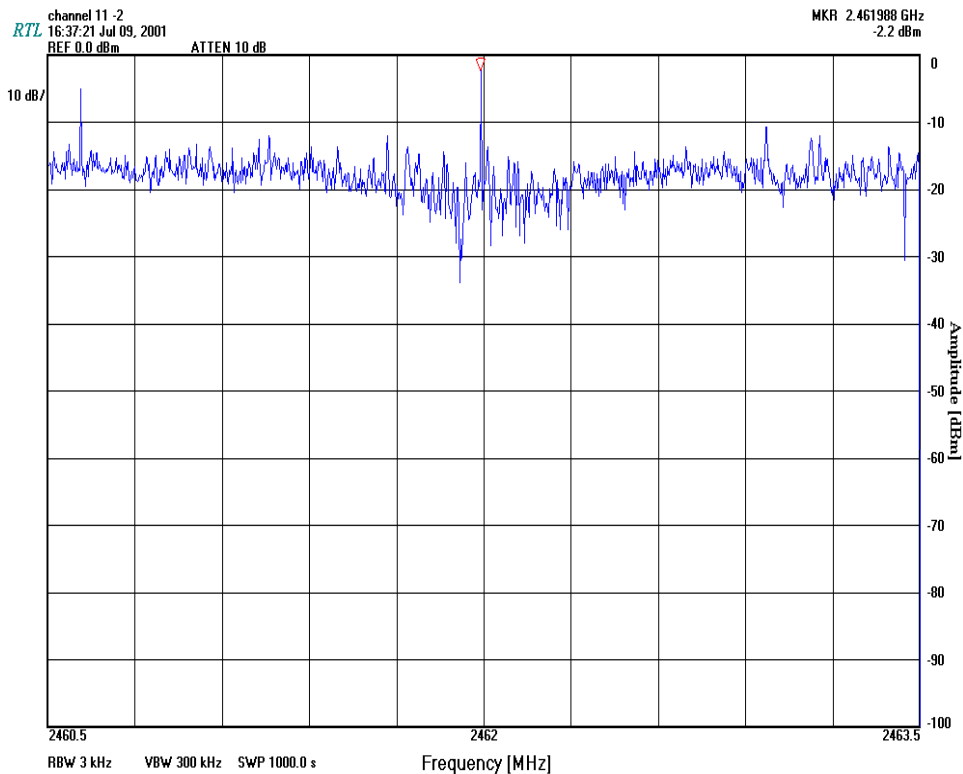
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PLOT 12-3: FCC PART 15 §15.247(D) POWER SPECTRAL DENSITY: CHANNEL 11



TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

SIGNATURE

JULY 30, 2001
DATE OF TEST

TABLE 12-1: TEST EQUIPMENT USED FOR TESTING (POWER SPECTRAL DENSITY)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771



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13 FCC PART 15 §15.205 COMPLIANCE WITH THE RESTRICTED BAND EDGE

Compliance with the band edges was performed using the FCC's "Radiated Measurement at a Band Edge" guidance document. The final data derived below were from radiated measurements only. The data taken in this report represents the worst case at 11 MBPS. Data rates of 5.5MBPS, 2 MBPS and 1 MBPS were investigated and found to be in compliance.

Channel Set to	Frequency tested MHz	Detector	Field Strength Level (dBμV/m)	FCC Limit (dBμV/m)	FCC Margin (dB)
1	2390.0	AV	32.3	54.0	-21.3
		PK	45.4		
11	2483.5	AV	35.7	54.0	-18.3
		PK	47.5		

TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

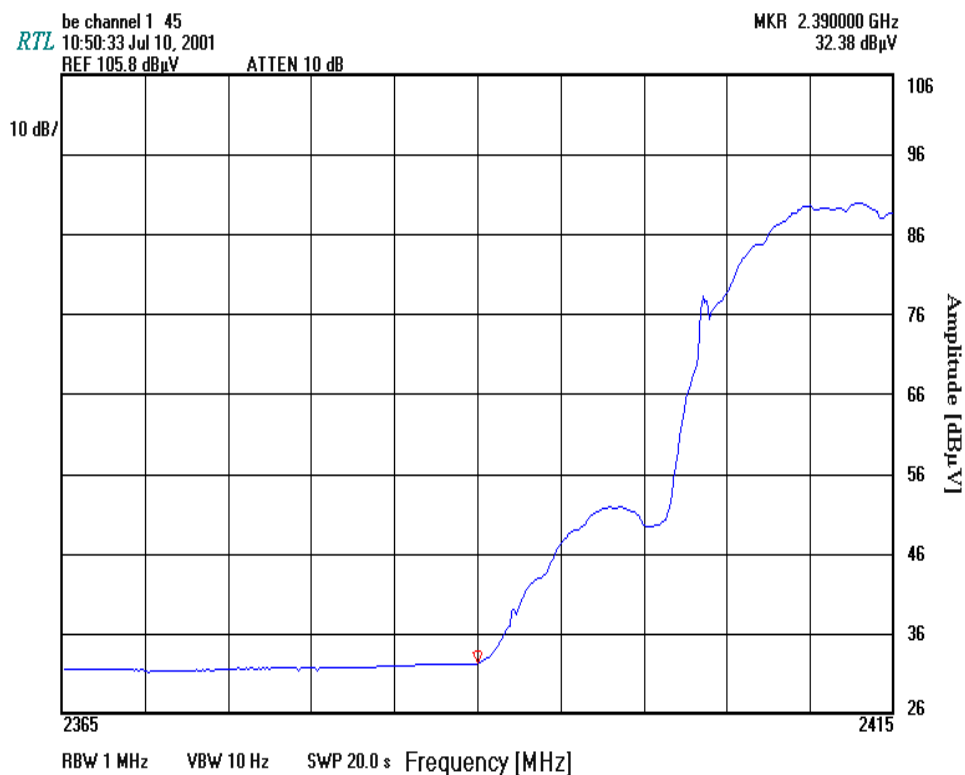
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PLOT 13-1: FCC PART 15 §15.205 BAND EDGE: AVERAGE MEASUREMENT FOR CHANNEL 1 (RBW 1MHz/VBW 10HZ)



TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

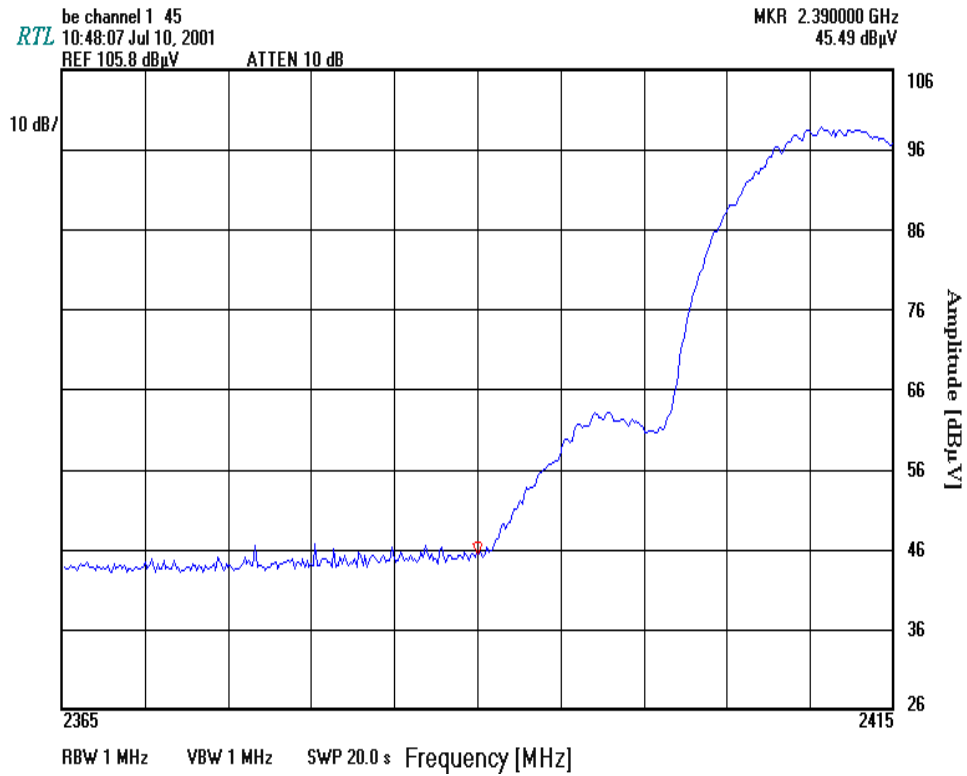
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PLOT 13-2: FCC PART 15 §15.205 BAND EDGE: PEAK MEASUREMENT FOR CHANNEL 1 (RBW 1MHZ/VBW 1MHZ)



TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

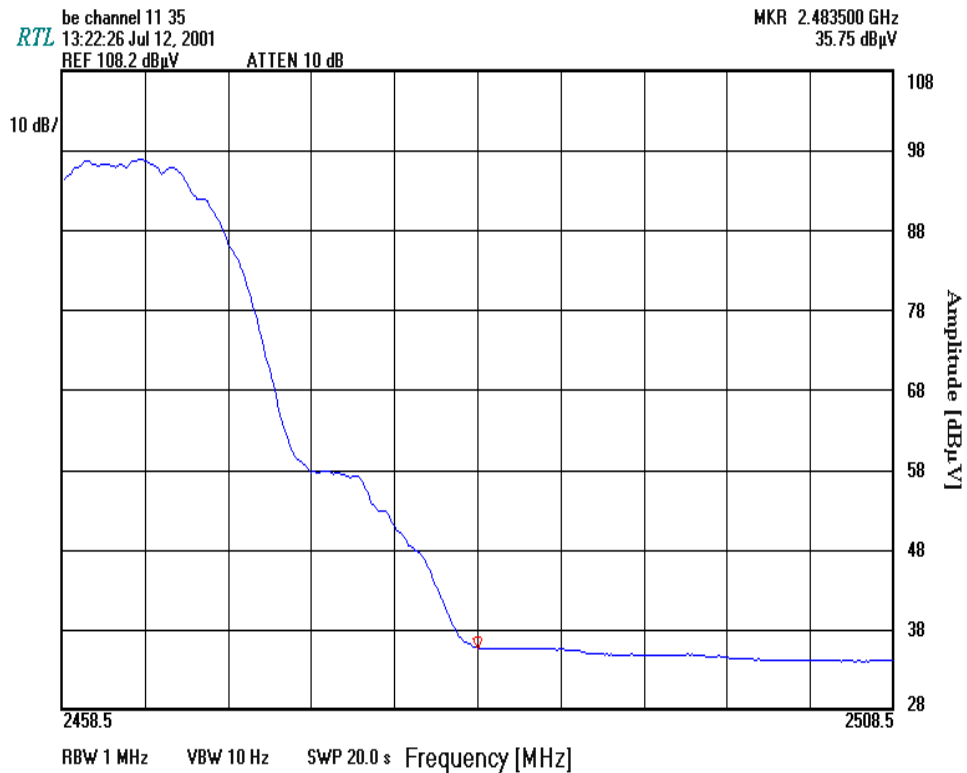
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PLOT 13-3: FCC PART 15 §15.205 BAND EDGE: AVERAGE MEASUREMENT FOR CHANNEL 11 (RBW 1MHZ/VBW 10HZ)



TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

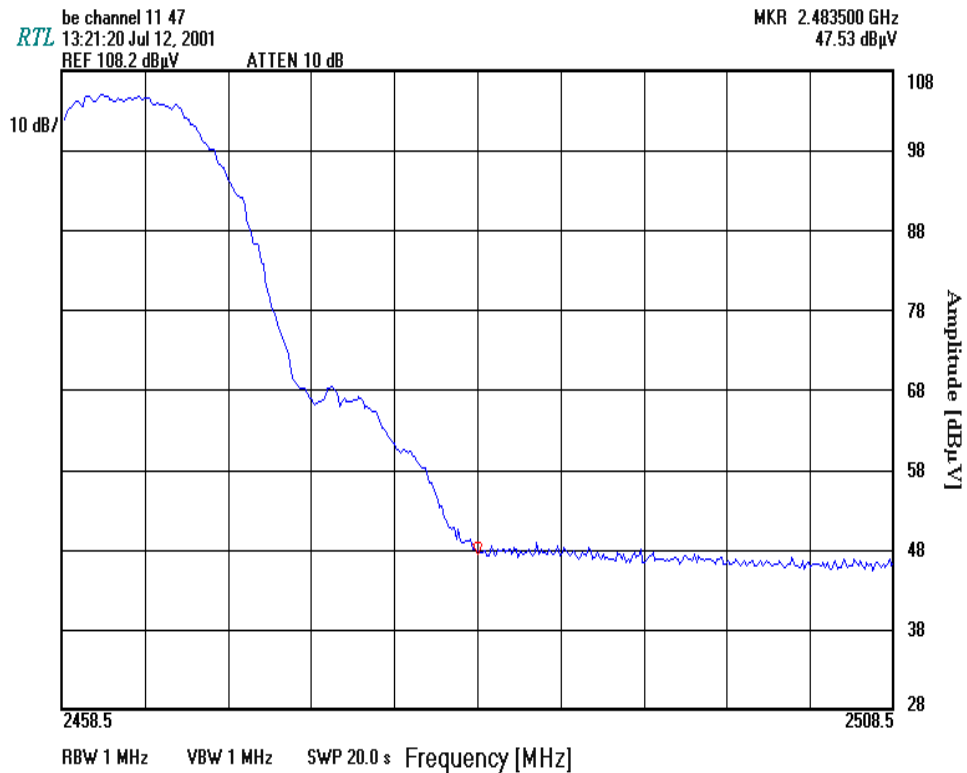
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PLOT 13-4: FCC PART 15 §15.205 BAND EDGE: PEAK MEASUREMENT FOR CHANNEL 11 (RBW 1MHZ/VBW 1MHZ)



TEST PERSONNEL:

RACHID SEHB
TEST TECHNICIAN/ENGINEER

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