



Engineering and Testing for EMC and Safety Compliance

CERTIFICATION APPLICATION REPORT
FCC PART 15.247 CERTIFICATION & INDUSTRY CANADA CERTIFICATION

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FCC ID:	ONJ-MDR2400ET	RTL WORK ORDER NUMBER:	2002006
MODEL(S):	MDR2400 ET4 Outdoor Unit (M/N: 651-03905) MDR MTE Indoor Unit (M/N: 651-03810)	RTL QUOTE NUMBER:	QRTL01-1219
DATE OF TEST REPORT:	June 12, 2002		
Standards and Procedures:	FCC 97-114 (DSSS), ANSI C63.4, ANSI/TIA/EIA603 and ANSI/TIA/EIA603-1		
FCC Classification:	DSS Direct Sequence Spread Spectrum		
FCC Rule Part(s):	Part 15.247: Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System		
Industry Canada Standard:	RSS-210: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)		
Digital Interface Information	Digital Interface was found to be compliant		
Receiver Information	Receiver was found to be compliant		
Frequency Range (MHz)	Output Power (W)	Freq. Tolerance	Emission Designator
2412-2458	0.1995	N/A	N/A

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to, or exclusions from the FCC Part 2, FCC Part 15, FCC 97-114 (DSSS), Industry Canada RSS-210, ANSI C63.4, ANSI/TIA/EIA603 and ANSI/TIA/EIA603-1.

Signature: Desmond A. Fraser

Date: June 12, 2002

Typed/Printed Name: Desmond A. Fraser

Position: President

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1 GENERAL INFORMATION

1.1 SCOPE

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

IC RSS-210 Section 6.2.2(o): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

A direct sequence (DS) system is a spread spectrum (SS) system in which the carrier has been modulated by a high speed spreading code and an information data stream. The high-speed code sequence dominates the “modulating function” and is the direct cause of the wide spreading of the transmitted signal.

1.2 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.3 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application for Certification for M/N: 651-03905 MDR2400 ET4 Outdoor Unit v. 1 and 651-03810 MDR MTE Indoor Unit v.2, FCC ID: ONJ-MDR2400ET. The IF, LO and up to the 2nd LO were investigated and tested.

2 TEST INFORMATION

2.1 TEST JUSTIFICATION

Both conducted and radiated testing was 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.

The EUT has a parabolic antenna. The parabolic antenna transmits, receives, and is connected to the antenna port.

The worst-case data taken in this report represents the highest data rate at 11 Mbps. The EUT is restricted to operate at a software setting of 22dBm at 2412MHz and 2426MHz, and a software setting of 18dBm at 2458MHz. The manufacturer will restrict the software/firmware of the EUT so that these levels are not exceeded.

2.2 EXERCISING THE EUT

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 TEST RESULT SUMMARY

TABLE 2-1: TEST RESULT SUMMARY WITH FCC RULES AND REGULATIONS

STANDARD	TEST	PASS/FAIL OR N/A
FCC 15.205	Compliance with the Restricted Band Edge	Pass
FCC 15.207	Conducted Emissions	Pass
FCC 15.209	Radiated Emissions	Pass
FCC 15.247(a)(2)	Modulated Bandwidth	Pass
FCC 15.247(b)	Power Output	Pass
FCC 15.247(c)	Antenna Conducted Spurious Emissions	Pass
FCC 15.247(d)	Power Spectral Density	Pass

2.4 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system are:

TABLE 2-2: EQUIPMENT UNDER TEST (EUT)

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
PARABOLIC ANTENNA	GABRIEL ELECTRONICS	SSG4-23	G4-5034	N/A	RTL ASSET 901238	14071
OUTDOOR UNIT	PLESSEY MICROWAVE	MDR2400 ET4 OU v. 1 (M/N: 651-03905)	MDR24000001	ONJ-MDR2400ET	SHIELDED CAT 5 CABLE UNSHIELDED DC POWER CABLE	14111
OUTDOOR UNIT	PLESSEY MICROWAVE	MDR2400 ET4 OU v. 1 (M/N: 651-03905)	MDR24000002	ONJ-MDR2400ET	SHIELDED CAT 5 CABLE UNSHIELDED DC POWER CABLE	14112
INDOOR UNIT	PLESSEY MICROWAVE	MDR MTE IU v. 2 DIGITAL RADIO (FAR) (M/N: 651-03810)	MDRTE000016	ONJ-MDR2400ET	SHIELDED CAT 5 CABLE UNSHIELDED DC POWER CABLE	13039
INDOOR UNIT	PLESSEY MICROWAVE	MDR MTE IU v. 2 DIGITAL RADIO (NEAR) (M/N: 651-03810)	MDRTE000035	ONJ-MDR2400ET	SHIELDED CAT 5 CABLE UNSHIELDED DC POWER CABLE	13038

2.5 CONFIGURATION OF TESTED SYSTEM

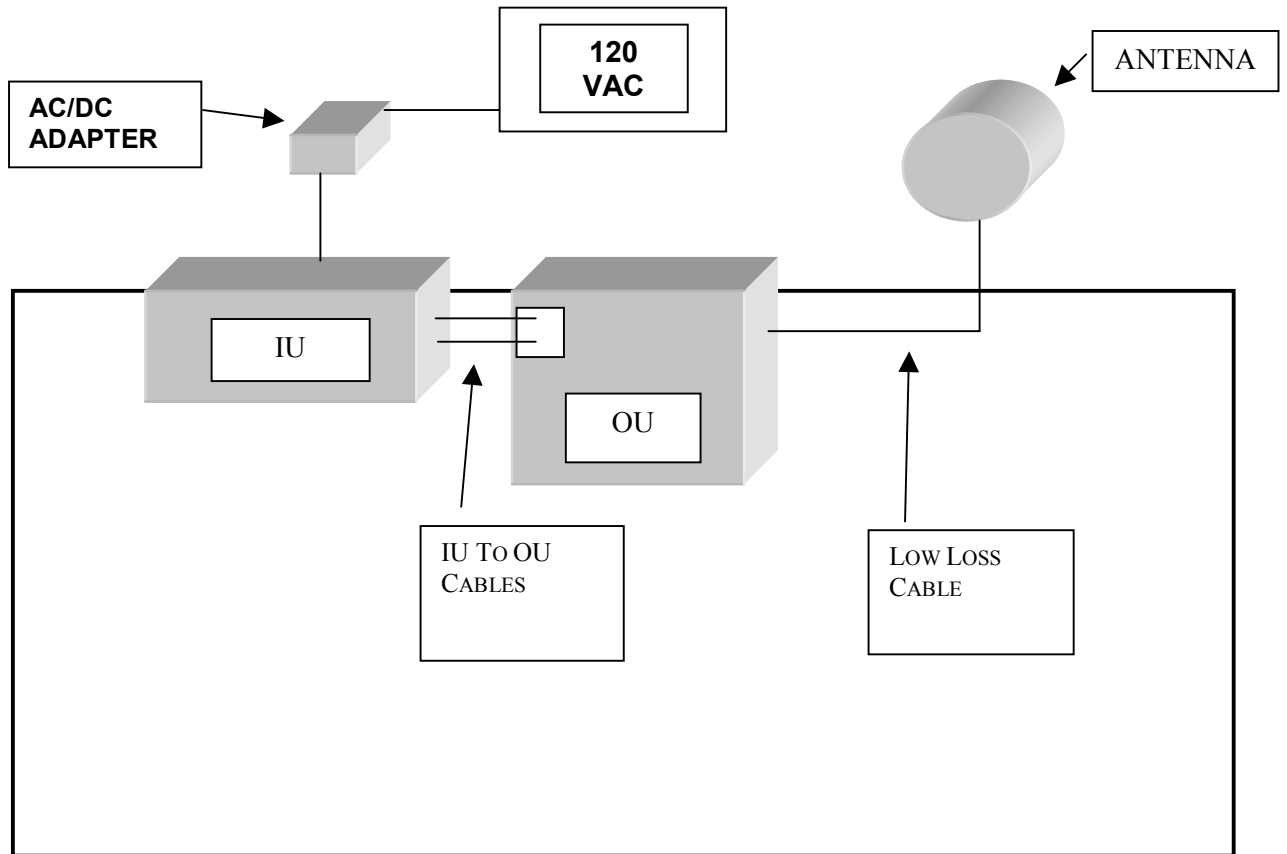


FIGURE 1: WORST CASE CONFIGURATION OF SYSTEM UNDER TEST

3 COMPLIANCE WITH THE RESTRICTED BAND EDGE - §15.205

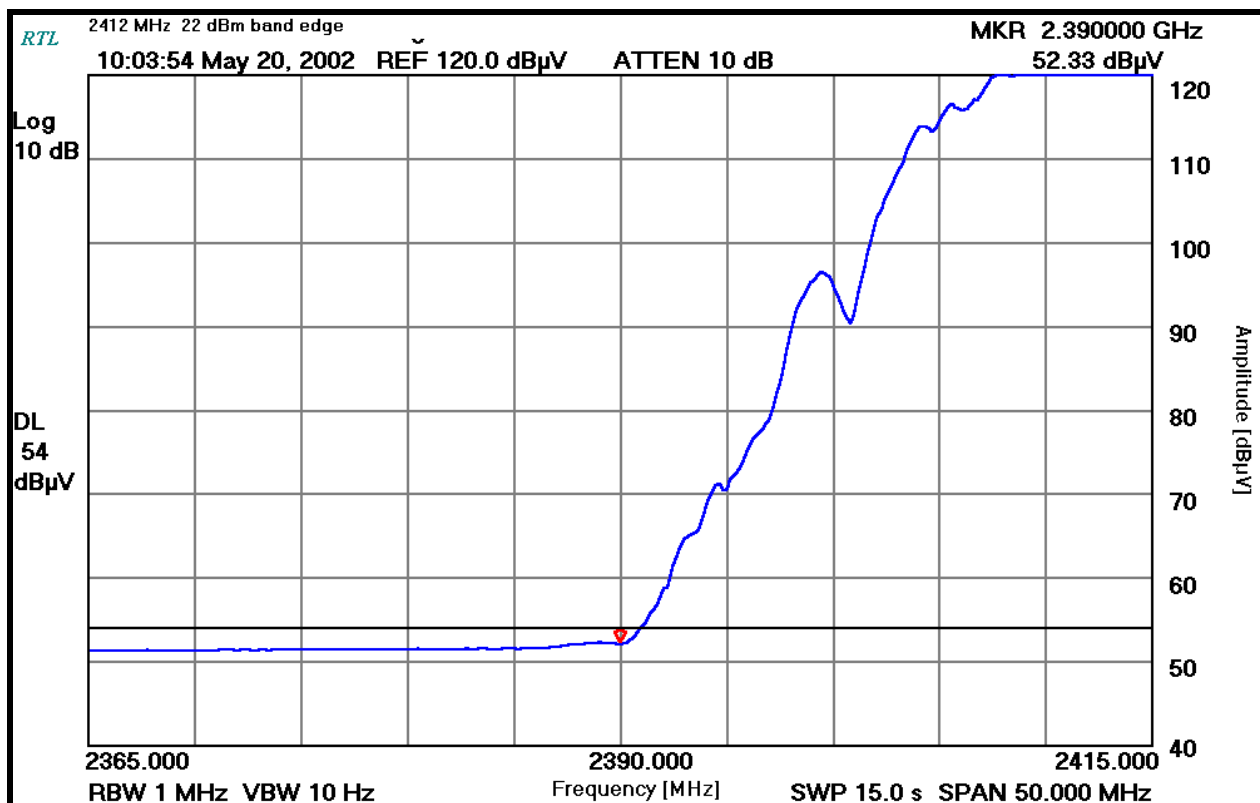
3.1 TEST PROCEDURE

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.

3.2 RESTRICTED BAND EDGE PLOTS

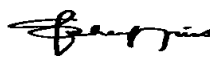
Frequency (MHz): 2412
Resolution Bandwidth (MHz): 1
Video Bandwidth (Hz): 10
Sweep Time (s): 15.0
Distance (meters): 3
Limit (dBuV/m): 54

PLOT 3-1: BAND EDGE FOR 2412MHZ CHANNEL (ABSOLUTE MEASUREMENT)



TEST PERSONNEL:

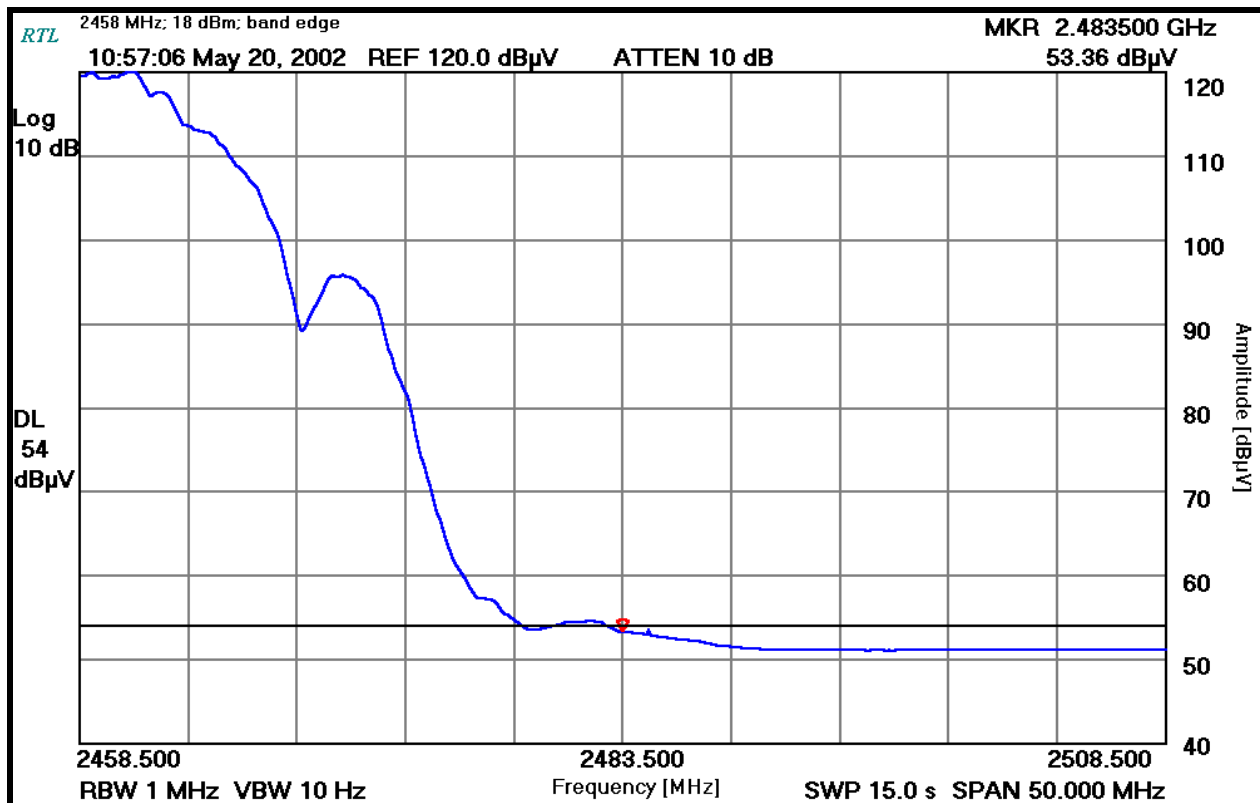
Franck Schuppius
Test Technician/Engineer


Signature

05/20/2002
Date Of Test

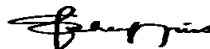
Frequency (MHz): 2458
Resolution Bandwidth (MHz): 1
Video Bandwidth (Hz): 10
Sweep Time (s): 15.0
Distance (meters): 3
Limit (dBuV/m): 54

PLOT 3-2: BAND EDGE FOR 2458MHZ CHANNEL (ABSOLUTE MEASUREMENT)



TEST PERSONNEL:

Franck Schuppius
Test Technician/Engineer


Signature

05/20/2002
Date Of Test

4 CONDUCTED LIMITS - §15.207

4.1 TEST METHODOLOGY FOR 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 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak 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 emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

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.

4.2 CONDUCTED EMISSION TEST PROCEDURE

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. If the quasi-peak measurement is at least 6dB higher than the amplitude in the average mode, the level measured in the quasi-peak mode may be reduced by 13dB before comparing it to the limit.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 450 kHz to 30 MHz on the NEUTRAL SIDE and PHASE SIDE.

TABLE 4-1: CONDUCTED SPURIOUS EMISSIONS TEST EQUIPMENT

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

4.3 CONDUCTED EMISSION TEST DATA

TABLE 4-2: CONDUCTED EMISSIONS (NEUTRAL SIDE) TRANSMITTING AT 2412MHZ

Temperature: 74°F Humidity: 45%						
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.452	Av	38.0	0.8	38.8	48.0	-9.2
0.561	Qp	43.3	0.7	44.0	48.0	-4.0
0.788	Qp	43.9	0.7	44.6	48.0	-3.4
1.004	Pk	45.0	0.7	45.7	48.0	-2.3
2.360	Pk	41.0	1.2	42.2	48.0	-5.8
6.170	Pk	42.3	1.7	44.0	48.0	-4.0
12.350	Pk	36.4	2.5	38.9	48.0	-9.1
20.000	Pk	36.6	3.1	39.7	48.0	-8.3
26.240	Pk	36.3	3.4	39.7	48.0	-8.3
29.330	Pk	39.4	3.6	43.0	48.0	-5.0

TABLE 4-3: CONDUCTED EMISSIONS (HOT SIDE) TRANSMITTING AT 2412MHZ

Temperature: 74°F Humidity: 45%						
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.450	Qp	45.5	0.8	46.3	48.0	-1.7
0.450	Av	38.6	0.8	39.4	48.0	-8.6
0.735	Pk	43.9	0.7	44.6	48.0	-3.4
0.789	Av	39.7	0.6	40.3	48.0	-7.7
0.789	Qp	41.5	0.6	42.1	48.0	-5.9
0.952	Pk	43.2	0.1	43.3	48.0	-4.7
1.112	Pk	43.7	0.8	44.5	48.0	-3.5
1.684	Pk	36.0	1.0	37.0	48.0	-11.0
6.845	Pk	42.3	1.9	44.2	48.0	-3.8
12.335	Pk	36.3	2.5	38.8	48.0	-9.2
19.980	Pk	35.8	3.1	38.9	48.0	-9.1
26.220	Pk	34.6	3.4	38.0	48.0	-10.0
29.310	Pk	39.5	3.6	43.1	48.0	-4.9

TEST PERSONNEL:

Franck Schuppius Test Technician/Engineer	 Signature	04/26/2002 Date Of Test
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TABLE 4-4: CONDUCTED EMISSIONS (NEUTRAL SIDE) TRANSMITTING AT 2426MHZ

Temperature: 74°F				Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.450	Qp	45.2	0.8	46.0	48.0	-2.0
0.562	Qp	43.7	0.7	44.4	48.0	-3.6
0.789	Qp	44.6	0.7	45.3	48.0	-2.7
1.116	Pk	42.8	0.8	43.6	48.0	-4.4
7.705	Pk	38.7	2.0	40.7	48.0	-7.3
12.352	Pk	37.4	2.5	39.9	48.0	-8.1
19.990	Pk	33.7	3.1	36.8	48.0	-11.2
26.240	Pk	34.4	3.4	37.8	48.0	-10.2
29.330	Pk	37.2	3.6	40.8	48.0	-7.2

TABLE 4-5: CONDUCTED EMISSIONS (HOT SIDE) TRANSMITTING AT 2426MHZ

Temperature: 74°F				Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.450	Pk	45.7	0.8	46.5	48.0	-1.5
0.560	Qp	42.8	0.7	43.5	48.0	-4.5
0.790	Qp	42.3	0.6	42.9	48.0	-5.1
1.012	Pk	44.5	0.7	45.2	48.0	-2.8
7.405	Pk	42.4	1.9	44.3	48.0	-3.7
12.340	Pk	39.1	2.5	41.6	48.0	-6.4
24.690	Pk	32.7	3.4	36.1	48.0	-11.9
26.230	Pk	36.2	3.4	39.6	48.0	-8.4
29.320	Pk	38.3	3.6	41.9	48.0	-6.1

TEST PERSONNEL:

Franck Schuppius		04/26/2002
Test Technician/Engineer	Signature	Date Of Test

TABLE 4-6: CONDUCTED EMISSIONS (NEUTRAL SIDE) TRANSMITTING AT 2458MHZ

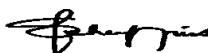
		Temperature: 74°F		Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.453	Qp	40.8	0.8	41.6	48.0	-6.4
0.565	Qp	42.4	0.7	43.1	48.0	-4.9
0.792	Qp	40.6	0.7	41.3	48.0	-6.7
6.160	Pk	41.3	1.7	43.0	48.0	-5.0
12.335	Pk	39.1	2.5	41.6	48.0	-6.4
12.340	Pk	38.6	2.5	41.1	48.0	-6.9
19.990	Pk	34.4	3.1	37.5	48.0	-10.5
24.690	Pk	32.8	3.4	36.2	48.0	-11.8
26.230	Pk	35.5	3.4	38.9	48.0	-9.1
29.320	Pk	38.7	3.6	42.3	48.0	-5.7

TABLE 4-7: CONDUCTED EMISSIONS (HOT SIDE) TRANSMITTING AT 2458MHZ

		Temperature: 74°F		Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.450	Qp	45.8	0.8	46.6	48.0	-1.4
0.561	Qp	42.8	0.7	43.5	48.0	-4.5
0.787	Qp	44.6	0.6	45.2	48.0	-2.8
1.016	Pk	41.8	0.7	42.5	48.0	-5.5
6.055	Pk	39.5	1.8	41.3	48.0	-6.7
12.350	Pk	38.0	2.5	40.5	48.0	-7.5
19.996	Pk	34.8	3.1	37.9	48.0	-10.1
24.706	Pk	30.7	3.4	34.1	48.0	-13.9
26.240	Pk	35.7	3.4	39.1	48.0	-8.9
29.330	Pk	37.9	3.6	41.5	48.0	-6.5

TEST PERSONNEL:

Franck Schuppius
Test Technician/Engineer


Signature

04/27/2002
Date Of Test

TABLE 4-8: CONDUCTED EMISSIONS (NEUTRAL SIDE) RECEIVING AT 2412MHZ

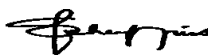
Temperature: 74°F				Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.451	Qp	45.4	0.8	46.2	48.0	-1.8
0.529	Qp	40.8	0.7	41.5	48.0	-6.5
0.674	Qp	39.3	0.7	40.0	48.0	-8.0
0.790	Pk	43.6	0.7	44.3	48.0	-3.7
0.837	Pk	44.2	0.7	44.9	48.0	-3.1
1.044	Pk	46.1	0.7	46.8	48.0	-1.2
6.415	Pk	40.7	1.8	42.5	48.0	-5.5
12.360	Pk	36.3	2.5	38.8	48.0	-9.2
19.980	Pk	34.8	3.1	37.9	48.0	-10.1
24.680	Pk	30.8	3.4	34.2	48.0	-13.8
26.220	Pk	32.4	3.4	35.8	48.0	-12.2
29.300	Pk	36.6	3.6	40.2	48.0	-7.8

TABLE 4-9: CONDUCTED EMISSIONS (HOT SIDE) RECEIVING AT 2412MHZ

Temperature: 74°F				Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.451	Qp	46.4	0.8	47.2	48.0	-0.8
0.451	Av	40.6	0.8	41.4	48.0	-6.6
0.484	Qp	45.1	0.7	45.8	48.0	-2.2
0.523	Qp	39.2	0.7	39.9	48.0	-8.1
0.674	Qp	42.4	0.7	43.1	48.0	-4.9
0.901	Pk	45.7	0.7	46.4	48.0	-1.6
1.460	Pk	45.0	0.9	45.9	48.0	-2.1
5.950	Pk	41.7	1.8	43.5	48.0	-4.5
12.340	Pk	36.8	2.5	39.3	48.0	-8.7
19.980	Pk	36.1	3.1	39.2	48.0	-8.8
26.220	Pk	34.2	3.4	37.6	48.0	-10.4
29.300	Pk	37.5	3.6	41.1	48.0	-6.9

TEST PERSONNEL:

Franck Schuppius
Test Technician/Engineer


Signature

04/27/2002
Date Of Test

TABLE 4-10: CONDUCTED EMISSIONS (NEUTRAL SIDE) RECEIVING AT 2426MHZ

Temperature: 74°F				Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.451	Qp	45.4	0.8	46.2	48.0	-1.8
0.525	Qp	43.2	0.7	43.9	48.0	-4.1
0.582	Pk	45.0	0.7	45.7	48.0	-2.3
0.663	Pk	46.1	0.7	46.8	48.0	-1.2
0.793	Pk	44.1	0.7	44.8	48.0	-3.2
0.904	Pk	45.6	0.7	46.3	48.0	-1.7
1.212	Pk	45.0	0.8	45.8	48.0	-2.2
5.505	Pk	41.7	1.6	43.3	48.0	-4.7
12.340	Pk	38.7	2.5	41.2	48.0	-6.8
15.430	Pk	28.7	2.8	31.5	48.0	-16.5
19.990	Pk	35.1	3.1	38.2	48.0	-9.8
26.238	Pk	35.8	3.4	39.2	48.0	-8.8
29.325	Pk	38.1	3.6	41.7	48.0	-6.3

TABLE 4-11: CONDUCTED EMISSIONS (HOT SIDE) RECEIVING AT 2426MHZ

Temperature: 74°F				Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.451	Qp	46.9	0.8	47.7	48.0	-0.3
0.451	Av	39.9	0.8	40.7	48.0	-7.3
0.524	Pk	45.2	0.7	45.9	48.0	-2.1
0.662	Pk	43.9	0.7	44.6	48.0	-3.4
0.791	Pk	43.6	0.6	44.2	48.0	-3.8
0.903	Pk	43.4	0.7	44.1	48.0	-3.9
1.116	Pk	44.4	0.8	45.2	48.0	-2.8
7.710	Pk	38.9	2.0	40.9	48.0	-7.1
12.340	Pk	37.4	2.5	39.9	48.0	-8.1
15.435	Pk	26.8	2.7	29.5	48.0	-18.5
19.990	Pk	33.7	3.1	36.8	48.0	-11.2
29.330	Pk	37.0	3.6	40.6	48.0	-7.4

TEST PERSONNEL:

Franck Schuppius		04/27/2002
Test Technician/Engineer	Signature	Date Of Test

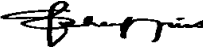
TABLE 4-12: CONDUCTED EMISSIONS (NEUTRAL SIDE) RECEIVING AT 2458MHZ

Temperature: 74°F				Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.451	Qp	45.3	0.8	46.1	48.0	-1.9
0.519	Pk	42.6	0.7	43.3	48.0	-4.7
0.670	Pk	44.8	0.7	45.5	48.0	-2.5
0.787	Pk	44.4	0.7	45.1	48.0	-2.9
1.208	Pk	43.5	0.8	44.3	48.0	-3.7
6.400	Pk	40.9	1.8	42.7	48.0	-5.3
10.800	Pk	33.2	2.2	35.4	48.0	-12.6
12.340	Pk	37.3	2.5	39.8	48.0	-8.2
19.991	Pk	33.8	3.1	36.9	48.0	-11.1
24.699	Pk	31.8	3.4	35.2	48.0	-12.8

TABLE 4-13: CONDUCTED EMISSIONS (HOT SIDE) RECEIVING AT 2458MHZ

Temperature: 74°F				Humidity: 45%		
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)
0.452	Qp	47.0	0.8	47.8	48.0	-0.2
0.452	Av	40.2	0.8	41.0	48.0	-7.0
0.523	Pk	46.2	0.7	46.9	48.0	-1.1
0.673	Pk	45.9	0.7	46.6	48.0	-1.4
0.787	Pk	43.4	0.6	44.0	48.0	-4.0
1.116	Pk	44.0	0.8	44.8	48.0	-3.2
7.705	Pk	40.0	2.0	42.0	48.0	-6.0
10.792	Pk	34.1	2.1	36.2	48.0	-11.8
12.331	Pk	37.9	2.5	40.4	48.0	-7.6
19.997	Pk	34.4	3.1	37.5	48.0	-10.5
24.699	Pk	32.9	3.4	36.3	48.0	-11.7

TEST PERSONNEL:

Franck Schuppius		04/27/2002
Test Technician/Engineer	Signature	Date Of Test

5 RADIATED EMISSION FOR RECEIVER/DIGITAL INTERFACE - §15.209

5.1 RADIATED EMISSION TEST PROCEDURE FOR RECEIVER/DIGITAL INTERFACE

Radiated spurious emissions for receiver/digital interface falls in the restricted and non-restricted bands between 30 MHz and up to the 2nd LO when the EUT is in the receiver/digital interface mode. The IF, LO and up to the 2nd LO of the receiver were investigated and tested. Operating frequencies of 2412MHz, 2426MHz and 2458MHz were investigated. 2412MHz was found to represent the worst case and is presented below. The restricted bands are listed in FCC Part 15.205 and the maximum permitted average field strength for the restricted band is listed in Part 15.209.

5.2 RADIATED EMISSION TEST DATA RECEIVER/DIGITAL INTERFACE

TABLE 5-1: RADIATED EMISSIONS RECEIVING 2412MHZ OPERATING FREQUENCY

Temperature: 55°F Humidity: 41%									
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)
49.410	Qp	V	45	1.0	50.0	-17.2	32.8	40.0	-7.2
150.022	Qp	V	267	1.0	39.1	-10.9	28.2	43.5	-15.3
180.000	Qp	H	270	1.5	48.9	-12.2	36.7	43.5	-6.8
200.002	Qp	V	55	1.0	46.6	-11.3	35.3	43.5	-8.2
220.000	Qp	V	50	1.0	51.3	-11.0	40.3	46.0	-5.7
240.000	Qp	V	80	1.0	49.4	-8.9	40.5	46.0	-5.5
250.000	Qp	V	85	1.0	44.9	-8.1	36.8	46.0	-9.2
280.000	Qp	V	75	1.0	46.6	-7.1	39.5	46.0	-6.5
340.000	Qp	H	67	3.0	47.6	-4.8	42.8	46.0	-3.2
500.100	Qp	V	270	1.0	40.5	0.0	40.5	46.0	-5.5

TEST PERSONNEL:

Jon Wilson		05/21/2002
Test Technician/Engineer	Signature	Date Of Test

6 RADIATED EMISSIONS/RADIATED HARMONICS/SPURIOUS NOISE - §15.247

6.1 RADIATED EMISSION TEST PROCEDURE FOR HARMONICS/SPURIOUS NOISE

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands when the EUT is configured in the transmit mode. The restricted bands are listed in Part 15.205. The maximum permitted average field strength for the restricted band is listed in Part 15.209. The EUT was tested from 10 kHz to the 10th harmonic of the fundamental. The data in this report represents the worst case modes.

Operating Frequency (MHz): 2412
Measured Cond. Pwr. (dBm): 23.0

Measured EIRP (dBm): 50.8
Antenna: Parabolic

EUT power setting was 22 dBm.

6.2 RADIATED EMISSIONS HARMONICS/SPURIOUS TEST DATA

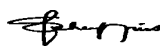
TABLE 6-1: RADIATED EMISSIONS HARMONICS/SPURIOUS 2412MHZ OPERATING FREQUENCY

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)
2412.000	Av	V	45	1.5	107	26	133	Fundamental
2412.000	Pk	V	45	1.5	96.3	26	122.3	Fundamental
4824.000	Av	V	45	1.5	<20 dB			54.0
7236.000	Av	V	45	1.5	<20 dB			54.0
9648.000	Av	V	45	1.5	<20 dB			54.0
12060.000	Av	V	45	1.5	<20 dB			54.0
14472.000	Av	V	45	1.5	<20 dB			54.0
16884.000	Av	V	45	1.5	<20 dB			54.0
19296.000	Av	V	45	1.5	<20 dB			54.0
21708.000	Av	V	45	1.5	<20 dB			54.0
24120.000	Av	V	45	1.5	<20 dB			54.0

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; <20dB= 20dB BELOW THE LIMIT

TEST PERSONNEL:

Franck Schuppius
Test Technician/Engineer


Signature

06/04/2002
Date Of Test

Operating Frequency (MHz): 2426
Measured Cond. Pwr. (dBm): 23.0

Measured EIRP (dBm): 50.9
Antenna: Parabolic

EUT power setting was 22 dBm.

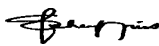
TABLE 6-2: RADIATED EMISSIONS HARMONICS/SPURIOUS 2426MHZ OPERATING FREQUENCY

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)
2426.000	Av	V	45	1.5	109.6	26	135.6	Fundamental
2426.000	Pk	V	45	1.5	99	26	125	Fundamental
4852.000	Av	V	45	1.5	<20 dB			54.0
7278.000	Av	V	45	1.5	<20 dB			54.0
9704.000	Av	V	45	1.5	<20 dB			54.0
12130.000	Av	V	45	1.5	<20 dB			54.0
14556.000	Av	V	45	1.5	<20 dB			54.0
16982.000	Av	V	45	1.5	<20 dB			54.0
19408.000	Av	V	45	1.5	<20 dB			54.0
21834.000	Av	V	45	1.5	<20 dB			54.0
24260.000	Av	V	45	1.5	<20 dB			54.0

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; <20dB= 20dB BELOW THE LIMIT

TEST PERSONNEL:

Franck Schuppius
Test Technician/Engineer


Signature

06/04/2002
Date Of Test

Operating Frequency (MHz): 2458
Measured Cond. Pwr. (dBm): 20.5

Measured EIRP (dBm): 45.6
Antenna: Parabolic

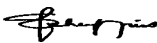
EUT power setting was 18 dBm.

TABLE 6-3: RADIATED EMISSIONS HARMONICS/SPURIOUS 2458MHZ OPERATING FREQUENCY

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)
2458.000	Av	V	45	1.5	103.4	26	129.4	Fundamental
2458.000	Pk	V	45	1.5	93.1	26	119.1	Fundamental
4916.000	Av	V	45	1.5	<20 dB			54.0
7374.000	Av	V	45	1.5	<20 dB			54.0
9832.000	Av	V	45	1.5	<20 dB			54.0
12290.000	Av	V	45	1.5	<20 dB			54.0
14748.000	Av	V	45	1.5	<20 dB			54.0
17206.000	Av	V	45	1.5	<20 dB			54.0
19664.000	Av	V	45	1.5	<20 dB			54.0
22122.000	Av	V	45	1.5	<20 dB			54.0
24580.000	Av	V	45	1.5	<20 dB			54.0

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz; <20dB= 20dB BELOW THE LIMIT

TEST PERSONNEL:

Franck Schuppiss		06/04/2002
Test Technician/Engineer	Signature	Date Of Test

6.3 TEST EQUIPMENT USED FOR TESTING

TABLE 6-4: RADIATED SPURIOUS EMISSIONS TEST EQUIPMENT

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

7 MODULATED BANDWIDTH - §15.247(A)(2)

7.1 MODULATED BANDWIDTH TEST PROCEDURE

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:

7.2 TEST EQUIPMENT USED FOR TESTING

TABLE 7-1: MODULATED BANDWIDTH TEST EQUIPMENT

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

7.3 MODULATED BANDWIDTH TEST DATA

TABLE 7-2: MINIMUM 6 DB MODULATED BANDWIDTHS

OPERATING FREQUENCY (MHZ)	6 dB BANDWIDTH (MHz)
2412	10.20
2426	9.90
2458	10.10

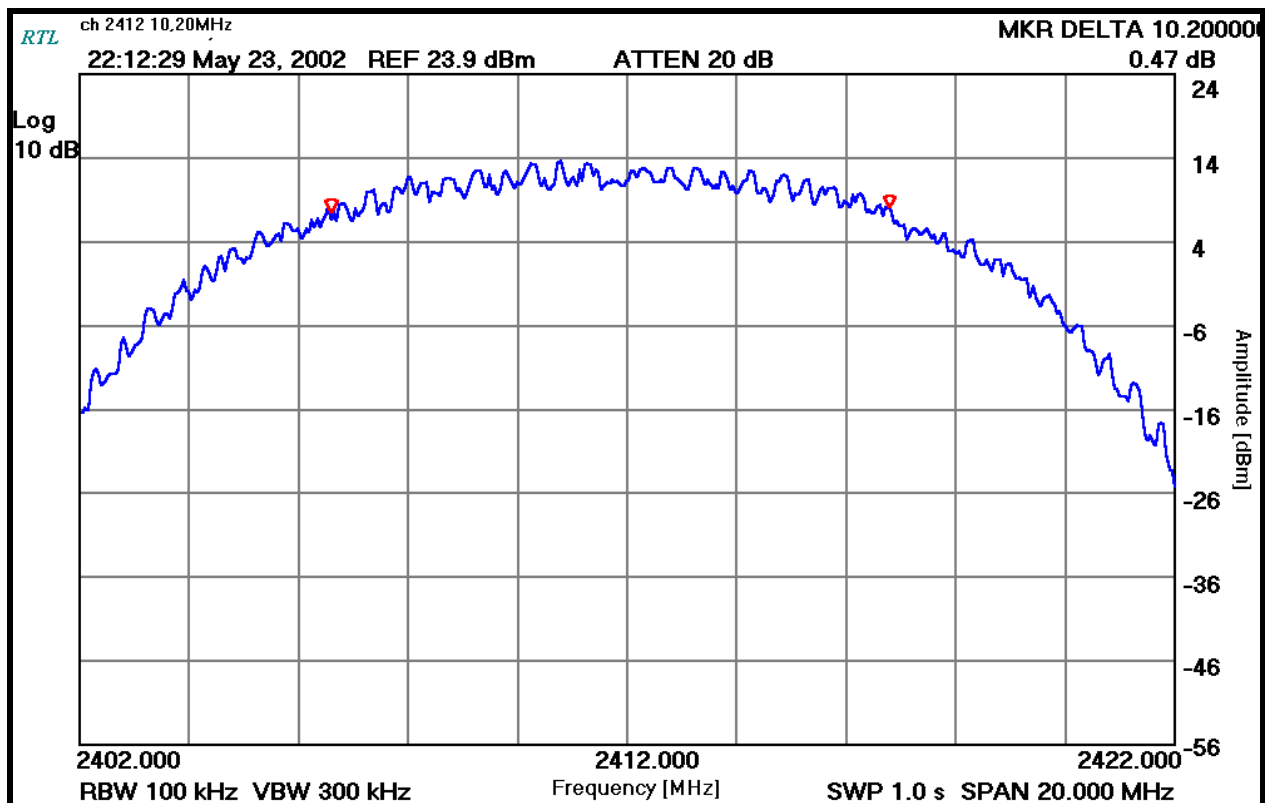
TEST PERSONNEL:

Franck Schuppius		5/13/2002
Test Technician/Engineer	Signature	Date Of Test

7.4 MODULATED BANDWIDTH PLOTS

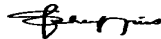
Frequency (MHz): 2412
Resolution Bandwidth (kHz): 100
Video Bandwidth (kHz): 300
Sweep Time (s): 1.0

PLOT 7-1: MODULATED BANDWIDTH 2412MHZ OPERATING FREQUENCY



TEST PERSONNEL:

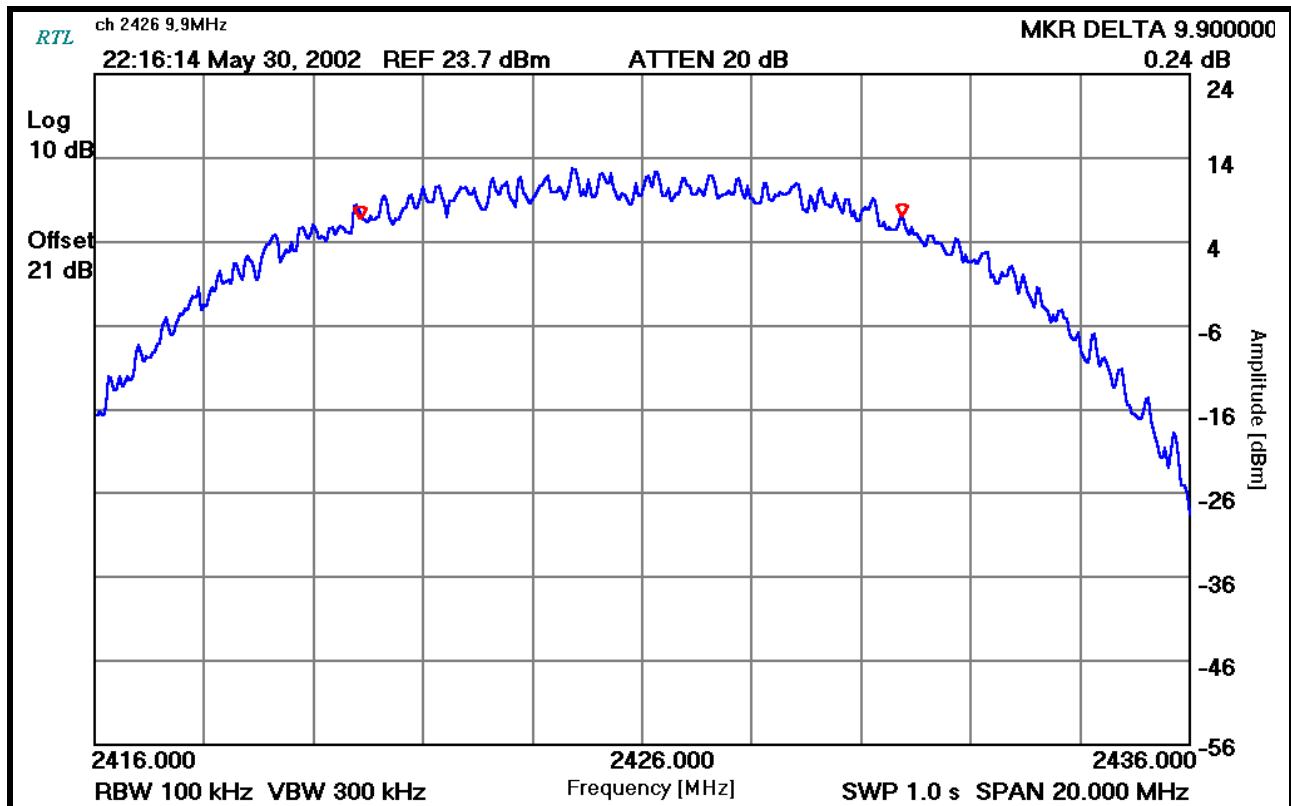
Franck Schuppis
Test Technician/Engineer


Signature

05/23/2002
Date Of Test

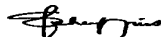
Frequency (MHz): 2426
Resolution Bandwidth (kHz): 100
Video Bandwidth (kHz): 300
Sweep Time (s): 1.0

PLOT 7-2: MODULATED BANDWIDTH 2426MHZ OPERATING FREQUENCY



TEST PERSONNEL:

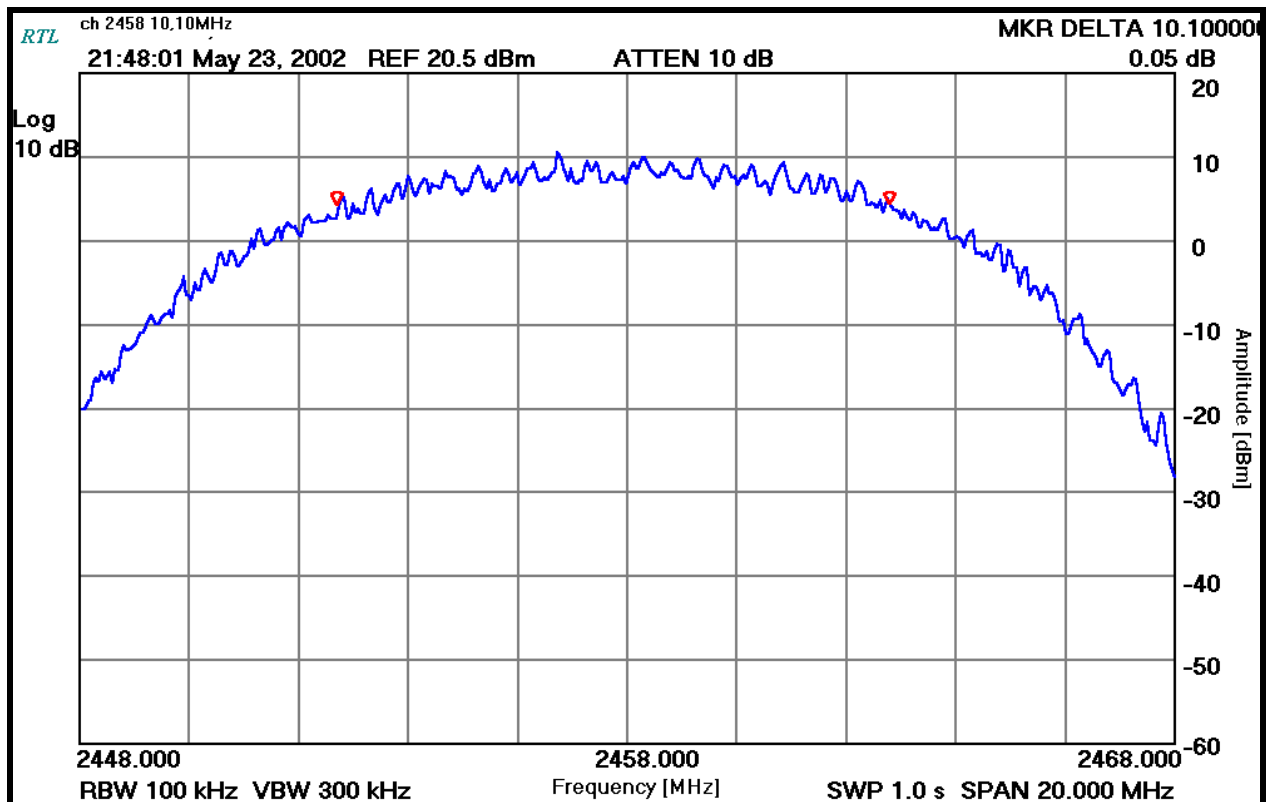
Franck Schuppius
Test Technician/Engineer


Signature

05/30/2002
Date Of Test

Frequency (MHz): 2458
 Resolution Bandwidth (kHz): 100
 Video Bandwidth (kHz): 300
 Sweep Time (s): 1.0

PLOT 7-3: MODULATED BANDWIDTH 2458MHZ OPERATING FREQUENCY



TEST PERSONNEL:

Franck Schuppis
 Test Technician/Engineer

[Signature]
 Signature

05/23/2002
 Date Of Test

8 POWER OUTPUT - §15.247(B)

8.1 POWER OUTPUT TEST PROCEDURE

The peak conducted output power of the EUT was measured using an Agilent 4416A EPM-P Series Power Meter with an E9323A Peak and Average Power Sensor. The EIRP measurement was performed as a radiated test using the substitution method

8.2 TEST EQUIPMENT USED FOR TESTING

TABLE 8-1: RADIATED RF OUTPUT TEST EQUIPMENT

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

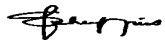
8.3 POWER OUTPUT TEST DATA

TABLE 8-2: POWER OUTPUT TEST DATA

OPERATING FREQUENCY (MHZ)	EIRP (dBm)*	POWER CONDUCTED OUTPUT (dBm)	EUT SOFTWARE POWER SETTING (dBm)
2412	51.1	23.0	22
2426	50.9	23.0	22
2458	45.6	20.5	18

*Measurement accuracy is +/- 1.5 dB

TEST PERSONNEL:

Franck Schuppis Test Technician/Engineer	 Signature	5/13/2002 Date Of Test
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9 ANTENNA CONDUCTED SPURIOUS EMISSIONS - §15.247(C)

9.1 ANTENNA CONDUCTED SPURIOUS EMISSIONS TEST PROCEDURE

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 2412MHz, 2426MHz and 2458MHz. No other harmonics or spurs were found within 20 dB of the carrier level, and from 9kHz to the carrier's 10th harmonic. See antenna conducted spurious noise table.

Operating frequencies 2412MHz, 2426MHz and 2458MHz were investigated and tested.

9.2 ANTENNA CONDUCTED SPURIOUS EMISSIONS 2412MHZ OPERATING FREQUENCY

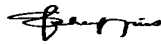
Operating Frequency (MHz): 2412
Measured Cond. Pwr. (dBm): 23.0
Measured EIRP (dBm): 51.1
Conducted Spurious Limit (dBm): -3.3 (20dB down value)

TABLE 9-1: ANTENNA CONDUCTED SPURIOUS EMISSIONS 2412MHZ OPERATING FREQUENCY

Frequency (MHz)	Measured Level (dBm)	Notch Filter Insertion Loss (dB)	Corrected Measured Level (dBc)	Margin (dB)
4824.000	-54.9	2.3	69.3	-72.6
7236.000	-52.5	6.0	63.2	-66.5
9648.000	-52.0	7.8	60.9	-64.2
12060.000	-52.3	8.1	60.9	-64.2
14472.000	-51.1	5.6	62.2	-65.5
16884.000	-50.5	7.6	59.5	-62.8
19296.000	-51.6	7.1	61.2	-64.5
21708.000	-50.3	7.1	59.9	-63.2
24120.000	-46.0	7.3	55.4	-58.7

TEST PERSONNEL:

Franck Schuppilus
Test Technician/Engineer


Signature

06/04/2002
Date Of Test

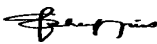
9.3 ANTENNA CONDUCTED SPURIOUS EMISSIONS 2426MHZ OPERATING FREQUENCY

Operating Frequency (MHz): 2426
Measured Cond. Pwr. (dBm): 23.0
Measured EIRP (dBm): 50.9
Conducted Spurious Limit (dBm): -7 (20dB down value)

TABLE 9-2: ANTENNA CONDUCTED SPURIOUS EMISSIONS 2426MHZ OPERATING FREQUENCY

Frequency (MHz)	Measured Level (dBm)	Notch Filter Insertion Loss (dB)	Corrected Measured Level (dBc)	Margin (dB)
4852.000	-54.8	2.4	65.4	-72.4
7278.000	-52.0	6.1	58.9	-65.9
9704.000	-52.1	7.9	57.2	-64.2
12130.000	-53.0	8.5	57.5	-64.5
14556.000	-51.4	6.0	58.4	-65.4
16982.000	-50.9	7.8	56.1	-63.1
19408.000	-51.6	7.3	57.3	-64.3
21834.000	-51.3	7.2	57.1	-64.1
24260.000	-47.5	7.4	53.1	-60.1

TEST PERSONNEL:

Franck Schuppius		06/04/2002
Test Technician/Engineer	Signature	Date Of Test

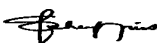
9.4 ANTENNA CONDUCTED SPURIOUS EMISSIONS 2458MHZ OPERATING FREQUENCY

Operating Frequency (MHz): 2458
Measured Cond. Pwr. (dBm): 20.5
Measured EIRP (dBm): 45.6
Conducted Spurious Limit (dBm): -10.3 (20dB down value)

TABLE 9-3: ANTENNA CONDUCTED SPURIOUS EMISSIONS 2458MHZ OPERATING FREQUENCY

Frequency (MHz)	Measured Level (dBm)	Notch Filter Insertion Loss (dB)	Corrected Measured Level (dBc)	Margin (dB)
4916.000	-55.8	1.5	64.0	-74.3
7374.000	-52.7	5.7	56.7	-67.0
9832.000	-52.8	10.3	52.2	-62.5
12290.000	-52.8	16.5	46.0	-56.3
14748.000	-53.0	6.7	56.0	-66.3
17206.000	-50.5	7.8	52.4	-62.7
19664.000	-50.5	10.0	50.2	-60.5
22122.000	-50.5	10.1	50.1	-60.4
24580.000	-48.2	10.1	47.8	-58.1

TEST PERSONNEL:

Franck Schuppius		06/04/2002
Test Technician/Engineer	Signature	Date Of Test

10 POWER SPECTRAL DENSITY - §15.247(D)

10.1 POWER SPECTRAL DENSITY TEST PROCEDURE

The Power spectral density per FCC 15.247(d) was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 30kHz, and the sweep time set at 1000 seconds. The 6 dB value on the bandwidth plots were corrected using the site correction factor (i.e. cable loss, amplifier gain, and antenna factor) and the path loss at 3 meter distance. The spectral lines were resolved for the modulated carriers at 2412MHz, 2426MHz and 2458MHz respectively. These levels are below the +8 dBm limit. See the following power spectral density plots.

10.2 POWER SPECTRAL DENSITY TEST EQUIPMENT

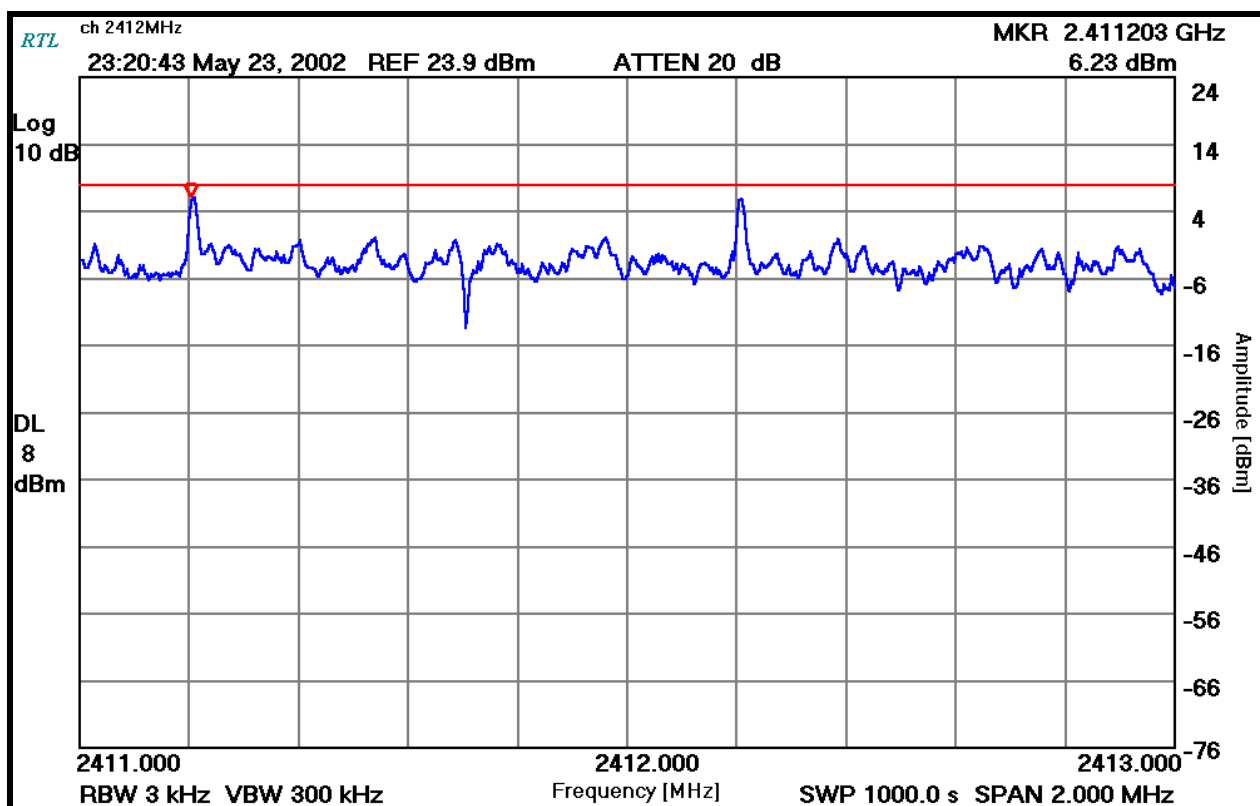
TABLE 10-1: POWER SPECTRAL DENSITY TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771

10.3 POWER SPECTRAL DENSITY PLOTS

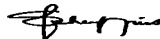
Operating Frequency (MHz): 2412
 Measured Cond. Pwr. (dBm): 23.0
 Measured EIRP (dBm): 51.1
 Bandwidth Resolution (kHz): 3
 Bandwidth Video (kHz): 300
 Sweep Time (s): 1000.0

PLOT 10-1: POWER SPECTRAL DENSITY 2412MHZ OPERATING FREQUENCY



TEST PERSONNEL:

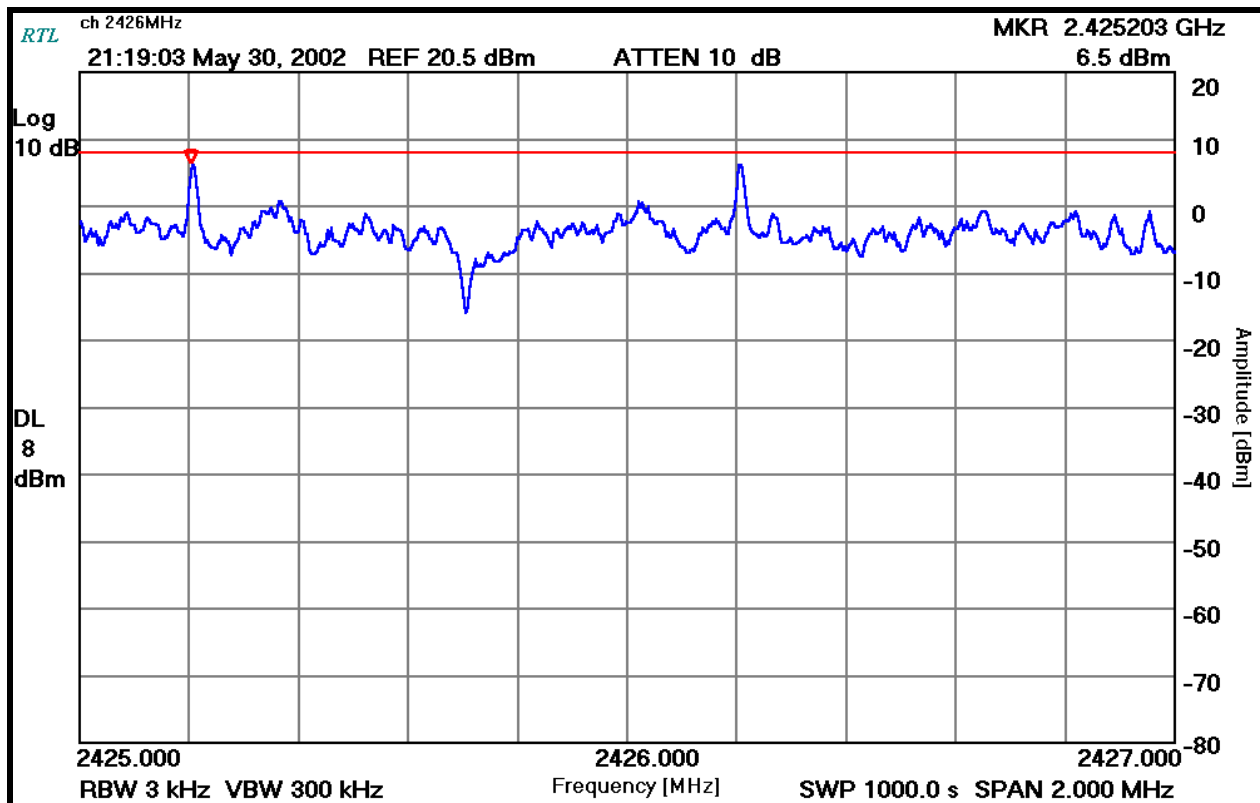
Franck Schuppis
 Test Technician/Engineer


 Signature

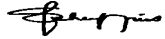
05/23/2002
 Date Of Test

Operating Frequency (MHz): 2426
 Measured Cond. Pwr. (dBm): 23.0
 Measured EIRP (dBm): 50.9
 Bandwidth Resolution (kHz): 3
 Bandwidth Video (kHz): 300
 Sweep Time (s): 1000.0

PLOT 10-2: POWER SPECTRAL DENSITY 2426MHZ OPERATING FREQUENCY

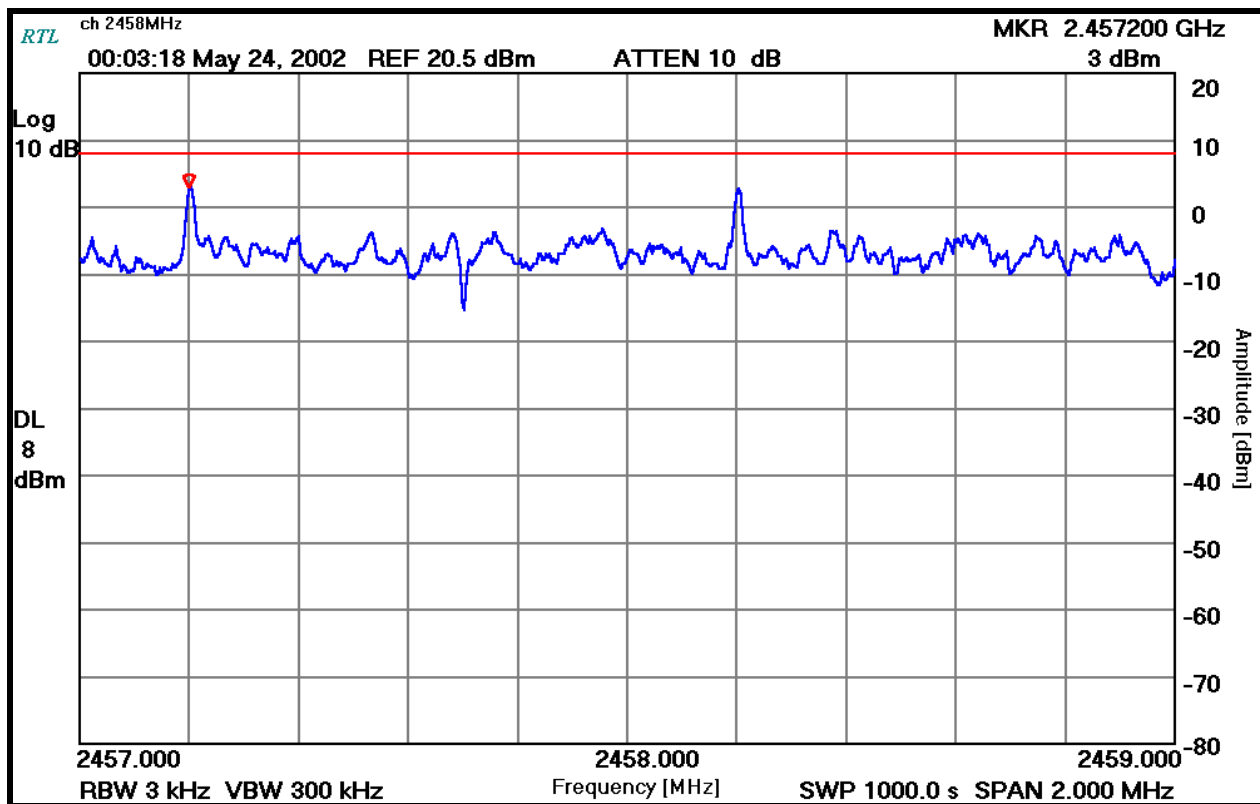


TEST PERSONNEL:

Franck Schuppius		05/30/2002
Test Technician/Engineer	Signature	Date Of Test

Operating Frequency (MHz): 2458
 Measured Cond. Pwr. (dBm): 20.5
 Measured EIRP (dBm): 45.6
 Bandwidth Resolution (kHz): 3
 Bandwidth Video (kHz): 300
 Sweep Time (s): 1000.0

PLOT 10-3: POWER SPECTRAL DENSITY 2458MHZ OPERATING FREQUENCY



TEST PERSONNEL:

Franck Schuppius
 Test Technician/Engineer

Franck Schuppius
 Signature

05/24/2002
 Date Of Test

11 CONCLUSION

The data in this measurement report shows that Tellumat Models: 651-03905 MDR2400ET4 Outdoor Unit and 651-03810 MDR MTE Indoor Unit, FCC ID: ONJ-MDR2400ET, comply with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Industry Canada RSS-210.