



Engineering and Testing for EMC and Safety Compliance

**CERTIFICATION APPLICATION REPORT
FCC PART 15.247 CERTIFICATION & INDUSTRY CANADA CERTIFICATION**

Test Lab: Rhein Tech Laboratories, Inc. Phone: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 Web Site: www.rheintech.com Herndon, VA 20170 E-Mail: FCCINFO@rheintech.com		Applicant Information: Vocollect Phone: 412-829-8145 Contact: Doug Zatezalo Fax: 412-829-0972 701 Rodi Road E-Mail: dzatezalo@vocollect.com Pittsburgh, PA 15235	
FCC ID:	MQOTT600-22300	GRANTEE FRN NUMBER:	0007-0735-47
PLAT FORM:	N/A	RTL WORK ORDER NUMBER:	2002140
MODEL(S):	TT-600	RTL QUOTE NUMBER:	QRTL02-513
DATE OF TEST REPORT:	September 5, 2002		
American National Standard Institute:	ANSI C63.4: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		
FCC Classification:	DSS – Part 15 Spread Spectrum Transmitter		
FCC Rule Part(s):	Part 15.247: Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Frequency Hopping System DA000705: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems		
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)	Frequency Tolerance	Emission Designator
2402-2480	0.115	N/A	N/A

* output power is maximum peak conducted

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, Industry Canada RSS-210, ANSI C63.4, and FCC DA 00-705.

Signature: 

Date: September 5, 2002

Typed/Printed Name: Desmond A. Fraser

Position: President

TABLE OF CONTENTS

1	GENERAL INFORMATION	5
1.1	SCOPE	5
1.2	TEST FACILITY	5
1.3	RELATED SUBMITTAL(S)/GRANT(S).....	5
2	TEST INFORMATION.....	6
2.1	TEST JUSTIFICATION	6
2.2	EXERCISING THE EUT	6
2.3	TEST RESULT SUMMARY	6
2.4	TEST SYSTEM DETAILS	7
2.5	CONFIGURATION OF TESTED SYSTEM	7
3	COMPLIANCE WITH THE RESTRICTED BAND EDGE - §15.205	8
3.1	TEST PROCEDURE.....	8
3.2	BAND EDGE TEST EQUIPMENT	8
3.3	COMPLIANCE WITH THE RESTRICTED BAND EDGE TEST DATA	8
3.4	COMPLIANCE WITH RESTRICTED BAND EDGE PLOTS	9
4	CONDUCTED LIMITS - §15.207	13
4.1	TEST METHODOLOGY FOR CONDUCTED LINE EMISSIONS MEASUREMENTS	13
4.2	CONDUCTED LINE EMISSION TEST	13
4.3	CONDUCTED LINE TEST EQUIPMENT	13
4.4	CONDUCTED LINE EMISSION TEST DATA	14
5	RADIATED EMISSION LIMITS RECEIVER/DIGITAL INTERFACE - §15.209	15
5.1	RECEIVER/DIGITAL INTERFACE RADIATED EMISSION LIMITS TEST PROCEDURE.....	15
5.2	RECEIVER/DIGITAL INTERFACE RADIATED EMISSIONS TEST EQUIPMENT	15
5.3	RECEIVER/DIGITAL INTERFACE RADIATED EMISSION LIMITS TEST DATA	16
6	RADIATED EMISSION LIMITS; SPURIOUS AND HARMONICS - §15.247	17
6.1	RADIATED SPURIOUS EMISSION LIMITS TEST PROCEDURE.....	17
6.2	RADIATED SPURIOUS TEST EQUIPMENT	17
6.3	RADIATED EMISSIONS HARMONICS/SPURIOUS TEST DATA	18
7	CARRIER FREQUENCY SEPARATION - §15.247 (A)(1).....	21
8	HOPPING CHARACTERISTICS - §15.247 (A)(1)(II)	22
8.1	NUMBER OF HOPPING FREQUENCIES	22
8.2	20 DB BANDWIDTH TEST DATA	23
8.3	AVERAGE TIME OF OCCUPANCY	26
9	MODULATED BANDWIDTH - §15.247(A)(2)	28
9.1	MODULATED BANDWIDTH TEST PROCEDURE – MINIMUM 6 DB BANDWIDTH.....	28
9.2	BANDWIDTH TEST EQUIPMENT	28
9.3	BANDWIDTH TEST DATA	28
9.4	MODULATED BANDWIDTH PLOTS	29
10	PEAK OUTPUT POWER - §15.247(B)(1).....	32
10.1	POWER OUTPUT TEST PROCEDURE	32
10.2	POWER OUTPUT TEST EQUIPMENT	32
10.3	POWER OUTPUT TEST DATA	32
11	ANTENNA CONDUCTED SPURIOUS EMISSIONS - §15.247(C)	33
11.1	ANTENNA CONDUCTED SPURIOUS EMISSIONS TEST PROCEDURES	33
11.2	ANTENNA CONDUCTED SPURIOUS TEST EQUIPMENT	33
11.3	ANTENNA CONDUCTED SPURIOUS PLOTS	34
11.4	ANTENNA CONDUCTED SPURIOUS EMISSIONS LOWER CHANNEL	36
11.5	ANTENNA CONDUCTED SPURIOUS EMISSIONS MIDDLE CHANNEL	37
11.6	ANTENNA CONDUCTED SPURIOUS EMISSIONS UPPER CHANNEL	38
12	POWER SPECTRAL DENSITY - §15.247(D).....	39
12.1	POWER SPECTRAL DENSITY TEST PROCEDURE	39
12.2	POWER SPECTRAL DENSITY TEST EQUIPMENT	39
12.3	POWER SPECTRAL DENSITY TEST DATA	39
12.4	POWER SPECTRAL DENSITY PLOTS	40
13	CONCLUSION	43

FIGURE INDEX

FIGURE 1: WORST CASE CONFIGURATION OF SYSTEM UNDER TEST	7
---	---

TABLE INDEX

TABLE 2-1: TEST RESULT SUMMARY WITH FCC RULES AND REGULATIONS	6
TABLE 2-2: EQUIPMENT UNDER TEST (EUT)	7
TABLE 3-1: BAND EDGE TEST EQUIPMENT	8
TABLE 4-1: CONDUCTED LINE TEST EQUIPMENT	13
TABLE 4-2: CONDUCTED EMISSIONS (NEUTRAL SIDE)	14
TABLE 4-3: CONDUCTED EMISSIONS (PHASE SIDE)	14
TABLE 5-1: RECEIVER/DIGITAL INTERFACE RADIATED EMISSIONS TEST EQUIPMENT	15
TABLE 5-2: RECEIVER/DIGITAL INTERFACE RADIATED EMISSIONS	16
TABLE 6-1: RADIATED SPURIOUS EMISSIONS TEST EQUIPMENT	17
TABLE 6-2: RADIATED EMISSIONS HARMONICS/SPURIOUS (LOW CHANNEL; 2402 MHZ)	18
TABLE 6-3: RADIATED EMISSIONS HARMONICS/SPURIOUS (MIDDLE CHANNEL; 2440 MHZ)	19
TABLE 6-4: RADIATED EMISSIONS HARMONICS/SPURIOUS (UPPER CHANNEL; 2480 MHZ)	20
TABLE 8-1: 20 DB BANDWIDTH TEST DATA	23
TABLE 9-1: BANDWIDTH TEST EQUIPMENT	28
TABLE 9-2: MINIMUM 6 DB BANDWIDTH TEST DATA	28
TABLE 10-1: POWER OUTPUT TEST EQUIPMENT	32
TABLE 11-1: ANTENNA CONDUCTED SPURIOUS TEST EQUIPMENT	33
TABLE 11-2: ANTENNA CONDUCTED SPURIOUS EMISSIONS LOWER CHANNEL	36
TABLE 11-3: ANTENNA CONDUCTED SPURIOUS EMISSIONS MIDDLE CHANNEL	37
TABLE 11-4: ANTENNA CONDUCTED SPURIOUS EMISSIONS UPPER CHANNEL	38
TABLE 12-1: POWER SPECTRAL DENSITY TEST EQUIPMENT	39
TABLE 12-2: POWER SPECTRAL DENSITY TEST DATA	39

PLOT INDEX

PLOT 3-1: LOWER BAND EDGE: RADIATED DELTA MEASUREMENT METHOD	9
PLOT 3-2: LOWER BAND EDGE: CONDUCTED MEASUREMENT	10
PLOT 3-3: UPPER BAND EDGE: RADIATED DELTA MEASUREMENT METHOD	11
PLOT 3-4: UPPER BAND EDGE: CONDUCTED MEASUREMENT	12
PLOT 7-1: CARRIER FREQUENCY SEPARATION	21
PLOT 8-1: NUMBER OF HOPPING FREQUENCIES	22
PLOT 8-2: 20 DB BANDWIDTH – LOW CHANNEL (2402 MHZ)	23
PLOT 8-3: 20 DB BANDWIDTH – MIDDLE CHANNEL (2440 MHZ)	24
PLOT 8-4: 20 DB BANDWIDTH – UPPER CHANNEL (2480 MHZ)	25
PLOT 8-5: TIME OF OCCUPANCY (DWELL TIME)	26
PLOT 8-6: TIME OF OCCUPANCY (DWELL TIME 30 SECOND SWEEP)	27
PLOT 9-1: MODULATED BANDWIDTH LOWER CHANNEL	29
PLOT 9-2: MODULATED BANDWIDTH MIDDLE CHANNEL	30
PLOT 9-3: MODULATED BANDWIDTH UPPER CHANNEL	31
PLOT 11-1: ANTENNA CONDUCTED SPURIOUS (9 KHZ-2.5 GHZ; MID CHANNEL 2440 MHZ)	34
PLOT 11-2: ANTENNA CONDUCTED SPURIOUS (2.5-24 GHZ; MID CHANNEL 2440 MHZ)	35
PLOT 12-1: POWER SPECTRAL DENSITY: CHANNEL 1	40
PLOT 12-2: POWER SPECTRAL DENSITY: CHANNEL 6	41
PLOT 12-3: POWER SPECTRAL DENSITY: UPPER CHANNEL	42

APPENDIX INDEX

APPENDIX A:	SAR REPORT	44
APPENDIX B:	ANTENNA SPECIFICATIONS	45
APPENDIX C:	AGENCY AUTHORIZATION LETTER	46
APPENDIX D:	CONFIDENTIALITY REQUEST LETTER (IF APPLICABLE)	47
APPENDIX E:	ATTESTATION LETTERS (IF APPLICABLE)	48
APPENDIX F:	PRODUCT DESCRIPTION	49
APPENDIX G:	LABEL AND LABEL LOCATION	50
APPENDIX H:	BILL OF MATERIAL (PARTS LIST) (IF APPLICABLE)	51
APPENDIX I:	SCHEMATICS	52
APPENDIX J:	BLOCK DIAGRAM (IF APPLICABLE)	53
APPENDIX K:	MANUAL	54
APPENDIX L:	TEST PHOTOGRAPHS	55
APPENDIX M:	EXTERNAL PHOTOGRAPHS	59
APPENDIX N:	INTERNAL PHOTOGRAPHS	62

PHOTOGRAPH INDEX

PHOTOGRAPH 1:	LABEL LOCATION	50
PHOTOGRAPH 2:	RADIATED EMISSION FRONT VIEW; WORST CASE CONFIGURATION	55
PHOTOGRAPH 3:	RADIATED EMISSION REAR VIEW; WORST CASE CONFIGURATION	56
PHOTOGRAPH 4:	CONDUCTED EMISSION FRONT VIEW	57
PHOTOGRAPH 5:	CONDUCTED EMISSION REAR VIEW	58
PHOTOGRAPH 6:	FRONT VIEW WITH BATTERY	59
PHOTOGRAPH 7:	FRONT VIEW WITHOUT BATTERY	60
PHOTOGRAPH 8:	REAR VIEW SHOWING BELT CLIP AND SIDE CONNECTORS	61
PHOTOGRAPH 9:	OVERALL INTERNAL VIEW	62
PHOTOGRAPH 10:	INTERNAL VIEW WITH WLAN CARD	63
PHOTOGRAPH 11:	INSIDE FRONT COVER	64
PHOTOGRAPH 12:	INSIDE REAR COVER	65
PHOTOGRAPH 13:	PCB TOP	66
PHOTOGRAPH 14:	PCB REAR WITH SHIELD	67
PHOTOGRAPH 15:	PCB REAR WITHOUT SHIELD	68
PHOTOGRAPH 16:	WLAN CARD FRONT WITH ANTENNA	69
PHOTOGRAPH 17:	WLAN CARD REAR WITH ANTENNA	70
PHOTOGRAPH 18:	ANTENNA FRONT	71
PHOTOGRAPH 19:	BACK WLAN PCMCIA CARD	72
PHOTOGRAPH 20:	PCB CONNECTIONS	73

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 Talkman T2, M/N: TT-600, FCC ID: MQOTT600-22300. The IF, LO and up to the 2nd LO were investigated and tested.

2 TEST INFORMATION

2.1 TEST JUSTIFICATION

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. Low channel (2402 MHz), middle channel (2440 MHz), and upper channel (2480 MHz) were tested and investigated from 9 kHz to 24 GHz. Data for all three channels are presented in this report.

The EUT contains an internal dipole antenna. The dipole antenna transmits, receives, and is connected to the internal antenna port.

The worst-case data taken in this report represents the highest data rate at 11 Mbps. Data rates of 5.5 Mbps, 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 EXERCISING THE EUT

The EUT was provided with software to continuously transmit during testing. The carrier was also checked to verify that 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
TALKMAN	VOCOLLECT, INC.	T2	6114115777	MQOTT600-22300	N/A	014387
BATTERY	VOCOLLECT, INC.	1500MAH	0038	N/A	N/A	014394
WALL MOUNT CHARGER	VOCOLLECT, INC.	CM-601-1	42172872	N/A	UNSHIELDED	014547
WIRELESS LAN ADAPTER	SYMBOL TECHNOLOGIES, INC.	LA-3021	00A82Y93N	H9PL3021-100	N/A	014604

2.5 CONFIGURATION OF TESTED SYSTEM

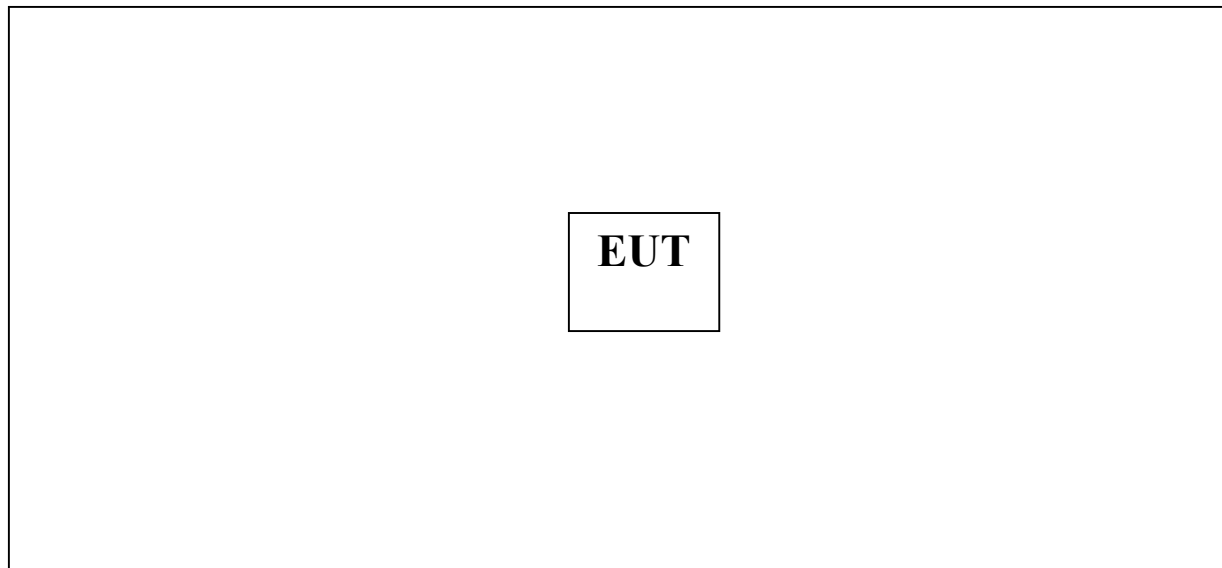


FIGURE 1: WORST CASE CONFIGURATION OF SYSTEM UNDER TEST

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 data taken in this report represents the worst case at 11 Mbps. Data rates of 5.5 Mbps, 2 Mbps and 1 Mbps were investigated and found to be in compliance. The hopping mode was disabled to conduct this test. A conducted plot with the display line referenced -20 dB from peak is also shown.

3.2 BAND EDGE TEST EQUIPMENT

TABLE 3-1: BAND EDGE TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	N/A
900913	Hewlett Packard	85462A	EMI Receiver RF Section, 9 KHz - 6.5 GHz	3325A00159	12/5/02
900914	Hewlett Packard	85460A	RF Filter Section, 100 KHz to 6.5 GHz	3330A00107	12/5/02
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridged Guide Antenna 1-18 GHz	2310	2/26/03
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	N/A
901231	IW Microwave Products	KPS-1503-2400-KPS	High frequency RF cables	240"	N/A
901235	IW Microwave Products	KPS-1503-360-KPS	High frequency RF cables	36"	N/A
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771	5/10/03

3.3 COMPLIANCE WITH THE RESTRICTED BAND EDGE TEST DATA

Calculation of Lower Band Edge

The level 114.8 dBuV/m is the Peak Field Strength measurement (worst case), from which the delta measurement of 62.5 dB is subtracted (reference plots), which is equivalent to a level of 52.3 dB. This level has a margin of 1.7 dB below the limit of 54 dBuV/m.

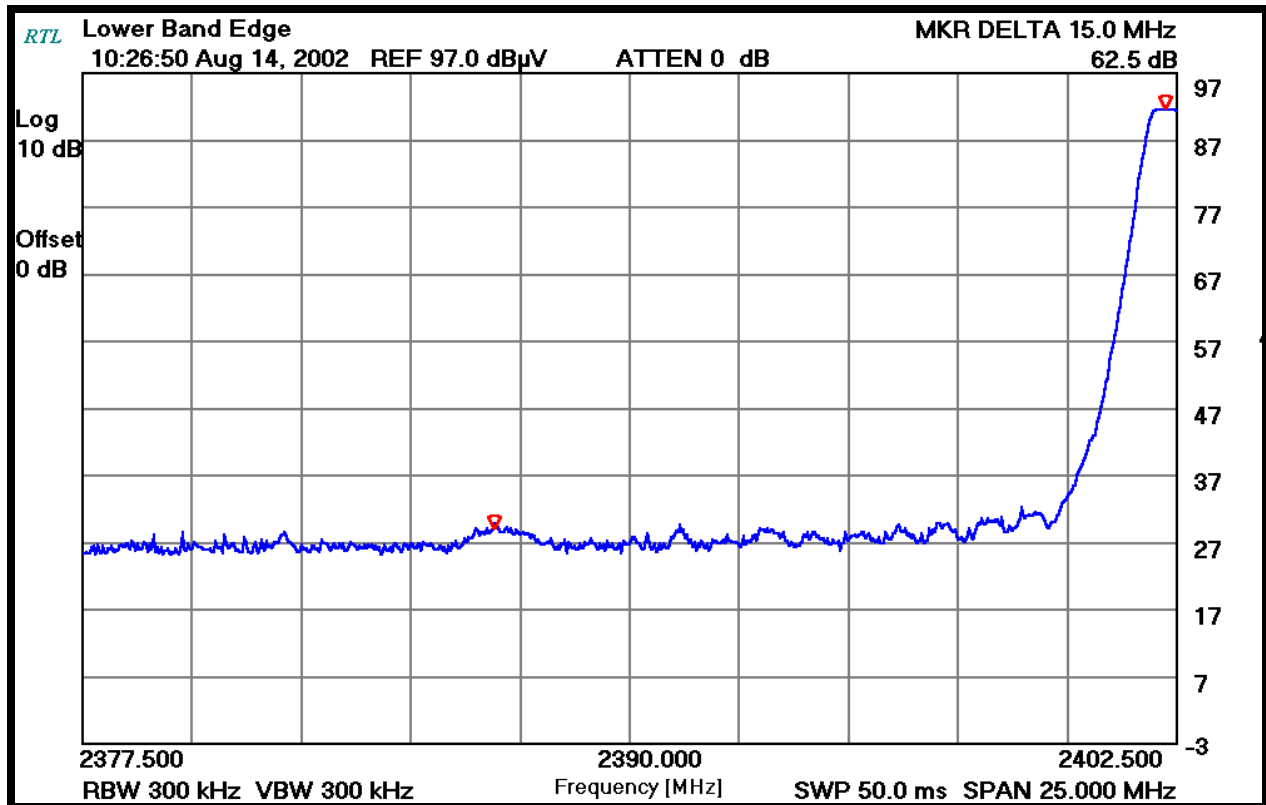
Calculation: $114.8 \text{ dBuV/m} - 62.5 \text{ dB} - 54 \text{ dBuV/m} = -1.7 \text{ dB}$

3.4 COMPLIANCE WITH RESTRICTED BAND EDGE PLOTS

Channel Number: Lower
Frequency (MHz): 2402
Resolution Bandwidth (kHz): 300
Video Bandwidth (kHz): 300
Sweep Time (ms): 50

PLOT 3-1: LOWER BAND EDGE: RADIATED DELTA MEASUREMENT METHOD

Peak Field Strength (1 MHz/1 MHz) = 114.8 dBuV/m
Average Field Strength (1 MHz/10 Hz) = 114.3 dBuV/m



TEST PERSONNEL:

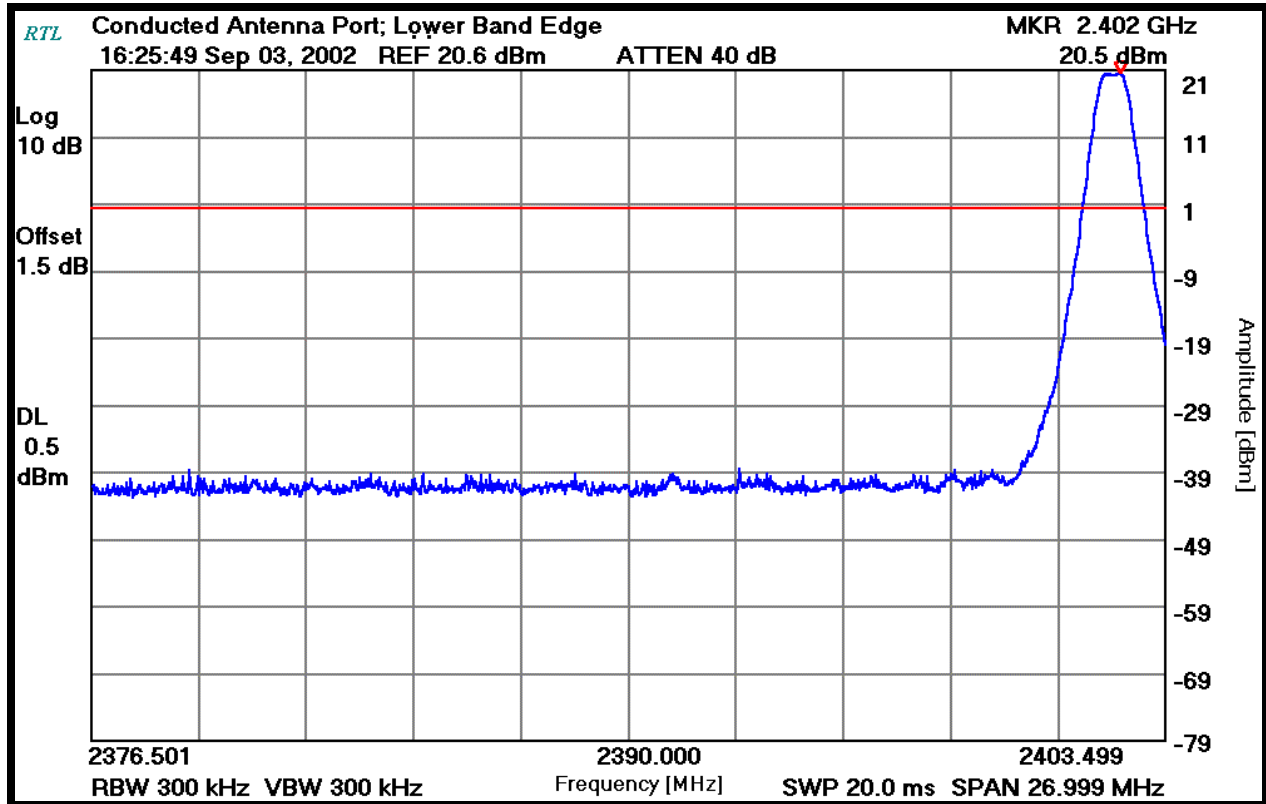
Daniel W. Baltzell
EMC Test Engineer

Signature

August 14, 2002
Date Of Test

PLOT 3-2: LOWER BAND EDGE: CONDUCTED MEASUREMENT

Conducted Power = 20.6 dBm



TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer

Daniel W. Baltzell

Signature

September 3, 2002
Date Of Test

Calculation of Upper Band Edge

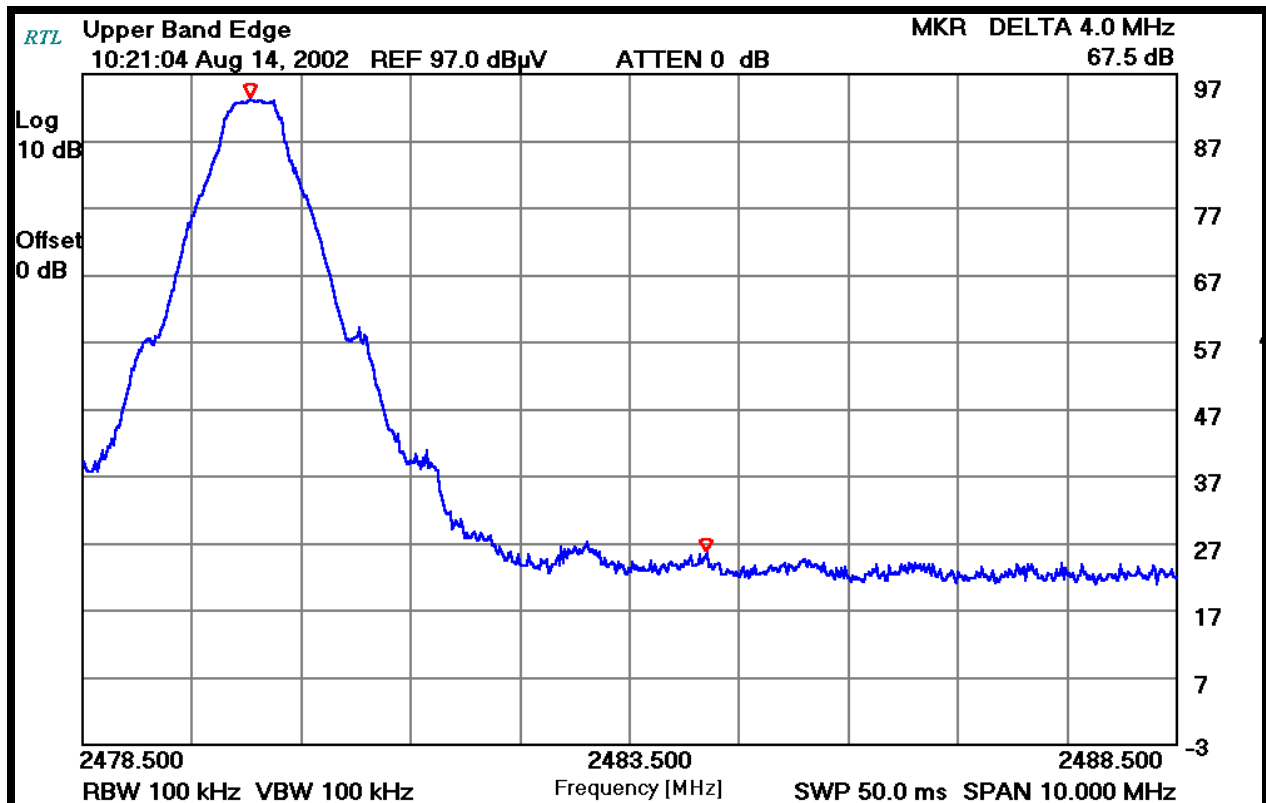
The level 116.2 dBuV/m is the Peak Field Strength measurement (worst case), from which the delta measurement of 67.5 dB is subtracted (reference plots), which is equivalent to a level of 48.7 dB. This level has a margin of 5.3 dB below the limit of 54 dBuV/m.

Calculation: $116.2 \text{ dBuV/m} - 67.5 \text{ dB} = 48.7 \text{ dB}$

Channel: Upper
Frequency (MHz): 2480
Resolution Bandwidth (kHz): 100
Video Bandwidth (kHz): 100
Sweep Time (ms.): 50.0

PLOT 3-3: UPPER BAND EDGE: RADIATED DELTA MEASUREMENT METHOD

Peak Field Strength (1 MHz/1 MHz) = 116.2 dBuV/m
Average Field Strength (1 MHz/10 Hz) = 115.7 dBuV/m



TEST PERSONNEL:

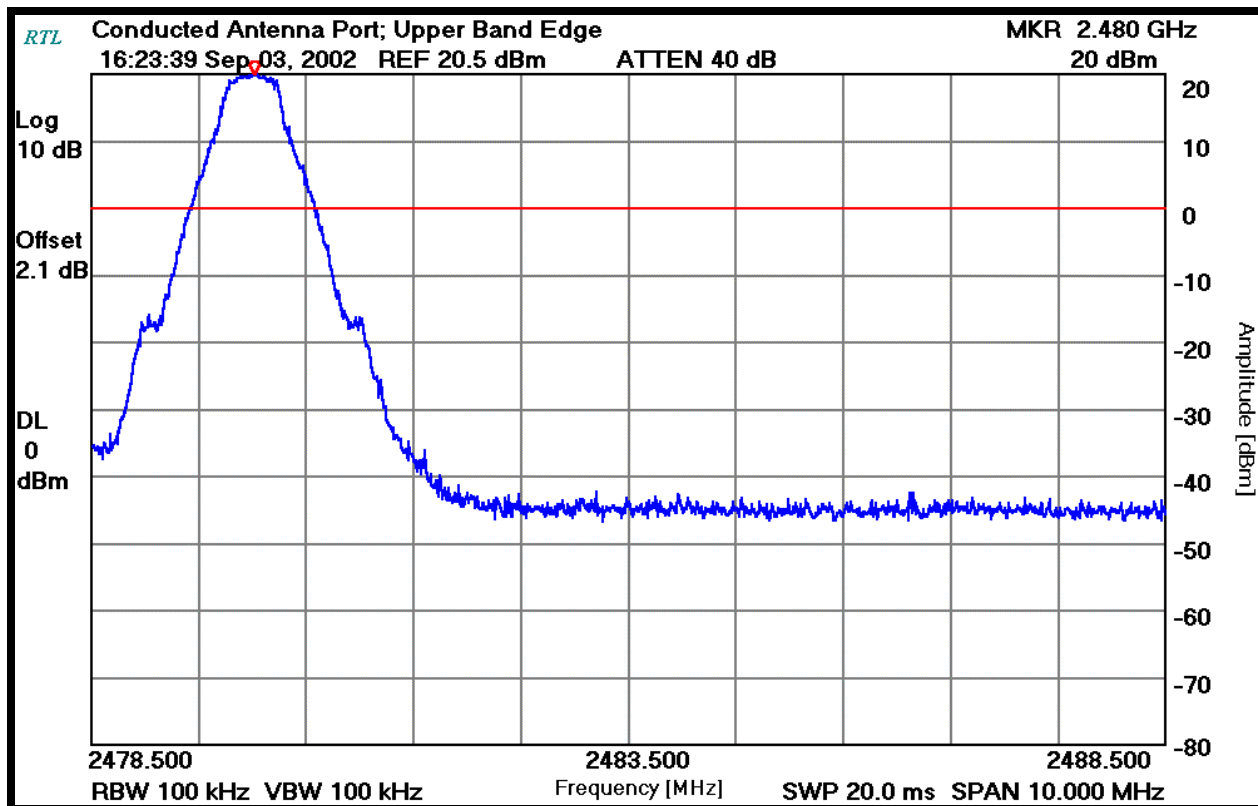
Daniel W. Baltzell
EMC Test Engineer

Daniel W. Baltzell
Signature

August 14, 2002
Date Of Test

PLOT 3-4: UPPER BAND EDGE: CONDUCTED MEASUREMENT

Conducted Power = 20.5 dBm



TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer

Daniel W. Baltzell
Signature

September 3, 2002
Date Of Test

4 CONDUCTED LIMITS - §15.207

4.1 TEST METHODOLOGY FOR CONDUCTED LINE 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 micro Henry 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 LINE EMISSION TEST

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.

4.3 CONDUCTED LINE TEST EQUIPMENT

TABLE 4-1: CONDUCTED LINE TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900931	HP	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/10/03
901084	AFJ international	LS16	16A LISN	16010020082	9/5/03

4.4 CONDUCTED LINE EMISSION TEST DATA

TABLE 4-2: CONDUCTED EMISSIONS (NEUTRAL SIDE)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	Limit (dBuV)	Margin (dBuV)
0.787	Pk	30.6	0.7	31.3	48.0	-16.7
2.236	Pk	33.6	1.2	34.8	48.0	-13.2
2.608	Pk	35.2	1.3	36.5	48.0	-11.5
5.075	Pk	33.4	1.6	35.0	48.0	-13.0
10.150	Pk	32.9	2.1	35.0	48.0	-13.0
20.580	Pk	22.9	3.2	26.1	48.0	-21.9

TABLE 4-3: CONDUCTED EMISSIONS (PHASE SIDE)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	Limit (dBuV)	Margin (dBuV)
0.578	Pk	30.3	0.7	31.0	48.0	-17.0
1.088	Pk	30.4	0.7	31.1	48.0	-16.9
2.344	Pk	33.1	1.2	34.3	48.0	-13.7
3.600	Pk	35.0	1.4	36.4	48.0	-11.6
5.120	Pk	29.6	1.7	31.3	48.0	-16.7
18.460	Pk	29.1	3.0	32.1	48.0	-15.9

TEST PERSONNEL:

Franck Schuppious
EMC Test Engineer



Signature

July 15, 2002
Date Of Test

5 RADIATED EMISSION LIMITS RECEIVER/DIGITAL INTERFACE - §15.209

5.1 RECEIVER/DIGITAL INTERFACE RADIATED EMISSION LIMITS TEST PROCEDURE

Emissions apply to spurious emissions that fall in the restricted and non-restricted bands. 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 IF, LO and up to the 2nd LO were investigated and tested. The lower, middle, and upper channels were tested and investigated in the transmitting and receiving mode between 10kHz and 1GHz.

5.2 RECEIVER/DIGITAL INTERFACE RADIATED EMISSIONS TEST EQUIPMENT

TABLE 5-1: RECEIVER/DIGITAL INTERFACE RADIATED EMISSIONS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	N/A
900889	Hewlett Packard	85685A	RF Preselector for HP 8566B or 8568B (20Hz-2GHz)	3146A01309	11/21/02
900905	RTL	PR-1040	Amplifier	900905	N/A
900931	HP	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/10/03
900969	Hewlett Packard	85650A	Quasi-Peak Adapter	2412A00414	5/10/03
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	5/22/03
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	N/A

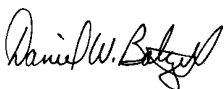
5.3 RECEIVER/DIGITAL INTERFACE RADIATED EMISSION LIMITS TEST DATA

TABLE 5-2: RECEIVER/DIGITAL INTERFACE RADIATED EMISSIONS

Temperature: 84°F					Humidity: 74%				
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)
103.233	Qp	V	0	1.0	35.2	-12.1	23.1	43.5	-20.4
206.470	Qp	H	0	1.0	41.1	-11.4	29.7	43.5	-13.8
309.699	Qp	V	180	1.4	41.0	-6.6	34.4	46.0	-11.6
412.940	Qp	H	0	1.0	38.0	-2.5	35.5	46.0	-10.5
516.166	Qp	H	0	1.0	35.9	0.6	36.5	46.0	-9.5
619.401	Qp	H	0	1.0	36.0	2.7	38.7	46.0	-7.3
722.636	Qp	H	0	1.0	35.2	5.2	40.4	46.0	-5.6

QP: RES. =100 KHZ, VID= 100 KHZ

TEST PERSONNEL:

 Daniel W. Baltzell EMC Test Engineer	Signature	July 16, 2002 Date Of Test
---	-----------	-------------------------------

6 RADIATED EMISSION LIMITS; SPURIOUS AND HARMONICS - §15.247

6.1 RADIATED SPURIOUS EMISSION LIMITS TEST PROCEDURE

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. 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 in the X-Y, X-Z and Y-Z orthogonal planes.

6.2 RADIATED SPURIOUS TEST EQUIPMENT

TABLE 6-1: RADIATED SPURIOUS EMISSIONS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900772	EMCO	3161-02	Horn Antenna	9804-1044	N/A
900321	EMCO	3161-03	Horn Antennas (4-8,2GHz)	9508-1020	N/A
900323	EMCO	3160-7	Horn Antennas (8,2-12.4 GHz)	9605-1054	N/A
900356	EMCO	3160-08	Horn Antennas (12.4 – 18 GHz)	9607-1044	N/A
900325	EMCO	3160-9	Horn Antennas (18 - 26.5 GHz)	9605-1051	N/A
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridged Guide Antenna 1-18 GHz	2310	2/26/03
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	N/A
900889	Hewlett Packard	85685A	RF Preselector for HP 8566B or 8568B (20Hz-2GHz)	3146A01309	11/21/02
900905	RTL	PR-1040	Amplifier	900905	N/A
900931	Hewlett Packard	8566B	Spectrum Analyzer	3138A07771	5/10/03
900666	Hewlett Packard	8449B	Microwave Preamplifier, 1 to 26.5 GHz	3008A00505	N/A
900969	Hewlett Packard	85650A	Quasi-Peak Adapter	2412A00414	5/10/03
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	N/A

6.3 RADIATED EMISSIONS HARMONICS/SPURIOUS TEST DATA

Operating Frequency (MHz): 2402
Channel: Low

TABLE 6-2: RADIATED EMISSIONS HARMONICS/SPURIOUS (LOW CHANNEL; 2402 MHZ)

Emission Frequency (MHz)	Peak Test Detector (dBuV)	Average Test Detector (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4804.00	46.7	37.0	15.0	52.0	54.0	-2.0
12010.00	22.7	14.2	16.7	30.9	54.0	-23.1

Peak: Res. =1 MHz, VID= 1MHz; Average: Res. =1 MHz, VID= 10Hz

TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer



Signature

July 18, 2002
Date Of Test

Operating Frequency (MHz): 2440
Channel: Middle

TABLE 6-3: RADIATED EMISSIONS HARMONICS/SPURIOUS (MIDDLE CHANNEL; 2440 MHZ)

Emission Frequency (MHz)	Peak Test Detector (dBuV)	Average Test Detector (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4880.00	43.0	30.2	14.8	45.0	54.0	-9.0
7320.00	37.7	36.8	11.5	48.2	54.0	-5.8
12200.00	25.4	16.8	16.6	33.4	54.0	-20.6

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz

TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer



Signature

July 18, 2002
Date Of Test

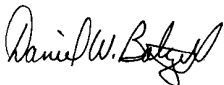
Operating Frequency (MHz): 2480
Channel: Upper

TABLE 6-4: RADIATED EMISSIONS HARMONICS/SPURIOUS (UPPER CHANNEL; 2480 MHZ)

Emission Frequency (MHz)	Peak Test Detector (dBuV)	Average Test Detector (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4960.00	41.7	30.8	14.1	45.0	54.0	-9.0
7440.00	46.0	36.0	11.5	47.5	54.0	-6.5
12400.00	25.4	16.8	16.6	33.4	54.0	-20.6

PEAK RES. = 1 MHz, VID= 1 MHz; AVERAGE: RES. =1 MHz, VID= 10Hz

TEST PERSONNEL:

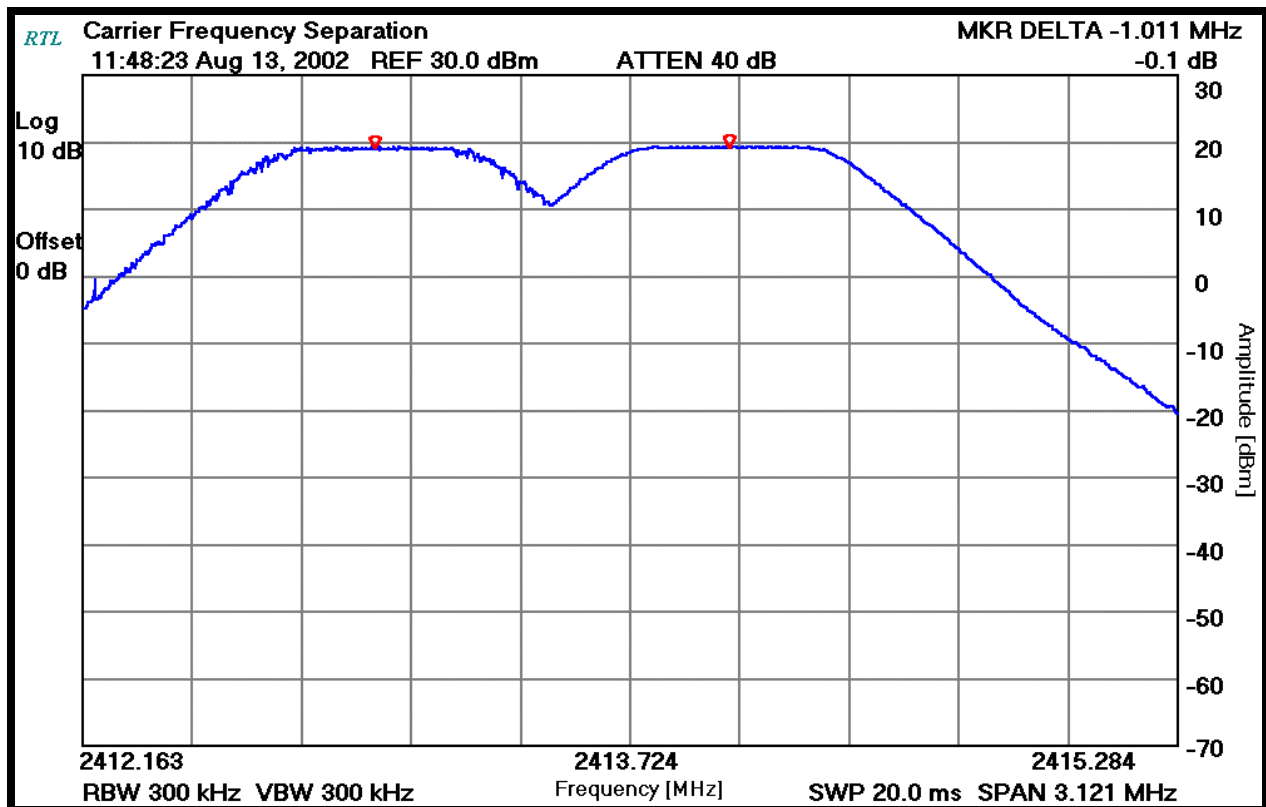
 Daniel W. Baltzell EMC Test Engineer	Signature	July 18, 2002 Date Of Test
--	-----------	-------------------------------

7 CARRIER FREQUENCY SEPARATION - §15.247 (A)(1)

Frequency Hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Measured frequency separation = 1.011 MHz

PLOT 7-1: CARRIER FREQUENCY SEPARATION



TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer

Daniel W. Baltzell
Signature

August 13, 2002
Date Of Test

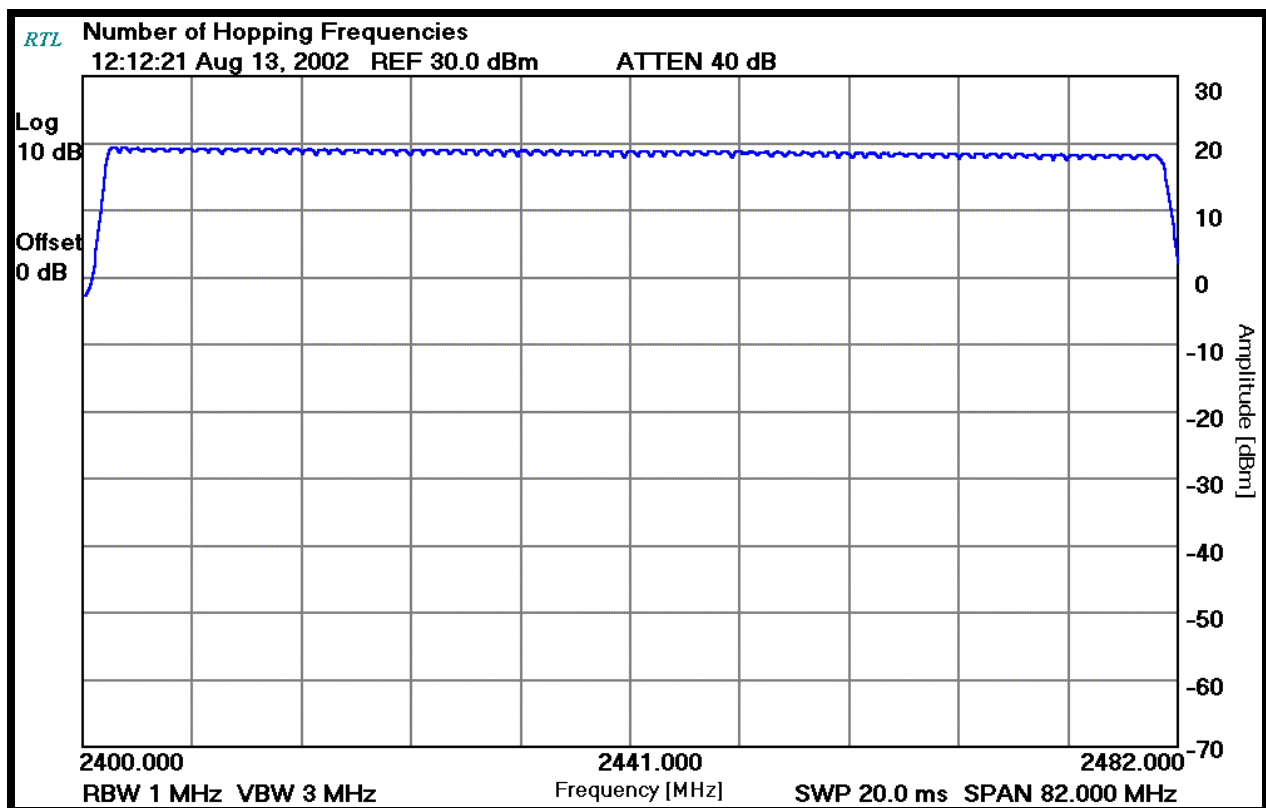
8 HOPPING CHARACTERISTICS - §15.247 (A)(1)(II)

Frequency hopping systems operating in the 2400–2483.5 MHz and 5725–5850 MHz bands shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

8.1 NUMBER OF HOPPING FREQUENCIES

Measured number of hopping frequencies = 79

PLOT 8-1: NUMBER OF HOPPING FREQUENCIES



TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer

Daniel W. Baltzell
Signature

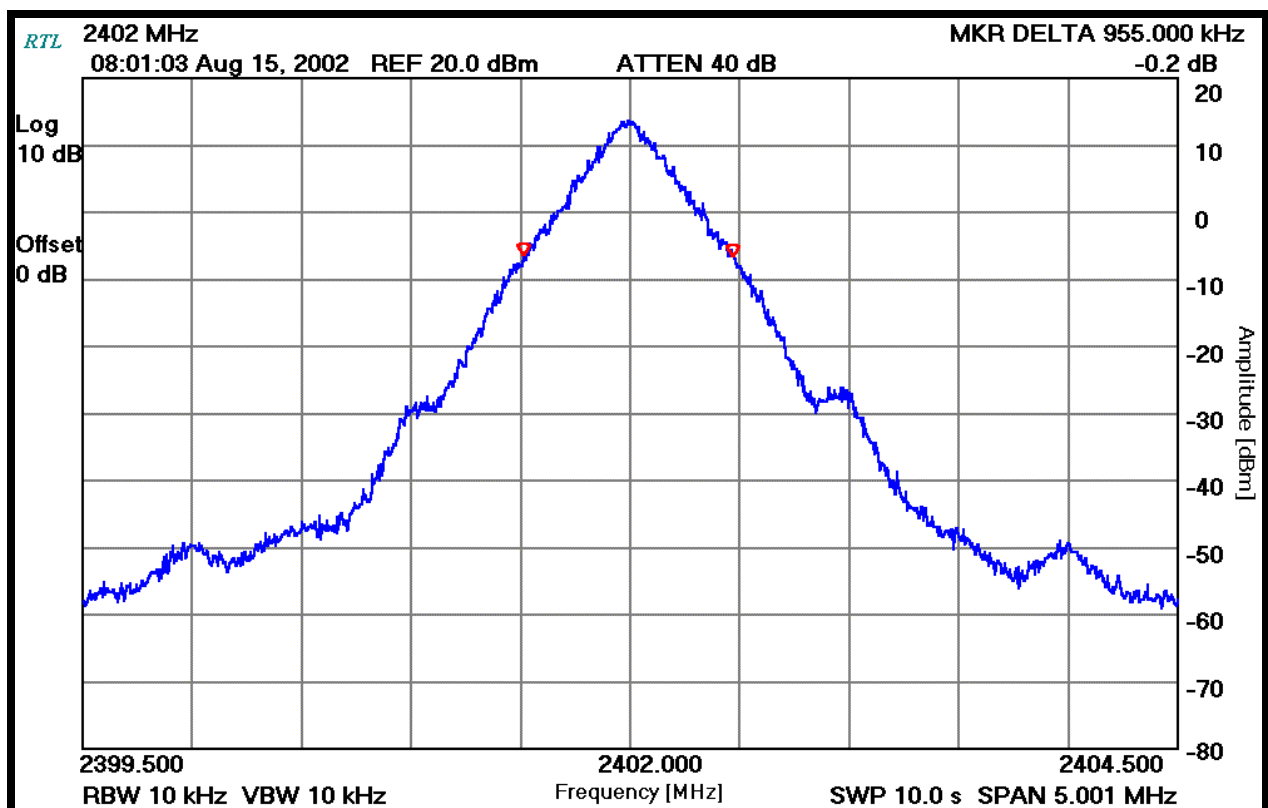
August 13, 2002
Date Of Test

8.2 20 DB BANDWIDTH TEST DATA

TABLE 8-1: 20 DB BANDWIDTH TEST DATA

CHANNEL	20 dB BANDWIDTH (kHz)
Low	955
Middle	960
High	920

PLOT 8-2: 20 DB BANDWIDTH – LOW CHANNEL (2402 MHZ)



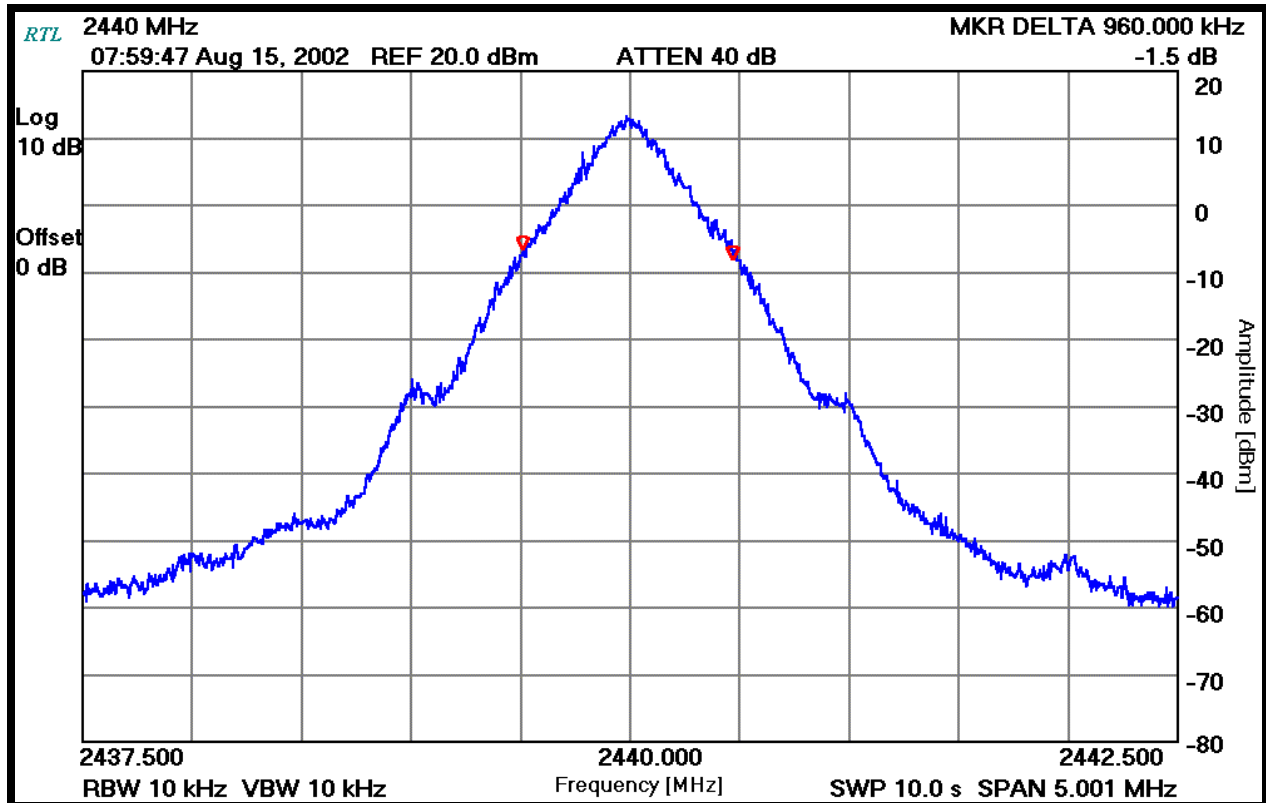
TEST PERSONNEL:

Daniel W. Baltzell
 EMC Test Engineer

Daniel W. Baltzell
 Signature

August 15, 2002
 Date Of Test

PLOT 8-3: 20 DB BANDWIDTH – MIDDLE CHANNEL (2440 MHZ)



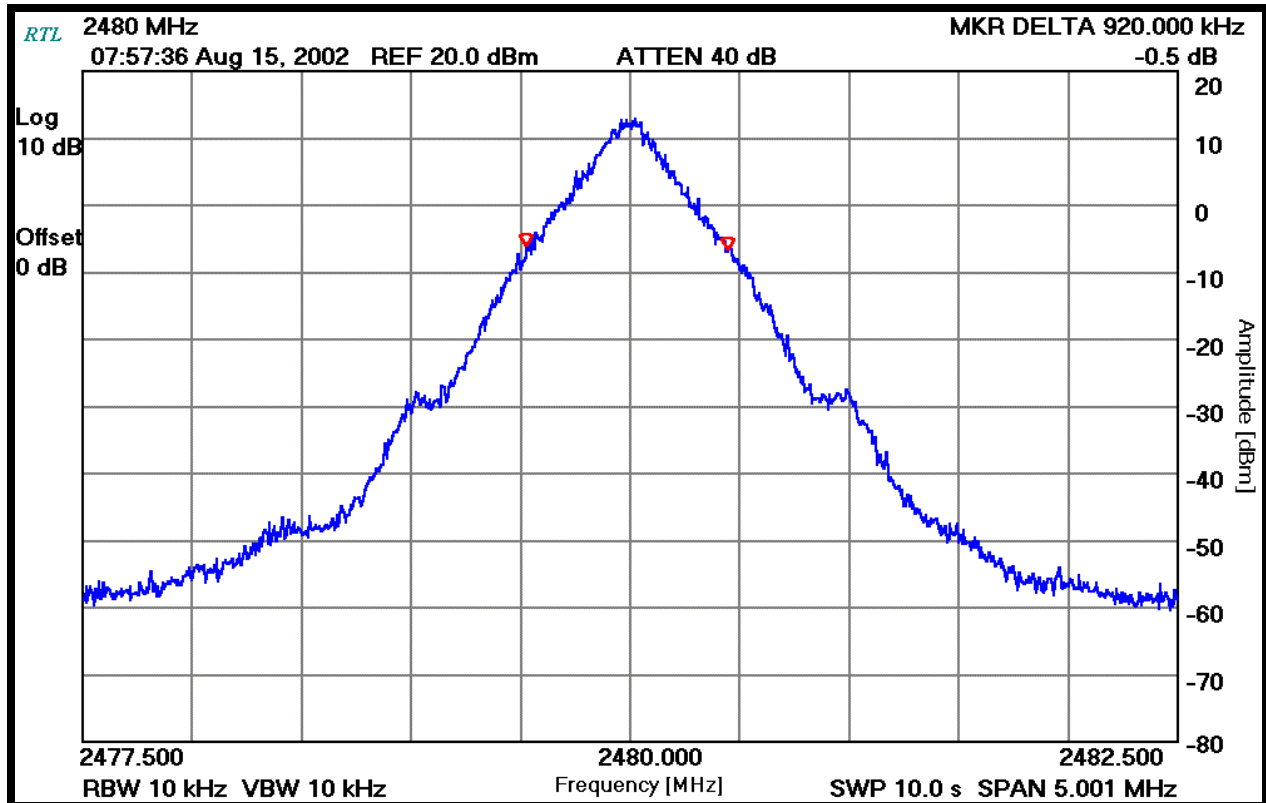
TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer

Daniel W. Baltzell
Signature

August 15, 2002
Date Of Test

PLOT 8-4: 20 DB BANDWIDTH – UPPER CHANNEL (2480 MHZ)



TEST PERSONNEL:

Daniel W. Baltzell
 EMC Test Engineer

Daniel W. Baltzell

Signature

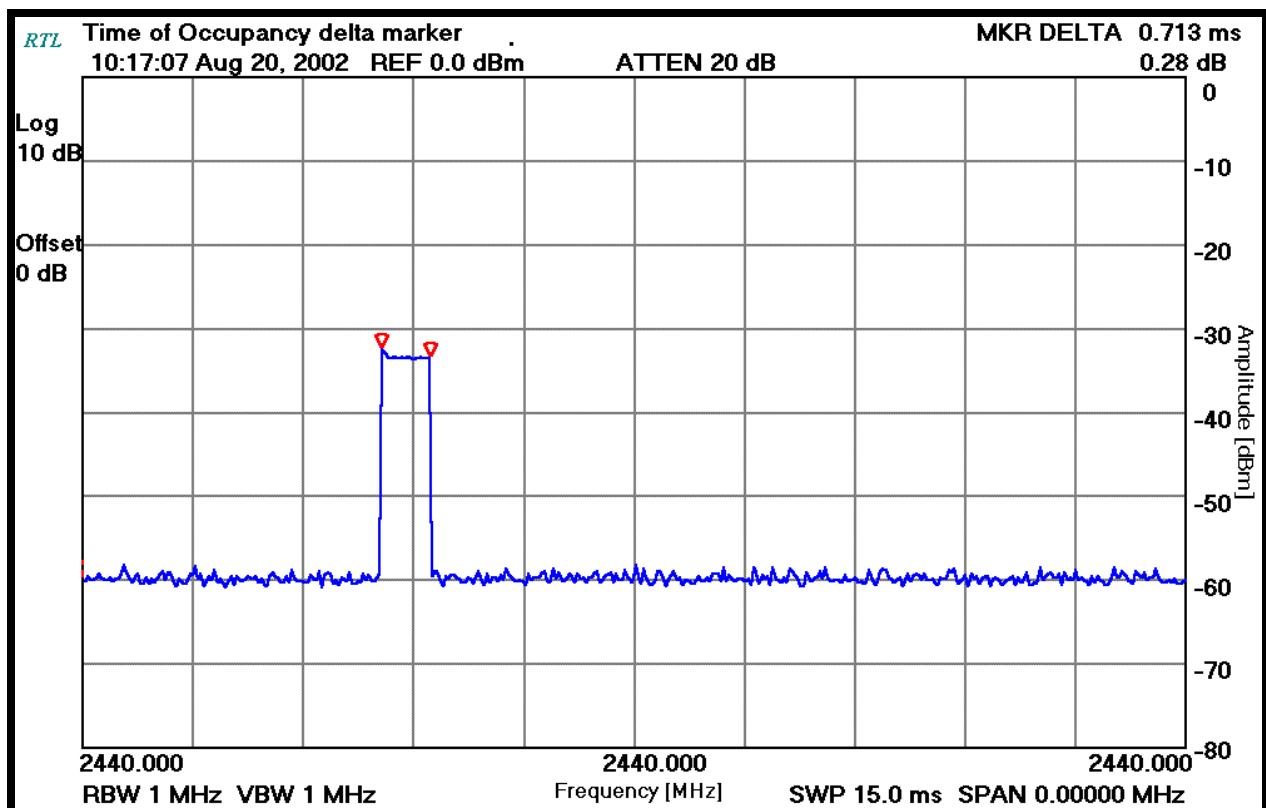
August 15, 2002
 Date Of Test

8.3 AVERAGE TIME OF OCCUPANCY

The spectrum analyzer sweep was set to 0.015 second, with a zero span and max hold until a pulse from the device under test was captured. A marker delta was used to measure dwell time for this plot. The sweep was then set to single sweep for 30 seconds for the required average time and the number of pulses counted to calculate the average time of occupancy as:

Number of pulses in 30 seconds (22) X Dwell Time measured (0.713 milliseconds) = 15.7 ms average occupancy in 30 seconds.

PLOT 8-5: TIME OF OCCUPANCY (DWEELL TIME)



TEST PERSONNEL:

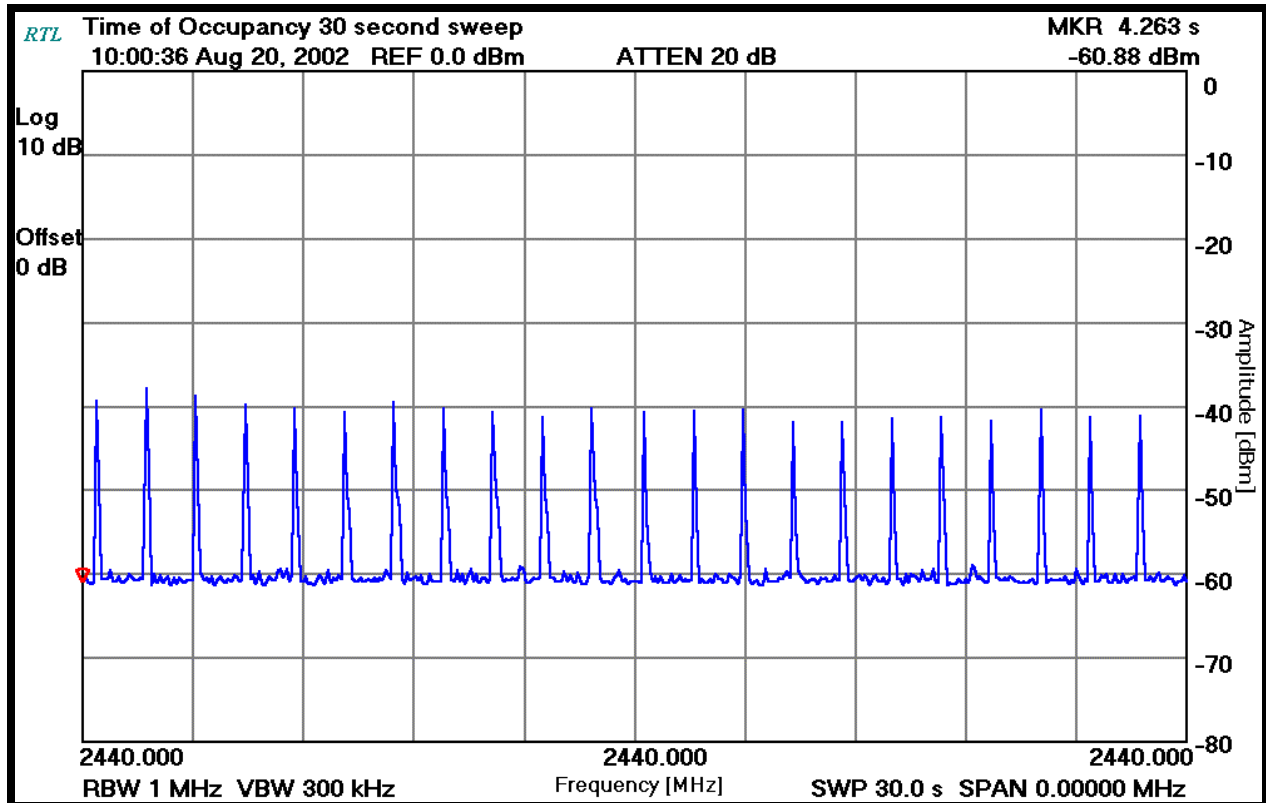
Daniel W. Baltzell
 EMC Test Engineer

Daniel W. Baltzell

Signature

August 20, 2002
 Date Of Test

PLOT 8-6: TIME OF OCCUPANCY (DWELL TIME 30 SECOND SWEEP)



TEST PERSONNEL:

Daniel W. Baltzell
 EMC Test Engineer

Signature

August 20, 2002
 Date Of Test

9 MODULATED BANDWIDTH - §15.247(A)(2)

9.1 MODULATED BANDWIDTH TEST PROCEDURE – MINIMUM 6 DB BANDWIDTH

The minimum 6 dB bandwidths per FCC 15.247 (a)(2) were measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The device was modulated using the maximum 11Mbps data rate. The minimum 6 dB bandwidths are as follows:

9.2 BANDWIDTH TEST EQUIPMENT

TABLE 9-1: BANDWIDTH TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771	5/10/03

9.3 BANDWIDTH TEST DATA

TABLE 9-2: MINIMUM 6 DB BANDWIDTH TEST DATA

CHANNEL	6 dB BANDWIDTH (kHz)
Low	585
Middle	585
High	582

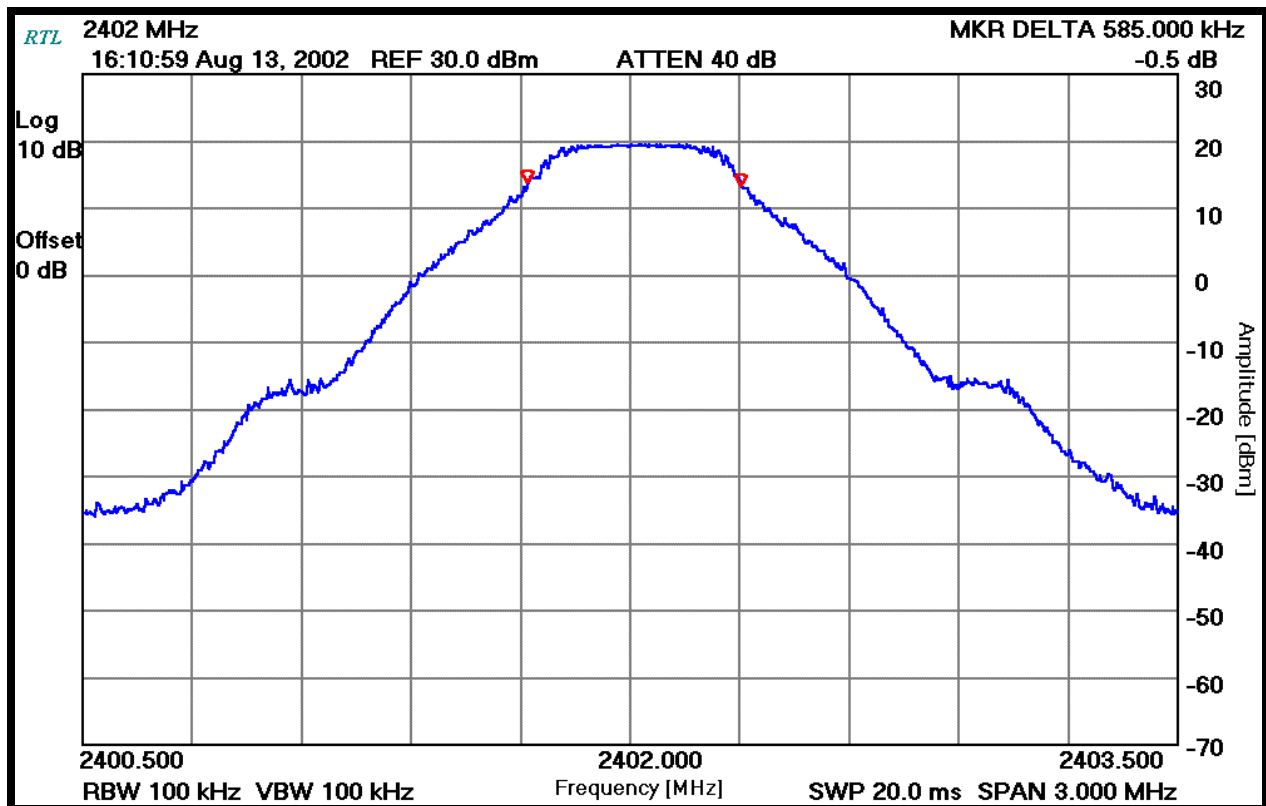
TEST PERSONNEL:

Daniel W. Baltzell EMC Test Engineer	 Signature	August 5, 2002 Date Of Test
---	--	--------------------------------

9.4 MODULATED BANDWIDTH PLOTS

Channel Number: Lower
Frequency (MHz): 2402
Resolution Bandwidth (kHz): 100
Video Bandwidth (kHz): 100
Sweep Time (ms): 20

PLOT 9-1: MODULATED BANDWIDTH LOWER CHANNEL



TEST PERSONNEL:

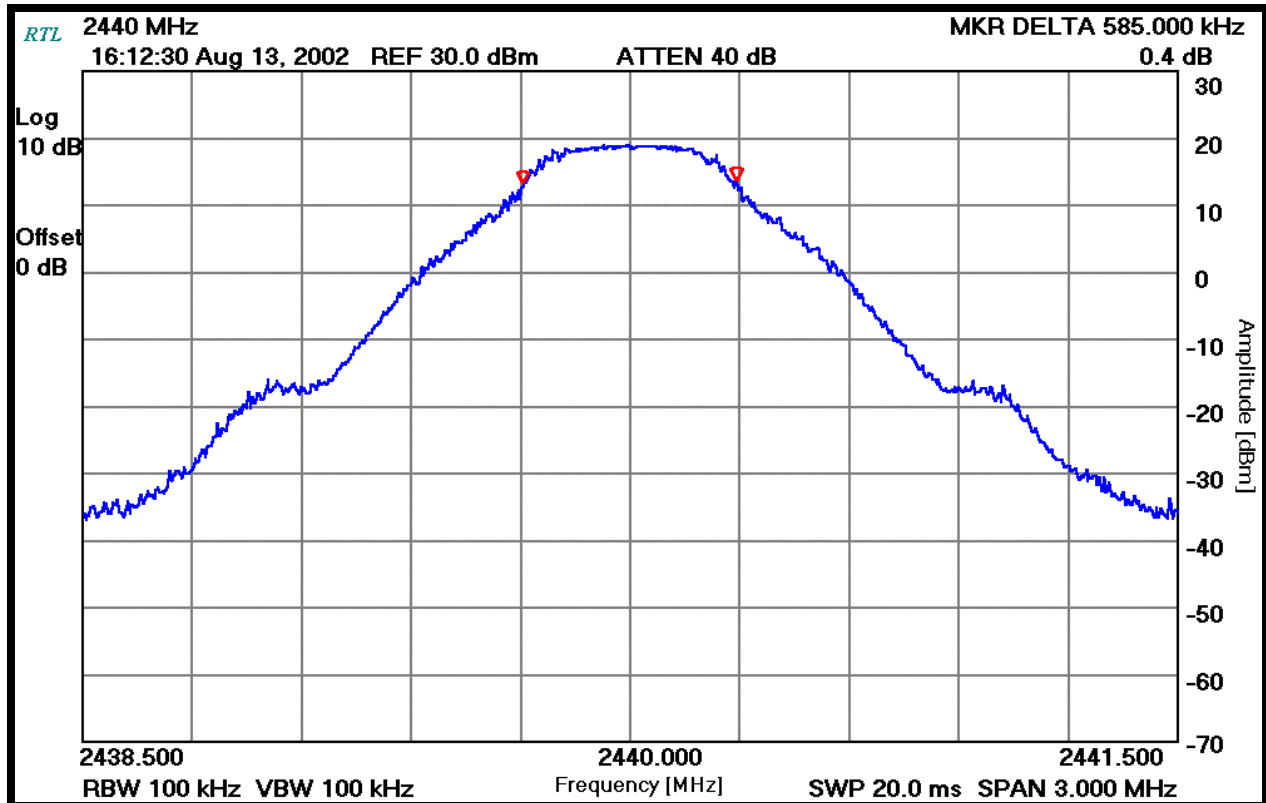
Daniel W. Baltzell
EMC Test Engineer

Daniel W. Baltzell
Signature

August 13, 2002
Date Of Test

Channel Number: Middle
Frequency (MHz): 2440
Resolution Bandwidth (kHz): 100
Video Bandwidth (kHz): 100
Sweep Time (ms): 20.0

PLOT 9-2: MODULATED BANDWIDTH MIDDLE CHANNEL



TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer

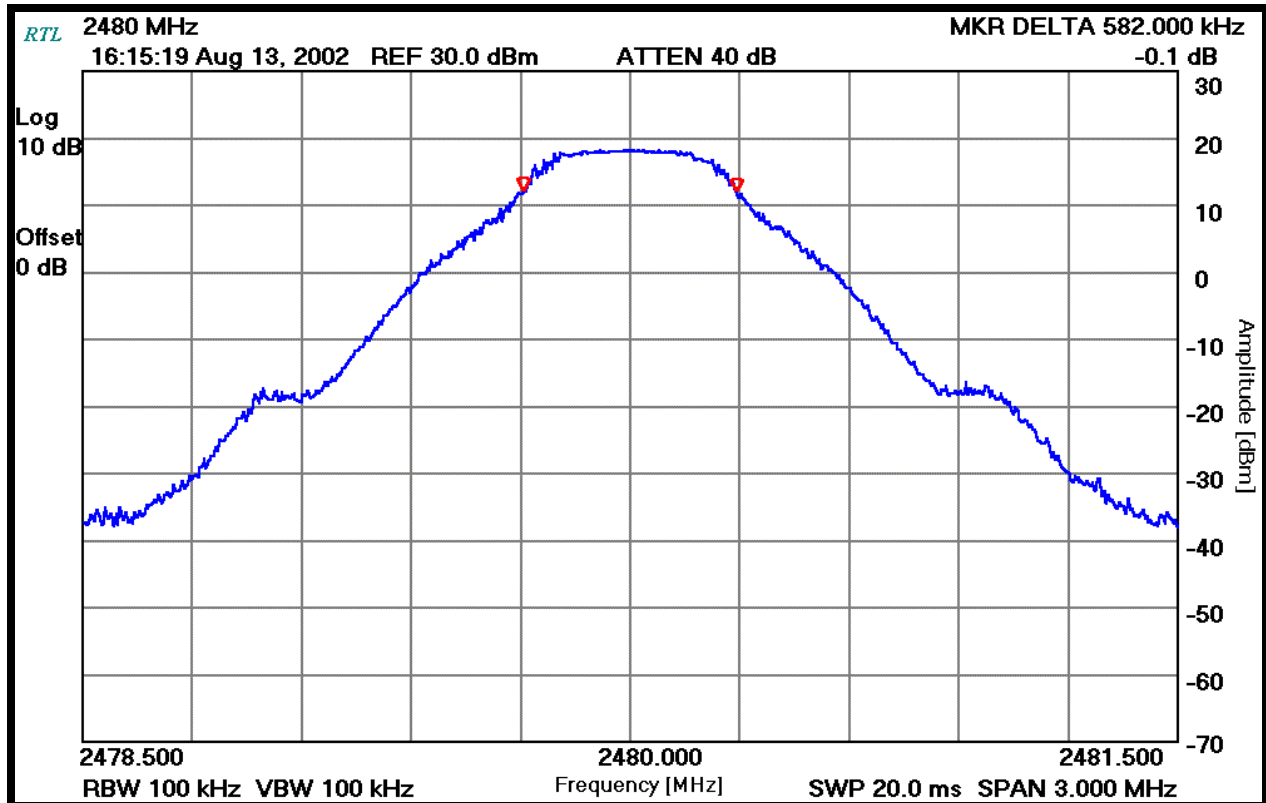
Daniel W. Baltzell

Signature

August 13, 2002
Date Of Test

Channel Number: Upper
Frequency (MHz): 2480
Resolution Bandwidth (kHz): 100
Video Bandwidth (kHz): 100
Sweep Time (ms): 20.0

PLOT 9-3: MODULATED BANDWIDTH UPPER CHANNEL



TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer

Daniel W. Baltzell

Signature

August 13, 2002
Date Of Test

10 PEAK OUTPUT POWER - §15.247(B)(1)

10.1 POWER OUTPUT TEST PROCEDURE

A conducted power measurement of the EUT was measured using an Agilent 4416A EPM-P Series Power Meter with a E9323A Peak and Average Power Sensor while the Frequency Hopping was disabled.

10.2 POWER OUTPUT TEST EQUIPMENT

TABLE 10-1: POWER OUTPUT TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
901186	Agilent Technologies	E9323A (50MHz- 6GHz)	Peak & Avg. Power Sensor	US40410380	6/25/02
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	7/5/02

10.3 POWER OUTPUT TEST DATA

FREQUENCY (MHZ)	CHANNEL	PEAK POWER CONDUCTED OUTPUT (dBm)
2402	Low	20.6
2440	Middle	20.5
2480	Upper	20.5

TEST PERSONNEL:

Daniel W. Baltzell EMC Test Engineer	 Signature	August 5, 2002 Date Of Test
---	--	--------------------------------

11 ANTENNA CONDUCTED SPURIOUS EMISSIONS - §15.247(C)

11.1 ANTENNA CONDUCTED SPURIOUS EMISSIONS TEST PROCEDURES

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 2.402GHz for the lower channel, 2.440GHz for the middle channel, and 2.480GHz for the upper channel. No other harmonics or spurs were found within 20 dB of the carrier level from 9kHz to the carrier 10th harmonic. See antenna conducted spurious noise table. The low, middle, and upper channels were investigated and tested. Notch filter used was found to have no effect on emission levels so it was not used in data presented.

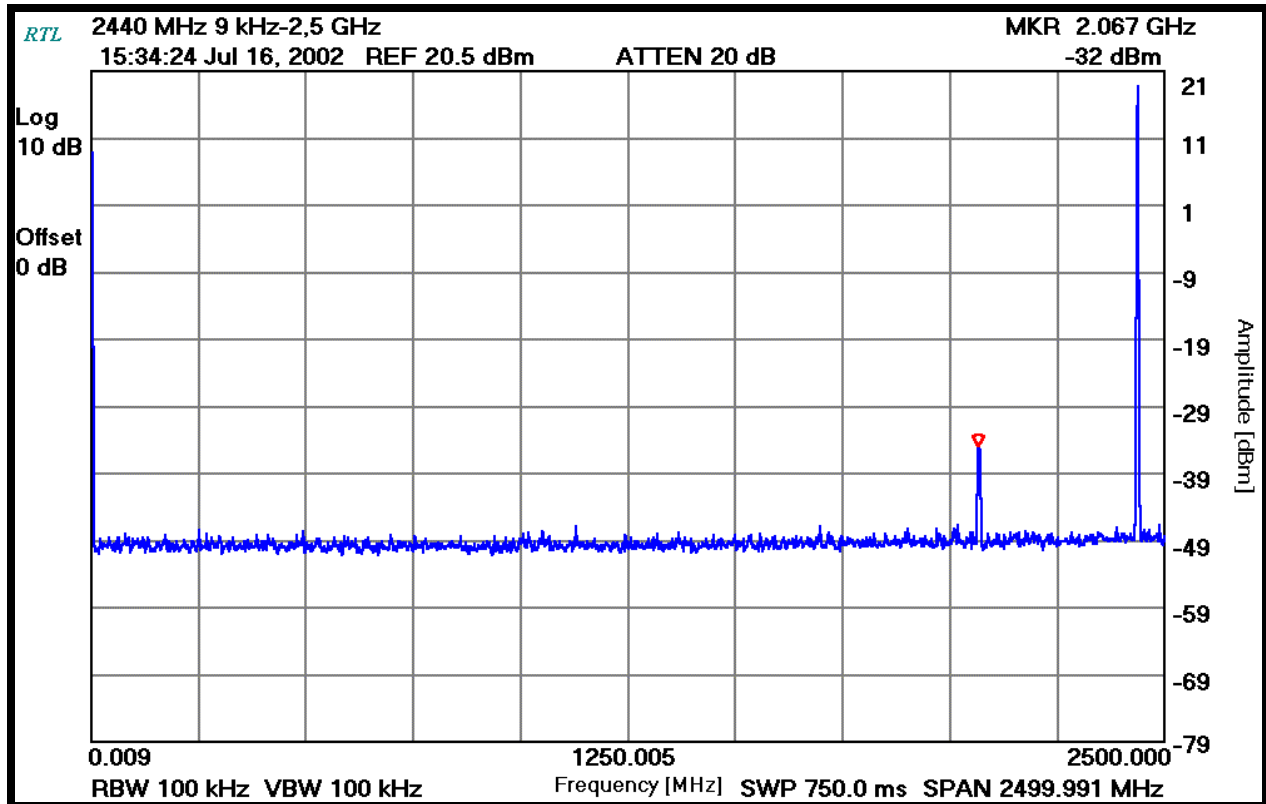
11.2 ANTENNA CONDUCTED SPURIOUS TEST EQUIPMENT

TABLE 11-1: ANTENNA CONDUCTED SPURIOUS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771	5/10/03
901137	Par Electronics	2.4-2.4850 GHz	Notch Filter	N/A	N/A

11.3 ANTENNA CONDUCTED SPURIOUS PLOTS

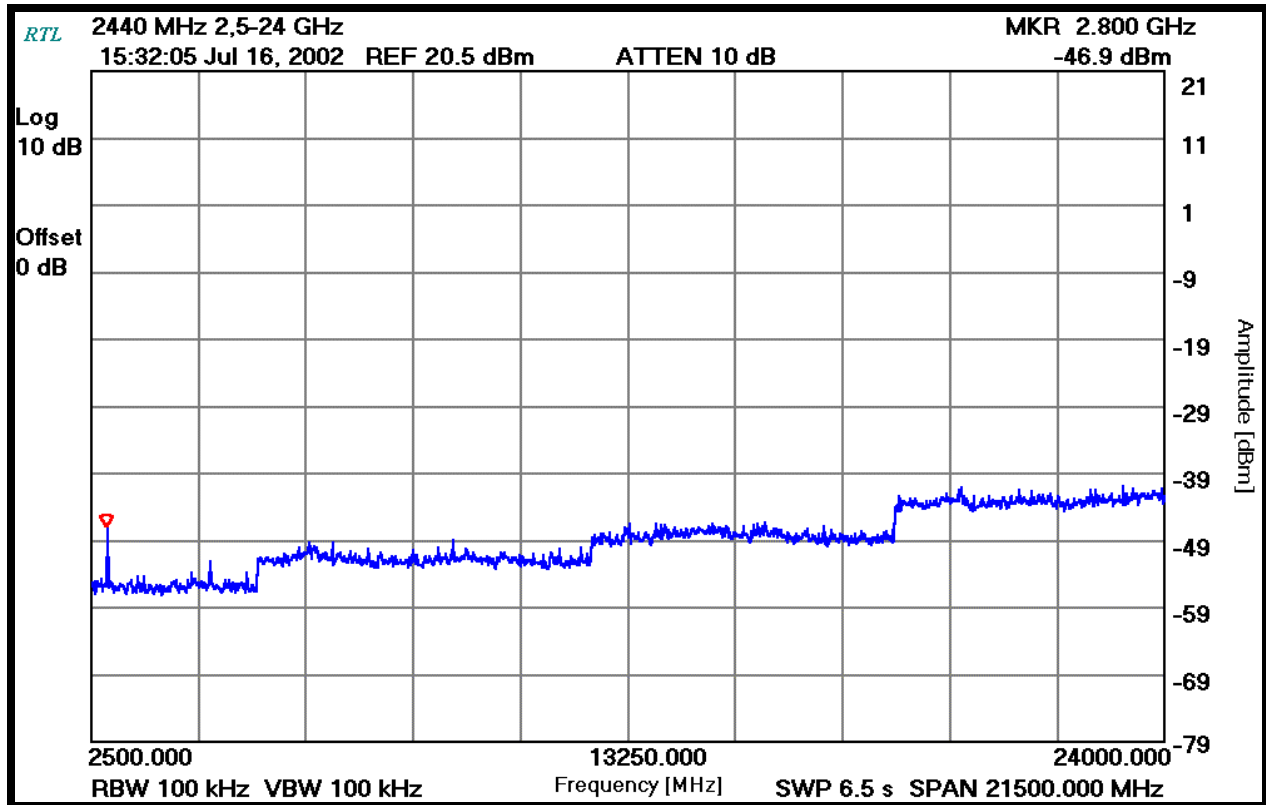
PLOT 11-1: ANTENNA CONDUCTED SPURIOUS (9 KHZ-2.5 GHZ; MID CHANNEL 2440 MHZ)



TEST PERSONNEL:

Daniel W. Baltzell EMC Test Engineer	 Signature	July 16, 2002 Date Of Test
---	--	-------------------------------

PLOT 11-2: ANTENNA CONDUCTED SPURIOUS (2.5-24 GHz; MID CHANNEL 2440 MHz)



TEST PERSONNEL:

Daniel W. Baltzell
 EMC Test Engineer

Signature

July 16, 2002
 Date Of Test

11.4 ANTENNA CONDUCTED SPURIOUS EMISSIONS LOWER CHANNEL

Operating Frequency (MHz): 2402
Channel: Lower
Measured Level at 100kHz (dBm): 19.9
Limit (dBm): -0.1

TABLE 11-2: ANTENNA CONDUCTED SPURIOUS EMISSIONS LOWER CHANNEL

Frequency (MHz)	Measured Level (dBm)	Insertion Loss (dB)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
1663.550	-32.1	0.2	67.4	-20.0	-47.4
4804.000	-48.3	0.8	59.5	-20.0	-39.5
7206.000	-42.8	3.2	56.7	-20.0	-36.7
9608.000	-44.8	8.0	60.9	-20.0	-40.9
12010.000	-45.8	4.8	52.7	-20.0	-32.7
14412.000	-42.0	9.2	46.5	-20.0	-26.5
16814.000	-44.3	17.7	55.4	-20.0	-35.4
19216.000	-44.3	8.8	52.4	-20.0	-32.4
21618.000	-41.3	8.8	50.1	-20.0	-30.1
24020.000	-39.0	8.8	51.8	-20.0	-31.8

TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer



Signature

August 5, 2002
Date Of Test

11.5 ANTENNA CONDUCTED SPURIOUS EMISSIONS MIDDLE CHANNEL

Operating Frequency (MHz): 2440
Channel: Middle
Measured Level at 100kHz (dBm): 19.6
Limit (dBm): -0.4

TABLE 11-3: ANTENNA CONDUCTED SPURIOUS EMISSIONS MIDDLE CHANNEL

Frequency (MHz)	Measured Level (dBm)	Insertion Loss (dB)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
2068.958	-32.2	0.2	51.6	-20.0	-31.6
4880.000	-45.5	1.2	63.9	-20.0	-43.9
7320.000	-42.5	3.0	59.1	-20.0	-39.1
9760.000	-44.8	8.2	56.2	-20.0	-36.2
12200.000	-44.5	9.7	54.4	-20.0	-34.4
14640.000	-41.2	6.2	54.6	-20.0	-34.6
17080.000	-40.7	12.0	48.3	-20.0	-28.3
19520.000	-41.7	6.3	55.0	-20.0	-35.0
21960.000	-41.5	6.3	54.8	-20.0	-34.8
24400.000	-40.5	6.3	53.8	-20.0	-33.8

TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer



Signature

August 5, 2002
Date Of Test

11.6 ANTENNA CONDUCTED SPURIOUS EMISSIONS UPPER CHANNEL

Operating Frequency (MHz): 2480
Channel: Upper
Measured Level at 100kHz (dBm): 19.1
Limit (dBc): -0.9

TABLE 11-4: ANTENNA CONDUCTED SPURIOUS EMISSIONS UPPER CHANNEL

Frequency (MHz)	Measured Level (dBm)	Insertion Loss (dB)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
2108.961	-29.4	0.2	48.3	-20.0	-28.3
4960.000	-44.8	1.2	62.8	-20.0	-42.8
7440.000	-43.3	3.8	58.6	-20.0	-38.6
9920.000	-45.0	6.2	57.9	-20.0	-37.9
12400.000	-43.8	7.0	55.9	-20.0	-35.9
14880.000	-43.0	6.0	56.1	-20.0	-36.1
17360.000	-42.7	12.5	49.3	-20.0	-29.3
19840.000	-43.0	7.3	54.8	-20.0	-34.8
22320.000	-42.5	7.3	54.3	-20.0	-34.3
24800.000	-40.0	7.3	51.8	-20.0	-31.8

TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer



Signature

August 5, 2002
Date Of Test

12 POWER SPECTRAL DENSITY - §15.247(D)

12.1 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 and video bandwidth set at 3 kHz, and the sweep time set at 70 seconds, i.e. (span/3 kHz) or 200000 Hz / 3000 Hz = 67 seconds. The spectral lines were resolved for the modulated carriers at 2.402GHz, 2.440GHz, and 2.480GHz respectively. These levels are below the +8 dBm limit. See power spectral density table and plots.

12.2 POWER SPECTRAL DENSITY TEST EQUIPMENT

TABLE 12-1: POWER SPECTRAL DENSITY TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771	5/10/03

12.3 POWER SPECTRAL DENSITY TEST DATA

Operating Frequency (MHz): 2402, 2440 & 2480
Channel: Lower, Middle, Upper
Measured Conducted Power (dBm): 20.6; 20.5; 20.5
Modulation Bandwidth (kHz): 585
Limit (dBm): 8

TABLE 12-2: POWER SPECTRAL DENSITY TEST DATA

CHANNEL	POWER SPECTRAL DENSITY LIMIT = +8dBm
1	0.6
6	-1.2
11	-1.6

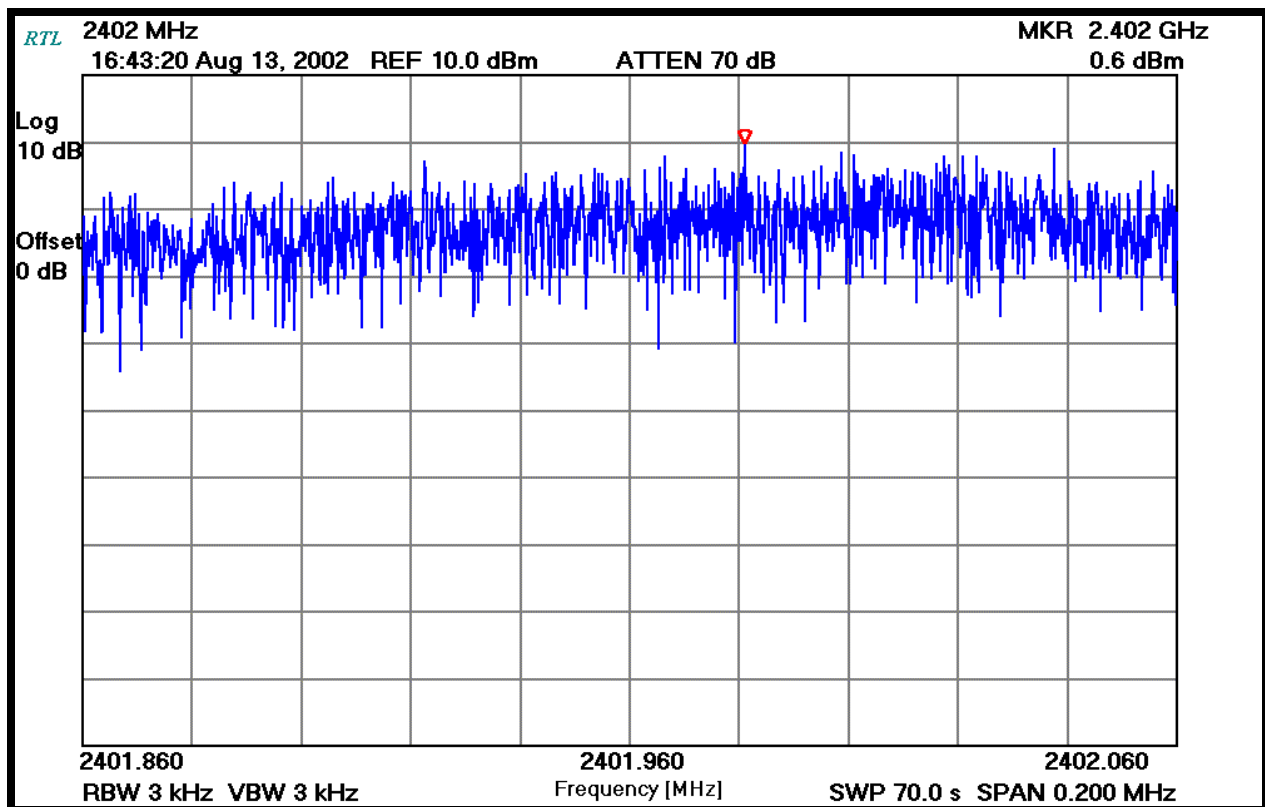
TEST PERSONNEL:

 Daniel W. Baltzell EMC Test Engineer	Signature	August 14, 2002 Date Of Test
--	-----------	---------------------------------

12.4 POWER SPECTRAL DENSITY PLOTS

Operating Frequency (MHz): 2402
Channel: Lower
Measured Conducted Power (dBm): 19.9
Bandwidth Resolution (kHz): 3
Bandwidth Video (kHz): 3
Sweep Time (sec.): 70

PLOT 12-1: POWER SPECTRAL DENSITY: CHANNEL 1



TEST PERSONNEL:

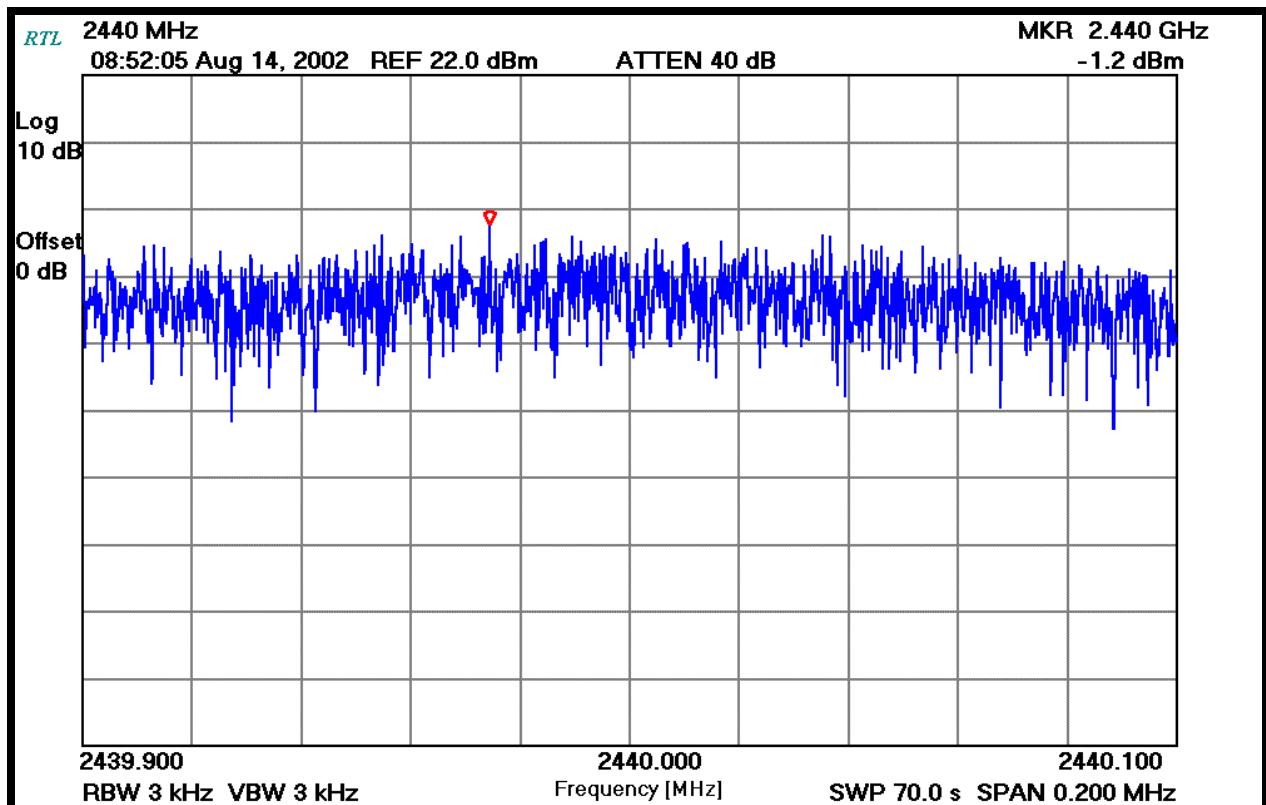
Daniel W. Baltzell
EMC Test Engineer

Signature

August 14, 2002
Date Of Test

Operating Frequency (MHz): 2440
Channel: Middle
Measured Conducted Power (dBm): 19.6
Bandwidth Resolution (kHz): 3
Bandwidth Video (kHz): 3
Sweep Time (sec.): 70

PLOT 12-2: POWER SPECTRAL DENSITY: CHANNEL 6



TEST PERSONNEL:

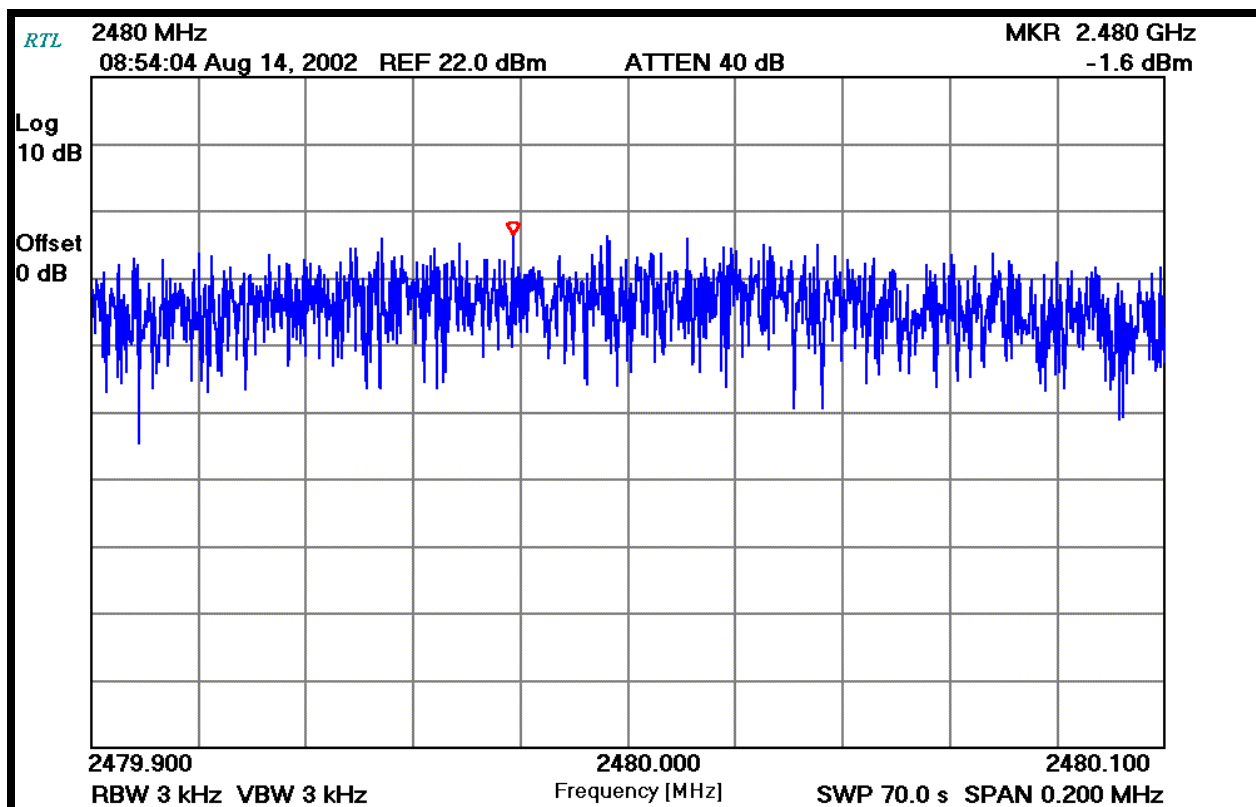
Daniel W. Baltzell
EMC Test Engineer

Signature

August 14, 2002
Date Of Test

Operating Frequency (MHz): 2480
Channel: Upper
Measured Conducted Power (dBm): 18.9
Bandwidth Resolution (kHz): 3
Bandwidth Video (kHz): 3
Sweep Time(sec.): 70

PLOT 12-3: POWER SPECTRAL DENSITY: UPPER CHANNEL



TEST PERSONNEL:

Daniel W. Baltzell
EMC Test Engineer

Signature

August 14, 2002
Date Of Test

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

Report Number: 2002140-Rev. 1
FCC: Part 15.247
Industry Canada: RSS-210
FCC ID: MQOTT600-22300
M/N: TT-600

13 CONCLUSION

The data in this measurement report shows that Vocollect, Inc. Talkman T2 Model: TT-600, FCC ID: MQOTT600-22300, complies with all the requirements of Parts 2 and 15 of the FCC Rules and Industry Canada RSS-210.