Standards Council of Canada
Accredited Laboratory
Scope of Accreditation 75

Conseil canadien des normes
Laboratoire accrédité
Portée d'accréditation 75

TM

Test Report:	4W33591 Issue 2
Applicant:	Vtech Engineering Canada Ltd. Suite 200 -- 7671 Alderbridge Way Richmond, B.C. Canada V6X 1Z9
Equipment Under Test: (EUT)	Vtech MI6823 & MI6863 Cordless Phones
FCC ID:	EW780-5656-01
In Accordance With:	**FCC Part 15.247, Subpart C** FHSS System and Digitally Modulated Radiators 2400 - 2483.5 MHz, 5725-5850MHz
Tested By:	Nemko Canada Inc. 303 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	Sim Jagpal, Resource Manager
Date:	10 February 2005
Total Number of Pages:	33

Table of Contents

Section 1. Summary of Test Results 3

Section 2. General Equipment Specification 6

Section 3. 20 dB Bandwidth 8

Section 4. Occupancy Time 9

Section 5. Number of Hopping Channels 11

Section 6. Minimum Channel Separation 15

Section 7. Peak Output Power 17

Section 8. Spurious Emissions 19

Section 9. Block Diagrams 31

Section 10. Test Equipment List 32

Section 11. Restricted bands (15.205) 33

Section 1. Summary of Test Results

General

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C. Radiated tests were conducted is accordance with ANSI C63.4-2001. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See " Summary of Test Data".

TESTED BY: _____ DATE: 10 February 2005
Jason Nixon, Telecom Specialist

Nemko Canada Inc. authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report applies only to the items tested.

Summary Of Test Data

Name Of Test	Para. No.	Result
Powerline Conducted Emissions	15.207(a)	N/A
6dB Bandwidth	15.247(a)(2)	N/A- Note 1
20 dB Bandwidth	15.247(a)(1)(ii)	Complied
Number of Hopping Channels	15.247(a)(1)(ii)	Complied
Occupancy Time	15.247(f)	Complied
Minimum Channel Separation	15.247(a)(1)	Complied
Peak Output Power	15.247(b)(1)	Complied
Spurious Emissions (Antenna Conducted)	15.247(c)	Complied
Spurious Emissions (Radiated)	15.247(c)	Complied
Peak Power Spectral Density	15.247(d)	Complied

Notes: 1) The EUT is battery powered.

Test Conditions:

Indoor Temperature: 22°C
Humidity: 20%

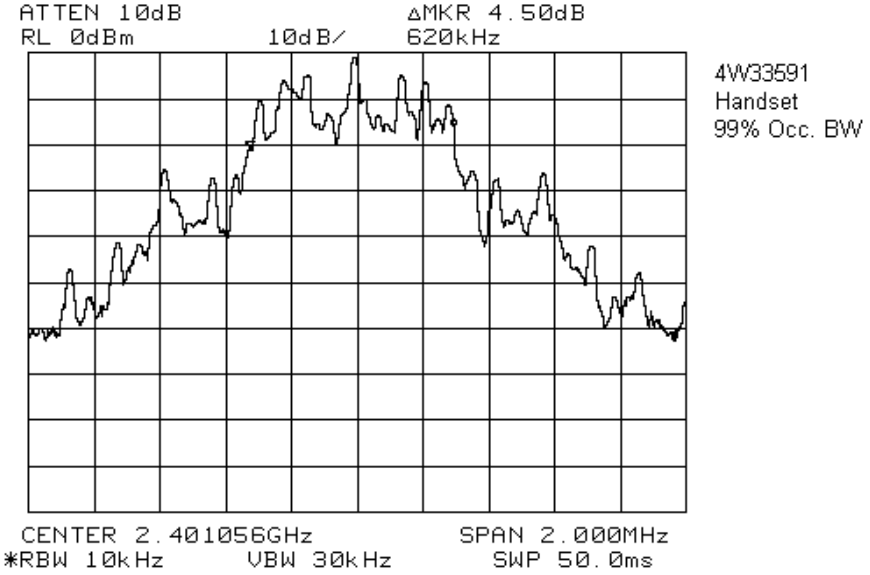
Outdoor Temperature: 10°C
Humidity: 50%

Engineering Considerations

Product Modification	
To achieve compliance the following change(s) were made during compliance testing: None	
Justification	
None	
Deviations	
The following deviations from, additions to, or exclusions from the test specification have been made: None	
Test Report Revision History	
Issue #	Details of changes made to test report
2	Changes required as per CB checklist.

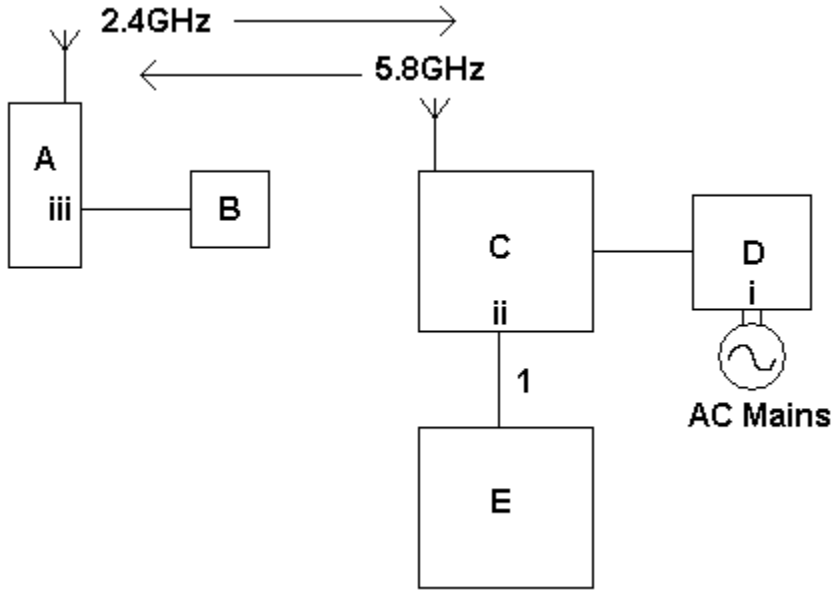
Section 2. General Equipment Specification

Manufacturer:	Vtech (Dongguan) Electronics and Communications Ltd.
Model No.:	MI6823 & MI6863 CI
Serial No.:	None
Date Received In Laboratory:	November 16, 2004
Nemko Identification No.:	Refer to Nemko Receiving Report.
Operating Frequency:	HS TX 2401.056 -> 2482.272 MHz
Peak Output Power (ERP):	18.8dBm (0.076W)
Emission Designator	620KF1D
Rated Power:	HS 20.0dBm (Typical)
Modulation:	GFSK
Antenna Data:	The EUT uses a 0dBi integral antenna.



Equipment Configuration:

Equipment Configuration List				
Item	Description		Identification: *(M/N #, S/N #, P/N #, Rev.)*	
(A)	Cordless Handset		None	
(B)	Headset with mini-din cable integral		None	
(C)	Base Unit		M/N: MI6823 or MI6863 CI	
(D)	Component Telephone Class 2 Power Supply		M/N: U080065D (used with the MI6823) M/N: U080085D31 (with the MI6863 CI)	
1. (E)	DC feed		None	
EUT Ports				
Port	Description	Indoor/Outdoor	Type (See Legend)	Qty
i.	AC Mains Input	Outdoor	1	1
ii.	PSTN	Outdoor	3	1
iii.	Headset port	Indoor	4	1
Inter-Connection Cables				
Item	Description	Shielded	Ferrite	Length (m)
(1)	Standard RJ11 telephone cable	No	No	1.5
Legend: 1 = AC Power Input/Output, 2 = DC Power Input/Output, 3 = Telecom, 4 = Non-telecom I/O, 5 = Maintenance, 6 = Fiber Optic				
Notes				
None				



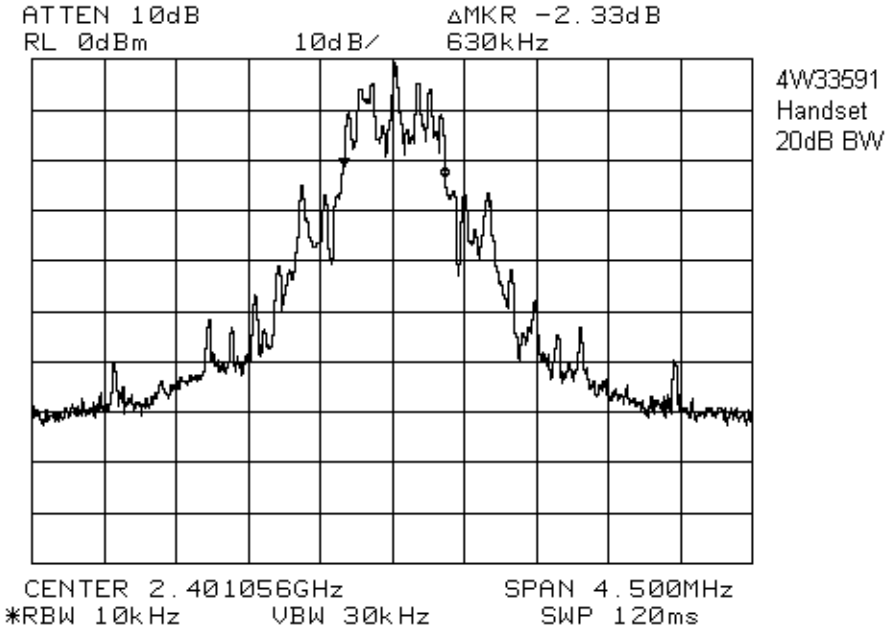
Section 3. 20 dB Bandwidth

Para. No.: 15.247(a) (1)(ii)

Test Performed By: Chris Maidens	**Date of Test: Nov. 17, 2004**

Limits: 1MHz

Measurement Data: See Plot



Section 4. Occupancy Time

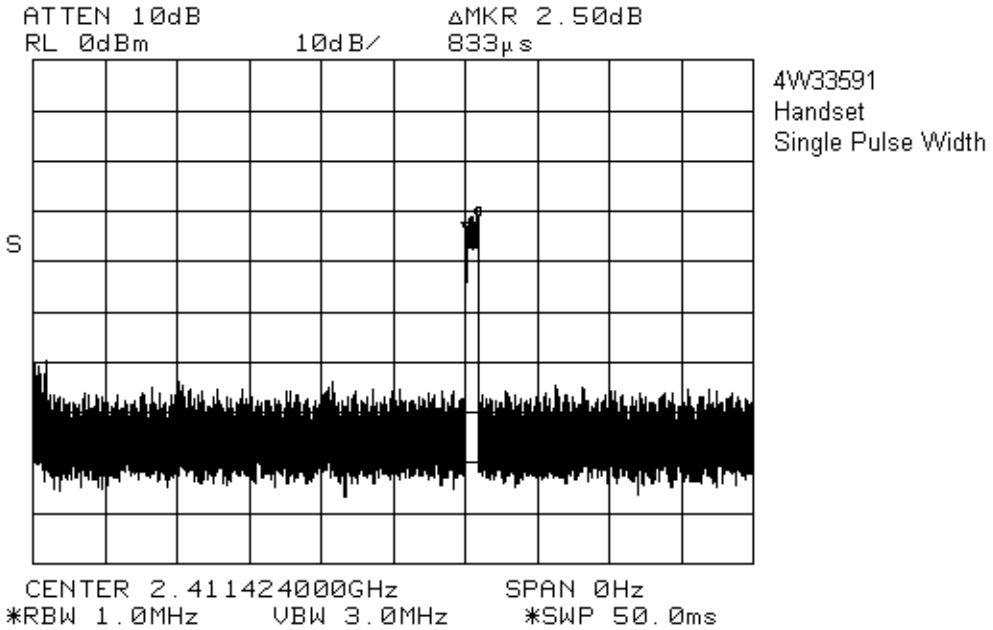
Para. No.: 15.247(a) (1) (iii)

Test Performed By: Chris Maidens	**Date of Test: Nov. 17, 2004**

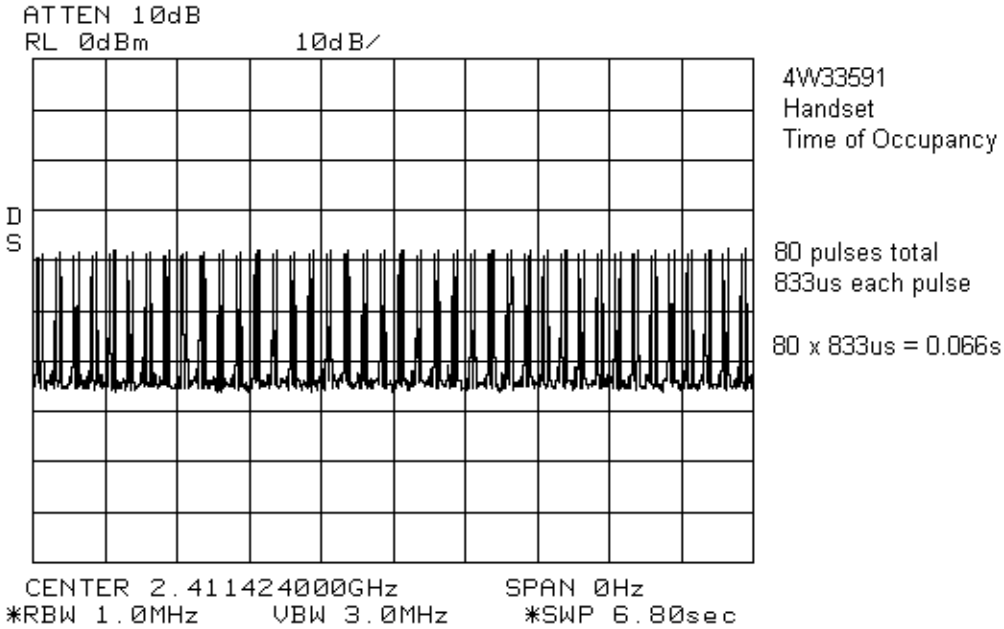
Limit: For the purposes of this section, hybrid systems are those that employ a combination of both frequency hopping and digital modulation techniques. The frequency hopping operation of the hybrid system, with the direct sequence or digital modulation operation turned off, shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4. The digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

Measurement Data: See Plots

Handset:



4W33591
Handset
Single Pulse Width



4W33591
Handset
Time of Occupancy

80 pulses total
833us each pulse

80 x 833us = 0.066s

(17 hopping frequencies) x 0.4= 6.8 seconds

Section 5. Number of Hopping Channels

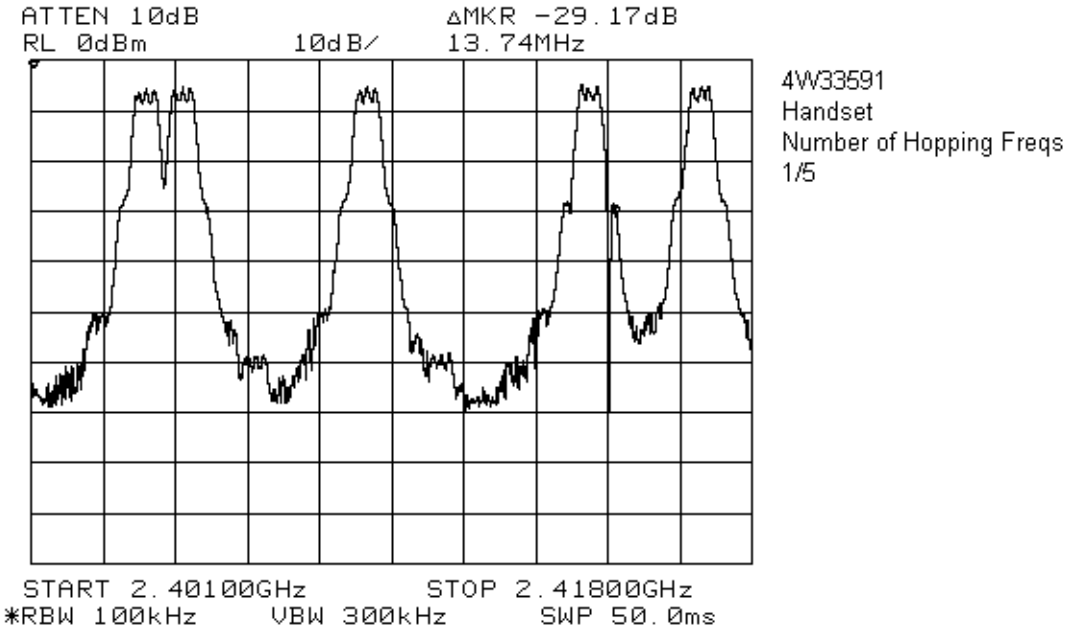
Para. No.: 15.247(a)(1)(ii)

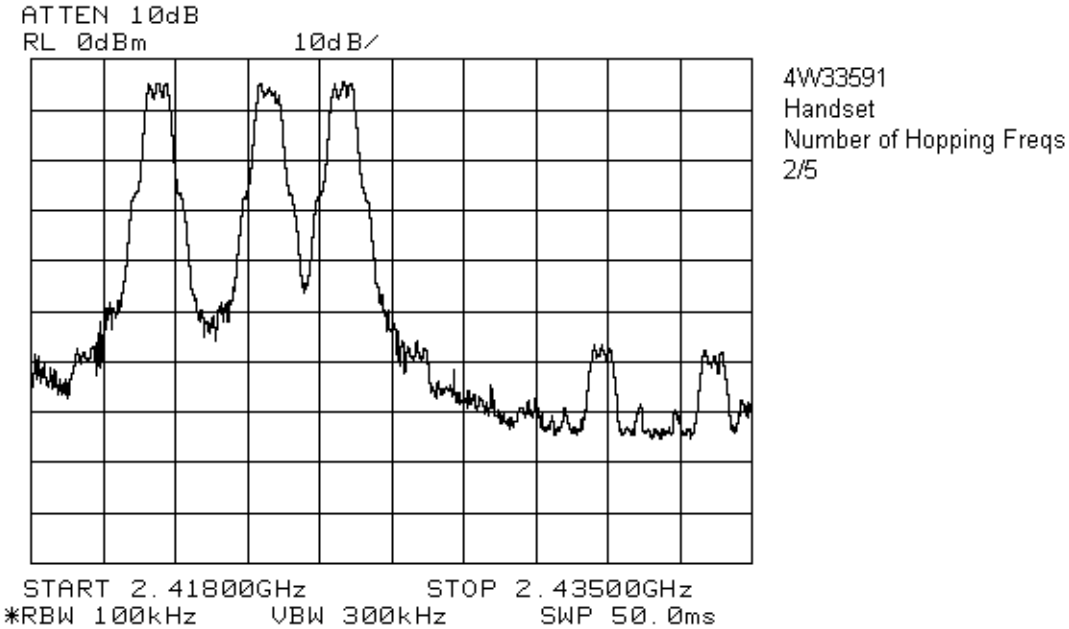
Test Performed By: Chris Maidens	**Date of Test: Nov. 14, 2004**

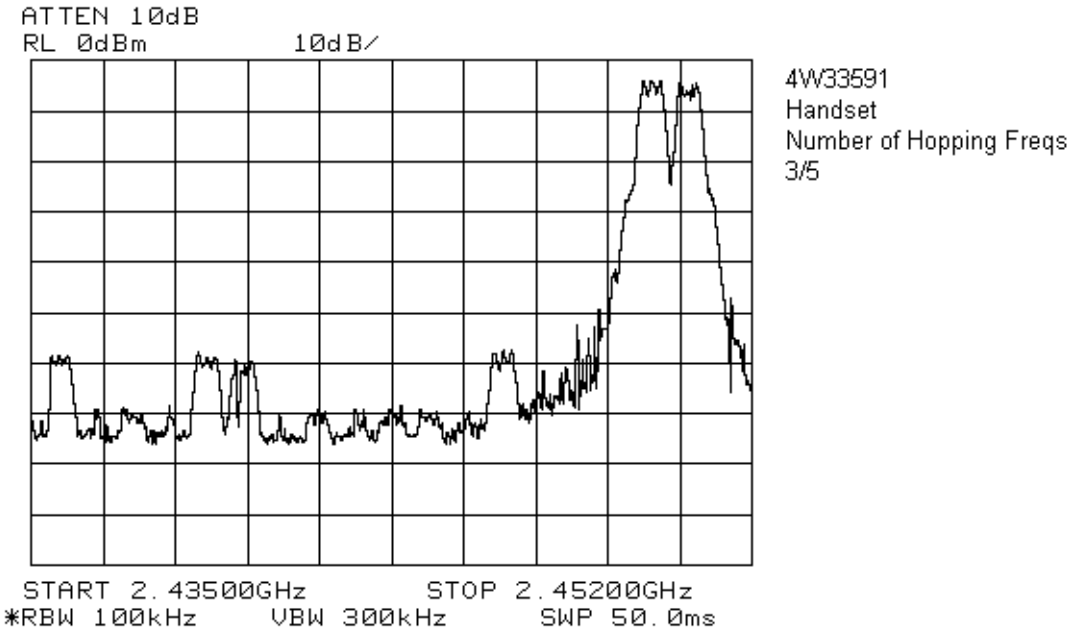
Limit: Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

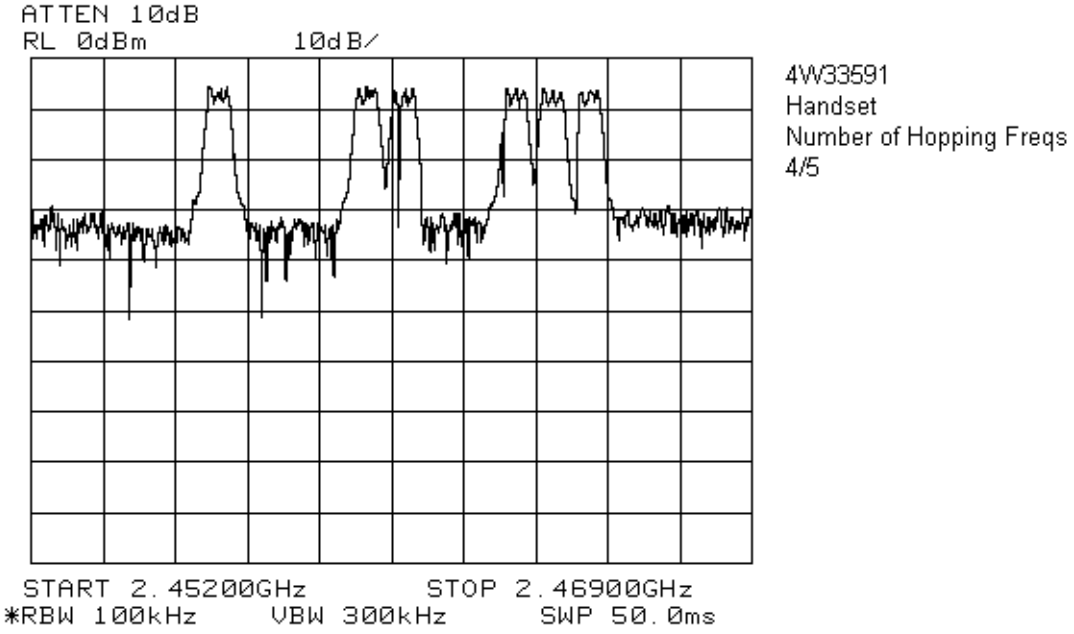
Measurement Data: The EUT uses 17 channels (See Plots)

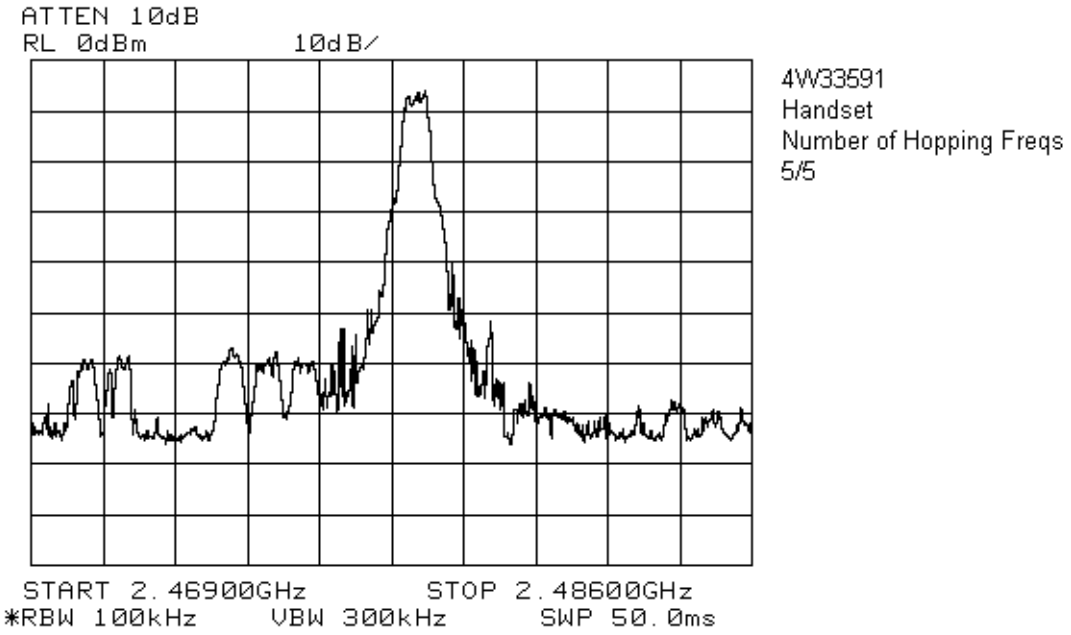
Plots:


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR -29.17dB
13.74MHz
4W33591
Handset
Number of Hopping Freqs
1/5
START 2.40100GHz
STOP 2.41800GHz
*RBW 100kHz
VBW 300kHz
SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
4W33591
Handset
Number of Hopping Freqs
2/5
START 2.41800GHz
STOP 2.43500GHz
*RBW 100kHz
VBW 300kHz
SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
4W33591
Handset
Number of Hopping Freqs
3/5
START 2.43500GHz
STOP 2.45200GHz
*RBW 100kHz
VBW 300kHz
SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
4W33591
Handset
Number of Hopping Freqs
4/5
START 2.45200GHz
STOP 2.46900GHz
*RBW 100kHz
VBW 300kHz
SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
4W33591
Handset
Number of Hopping Freqs
5/5
START 2.46900GHz
STOP 2.48600GHz
*RBW 100kHz
VBW 300kHz
SWP 50.0ms

Section 6. Minimum Channel Separation

Para. No.: 15.247(a)(1)

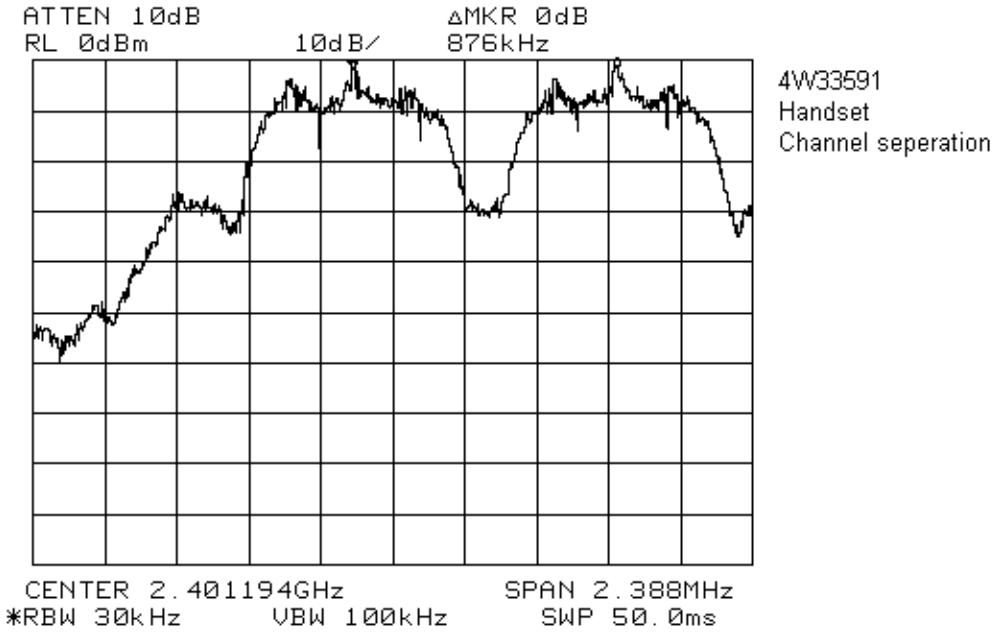
Test Performed By: Chris Maidens	**Date of Test: Nov. 17, 2004**

Limit: 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. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Measurement Data: Channel Separation was measured to be 876kHz, which is >630kHz (the 20dB BW of this device)

See Plot on next page.

Plot


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR 0dB
876kHz
4W33591
Handset
Channel seperation
CENTER 2.401194GHz
SPAN 2.388MHz
*RBW 30kHz
VBW 100kHz
SWP 50.0ms

Section 7. Peak Output Power

Para. No.: 15.247 (b)(1)

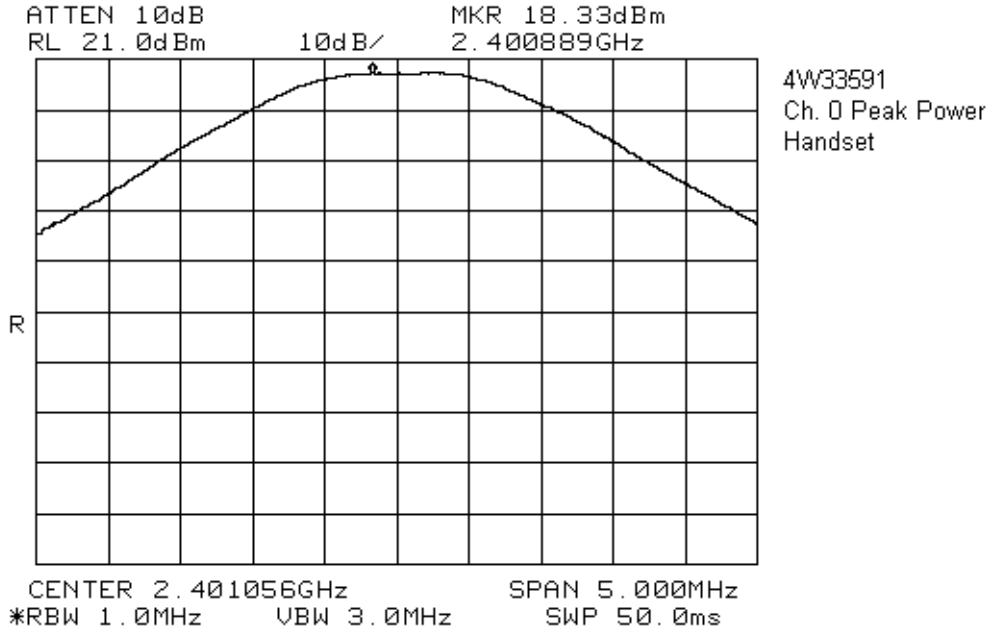
Test Performed By: Chris Maidens	**Date of Test: Nov. 18, 2004**

Limit: 0.125W (21dBm)

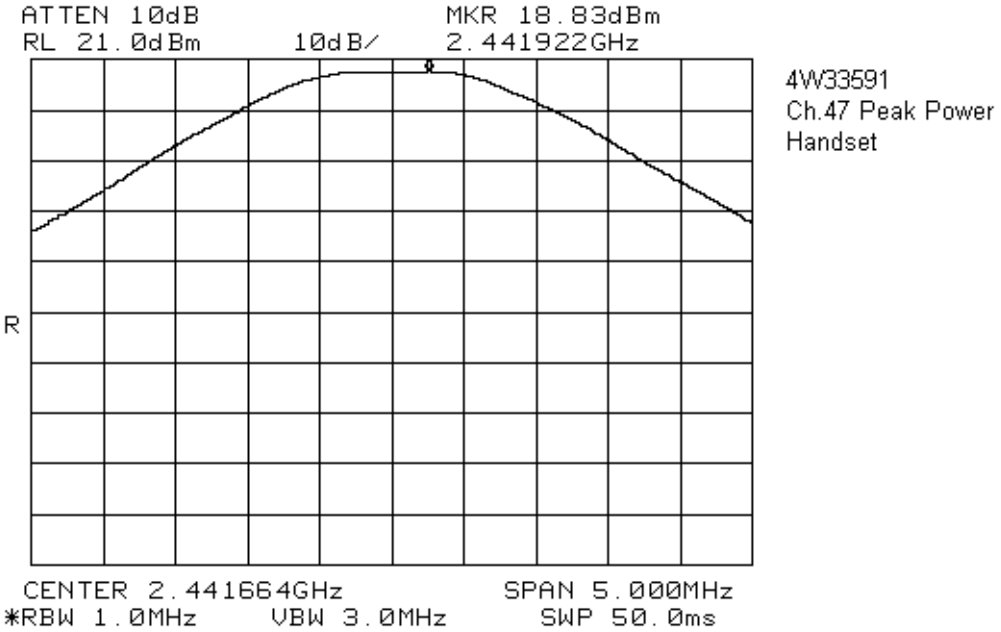
Measurement Data: The highest power was 18.8dBm on Channel 47 of the EUT. See conducted plots.

All measurements were performed using fresh charged batteries.

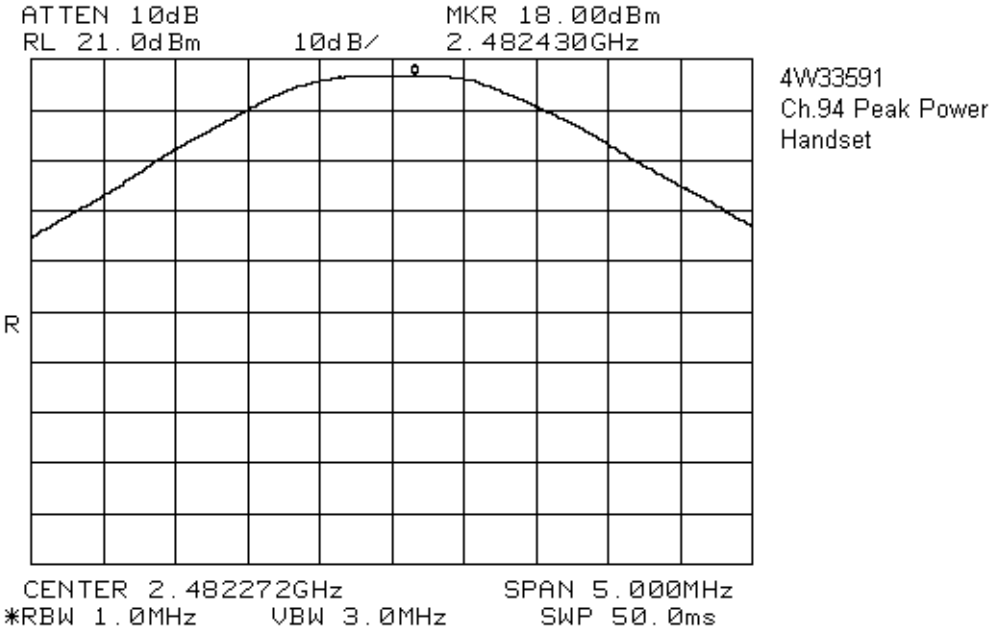
Maximum radiated power = 18.8dBm +0dBi = 18.8dBmEIRP
Maximum allowable radiated power is 36dBmEIRP,
30dBm + 6dBi



Peak Output Power (continued)



4W33591
Ch.47 Peak Power
Handset



4W33591
Ch.94 Peak Power
Handset

Section 8. Spurious Emissions

Para. No.: 15.247(d)

Test Performed By: Chris Maidens	**Date of Test: Dec. 7, 2004**

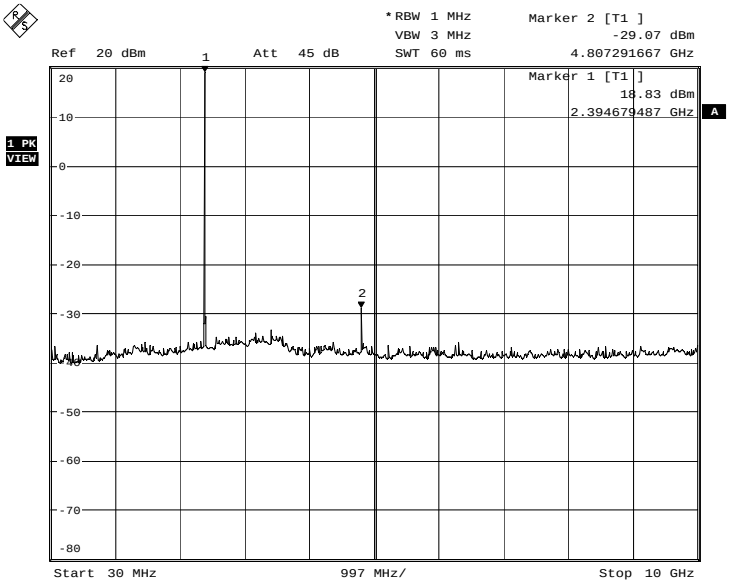
Limit: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Measurement Data: The spectrum was searched using a sample modified for conducted measurements. Emissions related to the fundamental, which fall within restricted bands, were measured using an unmodified sample for radiated measurements.

Measurements were performed on three orthogonal axis, with freshly charged batteries.

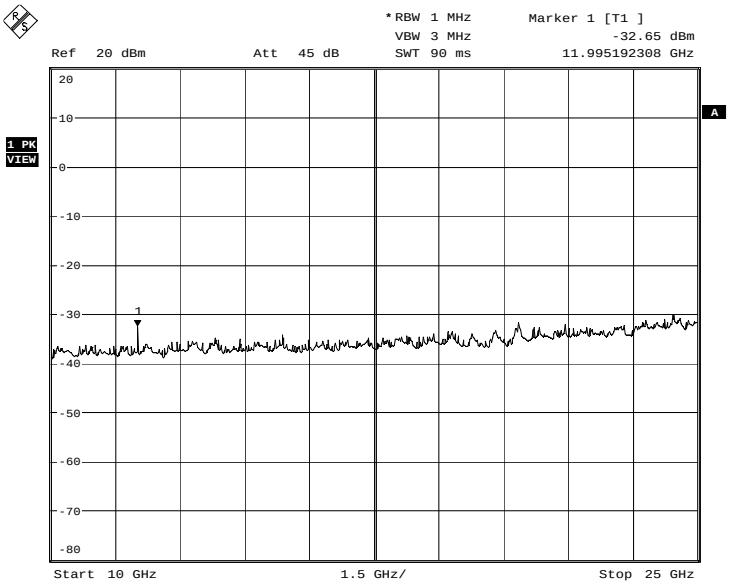
The spectrum was searched from 30MHz to 25GHz.

Conducted Emissions CH00



CH00 30MHz to 10GHz

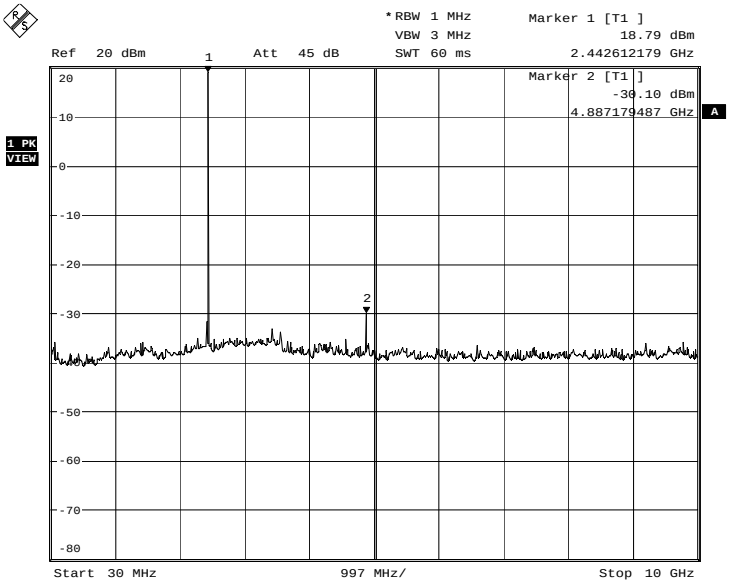
Date: 10.FEB.2005 09:04:53



CH00 10GHz to 25GHz

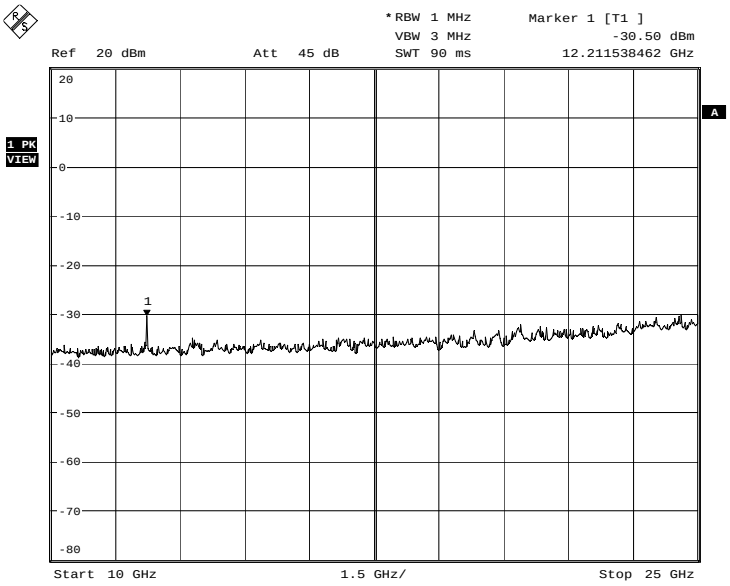
Date: 10.FEB.2005 09:06:14

Conducted Emissions CH47



CH47 30MHz to 10GHz

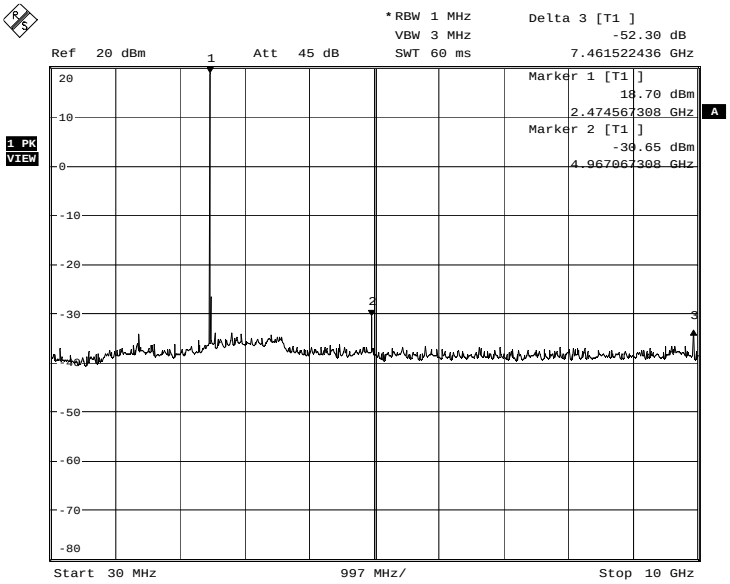
Date: 10.FEB.2005 09:12:26



CH47 10GHz to 25GHz

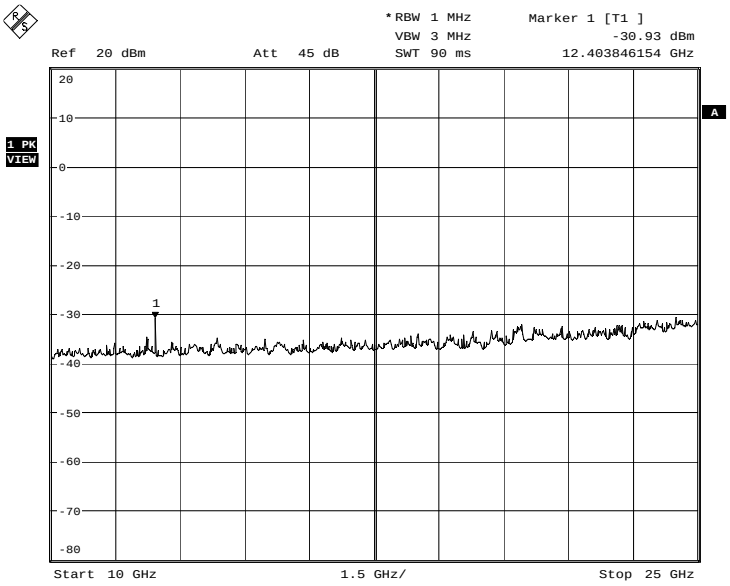
Date: 10.FEB.2005 09:07:52

Conducted Emissions CH94



CH94 30MHz to 10GHz

Date: 10.FEB.2005 09:13:51



CH94 10GHz to 25GHz

Date: 10.FEB.2005 09:14:55

Spurious Harmonic Emissions Test Data: Base Station, Peak

Test Date: 10 Feb 2005

Engineer's Name: Jason Nixon

Temperature (C°): 21 | Humidity %: 35

Measurement distance = 3m.

Freq. (MHz)	Ant.	Pol. V/H	RCVD Signal (dBμV)	Ant. Factor (dB)	Amp. Gain / Passband filter / Cable Loss (dB)	Distance Correction (dB)	Duty Cycle Corr. (-dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)
Low Band Ch.00										
4802.1120	Horn1	V	86.7	33.4	50.0	-	-	70.1	74	3.9
4802.1120	Horn1	H	87.7	33.5	50.0	-	-	71.2	74	2.8
12005.280	Horn1	V	66.0	39.3	37.0	-	-	68.3	74	5.7
12005.280	Horn1	H	67.2	39.5	37.0	-	-	69.7	74	4.3
19208.448	Horn5	V	53.2	45.0	40.2	-	-	58.0	74	16.0
19208.448	Horn5	H	53.3	44.0	40.2	-	-	57.1	74	16.9
Mid Band Ch.47										
4883.3280	Horn1	V	86.7	33.4	49.4	-	-	70.7	74	3.3
4883.3280	Horn1	H	88.5	33.5	49.4	-	-	72.6	74	1.4
7324.9920	Horn1	V	76.2	36.5	49.4	-	-	63.2	74	10.8
7324.9920	Horn1	H	77.8	36.7	49.4	-	-	65.1	74	8.9
12208.320	Horn1	V	70.0	39.0	37.0	-	-	72.0	74	2.0
12208.320	Horn1	H	69.5	39.3	37.0	-	-	71.8	74	2.2
19533.312	Horn5	V	54.2	45.3	40.2	-	-	59.2	74	14.8
19533.312	Horn5	H	53.8	44.2	40.2	-	-	57.9	74	16.1
Mid Band Ch.94										
2492.8000	Horn1	V	33.8	28.8	-1.8	-	-	64.4	74	9.6
2492.8000	Horn1	H	33.3	28.8	-1.8	-	-	64.0	74	10.0
4964.5440	Horn1	V	82.8	33.4	49.1	-	-	67.2	74.0	6.8
4964.5440	Horn1	H	85.8	33.5	49.1	-	-	70.3	74.0	3.7
7446.8160	Horn1	V	76.0	36.5	49.0	-	-	63.6	74.0	10.4
7446.8160	Horn1	H	76.8	36.7	49.0	-	-	64.6	74.0	9.4
12411.360	Horn1	V	70.8	38.8	37.0	-	-	72.6	74	1.4
12411.360	Horn1	H	71.8	39.0	37.0	-	-	73.8	74	0.2
19858.176	Horn5	V	54.0	45.8	40.2	-	-	59.6	74	14.4
19858.176	Horn5	H	54.7	44.7	40.2	-	-	59.2	74	14.8

Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole
Note 2: The EUT was searched up to 10th harmonic of the fundamental

Notes: Measurement Receiver = HP 8564E, RBW/VBW =1000kHz

Spurious Harmonic Emissions Test Data: Base Station, Average

Test Date: 10 Feb 2005

Engineer's Name: Jason Nixon

Temperature (C°): 21 | Humidity %: 35

Measurement distance = 3m.

Freq. (MHz)	Ant.	Pol. V/H	RCVD Signal (dBμV)	Ant. Factor (dB)	Amp. Gain / Passband filter / Cable Loss (dB)	Distance Correction (dB)	Duty Cycle Corr. (-dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)
Low Band Ch.00										
4802.1120	Horn1	V	86.7	33.4	50.0	-	21.7	48.4	54	5.6
4802.1120	Horn1	H	87.7	33.5	50.0	-	21.7	49.5	54	4.5
12005.280	Horn1	V	66.0	39.3	37.0	-	21.7	46.6	54	7.4
12005.280	Horn1	H	67.2	39.5	37.0	-	21.7	48.0	54	6.0
19208.448	Horn5	V	53.2	45.0	40.2	-	21.7	36.3	54	17.7
19208.448	Horn5	H	53.3	44.0	40.2	-	21.7	35.4	54	18.6
Mid Band Ch.47										
4883.3280	Horn1	V	86.7	33.4	49.4	-	21.7	49.0	54	5.0
4883.3280	Horn1	H	88.5	33.5	49.4	-	21.7	50.9	54	3.1
7324.9920	Horn1	V	76.2	36.5	49.4	-	21.7	41.5	54	12.5
7324.9920	Horn1	H	77.8	36.7	49.4	-	21.7	43.4	54	10.6
12208.320	Horn1	V	70.0	39.0	37.0	-	21.7	50.3	54	3.7
12208.320	Horn1	H	69.5	39.3	37.0	-	21.7	50.1	54	3.9
19533.312	Horn5	V	54.2	45.3	40.2	-	21.7	37.5	54	16.5
19533.312	Horn5	H	53.8	44.2	40.2	-	21.7	36.2	54	17.8
Mid Band Ch.94										
2492.8000	Horn1	V	33.8	28.8	-1.8	-	21.7	42.7	54	11.3
2492.8000	Horn1	H	33.3	28.8	-1.8	-	21.7	42.3	54	11.7
4964.5440	Horn1	V	82.8	33.4	49.1	-	21.7	45.5	54	8.5
4964.5440	Horn1	H	85.8	33.5	49.1	-	21.7	48.6	54	5.4
7446.8160	Horn1	V	76.0	36.5	49.0	-	21.7	41.9	54	12.1
7446.8160	Horn1	H	76.8	36.7	49.0	-	21.7	42.9	54	11.1
12411.360	Horn1	V	70.8	38.8	37.0	-	21.7	50.9	54	3.1
12411.360	Horn1	H	71.8	39.0	37.0	-	21.7	52.1	54	1.9
19858.176	Horn5	V	54.0	45.8	40.2	-	21.7	37.9	54	16.1
19858.176	Horn5	H	54.7	44.7	40.2	-	21.7	37.5	54	16.5

Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole
Note 2: Detector Legend: Q-Peak = 120 kHz RBW, Average = 1.0 MHz RBW
Note 3: The EUT was searched up to 10th harmonic of the fundamental

Notes: Measurement Receiver = HP 8564E, RBW/VBW =1000kHz

Spurious Emission Test Data:

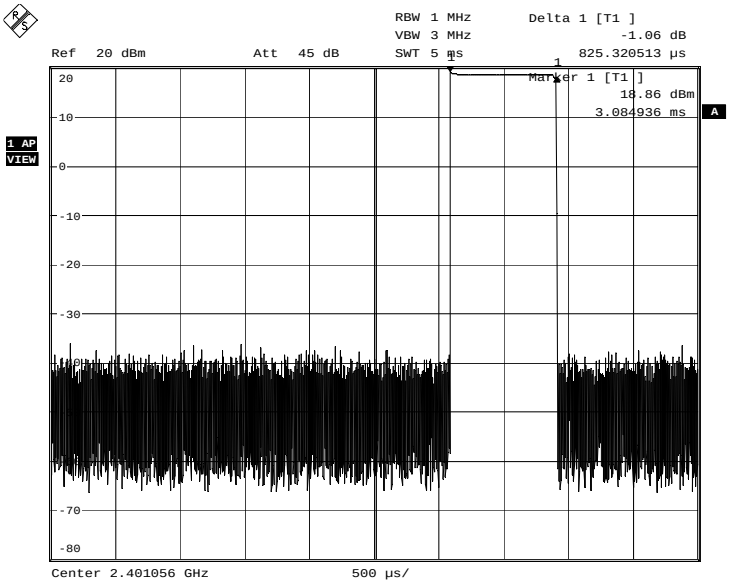
Test Date: December 10, 2004	
Engineer's Name: Chris Maidens	
Temperature (C°): 13	Humidity %: 30
Tested as per Table Top	
Test Distance (meters): 3m	Range: Almonte

Freq. (MHz)	Ant.	Pol. V/H	RCVD Signal (dBμV)	Ant. Factor (dB)	Amp. Gain (dB)	Cable Loss (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Amp.
186.6240	BL	H	29.3	9.5	N/A	1.7	40.6	43.5	2.9	Q-Peak	N/A
207.3601	BL	V	28.3	10.4	N/A	1.8	40.5	43.5	3.0	Q-Peak	N/A
179.7120	BL	V	26.6	10.4	N/A	1.7	38.7	43.5	4.8	Q-Peak	N/A
196.9919	BL	V	24.5	10.2	N/A	1.7	36.4	43.5	7.1	Q-Peak	N/A
114.0481	BL	V	21.3	12.9	N/A	1.3	35.5	43.5	8.0	Q-Peak	N/A
217.7280	BL	V	24.7	10.2	N/A	1.9	36.8	46.0	9.2	Q-Peak	N/A
171.8164	BL	V	21.6	10.8	N/A	1.6	34.0	43.5	9.5	Q-Peak	N/A
176.2560	BL	V	20.9	10.5	N/A	1.6	33.1	43.5	10.4	Q-Peak	N/A
110.5921	BL	V	17.7	12.8	N/A	1.3	31.9	43.5	11.6	Q-Peak	N/A
124.4160	BL	H	17.2	12.7	N/A	1.4	31.3	43.5	12.2	Q-Peak	N/A
152.0640	BL	V	18.1	11.6	N/A	1.5	31.2	43.5	12.3	Q-Peak	N/A
31.1041	BL	V	9.5	17.5	N/A	0.7	27.7	40.0	12.3	Q-Peak	N/A
164.6575	BL	V	14.9	10.9	N/A	1.7	27.5	43.5	16.0	Q-Peak	N/A
165.8881	BL	V	14.9	10.9	N/A	1.7	27.5	43.5	16.0	Q-Peak	N/A

Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole
Note 2: Detector Legend: Q-Peak = 120 kHz RBW, Average = 1.0 MHz RBW

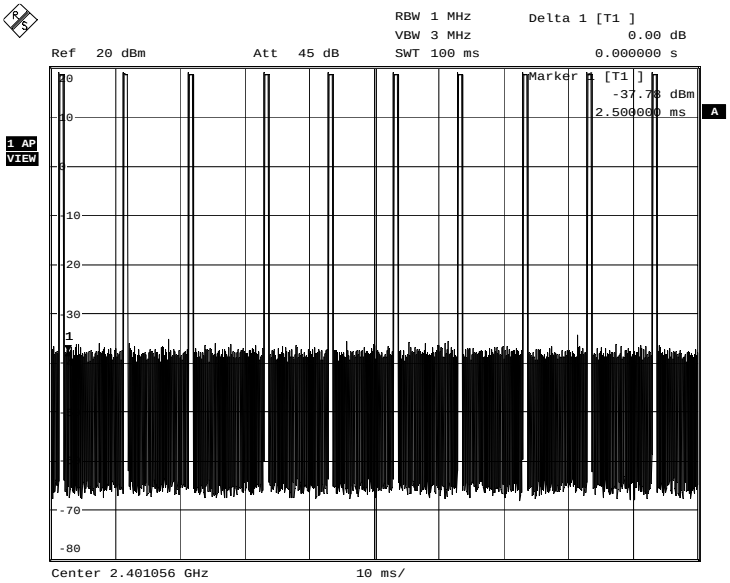
Notes:	1) The handset was tested with a freshly charged battery. 2) The spectrum was searched from 30MHz to the 10th harmonic (24822.72MHz). All emissions detected within 20dB of the specification limit have been reported. 3) The handset was verified in 3 orthogonal axes, the worst case has been reported and photographed.

Duty cycle:



On-time

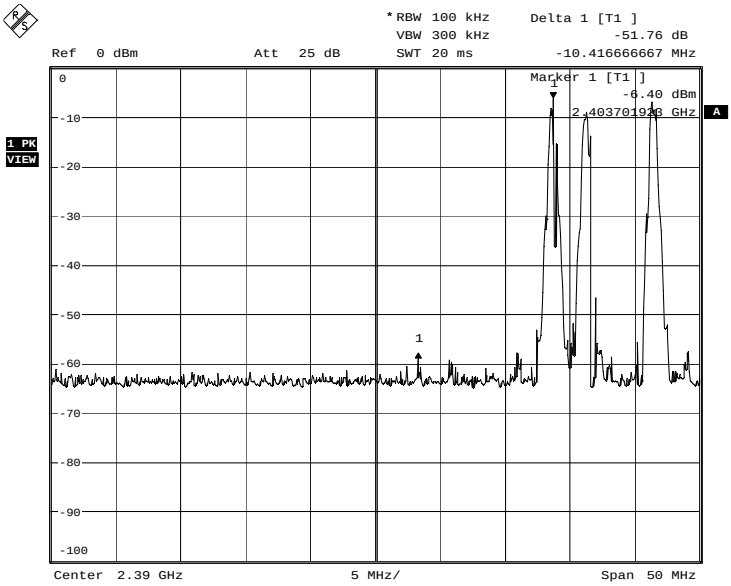
Date: 10.FEB.2005 09:47:15



Dutycycle = 20log((0.8253 x 10)/100) = -21.7dB

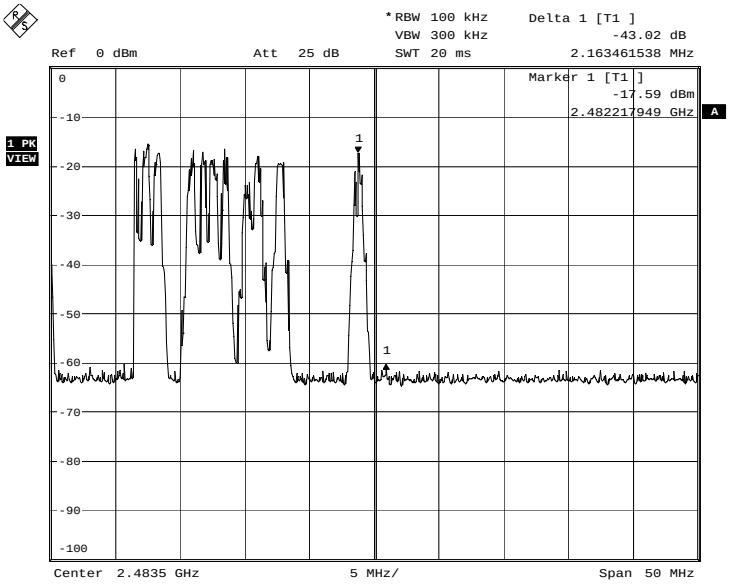
Date: 10.FEB.2005 09:53:35

Band Edge Hopping On:



Lower Bandedge Hopping On

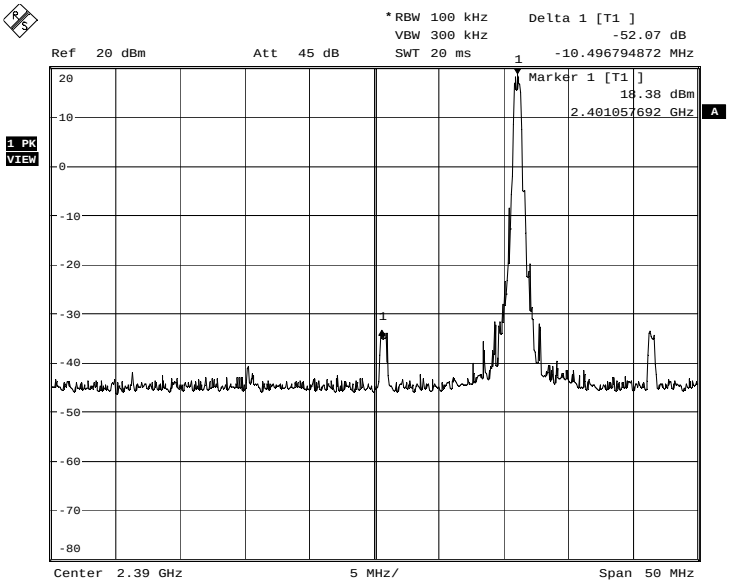
Date: 10.FEB.2005 09:59:57



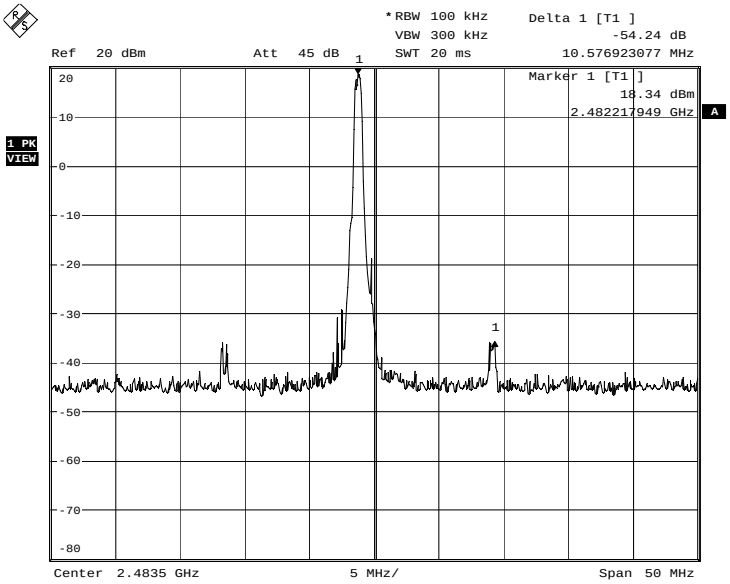
Upper Bandedge Hopping On

Date: 10.FEB.2005 10:02:04

Band Edge Hopping Off:

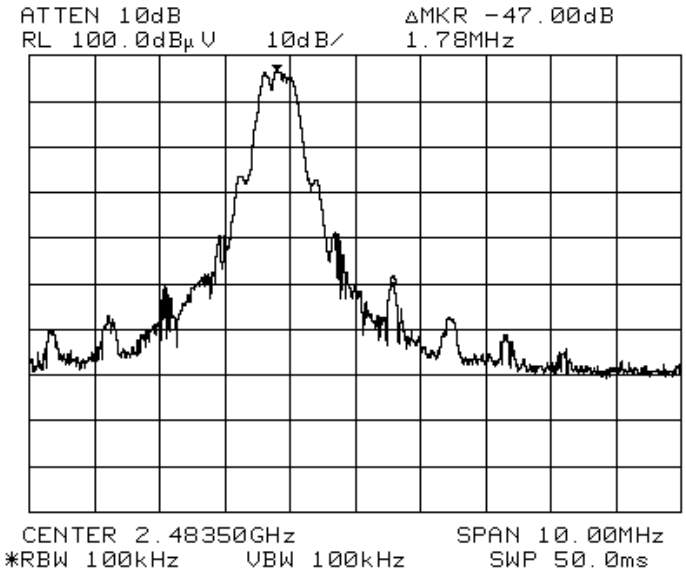


Lower Bandedge Hopping Off
Date: 10.FEB.2005 09:39:32



Upper Bandedge Hopping Off
Date: 10.FEB.2005 09:43:15

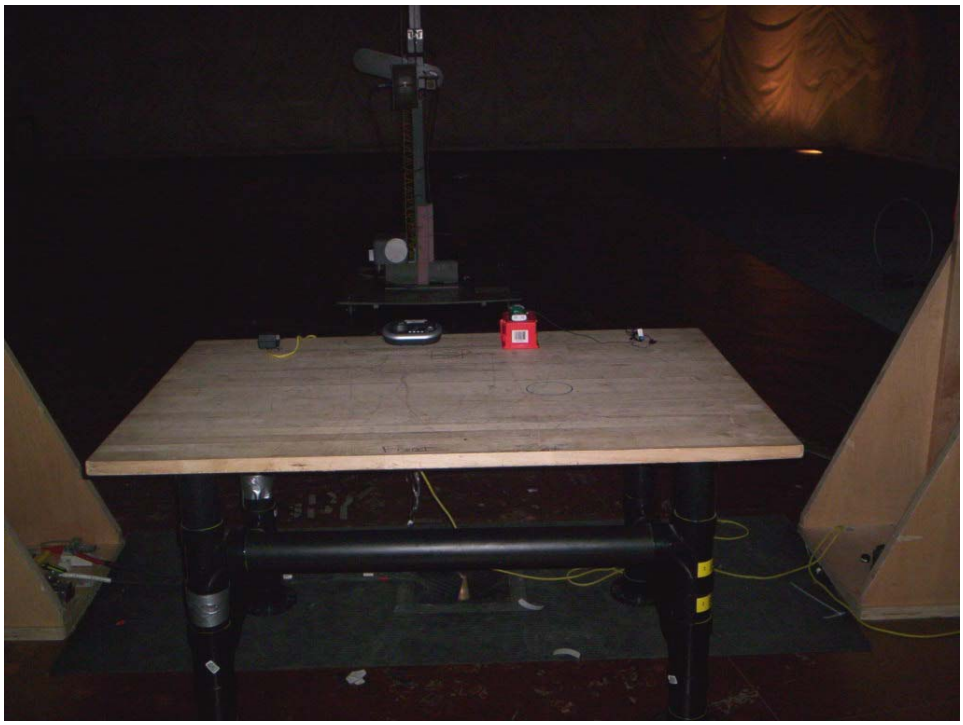
Delta Marker Method



Measured Fundamental Field Strength = 111.6dBuV/m @ 3m

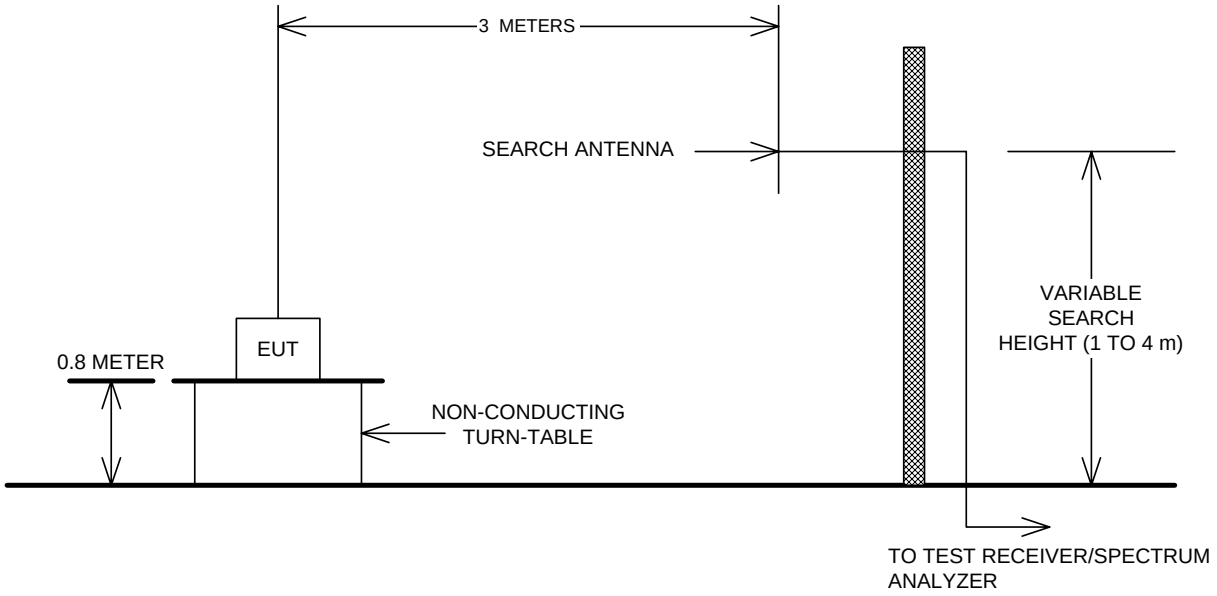
Field strength @ marker:
Peak : 111.6dBuV/m – 47 = 64.6dBuV/m @ 3m
Average : 64.6dBuV/m – 21.9 = 42.7dBuV/m @ 3m

Set-up Photos

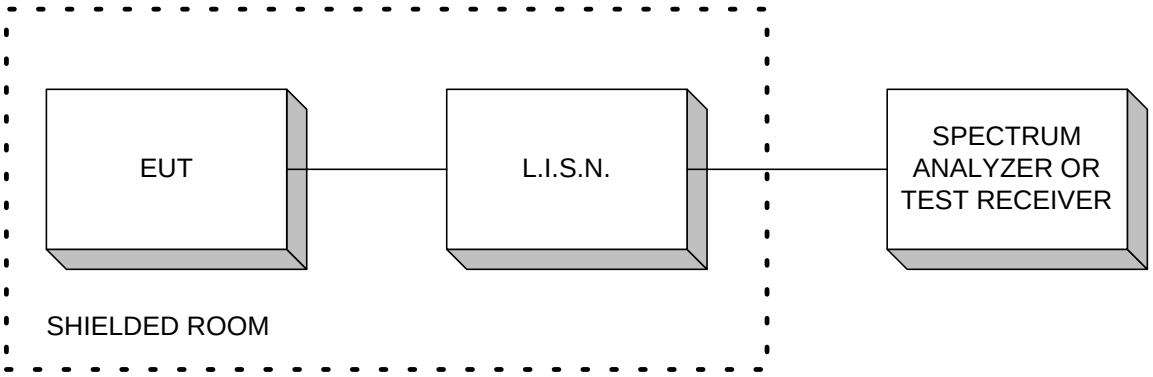


Section 9. Block Diagrams

Test Site For Radiated Emissions



Conducted Emissions



Section 10. Test Equipment List

CAL Cycle	Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
1 Year	Receiver	Rohde & Schwarz	ESVS-30	FA001445	July 07/05
1 Year	Bilog	Schaffner	CBL6112B	FA001503	July 09/05
1 Year	LISN	Tegam	95300-50	FA000986	Jan. 27/05
1 Year	LISN	Tegam	95300-50	FA000987	Jan. 27/05
1 Year	Spectrum Analyzer	Hewlett-Packard	8566B	FA001309	May 28/05
1 Year	Spectrum Analyzer Display	Hewlett-Packard	85662A	FA001309	May 28/05
1 Year	Transient Limiter	Hewlett-Packard	1194 7A	FA000975	June 10/05
1 Year	Spectrum Analyzer	Hewlett-Packard	8564E	FA001367	June 28/05
1 Year	Spectrum Analyzer	Rohde & Schwarz	FSU	FA001877	May 26/05
NCR	Bilog	Schaffner	CBL6112B	FA001504	NCR
1 Year	Horn Antenna #1	EMCO	3115	FA000649	Dec. 22/05
NCR	0.1 – 1300 MHz Amplifier	Hewlett Packard	8447D	FA001748	NCR

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use

Section 11. Restricted bands (15.205)

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			