

	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 1 of 37



dB Technology
 (Cambridge Ltd.)
 EMC Testing EMC Consultancy EMC Training

23, Headington Drive,
 Cambridge.
 CB1 9HE
 Tel : 01954 251974 (test site)
 or : 01223 241140 (accounts)
 Fax : 01954 251907
 web : www.dbtechnology.co.uk
 email: mail@dbtechnology.co.uk

REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

Performed at:
TWENTY PENCE TEST SITE

**Twenty Pence Road,
 Cottenham,
 Cambridge
 U.K.
 CB4 8PS**

on

Ubisense

Ubisensor

dated

10 August 2004

Document History

Issue	Date	Affected page(s)	Description of modifications	Revised by	Approved by
1	12/08/04		Initial release		

Based on report template:
 v040722

*This report shall not be reproduced except in full, without the written approval of:
 dB Technology (Cambridge) Ltd.*

	Report No: R1908	FCC ID: SEAUBISENSOR10	Page: 2 of 37
	Issue No: 1		
Test No: T1334		Test Report	

Equipment Under Test (EUT): Ubisensor

Test Commissioned by: Ubisense
1 Quayside
Cambridge
CB5 8AB
Cambridgshire
UK

Representative: Andy Ward

Test Started: 27 July 2004

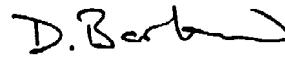
Test Completed: 4 August 2004

Test Engineer: Dave Smith

Date of Report: 10 August 2004

Report:

Written by: Dave Smith Checked by: Derek Barlow

 Signature: 
 Date: 10th August 2004 Date: 12th August 2004

dB Technology can only report on the specific unit(s) tested at its site. The responsibility for extrapolating this data to a product line lies solely with the manufacturer.

Test Standards Applied

CFR 47 : 2004

Code of Federal Regulations: Pt 15 Subpart C - Radio Frequency Devices - Intentional Radiators

	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 3 of 37

Emissions Test Results Summary

CFR 47 : 2004

Test	Port	Method	Limit	PASS/FAIL	PASS	Notes
Conducted Emissions	ac power	ANSI C63.4:1992	CISPR22(B)	PASS		
Radiated Emissions		ANSI C63.4:1992	FCC_15B Class A & FCC_C (15.249)	PASS		

fcc_v031110

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		
	Test No: T1334	Test Report	Page: 4 of 37

Contents

1 EUT Details	5
1.1 General	5
1.2 Details of Interconnecting Cables	6
1.3 Modifications to EUT and Peripherals	6
1.4 EUT Operating Modes	6
<i>Figure 1 General Arrangement of EUT and Peripherals</i>	7
<i>Photograph 1 Conducted Emissions - Front</i>	8
<i>Photograph 2 Conducted Emissions - Back</i>	8
<i>Photograph 3 Radiated Emissions - Front</i>	9
<i>Photograph 4 Radiated Emissions - Back</i>	9
2 Test Equipment	10
3 Test Methods	11
3.1 Conducted Emissions - ac power	11
3.2 Radiated Emissions	11
4 Test Results	11
4.1 Conducted Emission Results	12
4.2 Radiated Emissions Results - Low Channel	13
4.3 Radiated Emissions Results - High Channel	14
<i>PLOT 1 Conducted Emissions - 115V - Live</i>	15
<i>PLOT 2 Conducted Emissions - 115V - Neutral</i>	16
<i>PLOT 3 Radiated Emissions - 30MHz to 1GHz - Low Channel - Antenna A</i>	17
<i>PLOT 4 Radiated Emissions - 30MHz to 1GHz - Low Channel - Antenna B</i>	18
<i>PLOT 5 Radiated Emissions - 30MHz to 1GHz - High Channel - Antenna A</i>	19
<i>PLOT 6 Radiated Emissions - 30MHz to 1GHz - High Channel - Antenna B</i>	20
<i>PLOT 7 Radiated Emissions - 1GHz to 6GHz - Low Channel - Antenna A</i>	21
<i>PLOT 8 Radiated Emissions - 1GHz to 6GHz - Low Channel - Antenna B</i>	22
<i>PLOT 9 Radiated Emissions - 1GHz to 6GHz - High Channel - Antenna A</i>	23
<i>PLOT 10 Radiated Emissions - 1GHz to 6GHz - High Channel - Antenna B</i>	24
<i>PLOT 11 Radiated Emissions - 6GHz to 10GHz - Vert. - Low Channel - Antenna A</i>	25
<i>PLOT 12 Radiated Emissions - 6GHz to 10GHz - Hor. - Low Channel - Antenna A</i>	26
<i>PLOT 13 Radiated Emissions - 6GHz to 10GHz - Vert. - Low Channel - Antenna B</i>	27
<i>PLOT 14 Radiated Emissions - 6GHz to 10GHz - Hor. - Low Channel - Antenna B</i>	28
<i>PLOT 15 Radiated Emissions - 6GHz to 10GHz - Vert. - High Channel - Antenna A</i>	29
<i>PLOT 16 Radiated Emissions - 6GHz to 10GHz - Hor. - High Channel - Antenna A</i>	30
<i>PLOT 17 Radiated Emissions - 6GHz to 10GHz - Vert. - High Channel - Antenna B</i>	31
<i>PLOT 18 Radiated Emissions - 6GHz to 10GHz - Hor. - High Channel - Antenna B</i>	32
<i>PLOT 19 Tx bandwidth - Low Channel - Antenna A (with 120kHz rbw detector)</i>	33
<i>PLOT 20 Tx bandwidth - Low Channel - Antenna B (with 120kHz rbw detector)</i>	34
<i>PLOT 21 Tx bandwidth - High Channel - Antenna A (with 120kHz rbw detector)</i>	35
<i>PLOT 22 Tx bandwidth - High Channel - Antenna B (with 120kHz rbw detector)</i>	36
<i>PLOT 23 Tx bandwidth - Low Channel - Antenna B (with 3kHz rbw detector)</i>	37

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		
	Test No: T1334	Test Report	Page: 5 of 37

1 EUT Details

1.1 General

The EUT was Ubisensor which contains a radio transceiver operating within the frequency band 908.37MHz to 915MHz.

The Ubisensor was considered as a composite device consisting of:

- o a transmitter (and its associated control circuitry)
- o a receiver (contained within the transceiver circuit)
- o a Class A digital device

The transmitter is subject to Certification Authorisation. The class A digital device and the receiver are subject to Verification Authorisation (see section 15.101b of CFR 47)

This report concentrates only on the transmitter section of the composite device (although emissions were measured from both the transmitter circuit and the active parts of the digital device).

The Ubisensor was considered as an intentional radiator operating under the rules of section 15.249 of CFR 47.

The device has two antennae which are internal to the system. Tests were performed with both antennae - an internal switch was used to select between the two.

The maximum clock frequency of the digital circuitry used to control the transmitter was 14.7456MHz. The maximum clock frequency of the Class A digital device circuitry was 315MHz.

Details of the EUT and associated peripherals used during the tests are listed below. Figure 1 shows the interconnections between the EUT and peripherals.

Item	Manufacturer	Model	Description	Serial No:	Notes
	Ubisense Stontronics	Ubisensor EPA-121DA-12	EUT power adaptor		

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		
Test No: T1334		Test Report	Page: 6 of 37

1.2 Details of Interconnecting Cables

The following table lists details of the cables connected to the EUT.

From	To	Cable Type	Length	Notes
EUT	power adaptor	unscreened 2 core	1.8m	
power adaptor	ac power	unscreened 2 core	1.8m	

1.3 Modifications to EUT and Peripherals

Details of any modifications that were required to achieve compliance are listed below. The modification numbers are referred to in the results sections as appropriate.

Mod No:	Details	Implemented for
0	Unmodified unit as submitted for testing.	

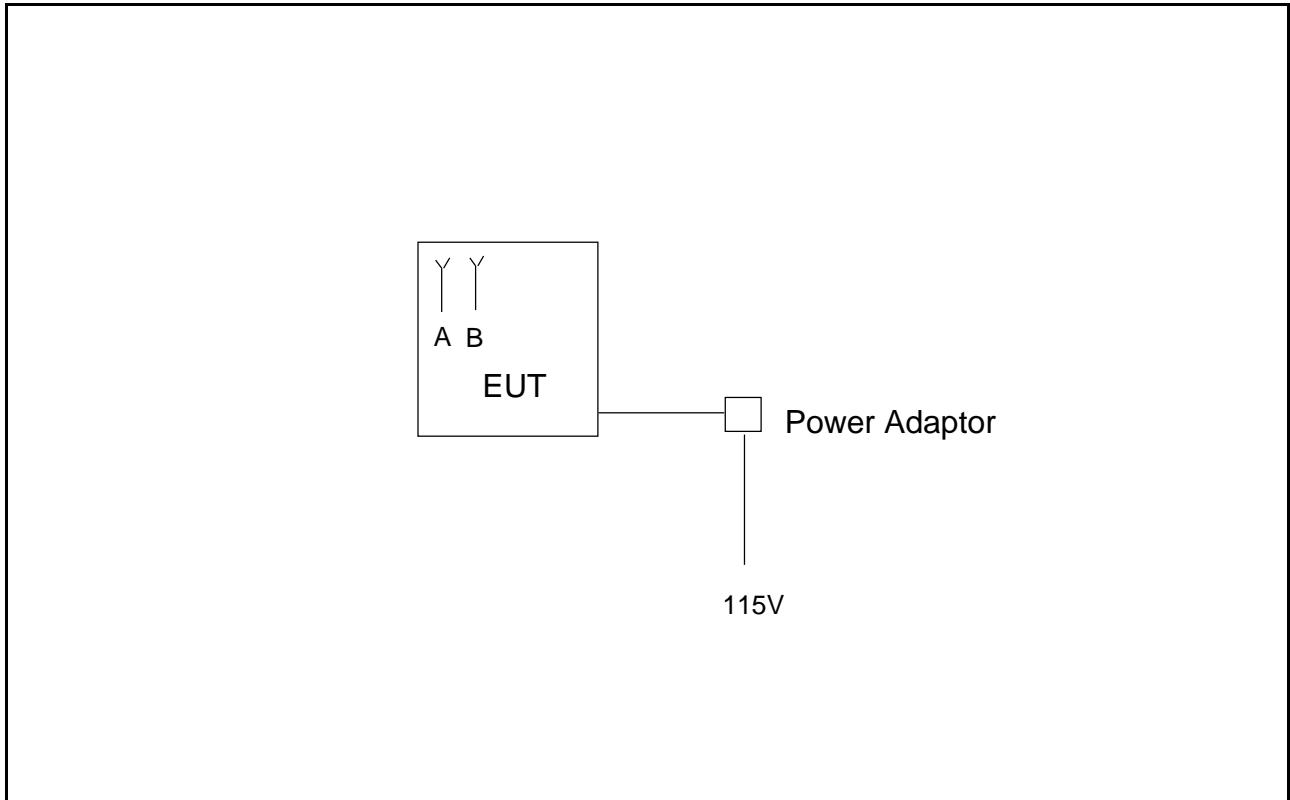
1.4 EUT Operating Modes

The EUT was tested in the following operating mode or modes. Generally, operating modes are chosen that will exercise the functions of the EUT as fully as possible and in a manner likely to produce maximum emission levels or susceptibility. Individual test result sheets reference the operating mode of the EUT.

Operating Mode	Details
1	Transmitting at 908.37MHz - using antenna A.
2	Transmitting at 908.37MHz - using antenna B.
3	Transmitting at 915MHz - using antenna A.
4	Transmitting at 915MHz - using antenna B.

	Report No: R1908 Issue No: 1	FCC ID: SEaubisensor10	
Test No: T1334		Test Report	Page: 7 of 37

Figure 1 General Arrangement of EUT and Peripherals



	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 8 of 37

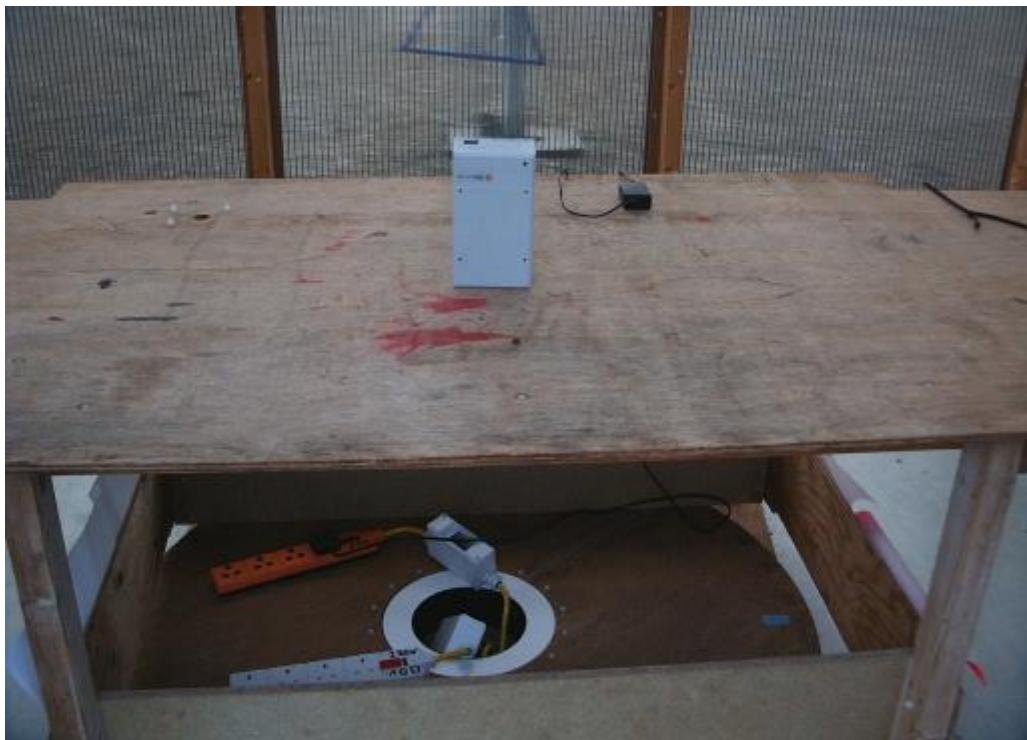


Photograph 1 Conducted Emissions - Front



Photograph 2 Conducted Emissions - Back

	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 9 of 37



Photograph 3 Radiated Emissions - Front



Photograph 4 Radiated Emissions - Back

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		
Test No: T1334		Test Report	Page: 10 of 37

2 Test Equipment

The test equipment used during the tests was one or more of the items listed below. Individual test result sheets indicate which items were used.

Ref No:	Manufacturer	Model	Description	Serial Number	Cal Due
R1	Chase	LHR7000	RF Receiver (10kHz-30MHz)	1056	24 Feb 05
R4	Rohde and Schwarz	ESVS10	RF Receiver (20MHz-1GHz)	843744/002	11 Mar 05
R5	Hewlett Packard	HP 8595E	Spectrum Analyser	3412A00701	7 Jan 05
R5B	Hewlett Packard	HP87405A	Pre-amp	3207A00322	7 Jan 05
R6	Marconi Instruments	2390	Spectrum Analyser	23901010	6 Feb 05
L1	EMCO	3825/2	LISN	1358	17 Nov 04
A5	Chase	CBL6111A	Bilog Antenna (30MHz-1GHz)	1760	26 Aug 04
A8	EMCO	3115	DR Waveguide Ant (1GHz-18GHz)	0002-6070	2 Mar 05
A12	Chase	CBL6111A	Bilog Antenna (30MHz-1GHz)	1012	26 Aug 04
PRE3	dB Technology	Pre-amp	36dB Pre-amp (100MHz to 20GHz)	03	9 Jan 05

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		
	Test No: T1334	Test Report	Page: 11 of 37

3 Test Methods

3.1 Conducted Emissions - ac power

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Bench top EUTs and peripheral equipment are normally placed on a 0.8m high non-conducting bench, positioned 0.4m from one of the metallic walls of a screened room. Floor standing EUTs are normally placed 0.1m above the metallic floor of the screened room. Mains leads are bundled so as not to exceed 1m.

The EUT is powered using a 50ohm/50uH Line Impedance Stabilisation Network (LISN). Peripherals are powered using a second a 50ohm/50uH LISN. These LISNs are bonded to the screened room floor.

With the correct supply voltage applied to the EUT scans are performed on both the live and neutral line outputs of the LISN using quasi-peak detection over the specified frequency range. The results of these scans are shown in the plots section at the end of the report.

Significant emissions identified by the scans are measured and the results tabulated. The table of results is shown in the conducted emissions results section.

An absorbing clamp as specified in CISPR16 is used to measure the disturbance power on each cable. A spectrum analyser is connected to the clamp in order to scan the emissions produced over the appropriate frequency range. Each connecting cable is measured individually - all other cables not required for correct operation are disconnected. The measured cable is extended in length to exceed 5m plus twice the length of the clamp. The results of the scans are shown in the plots included at the end of the report. Cables are moved in an attempt to find the configuration which produces highest emissions.

Significant emissions identified by the scans are measured and the results tabulated.

3.2 Radiated Emissions

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Initial scans are performed in a semi-anechoic screened room. Scans are performed over the frequency range specified in the test standard with the antenna both horizontally and vertically polarised. During these scans the EUT and peripherals are rotated through 360°. Bench top EUTs are placed on a non-conducting bench at a height of 0.8m above the ground plane. Floor standing EUTs are placed 0.1m above the ground plane. The results of the scans are shown in the plots included at the end of the report. Cables are moved in an attempt to find the configuration which produces highest emissions.

Significant emissions identified by the scans are measured on an open area test site at the appropriate test distance. Maximised readings are obtained by rotating the EUT through 360° and adjusting the height of the antenna from 1m to 4m. Measurements are made with the antenna both horizontally and vertically polarised and the results tabulated.

4 Test Results

The following sections contain tabulated test results. Plots of various scans are included at the back of this section.

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		
Test No: T1334	Test Report		Page: 12 of 37

4.1 Conducted Emission Results

Test Equipment:	Factor Set 1:	EMLISN	10DB_PAD	RG214	10 m cable
-----------------	---------------	--------	----------	-------	------------

Conducted Emissions

Company:	Ubisense										Product:	Ubisensor						
Date:	3 August 2004										Test Eng:	Dave Smith						
Ports:	ac power																	
Test:	ANSI C63.4:1992 using limits of CISPR22(B)																	
Ports:																		
Test:																		
Plot	Op Mode	Mod State	Line (L/N)	Fact Set	Freq. MHz	Det qp/av	Rec. Level dBuV	Corr'n Factor dB	Total Level dBuV	Limit CISPR22(B) dBuV	Margin CISPR22(B) dB	Limit	Margin	Notes				
1	0	L	1	0.301	qp	32.8	10.1	42.9	60.2	17.3								
1	0	L	1	0.301	av	32.7	10.1	42.8	50.2	7.4								
1	0	L	1	0.600	qp	21.3	10.1	31.4	56.0	24.6								
1	0	L	1	0.600	av	21.0	10.1	31.1	46.0	14.9								
1	0	L	1	0.902	qp	23.5	10.1	33.6	56.0	22.4								
1	0	L	1	0.902	av	22.7	10.1	32.8	46.0	13.2								
1	0	L	1	2.106	qp	17.0	10.1	27.1	56.0	28.9								
1	0	L	1	2.106	av	14.0	10.1	24.1	46.0	21.9								
1	0	N	1	0.302	qp	36.0	10.1	46.1	60.2	14.1								
1	0	N	1	0.302	av	35.7	10.1	45.8	50.2	4.4								
1	0	N	1	0.602	qp	22.5	10.1	32.6	56.0	23.4								
1	0	N	1	0.602	av	21.6	10.1	31.7	46.0	14.3								
1	0	N	1	0.903	qp	24.3	10.1	34.4	56.0	21.6								
1	0	N	1	0.903	av	23.0	10.1	33.1	46.0	12.9								
1	0	N	1	2.102	qp	16.7	10.1	26.8	56.0	29.2								
1	0	N	1	2.102	av	14.5	10.1	24.6	46.0	21.4								
Results					Minimum Margin PASS/FAIL				4.4	dB								
Notes		Comments and Observations																
		<p>Results of scans shown in plot 1 and plot 2.</p> <p>Note: EUT was found to comply with class B limits. As the unit contained a Class A digital device, the higher class A limits could have been applied in which case the margin would have been greater.</p>																

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		
Test No: T1334		Test Report	Page: 13 of 37

4.2 Radiated Emissions Results - Low Channel

Test Equipment:	Factor Set 1: BILOG	RG214	25 m cable
	Factor Set 2: DR_GUIDE	PRE3_043_044	6 m cable

Radiated Emissions

Company:	Ubisense	Product:	Ubisensor
Date:	27 Jul & 2 Aug 2004	Test Eng:	DS
Ports:			
Test:	ANSI C63.4:1992 using limits of	FCC_C	
Ports:			
Test:	ANSI C63.4:1992 using limits of	CISPR22(A)	

Plot	Op	Mod	Dist	Fact	Freq.	Ant	Rec.	Corr'n	Total	Limit	Margin	Limit	Margin	Notes
	Mode	State	m	Set	MHz	Pol	Level	Factor	Level	FCC_C	FCC_C	CISPR22(A)	CISPR22(A)	
3	1	0	10	1	48.130	V	5.6	9.7	15.3			40.0	24.7	1
3	1	0	10	1	679.807	V	4.6	25.9	30.5			47.0	16.5	1
3	1	0	10	1	679.807	H	6.3	25.9	32.2			47.0	14.8	1
3	1	0	3	1	908.411	V	58.8	29.0	87.8	94.0	6.1			A
3	1	0	3	1	908.411	H	58.8	29.0	87.8	94.0	6.2			A
4	2	0	3	1	908.411	V	59.2	29.0	88.2	94.0	5.8			B
4	2	0	3	1	908.411	H	57.2	29.0	86.2	94.0	7.8			B
7	1	0	3	2	1816.800	V	50.1	-7.3	42.8	54.0	11.1			A
7	1	0	3	2	1816.800	H	45.4	-7.3	38.1	54.0	15.9			A
7	1	0	3	2	2725.000	V	55.7	-3.7	51.9	54.0	2.1			A
7	1	0	3	2	2725.000	H	49.2	-3.7	45.4	54.0	8.6			A
7	1	0	3	2	3633.400	V	48.5	-0.7	47.7	54.0	6.3			A
7	1	0	3	2	3633.400	H	48.1	-0.7	47.4	54.0	6.6			A
8	2	0	3	2	1816.800	V	47.0	-7.3	39.7	54.0	14.3			B
8	2	0	3	2	1816.800	H	44.0	-7.3	36.7	54.0	17.3			B
8	2	0	3	2	2725.000	V	56.4	-3.7	52.7	54.0	1.3			B
8	2	0	3	2	2725.000	H	51.7	-3.7	48.0	54.0	6.0			B
8	2	0	3	2	3633.400	V	50.4	-0.7	49.7	54.0	4.3			B
8	2	0	3	2	3633.400	H	48.0	-0.7	47.3	54.0	6.7			B
Results								Minimum Margin		1.3 dB		14.8 dB		
PASS/FAIL								PASS		PASS		PASS		

Notes	Comments and Observations
	Results of screened room scans shown in plot 3 to plot 18. Below 1GHz measurements made with 120kHz quasi-peak detector, above 1GHz with 1MHz peak detector. All tabulated measurements made on open area test site.
1 A B	Not related to intentional radiator. Class A Digital Device emissions (antenna A connected) Antenna A Antenna B Below 1GHz - R4,A5,CBL015 Above 1GHz - R5,A8,PR3,CBL043,CBL044,notch filter

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		
Test No: T1334	Test Report		Page: 14 of 37

4.3 Radiated Emissions Results - High Channel

Test Equipment:	Factor Set 1: BILOG	RG214	25 m cable
	Factor Set 2: DR_GUIDE	PRE3_043_044	6 m cable

Radiated Emissions

Company: Ubisense	Product: Ubisensor
Date: 27 Jul & 2 Aug 2004	Test Eng: DS
<i>Ports:</i>	
Test: ANSI C63.4:1992	using limits of FCC_C
<i>Ports:</i>	
Test: ANSI C63.4:1992	using limits of CISPR22(A)

Plot	Op	Mod	Dist	Fact	Freq.	Ant	Rec.	Corr'n	Total	Limit	Margin			Notes									
	Mode		m	Set	MHz	Pol	Level	Factor	Level	FCC_C	FCC_C												
5	3	0	3	1	914.986	V	55.4	29.1	84.5	94.0	9.5			A									
5	3	0	3	1	914.986	H	54.7	29.1	83.8	94.0	10.2			A									
6	4	0	3	1	914.986	V	53.8	29.1	82.9	94.0	11.1			B									
6	4	0	3	1	914.986	H	54.7	29.1	83.8	94.0	10.2			B									
9	3	0	3	2	1829.972	V	52.0	-7.2	44.8	54.0	9.2			A									
9	3	0	3	2	1829.972	H	49.5	-7.2	42.3	54.0	11.7			A									
9	3	0	3	2	2744.900	V	54.2	-3.7	50.5	54.0	3.5			A									
9	3	0	3	2	2744.900	H	51.5	-3.7	47.8	54.0	6.2			A									
9	3	0	3	2	3660.000	V	46.3	-0.7	45.6	54.0	8.4			A									
9	3	0	3	2	3660.000	H	49.8	-0.7	49.1	54.0	4.9			A									
10	4	0	3	2	1829.972	V	54.1	-7.2	46.9	54.0	7.1			B									
10	4	0	3	2	1829.972	H	49.1	-7.2	41.9	54.0	12.1			B									
10	4	0	3	2	2744.900	V	55.8	-3.7	52.1	54.0	1.9			B									
10	4	0	3	2	2744.900	H	51.4	-3.7	47.7	54.0	6.3			B									
10	4	0	3	2	3660.000	V	48.9	-0.7	48.1	54.0	5.9			B									
10	4	0	3	2	3660.000	H	48.2	-0.7	47.4	54.0	6.6			B									
Results					Minimum Margin PASS/FAIL			1.9 dB PASS															
Notes	Comments and Observations																						
A	Results of screened room scans shown in plot 3 to plot 18. Below 1GHz measurements made with 120kHz quasi-peak detector, above 1GHz with 1MHz peak detector. All tabulated measurements made on open area test site.																						
B	Antenna A Antenna B Below 1GHz - R4,A5,CBL015 Above 1GHz - R5,A8,PR3,CBL043,CBL044,notch filter																						

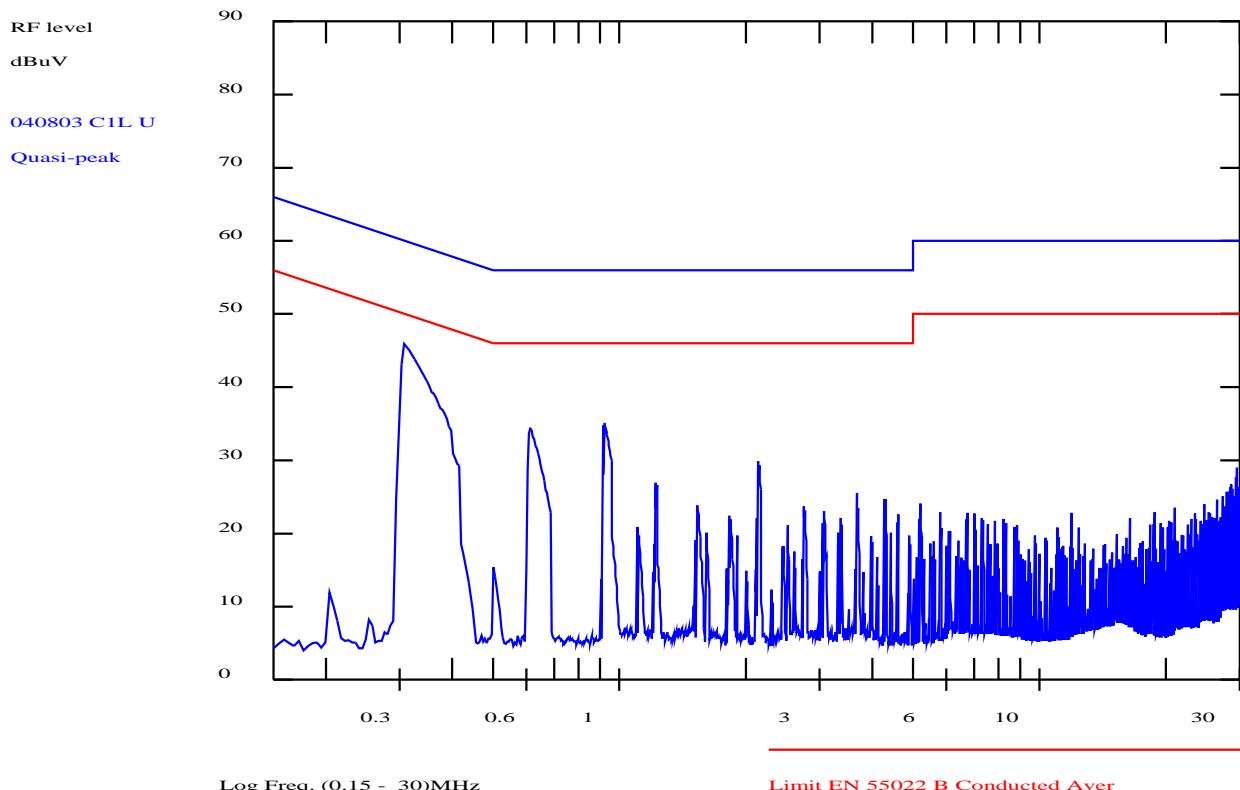
	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 15 of 37

Chase EMS 6.21

Notes

Analyse 040803 C1L Ubisensor

Test: EN55022(B),EN55011(B),EN55014&13 Main Cond(QP Det)



PLOT 1 Conducted Emissions - 115V - Live

Company: Ubisense	Product: Ubisensor
Date: 03 Aug 04	Test Engineer: DS
Test: FCC pt 15	Limit: CISPR(B) QP + AV
Notes:	
Equip: R1,L1,AB001,CBL005,patch 5 and CBL007.	
Line: Live	Attenuator: 10dB PAD
Detector: QuasiPeak	Operating Mode: 1
LISN: EMCO	Mod. State: 0
Filename: C48037CC.plt	

Frequency List (MHz)

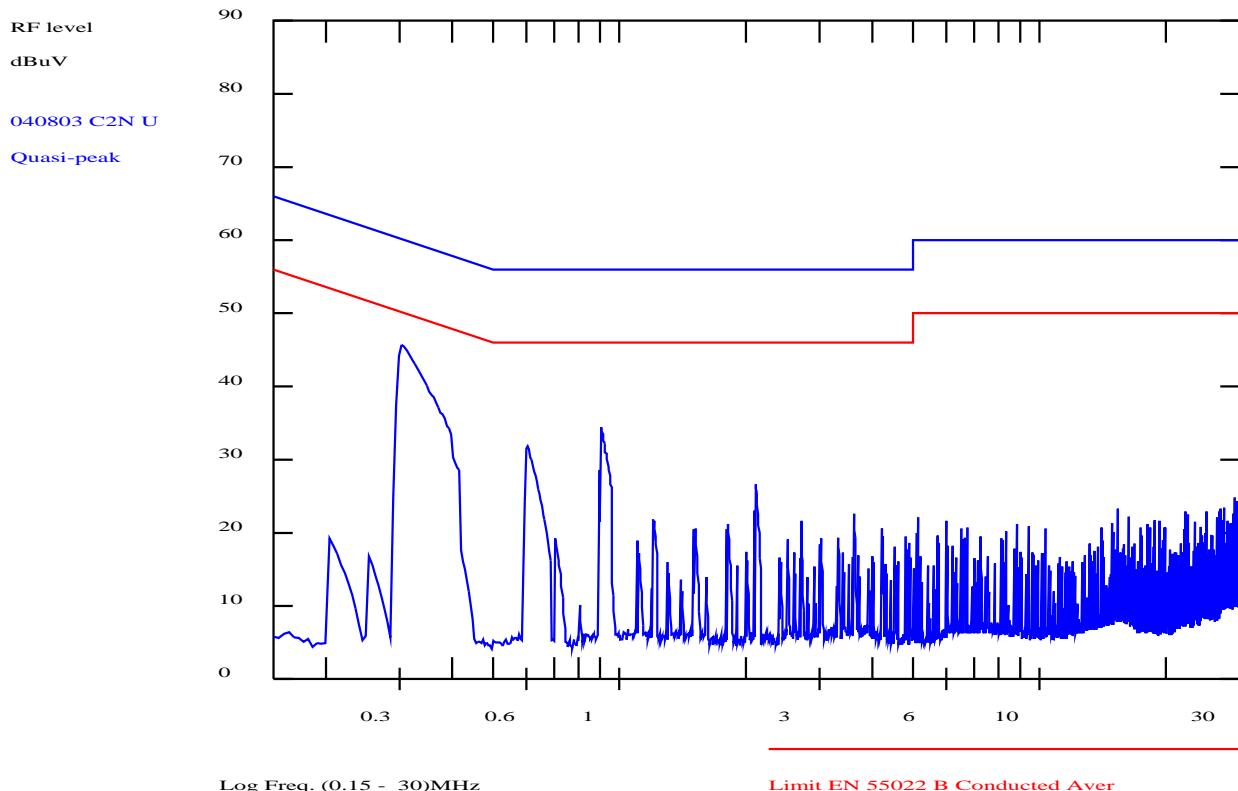
	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 16 of 37

Chase EMS 6.21

Notes

Analyse 040803 C2N Ubisensor

Test: EN55022(B),EN55011(B),EN55014&13 Main Cond(QP Det)



PLOT 2 Conducted Emissions - 115V - Neutral

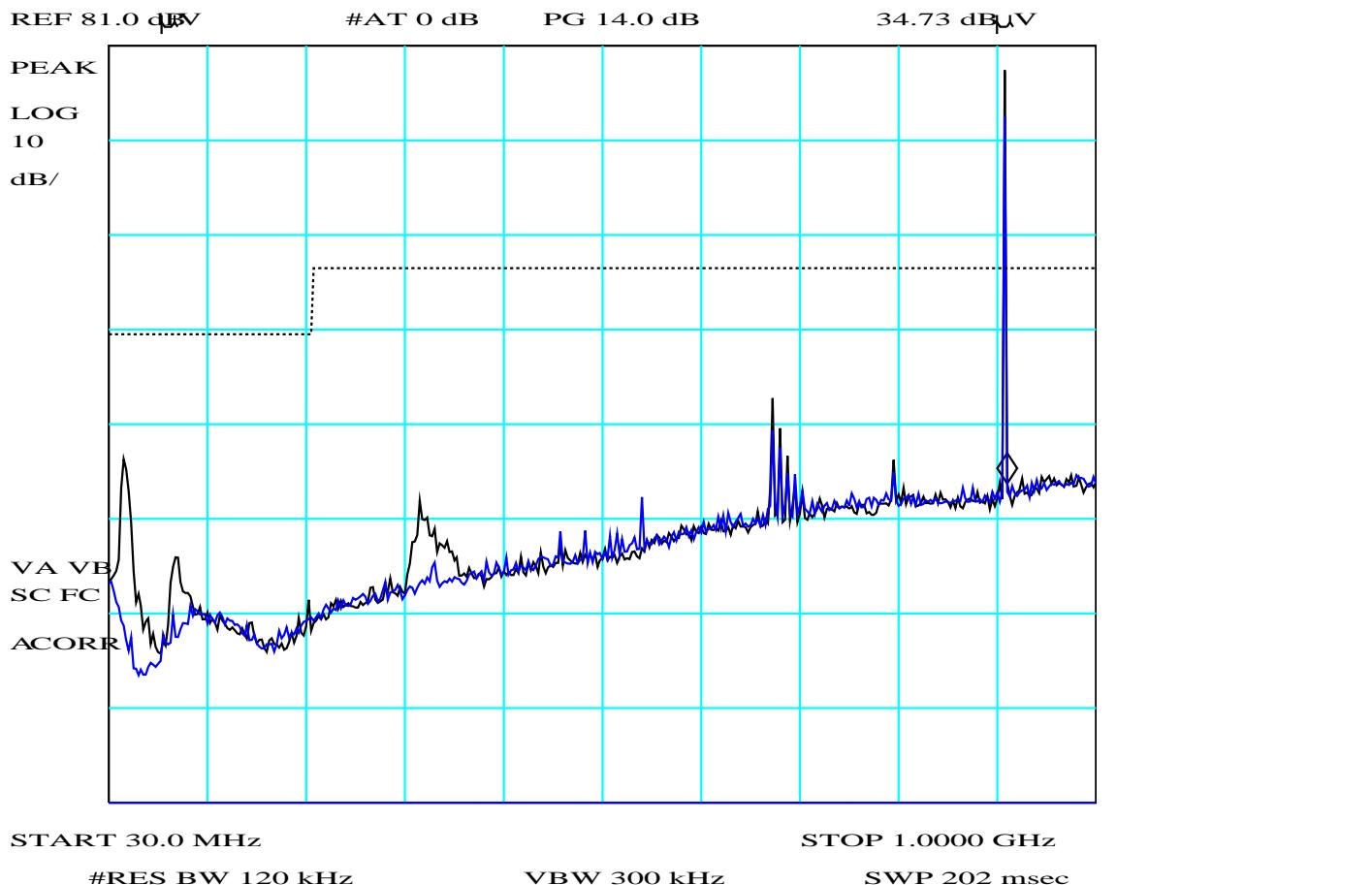
Company:	Ubisense	Product:	Ubisensor
Date:	03 Aug 04	Test Engineer:	DS
Test:	FCC pt 15	Limit:	CISPR (B) QP + AV
Notes:			
Equip: R1,L1,AB001,CBL005,patch 5 and CBL007.			
Line:	Neutral	Attenuator:	10dB PAD
Detector:	QuasiPeak		Operating Mode: 1
LISN:	EMCO	Filename:	C48037E6.plt

Frequency List (MHz)

	Report No: R1908 Issue No: 1 Test No: T1334	FCC ID: SEAUBISENSOR10	
	Test Report		

/p

MKR 912.7 MHz



PLOT 3 Radiated Emissions - 30MHz to 1GHz - Low Channel - Antenna A

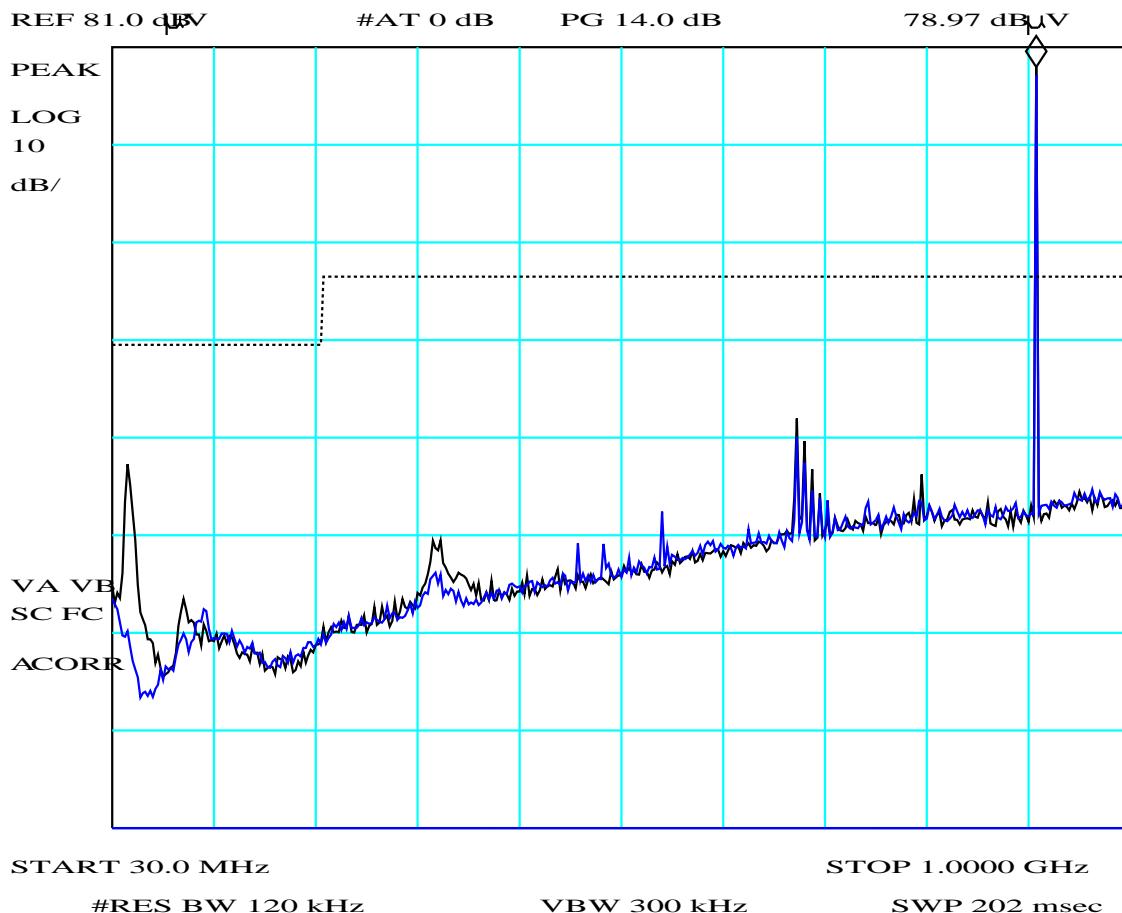
Company: Ubisense Ltd	Product: Ubisensor
Date: 30 Jul 04	Test Engineer: DS
Test: FCC pt 15	Limit: FCC15c
Notes:	
Antenna A	
Tx - Low channel	
Equip: R5,R5B,A12	
Polarisation: V + H	Orientation: 0 - 360°
Distance: 3m	Antenna: BILOG
Height: 1m	Filename: H473080E.plt
Operating Mode: 1	
Mod. State: 0	

Frequency List (MHz)

	Report No: R1908 Issue No: 1 Test No: T1334	FCC ID: SEAUBISENSOR10	
	Test Report		

/p

MKR 910.3 MHz



PLOT 4 Radiated Emissions - 30MHz to 1GHz - Low Channel - Antenna B

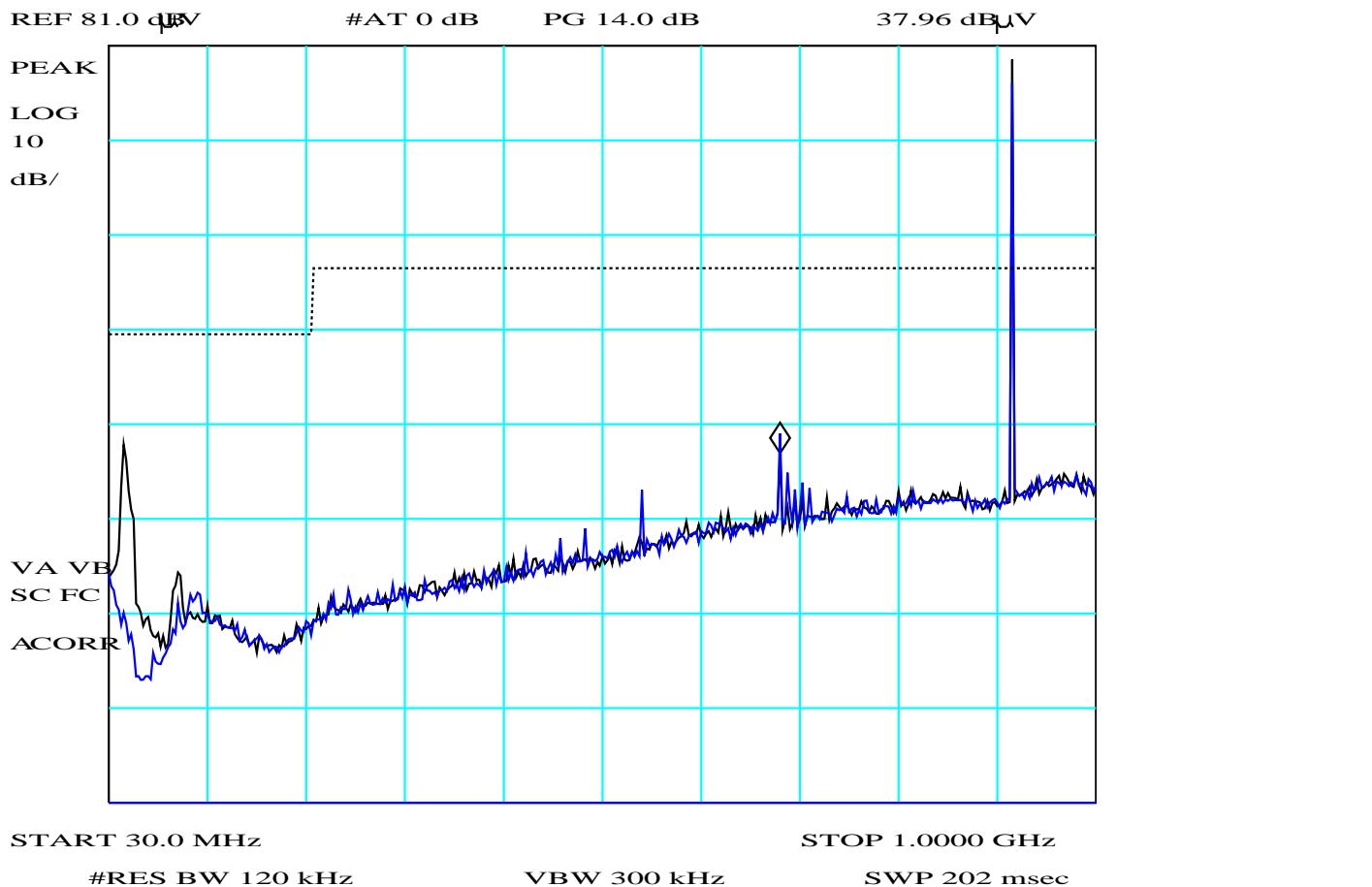
Company:	Ubisense Ltd	Product:	Ubisensor
Date:	30 Jul 04	Test Engineer:	DS
Test:	FCC pt 15	Limit:	FCC15c
Notes:			
Antenna B			
Tx - Low channel			
Equip: R5,R5B,A12			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	BILOG
Height:	1m	Filename:	H4730806.plt

Frequency List (MHz)

	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 19 of 37

/p

MKR 689.6 MHz

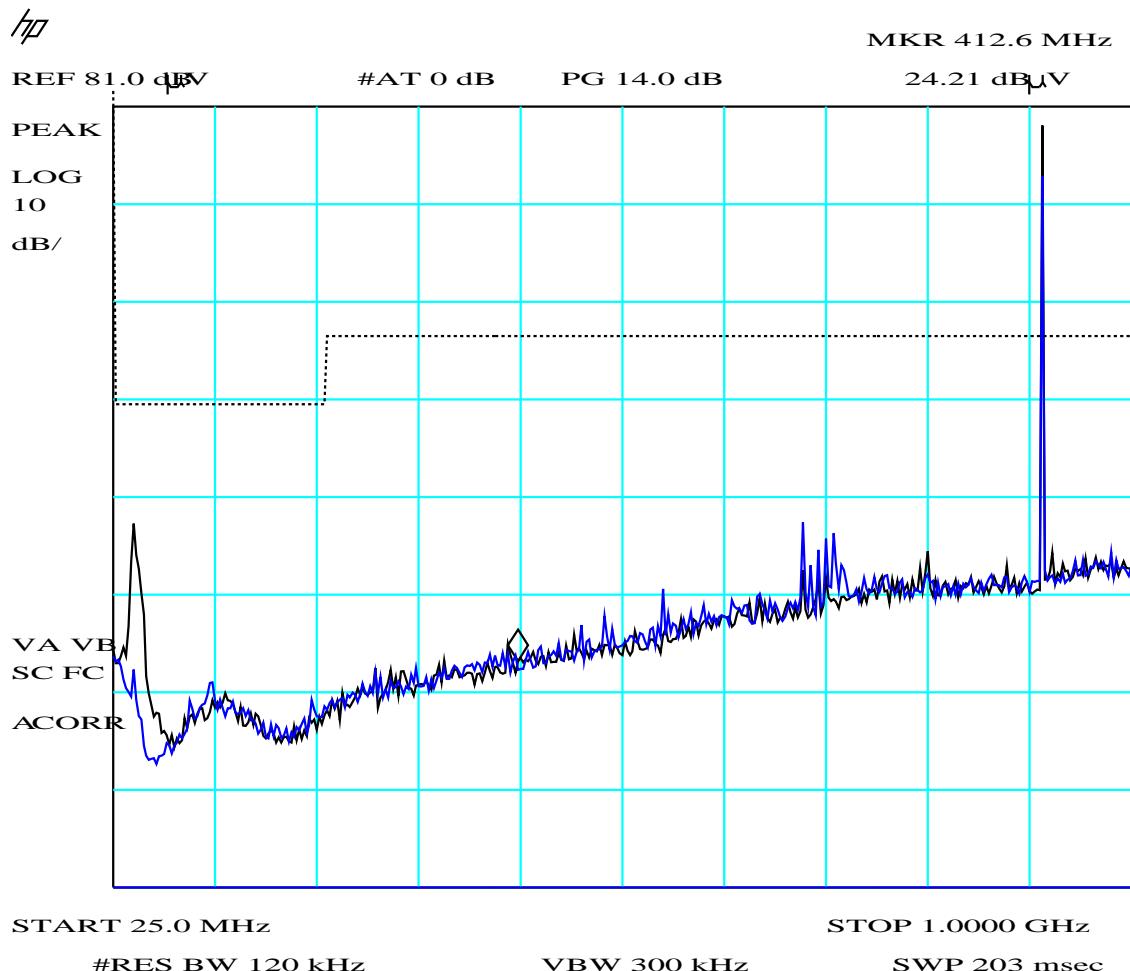


PLOT 5 Radiated Emissions - 30MHz to 1GHz - High Channel - Antenna A

Company: Ubisense Ltd	Product: Ubisensor
Date: 30 Jul 04	Test Engineer: DS
Test: FCC pt 15	Limit: FCC15c
Notes:	
Antenna A	
Tx - High Channel	
Equip: R5,R5B,A12	
Polarisation: V + H	Orientation: 0 - 360°
Distance: 3m	Antenna: BILOG
Height: 1m	Filename: H4730816.plt

Frequency List (MHz)

	Report No: R1908 Issue No: 1 Test No: T1334	FCC ID: SEAUBISENSOR10 Test Report	Page: 20 of 37
---	---	---------------------------------------	----------------



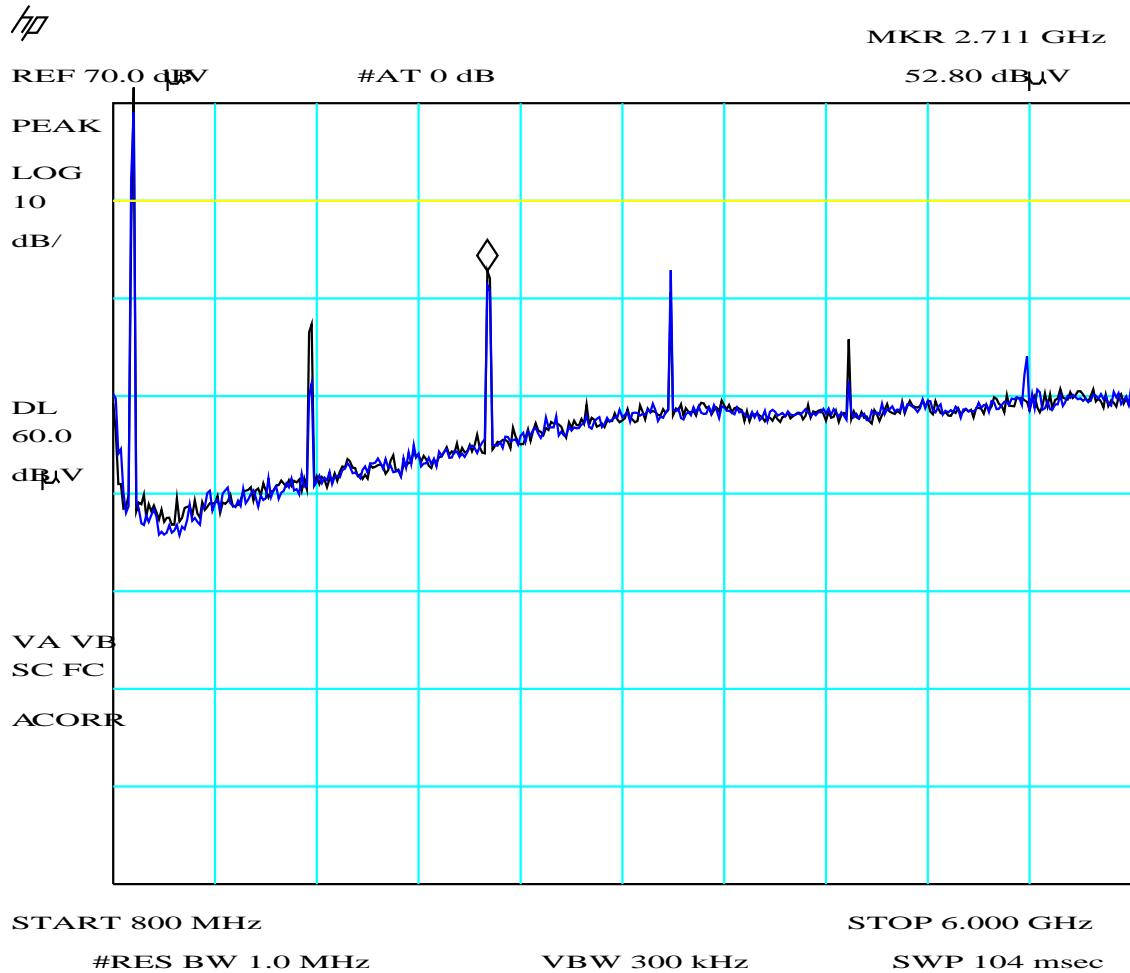
PLOT 6 Radiated Emissions - 30MHz to 1GHz - High Channel - Antenna B

Company:	Ubisense Ltd	Product:	Ubisensor
Date:	30 Jul 04	Test Engineer:	DS
Test:	FCC pt 15	Limit:	FCC15c
Notes:			
Antenna B			
Tx - High Channel			
Equip: R5,R5B,A12			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	BILOG
Height:	1m	Filename:	H473082D.plt

Frequency List (MHz)

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		

Test No: T1334	Test Report	Page: 21 of 37
----------------	-------------	----------------

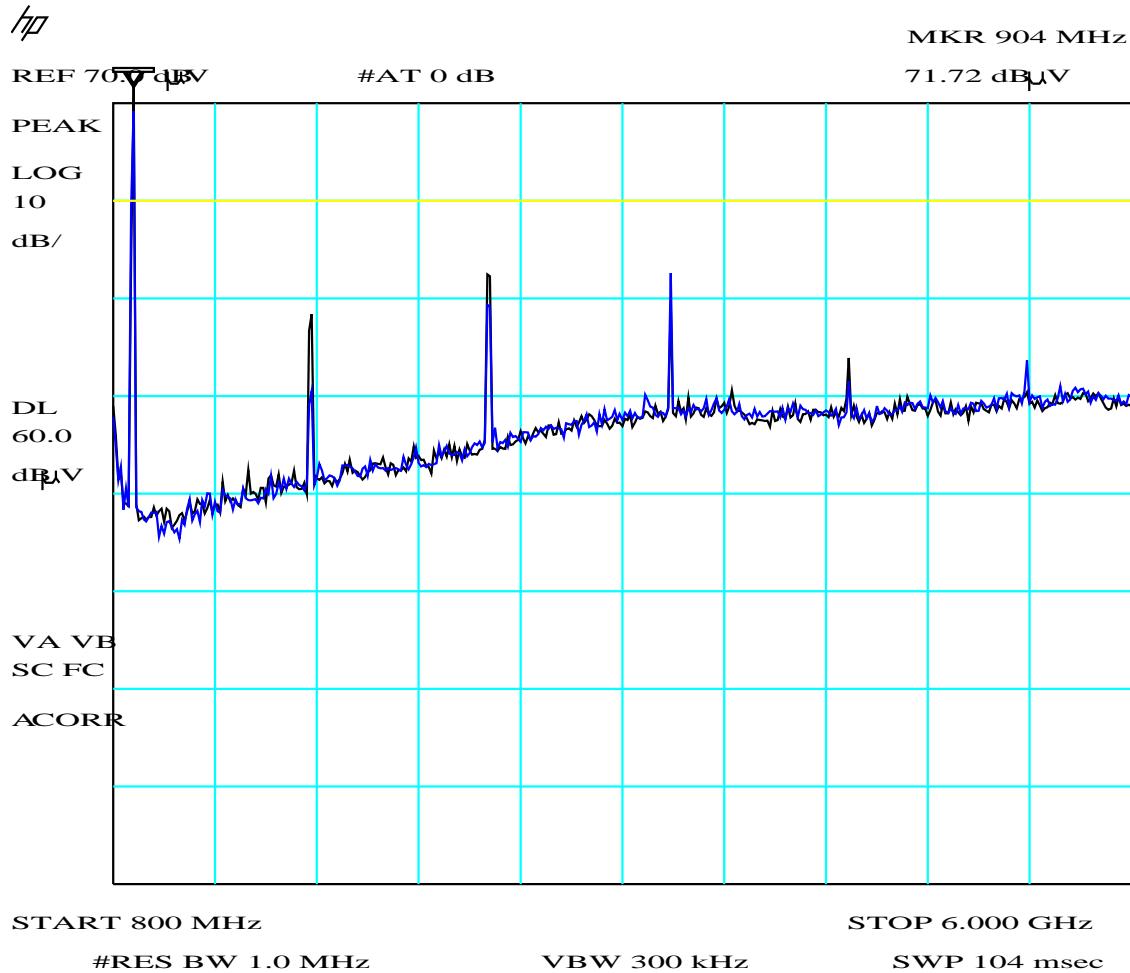


PLOT 7 Radiated Emissions - 1GHz to 6GHz - Low Channel - Antenna A

Company: Ubisense Ltd	Product: Ubisensor
Date: 30 Jul 04	Test Engineer: DS
Test: FCC pt 15	Limit: FCC15c
Notes:	
Antenna A	
Tx - Low channel	
Measured at 1.5m - limit raised 6dB to account for distance.	
Equip: R5,DRG,CBL043,CBL044,PRE3,notch_filter	
Polarisation: V + H	Orientation: 0 - 360°
Distance: 1.5m	Antenna: DRG
Height: 1m	Filename: H4730715.plt

Frequency List (MHz)

	Report No: R1908 Issue No: 1 Test No: T1334	FCC ID: SEAUBISENSOR10 Test Report	Page: 22 of 37
---	---	---------------------------------------	----------------



PLOT 8 Radiated Emissions - 1GHz to 6GHz - Low Channel - Antenna B

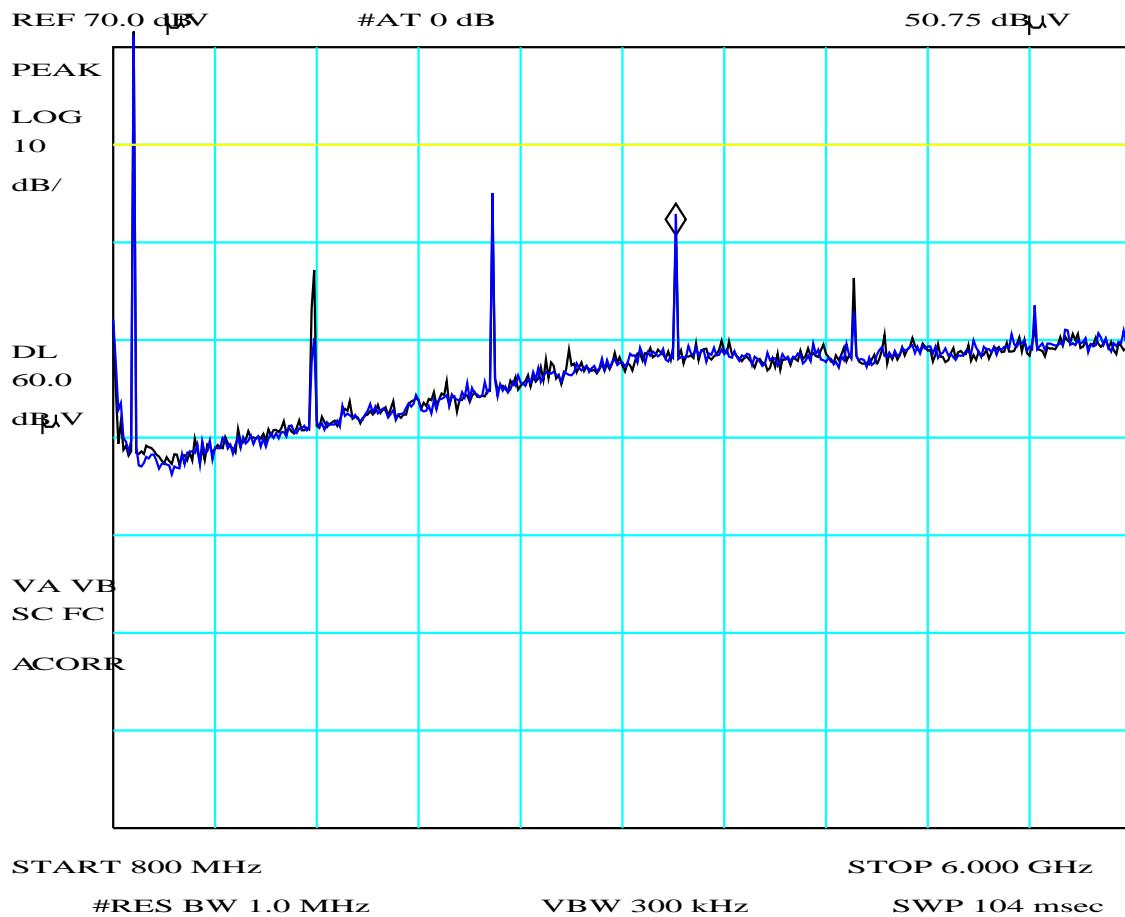
Company: Ubisense Ltd	Product: Ubisensor
Date: 30 Jul 04	Test Engineer: DS
Test: FCC pt 15	Limit: FCC15c
Notes:	
Antenna B	
Tx - Low channel	
Measured at 1.5m - limit raised 6dB to account for distance.	
Equip: R5,DRG,CBL043,CBL044,PRE3,notch_filter	
Polarisation: V + H	Orientation: 0 - 360°
Distance: 1.5m	Antenna: DRG
Height: 1m	Filename: H473070E.plt

Frequency List (MHz)

	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 23 of 37

HP

MKR 3.673 GHz



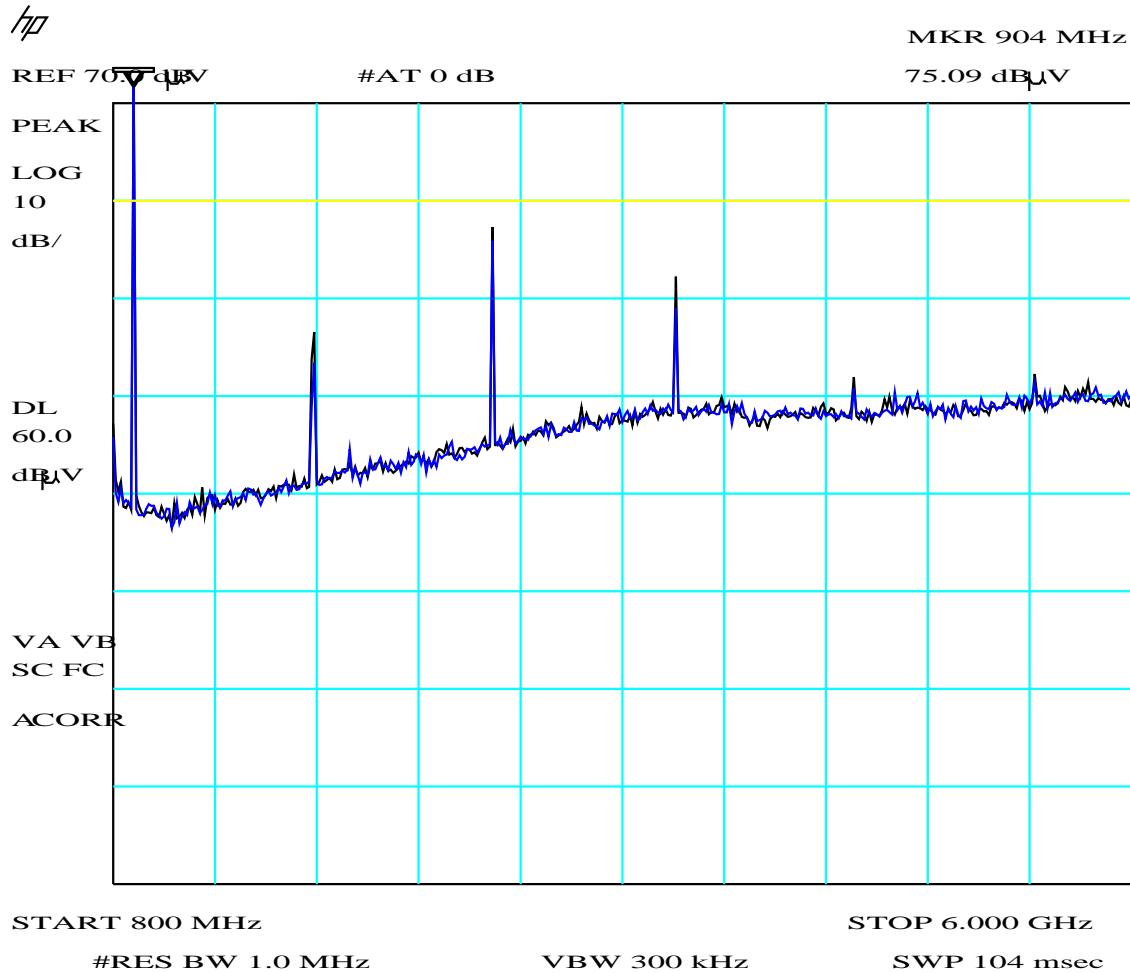
PLOT 9 Radiated Emissions - 1GHz to 6GHz - High Channel - Antenna A

Company: Ubisense Ltd	Product: Ubisensor		
Date: 30 Jul 04	Test Engineer: DS		
Test: FCC pt 15	Limit: FCC15c		
Notes:			
Antenna A			
Tx - High channel			
Measured at 1.5m - limit raised 6dB to account for distance.			
Equip: R5,DRG,CBL043,CBL044,PRE3,notch_filter			
Polarisation: V + H	Orientation: 0 - 360°	Operating Mode: 3	
Distance: 1.5m	Antenna: DRG	Mod. State: 0	
Height: 1m	Filename: H4730730.plt		

Frequency List (MHz)

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		

Test No: T1334	Test Report	Page: 24 of 37
----------------	-------------	----------------

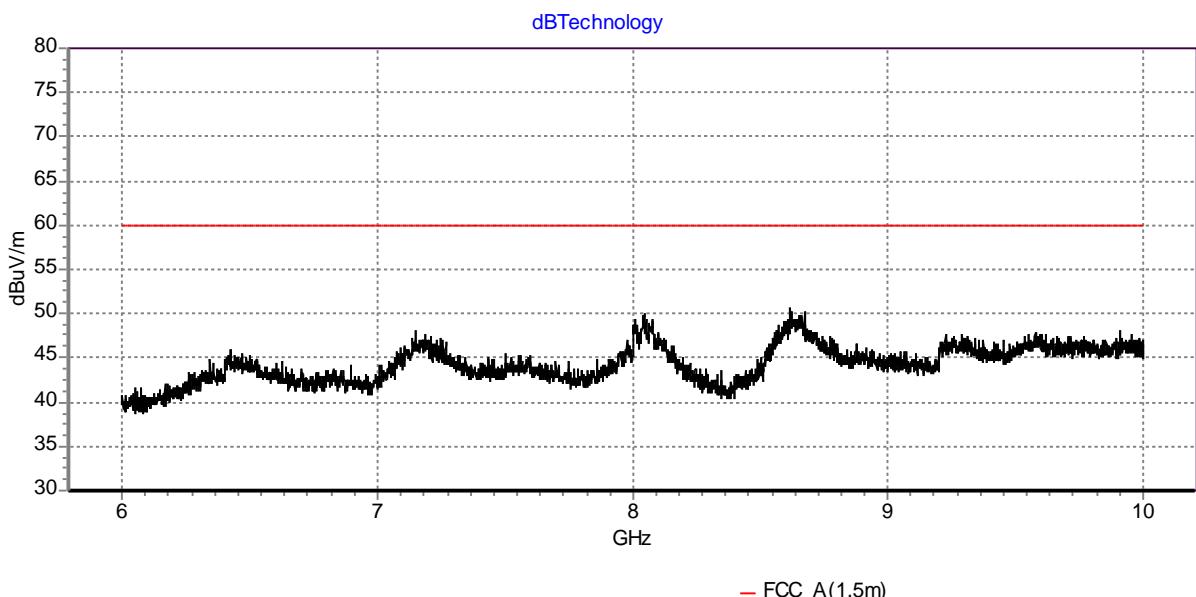


PLOT 10 Radiated Emissions - 1GHz to 6GHz - High Channel - Antenna B

Company: Ubisense Ltd	Product: Ubisensor		
Date: 30 Jul 04	Test Engineer: DS		
Test: FCC pt 15	Limit: FCC15c		
Notes:			
Antenna B			
Tx - High channel			
Measured at 1.5m - limit raised 6dB to account for distance.			
Equip: R5,DRG,CBL043,CBL044,PRE3,notch_filter			
Polarisation: V + H	Orientation: 0 - 360°	Operating Mode: 4	
Distance: 1.5m	Antenna: DRG	Mod. State: 0	
Height: 1m	Filename: H4730737.plt		

Frequency List (MHz)

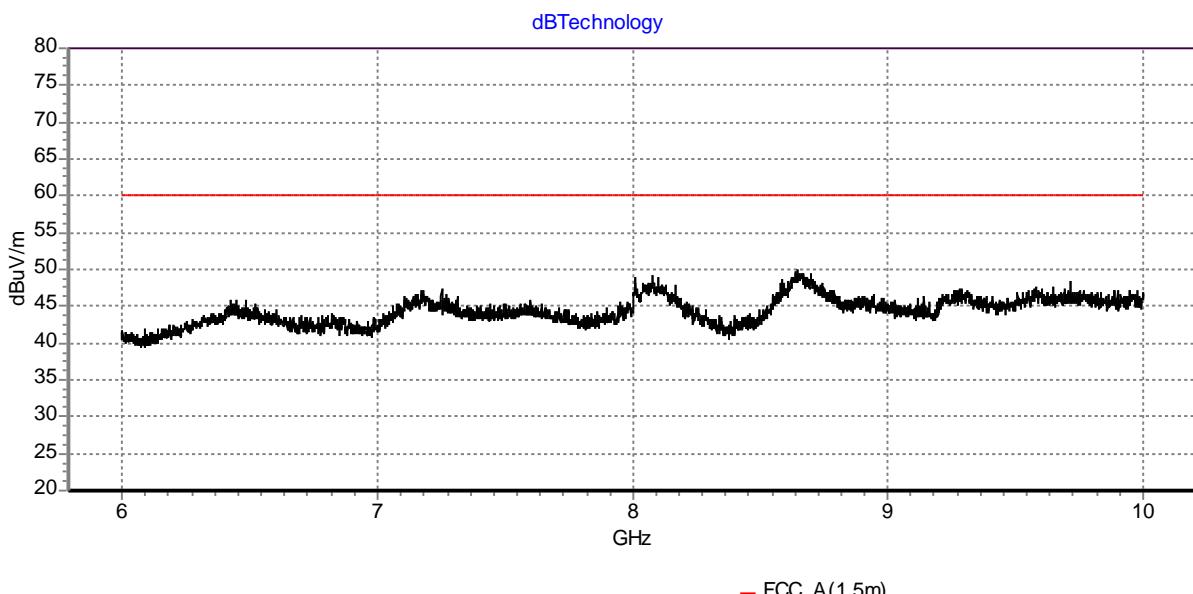
	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 25 of 37



PLOT 11 Radiated Emissions - 6GHz to 10GHz - Vert. - Low Channel - Antenna A

Company: Ubisense	Product: Ubisensor								
Date: 30 July 2004	Test Eng: DS								
Limit1: FCC_A(1.5m)	Limit2:								
CF1: DR_Guide	CF3: dBmV_to_dBuV								
CF3: R6+PRE3+CBL043+CBL045	CF4:								
Antenna A									
TX - Low Channel									
Polarisation: V	Mod. State: 0								
Filename: E:\Tests\T1334\T1334_marconi_8_040730.txt									
Start	Stop	rbw	vbw	time(ms)	Start	Stop	rbw	vbw	time(ms)
6 GHz	6.4 GHz	1 MHz	1 MHz	50					
6.4 GHz	6.8 GHz	1 MHz	1 MHz	50					
6.8 GHz	7.2 GHz	1 MHz	1 MHz	50					
7.2 GHz	7.6 GHz	1 MHz	1 MHz	50					
7.6 GHz	8 GHz	1 MHz	1 MHz	50					
8 GHz	8.4 GHz	1 MHz	1 MHz	50					
8.4 GHz	8.8 GHz	1 MHz	1 MHz	50					
8.8 GHz	9.2 GHz	1 MHz	1 MHz	50					
9.2 GHz	9.6 GHz	1 MHz	1 MHz	50					
9.6 GHz	10 GHz	1 MHz	1 MHz	50					

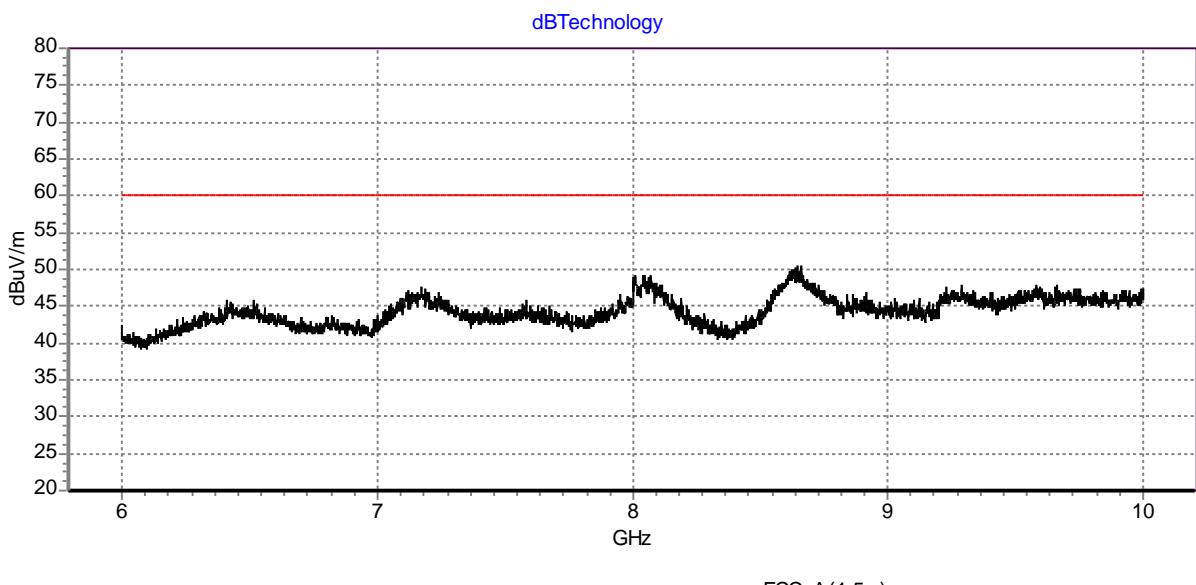
	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 26 of 37



PLOT 12 Radiated Emissions - 6GHz to 10GHz - Hor. - Low Channel - Antenna A

Company: Ubisense	Product: Ubisensor								
Date: 30 July 2004	Test Eng: DS								
Limit1: FCC_A(1.5m)	Limit2:								
CF1: DR_Guide	CF3: dBmV_to_dBuV								
CF3: R6+PRE3+CBL043+CBL045	CF4:								
Antenna A									
TX - Low Channel									
Polarisation: H	Mod. State: 0								
Filename: E:\Tests\T1334\T1334_marconi_7_040730.txt									
Start	Stop	rbw	vbw	time(ms)	Start	Stop	rbw	vbw	time(ms)
6 GHz	6.4 GHz	1 MHz	1 MHz	50					
6.4 GHz	6.8 GHz	1 MHz	1 MHz	50					
6.8 GHz	7.2 GHz	1 MHz	1 MHz	50					
7.2 GHz	7.6 GHz	1 MHz	1 MHz	50					
7.6 GHz	8 GHz	1 MHz	1 MHz	50					
8 GHz	8.4 GHz	1 MHz	1 MHz	50					
8.4 GHz	8.8 GHz	1 MHz	1 MHz	50					
8.8 GHz	9.2 GHz	1 MHz	1 MHz	50					
9.2 GHz	9.6 GHz	1 MHz	1 MHz	50					
9.6 GHz	10 GHz	1 MHz	1 MHz	50					

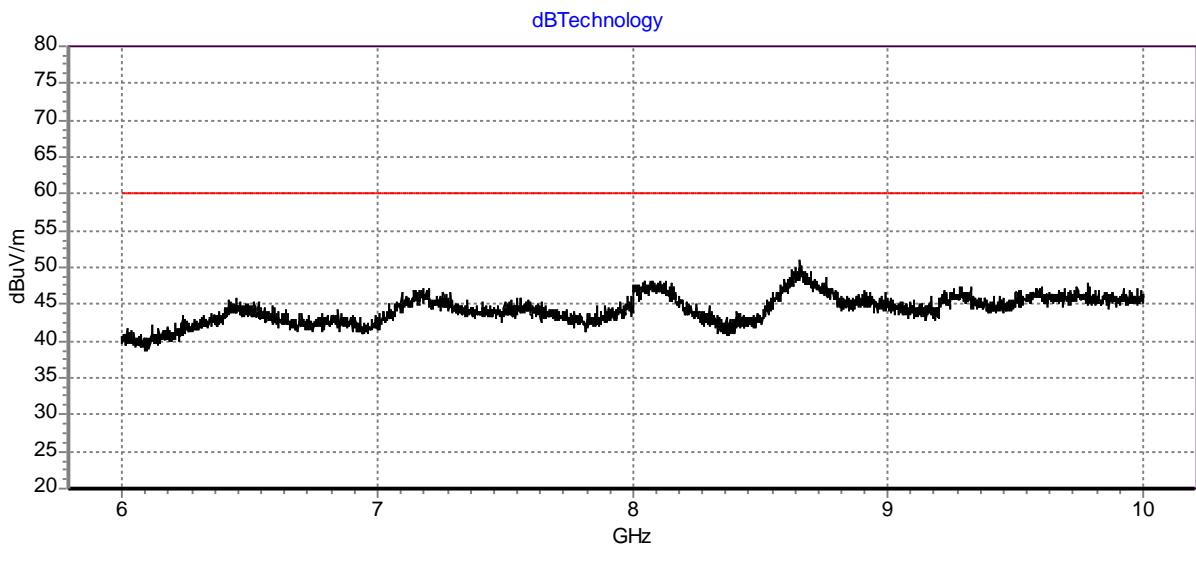
	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 27 of 37



PLOT 13 Radiated Emissions - 6GHz to 10GHz - Vert. - Low Channel - Antenna B

Company: Ubisense	Product: Ubisensor								
Date: 30 July 2004	Test Eng: DS								
Limit1: FCC_A(1.5m)	Limit2:								
CF1: DR_Guide	CF3: dBmV_to_dBuV								
CF3: R6+PRE3+CBL043+CBL045	CF4:								
Antenna B									
TX - Low Channel									
Polarisation: V	Mod. State: 0								
Filename: E:\Tests\T1334\T1334_marconi_5_040730.txt	Mode: 2								
Start	Stop	rbw	vbw	time(ms)	Start	Stop	rbw	vbw	time(ms)
6 GHz	6.4 GHz	1 MHz	1 MHz	50					
6.4 GHz	6.8 GHz	1 MHz	1 MHz	50					
6.8 GHz	7.2 GHz	1 MHz	1 MHz	50					
7.2 GHz	7.6 GHz	1 MHz	1 MHz	50					
7.6 GHz	8 GHz	1 MHz	1 MHz	50					
8 GHz	8.4 GHz	1 MHz	1 MHz	50					
8.4 GHz	8.8 GHz	1 MHz	1 MHz	50					
8.8 GHz	9.2 GHz	1 MHz	1 MHz	50					
9.2 GHz	9.6 GHz	1 MHz	1 MHz	50					
9.6 GHz	10 GHz	1 MHz	1 MHz	50					

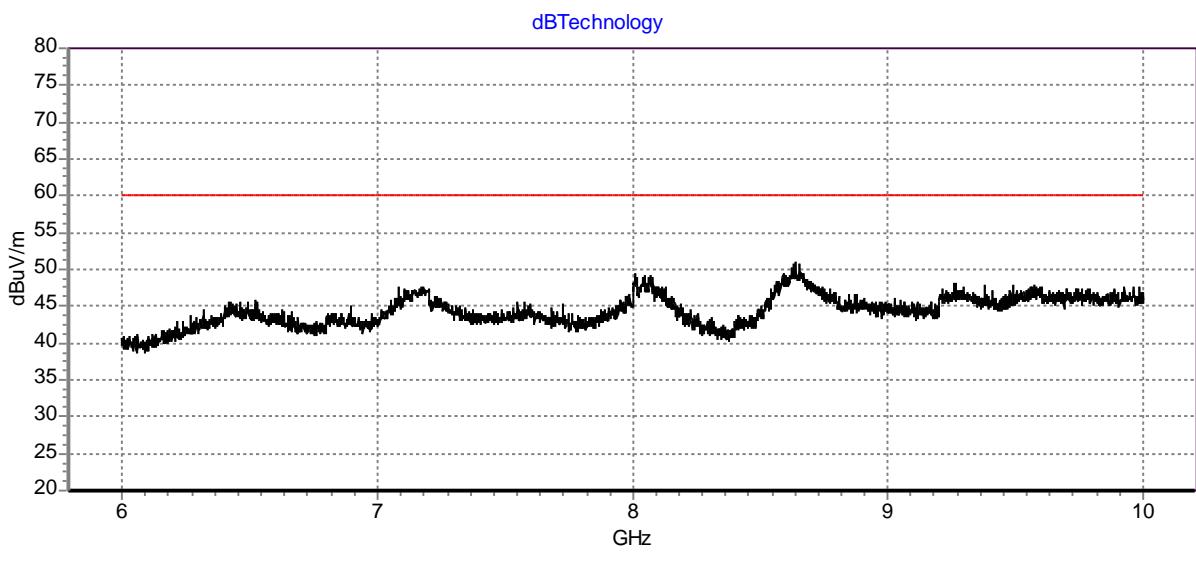
	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 28 of 37



PLOT 14 Radiated Emissions - 6GHz to 10GHz - Hor. - Low Channel - Antenna B

Company: Ubisense	Product: Ubisensor								
Date: 30 July 2004	Test Eng: DS								
Limit1: FCC_A(1.5m)	Limit2:								
CF1: DR_Guide	CF3: dBmV_to_dBuV								
CF3: R6+PRE3+CBL043+CBL045	CF4:								
Antenna B									
TX - Low Channel									
Polarisation: H	Mod. State: 0								
Filename: E:\Tests\T1334\T1334_marconi_6_040730.txt	Mode: 2								
Start	Stop	rbw	vbw	time(ms)	Start	Stop	rbw	vbw	time(ms)
6 GHz	6.4 GHz	1 MHz	1 MHz	50					
6.4 GHz	6.8 GHz	1 MHz	1 MHz	50					
6.8 GHz	7.2 GHz	1 MHz	1 MHz	50					
7.2 GHz	7.6 GHz	1 MHz	1 MHz	50					
7.6 GHz	8 GHz	1 MHz	1 MHz	50					
8 GHz	8.4 GHz	1 MHz	1 MHz	50					
8.4 GHz	8.8 GHz	1 MHz	1 MHz	50					
8.8 GHz	9.2 GHz	1 MHz	1 MHz	50					
9.2 GHz	9.6 GHz	1 MHz	1 MHz	50					
9.6 GHz	10 GHz	1 MHz	1 MHz	50					

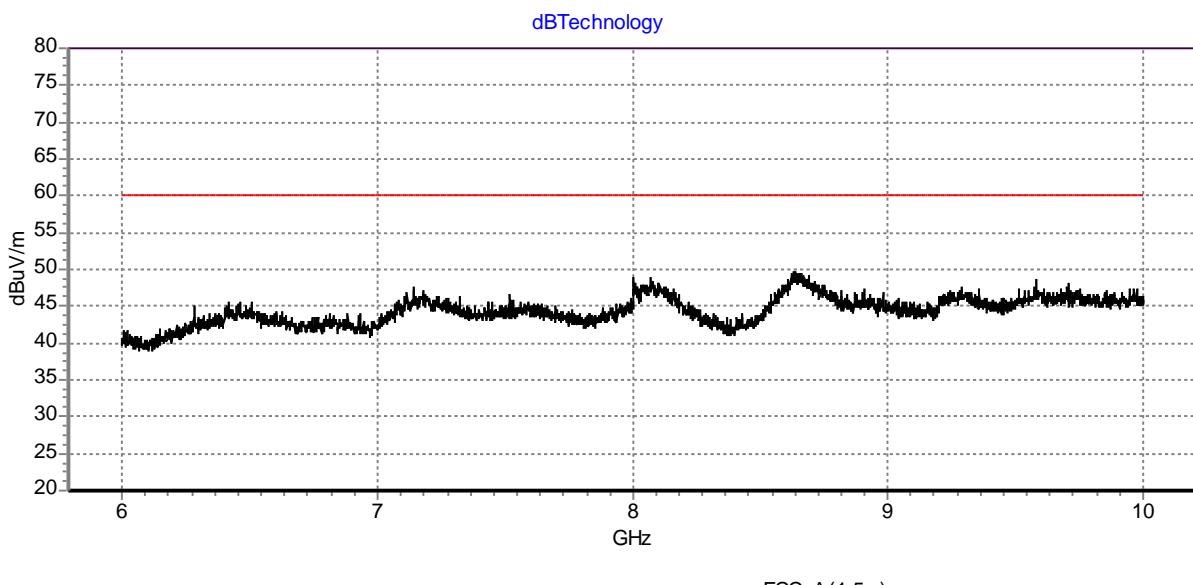
	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 29 of 37



PLOT 15 Radiated Emissions - 6GHz to 10GHz - Vert. - High Channel - Antenna A

Company: Ubisense	Product: Ubisensor								
Date: 30 July 2004	Test Eng: DS								
Limit1: FCC_A(1.5m)	Limit2:								
CF1: DR_Guide	CF3: dBmV_to_dBuV								
CF3: R6+PRE3+CBL043+CBL045	CF4:								
Antenna A									
TX - High Channel									
Polarisation: V	Mod. State: 0								
Filename: E:\Tests\T1334\T1334_marconi_4_040730.txt	Mode: 3								
Start	Stop	rbw	vbw	time(ms)	Start	Stop	rbw	vbw	time(ms)
6 GHz	6.4 GHz	1 MHz	1 MHz	50					
6.4 GHz	6.8 GHz	1 MHz	1 MHz	50					
6.8 GHz	7.2 GHz	1 MHz	1 MHz	50					
7.2 GHz	7.6 GHz	1 MHz	1 MHz	50					
7.6 GHz	8 GHz	1 MHz	1 MHz	50					
8 GHz	8.4 GHz	1 MHz	1 MHz	50					
8.4 GHz	8.8 GHz	1 MHz	1 MHz	50					
8.8 GHz	9.2 GHz	1 MHz	1 MHz	50					
9.2 GHz	9.6 GHz	1 MHz	1 MHz	50					
9.6 GHz	10 GHz	1 MHz	1 MHz	50					

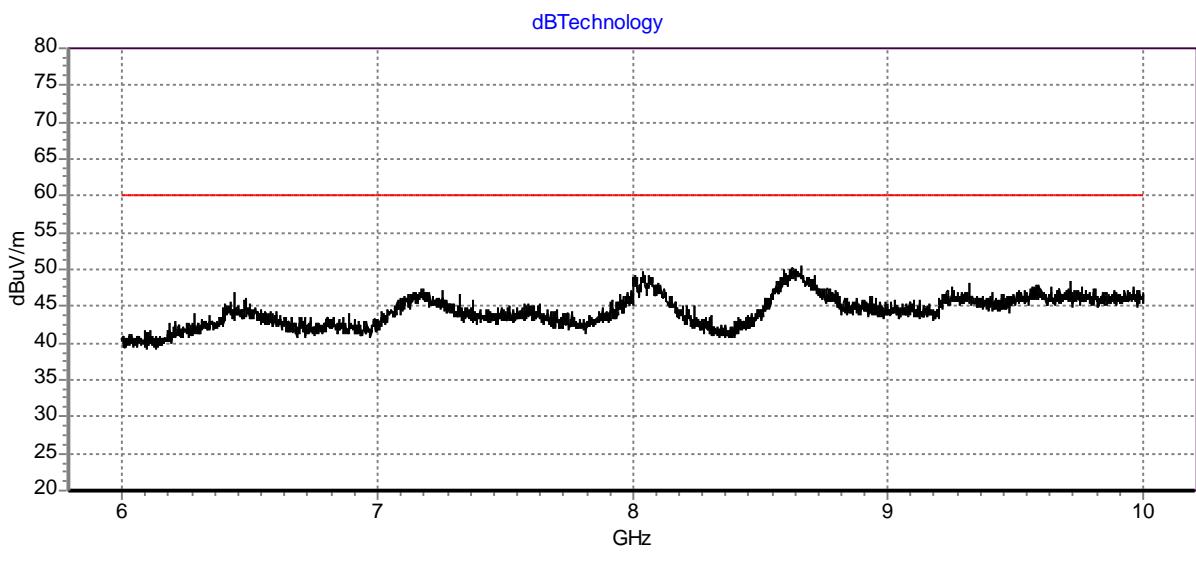
	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 30 of 37



PLOT 16 Radiated Emissions - 6GHz to 10GHz - Hor. - High Channel - Antenna A

Company: Ubisense	Product: Ubisensor								
Date: 30 July 2004	Test Eng: DS								
Limit1: FCC_A(1.5m)	Limit2:								
CF1: DR_Guide	CF3: dBmV_to_dBuV								
CF3: R6+PRE3+CBL043+CBL045	CF4:								
Antenna A									
TX - High Channel									
Polarisation: H	Mod. State: 0								
Filename: E:\Tests\T1334\T1334_marconi_3_040730.txt	Mode: 3								
Start	Stop	rbw	vbw	time(ms)	Start	Stop	rbw	vbw	time(ms)
6 GHz	6.4 GHz	1 MHz	1 MHz	50					
6.4 GHz	6.8 GHz	1 MHz	1 MHz	50					
6.8 GHz	7.2 GHz	1 MHz	1 MHz	50					
7.2 GHz	7.6 GHz	1 MHz	1 MHz	50					
7.6 GHz	8 GHz	1 MHz	1 MHz	50					
8 GHz	8.4 GHz	1 MHz	1 MHz	50					
8.4 GHz	8.8 GHz	1 MHz	1 MHz	50					
8.8 GHz	9.2 GHz	1 MHz	1 MHz	50					
9.2 GHz	9.6 GHz	1 MHz	1 MHz	50					
9.6 GHz	10 GHz	1 MHz	1 MHz	50					

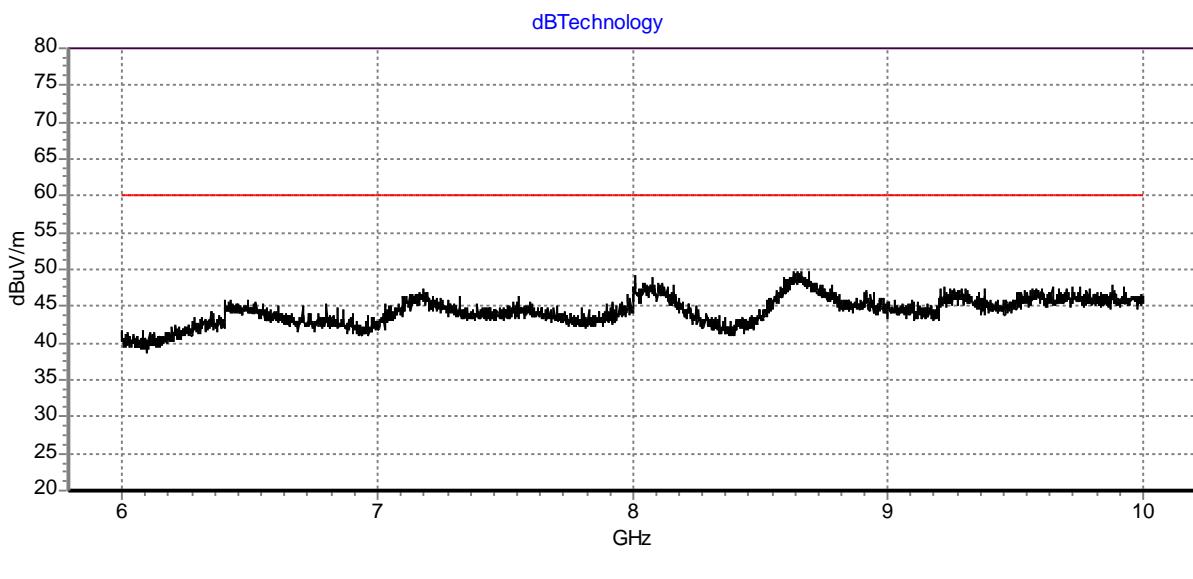
	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 31 of 37



PLOT 17 Radiated Emissions - 6GHz to 10GHz - Vert. - High Channel - Antenna B

Company: Ubisense	Product: Ubisensor								
Date: 30 July 2004	Test Eng: DS								
Limit1: FCC_A(1.5m)	Limit2:								
CF1: DR_Guide	CF3: dBmV_to_dBuV								
CF3: R6+PRE3+CBL043+CBL045	CF4:								
Antenna B - High Channel									
Polarisation: V	Mod. State: 0								
Filename: E:\Tests\T1334\T1334_marconi_1_040730.txt	Mode: 4								
Start	Stop	rbw	vbw	time(ms)	Start	Stop	rbw	vbw	time(ms)
6 GHz	6.4 GHz	1 MHz	1 MHz	50					
6.4 GHz	6.8 GHz	1 MHz	1 MHz	50					
6.8 GHz	7.2 GHz	1 MHz	1 MHz	50					
7.2 GHz	7.6 GHz	1 MHz	1 MHz	50					
7.6 GHz	8 GHz	1 MHz	1 MHz	50					
8 GHz	8.4 GHz	1 MHz	1 MHz	50					
8.4 GHz	8.8 GHz	1 MHz	1 MHz	50					
8.8 GHz	9.2 GHz	1 MHz	1 MHz	50					
9.2 GHz	9.6 GHz	1 MHz	1 MHz	50					
9.6 GHz	10 GHz	1 MHz	1 MHz	50					

	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 32 of 37



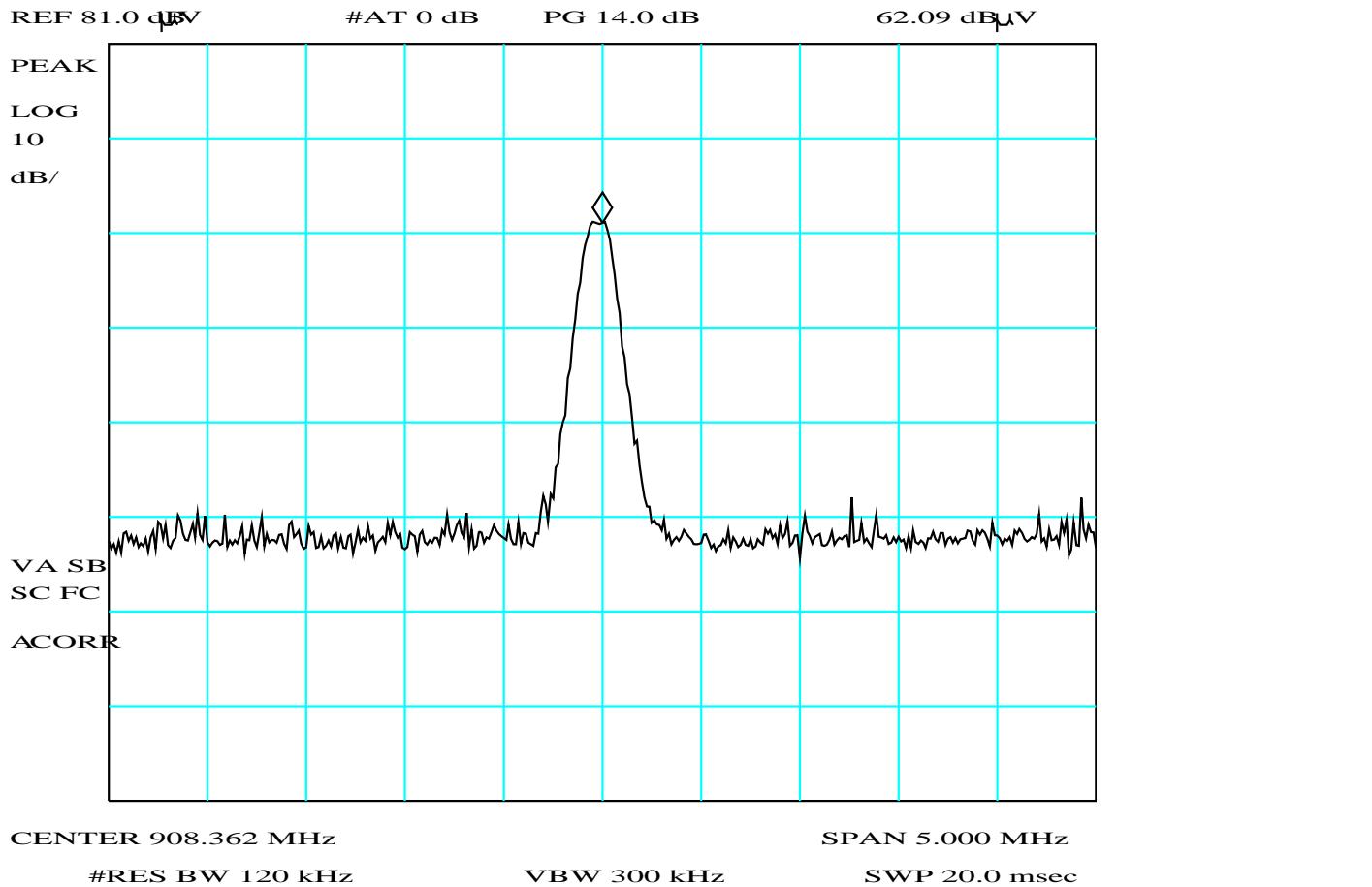
PLOT 18 Radiated Emissions - 6GHz to 10GHz - Hor. - High Channel - Antenna B

Company: Ubisense	Product: Ubisensor								
Date: 30 July 2004	Test Eng: DS								
Limit1: FCC_A(1.5m)	Limit2:								
CF1: DR_Guide	CF3: dBmV_to_dBuV								
CF3: R6+PRE3+CBL043+CBL045	CF4:								
Antenna B - High Channel									
Polarisation: H	Mod. State: 0								
Filename: E:\Tests\T1334\T1334_marconi_2_040730.txt	Mode: 4								
Start	Stop	rbw	vbw	time(ms)	Start	Stop	rbw	vbw	time(ms)
6 GHz	6.4 GHz	1 MHz	1 MHz	50					
6.4 GHz	6.8 GHz	1 MHz	1 MHz	50					
6.8 GHz	7.2 GHz	1 MHz	1 MHz	50					
7.2 GHz	7.6 GHz	1 MHz	1 MHz	50					
7.6 GHz	8 GHz	1 MHz	1 MHz	50					
8 GHz	8.4 GHz	1 MHz	1 MHz	50					
8.4 GHz	8.8 GHz	1 MHz	1 MHz	50					
8.8 GHz	9.2 GHz	1 MHz	1 MHz	50					
9.2 GHz	9.6 GHz	1 MHz	1 MHz	50					
9.6 GHz	10 GHz	1 MHz	1 MHz	50					

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		
Test No: T1334		Test Report	Page: 33 of 37

/p

MKR 908.362 MHz



PLOT 19 Tx bandwidth - Low Channel - Antenna A (with 120kHz rbw detector)

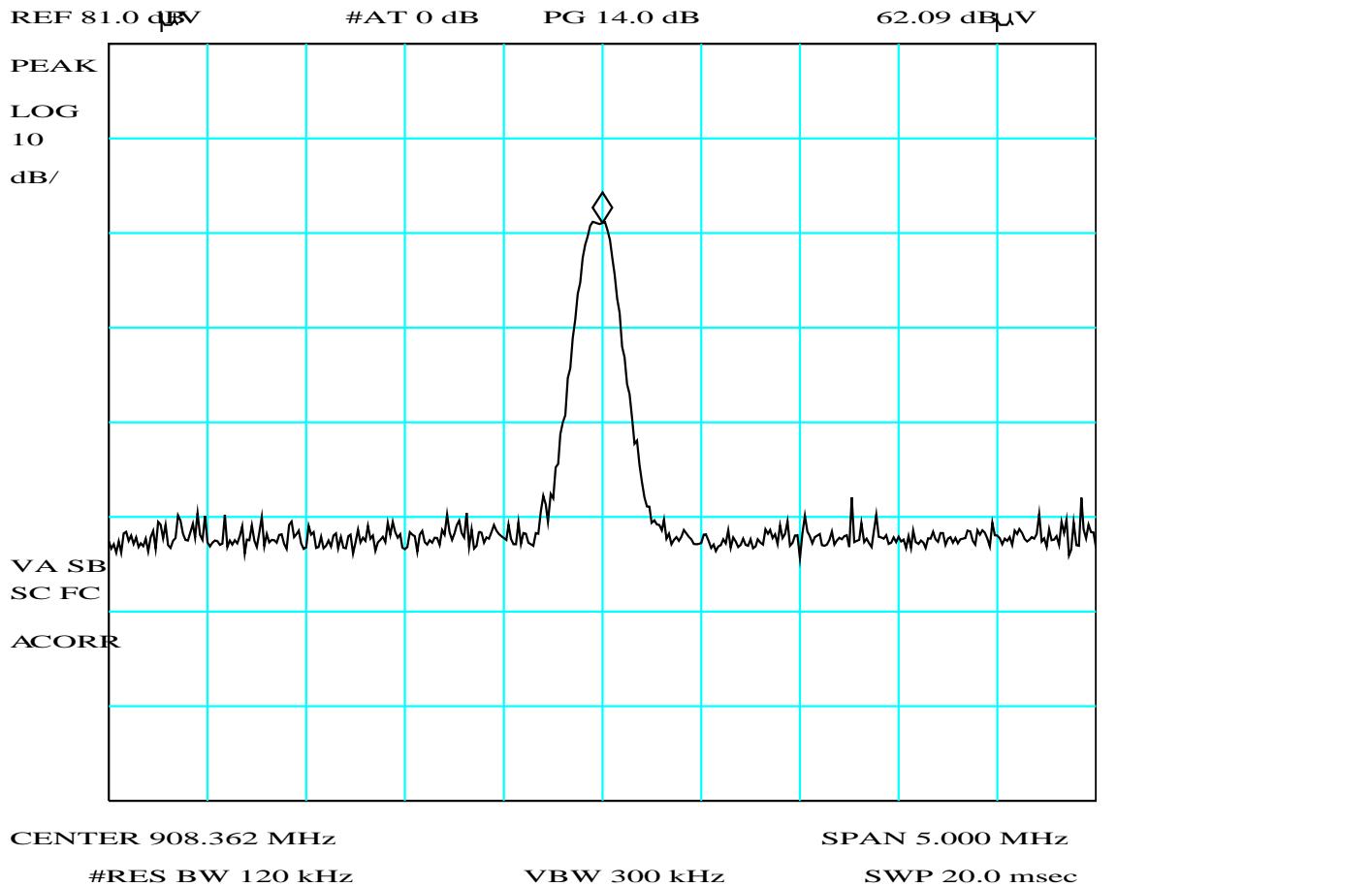
Company: Ubisense Ltd	Product: Ubisensor
Date: 30 Jul 04	Test Engineer: DS
Test: FCC pt 15	Limit: FCC15c
Notes:	
Antenna A	
Tx - Low Channel	
Equip: R5,R5B,A12	
Polarisation: V + H	Orientation: 0 - 360°
Distance: 3m	Antenna: BILOG
Height: 1m	Filename: H473083F.plt

Frequency List (MHz)

	Report No: R1908	FCC ID: SEAUBISENSOR10	
	Issue No: 1		
Test No: T1334		Test Report	Page: 34 of 37

/p

MKR 908.362 MHz



PLOT 20 Tx bandwidth - Low Channel - Antenna B (with 120kHz rbw detector)

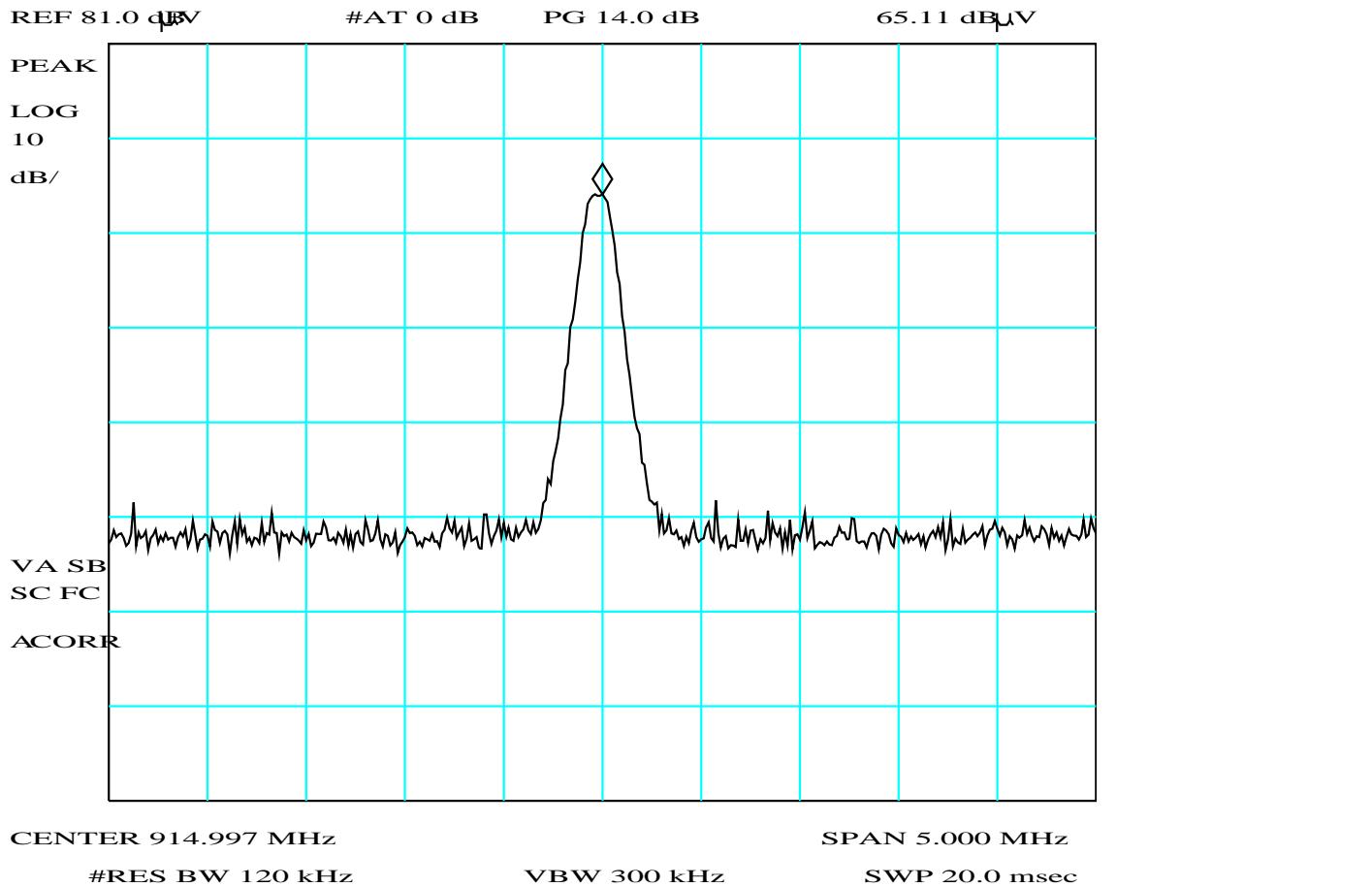
Company: Ubisense Ltd	Product: Ubisensor
Date: 30 Jul 04	Test Engineer: DS
Test: FCC pt 15	Limit: FCC15c
Notes:	
Antenna B	
Tx - Low Channel	
Equip: R5,R5B,A12	
Polarisation: V + H	Orientation: 0 - 360°
Distance: 3m	Antenna: BILOG
Height: 1m	Filename: H4730845.plt

Frequency List (MHz)

	Report No: R1908 Issue No: 1 Test No: T1334	FCC ID: SEAUBISENSOR10	
		Test Report	Page: 35 of 37

HP

MKR 914.997 MHz



PLOT 21 Tx bandwidth - High Channel - Antenna A (with 120kHz rbw detector)

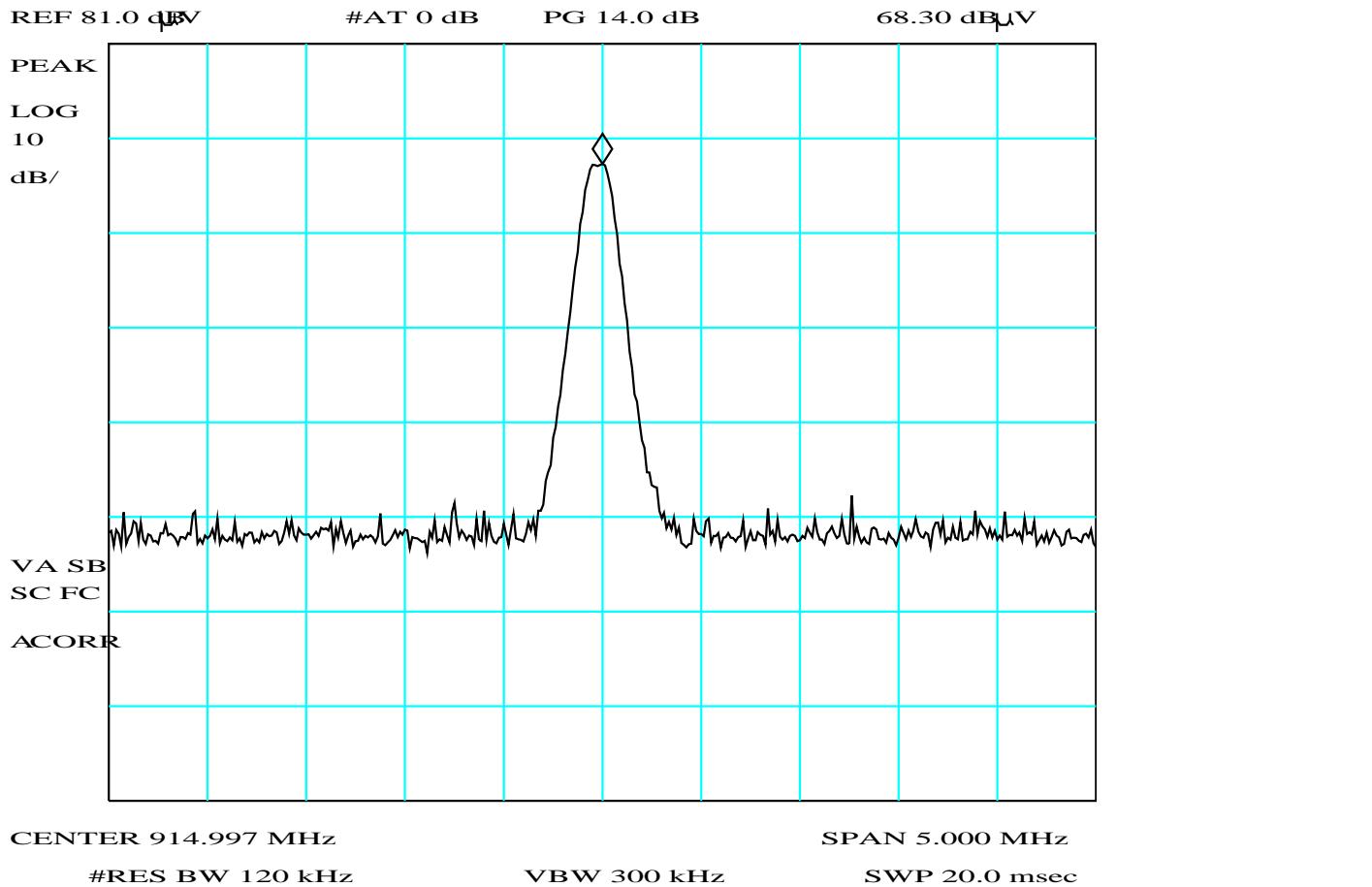
Company:	Ubisense Ltd	Product:	Ubisensor
Date:	30 Jul 04	Test Engineer:	DS
Test:	FCC pt 15	Limit:	FCC15c
Notes:			
Antenna A			
Tx - High Channel			
Equip: R5,R5B,A12			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	BILOG
Height:	1m	Filename:	H473083A.plt

Frequency List (MHz)

	Report No: R1908 Issue No: 1	FCC ID: SEAUBISENSOR10	
Test No: T1334		Test Report	Page: 36 of 37

/p

MKR 914.997 MHz



PLOT 22 Tx bandwidth - High Channel - Antenna B (with 120kHz rbw detector)

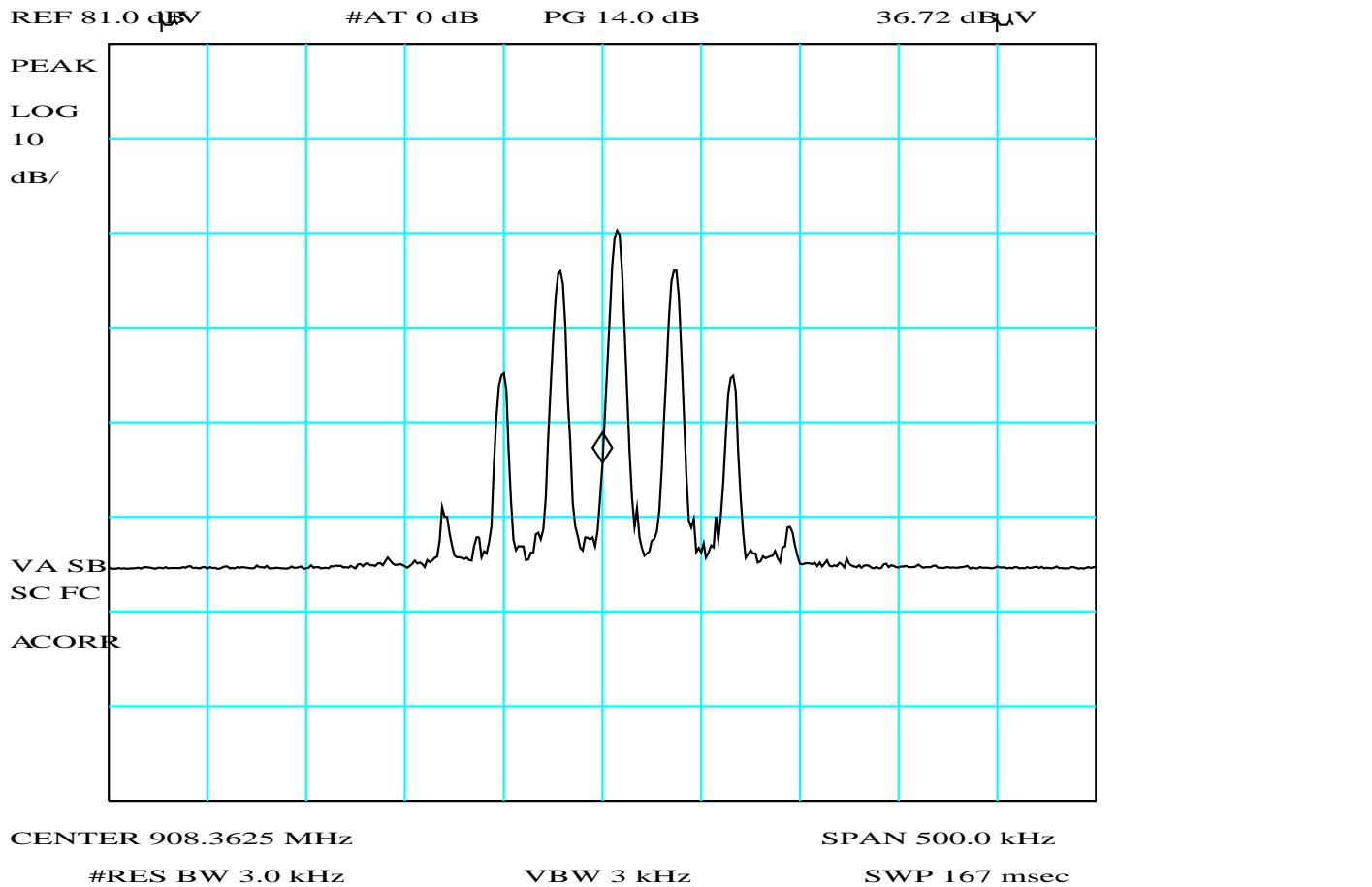
Company:	Ubisense Ltd	Product:	Ubisensor
Date:	30 Jul 04	Test Engineer:	DS
Test:	FCC pt 15	Limit:	FCC15c
Notes:			
Antenna B			
Tx - High Channel			
Equip: R5,R5B,A12			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	BILOG
Height:	1m	Filename:	H4730836.plt

Frequency List (MHz)

	Report No: R1908 Issue No: 1 Test No: T1334	FCC ID: SEAUBISENSOR10	
		Test Report	Page: 37 of 37

/p

MKR 908.3625 MHz



PLOT 23 Tx bandwidth - Low Channel - Antenna B (with 3kHz rbw detector)

Company:	Ubisense Ltd	Product:	Ubisensor
Date:	30 Jul 04	Test Engineer:	DS
Test:	FCC pt 15	Limit:	FCC15c
Notes:			
Antenna B			
Tx - Low Channel			
Equip: R5,R5B,A12			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	BILOG
Height:	1m	Filename:	H4730846.plt

Frequency List (MHz)
