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Report On

EMC Testing of the
Loc8tor Ltd
Loc8tor Tag

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FCC ID: TUW-FIR1
IC ID: 6444A-FIR1

Document 75902529 Report 07 Issue 5

February 2008



Product Service

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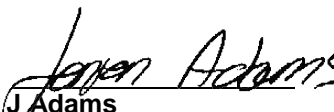
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DATED

27 February 2008

27 February 2008

This report has been up-issued to Issue 5 to include the manufacturer and emission designator details.





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SECTION 1

REPORT SUMMARY

EMC Testing of the
Loc8tor Ltd
Loc8tor Tag



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Loc8tor Ltd Loc8tor Tag to the requirements of FCC Part 15B: 2006, FCC Part 15C: 2006, RSS-Gen: 2005 and RSS-210: 2005.

Objective	To perform Electromagnetic Compatibility (EMC) Qualification Approval Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Kingtronics Ltd Kingtronics Science & Industrial Park North Section of Hu-Bin East Road Kingtronics Road Xiamen, Fujian CHINA
Model Number(s)	Loc8tor Tag
Serial Number(s)	F14 Receiver F11 Transmitter
Software Version	V0.9
Hardware Version	Iss A
Emission Designator	5M0G1D
Number of Samples Tested	Two
Test Specification/Issue/Date	FCC Part 15B: 2006 FCC Part 15C: 2006 RSS-Gen: Issue 1: 2005 RSS-210: Issue 6: 2005
Incoming Release Date	Not Formally Released 16 November 2007
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	ASH088 08 November 2007
Start of Test	18 November 2007
Finish of Test	30 November 2007
Name of Engineer(s)	S C Hartley G Lawler J Holcombe
Related Document(s)	ANSI C63.4: 2001 RSS-212, Issue 1: 1999 SRSP-503, Issue 6: 2003 SRSP-510, Issue 3: 2003



Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC Part 15B and 15C 2006, is shown below.

Section	Spec Clause FCC	Spec Clause Industry Canada	Test Description	Mode	Result
2.1	15.109 (a)	RSS-Gen, 6	Radiated Emissions (Enclosure Port)	Receive	Pass
2.2	15.205	RSS-Gen, A8.5	Measurements at Band Edge	Transmit	Pass
2.3	15.247 (a)(2)	RSS-210 A8.2 (1)	6dB Bandwidth	Transmit	Pass
2.4	15.247 (b)(3)	RSS-Gen A8.4(1)	Maximum Peak Output Power (Radiated)	Transmit	Pass
2.5	15.209, 15.247(d), 15.205	RSS-Gen A8.5	Radiated Emissions (Enclosure Port)	Transmit	Pass
2.6	15.247(e)	RSS-210 A8.2 (2)	Peak Power Spectral Density	Transmit	Pass



1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	2.4GHz Transceiver
MANUFACTURER	Loc8tor Ltd
TYPE	Electronics
PART NUMBER	Loc8tor Tag
SERIAL NUMBER	F14 and F11
HARDWARE VERSION	Iss A
SOFTWARE VERSION	V0.9
TRANSMITTER OPERATING RANGE	2.445 GHz single frequency (5 MHz bw)
RECEIVER OPERATING RANGE	2.445 GHz single frequency (5 MHz bw)
COUNTRY OF ORIGIN	China
INTERMEDIATE FREQUENCIES	2 MHz (Rx only)
ITU DESIGNATION OF EMISSION	5M0G1D
HIGHEST INTERNALLY GENERATED FREQUENCY IN TRANSMIT	2.445 GHz
HIGHEST CLOCK FREQUENCY	13 MHz
OUTPUT POWER (W or dBm)	3 dBm (conducted), <0 dBm radiated
FCC ID	TUW-FIR1
INDUSTRY CANADA ID	6444A-FIR1
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Tag unit for asset location – tags are placed on various assets (eg keys, wallet, pets) and the handheld helps locate the asset.
BATTERY/POWER SUPPLY	
MANUFACTURING DESCRIPTION	Silver oxide battery – off the shelf
MANUFACTURER	Various
TYPE	Silver Oxide
PART NUMBER	SR54
VOLTAGE	2 x 1.5V
COUNTRY OF ORIGIN	Various

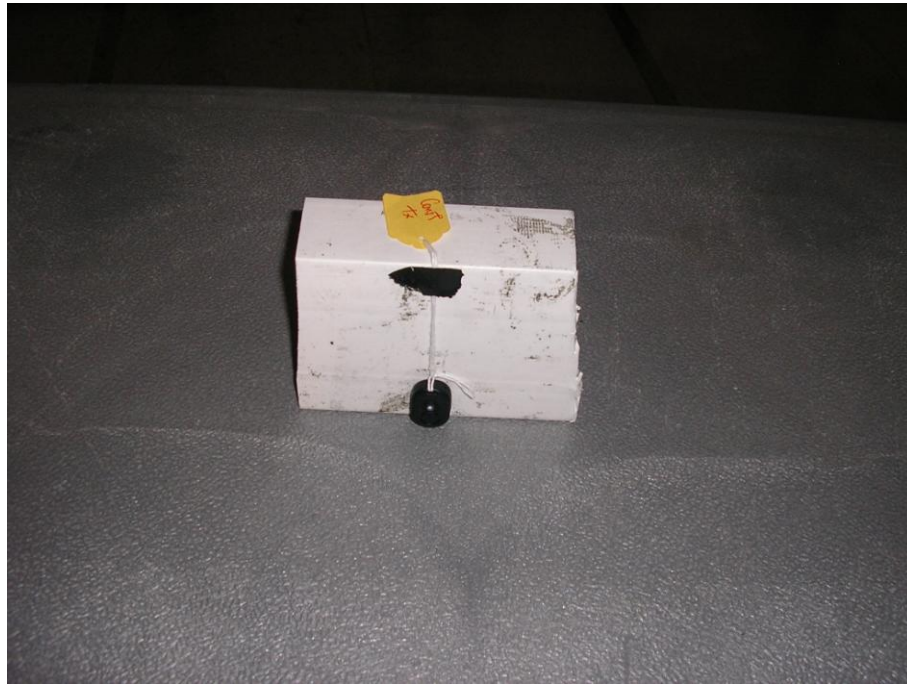


Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Loc8tor Ltd Loc8tor Tag as shown in the photograph below. A full technical description can be found in the Manufacturers documentation.



Equipment Under Test



Product Service

1.4.2 Test Configuration

Configuration 1 : Loc8tor Tag

The EUT was configured in accordance with FCC Part 15B: 2006, FCC Part 15C: 2006, RSS-Gen: 2005 and RSS-210: 2005.

1.4.3 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mode 1 - Transmit.

Mode 2 - Receive.

Information on the specific test modes utilised are detailed in the test procedure for each individual test.



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1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or an open test area as appropriate. The testing was carried out at the Octagon House facility.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC4270 Octagon House, Fareham Test Laboratory

The Loc8tor Tag was powered from two 1.5V batteries.

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.



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SECTION 2

TEST DETAILS

EMC Testing of the
Loc8tor Ltd
Loc8tor Tag



Product Service

2.1 RADIATED EMISSIONS (ENCLOSURE PORT)**2.1.1 Specification Reference**

FCC Part 15B: 2006, Clause 15.109 (a)
RSS-Gen; 6

2.1.2 Equipment Under Test

Loc8tor Tag, Serial Number: F14

2.1.3 Date of Test

28 November and 30 November 2007

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC Part 15B: 2006.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 2

2.1.6 Environmental Conditions

	28 November 2007	30 November 2007
Ambient Temperature	21°C	19°C
Relative Humidity	48%	36%
Atmospheric Pressure	1000mbar	1005mbar



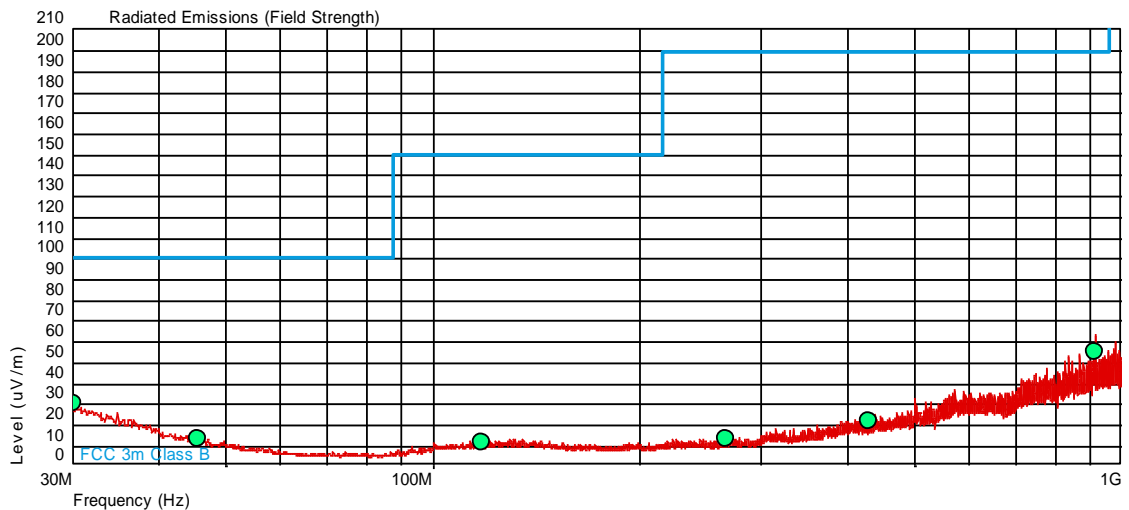
2.1.7 Test Results

For the period of test the EUT met the requirements of FCC Part 15B: 2006, Clause 15.109 (a) and Industry Canada RSS-Gen; 6 for Radiated Emissions (Enclosure Port).

The test results are shown below.

Configuration 1 - Mode 2

30MHz to 1GHz



Frequency (MHz)	QP Level (uV/m)	QP Limit (uV/m)	QP Margin (uV/m)	Angle(Deg)	Height(m)	Polarity
30.000	29.9	100.0	-70.1	218	1.00	Horizontal
45.601	13.6	100.0	-86.4	45	1.00	Horizontal
117.754	11.9	150.0	-138.1	358	1.00	Horizontal
267.153	13.5	200.0	-186.5	63	1.00	Horizontal
429.172	21.9	200.0	-178.1	223	1.00	Vertical
917.146	55.0	200.0	-145.0	122	1.00	Vertical

1GHz to 12.75GHz

No emissions were detected within 25dB of the limit.

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2.2 MEASUREMENT AT THE BAND EDGE

2.2.1 Specification Reference

FCC Part 15C: 2006, Clause 15.205
RSS-Gen, A8.5

2.2.2 Equipment Under Test

Loc8tor Tag, Serial Number: F11

2.2.3 Date of Test

30 November 2007

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC Part 15C: 2006.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.2.6 Environmental Conditions

	30 November 2007
Ambient Temperature	17°C
Relative Humidity	31%
Atmospheric Pressure	1001mbar



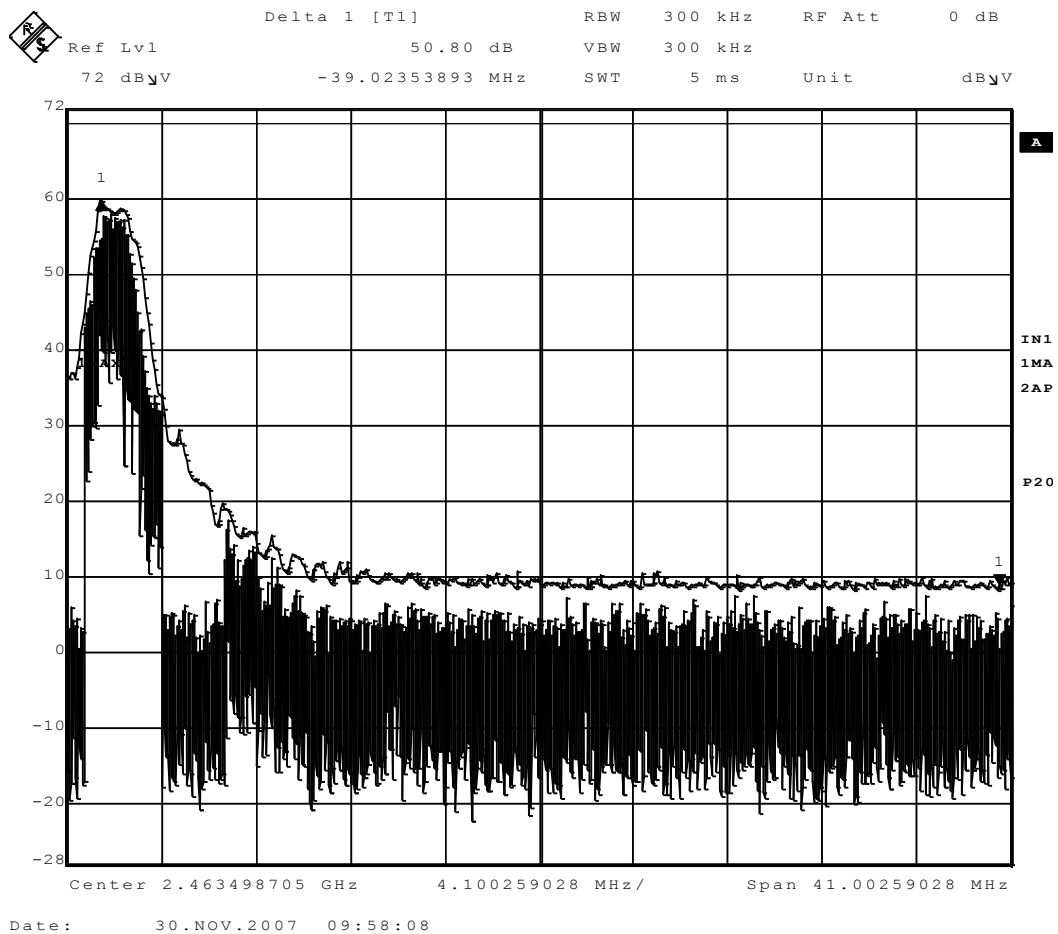
2.2.7 Test Results

For the period of test the EUT met the requirements of FCC Part 15C: 2006, Clause 15.205 and Industry Canada RSS-Gen A8.5 for Measurements at the Band Edge.

The test results are shown below.

Configuration 1 Mode 1

Frequency GHz	Peak Result B μ V/m)	Peak Limit (dB μ V/m)	Average Result (dB μ V/m)	Average Limit (dB μ V/m)
2.444	254.0	5000.0	10.0	500.0





Product Service

2.3 6dB BANDWIDTH**2.3.1 Specification Reference**

FCC Part 15C: 2006, Clause 15.247 (a) (2)
RSS-210 A8.2 (1)

2.3.2 Equipment Under Test

Loc8tor Tag, Serial Number: F11

2.3.3 Date of Test

30 November 2007

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC Part 15C: 2006.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.3.6 Environmental Conditions

	30 November 2007
Ambient Temperature	18.1°C
Relative Humidity	50%
Atmospheric Pressure	1001mbar

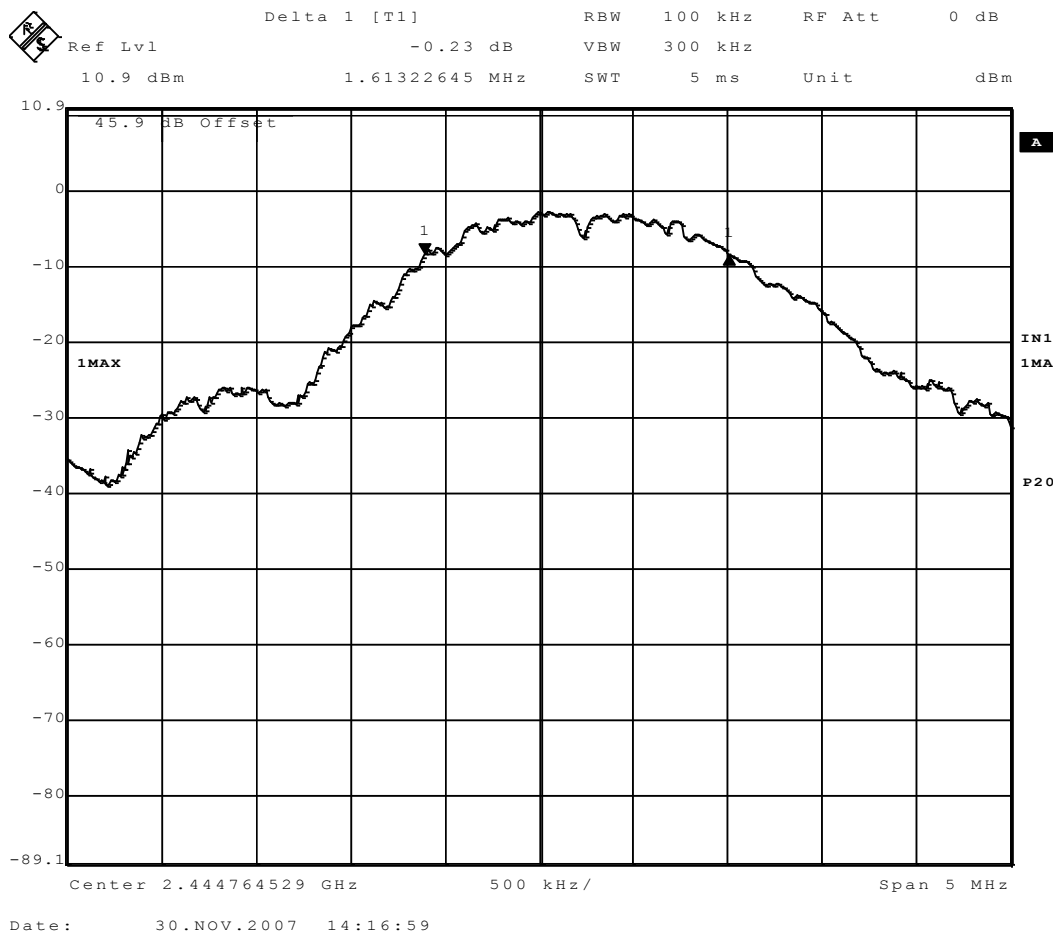


2.3.7 Test Results

For the period of test the EUT met the requirements of FCC Part 15C: 2006, Clause 15.247 (a)(2) and Industry Canada RSS-210 A8.2 (1) for 6dB Bandwidth.

Configuration 1 – Mode 1

Frequency (MHz)	Data Rate kbps	6dB Bandwidth (MHz)
2445	250	1.61322645
Limit	>500kHz	





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2.4 MAXIMUM PEAK OUTPUT POWER (RADIATED METHOD) EIRP**2.4.1 Specification Reference**

FCC Part 15C: 2006, Clause 15.247 (b) (3)
RSS-Gen A8.4 (1)

2.4.2 Equipment Under Test

Loc8tor Tag, Serial Number: F11

2.4.3 Date of Test

18 November 2007

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC Part 15C: 2006.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.4.6 Environmental Conditions

18 November 2007
Ambient Temperature 17°C
Relative Humidity 31%
Atmospheric Pressure 1001mbar

2.4.7 Test Results

For the period of test the EUT met the requirements of FCC Part 15C: 2006, Clause 15.247 (b)(3) and Industry Canada RSS-Gen A8.4(1) for Maximum Peak Output Power (Radiated).

Configuration 1 – Mode 1

Frequency (MHz)	Result dBm	Limit dBm	Result W	Limit W
2.445	-6.9	36.0	0.0002	4.000



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2.5 RADIATED EMISSIONS (ENCLOSURE PORT)

2.5.1 Specification Reference

FCC Part 15C: 2006, Clause 15.209, 15.247(d), 15.205
RSS-Gen A8.5

2.5.2 Equipment Under Test

Loc8tor Tag, Serial Number: F11

2.5.3 Date of Test

18 November, 28 November and 30 November 2007

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of : FCC Part 15C: 2006

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.5.6 Environmental Conditions

	18 November 2007	28 November 2007	30 November 2007
Ambient Temperature	17.1°C	21°C	19°C
Relative Humidity	31%	48%	36%
Atmospheric Pressure	1001mbar	1000mbar	1005mbar

2.5.7 Test Results

For the period of test the EUT met the requirements of FCC Part 15C: 2006, Clause 15.209, 15.247(d), 15.205 and Industry Canada GSS-Gen A8.5 for Radiated Emissions (Enclosure Port).

The test results are shown below.

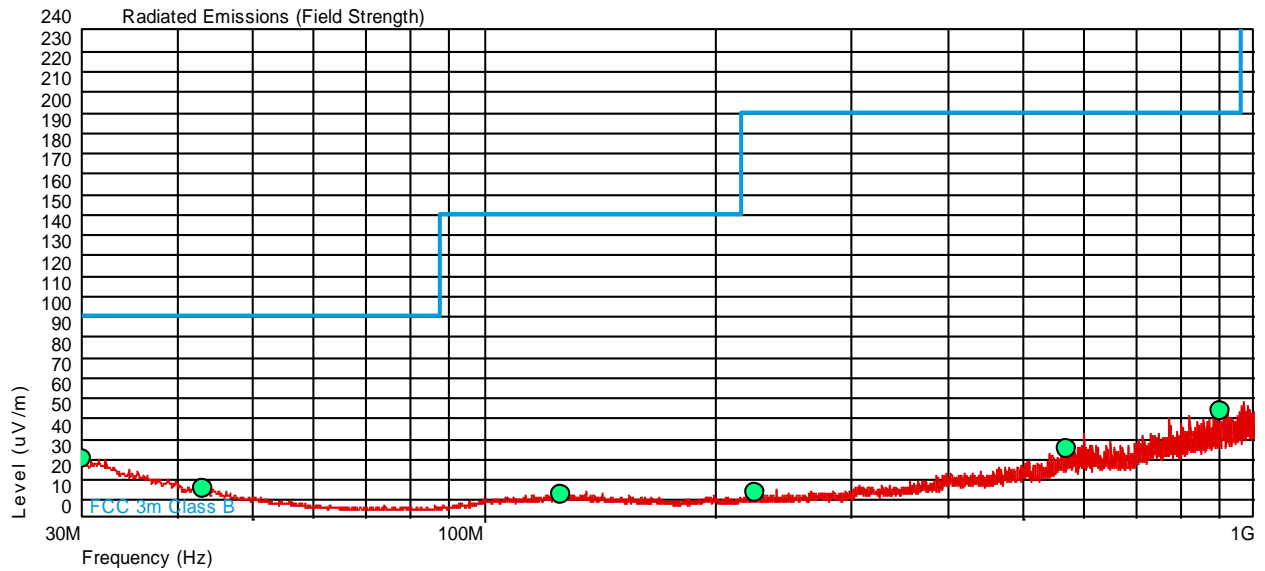
Calculation of Out of Band Limit

Frequency GHz	Antenna Polarisation	Antenna Height cm	EUT Arc Degrees	Final Peak $\mu\text{V/m}$	Restricted Band Limit dB $\mu\text{V/m}$
2.445	Vertical	100	093	23,173.0	5000.0
2.445	Horizontal	100	180	58,884.0	5888.4



Configuration 1 – Mode 1 Transmit (2.445GHz only)

30MHz to 1GHz



Final Result

Frequency (MHz)	QP Level (μV/m)	QP Limit (μV/m)	QP Margin (μV/m)	Angle(Deg)	Height(m)	Polarity
30.000	28.9	100.0	-71.1	55	1.00	Horizontal
43.191	15.1	100.0	-84.9	311	1.00	Horizontal
125.842	12.3	150.0	-137.7	169	1.00	Vertical
225.008	13.3	200.0	-186.7	161	1.00	Vertical
572.213	34.7	200.0	-165.3	343	1.00	Vertical
906.599	53.1	200.0	-146.9	5	3.32	Horizontal

1GHz to 25GHz

Frequency GHz	Antenna Polarisation	Antenna Height cm	EUT Arc Degrees	Final Peak dBμV/m	Final Average dBμV/m	Peak Limit dBμV/m	Average Limit dBμV/m
4.889	Vertical	100	025	4954.5	342.8	5000.0	500.0
7.334	Vertical	100	313	1273.5	188.36	5000.0	500.0
9.782	Vertical	110	43.6	901.6	N/A	5888.4	N/A

No other emissions were detected within 20dB of the specification limit.



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2.6 PEAK POWER SPECTRAL DENSITY**2.6.1 Specification Reference**

FCC Part 15C: 2006, Clause 15.247 (e)
RSS-210 A8.2 (2)

2.6.2 Equipment Under Test

Loc8tor Tag, Serial Number: F11

2.6.3 Date of Test

30 November 2007

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC Part 15C: 2006.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.6.6 Environmental Conditions

	30 November 2007
Ambient Temperature	18.1°C
Relative Humidity	50%
Atmospheric Pressure	1005mbar

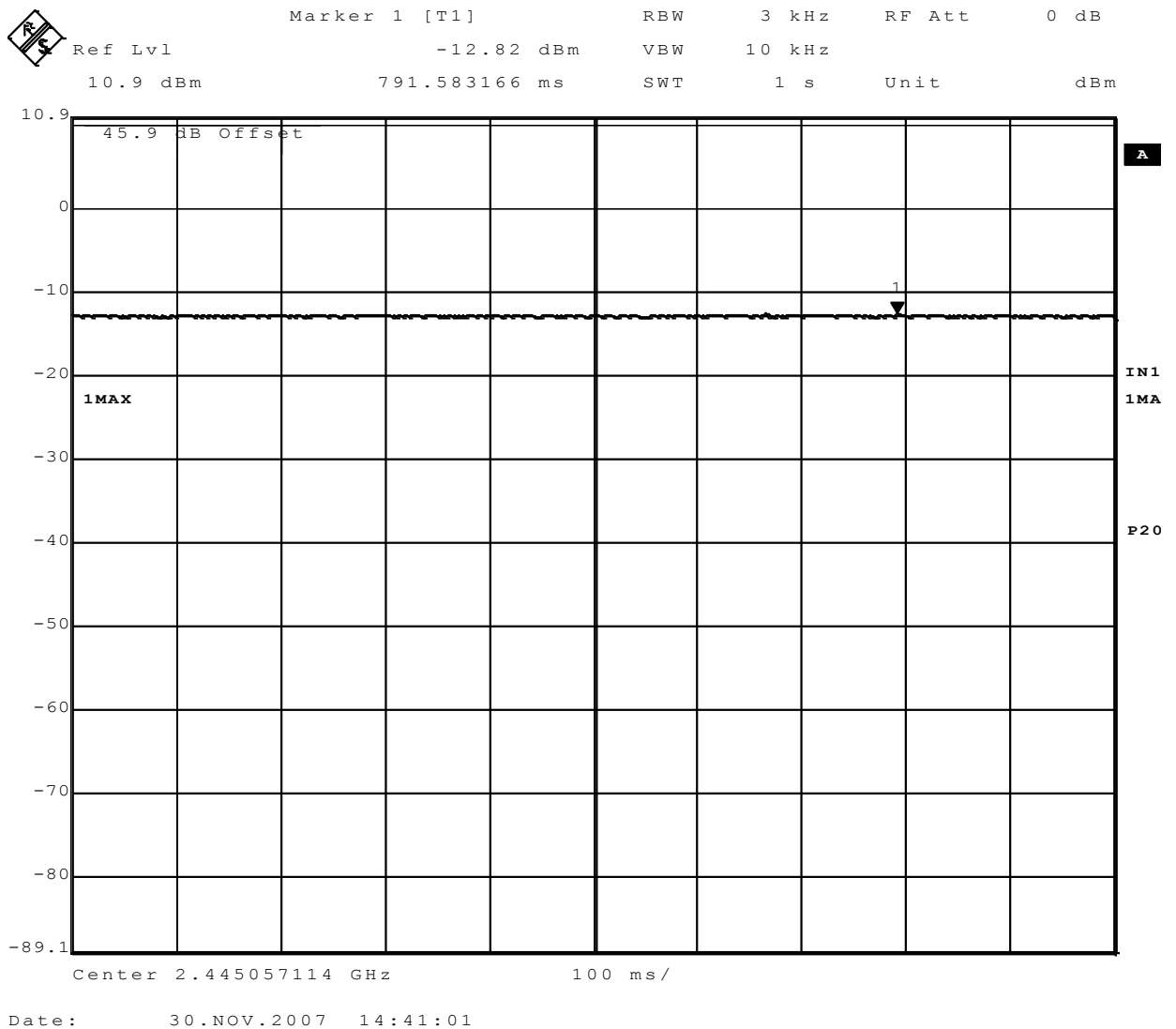


2.6.7 Test Results

For the period of test the EUT met the requirements of FCC Part 15C: 2006, Clause 15.247 (e) and Industry Canada GSS-210 A8.2 (2) for Peak Power Spectral Density.

Configuration 1 – Mode 1

Frequency (MHz)	Data Rate kbps	6dB Bandwidth (MHz)
2445	250	-12.82
Limit	<+8dBm/3kHz	





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SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.4 EMC - Maximum Output Power				
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	29-Jun-2008
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	29-Jun-2008
Screened Room (5)	Rainford	Rainford	1545	1-Mar-2008
Mast Controller	Inn-Co GmbH	CO 1000	1606	TU
Turntable/Mast Controller	EMCO	2090	1607	TU
Signal Generator	Marconi	2031	1845	16-Oct-2008
EMI Test Receiver	Rohde & Schwarz	ESIB26	2028	25-Jun-2008
Sections 2.1, 2.2 and 2.5 EMC - Radiated Emissions				
Signal Generator	Hewlett Packard	8672A	223	22-Feb-2008
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	22-Jun-2008
Amplifier	Miteq Corp	AMF-3D-001080-18-13P	231	TU
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	29-Jun-2008
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	29-Jun-2008
Antenna (Bilog)	Schaffner	CBL6143	287	13-Jan-2008
Dual Power Supply Unit	Thurlby	PL320	288	TU
Test Receiver	Rohde & Schwarz	ESIB40	1006	21-Apr-2008
Antenna (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	TU
Pre-Amplifier	Phase One	PS04-0086	1533	TU
Pre-Amplifier	Phase One	PS04-0087	1534	TU
Screened Room (5)	Rainford	Rainford	1545	1-Mar-2008
Mast Controller	Inn-Co GmbH	CO 1000	1606	TU
Turntable/Mast Controller	EMCO	2090	1607	TU
Signal Generator	Marconi	2031	1845	16-Oct-2008
EMI Test Receiver	Rohde & Schwarz	ESIB26	2028	25-Jun-2008
High Pass Filter (3GHz)	RLC Electronics	F-100-3000-5-R	3349	13-Apr-2008



Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.3 Radio (Tx) - 6dB Bandwidth				
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	29-Jun-2008
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	29-Jun-2008
Test Receiver	Rohde & Schwarz	ESIB40	1006	21-Apr-2008
Screened Room (5)	Rainford	Rainford	1545	1-Mar-2008
Mast Controller	Inn-Co GmbH	CO 1000	1606	TU
Turntable/Mast Controller	EMCO	2090	1607	TU
Signal Generator	Marconi	2031	1845	16-Oct-2008
Section 2.6 Radio (Tx) - Peak Power Density				
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	29-Jun-2008
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	29-Jun-2008
Test Receiver	Rohde & Schwarz	ESIB40	1006	21-Apr-2008
Mast Controller	Inn-Co GmbH	CO 1000	1606	TU
Turntable/Mast Controller	EMCO	2090	1607	TU
Signal Generator	Marconi	2031	1845	16-Oct-2008

TU – Traceability Unscheduled



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
6dB Bandwidth	2245MHz	212kHz
Maximum Peak Output Power (Radiated)	1GHz to 40GHz Amplitude	6.3dB*
Peak Power Spectral Density	2245MHz	1.8dB

Worst case error for both Time and Frequency measurement 12 parts in 10^6 .

* In accordance with CISPR 16-4



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SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
(Not UKAS Accredited).

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