

A RADIO TEST REPORT

FOR

GEMINI 2000 Ltd

ON

GEMTAG CX21

DOCUMENT NO.TRA-022262-47-00-B

HULL

Unit E, South Orbital Trading Park, Hedon Road, Hull, HU9 1NJ, UK.

T +44 (0)1482 801801 **F** +44 (0)1482 801806 **E** test@tracglobal.com

www.tracglobal.com

TRaC Wireless Test Report : TRA-022262-47-00-B

Applicant : Gemini 2000 Ltd

Apparatus : GemTag CX21

Specification(s) : CFR47 Part 15

Purpose of Test : **Certification**

FCCID : ZW2CX21

Authorised by

: 

: Radio Product Manager

Issue Date : 13th August 2014

Authorised Copy Number : PDF

Contents

Section 1:	Introduction	4
1.1	General	4
1.2	Tests Requested By	5
1.3	Manufacturer	5
1.4	Apparatus Assessed	5
1.5	Test Result Summary	6
1.6	Notes Relating To The Assessment	7
1.7	Deviations from Test Standards	7
Section 2:	Measurement Uncertainty	8
2.1	Measurement Uncertainty Values	8
Section 3:	Modifications	10
3.1	Modifications Performed During Assessment	10
Appendix A:	Formal Emission Test Results	11
A1	Transmitter Intentional Emission Radiated	12
A2	Radiated Magnetic Field Emissions	13
A3	Radiated Electric Field Emissions	15
A3	Power Line Conducted Emissions	17
A5	Frequency Stability	19
Appendix B:	Supporting Graphical Data	20
Appendix C:	Additional Test and Sample Details	26
Appendix D:	Additional Information	32
Appendix E:	Photographs and Figures	33

Section 1:**Introduction****1.1 General**

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on samples submitted to the Laboratory.

Test performed by: TRaC Global []
Unit E
South Orbital Trading Park
Hedon Road
Hull, HU9 1NJ.
United Kingdom.

Telephone: +44 (0) 1482 801801
Fax: +44 (0) 1482 801806

TRaC Global [X]
Unit 1
Pendle Place
Skelmersdale
West Lancashire, WN8 9PN
United Kingdom

Telephone: +44 (0) 1695 556666
Fax: +44 (0) 1695 577077

Email: test@tracglobal.com
Web site: <http://www.tracglobal.com>

Tests performed by: D. Winstanley

Report author: D. Winstanley

This report must not be reproduced except in full without prior written permission from TRaC Global.

1.2 Tests Requested By

This testing in this report was requested by :

Gemini 2000 Ltd
Peartree Business Center
Ferndown Industrial Estate
Wimborne
Dorset
BH21 7PT
Great Britain

1.3 Manufacturer

As Above

1.4 Apparatus Assessed

The following apparatus was assessed between 13th – 18th June 2014.

Gemtag CX21

The above device is a USB powered 13.56 MHz card access reader

1.5 Test Result Summary

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

The statements relating to compliance with the standards below apply ONLY as qualified in the notes and deviations stated in sections 1.6 to 1.7 of this test report.

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

Test Type	Regulation	Measurement standard	Result
Spurious Emissions Radiated <1000MHz	Title 47 of the CFR: Part 15 Subpart (c) 15.209	ANSI C63.10:2009	Pass
Spurious Emissions Radiated >1000MHz	Title 47 of the CFR: Part 15 Subpart (c) 15.209	ANSI C63.10:2009	Pass
AC Power conducted emissions	Title 47 of the CFR: Part 15 Subpart (c) 15.207	ANSI C63.10:2009	Pass
Intentional Emission Frequency	Title 47 of the CFR: Part 15 Subpart (c) 15.225	ANSI C63.10:2009	Pass
Intentional Emission Field Strength	Title 47 of the CFR: Part 15 Subpart (c) 15.225	ANSI C63.10:2009	Pass
Intentional Emission Band Occupancy	Title 47 of the CFR: Part 15 Subpart (c) 15.225	ANSI C63.10:2009	Pass
Intentional Emission ERP (mW)	Title 47 of the CFR: Part 15 Subpart (c)	ANSI C63.10:2009	N/A
Unintentional Radiated Spurious Emissions	Title 47 of the CFR: Part 15 Subpart (b) 15.109	ANSI C63.10:2009	Pass
Antenna Arrangements Integral:	Title 47 of the CFR: Part 15 Subpart (c) 15.203	-	Pass
Antenna Arrangements External Connector	Title 47 of the CFR: Part 15 Subpart (c) 15.204	-	N/A
Restricted Bands	Title 47 of the CFR: Part 15 Subpart (c) 15.205	-	-
Maximum Frequency of Search	Title 47 of the CFR: Part 15 Subpart (c) 15.33	-	-
Extrapolation Factor	Title 47 of the CFR: Part 15 Subpart (c) 15.31(f)	-	-

Abbreviations used in the above table:

ANSI C 63.10:2009 is outside the scope of the laboratories UKAS accreditation.

CFR : Code of Federal Regulations
REFE : Radiated Electric Field Emissions

ANSI : American National Standards Institution
PLCE : Power Line Conducted Emissions

1.6 Notes Relating To The Assessment

With regard to this assessment, the following points should be noted:

The results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 1.7 of this test report (Deviations from Test Standards).

For emissions testing, throughout this test report, "Pass" indicates that the results for the sample as tested were below the specified limit (refer also to Section 2, Measurement Uncertainty).

Where relevant, the apparatus was only assessed using the monitoring methods and susceptibility criteria defined in this report.

All testing with the exception of testing at the Open Area Test Site was performed under the following environmental conditions:

Temperature	: 17 to 23 °C
Humidity	: 45 to 75 %
Barometric Pressure	: 86 to 106 kPa

All dates used in this report are in the format dd/mm/yy.

This assessment has been performed in accordance with the requirements of ISO/IEC 17025.

1.7 Deviations from Test Standards

There were no deviations from the standards tested to.

Section 2:

Measurement Uncertainty

2.1 Measurement Uncertainty Values

For the test data recorded the following measurement uncertainty was calculated:

Radio Testing – General Uncertainty Schedule

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95% confidence where no required test level exists.

[1] Adjacent Channel Power

Uncertainty in test result = **1.86dB**

[2] Carrier Power

Uncertainty in test result (Power Meter) = **1.08dB**

Uncertainty in test result (Spectrum Analyser) = **2.48dB**

[3] Effective Radiated Power

Uncertainty in test result = **4.71dB**

[4] Spurious Emissions

Uncertainty in test result = **4.75dB**

[5] Maximum frequency error

Uncertainty in test result (Frequency Counter) = **0.113ppm**

Uncertainty in test result (Spectrum Analyser) = **0.265ppm**

[6] Radiated Emissions, field strength OATS 14kHz-18GHz Electric Field

Uncertainty in test result (14kHz – 30MHz) = **4.8dB**,

Uncertainty in test result (30MHz – 1GHz) = **4.6dB**,

Uncertainty in test result (1GHz – 18GHz) = **4.7dB**

[7] Frequency deviation

Uncertainty in test result = **3.2%**

[8] Magnetic Field Emissions

Uncertainty in test result = **2.3dB**

[9] Conducted Spurious

Uncertainty in test result – Up to 8.1GHz = **3.31dB**

Uncertainty in test result – 8.1GHz – 15.3GHz = **4.43dB**

Uncertainty in test result – 15.3GHz – 21GHz = **5.34dB**

Uncertainty in test result – Up to 26GHz = **3.14dB**

[10] Channel Bandwidth

Uncertainty in test result = **15.5%**

[11] Amplitude and Time Measurement – Oscilloscope

Uncertainty in overall test level = **2.1dB**,
Uncertainty in time measurement = **0.59%**,
Uncertainty in Amplitude measurement = **0.82%**

[12] Power Line Conduction

Uncertainty in test result = **3.4dB**

[13] Spectrum Mask Measurements

Uncertainty in test result = **2.59% (frequency)**
Uncertainty in test result = **1.32dB (amplitude)**

[14] Adjacent Sub Band Selectivity

Uncertainty in test result = **1.24dB**

[15] Receiver Blocking – Listen Mode, Radiated

Uncertainty in test result = **3.42dB**

[16] Receiver Blocking – Talk Mode, Radiated

Uncertainty in test result = **3.36dB**

[17] Receiver Blocking – Talk Mode, Conducted

Uncertainty in test result = **1.24dB**

[18] Receiver Threshold

Uncertainty in test result = **3.23dB**

[19] Transmission Time Measurement

Uncertainty in test result = **7.98%**

Section 3:

Modifications

3.1 Modifications Performed During Assessment

No modifications were performed during the assessment

Appendix A:**Formal Emission Test Results**

Abbreviations used in the tables in this appendix:

Spec	: Specification	ALSR	: Absorber Lined Screened Room
Mod	: Modification	OATS	: Open Area Test Site
		ATS	: Alternative Test Site
EUT	: Equipment Under Test		
SE	: Support Equipment	Ref	: Reference
		Freq	: Frequency
L	: Live Power Line		
N	: Neutral Power Line	MD	: Measurement Distance
E	: Earth Power Line	SD	: Spec Distance
Pk	: Peak Detector	Pol	: Polarisation
QP	: Quasi-Peak Detector	H	: Horizontal Polarisation
Av	: Average Detector	V	: Vertical Polarisation
CDN	: Coupling & decoupling network		

A1 Transmitter Intentional Emission Radiated

Carrier power was verified with the EUT transmitting Test Details:	
Regulation	Title 47 of the CFR: Part15 Subpart (c) 15.225
Measurement standard	ANSI C63.10:2009
EUT sample number	S01
Modification state	0
SE in test environment	S03, S04, S05, S06
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Temperature	23°C
Photographs (Appendix F)	1

Frequency (MHz)	Receiver Level (dBμV/m)	Measurement Distance (m)	Specification Distance (m)	Extrapolation Factor (dB)	Field Strength (dBμV/m)	Field Strength (μV/m)
13.56	80.90	3	30	39.78	41.12	113.699
13.56	60.20	10	30	19.08	41.12	113.699
Limit value @ f _c			15848 μV/m at 30m			
Band occupancy @ -20 dBc			f _{lower} (MHz)		f _{higher} (MHz)	
			13.34477564		13.78080128	
			20dB Bandwidth = 436.025641			

- Notes:**
- 1 Results quoted are extrapolated as indicated
 - 2 Receiver detector at f_c was Quasi Peak with 10kHz bandwidth
 - 3 When battery powered the EUT was powered with new batteries
 - 4 10-30m extrapolation 19.08 dB as per 15.31
 - 5 3-10m extrapolation 20.70dB as measured
 - 6 3-30m extrapolation 39.78dB (19.08 + 20.70)

- Test Method:**
- 1 As per Radio – Noise Emissions, ANSI C63.10
 - 2 Measuring distances 3m
 - 3 EUT 0.8 metre above ground plane
 - 4 Emissions maximised by rotation of EUT, on an automatic turntable
 - 5 EUT orientation in three orthogonal planes
 - 6 Maximum results recorded

A2 Radiated Magnetic Field Emissions

Preliminary scans were performed using a peak detector. The radiated magnetic field emissions test applies to all spurious emissions and harmonics emissions. The maximum permitted field strength is listed in Section 15.209. The EUT was set to transmit as required.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site :

☐

3m alternative test site :

☒

The effect of the EUT set-up on the measurements is summarised in note (c) below.

Test Details	
Regulation	Title 47 of the CFR, Part 15 Subpart (c) Clause 15.209
Measurement standard	ANSI C63.10
Frequency range	9kHz to 30MHz
EUT sample number	S01
Modification state	0
SE in test environment	S03, S04, S05, S06
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Temperature	23°C
Photographs	1

The worst case radiated emission measurements for spurious emissions are listed below.

Frequency (MHz)	Pk Level (dBuV/m)	Pk Limit (dBuV/m)	Pk Delta (dB)	Result Summary
No Significant emissions detected within 20dB of the limit				

Notes:

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1. For emissions below 30MHz the cable losses are assumed to be negligible.
- 2 In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.
- 3 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.
- 4 For Frequencies below 1 GHz, RBW= 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:

Peak RBW=VBW= 1MHz
Average RBW=VBW= 1MHz

The upper and lower frequency of the measurement range was decided according to 47 CFR part 15 Clause 15.33(a) and 15.33(a)(1). Radiated emission limits 47 CFR part 15: Clause 15.209 for all emissions:

Frequency of emission (MHz)	Field strength (μV/m)	Measurement Distance (m)	Field strength (dBμV/m)
0.009-0.490	2400/F(kHz)	300	67.6/F (kHz)
0.490-1.705	24000/F(kHz)	30	87.6/F (kHz)
1.705-30	30	30	29.5
30-88	100	3	40.0
88-216	150	3	43.5
216-960	200	3	46.0
Above 960	500	3	54.0

- (a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation (dB)} = x \log_{10} \left(\frac{\text{measurement distance}}{\text{specification distance}} \right)$$

- (b) The levels may have been rounded for display purposes.
(c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels:

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels	✓			
Effect of EUT internal configuration on emission levels		✓		
Effect of Position of EUT cables & samples on emission levels			✓	
(i) Parameter defined by standard and / or single possible, refer to Appendix D (ii) Parameter defined by client and / or single possible, refer to Appendix D (iii) Parameter had a negligible effect on emission levels, refer to Appendix D (iv) Worst case determined by initial measurement, refer to Appendix D				

A3 Radiated Electric Field Emissions

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric field emission test applies to all spurious emissions and harmonics emissions. The maximum permitted field strength is listed in Section 15.209. The EUT was set to transmit as required.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site : ☐

3m alternative test site : ☒

The effect of the EUT set-up on the measurements is summarised in note (c) below.

Test Details:	
Regulation	Title 47 of the CFR, Part 15 Subpart (c) Clause 15.209
Measurement standard	ANSI C63.10:2009
Frequency range	30 MHz – 1 GHz
EUT sample number	S01
Modification state	0
SE in test environment	S03, S04, S05, S06
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Temperature	25°C
Photographs (Appendix F)	2

The worst case radiated emission measurements for spurious emissions and harmonics that fall within the restricted bands are listed below:

Ref No.	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
1	40.65	15.3	0.8	12.1	-	28.2	-	25.70	100
2	144.00	13.5	1.8	10.6	-	25.9	-	19.72	150
3	162.75	30.5	1.8	9.3	-	41.6	-	120.23	150
4	189.85	26.4	2.1	8.4	-	36.9	-	69.98	150
5	216.95	23.7	2.1	8.3	-	34.1	-	50.70	200
6	257.65	15.1	2.4	12.9	-	30.4	-	33.11	200
7	474.65	6.7	3.5	17.0	-	27.2	-	22.91	200
8	488.20	13.7	3.6	17.2	-	34.5	-	53.09	200
9	501.75	7.8	3.7	17.4	-	28.8	-	27.54	200
10	517.75	13.0	3.7	17.6	-	34.3	-	51.88	200
11	549.70	14.3	3.8	18.9	-	37.0	-	70.79	200
12	581.95	19.4	4.0	18.8	-	42.2	-	128.82	200
13	614.25	18.0	4.1	18.6	-	40.7	-	108.39	200
14	623.80	10.6	4.2	19.0	-	33.8	-	48.98	200

Notes:

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10:2009: section 4.5, Table 1 For emissions below 30MHz the cable losses are assumed to be negligible.
- 2 In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.
- 3 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.
- 4 For Frequencies below 1 GHz, RBW= 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:

Peak RBW= 1MHz, VBW ≥ RBW
 Average RBW= 1MHz, VBW ≥ RBW

The upper and lower frequency of the measurement range was decided according to 47 CFR Part 15 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits 47 CFR Part 15: Clause 15.209 for all emissions:

Frequency of emission (MHz)	Field strength $\mu\text{V/m}$	Measurement Distance m	Field strength $\text{dB}\mu\text{V/m}$
0.009-0.490	2400/F(kHz)	300	67.6/F (kHz)
0.490-1.705	24000/F(kHz)	30	87.6/F (kHz)
1.705-30	30	30	29.5
30-88	100	3	40.0
88-216	150	3	43.5
216-960	200	3	46.0
Above 960	500	3	54.0

- (a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation (dB)} = 20 \log_{10} \left(\frac{\text{measurement distance}}{\text{specification distance}} \right)$$

- (b) The levels may have been rounded for display purposes.
- (c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels :

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels	✓			
Effect of EUT internal configuration on emission levels	✓			
Effect of Position of EUT cables & samples on emission levels	✓			
(i) Parameter defined by standard and / or single possible, refer to Appendix D (ii) Parameter defined by client and / or single possible, refer to Appendix D (iii) Parameter had a negligible effect on emission levels, refer to Appendix D (iv) Worst case determined by initial measurement, refer to Appendix D				

A3 Power Line Conducted Emissions

Preview power line conducted emission measurements were performed with a peak detector in a screened room. The effect of the EUT set-up on the measurements is summarised in note (b). Where applicable formal measurements of the emissions were performed with a peak, average and/or quasi peak detector.

Test Details:	
Regulation	Title 47 of the CFR: Part 15 Subpart (c) Clause 15.207
Measurement standard	ANSI C63.10:2009
Frequency range	150kHz to 30MHz
EUT sample number	S01, S08
Modification state	0
SE in test environment	S03, S04, S05, S06
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Photographs (Appendix F)	3

The worst-case power line conducted emission measurements are listed below:

Results measured using the average detector compared to the average limit

Ref No.	Frequency (MHz)	Conductor	Result (dBuV)	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	13.562000	N	67.1	50.0	-17.1	Note 1
2	27.122000	L1	48.7	50.0	1.3	Pass
With Dummy Load						
3	13.562000	N	26.72	50.0	23.28	Pass Note 2

Results measured using the Quasi-peak detector compared to the Quasi-peak limit

Ref No.	Frequency (MHz)	Conductor	Result (dBuV)	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	0.150000	L1	51.0	66.0	15.0	Pass
2	0.242000	L1	42.5	62.0	19.6	Pass
3	13.562000	N	67.4	60.0	-7.4	Note 1
4	27.122000	L1	49.7	60.0	10.3	Pass
With Dummy Load						
5	13.562000	N	30.99	60.0	29.01	Pass Note 2

Notes 1. With antenna connected

2 Fundamental measured with dummy load connected

Specification limits :

Conducted emission limits (47 CFR Part 15: Clause 15.207):

Conducted disturbance at the mains ports.

Frequency range MHz	Limits dB μ V	
	Quasi-peak	Average
0.15 to 0.5	66 to 56 ²	56 to 46 ²
0.5 to 5	56	46
5 to 30	60	50

Notes:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

Notes:

- (a) The levels may have been rounded for display purposes.
- (b) The following table summarises the effect of the EUT operating mode and internal configuration on the measured emission levels :

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels		✓		
Effect of EUT internal configuration on emission levels		✓		

(i) Parameter defined by standard and / or single possible, refer to Appendix C
(ii) Parameter defined by client and / or single possible, refer to Appendix C
(iii) Parameter had a negligible effect on emission levels, refer to Appendix C
(iv) Worst case determined by initial measurement, refer to Appendix C

A5 Frequency Stability

Test Details:	
Regulation	Title 47 of the CFR, Part 15 Subpart (c) Clause 15.225
Measurement standard	ANSI C63.10
EUT sample number	S01
Modification state	0
SE in test environment	S03, S04, S05, S06
SE isolated from EUT	None
EUT set up	Refer to Appendix C

Vnom (Vdc)	Temperature (°C)	Frequency (MHz)	Deviation (kHz)	Limit = ± 0.01% = ±1.3562kHz
5	+20 °C	13.56079006	-	-
5	+55 °C	13.56078846	-0.0016	Pass
5	-20 °C	13.56083013	0.0401	Pass
Voltage (Vdc) 85% - 115%	Temperature (°C)	Frequency (MHz)	Deviation (kHz)	Limit = ± 0.01% = 1.3562kHz
85%	+20 °C	13.56082212	0.0321	Pass
115%	+20 °C	13.5608093	0.0192	Pass

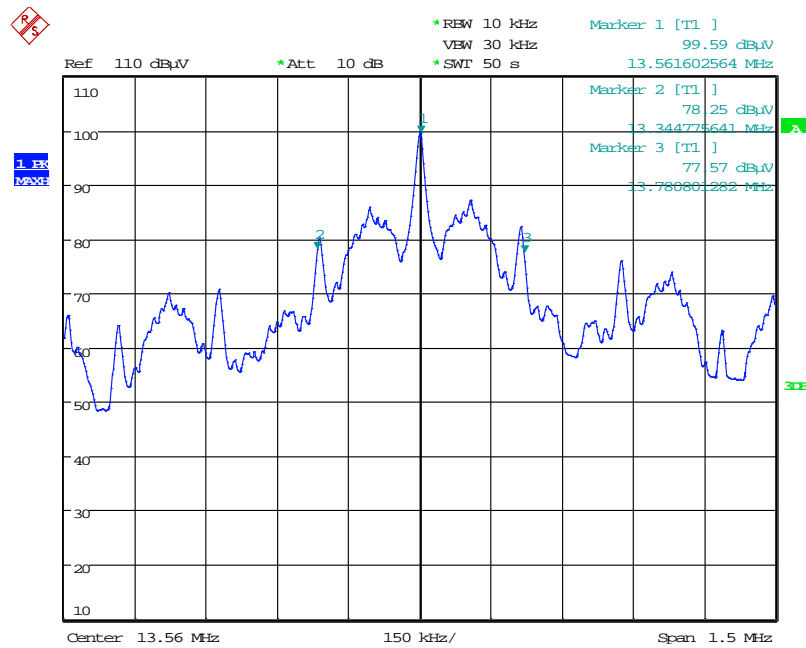
Appendix B:**Supporting Graphical Data**

This appendix contains graphical data obtained during testing.

Notes:

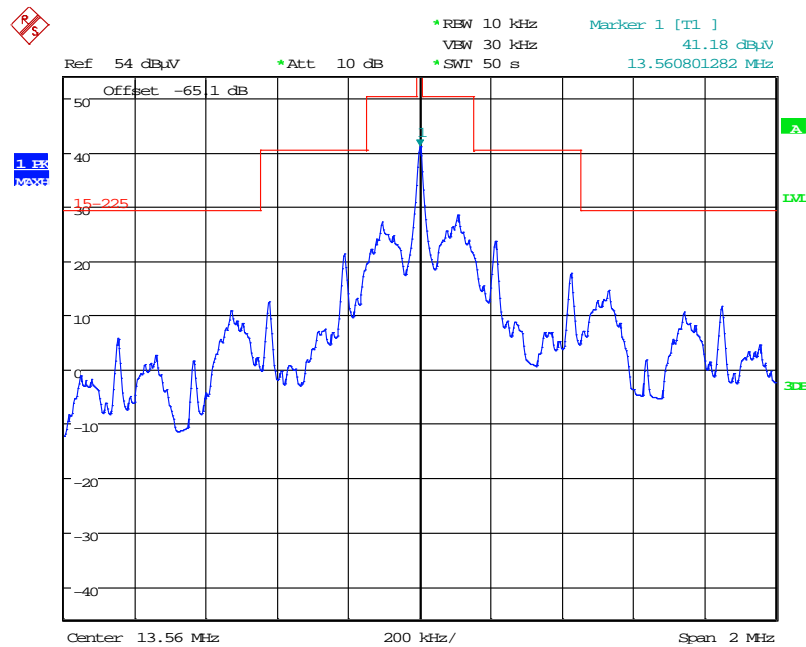
- (a) The radiated electric field emissions and conducted emissions graphical data in this appendix is preview data. For details of formal results, refer to Appendix A and Appendix B.
- (b) The time and date on the plots do not necessarily equate to the time of the test.
- (c) Where relevant, on power line conducted emission plots, the limit displayed is the average limit, which is stricter than the quasi peak limit.
- (d) Appendix C details the numbering system used to identify the sample and its modification state.
- (e) The plots presented in this appendix may not be a complete record of the measurements performed, but are a representative sample, relative to the final assessment.

20dB Bandwidth



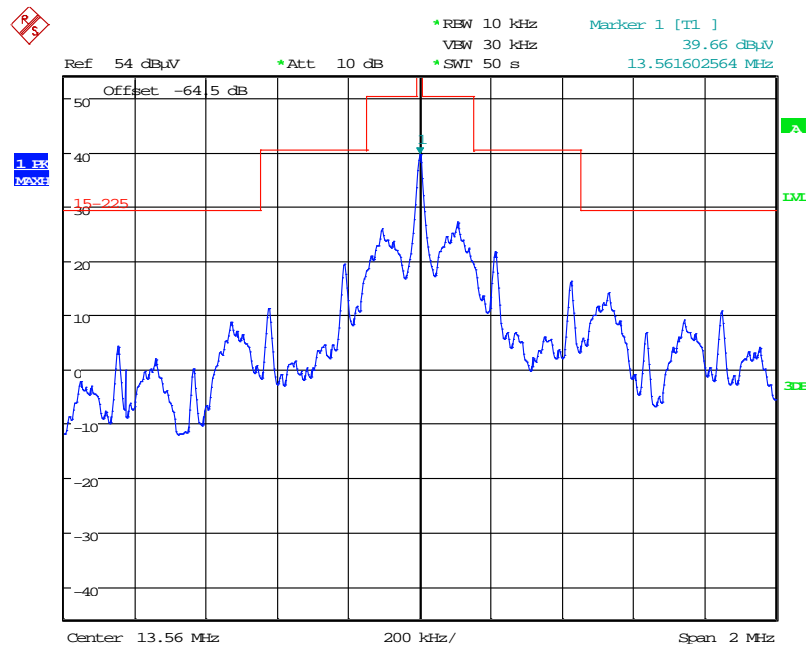
Date: 13.JUN.2014 13:55:38

Emissions Mask – Tnom, Vnom



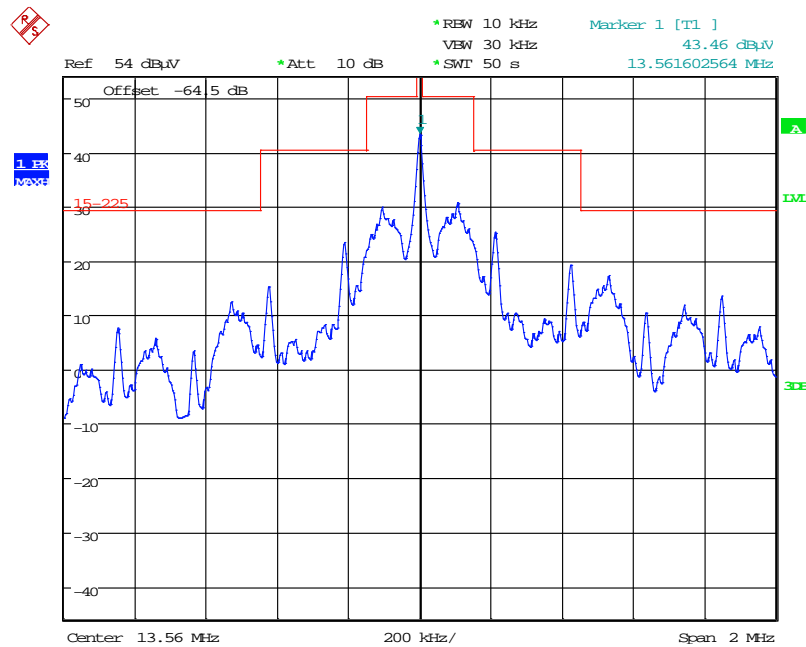
Date: 13.JUN.2014 10:41:39

Emissions Mask – Tnom, Vmin



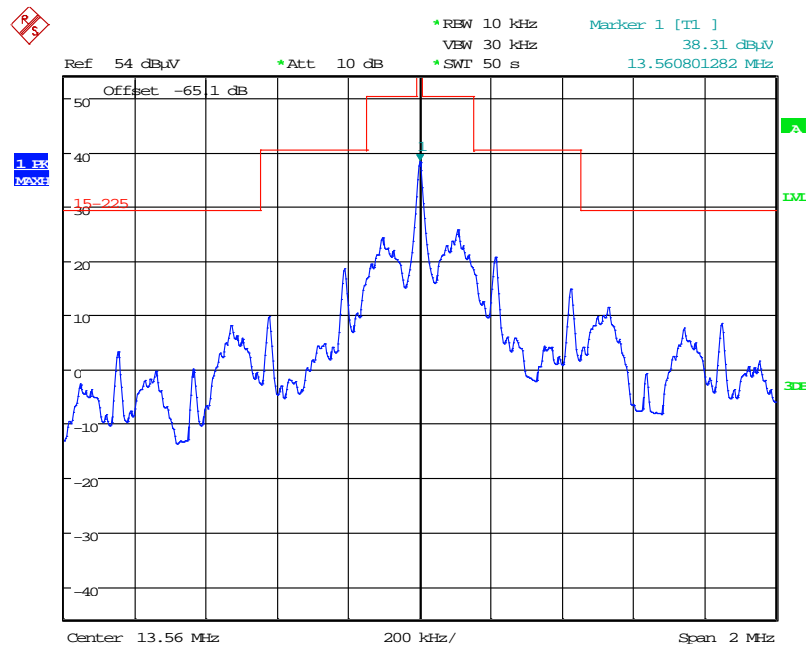
Date: 13.JUN.2014 14:18:04

Emissions Mask – Tnom, Vmax



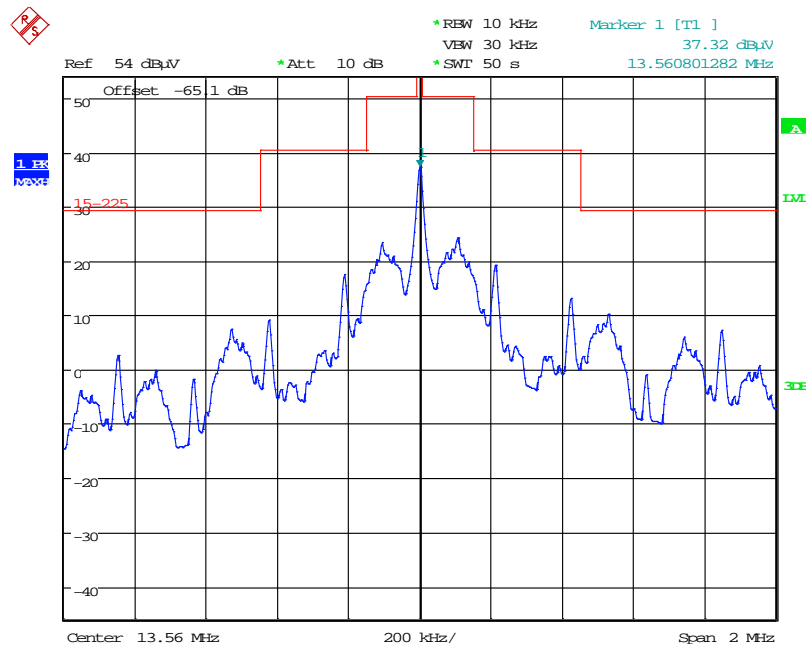
Date: 13.JUN.2014 14:21:44

Emissions Mask – Tmin, Vnom



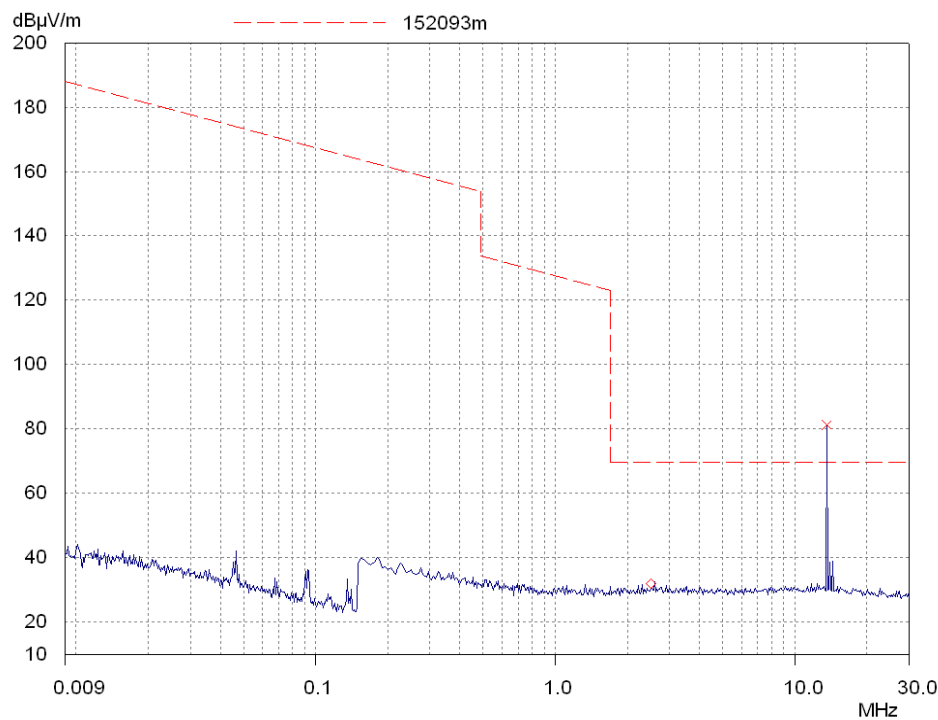
Date: 13.JUN.2014 13:31:45

Emissions Mask – Tmax, Vnom

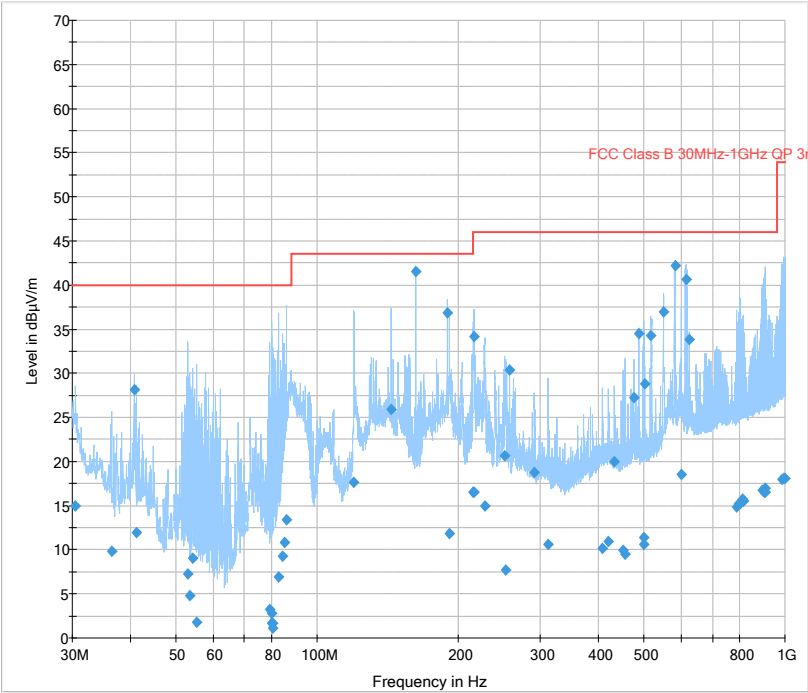


Date: 13.JUN.2014 12:31:56

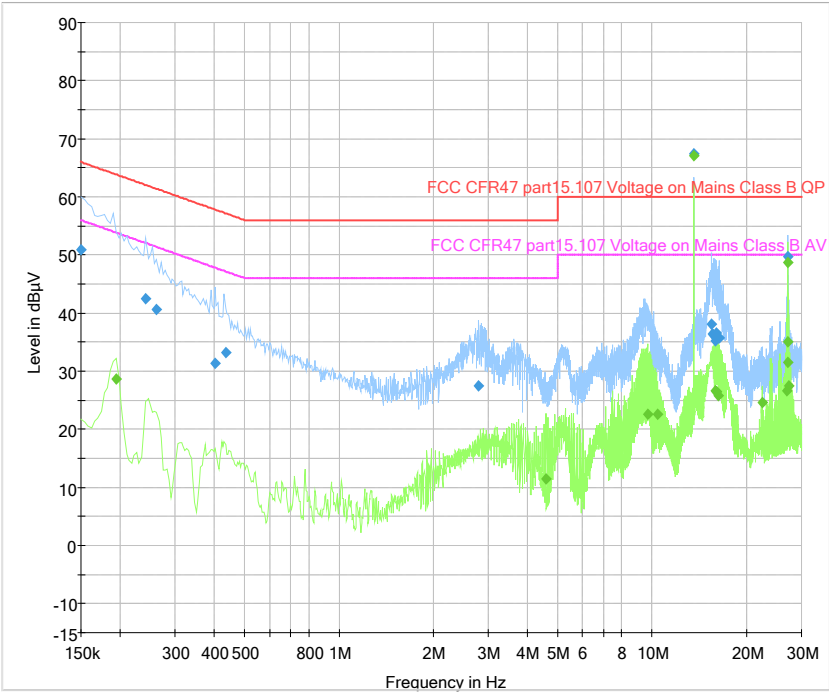
Radiated H-field scan



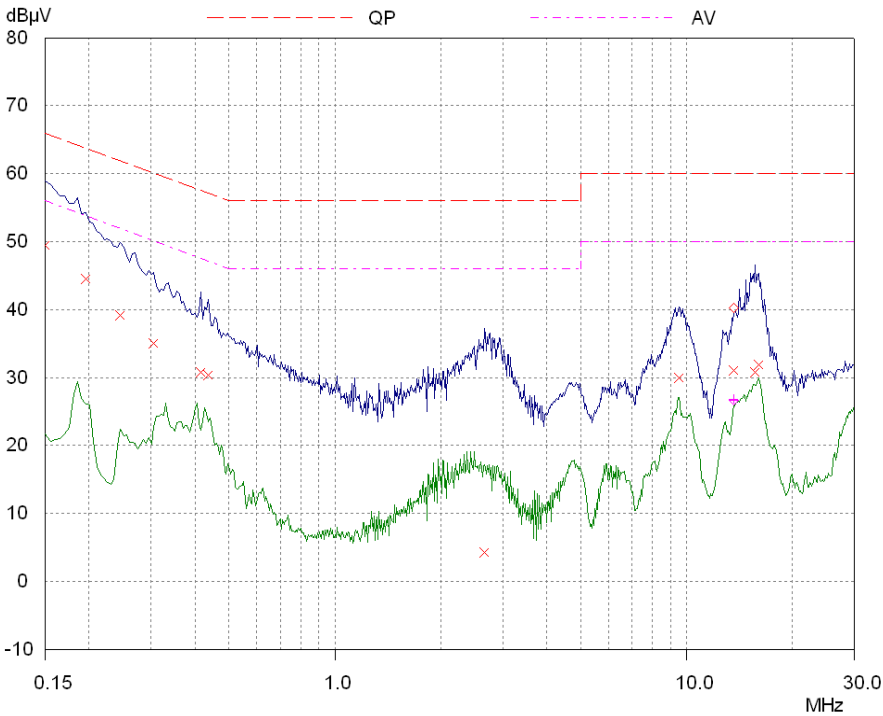
Radiated E-field scan



Powerline conducted emissions – With Antenna



Powerline conducted emissions – With Dummy Load



Appendix C:**Additional Test and Sample Details**

This appendix contains details of:

1. The samples submitted for testing.
2. Details of EUT operating mode(s)
3. Details of EUT configuration(s) (see below).
4. EUT arrangement (see below).

Throughout testing, the following numbering system is used to identify the sample and it's modification state:

Sample No: Sxx Mod w

where:

xx	= sample number	eg. S01
w	= modification number	eg. Mod 2

The following terminology is used throughout the test report:

Support Equipment (SE) is any additional equipment required to exercise the EUT in the applicable operating mode. Where relevant SE is divided into two categories:

SE in test environment: The SE is positioned in the test environment and is not isolated from the EUT (e.g. on the table top during REFE testing).

SE isolated from the EUT: The SE is isolated via filtering from the EUT. (e.g. equipment placed externally to the ALSR during REFE testing).

EUT configuration refers to the internal set-up of the EUT. It may include for example:

- Positioning of cards in a chassis.
- Setting of any internal switches.
- Circuit board jumper settings.
- Alternative internal power supplies.

Where no change in EUT configuration is **possible**, the configuration is described as "single possible configuration".

EUT arrangement refers to the termination of EUT ports / connection of support equipment, and where relevant, the relative positioning of samples (EUT and SE) in the test environment.

For further details of the test procedures and general test set ups used during testing please refer to the related document "EMC Test Methods - An Overview", which can be supplied by TRaC Global upon request.

C1) Test samples

The following samples of the apparatus were submitted by the client for testing :

Sample No.	Description	Identification
S01	Gemtag CX21	4929 4208
S08	Gemtag CX21 – Dummy Load	

The following samples of apparatus were submitted by the client as host, support or drive equipment (auxiliary equipment):

Sample No.	Description	Identification
S03	Support Laptop , PSU	6591 6001
S04	5 Test cards and block pack	None
S05	USB cable	None
S06	Laptop Mains adaptor	None

The following samples of apparatus were supplied by TRaC Global as support or drive equipment (auxiliary equipment):

Identification	Description
None	

C2) EUT Operating Mode During Testing.

During testing, the EUT was exercised as described in the following tables :

Test	Description of Operating Mode:
All tests detailed in this report	EUT transmitting at maximum Power, reading card as required.

C3) EUT Configuration Information.

The EUT was submitted for testing in one single possible configuration.

C4) List of EUT Ports

The tables below describe the termination of EUT ports:

Sample : S01 & S03
Tests : Radiated Emissions

Port	Description of Cable Attached	Cable length	Equipment Connected
6 Way header	4 core - USB	1.5m	S03
	2 Core – Serial – USB Adaptor	2m	S03

* Only connected during setup.

C5 Details of Equipment Used

TRaC No	Equipment Type	Equipment Description	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH093	CBL6112B	Bilog	Chase	08/07/2013	24	08/07/2015
UH191	CBL611/A	Bilog	Chase	13/12/2012	24	13/12/2014
UH195	ESH3-Z5.831.5	Lisn	R&S	03/07/2013	12	03/07/2014
UH281	FSU46	Spectrum Analyser	R&S	26/03/2014	12	26/03/2015
UH387	ATS	Chamber 1	Rainford EMC	04/07/2013	24	04/07/2015
UH388	ATS	Chamber 2	Rainford EMC	04/07/2013	24	04/07/2015
UH396	ENV216	Lisn	R&S	22/05/2014	12	22/05/2015
UH403	ESCI 7	Recevier	R&S	12/08/2013	12	12/08/2014
UH405	FSU26	Spectrum Analyser	R&S	16/04/2014	12	16/04/2015
UH420	CBL6112	Bilog	Chase	06/07/2012	24	06/07/2014
L007	hfh2	Loop Antenna	R&S	17/10/2013	24	17/10/2015
L290	CBL611/A	Bilog	Chase	13/12/2012	24	13/12/2014
L300	20240-20	Horn 18-26GHz (&UH330)	Flann	10/02/2014	24	10/02/2016
L317	ESVS10	Receiver	R&S	12/02/2014	12	12/02/2015
L352	ESVS10	Receiver	R&S	21/03/2014	12	21/03/2015
L426	52 Series II	Temperature Indicator	Fluke	22/05/2014	12	22/05/2015
REF909	FSU26	Spectrum Analyser	R&S	12/02/2014	12	12/02/2015
REF916	SMBV100A	Signal Generator	R&S	19/02/2014	12	19/02/2015
REF940	ATS	Radio Chamber - PP	Rainford EMC	09/07/2013	24	09/07/2015
REF976	34405a	Multimeter	Agilent	19/05/2014	12	19/05/2015

Appendix D:

Additional Information

No additional information is included within this test report.

Appendix E:

Photographs and Figures

The following photographs were taken of the test samples:

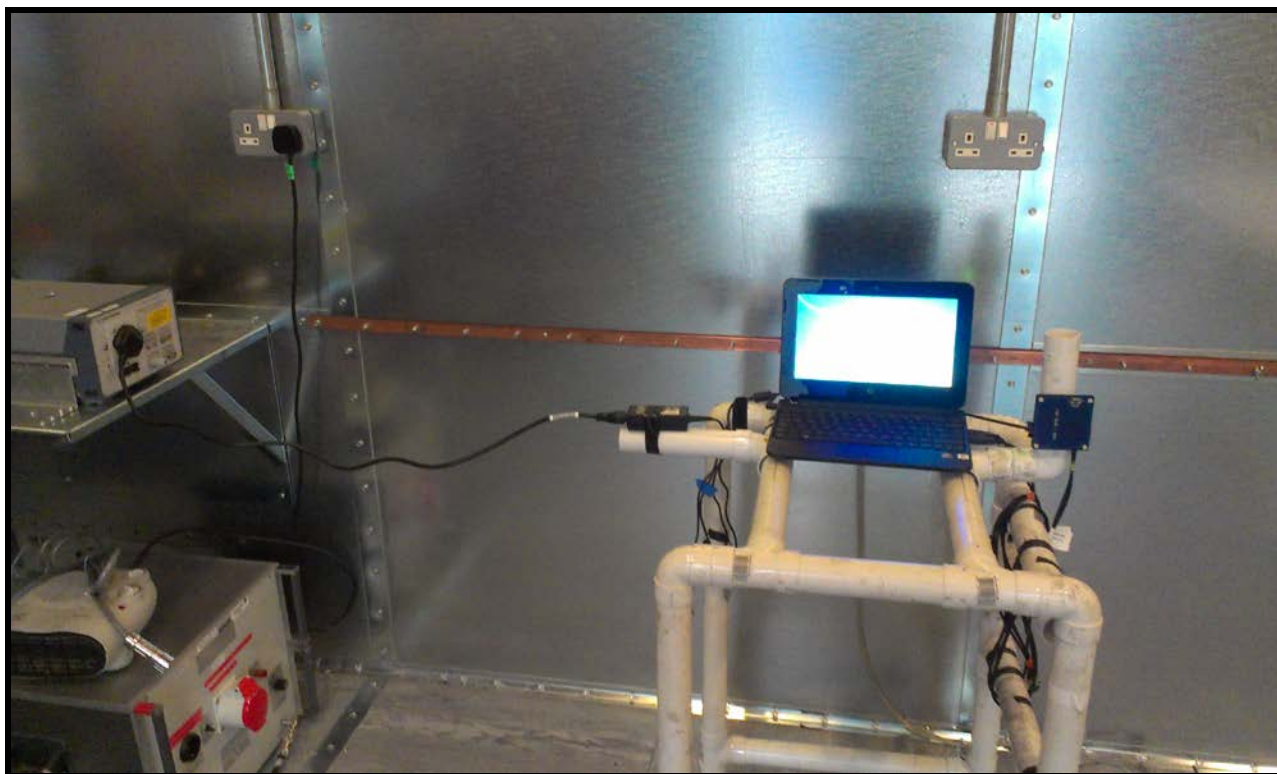
1. Radiated electric field emissions arrangement: Over view.
2. Radiated electric field emissions arrangement: Close up.
3. AC Power line Conducted Emissions: Over view



Photograph 1



Photograph 2



Photograph 3

