TRaC Wireless Test Report	**:** 0F3071WUS1
Applicant	**:** Stanley Security Solutions Ltd
Apparatus	**:** iPAC Controller
Specification(s)	**:** CFR47 Part 15 .209 July10th 2008 **:** CFR47 Part 15.109 (b) July 10th 2008
Purpose of Test	**: Certification**
FCCID	**: OQL-C-IPAC**
Authorised by	: 
	: Radio Product Manager
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Contents

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.

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1.4 Apparatus Assessed. iPAC Controller

The apparatus was assessed between 10th – 16th March 2010

Product Description

The iPAC is a two door access controller. It has the necessary interface to be able to connect external RFID readers, electronic locks and door sensors to the door channels. These external peripherals are not supplied with the equipment.

The iPAC is a standalone door controller and does not need a controlling PC connection to operate.

The iPAC is fitted with an on board user interface and an integrated RFID administration reader which allows the operator to directly administer the controller, it can also be administered via a web browser by connecting to an Ethernet network.

The operator adds unique RFID tokens to the iPAC and administers the access rights of the token and hence user access. The user presents a RFID token to the external readers connected to the door channels, if the user is allowed access the controller actuates the lock. The controller can control a LED on the external reader which is used to indicate the state of the lock i.e. red for locked, green for access and red/green for access denied. The iPAC can also connect to a door sensor switch to indicate events such as door left open or door forced.

All user data is held in battery backed RAM on the controller.

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	Pass
Spurious Emissions Radiated >1000MHz	Title 47 of the CFR: Part 15 Subpart (c)	ANSI C63.10	N/A
AC Power conducted emissions	Title 47 of the CFR: Part 15 Subpart (c) 15.207	ANSI C63.10	Pass
Intentional Emission Frequency	Title 47 of the CFR: Part 15 Subpart (c)	ANSI C63.10	N/A
Intentional Emission Field Strength:	Title 47 of the CFR: Part 15 Subpart (c) 15.209	ANSI C63.10	Pass
Intentional Emission Band Occupancy	Title 47 of the CFR: Part 15 Subpart (c) 15.209	ANSI C63.10	Pass
Intentional Emission ERP (mW)	Title 47 of the CFR: Part 15 Subpart (c)	ANSI C63.10	N/A
Unintentional Radiated Spurious Emissions	Title 47 of the CFR: Part 15 Subpart (b) 15.109	ANSI C63.10	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	-	Pass
Maximum Frequency of Search	Title 47 of the CFR: Part 15 Subpart (c) 15.33	-	Pass
Extrapolation Factor	Title 47 of the CFR: Part 15 Subpart (c) 15.31(f)	-	√

Abbreviations used in the above table:

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 20 °C
Humidity	: 47 to 54 %

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 Application of Measurement Uncertainty

The following table contains the measurement uncertainties for measurements

The following procedure is used when determining the result of a measurement :

(i) If specification limits are not exceeded by the measured result, extended by the positive component of the expanded uncertainty interval at a confidence level of 95%, then a pass result is recorded.

(ii) Where a specification limit is exceeded by the result even when the result is decreased by the negative component of the expanded uncertainty interval, a fail result is recorded.

(iii) Where the measured result is below a limit, but by a margin less than the positive measurement uncertainty component, it is not possible to record a pass based on a 95% confidence level. However, the result indicates that a pass result is more probable than a fail result.

(iv) Where a measured result is above a limit, but by a margin less than the negative measurement uncertainty component, it is not possible to record a fail based on a 95% confidence level. However the result indicates that a fail is more probable than a pass.

2.2 Measurement Uncertainty Values

For the test data recorded in accordance with note (iii) of Section 2.1 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 (Equipment - TRLUH120) = **2.18dB**
Uncertainty in test result (Equipment – TRL05) = **1.08dB**
Uncertainty in test result (Equipment – TRL479) = **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 (Equipment - TRLUH120) = **119ppm**
Uncertainty in test result (Equipment – TRL05) = **0.113ppm**
Uncertainty in test result (Equipment – TRL479) = **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 (Equipment TRL479) Up to 8.1GHz = **3.31dB**
Uncertainty in test result (Equipment TRL479) 8.1GHz – 15.3GHz = **4.43dB**
Uncertainty in test result (Equipment TRL479) 15.3GHz – 21GHz = **5.34dB**
Uncertainty in test result (Equipment TRLUH120) 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%**

[11] Power Line Conduction

Uncertainty in test result = **3.4dB**

[12] Spectrum Mask Measurements

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

[13] Adjacent Sub Band Selectivity

Uncertainty in test result = **1.24dB**

[14] Receiver Blocking – Listen Mode, Radiated

Uncertainty in test result = **3.42dB**

[15] Receiver Blocking – Talk Mode, Radiated

Uncertainty in test result = **3.36dB**

[16] Receiver Blocking – Talk Mode, Conducted

Uncertainty in test result = **1.24dB**

[17] Receiver Threshold

Uncertainty in test result = **3.23dB**

[18] 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
Mod	: Modification
EUT	: Equipment Under Test
SE	: Support Equipment
L	: Live Power Line
N	: Neutral Power Line
E	: Earth Power Line
Pk	: Peak Detector
QP	: Quasi-Peak Detector
Av	: Average Detector
CDN	: Coupling & decoupling network

ALSR	: Absorber Lined Screened Room
OATS	: Open Area Test Site
ATS	: Alternative Test Site
Ref	: Reference
Freq	: Frequency
MD	: Measurement Distance
SD	: Spec Distance
Pol	: Polarisation
H	: Horizontal Polarisation
V	: Vertical Polarisation

A1 Transmitter Intentional Emission Radiated

Carrier power was verified with the EUT transmitting **Test Details:**	
Regulation	Title 47 of the CFR: Part15.209
Measurement standard	ANSI C63.10:2003
EUT sample number	S01
Modification state	None
SE in test environment	S02 S03
SE isolated from EUT	None
EUT set up	Refer to Appendix C
Temperature	14°C
Photographs (Appendix E)	2

FREQ. (kHz)	**MEASUREMENT DISTANCE Meters**	**MEASUREMENT Rx. READING (dBµV/m)**	**EXTRAP. FACTOR (dB)**	**FIELD STRENGTH (µV/m)**
133.4	**1**	**82.3**	**94.70**	**0.240**
133.4	**3**	**67.6**	**80.00**	**0.240**
Limit value @ fc		18.0µV/m@ 300m		
Band occupancy @ -20 dBc		f lower	f higher	
		131.958333kHz	134.786858kHz	
		Band occupancy = 2.82kHz		

Notes:
1 Results quoted are extrapolated as indicated
2 Receiver detector @ fc = Average 10 / 120kHz bandwidth
3 Extrapolation used 1m to 300m and 3m to 300m

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

A2 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 : [X] 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
Measurement standard	ANSI C63.10:2003
Frequency range	9kHz to 30MHz
EUT sample number	S01
Modification state	None
SE in test environment	S02 S03
SE isolated from EUT	None
EUT set up	EUT measured at 1m and 3m
Temperature	14°C
Photographs (Appendix E)	1

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)	FIELD ST'GH (dBµV/m)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
1.	No Significant emissions within 20dB of the limit						

Radiated Harmonics from the intentional radiator @ 133.0kHz investigated upto the 10th harmonic

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 15:2008 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits 47 CFR 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:

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

(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 C63.10:2003
Frequency range	150kHz to 30MHz
EUT sample number	S01
Modification state	NONE
SE in test environment	S02 S03
SE isolated from EUT	NONE
EUT set up	Refer to Appendix C

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

Results measured using the average detector compared to the average limit

Ref No.	Freq (MHz)	Conductor	Result (dBuV)	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	No significant emissions within 20dB of the limit					

Results measured using the quasi-peak detector compared to the quasi–peak limit

Ref No.	Freq (MHz)	Conductor	Result (dBuV)	Spec Limit (dBuV)	Margin (dB)	Result Summary
1	0.515	Live	39.26	56.00	16.74	Pass
2	0.660	Neutral	38.22	56.00	17.78	Pass

Specification limits :

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

Conducted disturbance at the mains ports.

Frequency range MHz	Limits dBμV	
	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 Unintentional Radiated Emissions

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric field emission test applies to all spurious emissions directly related to the transmitter. The maximum permitted field strength is listed in Section 15.109(b) class A digital device. The EUT was set to operate in transmit mode.

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

10m open area test site : [X] 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 section 15.109(b) Class A digital device
Measurement standard	ANSI C63.10:2003
Frequency range	30MHz – 1GHz
EUT sample number	S01
Modification state	NONE
SE in test environment	S02 S03
SE isolated from EUT	NONE
EUT set up	Refer to Appendix C
Temperature	7°C
Photographs (Appendix E)	1

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

Ref No.	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	FIELD ST'GH (dBµV/m)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
1.	34.4	14.51	0.8	15.89	31.20	36.30	90.00
2.	34.6	15.91	0.8	15.89	32.60	42.65	90.00
3.	40.40	15.12	0.85	12.53	28.50	26.60	90.00
4.	66.35	23.66	1.15	4.99	29.80	30.90	90.00
5.	73.85	17.79	1.16	5.55	24.50	16.78	90.00
6.	80.00	16.93	1.19	6.68	24.80	17.37	90.00
7.	86.20	19.70	1.30	7.90	28.90	27.86	90.00
8.	111.45	25.01	1.48	11.41	37.90	78.52	150.00
9.	112.10	24.29	1.49	11.42	37.20	72.44	150.00
10.	113.80	24.04	1.50	11.46	37.00	70.79	150.00
11.	257.65	14.93	2.27	12.60	29.80	30.90	210.00
12.	768.0	4.07	4.40	20.08	28.55	70.79	210.00

5 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.

6 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded.

For Frequencies below 1 GHz, RBW = 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector.

The upper and lower frequency of the measurement range was decided according to 47 CFR 15:2008 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits 47 CFR 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:

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

(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	✓			

(v) Parameter defined by standard and / or single possible, refer to Appendix D
(vi) Parameter defined by client and / or single possible, refer to Appendix D
(vii) Parameter had a negligible effect on emission levels, refer to Appendix D
(viii) Worst case determined by initial measurement, refer to Appendix D

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.

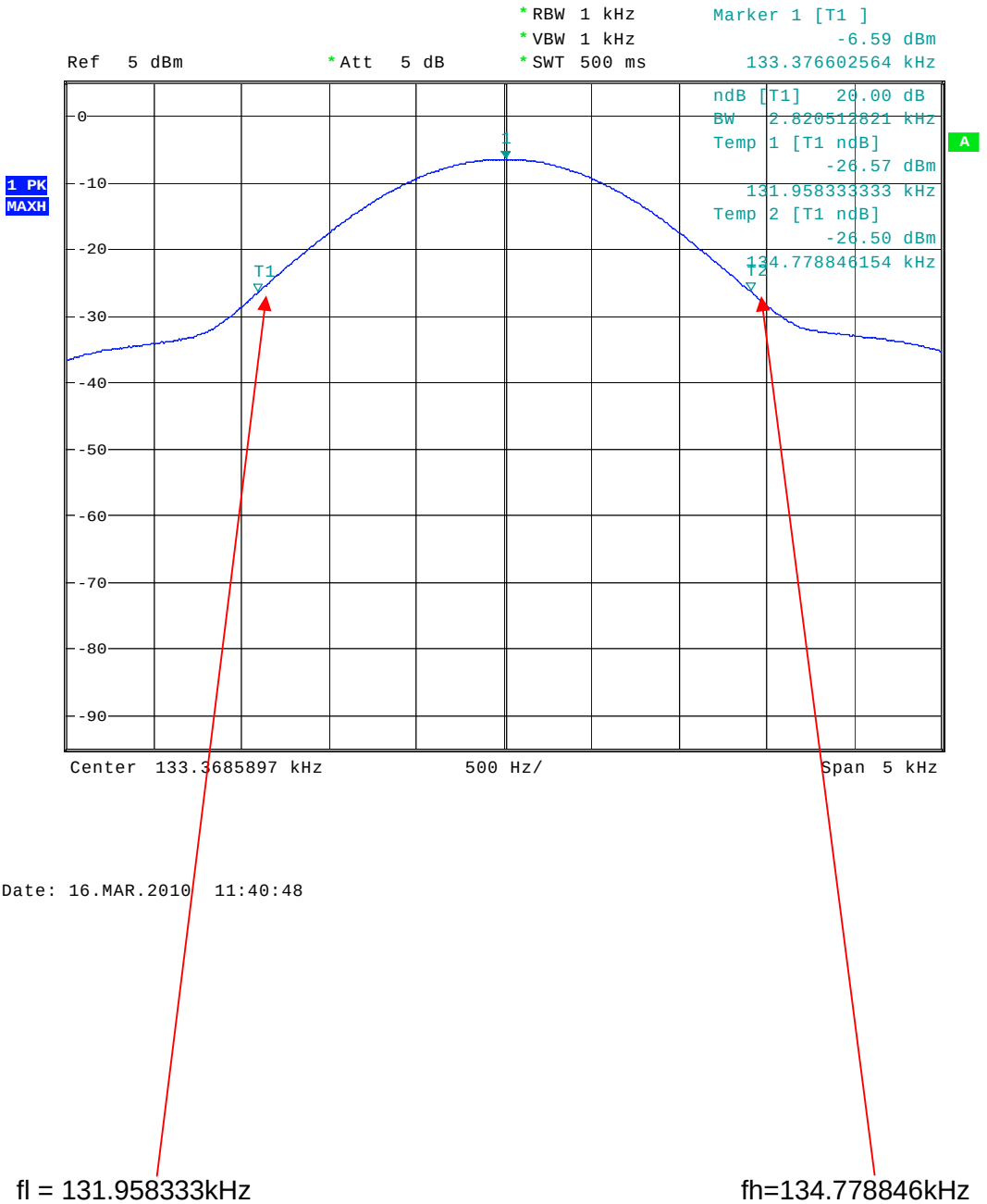
(b) The time and date on the plots do not necessarily equate to the time of the test.

(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



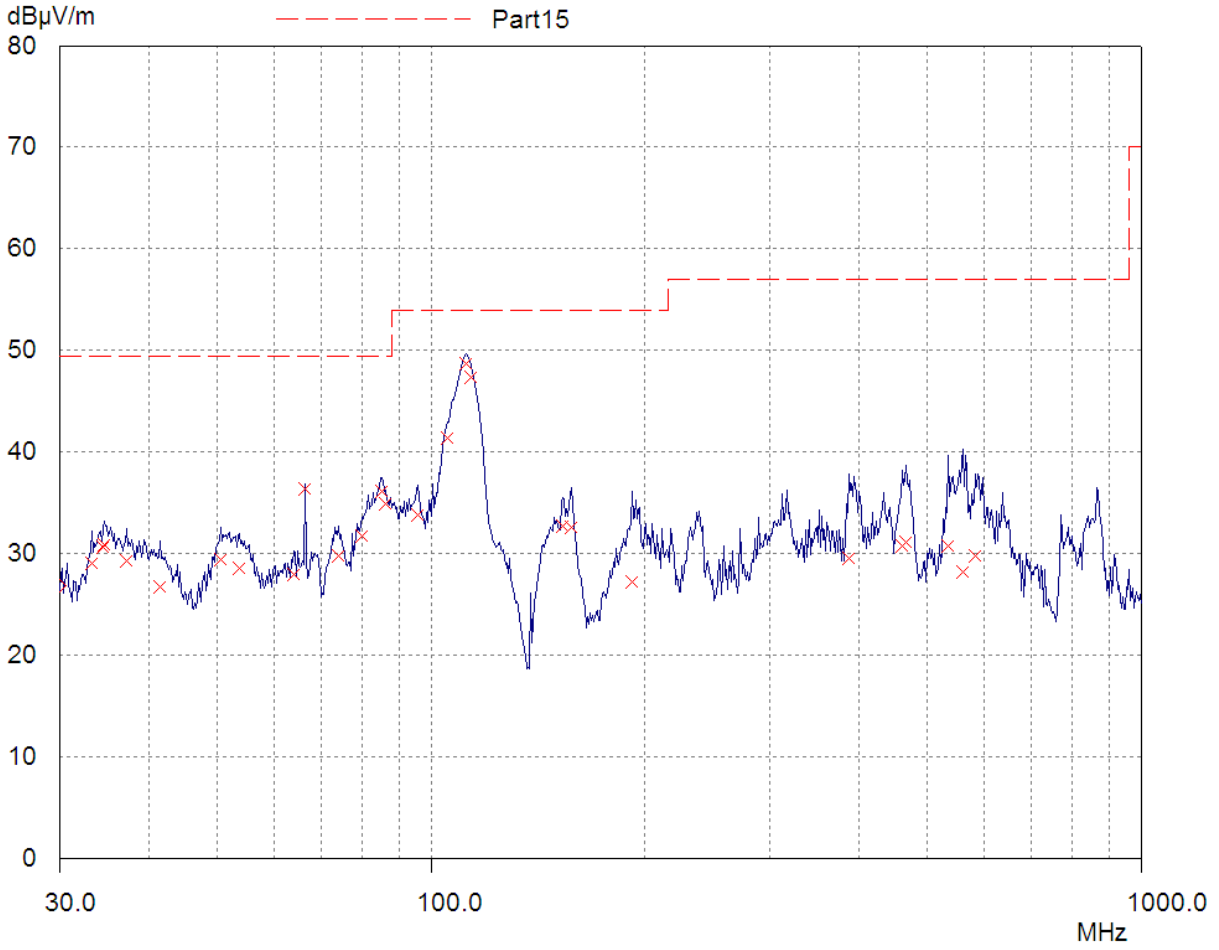
fl = 131.958333kHz

fh=134.778846kHz

Band occupancy = 2.82kHz

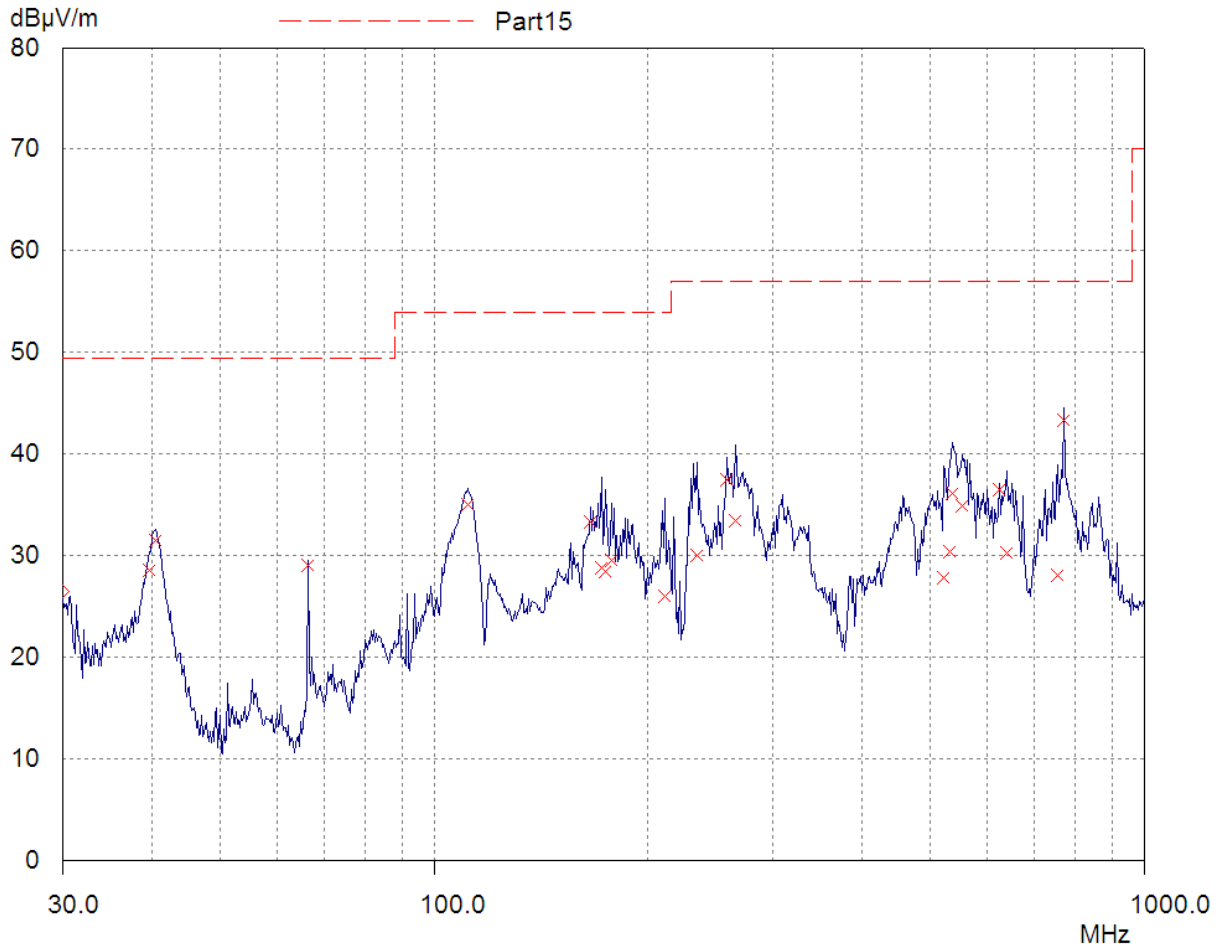
Radiated spurious emissions 30 MHz to 1 GHz @ 3m
10m limit line Class A Digital Device

Vertical

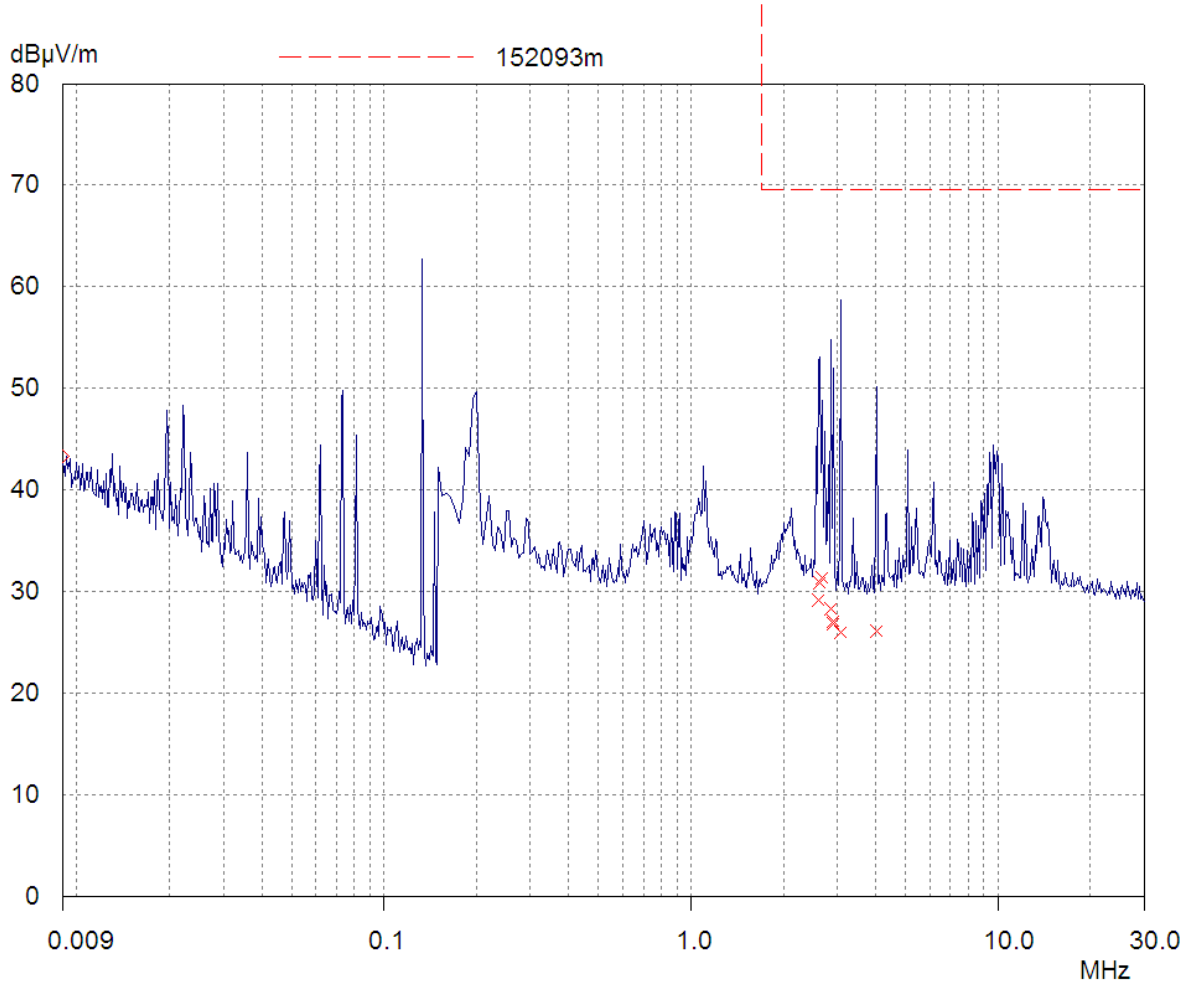


Radiated spurious emissions 30 MHz to 1 GHz @ 3m
10m limit line Class A Digital Device

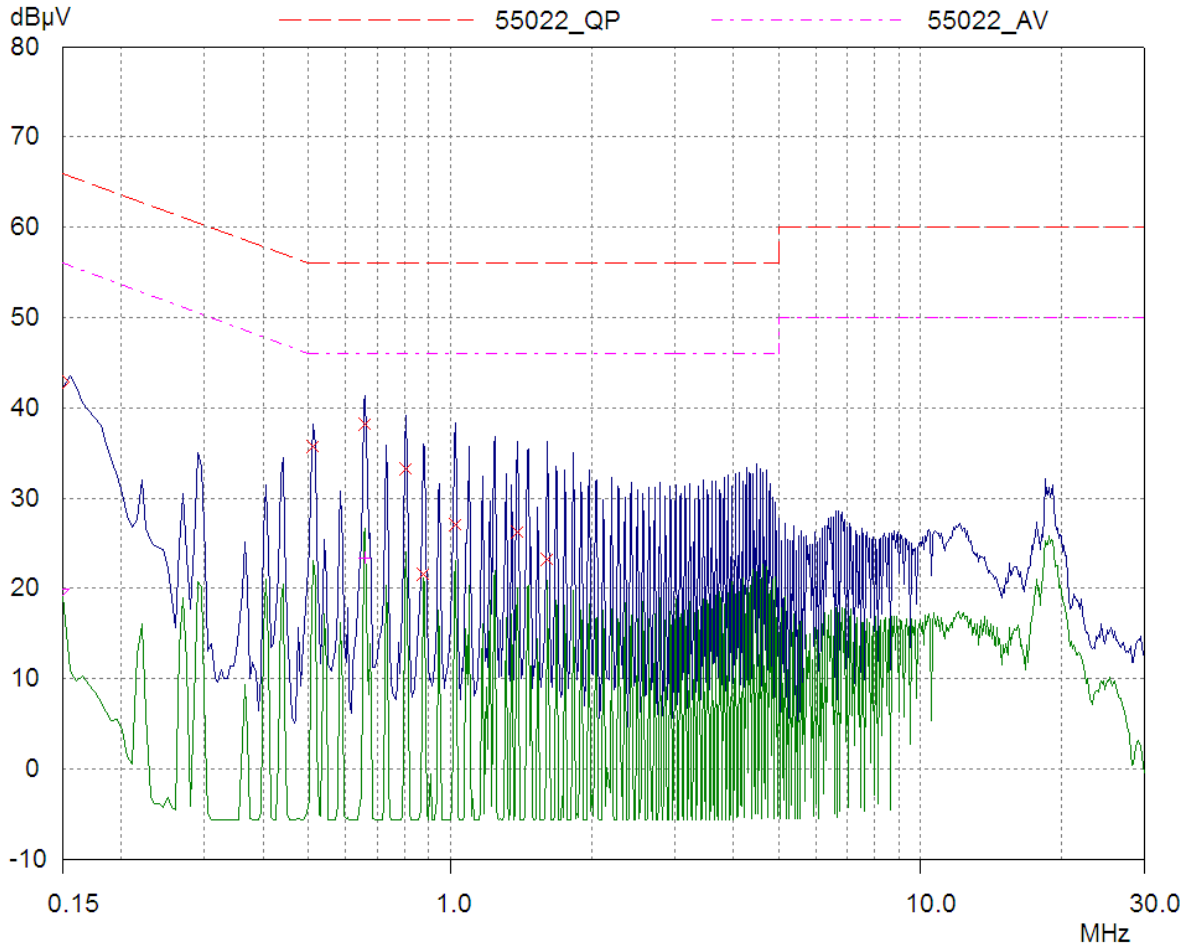
Horizontal



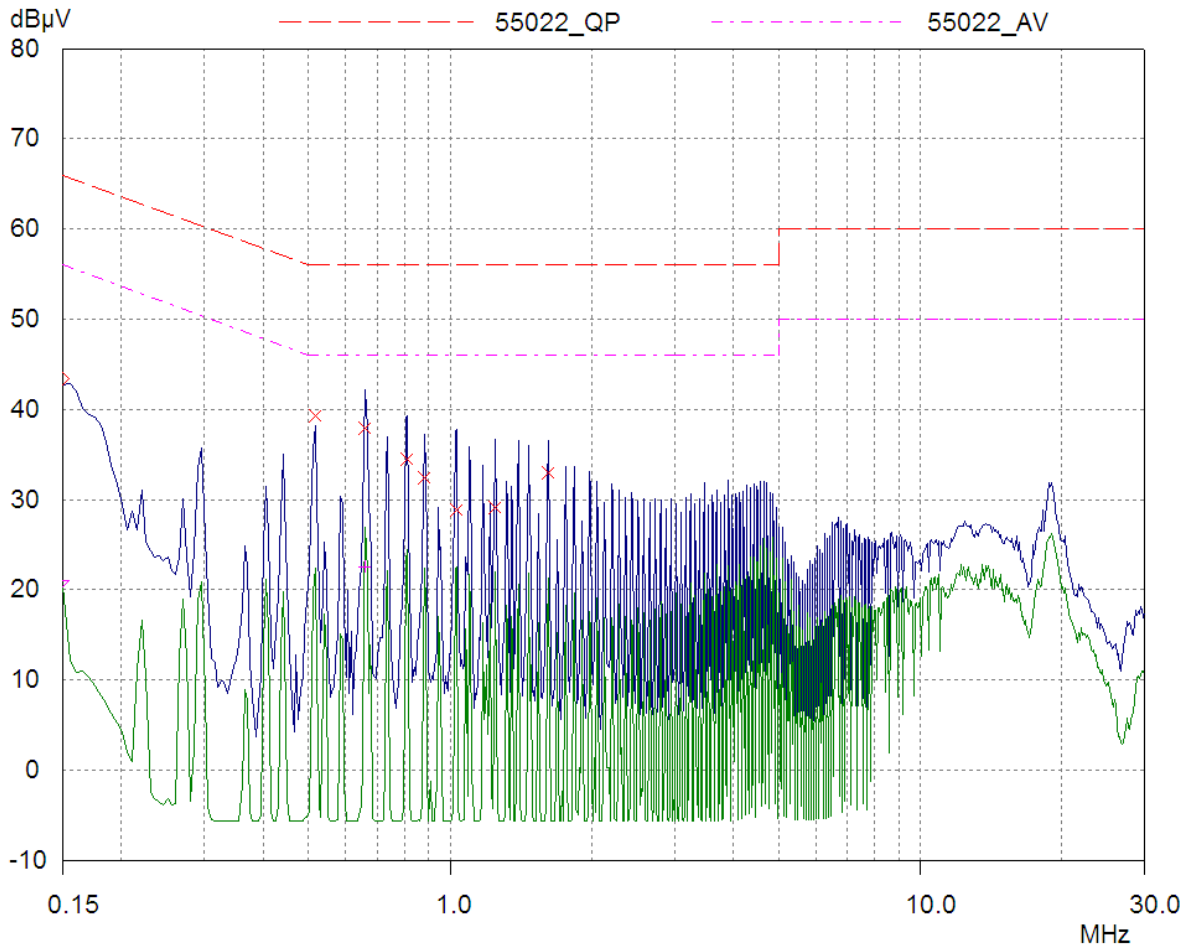
Radiated spurious 9kHz – 30MHz @ 3m



AC Powerline Conducted Emissions



AC Powerline Conducted Emissions



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 Telecoms & Radio upon request.

C1) Test samples

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

Sample No.	Description	Identification
S01	iPAC Controller	None

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

Sample No.	Description	Identification
S02	Dummy Load	None
S03	Memory stick	None

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

Identification	Description

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	Tx enabled during all tests

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 :
Tests : Radiated

Port	Description of Cable Attached	Cable length	Equipment Connected
USB	None	None	Memory Stick

Sample :
Tests : Radiated Emissions

Port	Description of Cable Attached	Cable length	Equipment Connected
Ethernet	Ethernet Network Cable	10m	Network port

* Only connected during setup.

C5 Details of Equipment Used

TRAC Ref	Type	Description	Manufacturer	Date Calibrated.
TRLUH281	FSU46	Spectrum Analyser	Rhode & Schwarz	29/01/2010
TRLUH003	ESHS10	EMI Test Receiver	Rhode & Schwarz	10/12/2009
L007	Loop	Loop Antenna	Rhode & Schwarz	26/08/2009
TRLUH372	6201-69	30MHz – 1 GHz Pre Amplifier	Watkins Johnson	19/03/2009
TRLUH04	ESHS10	Receiver	Rhode & Schwarz	10/12/2009
TRLUH191	CBL611/A	BiLog Periodic Antenna	York	01/10/2008
TRL93	EL5129	Bilog Periodic Antenna	Schaffner	03/06/2009
TRLUH76	LISN	NSLK 8128	Schwarzbeck	14/04/2009

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:

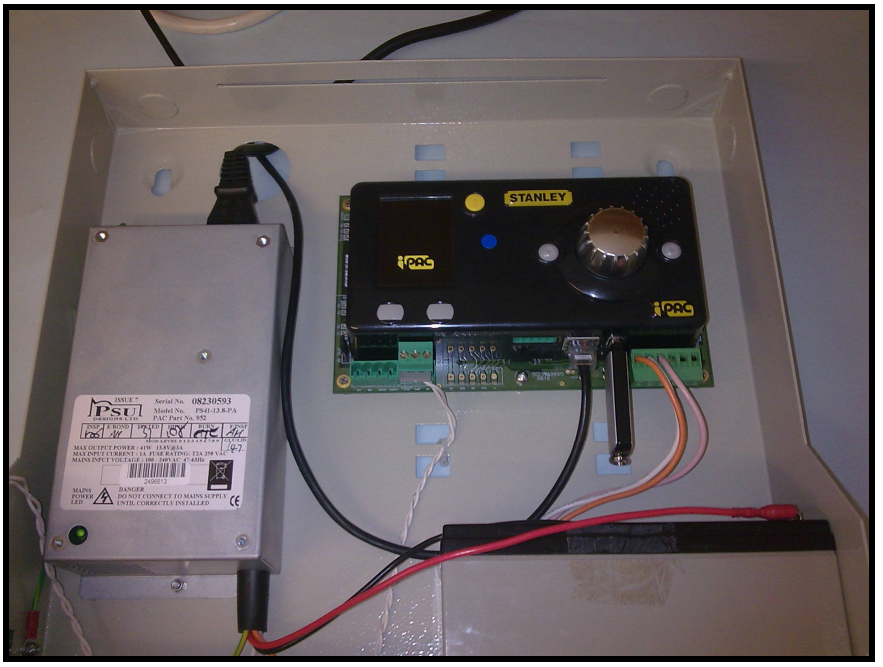
1. Radiated electric field emissions arrangement: Test setup
2. Radiated electric field emissions arrangement: Test setup
3. Photo of the iPAC Controller Overview
4. Control / interface PCB trackside / component side
5. RF / display PCB trackside / component side

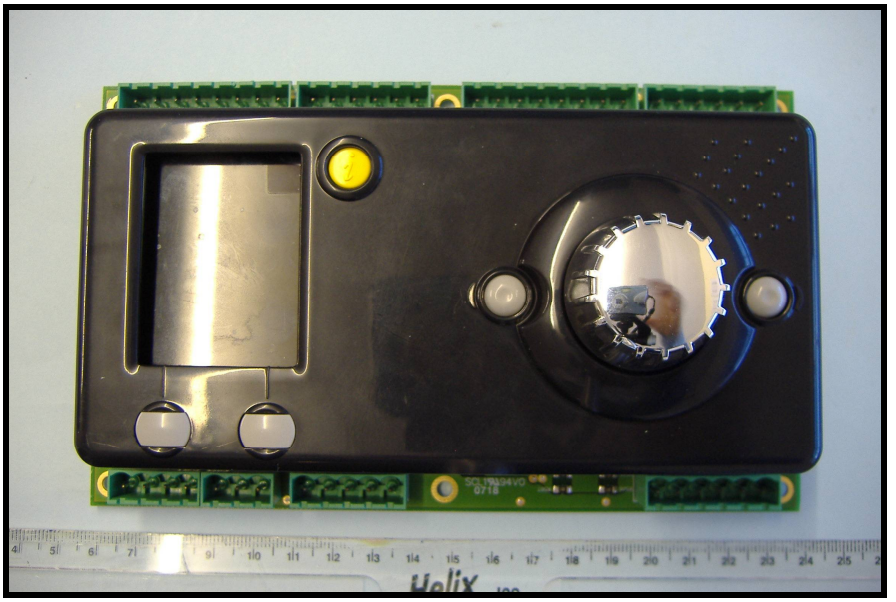
Photograph 1

Photograph 2

Photograph 3

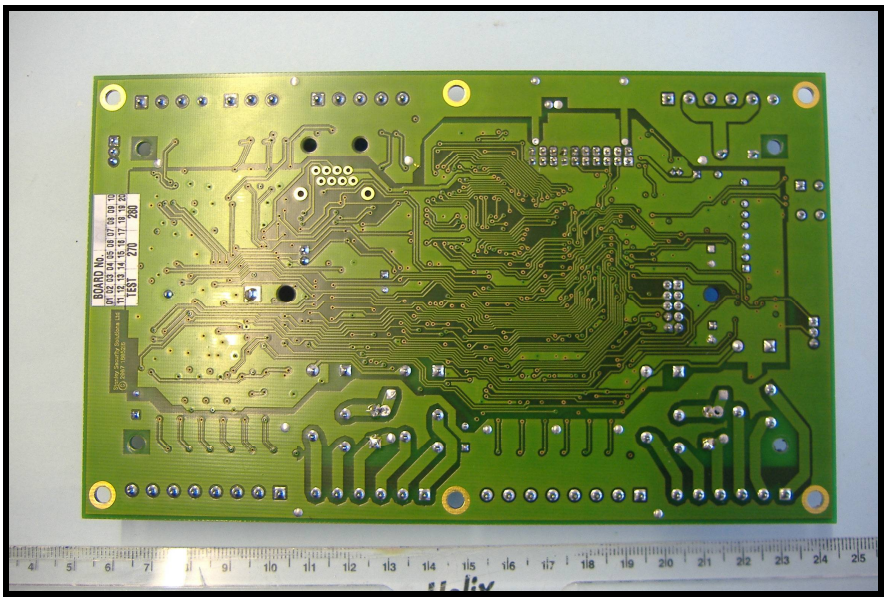
Overview



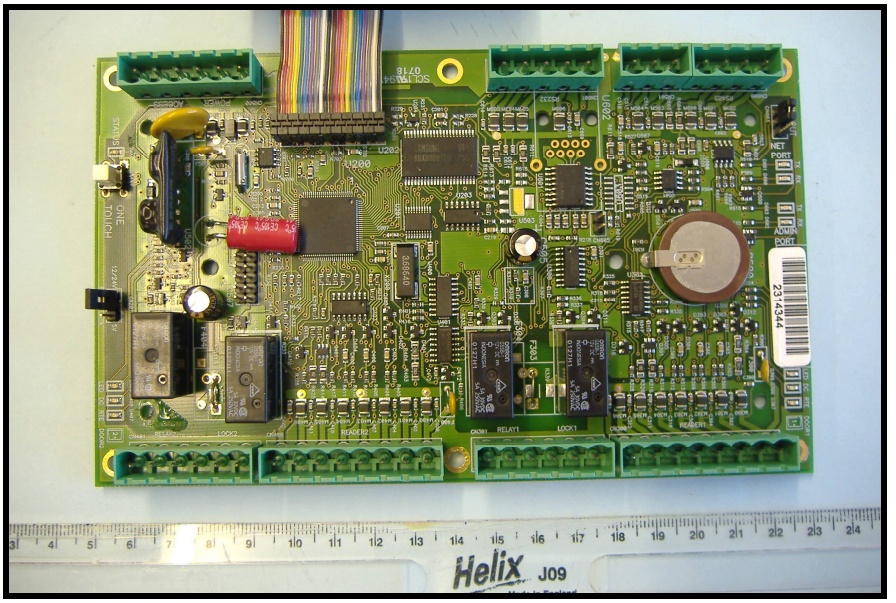


Photograph 4

Control / interface PCB trackside

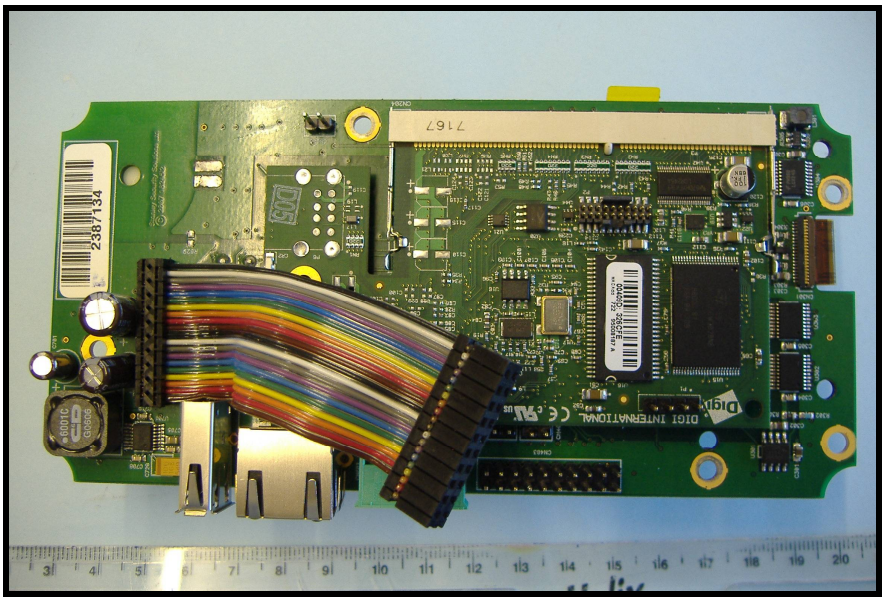


Control / interface PCB component side

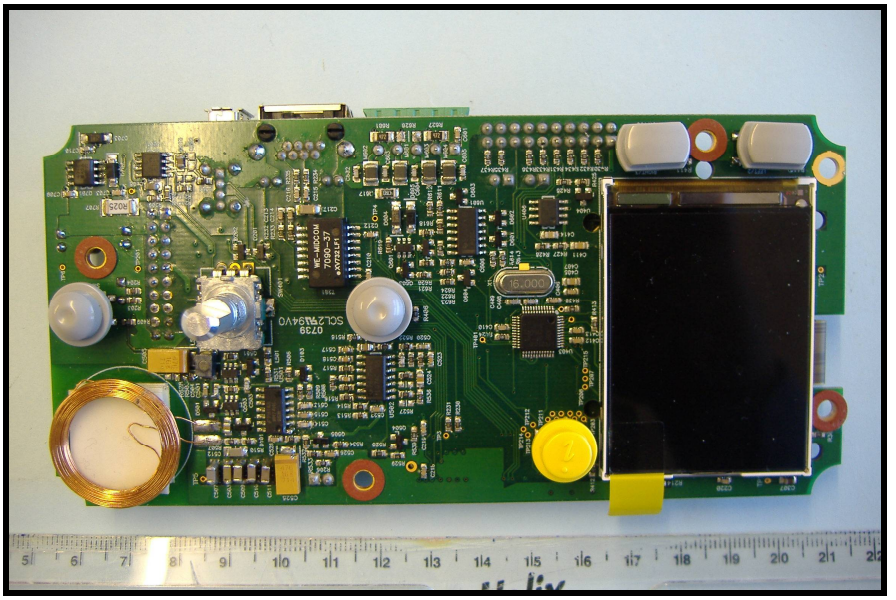


Photograph 5

RF*I* display PCB track side



RF*I* display PCB component side



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