Compliance Engineering Ireland Ltd

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Project Number: 13E4471-2

Prepared for:

Forcefield Active Technologies LTD

By

Compliance Engineering Ireland Ltd

Clonross Lane

Derrockstown

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Co. Meath

FCC Site Registration: 92592

Industry Canada Assigned Site Code: 8517A-2

FCC ID: 2ACD7PF02

Date

25th March 2013

FCC EQUIPMENT AUTHORISATION

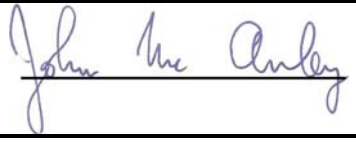
Test Report

EUT Description

Petfence

Authorised :

John McAuley



TEST SUMMARY

The equipment complies with the requirements according to the following standards.

FCC Part Section(s)	RSS-210 Section	TEST PARAMETERS	Test Result
15.207(a)		CONDUCTED EMISSIONS ON THE MAINS	PASS
15.209(a)		SPURIOUS EMMISIONS	PASS

Exhibit A – Technical Report

Table of Contents

1.0 EUT Description

The EUT was a Pet containment system that incorporates a 10 kHz Transmitter.

The EUT comprises of mains powered central transmitter unit, perimeter wire and receiver Tag.

Model:	Petfence
FCC ID:	2ACD7PF02
Company:	Forcefield Active Technologies Ltd
Contact	John Gavin
Address:	Unit 118, Shannon Free Zone West, Shannon, Co. Clare
Phone:	061471511
e-mail:	John.gavin@forcefield.ie
Test Standards:	47 CFR, Part 15.209(a,d,e) ; 47 CFR, Part 15.207(a)
Transmitter power configuration:	110 V ac to 18 V dc Sinsukian part number SK01g 1800030U
Oper. Temp Range:	0° C to +40° C
Classification:	DCD
Test Methodology:	Measurements performed according to the procedures in ANSI C63.4-2003

1.1 EUT Operation

Operating Conditions during Test:

The equipment under test was operated during the measurement under the following conditions:

The EUT was operated in normal mode for Spurious Emissions tests.

Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

☒ Normal

Temperature:	+9 to +23° C
Humidity:	58-69 %

1.2 Modifications

No modifications were required in order to pass the test specifications.

1.3 Date of Test

The tests were carried out on one sample of the EUT during the month of March 2013.

1.4 Electromagnetic Emissions Testing

The guidelines of CISPR 16-4 were used for all uncertainty calculations, estimates and expressions thereof for EMC testing. A copy of Compliance Engineering Ireland Ltd.'s policy for EMC Measurement Uncertainty is available on request.

RF Requirements: Spurious emissions in accordance with FCC CFR 15.207 and 15.209. Tests were carried out to the requirements of CISPR 16-4 and ANSI C63.4-2009.

1.4.1 Measurement Uncertainty

The measurement uncertainty (with a 95% confidence level) for the conducted emissions test was ±3.5 dB.

The measurement uncertainty (with a 95% confidence level) for the radiated emissions test was ±5.3 dB (from 30 to 100 MHz), ±4.7 dB (from 100 to 300 MHz), ±3.9 dB (from 300 to 1000 MHz) and ±3.8 dB (from 1 GHz to 40 GHz).

2.0 Emissions Measurements

2.1 Conducted Emissions Measurements

The EUT was powered from AC mains to 18v dc adapter which was connected to the mains through a LISN and measurements were carried out using a Receiver over the frequency range 150KHz to 30MHz.

2.2 Radiated Emissions Measurements

Field Strength of Spurious Radiated Emissions

Emissions from 9 Khz to 30 Mhz were measured with a loop antenna. The resolution bandwidth was 300 Hz (9 - 150 kHz) and 10 kHz (150 kHz to 30 MHz) with a peak detector.

Emissions from 30 MHz to 1GHz were measured using a bi-log antenna. In this case the resolution bandwidth was 120 kHz with a peak detector.

To represent a typical installation, the EUT was set up outdoors in an open area with 100 metre's of wire cable in a square circuit of approx 25 metres per side. The cable was layed above ground and the transmitter unit was set to large garden size and boundary width. The transmitter unit and receiver tag were placed beside each other on a table 1 metre above ground.

The maximum point of emissions was ascertained using all three antenna polarities, by measuring all sides of the wire perimeter including the EUT at 10 metre intervals at a distance of 10 metres. Measurements were then repeated at the maximum point of emissions from 9 kHz to 30 MHz.

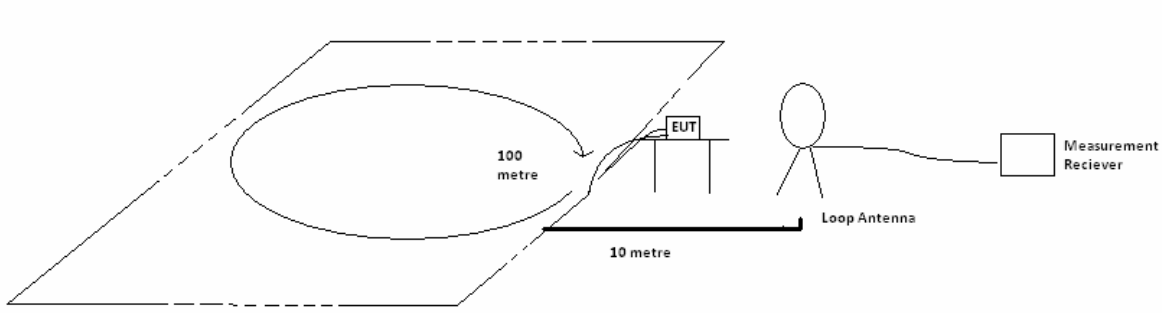


Figure 1: Test Setup for Spurious Radiated Emissions 9 kHz to 30 MHz

Measurements of emissions from 30 MHz to 1 GHz were made at the Compliance Engineering Ireland Ltd anechoic chamber located in Dunshaughlin, Co. Meath, Ireland to determine the radio noise radiated from the EUT. A "Description of Measurement Facilities" has been submitted to the FCC and approved pursuant to Section 2.948 of

CFR 47 of the FCC rules. These measurements were made using a bi-log antenna with a resolution of 120 kHz.

3.1 Results for Spurious Radiated emissions

Appendix A shows the results of the scans in the anechoic chamber.

Result: Pass

3.1.1 Measurements with Loop Antenna (9 kHz to 30 MHz) at a distance of 10 metres

Frequency kHz	Peak Level No Factors dBuV/m	Antenna Polarity	Antenna Factor dB	Cable loss dB	Measured Field Strength Peak dBuV/m	FCC Limits 10m Field Strength dBuV/m
10.128	67.9	Vertical	17.1	0.2	85.2	106.6
18.870	71.3	Vertical	13.4	0.2	84.9	101.2
28.458	72.7	Vertical	11.5	0.2	84.4	97.6
38.046	67.7	Vertical	10.6	0.2	78.5	95.1
86.012	53.3	Vertical	9.7	0.2	63.2	88.0
159.326	66.8	Vertical	9.5	0.2	76.5	82.6

Spurious Emmisions Measurements from EUT 9 kHz to 30 MHz

Formula for extrapolated limits from FCC 15.209 (a) table:

For the frequency range 9 kHz to 490 kHz: $A_{limit300m}$ uV = (2400/Frequency)

Converted to Decibel $A_{limit300m}$ dB = 20 * Log($A_{limit300m}$ uV)

From FCC 15.31:- Limit extrapolated to 10 metre using:

$$A_{limit10m}\ dB = A_{limit300m}\ dB + 20*Log(300/(10)^{\wedge 2})\ dB$$
$$Or = A_{limit300m}\ dB + 40*Log(300/10)\ dB$$

Sample Calculation: Fundamental Peak at 10.128 kHz

From 25.209 (a) table (2400/10.128)=236.967 uV/m

20 * Log (236.967) = 47.5 dB uV -Limit at 300 metre

106.6 dBuV/m = 47.5 dB uV/m + 40 * Log (300/10) -Limit at 10 metre

4 List of Test Equipment

Instrument	Mftr.	Model	CEI Ref No.	Cal Due Date
Measuring Receiver	Rohde & Schwarz	ESVS30	607	19/04/2014
Bilog Antenna	Chase	CBL 6140	690	03/10/2015
Spectrum Analyser/Receiver	Rohde & Schwarz	ESR	869	25/05/2014
LISN	Rohde & Schwarz	ESH3-Z5	604	11/12/2013
Loop Antenna	Chase	CA 5635	821	17/09/2013
Measuring Receiver	Rohde & Schwarz	ESHS30	605	29/04/2014

Appendix A

Additional Test Results

Compliance Engineering Ireland ltd
Conducted Emissions

Manuf: Petfence
Operator: L Brien
Comment: Live

Scan Settings (1 Range)

Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	20ms	AUTO	LN OFF	60dB

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 8
Acc Margin: 20dB

Transducer No.	Start	Stop	Name
1	9k	30M	LISN

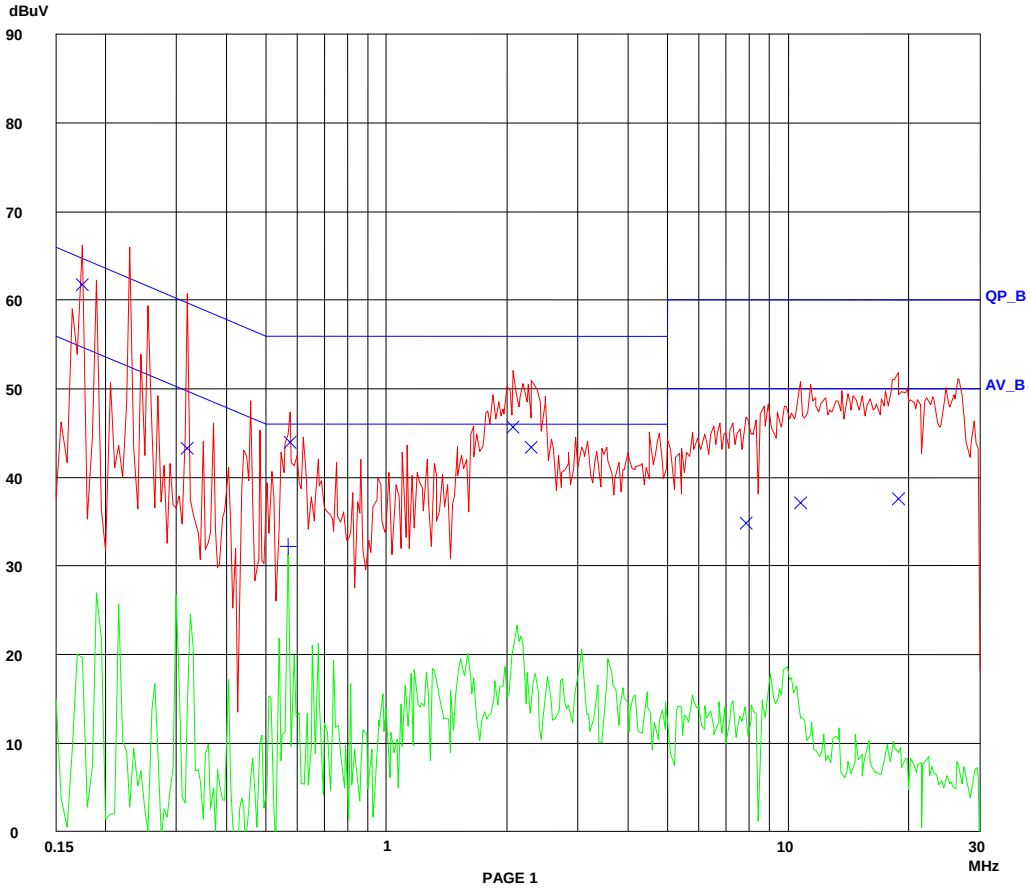


Fig1 Conducted Emissions Mains Live

Compliance Engineering Ireland ltd
Conducted Emissions

Manuf: Petfence
Operator: L Brien
Comment: Neutral

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	20ms	AUTO	LN OFF	60dB

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 8
Acc Margin: 20dB

Transducer No.	Start	Stop	Name
1	9k	30M	LISN

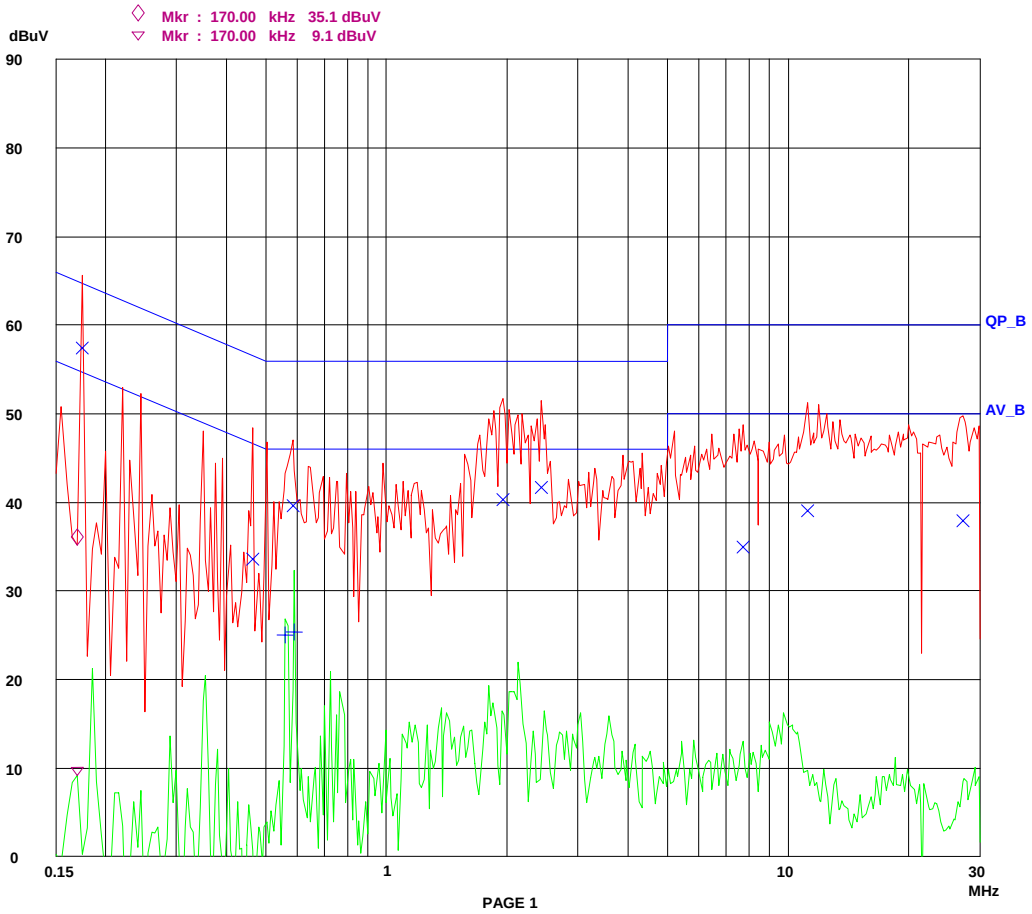


Fig 2 Conducted Emissions Mains Neutral

Detector	Frequency MHz	Reading dBuV	Margin dB	Phase	Limit dB
Peak	0.175	61.7	3.5	Live	65.2
Peak	0.320	43.1	12.9	Live	56.0
Average	0.570	32.3	13.7	Live	46.0
Peak	0.575	44.1	11.9	Live	56.0
Peak	2.070	45.2	10.8	Live	56.0
Peak	2.3000	43.2	12.8	Live	56.0
Peak	7.860	34.2	25.8	Live	60.0
Peak	10.775	37.2	22.8	Live	60.0
Peak	18.795	37.7	22.3	Live	60.0

Detector	Frequency MHz	Reading dBuV	Margin dB	Phase	Limit dB
Peak	0.175	57.1	8.1	Neutral	65.2
Peak	0.465	43.8	12.2	Neutral	56.0
Average	0.560	25.1	20.9	Neutral	46.0
Peak	0.585	39.7	16.3	Neutral	56.0
Average	0.585	25.4	20.6	Neutral	46.0
Peak	1.955	40.6	15.4	Neutral	56.0
Peak	2.43	41.9	18.1	Neutral	60.0
Peak	7.73	35.2	24.8	Neutral	60.0
Peak	11.19	38.9	21.1	Neutral	60.0
Peak	27.205	38.1	21.9	Neutral	60.0

Results for Conducted Emissions on the mains

Test Result Pass

RADIATED EMISSIONS

25. Mar 13 16:23

Op Cond: Normal
Operator: J McAuley
Test Spec: FCC
Comment: Petfence

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	120k	120k	PK	5ms	0dBLN	OFF	60dB

Final Measurement: x Hor-Max / + Vert-Max
Meas Time: 1 s
Subranges: 8
Acc Margin: 0dB

Transducer No.	Start	Stop	Name
3	20M	1000M	CEIL615
9	30M	1000M	BILOG

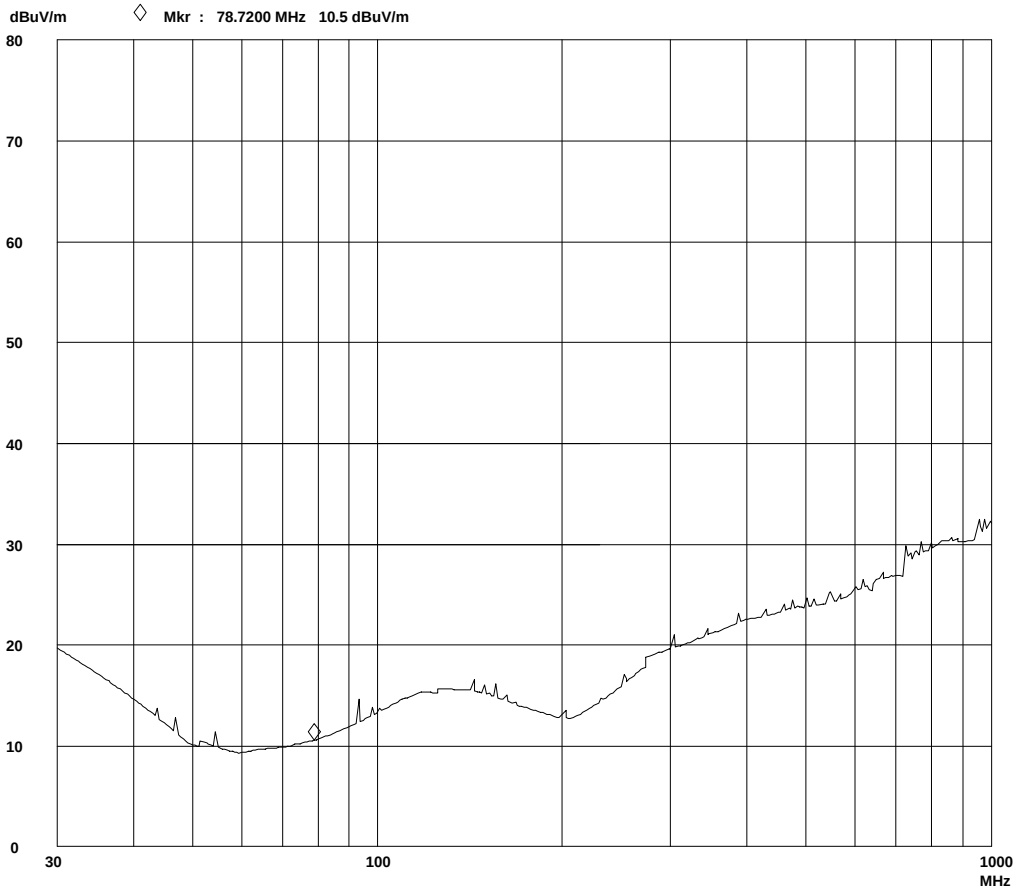


Fig 3 Scan 30 MHz - 1GHz Vertical 10 metres Anechoic Chamber

No Measurable Peaks Detected

RADIATED EMISSIONS

25. Mar 13 16:45

Op Cond: Normal
Operator: J McAuley
Test Spec: FCC
Comment: Petfence

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	120k	120k	PK	5ms	0dB	LN OFF	60dB

Final Measurement: x Hor-Max / + Vert-Max
Meas Time: 1 s
Subranges: 8
Acc Margin: 0dB

Transducer No.	Start	Stop	Name
3	9 20M	1000M	CEIL615
19	30M	1000M	BILOG

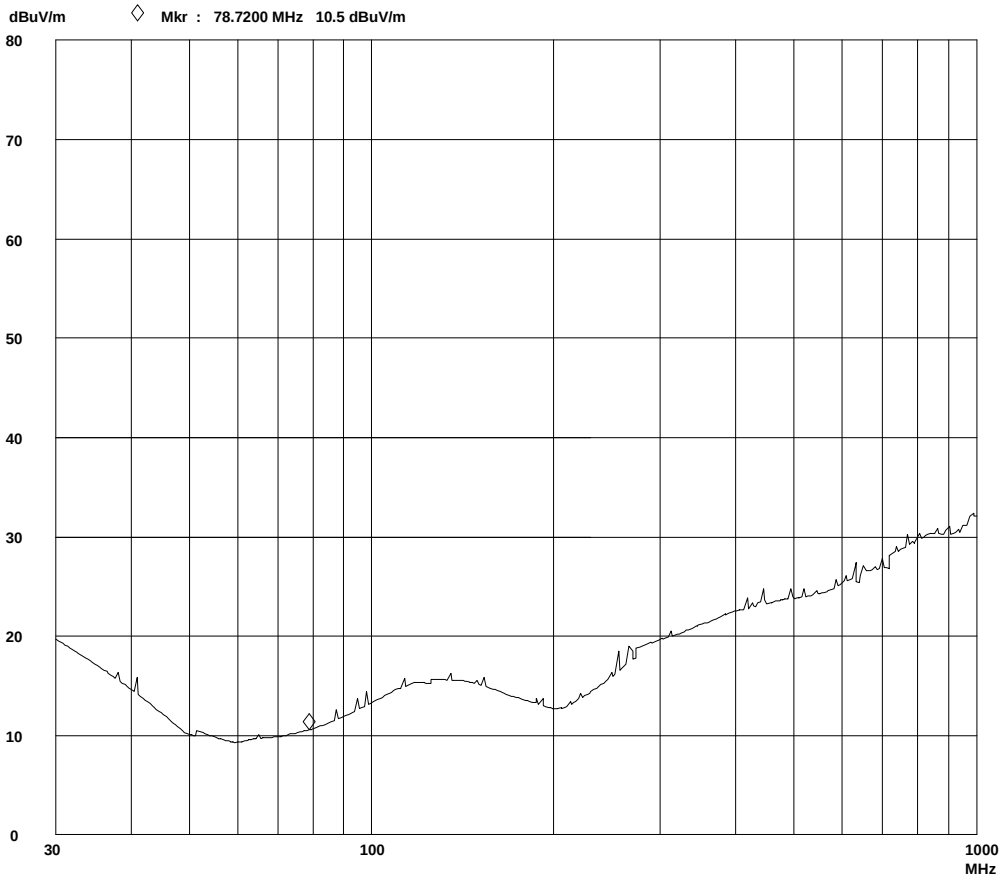


Fig 4 Scan 30 MHz- 1GHz Horizontal 10 metres Anechoic Chamber

No Measurable Peaks Detected