



Confidential Report

Client: Excelsys Technologies Ltd, 27 East Gate Drive, East Gate Business Park, Little Island, Co. Cork, Ireland. <u>Attention: Mr. Diarmuid Hogan</u>	Test of: 24V 1008W fan cooled power supply & 48V 1008W fan cooled power supply To: EN 55011: 2009 + A1: 2010 EN 60601-1-2: 2007
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TESTED BY: P Reilly

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APPROVED SIGNATORY: J McAuley

JOB TITLE: Technical Manager

SIGNATURE:

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**Test of:
24V 1008W fan cooled power supply & 48V 1008W fan cooled power supply**

1 Equipment Under Test (E.U.T.)

1.1.1 Identification of E.U.T.

(Immunity testing carried out on)

Brand Name:	Excelsys
Description:	24V 1008W fan cooled power supply. Serial number 00000031
Model Number:	XS1000-24N-000

1.1.2 Identification of E.U.T.

(Emissions testing carried out on)

Brand Name:	Excelsys
Description:	24V 1008W fan cooled and 24V 504W convection cooled power supplies. Serial number 00000032.
Model Number:	XS1000-24N-000 and XS500-24N-000

Brand Name:	Excelsys
Description:	48V 1008W fan cooled power supply
Model Number:	XS1000-48N-000

1.2 Description of E.U.T.

The EUT was an Excelsys Technologies Ltd, 24V 1008W/504W, off-line dc power supply intended for industrial and medical applications. For emissions testing, the EUT was tested as both 1008W and 504W variants, the 504W variant sample being created from the 1008W variant by the removal of the top cover and the fan bracket assembly.

Emissions were also carried out on a 48V 1008W, off-line ac/dc power supply intended for

industrial and medical applications. The EUT was tested as a 1008W variant.

1.3 Modifications incorporated in E.U.T.

An additional circuit to introduce frequency dithering to the DC-DC stage was incorporated on the EUT to increase the PASS margin on the Conducted Emissions. This will be added to the final released version of the product.

1.4 Support Equipment List

There was no manufacture supplied support equipment.

1.5 Date of Test

The tests were carried out on the 11th, 12th and 13th of June 2014.

2 Test Specification, Methods and Procedures

2.1 Emissions Test Specification

Radiated Emissions Requirements

EN 55011: 2009 + A1: 2010

Title:

Industrial, Scientific and Medical equipment– Radio disturbance characteristics – Limits and methods of measurement

2.2 Immunity

Immunity was assessed to the parts of the following standard as requested by the manufacturer:

EN 60601-1-2: 2007

Title:

Medical Electrical Equipment
Section 1.2: Collateral standard: Electromagnetic Compatibility – Requirements and tests.

EN 61000-4-3	Electromagnetic Compatibility (EMC) Part4: Testing and measurement techniques Section3: Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-2	Electromagnetic Compatibility (EMC) Part4: Testing and measurement techniques Section2: Electrostatic discharge immunity test
EN 61000-4-4	Electromagnetic Compatibility (EMC) Part4: Testing and measurement techniques Section4: Electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) Part 4. Testing and measurement techniques. Section 5: Surge immunity test.
EN 61000-4-6	Electromagnetic compatibility (EMC) Part 4. Testing and measurement techniques. Section 6: Immunity to Conducted disturbances, induced by radio-frequency fields.
EN 61000-4-8	Electromagnetic Compatibility (EMC) Part4: Testing and measurement techniques Section4: Power frequency magnetic field immunity test
EN 61000-4-11	Electromagnetic Compatibility (EMC) Part4: Testing and measurement techniques Section11: Voltage dips, short interruptions and voltage variations immunity test.

2.3 Apparatus and Methods:

Measuring apparatus used during tests was designed and built to the requirements of:

C.I.S.P.R. 16 Series: Specifications for radio disturbance and immunity measuring apparatus and methods.

2.4 Purpose of test

To determine compliance with the EU EMC Directive 2004/108/EC.

3 Deviations and Exclusions from the Test Specifications

3.1 Deviations

Up to date versions of the basic standards have been used in this test programme. Where necessary, we have verified that the requirements of any older basic standards as may be referred to in the product standard have been complied with.

3.2 Exclusions

There were no exclusions from the test specification.

4 Operation of E.U.T. During Testing

4.1 Operating Environment

Supply Voltage: 230 Vac, 50 Hz

The following were the conditions at the time of immunity testing.

Temperature: 19-22°C
Humidity: 49-52% RH

4.2 Operating Modes:

The EUT was operated in normal mode with a resistive load.

5 Results

5.1 Radiated Emissions

Compliant measurements of radiated emissions were carried out on in an Anechoic Chamber from 30 MHz to 1 GHz. The equipment and cable orientation were investigated to ensure that maximum emissions were obtained at critical frequencies. The antenna height was also adjusted through the range of 1m - 4m.

The receiver bandwidth was set to 120 kHz for frequencies between 30 MHz and 1 GHz. See Appendix 3 for results.

See Appendix 3 for results.

5.1.2 Measurement Uncertainty

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) and ± 3.9 dB (from 300 to 1000 MHz).

5.2 Conducted Emissions

Measurements of conducted emissions were carried out using the receiver analysis feature, which uses three detectors, peak, quasi peak and average. Using this mode the voltage emission spectrum could be scanned in peak detection mode and emissions, which exceeded a sub range margin relevant to the respective limits, could be further measured.

Appendix 3 illustrate the results. The test configuration is shown in Appendix 2.

5.2.1 Measurement Uncertainty

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

5.3 Immunity to Radiated, Radio Frequency Electromagnetic Fields

Port: Enclosure
Basic Standard: EN 61000-4-3
Performance Criterion: A
Limit: 10 V/m (2 Hz Pulse Modulation)
Frequency range: 80-2700 MHz

The E.U.T. was placed in the anechoic chamber.

These tests were carried out over the frequency range of 80-2700 MHz. The step sizes from 80-2700 MHz were in 1% steps. All four sides of the E.U.T. were tested.

The dwell time at each frequency was 3 seconds. The distance of the antenna from the E.U.T. was 2.2m. The tests were carried out with the antenna oriented in horizontal and vertical polarisations.

The E.U.T. maintained normal operation during the testing and was subsequently found to be operating satisfactorily.

Frequency MHz	Polarisation (V/H)	Level (V/m)	Result
80-2700 MHz	V and H	10	Complied

Results of Radiated Immunity Testing

5.4 Electrostatic Discharge Test

Port:	Enclosure
Basic Standard:	EN 61000-4-2
Performance Criterion:	B
Limit:	± 4 & 6 kV contact discharges ± 2 , 4 & 8 kV air discharges

The ESD generator contained a discharge capacitor of 150pF and resistor of 330 Ω in accordance with the requirements of EN 61000-4-2. The tests were carried out using both positive and negative discharges. Contact discharges were applied to the EUT to comply with EN 61000-4-2.

Only parts of the equipment that can be touched during normal operation were subjected to discharges.

The test configuration is shown in Appendix 2.

Air discharges of ± 2 , 4 & 8 kV were applied to points on the case. Contact discharges of ± 4 & 6 kV were applied to the horizontal and vertical coupling plane.

The test configuration is shown in Appendix 2.

The EUT operated satisfactorily when discharges were applied.

5.5 Conducted RF Immunity

Ports: AC mains
 Basic Standard: EN 61000-4-6
 Performance Criterion: A
 Limit: 10 Vemf, 2 Hz Pulse Modulation
 Frequency range: 150 kHz to 80 MHz

The EUT was placed 0.1m above the ground plane and the mains cable was arranged 0.03m above the ground plane. All peripheral equipment was also placed 0.1m above the ground plane.

The current was injected on the mains cable in common mode. Each surface of the EUT was more than 0.5m from other metal surfaces.

The test configuration used was the EM clamp injection method. The system was calibrated to provide a current input level equivalent to an injected voltage level of 10 Vemf into a 150 ohm system. The dwell time at each frequency was 3 seconds.

Testing was carried out at both 240 V ac and 100 V ac.

The E.U.T. was found to be operating satisfactorily during and subsequent to testing.

Port	Disturbance type	Result
Mains	10 Vemf, 150 kHz – 80 MHz	Complied

Results of Conducted Immunity Testing

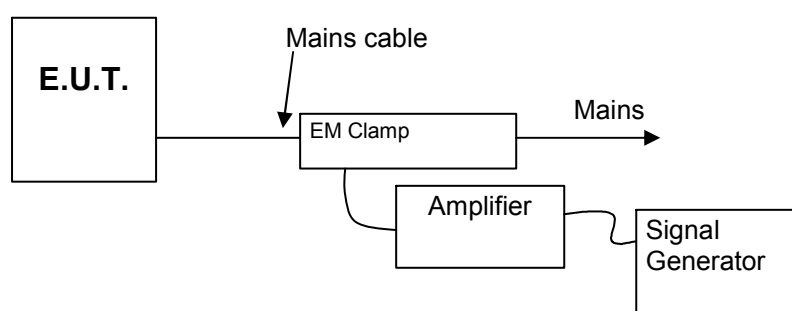


Figure 1: Conducted Immunity Test Set up

5.6 Electrical Fast Transient Test

Ports: AC Mains
Basic Standard: EN 61000-4-4
Performance Criterion: A
Limit: 1 & 2 kV mains power ports

Positive and negative fast transient discharges of amplitude 1 & 2 kV were applied to the mains input in accordance with the requirements of EN 61000-4-4.

The test configuration is shown in Appendix 2.

The tests were carried out with negative and positive transients. The application time for each test was 1 minute.

Testing was carried out at 240 V ac and 100 V ac.

The E.U.T. was found to be operating satisfactorily during and subsequent to testing.

Test port	Level	Result
Live	±1 & 2 kV	Complied
Neutral	±1 & 2 kV	Complied
Earth	±1 & 2 kV	Complied
L-N-E	±1 & 2 kV	Complied

Results of Fast Transient Testing

5.7 Surge Immunity Test

Ports:	AC Mains
Basic Standard:	EN 61000-4-5
Performance Criterion:	A
Limit, Live to Neutral:	± 0.5 & 1 kV
Live to Earth:	± 0.5 , 1 & 2 kV
Neutral to Earth:	± 0.5 , 1 & 2 kV

Positive and negative surges were applied to each of the mains inputs in accordance with the requirements of EN 61000-4-5.

Surges were applied to the mains conductors coupled line to line.

The test configuration is shown in Appendix 2.

The tests were carried out with positive and negative surges. The test was repeated every 60 seconds for a total of 5 times in each polarity and in all coupling modes. The tests were performed at 0°, 90°, 180° and 270° phases for both polarities.

Testing was carried out at 240 V ac and 100 V ac.

The E.U.T. was found to be operating satisfactorily during and subsequent to testing.

Port	Mode of conduction	Disturbance level	Result
PSU	L-N	± 0.5 & 1 kV	Complied
PSU	L-E	± 0.5 , 1 & 2 kV	Complied
PSU	N-E	± 0.5 , 1 & 2 kV	Complied

Results of Surge Immunity Testing

5.8 Voltage Dips & Interruptions Test

Ports: AC Mains
Basic Standard: EN 61000-4-11

Performance Criterion: B

Dips: Mains port - >95% dip 0.5 cycles
Mains port – 60% dip 5 cycles
Mains port – 30% dip 25 cycles

Interruption: Mains port – Interruption 250 cycles

Dips and interruptions were applied to the mains input in accordance with the requirements of EN 61000-4-11.

The test was carried out at 100 and 240 Vac

The EUT was found to be operating satisfactorily during and subsequent to testing.

Port	Disturbance type	Result
Mains supply	>95% dip 0.5 cycles	Complied
Mains supply	>95% interruption 250 cycles	Complied
Mains supply	60% dip 5 cycles	Complied
Mains supply	30% dip 25 cycles	Complied

Results of Voltage Dips & Interruptions testing

5.9 Power Frequency Magnetic Field Immunity Test

Basic Standard: EN 61000-4-8
Performance Criterion: A
Level: 3 A/m

The unit was placed on a non-conductive table of 0.8 meter height from the ground plane.

The field strength was set to 3 A/m and the unit was centred in the middle of the loop. The EUT was tested with the loop in both horizontal and vertical positions for one minute. The test was carried out at 230 Vac.

The EUT maintained normal operation during and subsequent to testing.

5.10 Fluctuating Harmonics

Ports: AC mains
Basic Standard: EN 61000-3-2
Class: A

The test measures the current at each of the harmonic frequencies from the second harmonic up to the fortieth harmonic.

A 50 Hertz, 230 Volt AC source was used to power the unit in compliance with EN 61000-3-2. The current harmonic levels were measured and compared with the limit levels for Class C waveforms. See Appendix 3 for results.

5.11 Flicker

Ports: AC mains
Basic Standard: EN 61000-3-3

The E.U.T. was connected to an impedance network and a 50 Hertz, 230 Volt AC source to power the unit in compliance with EN 61000-3-3.

The mains voltage flicker test was performed for 120 minutes. The E.U.T. flicker levels were significantly below the limit. See Appendix 3 for results.

6 Analysis of Test Results, Conclusions

6.1 Measurement Uncertainties

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4 with a confidence level of 95%.

6.2 Radiated Emissions to EN 55011.

The E.U.T. complied with the radiated emission specification of EN 55011 Class B when tested in accordance with the manufacturer's specification.

6.3 Conducted Emissions to EN 55011.

The E.U.T. complied with the EN 55011 Class B conducted emission specification when tested in accordance with the manufacturer's specification.

6.4 Immunity.

The E.U.T. complied with the immunity tests carried out to demonstrate compliance with the manufacturer's specification's when tested in accordance with the manufacturer's specification.

6.5 Steady State and Fluctuating Harmonics

The E.U.T. complied with the tests carried out to demonstrate compliance with EN 61000-3-2.

6.6 Flicker

The E.U.T. complied with the tests carried out to demonstrate compliance with EN 61000-3-3.

Appendix 1
Test Equipment Used:

Instrument	Mftr.	Model	Serial No.
Measuring Receiver	Rohde and Schwarz	ESVS30	607
Measuring Receiver	Rohde and Schwarz	ESHS30	605
LISN	Rohde and Schwarz	ESH3-Z5	604
Signal Generator	Rohde and Schwarz	SME 03	782
Signal Generator	Rohde and Schwarz	SME 03	765
Power Amplifier	Ophir	5141F	-
Power Amplifier	Schaffner	CBA9433	-
Bilog Antenna	Schaffner	CBL6111C	-
Bilog Antenna	Chase	-	690
Transient Simulator	Schaffner	Best emc	822
EM Clamp	Schaffner	KEMZ 801	727
Directional Coupler	Lab Plant	RX 1026	738
Impedance Network	Voltech	IEC Standard 555	674
Flicker / Harmonics Meter	California Instruments	PACS-1	785
Magnetic Loop	CEI	-	-

Appendix 2
Test Configurations



Figure 1: Conducted Immunity Test Set up



Figure 2: Fast Transients Test Set up

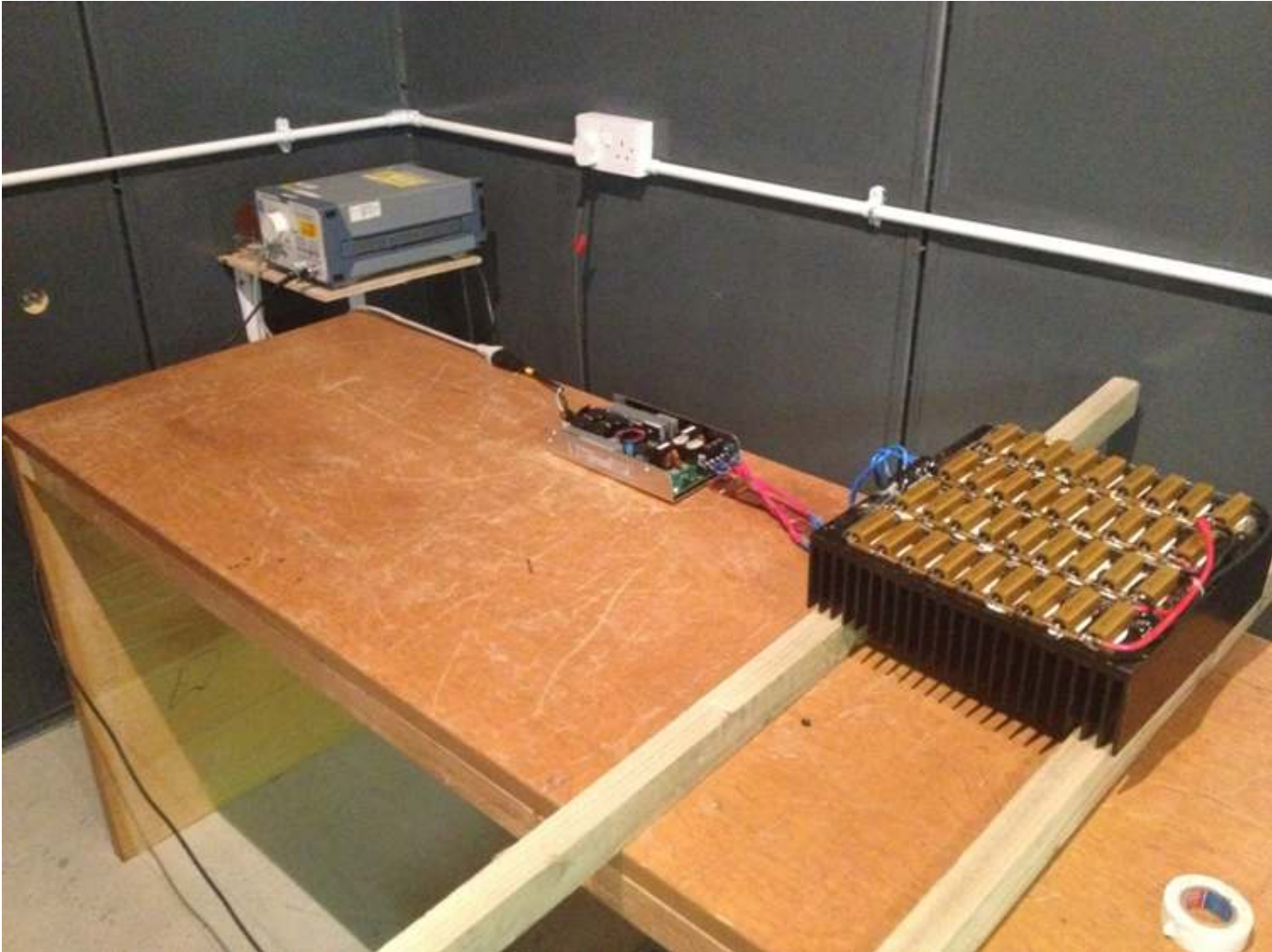


Figure 3: Conducted Emissions Test Set up



Figure 4: ESD Test set up



Figure 5: Harmonics and Flicker Test set up

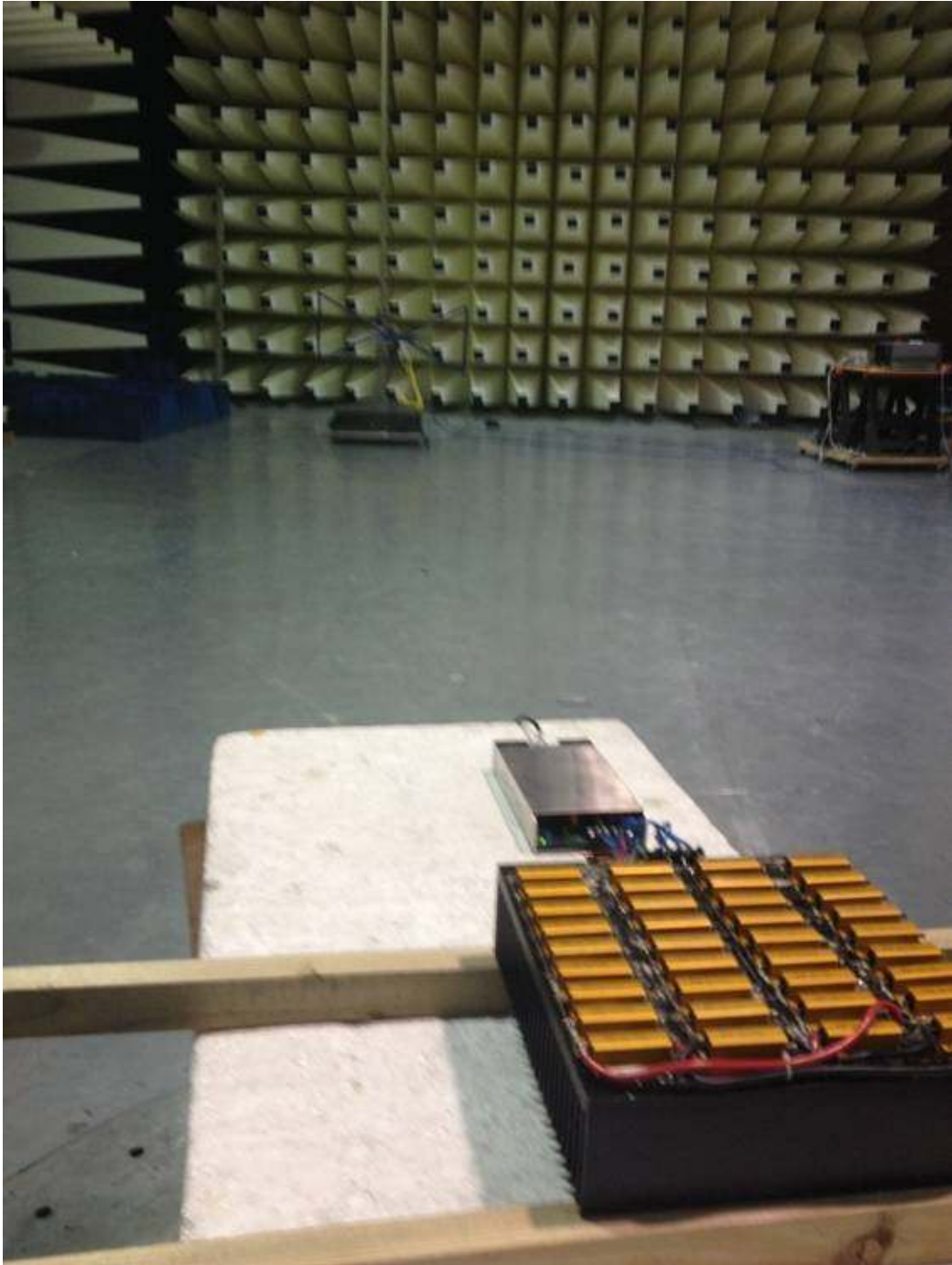


Figure 6: Radiated Emissions Test Set up



Figure 7: Surges & Voltage Dips Test Set up

Appendix 3:
Test Results

Frequency (MHz)	Q.P. Level dB(μ V/m)	Q.P. Limit dB(μ V/m)	Antenna Pol. Vertical/Horizontal	Antenna Height (m)	Pass / Fail
30.000	29.1	30.0	Vertical	1	Pass
59.372	26.3	30.0	Vertical	1	Pass
90.008	20.6	30.0	Vertical	1	Pass
137.560	24.3	30.0	Vertical	1	Pass
181.784	26.6	30.0	Vertical	1	Pass

48 Volt PSU – Radiated Emissions Results

Frequency (MHz)	Q.P. Level dB(μ V/m)	Q.P. Limit dB(μ V/m)	Antenna Pol. Vertical/Horizontal	Antenna Height (m)	Pass / Fail
30.120	29.9	30.0	Vertical	1	Pass
54.916	27.1	30.0	Vertical	1	Pass
106.828	21.3	30.0	Vertical	1	Pass
145.560	19.0	30.0	Vertical	1	Pass

24 Volt PSU – Radiated Emissions Results

RADIATED EMISSIONS

01. Aug 14 14:18

Op Cond: Normal
Operator: J McAuley
Test Spec: EN 55022
Comment: NO CABLES

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	300M	120k	120k	PK	1ms	0dBLN	OFF	60dB

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

Transducer No.	Start	Stop	Name
18	20M	300M	871

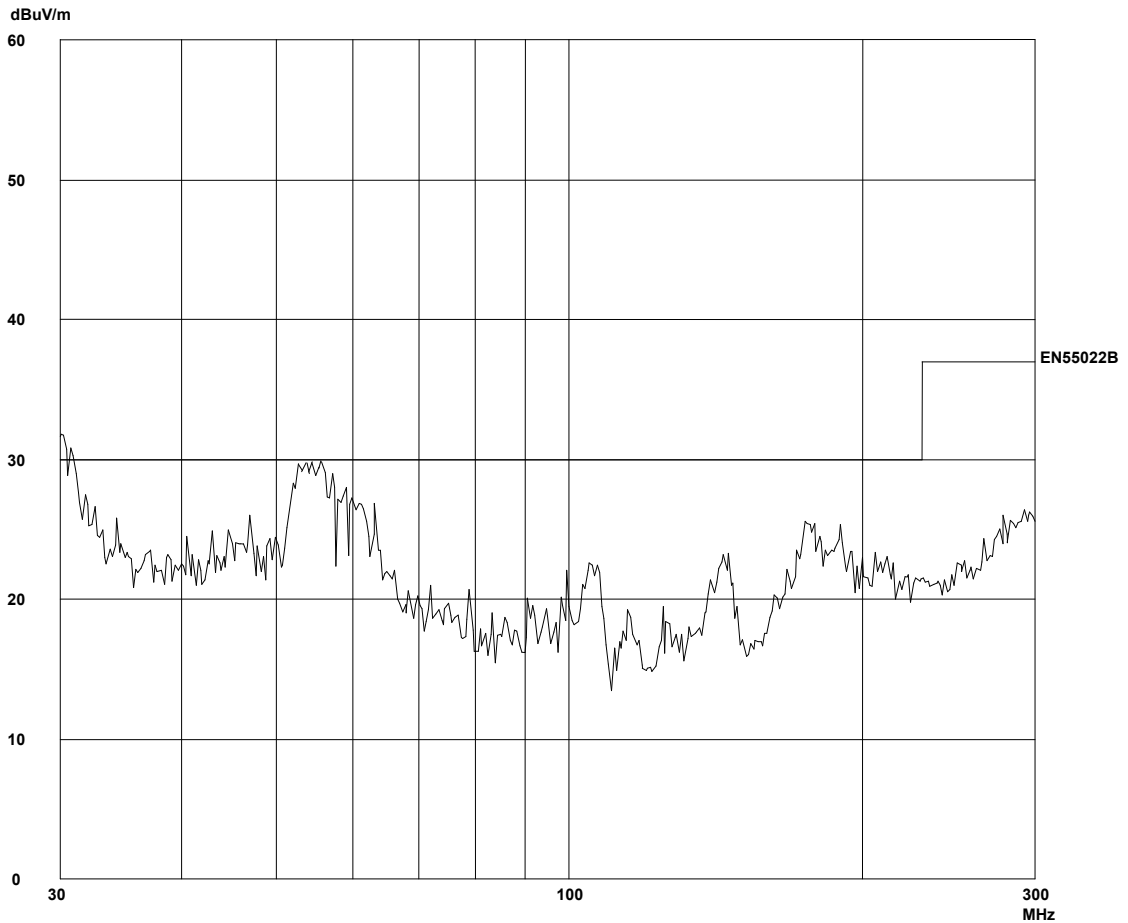


Figure 1: Radiated Emissions, [30-300 MHz] Vertical (24 Volt System)

RADIATED EMISSIONS

01. Aug 14 14:01

Op Cond: Normal
Operator: J McAuley
Test Spec: EN 55022
Comment: NO CABLES

Scan Settings (1 Range)

Frequencies				Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	300M	120k	120k	PK	1ms	0dB	BLN OFF	60dB

Final Measurement: x Hor-Max / + Vert-Max

Meas Time: 1 s
Subranges: 8
Acc Margin: 0dB

Transducer No. Start Stop Name
18 20M 300M 871

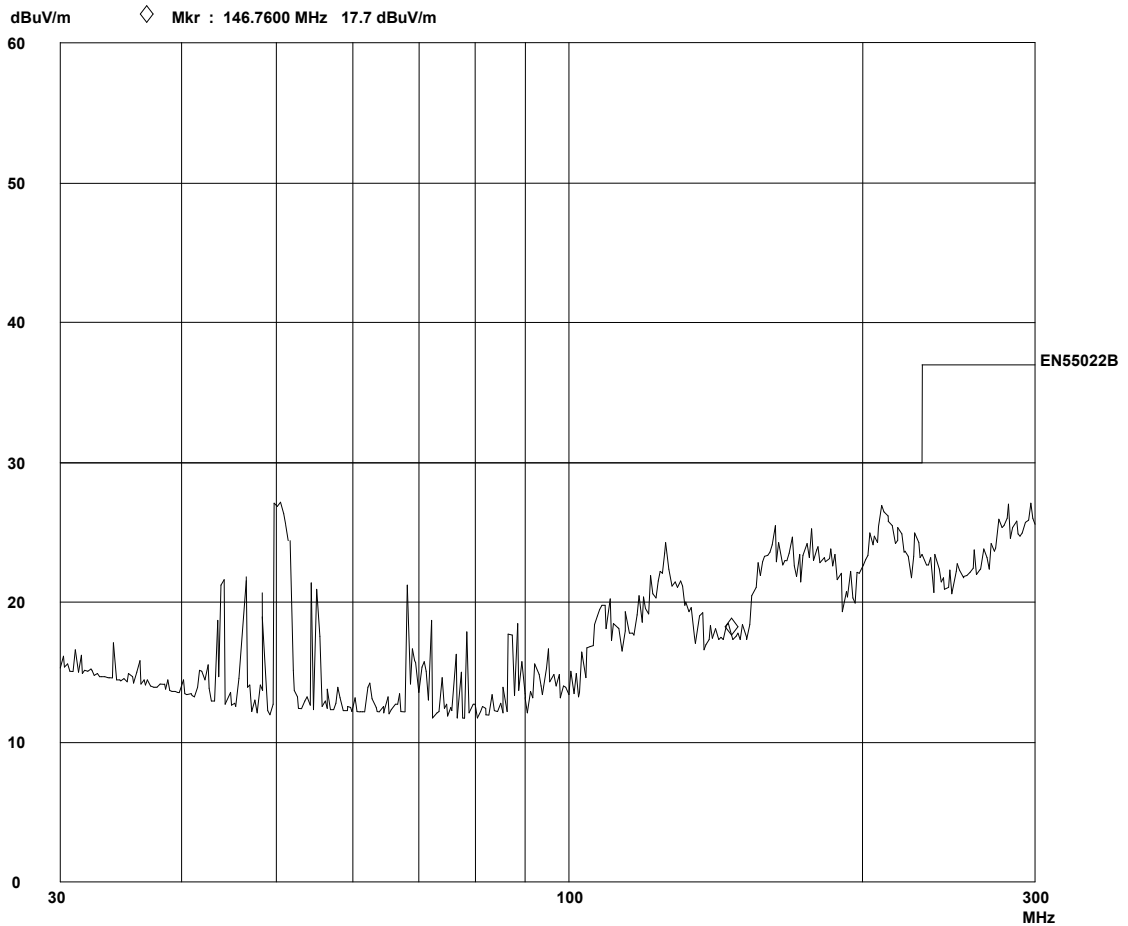


Figure 2: Radiated Emissions, [30-300 MHz] Horizontal (24 Volt System)

RADIATED EMISSIONS

01. Aug 14 14:54

Op Cond: Normal
Operator: J McAuley
Test Spec: EN 55022
Comment: NO CABLES

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
300M	1000M	120k	120k	PK	1ms	0dB	BLN OFF	60dB

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

Transducer No. Start Stop Name
22 300M 1000M LogP_615

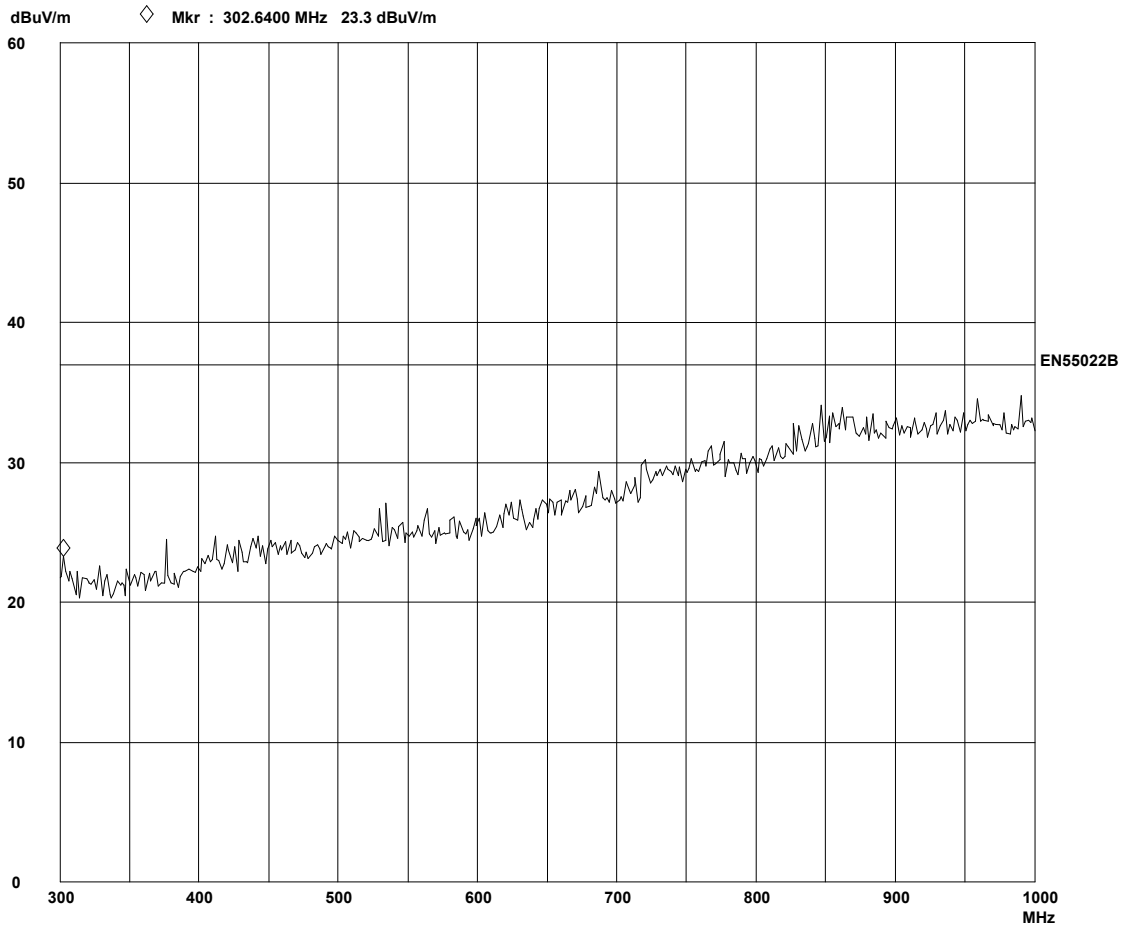


Figure 3: Radiated Emissions, [300-1000 MHz] Vertical (24 Volt System)

RADIATED EMISSIONS

01. Aug 14 14:52

Op Cond: Normal
Operator: J McAuley
Test Spec: EN 55022
Comment: NO CABLES

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
300M	1000M	120k	120k	PK	1ms	0dB	BLN OFF	60dB

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

Transducer No. Start Stop Name
22 300M 1000M LogP_615

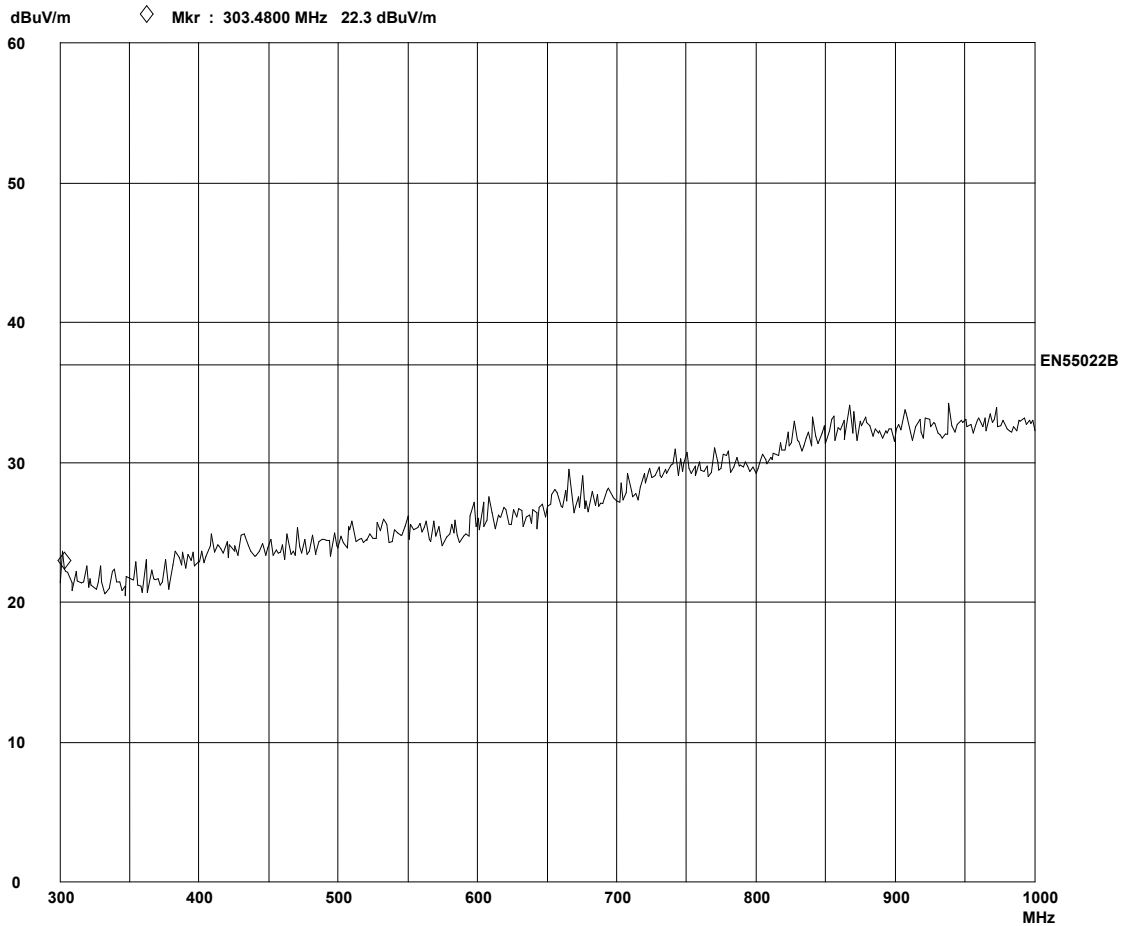


Figure 4: Radiated Emissions, [300-1000 MHz] Horizontal (24 Volt System)

RADIATED EMISSIONS

01. Aug 14 15:32

Op Cond: Normal
Operator: J McAuley
Test Spec: EN 55022
Comment: NO CABLES

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	300M	120k	120k	PK	1ms	0dB	BLN OFF	60dB

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

Transducer No.	Start	Stop	Name
18	20M	300M	871

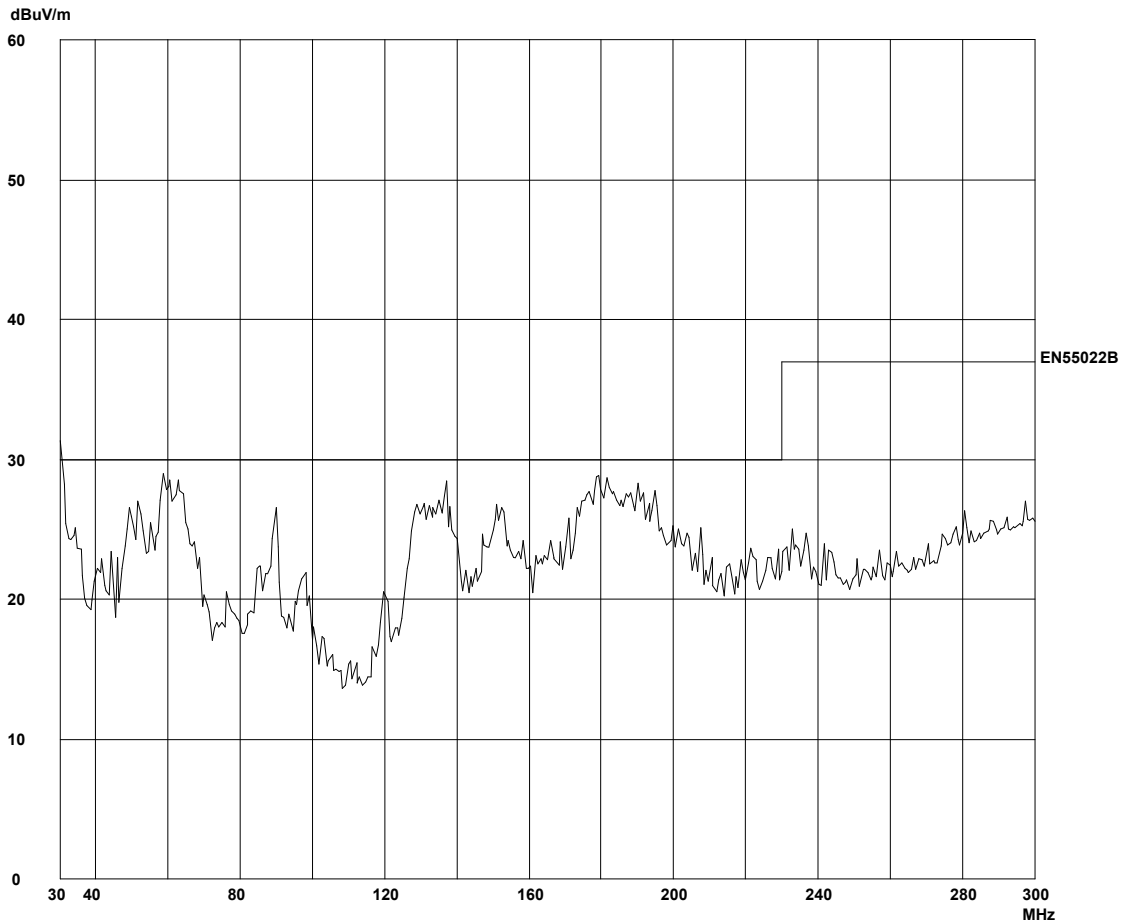


Figure 5: Radiated Emissions, [30-300 MHz] Vertical (48 Volt System)

RADIATED EMISSIONS

01. Aug 14 14:49

Op Cond: Normal
Operator: J McAuley
Test Spec: EN 55022
Comment: NO CABLES

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	300M	120k	120k	PK	1ms	0dB	BLN OFF	60dB

Final Measurement: x Hor-Max / + Vert-Max

Transducer No.	Start	Stop	Name
18	20M	300M	871

Meas Time: 1 s
Subranges: 8
Acc Margin: 0dB

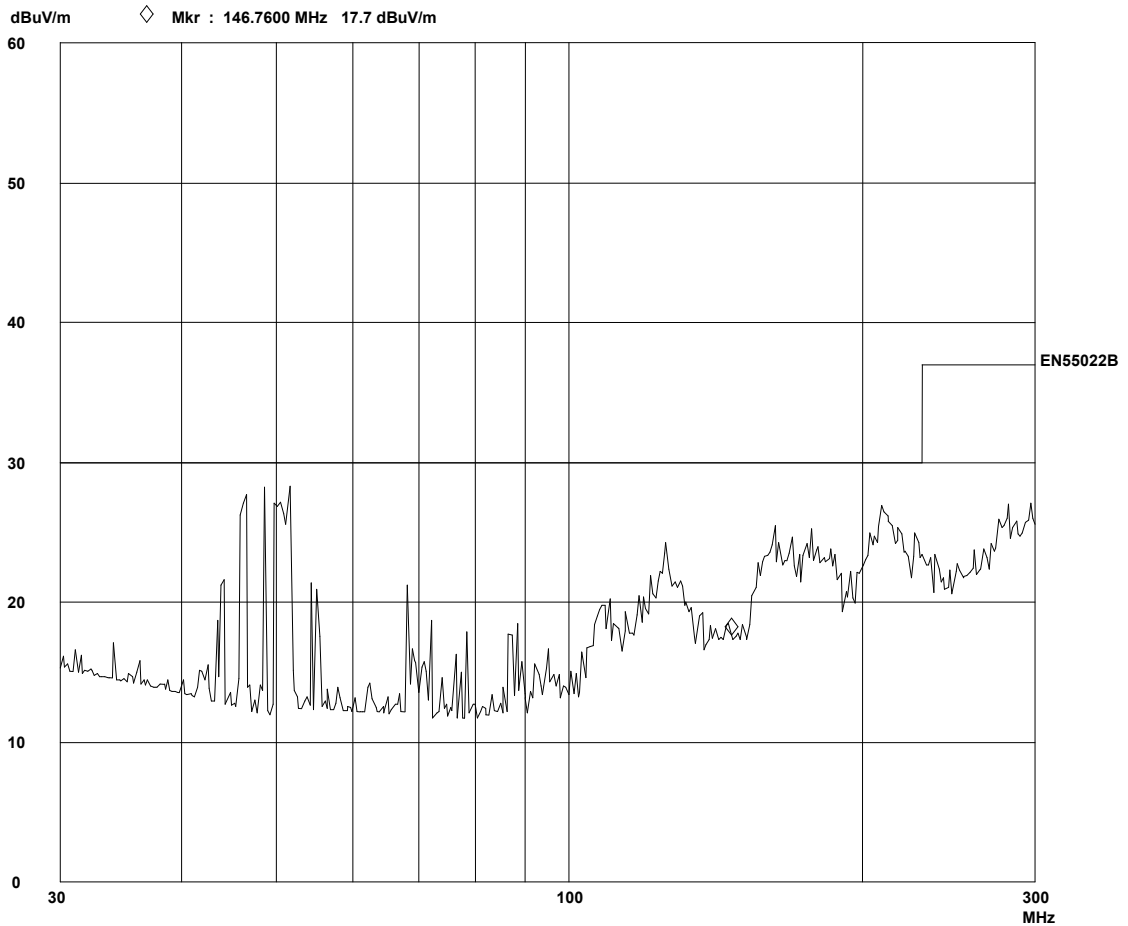


Figure 6: Radiated Emissions, [30-300 MHz] Horizontal (48 Volt System)

RADIATED EMISSIONS

01. Aug 14 15:06

Op Cond: Normal
Operator: J McAuley
Test Spec: EN 55022
Comment: NO CABLES

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
300M	1000M	120k	120k	PK	1ms	0dB	BLN OFF	60dB

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

Transducer No. Start Stop Name
22 300M 1000M LogP_615

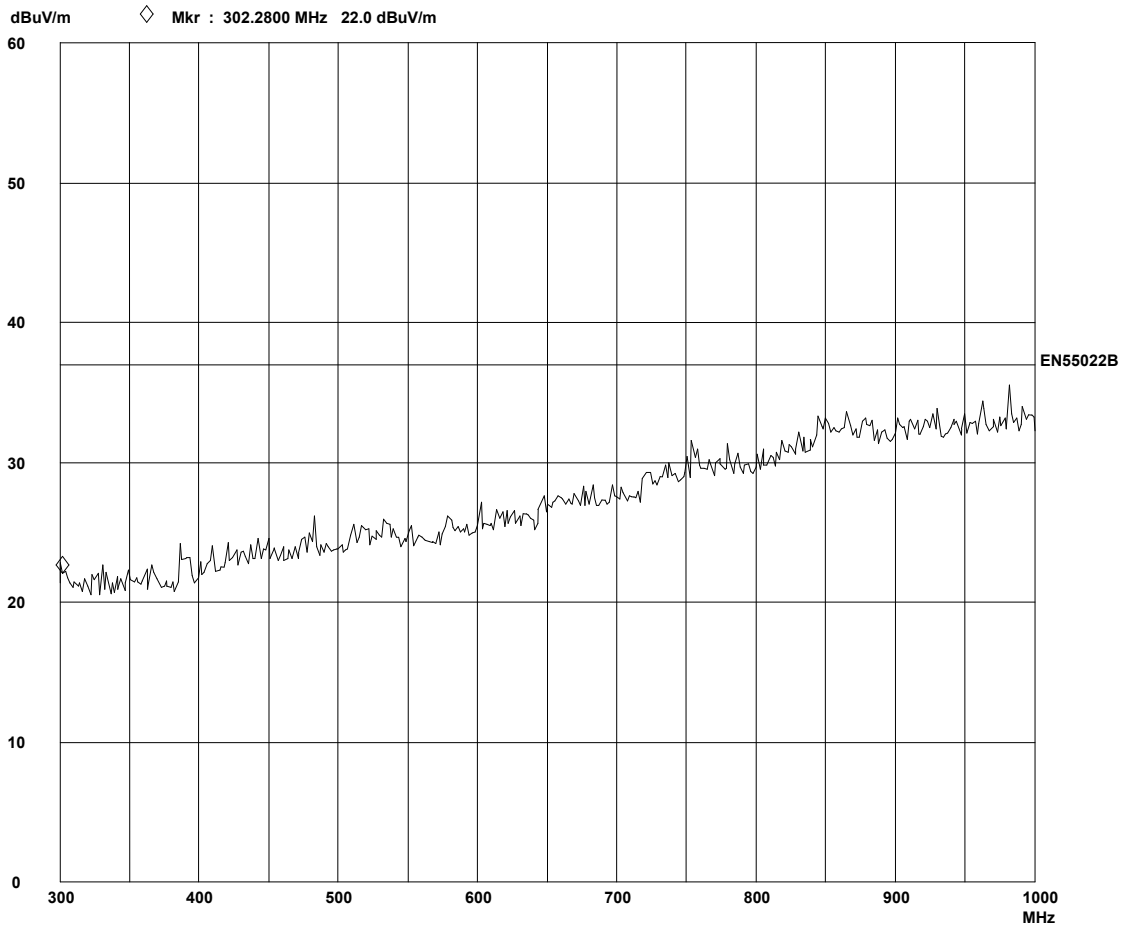


Figure 7: Radiated Emissions, [300-1000 MHz] Vertical (48 Volt System)

RADIATED EMISSIONS

01. Aug 14 15:11

Op Cond: Normal
Operator: J McAuley
Test Spec: EN 55022
Comment: NO CABLES

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
300M	1000M	120k	120k	PK	1ms	0dB	BLN OFF	60dB

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

Transducer No. Start Stop Name
22 300M 1000M LogP_615

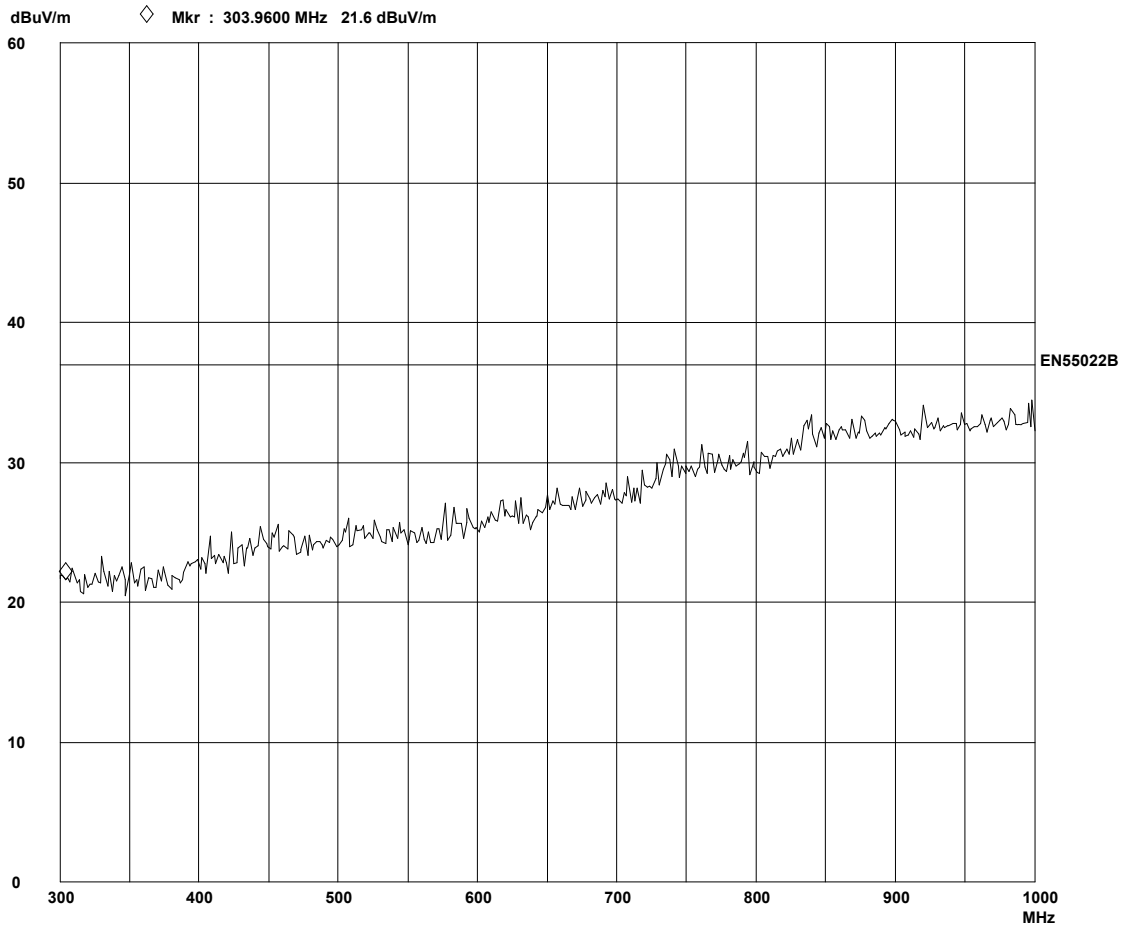


Figure 8: Radiated Emissions, [300-1000 MHz] Horizontal (48 Volt System)

Compliance Engineering Ireland Ltd Conducted Emissions

01. Aug 14 13:54

Operator: P Reilly
Comment: Live

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

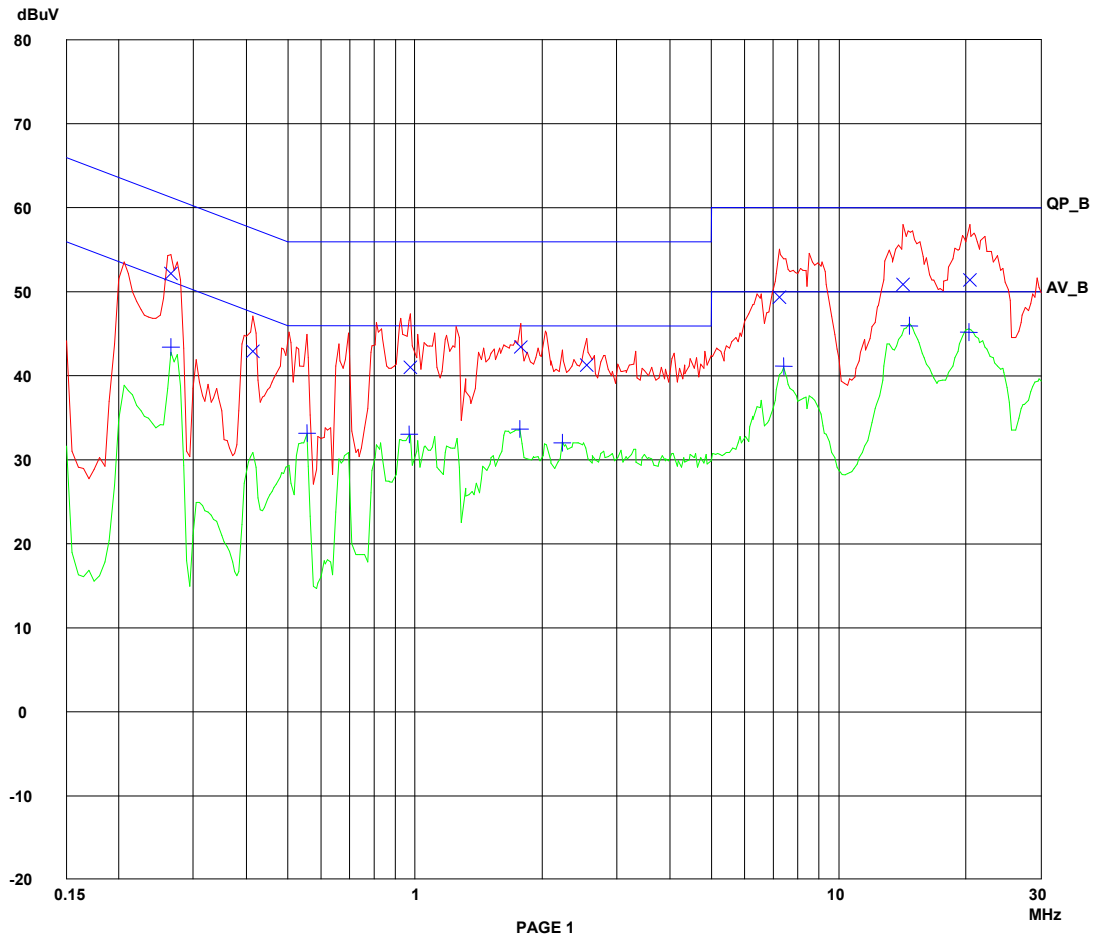


Figure 9: Conducted Emissions, Live– 24 Volt

Compliance Engineering Ireland Ltd Conducted Emissions

01. Aug 14 13:41

Operator: P Reilly
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

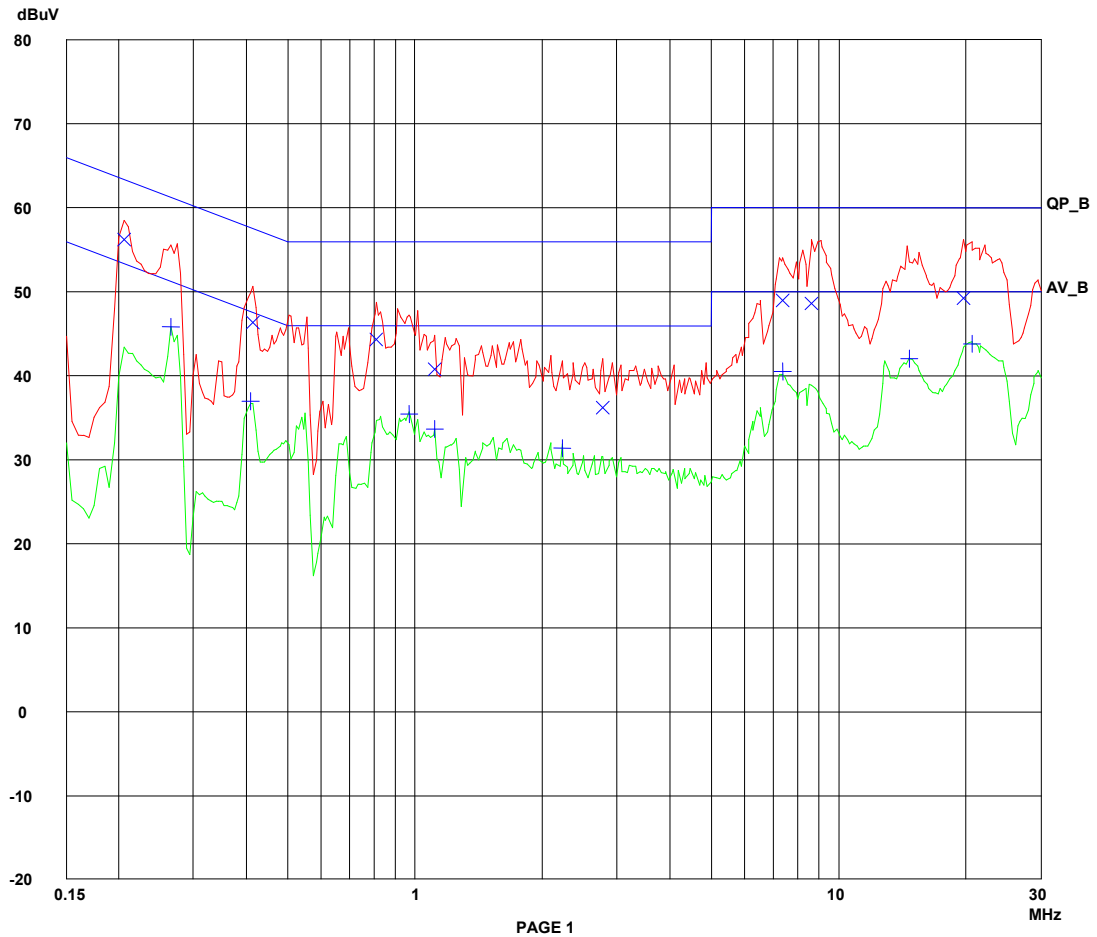


Figure 10: Conducted Emissions, Neutral– 24 Volt

Compliance Engineering Ireland Ltd Conducted Emissions

01. Aug 14 14:24

Operator: P Reilly
Comment: Live

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

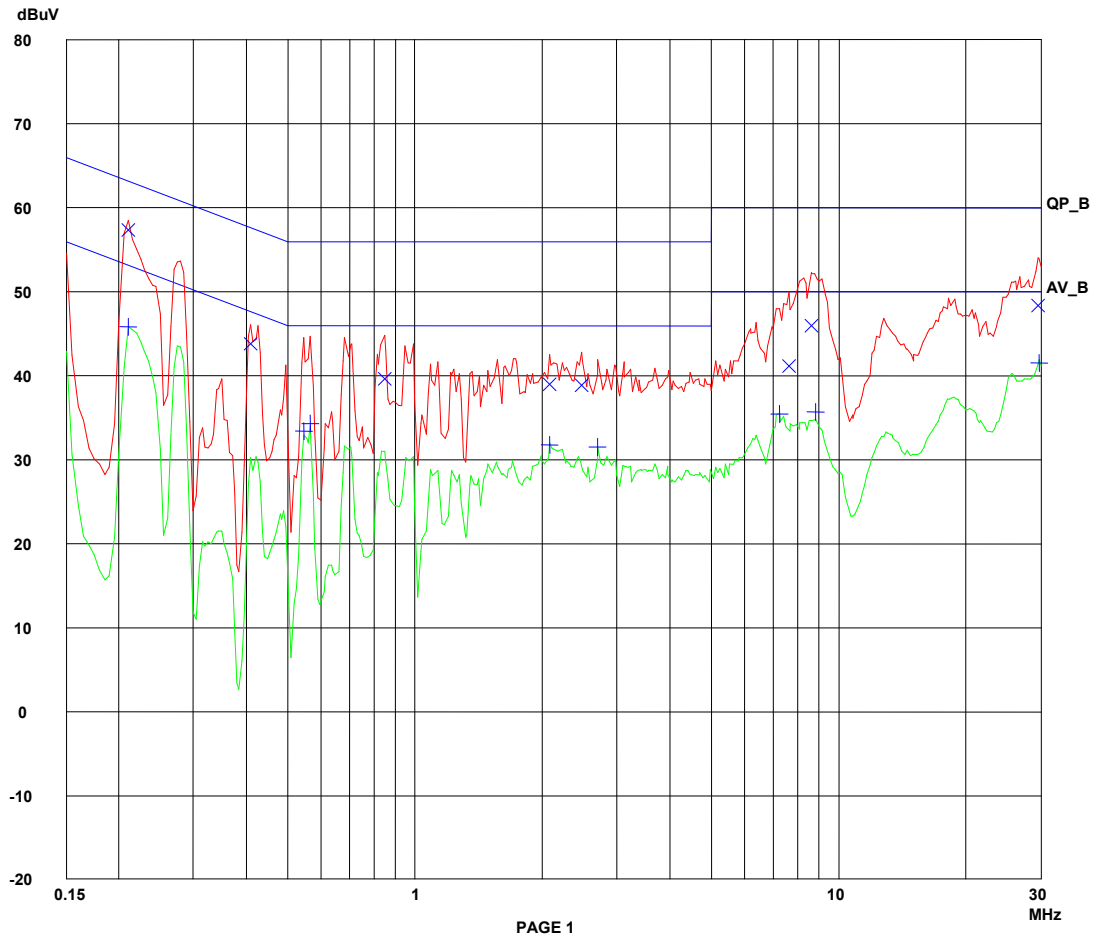


Figure 11: Conducted Emissions, Live – 48 Volt

Compliance Engineering Ireland Ltd Conducted Emissions

01. Aug 14 14:39

Operator: P Reilly
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

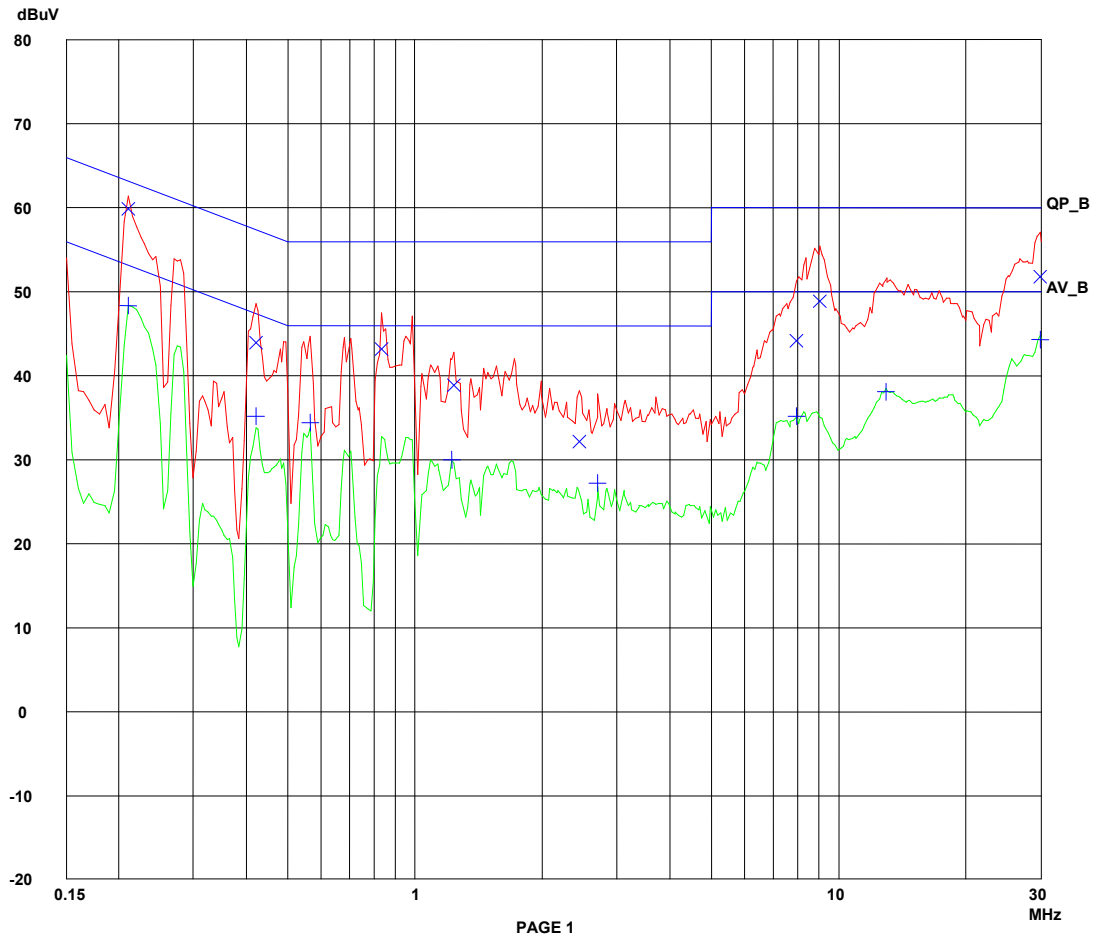


Figure 12: Conducted Emissions, Neutral – 48 Volt

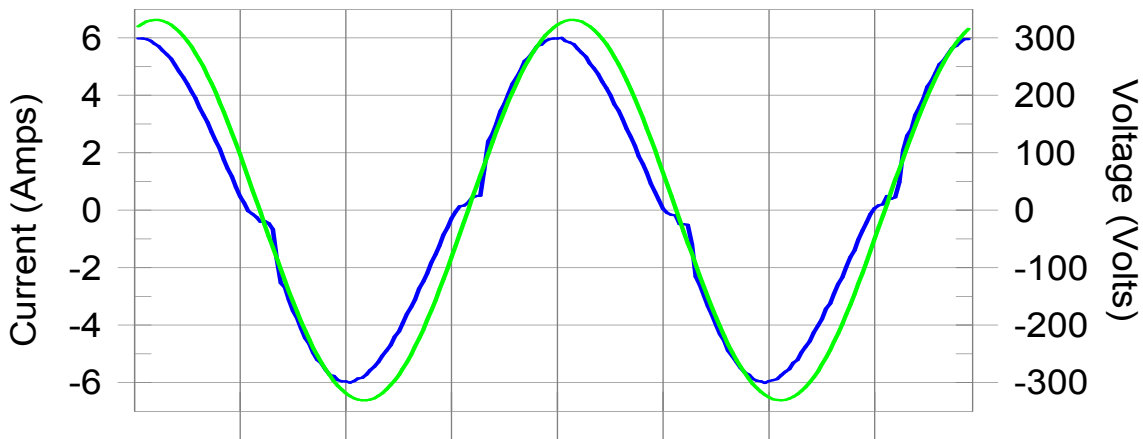
Harmonics – Class-A per Ed. 3.0 (2005-11)(Run time)

EUT: Equipment Under Test
Test category: Class-A per Ed. 3.0 (2005-11) (European limits)
Test date: 13/06/2014
Test duration (min): 10
Comment: Comment
Customer: Excelsys

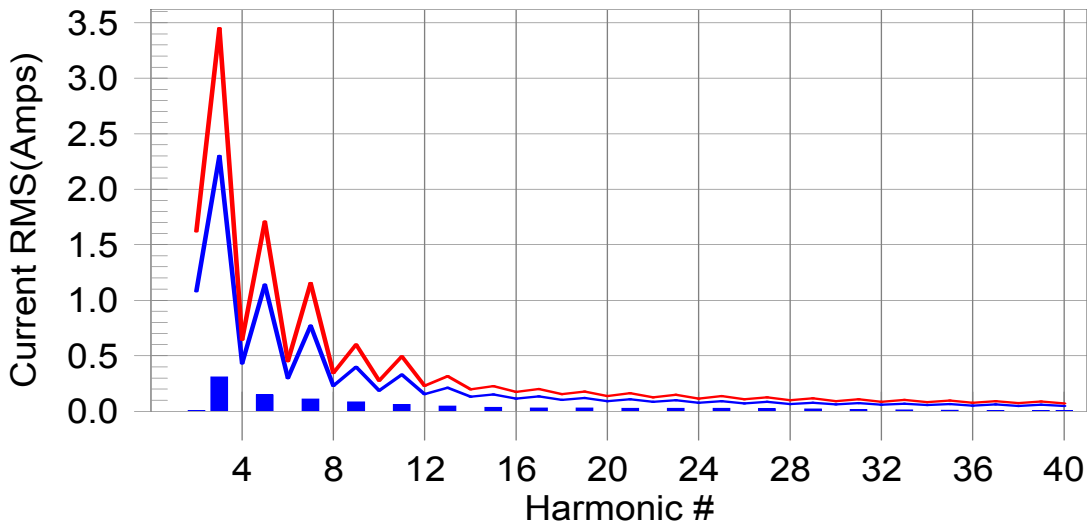
Tested by: P Reilly
Test Margin: 100
Start time: 15:32:00
End time: 15:42:22
Data file name: H-001956.cts_data

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonic was #25 with 29.32% of the limit.

Current Test Result Summary (Run time)

EUT: Equipment Under Test Tested by: P Reilly
 Test category: Class-A per Ed. 3.0 (2005-11) (European limits) Test Margin: 100
 Test date: 13/06/2014 Start time: 15:32:00 End time: 15:42:22
 Test duration (min): 10 Data file name: H-001956.cts_data
 Comment: Comment
 Customer: Excelsys

Test Result: Pass Source qualification: Normal
 THC(A): 0.38 I-THD(%): 9.53 POHC(A): 0.061 POHC Limit(A): 0.251
 Highest parameter values during test:

V_RMS (Volts): 234.28	Frequency(Hz): 50.00
I_Peak (Amps): 6.071	I_RMS (Amps): 4.060
I_Fund (Amps): 4.041	Crest Factor: 1.496
Power (Watts): 934.8	Power Factor: 0.983

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.005	1.080	0.4	0.006	1.620	0.37	Pass
3	0.307	2.300	13.3	0.309	3.450	8.97	Pass
4	0.001	0.430	0.2	0.001	0.645	0.22	Pass
5	0.148	1.140	12.9	0.148	1.710	8.68	Pass
6	0.001	0.300	0.4	0.002	0.450	0.35	Pass
7	0.110	0.770	14.2	0.110	1.155	9.56	Pass
8	0.001	0.230	0.5	0.001	0.345	0.37	Pass
9	0.084	0.400	21.0	0.085	0.600	14.12	Pass
10	0.001	0.184	0.5	0.001	0.276	0.44	Pass
11	0.062	0.330	18.8	0.062	0.495	12.62	Pass
12	0.001	0.153	0.5	0.001	0.230	0.48	Pass
13	0.046	0.210	22.1	0.047	0.315	14.84	Pass
14	0.001	0.131	0.5	0.001	0.197	0.43	Pass
15	0.036	0.150	23.7	0.036	0.225	15.92	Pass
16	0.001	0.115	0.5	0.001	0.173	0.49	Pass
17	0.030	0.132	22.8	0.030	0.199	15.26	Pass
18	0.001	0.102	0.6	0.001	0.153	0.57	Pass
19	0.028	0.118	23.9	0.029	0.178	16.08	Pass
20	0.001	0.092	0.7	0.001	0.138	0.62	Pass
21	0.028	0.107	25.9	0.028	0.161	17.36	Pass
22	0.001	0.084	1.4	0.001	0.125	1.13	Pass
23	0.027	0.098	28.1	0.028	0.147	18.86	Pass
24	0.001	0.077	1.3	0.001	0.115	1.06	Pass
25	0.026	0.090	29.3	0.027	0.135	19.75	Pass
26	0.001	0.071	1.1	0.001	0.106	0.96	Pass
27	0.024	0.083	28.3	0.024	0.125	19.10	Pass
28	0.001	0.066	1.1	0.001	0.099	0.89	Pass
29	0.020	0.078	25.7	0.020	0.116	17.48	Pass
30	0.001	0.061	1.1	0.001	0.092	0.95	Pass
31	0.015	0.073	21.2	0.016	0.109	14.35	Pass
32	0.000	0.058	0.6	0.001	0.086	0.58	Pass
33	0.012	0.068	17.4	0.012	0.102	11.88	Pass
34	0.000	0.054	0.8	0.001	0.081	0.72	Pass
35	0.008	0.064	13.0	0.009	0.096	9.02	Pass
36	0.001	0.051	1.8	0.001	0.077	1.47	Pass
37	0.005	0.061	9.0	0.006	0.091	6.31	Pass
38	0.000	0.048	0.8	0.001	0.073	0.85	Pass
39	0.005	0.058	9.1	0.006	0.087	6.42	Pass
40	0.002	0.046	4.4	0.003	0.069	4.04	Pass

Voltage Source Verification Data (Run time)

EUT: Equipment Under Test
Test category: Class-A per Ed. 3.0 (2005-11) (European limits)
Test date: 13/06/2014
Test duration (min): 10
Comment: Comment
Customer: Excelsys
Tested by: P Reilly
Test Margin: 100
Start time: 15:32:00
End time: 15:42:22
Data file name: H-001956.cts_data

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	234.28	Frequency(Hz):	50.00
I_Peak (Amps):	6.071	I_RMS (Amps):	4.060
I_Fund (Amps):	4.041	Crest Factor:	1.496
Power (Watts):	934.8	Power Factor:	0.983

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.294	0.468	62.70	OK
3	0.335	2.108	15.88	OK
4	0.063	0.468	13.42	OK
5	0.117	0.937	12.48	OK
6	0.026	0.468	5.53	OK
7	0.121	0.703	17.18	OK
8	0.011	0.468	2.32	OK
9	0.108	0.468	22.98	OK
10	0.014	0.468	2.97	OK
11	0.091	0.234	38.93	OK
12	0.018	0.234	7.80	OK
13	0.081	0.234	34.59	OK
14	0.009	0.234	4.00	OK
15	0.067	0.234	28.49	OK
16	0.011	0.234	4.69	OK
17	0.067	0.234	28.49	OK
18	0.007	0.234	3.16	OK
19	0.069	0.234	29.39	OK
20	0.006	0.234	2.72	OK
21	0.061	0.234	26.12	OK
22	0.018	0.234	7.50	OK
23	0.071	0.234	30.39	OK
24	0.012	0.234	5.32	OK
25	0.081	0.234	34.39	OK
26	0.007	0.234	3.14	OK
27	0.079	0.234	33.72	OK
28	0.008	0.234	3.23	OK
29	0.067	0.234	28.48	OK
30	0.007	0.234	3.16	OK
31	0.055	0.234	23.28	OK
32	0.005	0.234	2.20	OK
33	0.048	0.234	20.67	OK
34	0.004	0.234	1.60	OK
35	0.031	0.234	13.35	OK
36	0.014	0.234	5.95	OK
37	0.035	0.234	14.96	OK
38	0.009	0.234	3.69	OK
39	0.028	0.234	12.05	OK
40	0.013	0.234	5.39	OK

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

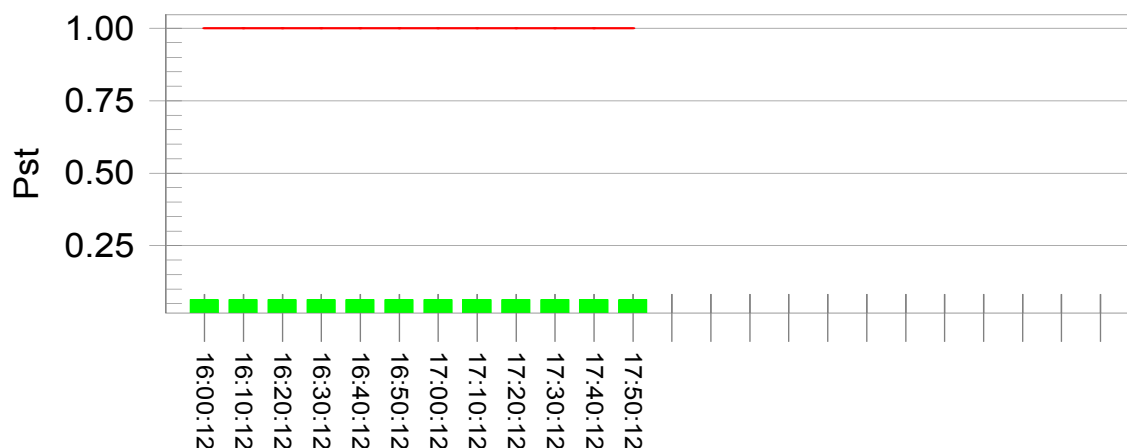
EUT: Equipment Under Test
 Test category: All parameters (European limits)
 Test date: 13/06/2014
 Test duration (min): 120
 Comment: Comments
 Customer: Exelsys

Tested by: P Reilly
 Test Margin: 100
 Start time: 15:49:52
 End time: 17:50:13
 Data file name: F-001957.cts_data

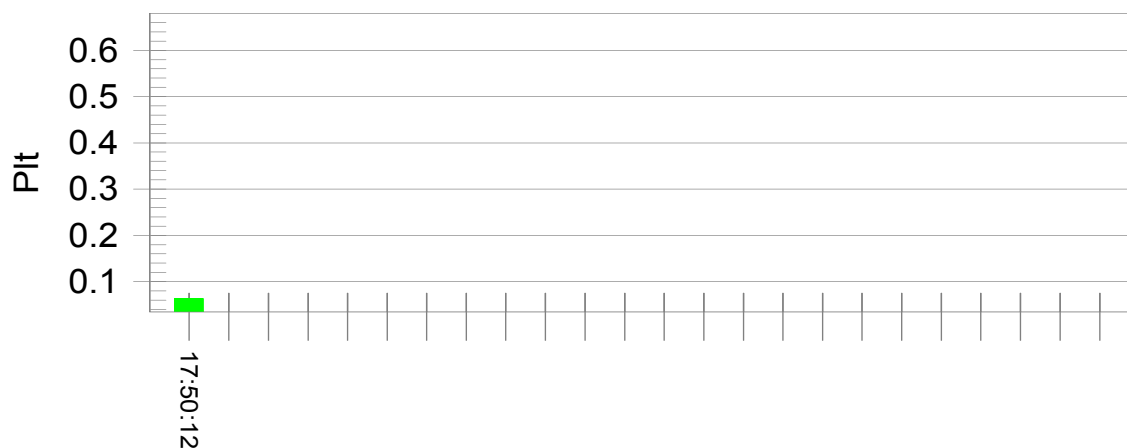
Test Result: Pass Status: Test Completed

Pst_t and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	232.87		
Highest dt (%):	0.16	Test limit (%):	3.30 Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0 Pass
Highest dc (%):	0.00	Test limit (%):	3.30 Pass
Highest dmax (%):	-0.13	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.064	Test limit:	0.650 Pass