

# **TRACOPOWER**

## **Model: TOP 200-115 EMC – Test Report**

EUT: TRACOPOWER Model: TOP 200-115

Serial No.: N/A

Manufacturer No.: 200HPP183

Manufacturer: Convertec Ltd.  
Whitemill Industrial Estate  
Wexford  
Republic of Ireland

Tester: David Lambe, Convertec

Date: 03/05/2011

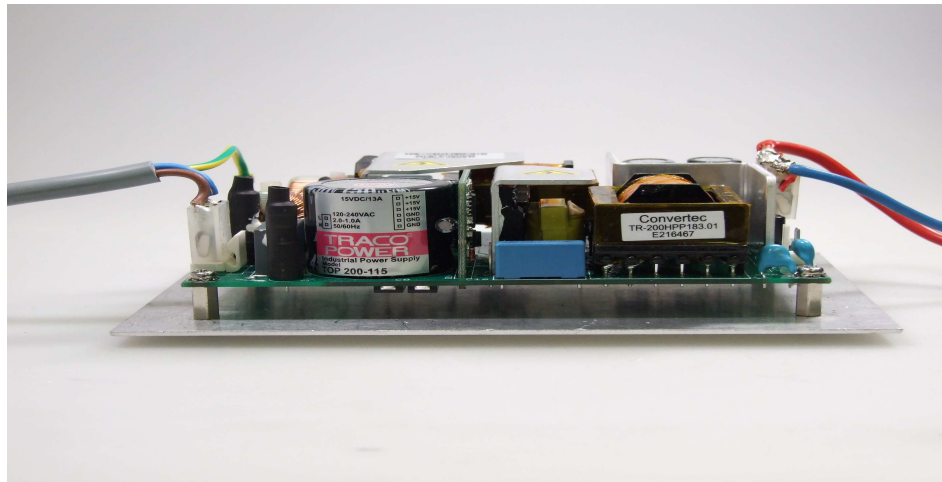
This product is not an apparatus as referred to in the “Guide for the EMC Directive 2004/108EC, 21. May 2007”, but a component. It should be noted, that combining two or more CE compliant finished appliances does not automatically produce a compliant system. The manufacturer of an apparatus or a fixed installation is responsible for the EMC-compliance of the final apparatus.

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# 1 EMC Setup Instructions

To test for EMC compliance on the TOP 200 series units, the units should be mounted on a conductive metal base plate of at least 1mm thickness that extends at least 10mm from all sides as in figure 1(b). The unit must be screwed down on top of 4 metal pillars, which must form a good electrical connection to the base plate. The pillars should be 6mm minimum height and 6.3mm maximum diameter (see figure 1). For safety class I compliance, the base plate should have a good electrical connection to safety earth. For safety class II compliance, no connection to safety earth should be made but the unit should still have a good electrical connection to the base plate via the metal pillars as before. Please see figures 1 (a) & (b) for reference.



*Figure 1(a) TOP 200 Series, EMC setup – Elevation*



*Figure 1(b) TOP 200 Series, EMC setup - Plan*

## 2 Conducted Input Emissions Test

**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standards:** IEC61000-6-3: 2006 referring to CISPR 16-1-2: 2003

### Notes:

- EUT tested under normal operating conditions of 220V 50Hz input at full load (15V/13A Resistive)
- Emissions measured using PMM 8000 analyzer and PMM LISN
- Tested to CISPR 16 -1-2:2003 Class B limits
- Transient limiter used to protect PMM 8000, with appropriate correction factors applied
- EUT attached to a small conductive plane in a shielded room
- Tests carried out with and without safety earth connected

### 2.1 Test Setup

#### Test Equipment Settings:

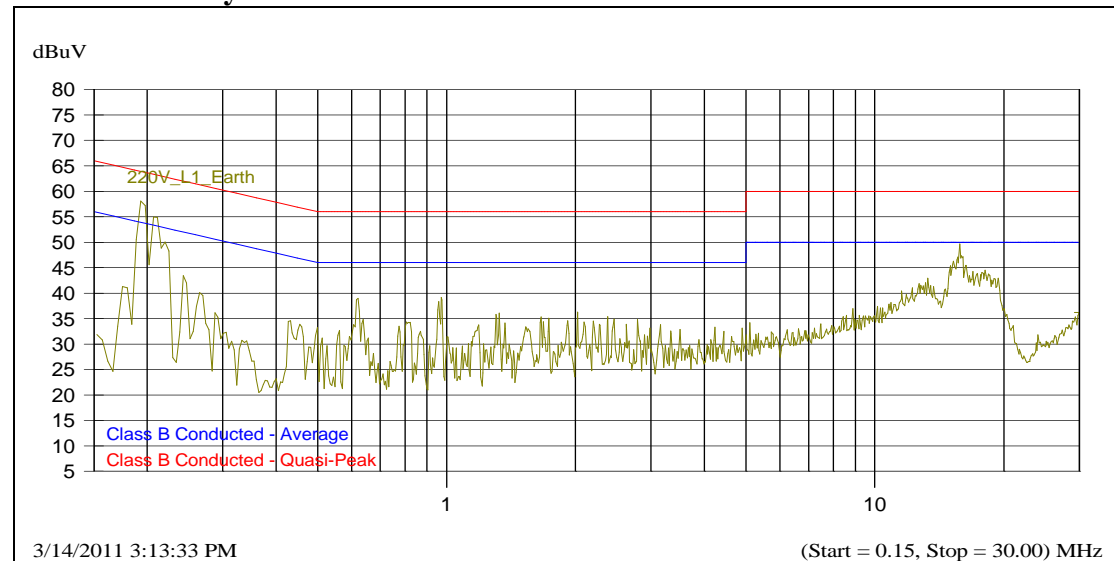
Start Freq.	Stop Freq.	Step	Pk Time	Avg Time
150kHz	30MHz	5kHz	50ms	50ms

#### Test Setup:

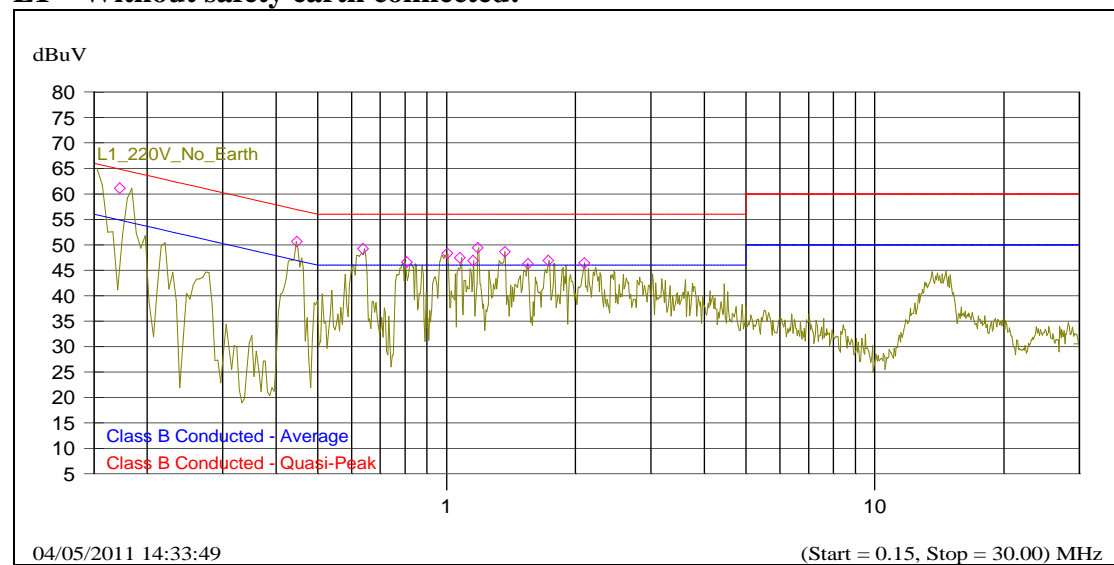


## 2.2 Conducted Input Emissions Results

### L1 – With safety earth connected:



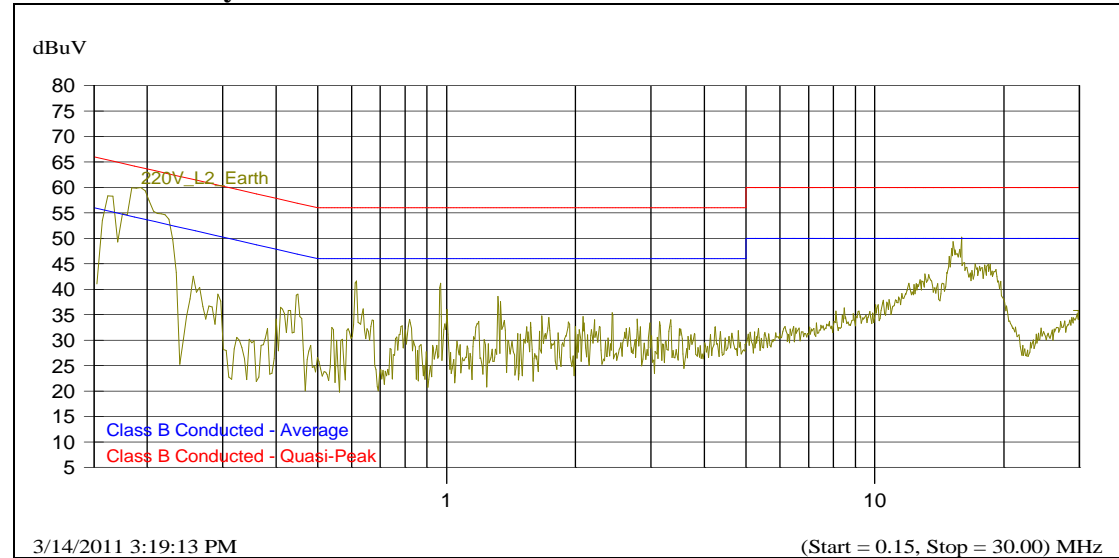
### L1 – Without safety earth connected:



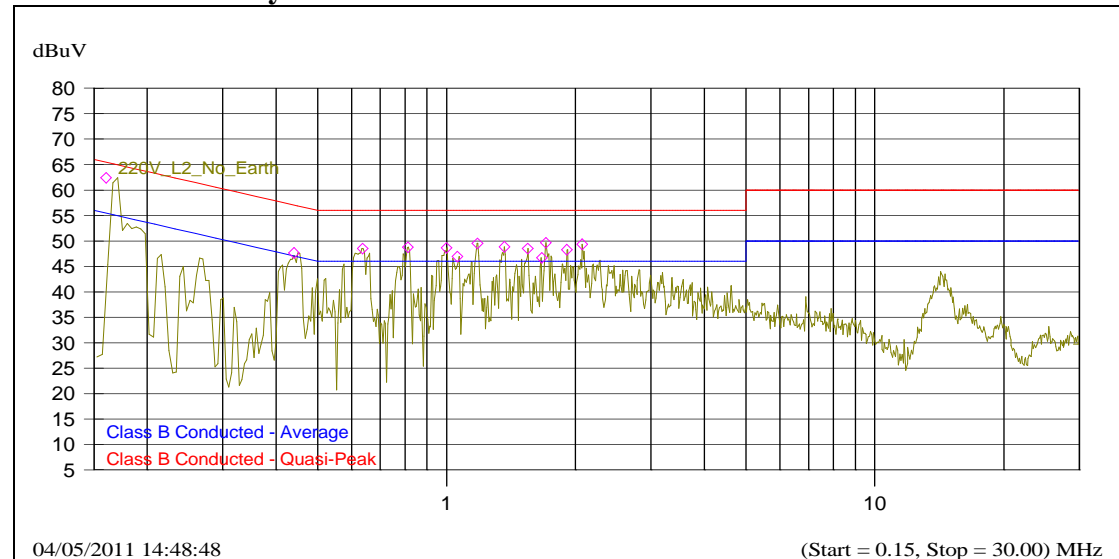
**Current List: L1 – Without safety earth connected**

Frequency	Peak	Avg	Pk-QP Limit	Avg-Avg Limit
MHz	dBuV	dBuV	dB	dB
0.173	61.1	38.6	-3.7	-16.3
0.447	50.7	34.5	-6.3	-12.5
0.638	49.2	35.9	-6.8	-10.1
0.807	46.6	31.7	-9.4	-14.3
1.004	48.3	32.6	-7.7	-13.4
1.073	47.5	26.1	-8.5	-19.9
1.153	46.9	29	-9.1	-17
1.181	49.4	34.6	-6.6	-11.4
1.368	48.6	34.3	-7.4	-11.7
1.549	46.3	33.9	-9.7	-12.1
1.727	46.9	33.1	-9.1	-12.9
2.098	46.4	31.4	-9.6	-14.6

## L2 – With safety earth connected:



## L2 – Without safety earth connected:



### Current List: L2 – Without safety earth connected

Frequency	Peak	Avg	Pk-QP Limit	Avg-Avg Limit
MHz	dBuV	dBuV	dB	dB
0.16	62.4	37	-3	-18.5
0.44	47.6	34.8	-9.4	-12.3
0.636	48.5	36.6	-7.5	-9.4
0.813	48.7	34.1	-7.3	-11.9
0.999	48.6	34.2	-7.4	-11.8
1.059	46.9	27	-9.1	-19
1.18	49.5	35	-6.5	-11
1.365	48.8	34.2	-7.2	-11.8
1.546	48.5	34.1	-7.5	-11.9
1.669	46.7	29.2	-9.3	-16.8
1.705	49.6	31.8	-6.4	-14.2
1.91	48.3	32.6	-7.7	-13.4
2.073	49.3	30.7	-6.7	-15.3

**PASS**



### 3 Radiated Emissions Test

**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standards:** IEC61000-6-3: 2006 referring to CISPR 16-2-3:2003

For an apparatus to comply with EMC radiated emissions requirements as set down in CISPR 16-2-3, free field measurements need to be performed. A test method similar to that described in IEC61204-3 (for low-voltage power supplies) section 6.4.2 shall be used here instead of free field measurements. This test is designed to give a good indication of whether an EUT will pass free field measurements or not. The absorber clamp used in this method is replaced by a Fischer high frequency current probe (Model: F-33-1). The limits used are set by comparison with open field measurements and are compensated by 20dB per frequency decade. Two limit lines are indicated, A and B, and the results may be interpreted as follows:

- Below limit line B: Limits are kept
- Below limit line A: Limits probably kept
- Above limit line A: Limits most likely not kept

Final Compliance can only be established by free field measurements in accordance to the relevant standard applicable to the apparatus or enclosure in which the power supply is used

**Notes:**

- EUT tested under normal operating conditions of 220V 50Hz input at full load (15V/13A Resistive)
- Emissions measured using receiver Agilent E7402A and FCC RF current probe
- RF current probe kept a distance of 10cm from input/output
- EUT attached to a small conductive plane in a shielded room
- Tests carried out with and without safety earth connected
- Tested to CISPR 16 -2-3:2003 Class B limits

### 3.1 Test Setup

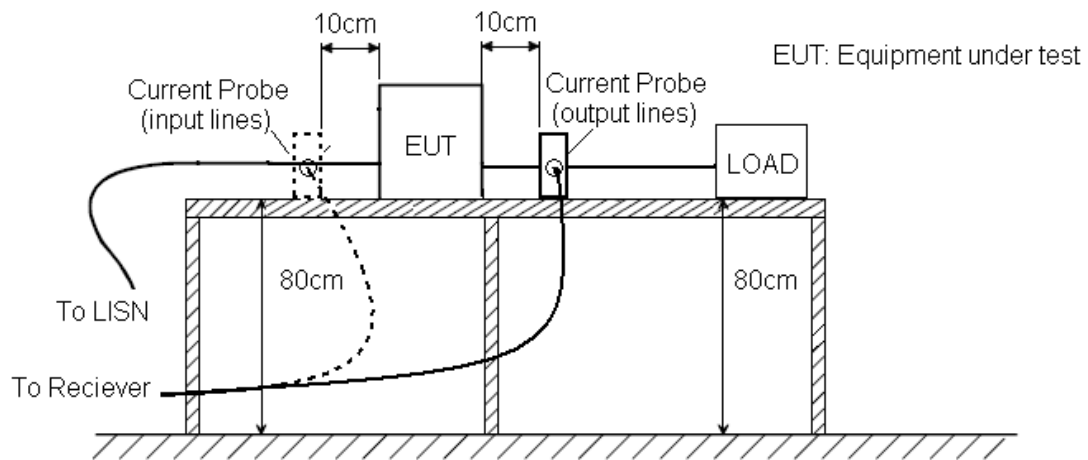


Figure 1. Test set-up for measurement of disturbance power similar to IEC61204-3

#### Test Equipment Settings:

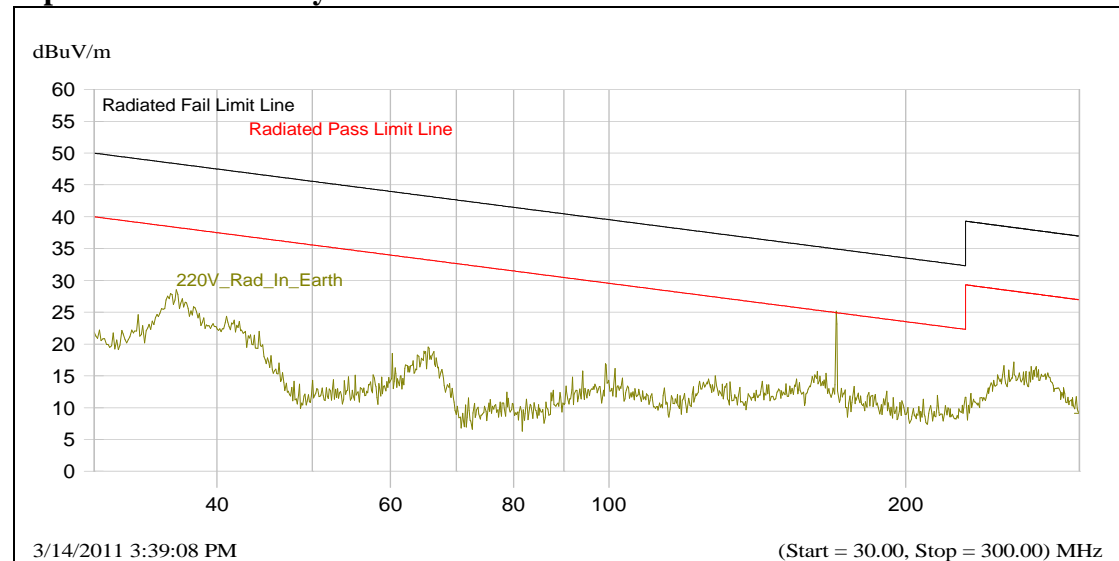
Start Freq.	Stop Freq.	Step	Pk Time
30MHz	300MHz	100kHz	10ms

**Test Setup:** The following shows the setup used for input lines, the setup used for the output lines is the same with the clamp on the output lines.

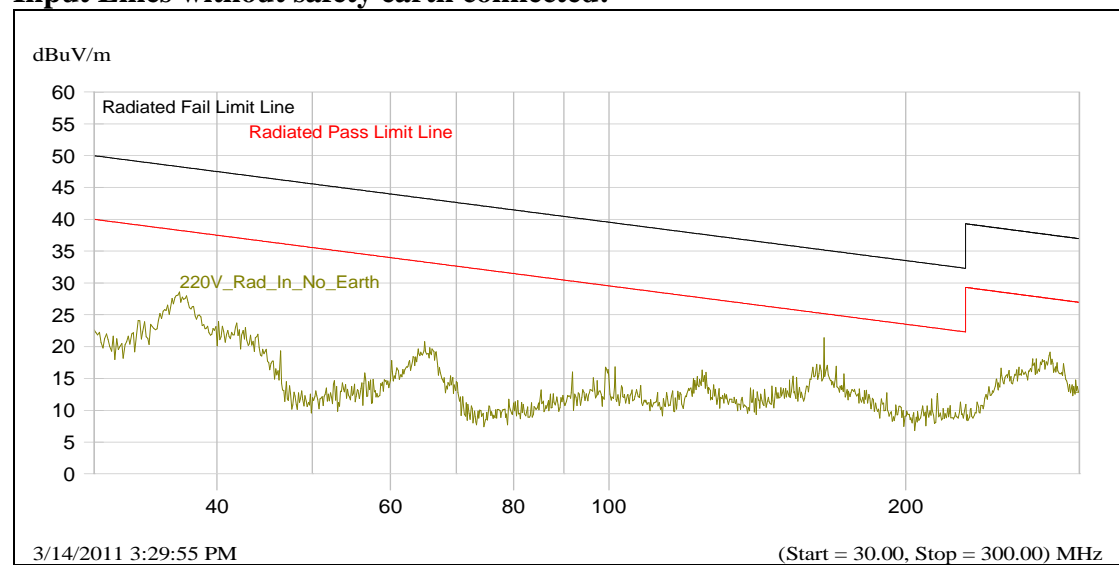


## 3.2 Radiated Emissions Results

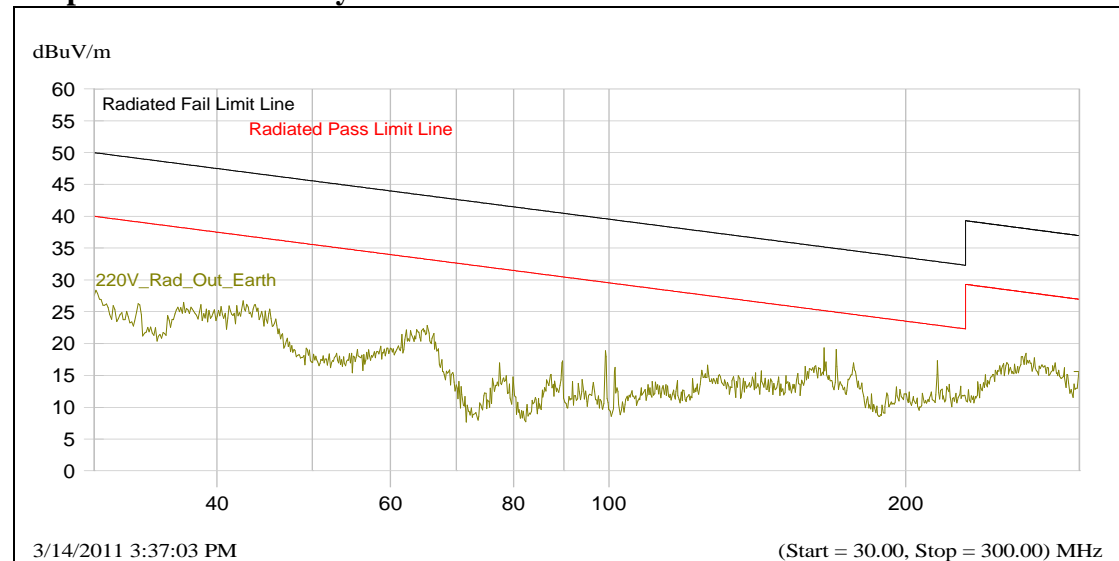
### Input Lines with safety earth connected:



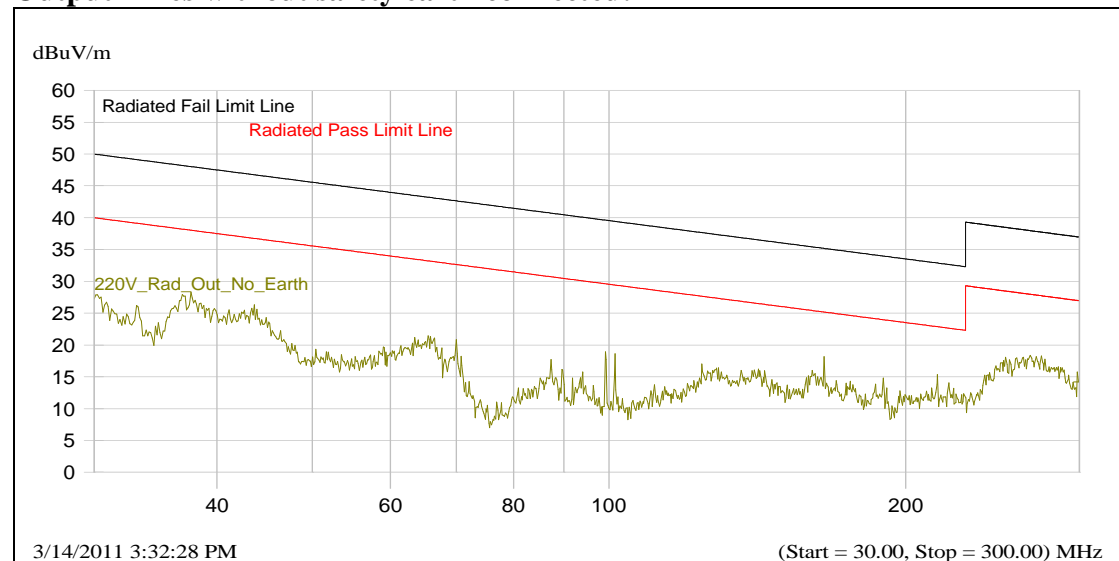
### Input Lines without safety earth connected:



### Output Lines with safety earth connected:



### Output Lines without safety earth connected:



**PASS**

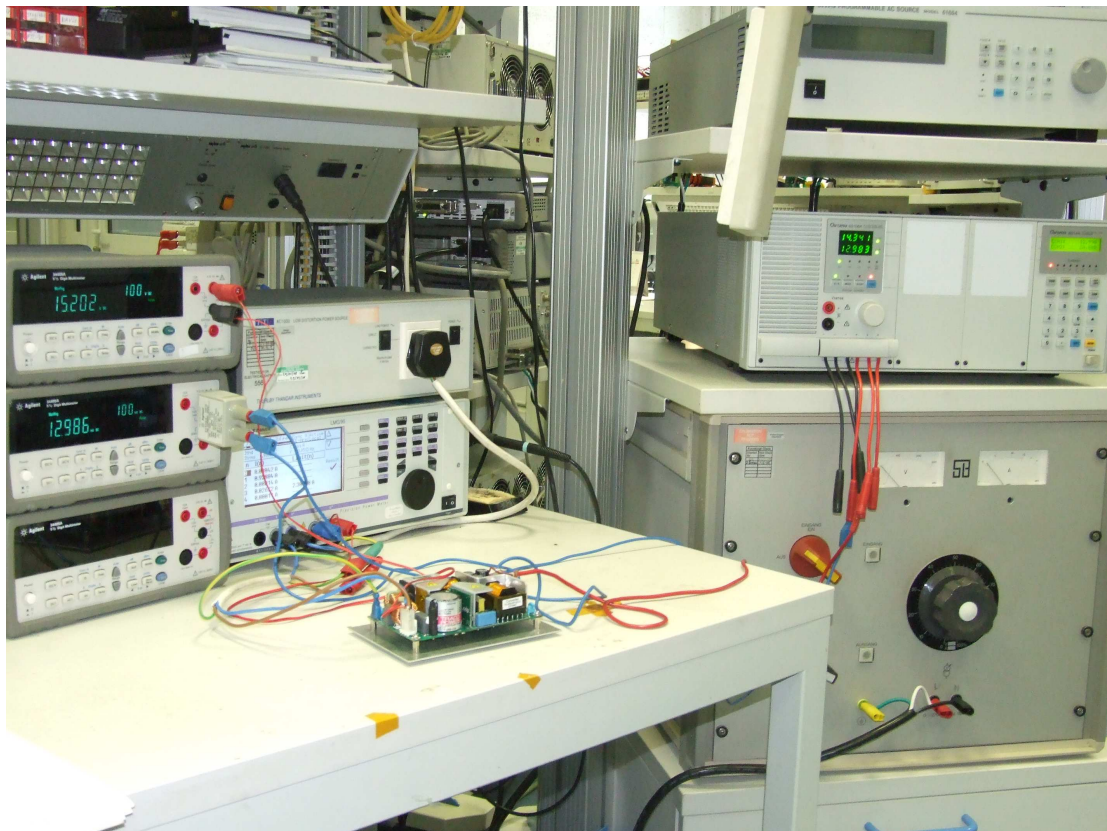
## 4 Harmonic Current Emissions Test

**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standard:** IEC61000-6-3: 2006 referring to IEC 61000-3-2: 2005

### Notes:

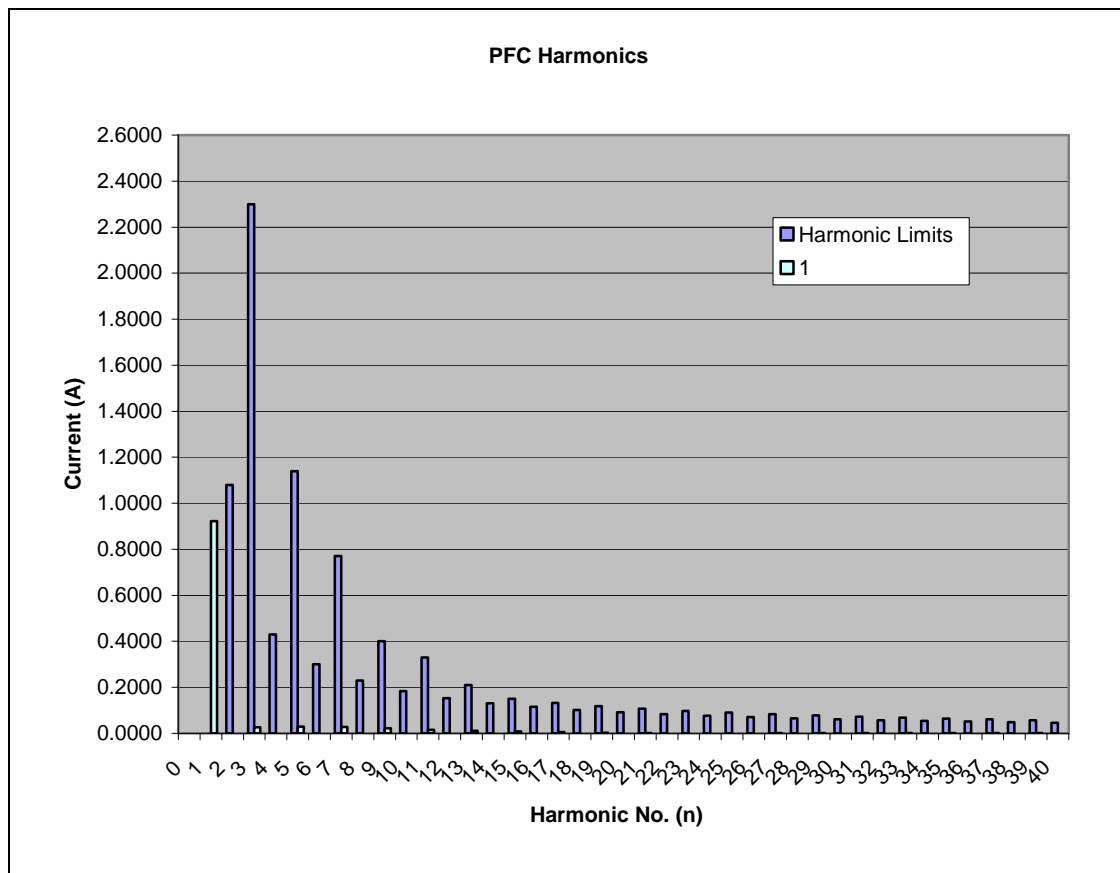
- EUT tested under normal operating conditions of 220V 50Hz input at full load (15V/13A Resistive)
- EUT powered by low-distortion AC Voltage Source, TTI AC-1000
- Harmonic Limits measured using LMG 95 Power Meter
- Tested to IEC61000-3-2 Table 1 Class A

### 4.1 Test Set-Up:



## 4.2 Harmonic Emissions Results

n	Harmonic Limit	Measured Values
3	2.3	0.02638
5	1.14	0.02973
7	0.77	0.02838
9	0.4	0.0216
11	0.33	0.01549
13	0.21	0.01135
15	0.15	0.0079
17	0.1324	0.005
19	0.1184	0.00327
21	0.1071	0.00164
23	0.0978	0.00064
25	0.09	0.0004
27	0.0833	0.00112
29	0.0776	0.0014
31	0.0726	0.00176
33	0.0682	0.00188
35	0.0643	0.00175
37	0.0608	0.00179
39	0.0577	0.00153



**PASS**

## 5 Electrostatic Discharge Test

**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standard:** IEC61000-6-2: 2005 referring to IEC 61000-4-2: 2000

### Notes:

- It is assumed that for an open frame unit post-installation, that no part of the EUT will be accessible to persons during normal use.
- Therefore no ESD tests were carried out in accordance with IEC 61000-4-2: 2000 section 8.3.1 Direct application of discharges to the EUT which states that:

“Unless stated otherwise in the generic, product-related or product-family standards, the static electricity discharges shall be applied only to those points and surfaces of the EUT which are accessible to persons during normal use”

### 5.1 ESD Results

PASS



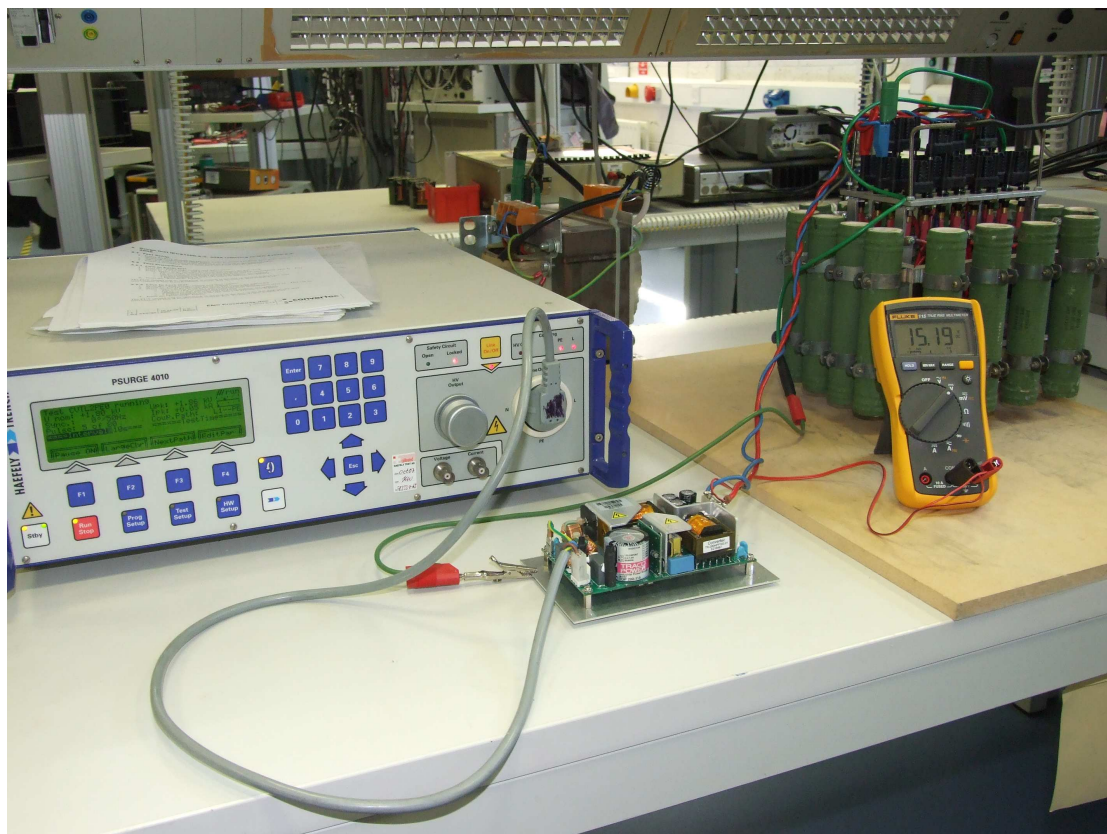
## 6 Surge Test

**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standard:** IEC61000-6-2: 2005 referring to IEC 61000-4-5: 2005

### Notes:

- EUT tested under normal operating conditions of 230V 50Hz input at full load (15V/13A Resistive)
- Used Haefely Surge generator PSURGE 4010
- Voltage test level: +/- 1kV Line-Line, +/- 2kV Line-Earth (installation class 3)
- No. of Surges per set: 5 tests Positive at 0, 90, 180, and 270 and 5 tests Negative at 0, 90, 180, and 270
- Interval Between Surges: 10s

### 6.1 Test Setup





## 6.2 Surge Results

	L to N	L to PE	N to PE
EUT: 200HPP183	PASS	PASS	PASS

### Conclusion:

Meets Classification B performance criteria (Ref. Section 9, IEC 61000-4-5).  
Class B performance criteria are required as per Table 6, IEC 61204-3.

PASS

## 7 Fast Transient Test (Burst)

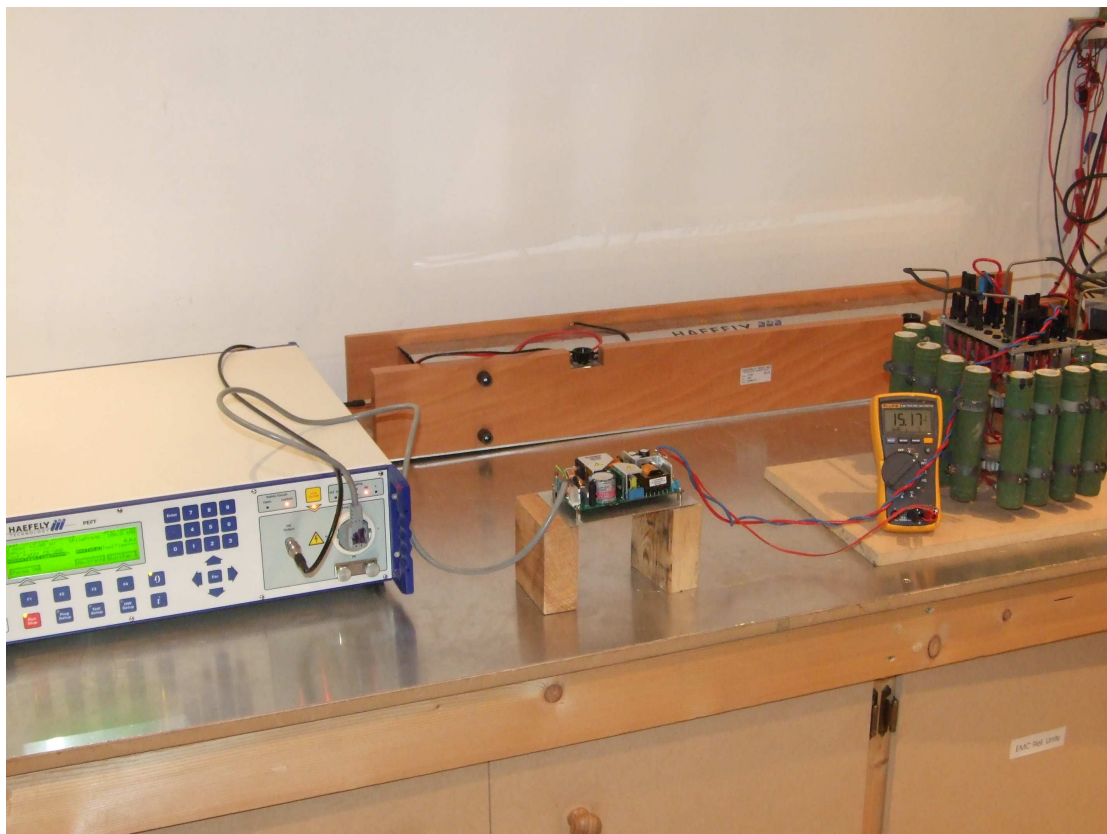
**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standard:** IEC61000-6-2: 2005 referring to IEC 61000-4-4: 2004

### Notes:

- EUT tested under normal operating conditions of 230V 50Hz input at full load (15V/13A Resistive)
- Units tested to IEC61000-4-4 test level 3
- Used Haefely Burst tester PEFT 4010
- Voltage test level:  $\pm 2\text{Kv}$
- Burst Duration: 0.75ms
- Repetition rate: 100kHz
- Burst Period: 300ms
- Individual test time: 1 min
- Polarity: Positive and Negative

The output lines were also tested as above to  $\pm 1\text{Kv}$  with Haefely coupling capacitor IP4A

### 7.1 Test Setup



## 7.2 Burst Results

EUT: 200HPP183	L-G	N-G	PE-G	L,N-G	L,PE-G	N,PE-G	L,N,PE-G
Positive	PASS	PASS	PASS	PASS	PASS	PASS	PASS
Negative	PASS	PASS	PASS	PASS	PASS	PASS	PASS

### Conclusion:

Meets Classification B performance criteria (Ref. Section 9, IEC 61000-4-4).

Class B performance criteria are required as per Table 6, IEC 61204-3.

PASS

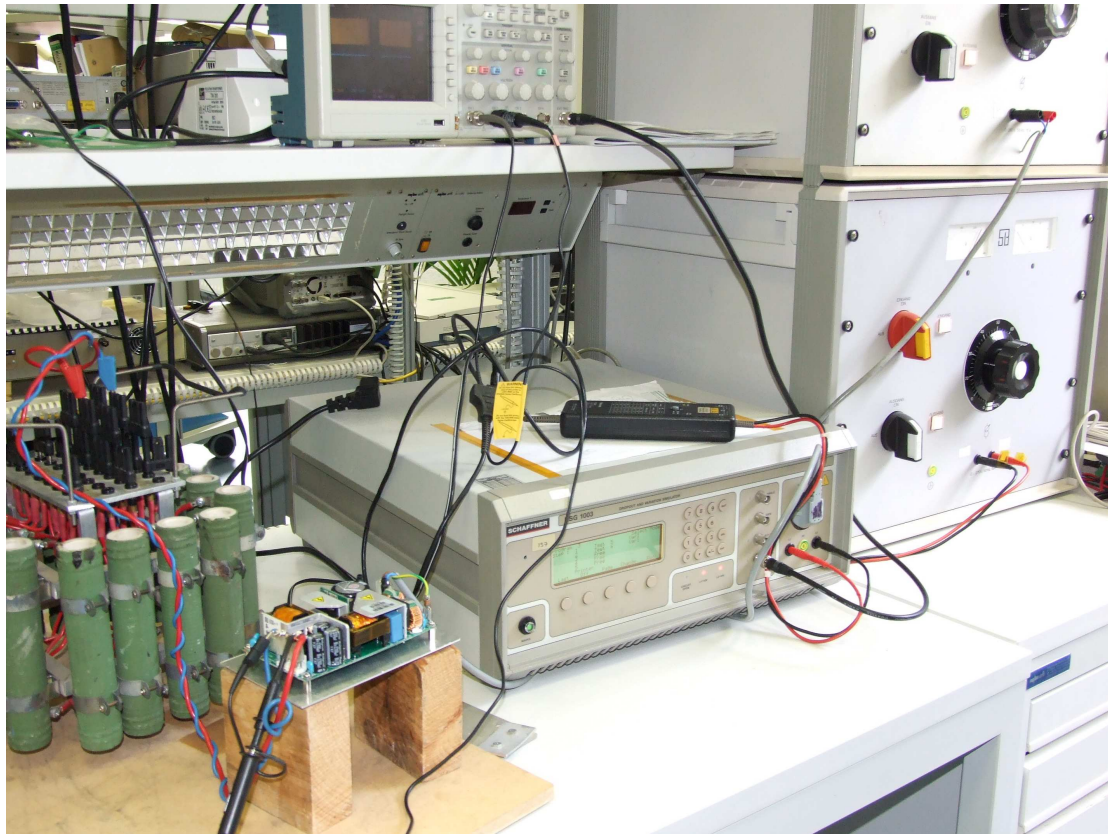
## 8 Voltage Dips and Short Interruptions

**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standard:** IEC61000-6-2:2005 referring to IEC 61000-4-11:2004

### Notes:

- EUT tested under normal operating conditions of 240V 50Hz input at full load (15V/13A Resistive)
- Test carried out using 2 Variacs and dropout simulator NSG 1003
- Tested according to class 3 IEC61000-4-11
- Units tested with highest and lowest nominal voltage (240V/120V) in accordance with IEC61000-4-11 section 5
- Interval between dropouts and short interruptions was 10s
- Phase angle was set to 0°, 90°, 180° and 270° for each voltage level tested
- Dropouts were tested from 100%-80% for 250 Mains cycles in accordance with IEC61000-4-11 table 2
- Dropouts were tested from 100%-70% for 25 Mains cycles in accordance with IEC61000-4-11 table 2
- Dropouts were tested from 100%-40% for 10 Mains cycles in accordance with IEC61000-4-11 table 2
- Dropouts were tested from 100%-0% for 1 Mains cycle in accordance with IEC61000-4-11 table 2
- 3 dropouts and 3 short interruptions were carried out per test
- Short interruptions tests were carried out at 100% to 0% for 0.1s, 0.2s, 0.5s, 1s, 2s, and 5s durations
- Short interruptions were done at worst case 0° phase angle

## 8.1 Test Setup



## 8.2 Voltage Dips & Short Interruptions Results

### Voltage Dips

<b>240VAC</b>				
Phase Angle:	0	90	180	270
100%-0%	B	B	B	B
100%-40%	B	B	B	B
100%-70%	A	A	A	A
100%-80%	A	A	A	A
<b>120VAC</b>				
Phase Angle:	0	90	180	270
100%-0%	B	B	B	B
100%-40%	B	B	B	B
100%-70%	B	B	B	B
100%-80%	A	A	A	A

### Short Interruptions

100%-0%	0.1s	0.2s	0.5s	1s	2s	5s
<b>120VAC</b>	B	B	B	B	B	B
<b>240VAC</b>	B	B	B	B	B	B

### Conclusion:

- In accordance with Class B, IEC61000-4-11 section 9 (b)

**PASS**

## 9 Conducted Input RF Immunity Test

**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standard:** IEC61000-6-2: 2005 referring to IEC 61000-4-6:2004  
**Notes:**

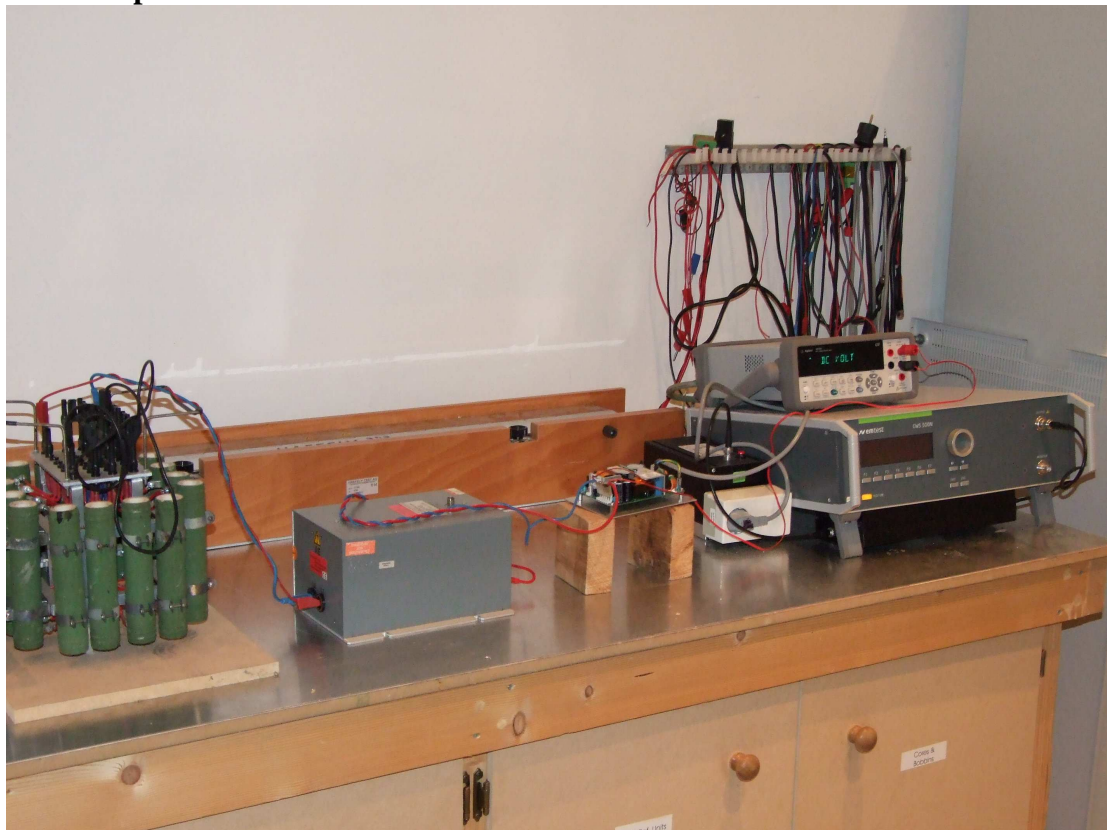
- EUT tested under normal operating conditions of 230V 50Hz input at full load (15V/13A Resistive)
- Test carried out using test generator “EM Test CWS 500N”, Coupling/Decoupling network “EM Test CDN M2/M3”, an attenuator “EM Test ATT6/75” and measurement instrument “Agilent 34410A”
- Unit tested to IEC61000-4-6 test level 3

### 9.1 Test Setup

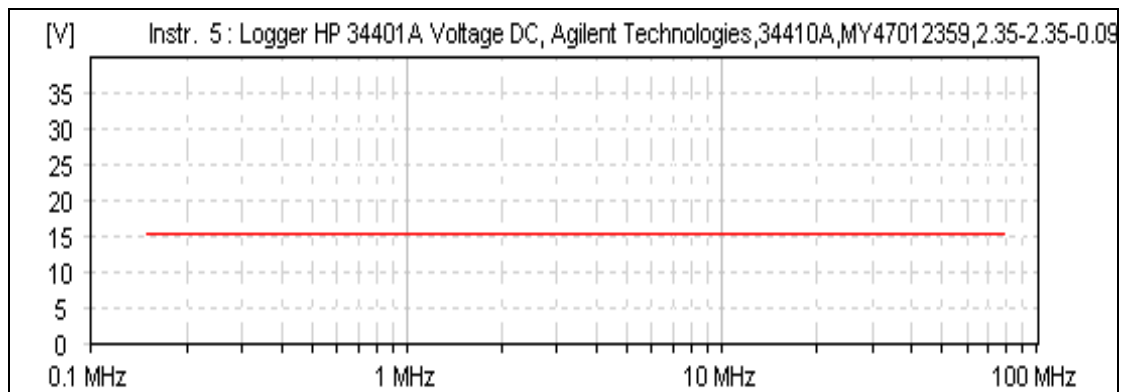
#### Test Equipment Settings:

Frq. start [MHz]	Level start [V]	Frq. stop [MHz]	Level stop [V]	Frq. step	td [s]	tp [s]	Modulation
0.150	10.0	80.000	10.0	1.0 %	0.5	0.0	AM 1kHz 80%

#### Test Setup:



## 9.2 Conducted Input RF Immunity Results



### Conclusion:

Meets Classification A (Ref. Section 9, IEC 61000-4-6)

Test Results were evaluated in relation to the Customer Specification

CS-200HPPseries.doc and the UUT was considered to have PASSED the tests.

**PASS**



## 10 Conducted Output RF Immunity Test

**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standard:** IEC61000-6-2: 2005 referring to IEC 61000-4-6:2004

### Notes:

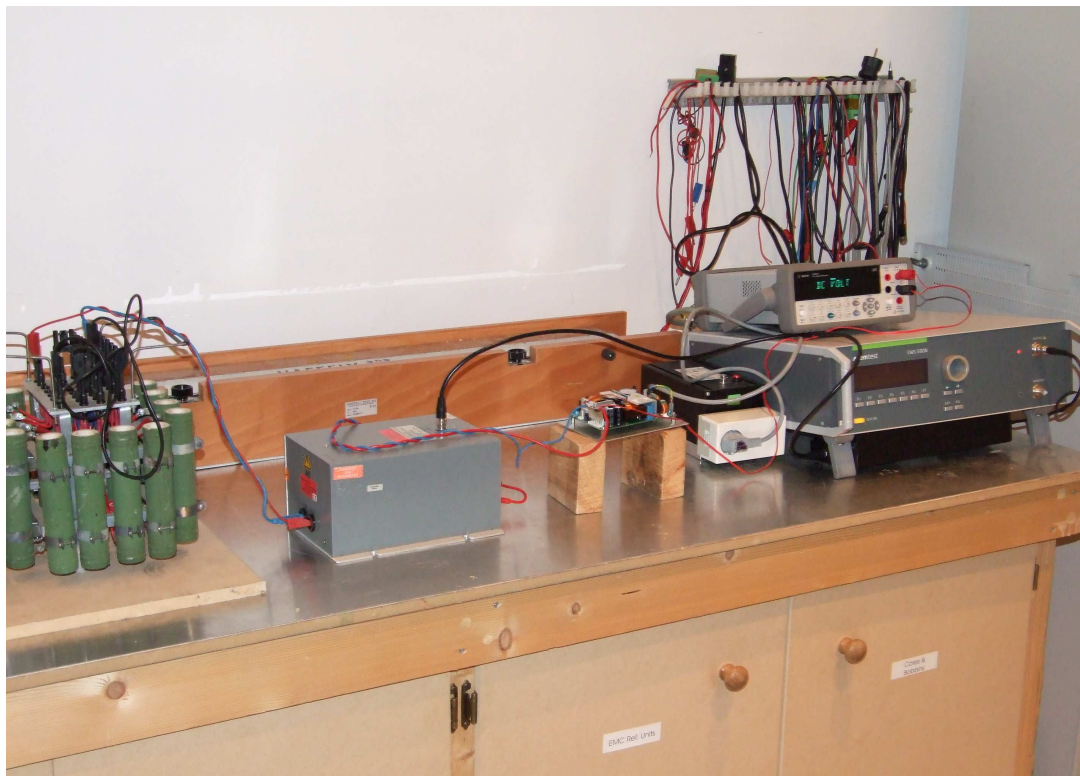
- EUT tested under normal operating conditions of 230V 50Hz input at full load (15V/13A Resistive)
- Test carried out using test generator “EM Test CWS 500N”, Coupling/Decoupling network “EM Test CDN M2/M3”, an attenuator “EM Test ATT6/75”, measurement instrument “Agilent 34410A” and FCC-801-M2-50A Coupling/Decoupling network.
- Unit tested to IEC61000-4-6 test level 3

### 10.1 Test Setup:

#### Test Equipment Settings:

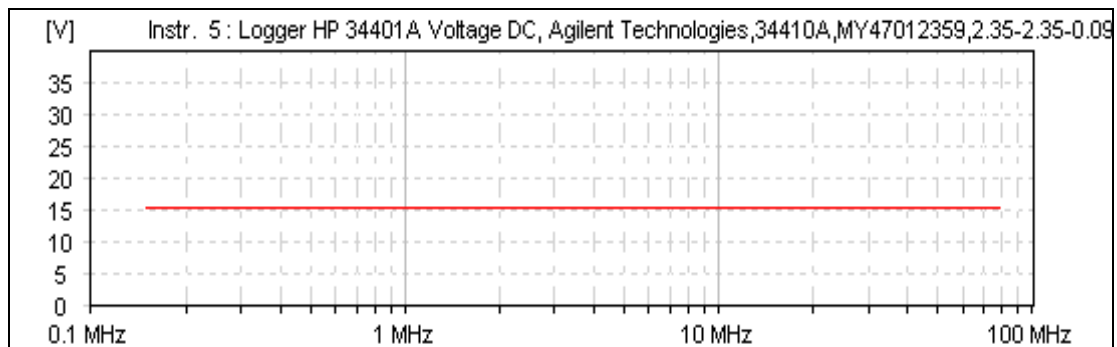
Frq. start [MHz]	Level start [V]	Frq. stop [MHz]	Level stop [V]	Frq. step	td [s]	tp [s]	Modulation
0.150	10.0	80.000	10.0	1.0 %	0.5	0.0	AM 1kHz 80%

#### Test Setup:





## 10.2 Conducted Output RF Immunity Results



### Conclusion:

Meets Classification A (Ref. Section 9, IEC 61000-4-6)

Test Results were evaluated in relation to the Customer Specification

CS-200HPPseries.doc and the UUT was considered to have PASSED the tests.

**PASS**

## 11 Radiated RF Immunity Test

**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standard:** IEC61000-6-2: 2005 referring to IEC 61000-4-3:2004

### Notes:

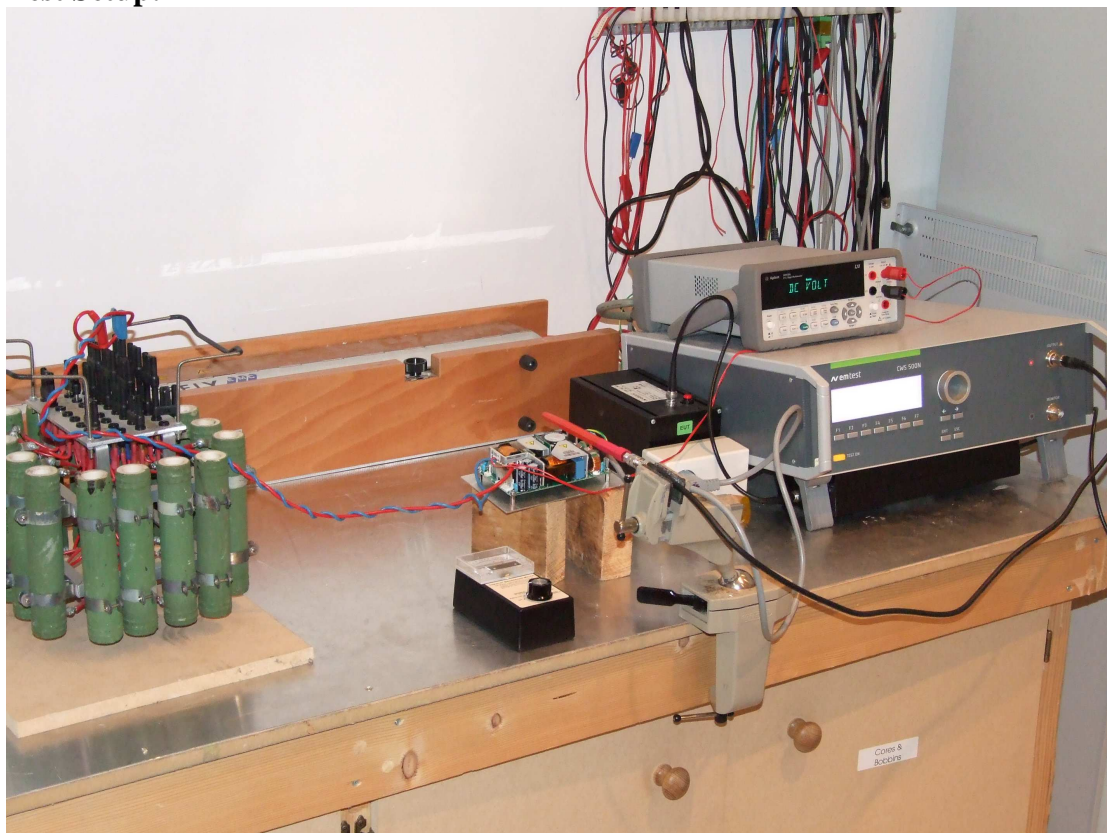
- EUT tested under normal operating conditions of 230V 50Hz input at full load (15V/13A Resistive)
- Test carried out using test generator “EM Test CWS 500N”, E-field probe and measurement instrument “Agilent 34410A”

### 11.1 Test Setup

#### Test Equipment Settings:

Frq. start [MHz]	Level start [V]	Frq. stop [MHz]	Level stop [V]	Frq. step	td [s]
80.0	20.0	1000.0	20.0	1.0 %	1

#### Test Setup:



## 11.2 Radiated RF Immunity Results

### **Conclusion:**

Meets Classification A (Ref. Section 9, IEC 61000-4-3)

Test Results were evaluated in relation to the Customer Specification  
CS-200HPPseries.doc and the UUT was considered to have PASSED the tests.

**PASS**

## 12 Power Frequency Magnetic Field Immunity

**Equipment Under Test:** TOP 200-115  
**EUT Serial No.:** N/A  
**Customer Spec:** CS-200HPPseries.doc  
**Date:** 03/05/2011  
**Standard:** IEC61000-6-2: 2005 referring to IEC61000-4-8: 2001

### Notes:

- EUT tested under normal operating conditions of 230V 50Hz input at full load (15V/13A Resistive)
- Test carried out using test generator “Chroma Programmable AC Source”, “1meter x 1meter 100 turn Induction Coil” and measurement instrument “Agilent 34405A”
- Unit tested to IEC61000-4-8 test levels 5

### 12.1 Test Setup

#### Test Equipment Settings:

Test generator settings			
Frequency	AC Current through Induction Coil (Arms)	Magnetic Field Strength (A/m)	Applied Field duration [s]
50Hz	1	100	Continuous
60Hz	1	100	Continuous
50Hz	10	1000	3
60Hz	10	1000	3

### Test Setup:



## 12.2 Power Frequency Magnetic Field Immunity Results

### Conclusion:

Meets Classification A (Ref. Section 9, IEC 61000-4-8)

Test Results were evaluated in relation to the Customer Specification

CS-200HPPseries.doc and the UUT was considered to have PASSED the tests.

**PASS**

## 13 Summary

Regulation	Class/Test Level	Result	Comments
<b>IEC61000-6-3: 2006 + CISPR 16-1-2: 2003 + CISPR 16-2-3: 2003</b>			
Conducted Input (0.15-30MHz)	Class B	PASS	
Radiated (30-300MHz)	Class B	PASS	
<b>IEC61000-6-3: 2006 + IEC 61000-3-2:2005</b>			
Harmonic Current Emissions	Class A	PASS	
<b>IEC61000-6-2: 2005 + IEC 61000-4-5:2005</b>			
EUT will be inaccessible to persons during normal use		PASS	
<b>IEC61000-6-2: 2005 + IEC 61000-4-5:2005</b>			
Surge			
- AC Supply	+/- 1kV (Class B) L-N	PASS	
	+/- 2kV (Class B) L-PE	PASS	
	+/- 2kV (Class B) N-PE	PASS	
<b>IEC61000-6-2: 2005 + IEC 61000-4-4: 2004</b>			
Fast Transient (Burst)			
- AC Supply	+/- 2kV (Class B Between all lines)	PASS	
<b>IEC61000-6-2: 2005 + IEC 61000-4-11:2004</b>			
Voltage Dips			
- AC Supply	100%-0% (b)	PASS	
	100%-40% (b)	PASS	
	100%-70% (b)	PASS	
	100%-80% (b)	PASS	
Short Interruptions (100%-0% for: 0.1s, 0.2s, 0.5s, 1s, 2s and 5s)	(b)	PASS	
<b>IEC61000-6-2: 2005 + IEC61000-4-6:2004</b>			
Conducted Input RF Immunity	Level III 10V (Class A)	PASS	
Conducted Output RF Immunity	Level III 10V (Class A)	PASS	
<b>IEC61000-6-2: 2005 + IEC61000-4-3:2004</b>			
Radiated RF Immunity	20V (Class A)	PASS	
<b>IEC61000-6-2: 2005 + IEC61000-4-8: 2001</b>			
Power Frequency Magnetic Field Immunity	Level 5 (Class A)	PASS	

## 14 List of Equipment Used:

Description	Model No.	Manufacturer	Serial No.
EMC Analyzer	E7402A	Agilent	MY45119210
LISN 1	PMM L2-16	PMM	1230L00301
LISN 2	FCC-801-M2-50A	FCC	3035
RF Current Probe	F-33-1	FCC	759
E Field Probe	n/a	R.A.M Test	n/a
Transient Limiter	11947A	Agilent	3107A03645
Precision Power Meter	LMG95	Zimmer	10790709
Low-Distortion AC Source	AC1000	Thurlby Thandar Instruments	151093
Trifield Broadband Meter	TBM-100	Laplace Instruments Ltd	n/s
Surge Generator	PSURGE 4010	Haefely	583 334-63
Burst generator	PEFT 4010	Haefely	080 981-08
Coupling Capacitor	IP4A	Haefely	171241
Dropout & Variation Simulator	NSG 1003	Schaffner	106
Electronic Load	63106A	Chroma	6314A0001433
High Power Resistors	n/a	n/a	n/a
Multimeter	34405A	Agilent	TW46290007
Multimeter	34405A	Agilent	TW46290015
Multimeter	34410A	Agilent	MY47012359
Multimeter	1906	TTI	n/a
High frequency generator	CWS 500N	EM Test	V0847104427
Coupling/Decoupling Network	CDN M2/M3	EM Test	1108-34
Attenuator	ATT6/75	EM Test	1107-53
Oscilloscope	TDS1002	Tektronix	C016388
Programmable AC Source	61604	Chroma	ABR000000672
Magnetic Field Generator	n/a	n/a	n/a
<b>Cables</b>	<b>Type</b>	<b>Length</b>	<b>Comments</b>
Mains Supply Cable	3-wire	1m	Unshielded
DC Lines Cable	2-wire	1m	Unshielded