

# **Traco Power**

## **Model: TBL 150-112**

### **EMC – Test Report**

**Amendment to EMC-Report: EMC\_TBL150-112\_26.03.09**

**EUT:** Traco Power - Model: TBL 150-112

**Serial No.:** 30952261220

**Manufacturer No.:** 150PSL182

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

**Tester:** Gunnar Tapper, Convertec Ltd

**Date:** 01/09/2014

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 as defined in the “Guide for the EMC Directive 2004/108EC, 21. May 2007” is responsible for the EMC-compliance of the final apparatus.

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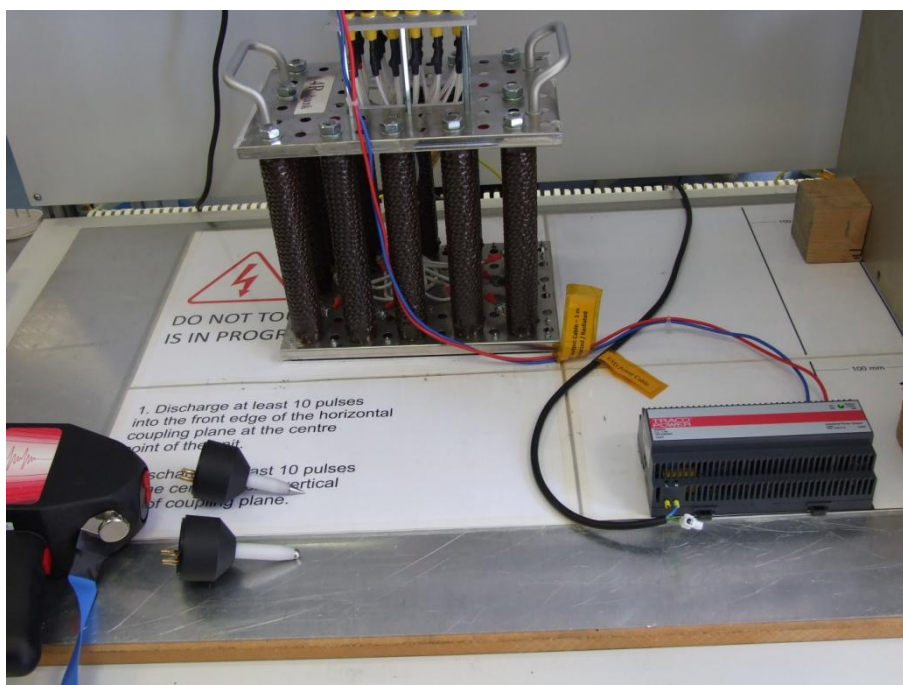
## 1. Electrostatic Discharge Immunity Test

**Equipment under Test:** TBL 150-112  
**EUT Serial No.:** 30952261220  
**Customer Spec:** CS-XXXPSL.doc  
**Date:** 01/09/2014  
**Standards:** IEC61000-6-2: 2005 referring to IEC 61000-4-2: 2000

### Notes:

- EUT tested under normal operating conditions of 230V 50Hz input at full nominal load (12V/10A Resistive).
- Since the EUT output is isolated from earth, a 470K HV resistor was placed between output and Earth to provide a discharge path between spikes.
- Contact discharge tests shall be applied to all areas exposed to the end user under final installation using ESD gun SEDS 200.
- Test voltage shall be increased from 2kV up to the max 8kV/4kV (air/contact) as required by the standard IEC/EN 61000-4-2.
- At least 10 discharges were applied per test point (in both polarities).
- A time interval between discharges of a least 1s was used.
- The ESD generator was held perpendicular to the test point wherever possible for repeatability of results.
- In the case of air discharges, the trigger is engaged at about 20cm and the tester is moved quickly toward the test point until a spark occurs and trigger is released.

### 1.1. Test Set-Up:



## 1.2. Electrostatic Discharge Immunity Test Results

All exposed metal screw heads and ground planes were tested as contact test points and also as air test points. The connector pins and all vents and inlets were also tested as air test points.

	<b>Contact Test points:</b>	<b>Air Test points:</b>
<b>EUT</b>	<b>PASS</b>	<b>PASS</b>

**Conclusion:**

The EUT still functions as expected after tests therefore it meets classification B in accordance with IEC61000-4-2.

**PASS**

**Environmental conditions during ESD Test**

	Environmental condition required according IEC61000-4-2	Environmental conditions measured
Ambient Temperature in [°C]	15 - 35	25.6
Air Humidity in [%]	30 - 60	46.1
Atmospheric Pressure in [kPa]	86.0 - 106.0	101.12

Environmental conditions during the test:

☒ kept

☐ not kept

## 2. Conducted RF Immunity Test at AC Mains Terminals

**Equipment under Test:** TBL 150-112  
**EUT Serial No.:** 30952261220  
**Customer Spec:** CS-XXXPSL.doc  
**Date:** 01/09/2014  
**Standard:** IEC61000-6-2: 2005 referring to IEC 61000-4-6:2004

**Notes:**

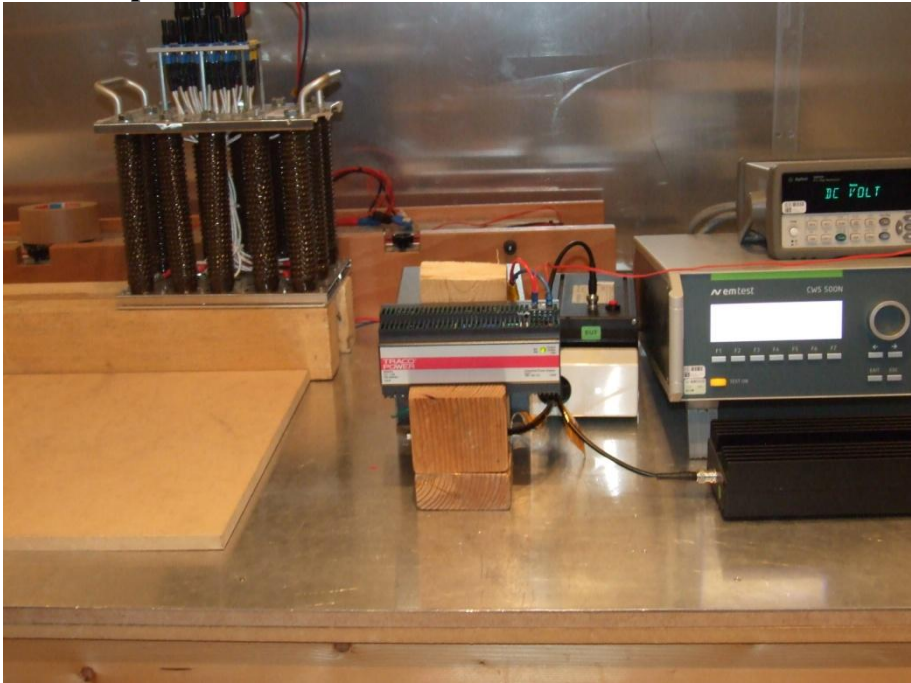
- EUT tested under normal operating conditions of 230V 50Hz input at full nominal load (12V/10A Resistive).
- Test carried out using test generator “EM Test CWS 500N”, Coupling/Decoupling network “EM Test CDN M2/M3”, an attenuator “EM Test ATT6/75” and measurement instrument “Agilent 34410A”.
- Unit tested to IEC61000-4-6 test level 3.

### 2.1. Test Setup

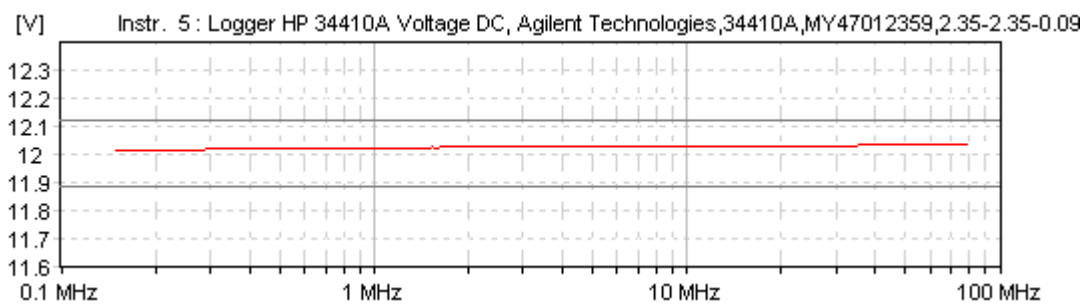
**Test Equipment Settings:**

Frq. start [MHz]	Level start [V]	Frq. stop [MHz]	Level stop [V]	Frq. step	td [s]	tp [s]	Modulation
0.150	3.0	80.000	3.0	1.0 %	0.5	0.0	AM 1kHz 80%

**Test Setup:**



## 2.2. Conducted RF Immunity Test Results



**Conclusion:**

The EUT meets Classification A (Ref. Section 9, IEC 61000-4-6).  
The test results were evaluated in relation to the Customer Specification CS-XXXPSL.doc and the output did not change by more than +/-120mV therefore the EUT was considered to have PASSED the tests.

**PASS**

### 3. Conducted RF Immunity Test at DC Output Terminals

**Equipment under Test:** TBL 150-112  
**EUT Serial No.:** 30952261220  
**Customer Spec:** CS-XXXPSL.doc  
**Date:** 01/09/2014  
**Standard:** IEC61000-6-2: 2005 referring to IEC 61000-4-6:2004

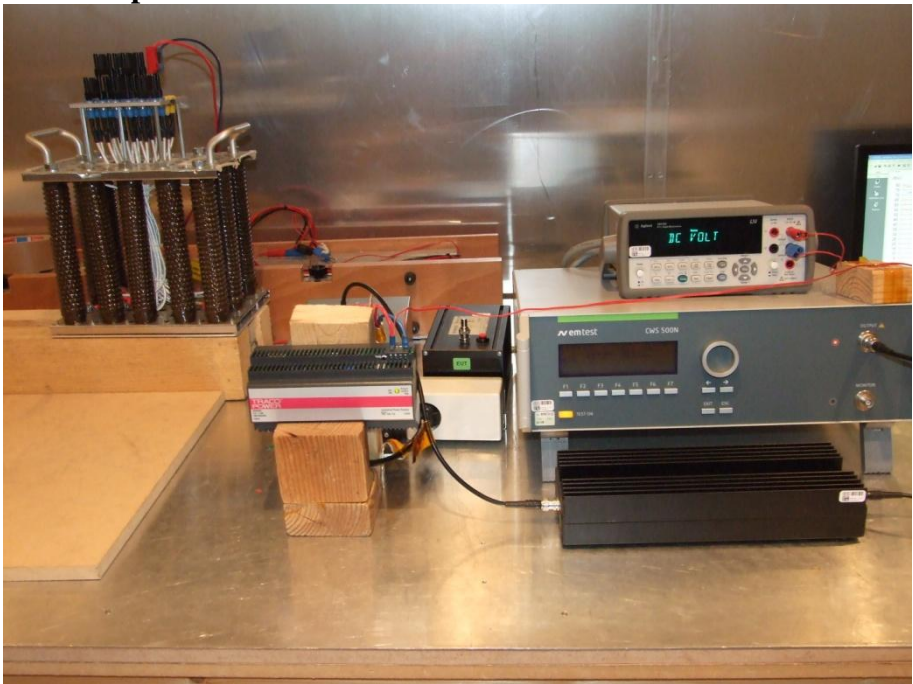
- Notes:**
- EUT tested under normal operating conditions of 230V 50Hz input at full nominal load (12V/10A Resistive).
  - Test carried out using test generator “EM Test CWS 500N”, Coupling/Decoupling network “EM Test CDN M2/M3”, an attenuator “EM Test ATT6/75”, measurement instrument “Agilent 34410A” and FCC-801-M2-50A Coupling/Decoupling network.
  - Unit tested to IEC61000-4-6 test level 3.

#### 3.1. Test Setup:

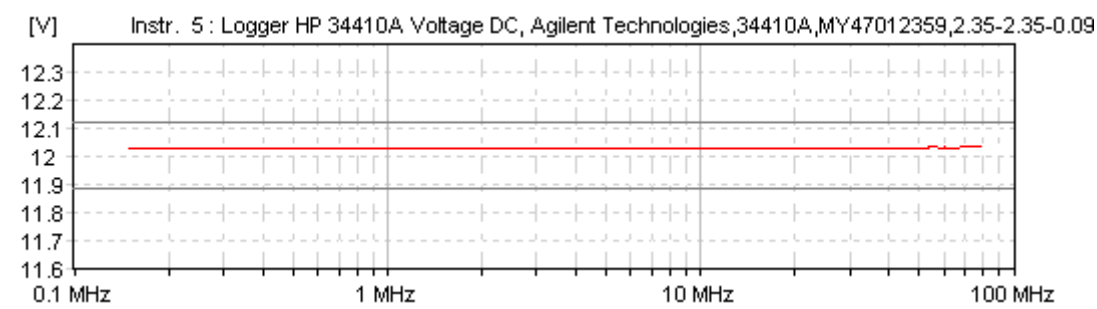
**Test Equipment Settings:**

Frq. start [MHz]	Level start [V]	Frq. stop [MHz]	Level stop [V]	Frq. step	td [s]	tp [s]	Modulation
0.150	3.0	80.000	3.0	1.0 %	0.5	0.0	AM 1kHz 80%

**Test Setup:**



### 3.2. Conducted RF Immunity Test Results



**Conclusion:**  
Meets Classification A (Ref. Section 9, IEC 61000-4-6)  
Test Results were evaluated in relation to the Customer Specification  
CS-XXXPSL.doc and the output did not change by more than +/-120mV therefore the  
EUT was considered to have PASSED the tests.

PASS



## 4. Radiated RF Immunity Test

**Equipment under Test:** TBL 150-112  
**EUT Serial No.:** 30952261220  
**Customer Spec:** CS-XXXPSL.doc  
**Date:** 01/09/2014  
**Standard:** IEC61000-6-2: 2005 referring to IEC61000-4-3: 2004

**Notes:**

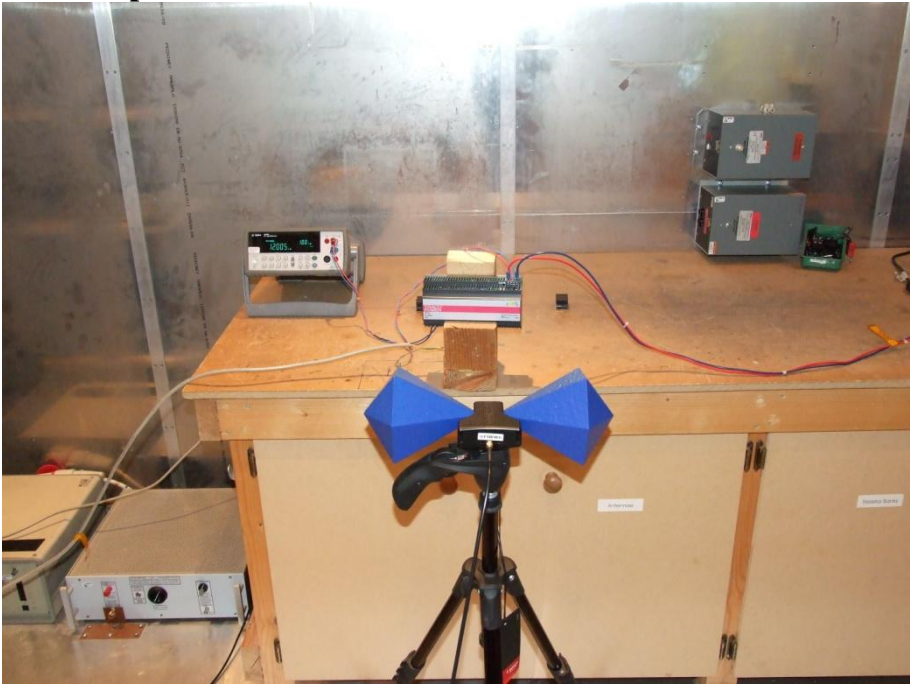
- EUT tested under normal operating conditions of 230V 50Hz input at full nominal load (12V/10A Resistive).
- Test carried out using test generator “EM Test CWS 500N”, Antenna BicoLOG 30100 X and Digitizing Multi Meter “Agilent 34405A”
- Measurement was carried out in a shielded room
- The input power port of the EUT was connected to mains via a 1.5m 3-core cable
- The output power port of the EUT was connected to the resistor bank via 1.5m long single core wires –wire size 14AWG

### 4.1. Test Setup

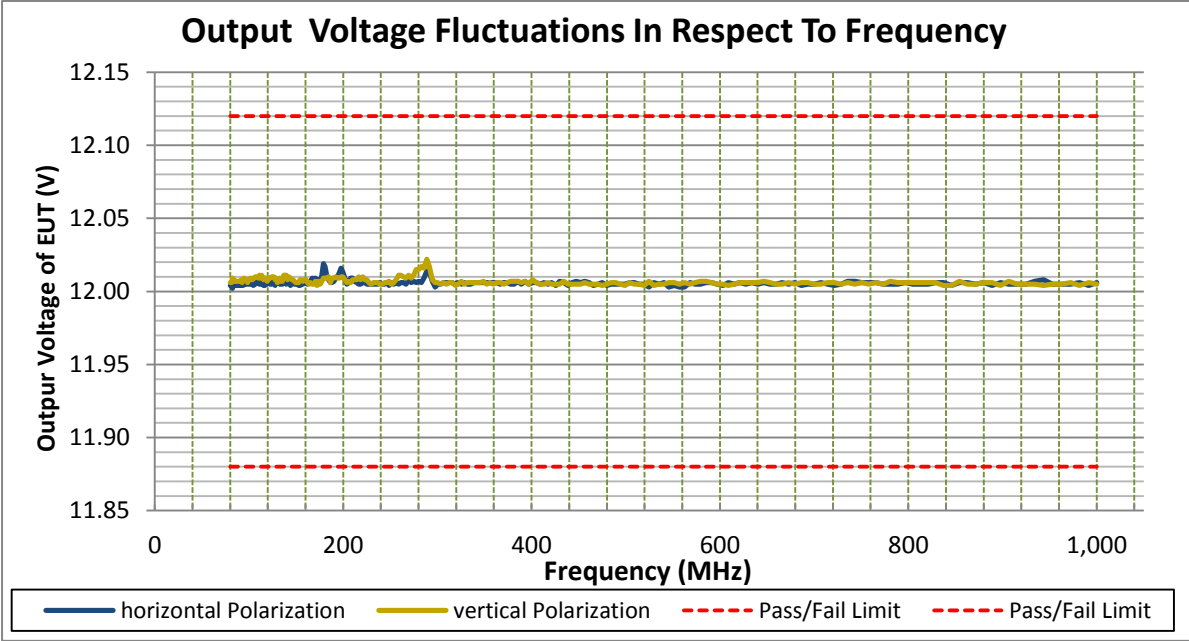
**Test Equipment Settings:**

Frq. start [MHz]	Level start [V]	Frq. stop [MHz]	Level stop [V]	Frq. step	td [s]
80.0	10.0	1000.0	10.0	1.0 %	1

**Test Setup:**



## 4.2. Radiated RF Immunity Test Results



**Conclusion:**

The EUT meets classification A (Ref. Section 9, IEC 61000-4-3). The test results were evaluated in relation to the Customer Specification CS-XXXPSL.doc and the output did not change by more than +/-120mV therefore the EUT was considered to have PASSED the tests.

**PASS**

## 5. Power Frequency Magnetic Field Immunity Test

**Equipment under Test:** TBL 150-112  
**EUT Serial No.:** 30952261220  
**Customer Spec:** CS-XXXPSL.doc  
**Date:** 01/09/2014  
**Standard:** IEC61000-6-2: 2005 referring to IEC61000-4-8: 2001

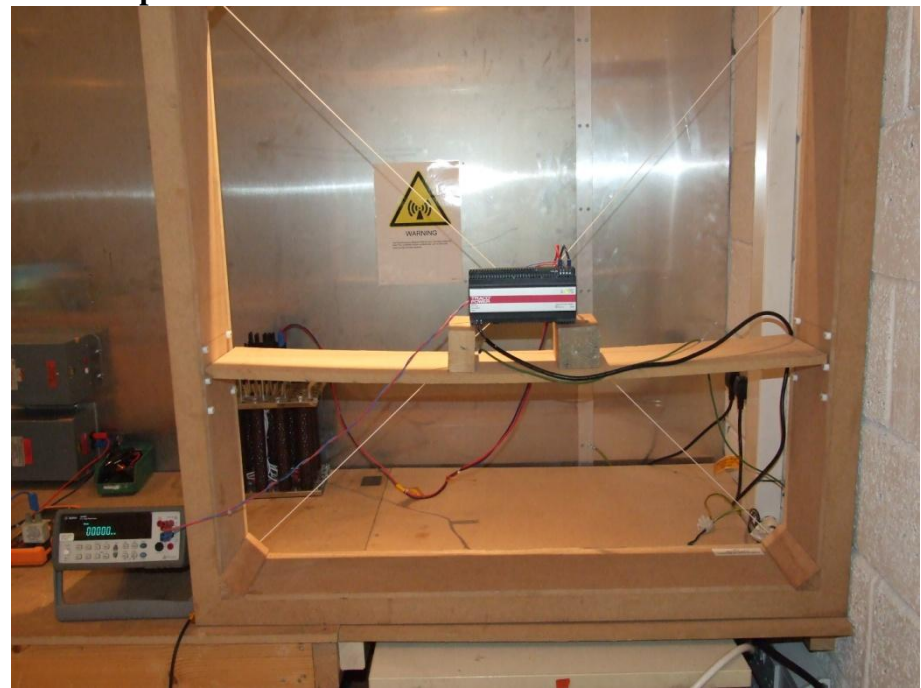
- Notes:**
- EUT tested under normal operating conditions of 230V 50Hz input at full nominal load (12V/10A Resistive).
  - Test carried out using test generator “Chroma Programmable AC Source”, “1meter x 1meter 100 turn Induction Coil” and measurement instrument “Agilent 34405A”.
  - Unit only required to meet test level 4 but tested to IEC61000-4-8 test levels 5.

### 5.1. Test Setup

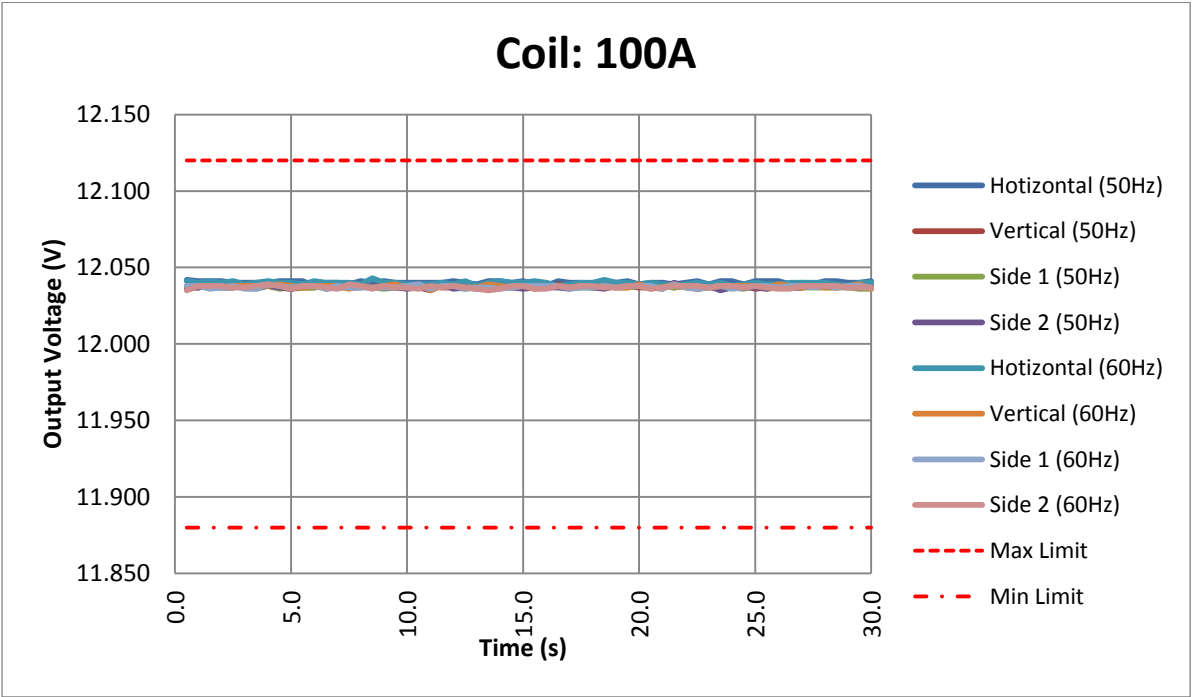
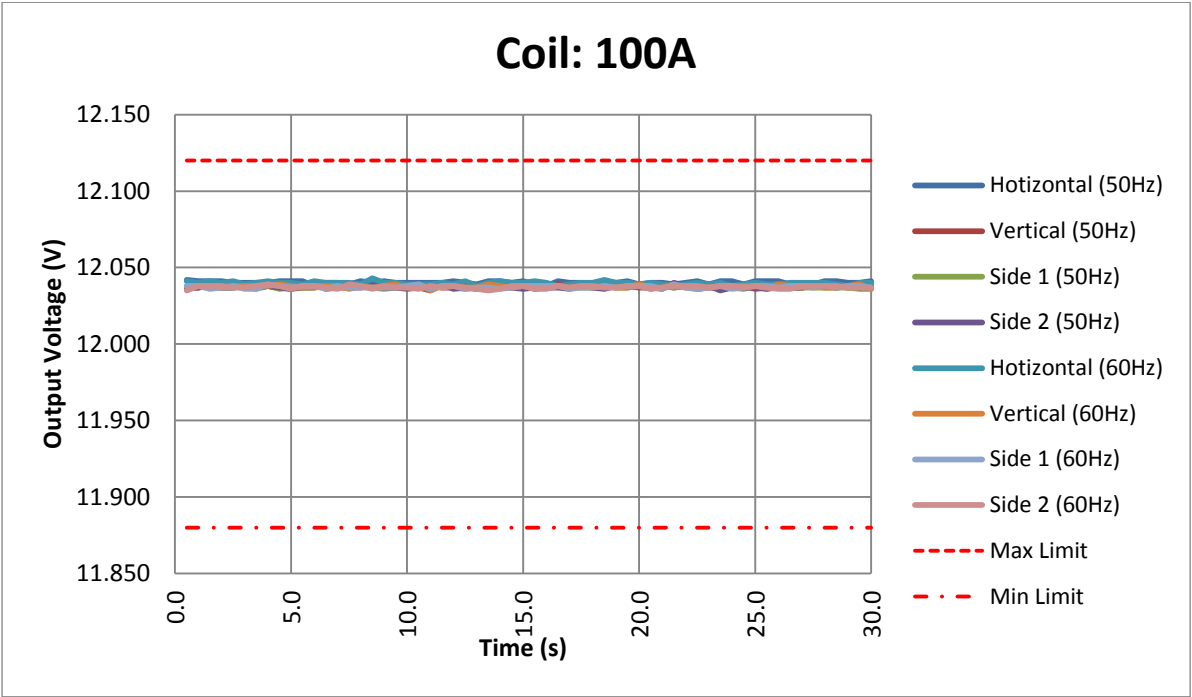
**Test Equipment Settings:**

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:**



## 5.2. Power Frequency Magnetic Field Immunity Test Results



**Conclusion:**

The EUT meets classification A (Ref. Section 9, IEC 61000-4-8). The test results were evaluated in relation to the Customer Specification CS-XXXPSL.doc and the output did not change by more than +/-120mV therefore the EUT was considered to have PASSED the tests.

PASS

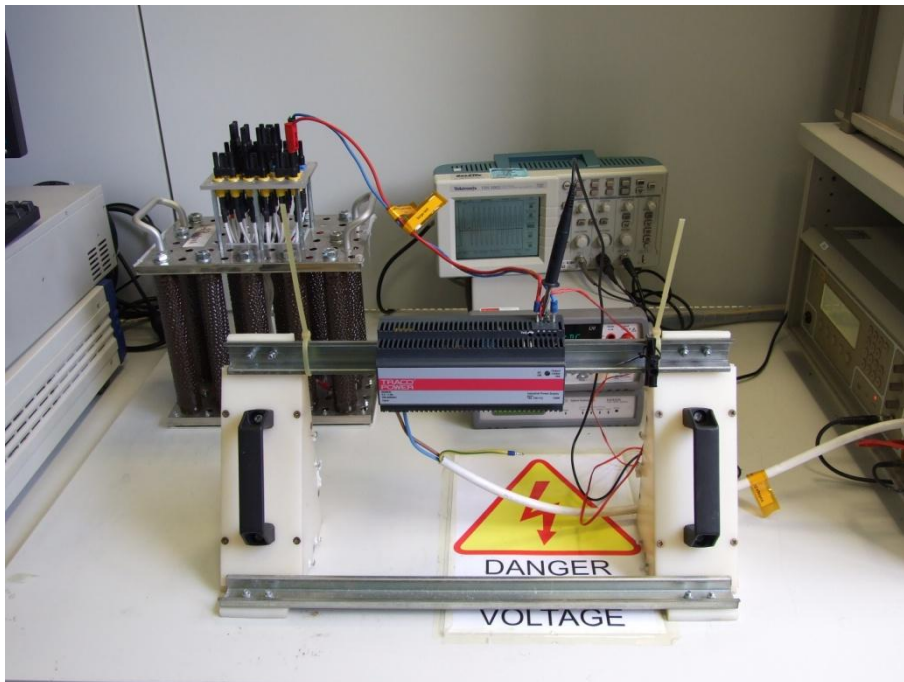
## 6. Voltage Sag Immunity Test (Semi F47)

**Equipment under Test:** TBL 150-112  
**EUT Serial No.:** 30952261220  
**Customer Spec:** CS-XXXPSL.doc  
**Date:** 01/09/2014  
**Standard:** SEMI F47-0706

### Notes:

- EUT tested under operating conditions of 230V and 115V 50Hz input at full nominal load (12V/10A Resistive).
- Test carried out using test generator using Voltage Sag Generator: Schaffner NSG1003: Dropout and Variation Simulator and Oscilloscope Tektronix: TDS2014C.
- Pass/Fail Criteria for Subsystems and Components-Voltage sag immunity testing of subsystems and components should meet the following as required by Semi-F47:
  - A. Performs at full rated operation.
  - B. May not perform at full rated operation but recovers operation without operator and/or host controller intervention. Must not send error signals to the equipment host controller indicating when full rated operation is not achieved.
  - C. May not perform at full rated operation but recovers operation without operator and/or host controller intervention. May send signals to the equipment host controller indicating when full rated operation is not achieved.
  - D. Does not perform at full rated operation and requires an operator and/or host controller intervention for recovering.

### 6.1. Test Setup



## 6.2. Voltage Sag Immunity test Results (Semi F47)

Input Voltage = 230VAC, Output = 12V,10A

Voltage Sag	Duration	Duration	Output Voltage	% delta of nominal output voltage	Semi F47	Criteria
[V]	[s]	[cycles]	[V]	DUT 50Hz [%]	[%]	[Class]
207	20	1000	12.02	0.0	90	A
207	10	500	12.02	0.0	90	A
184	10	500	12.02	0.0	80	A
184	1	50	12.02	0.0	80	A
184	0.5	25	12.02	0.0	80	A
161	0.5	25	12.02	0.0	70	A
161	0.5	10	12.02	0.0	70	A
115	0.2	10	11.95	0.4	50	A
115	0.02	1	12.02	0.0	50	A
0	0.02	1	12.02	0.0	0	A

\*Yellow indicates the required Voltage SAG Immunity Levels. Other levels are recommended.

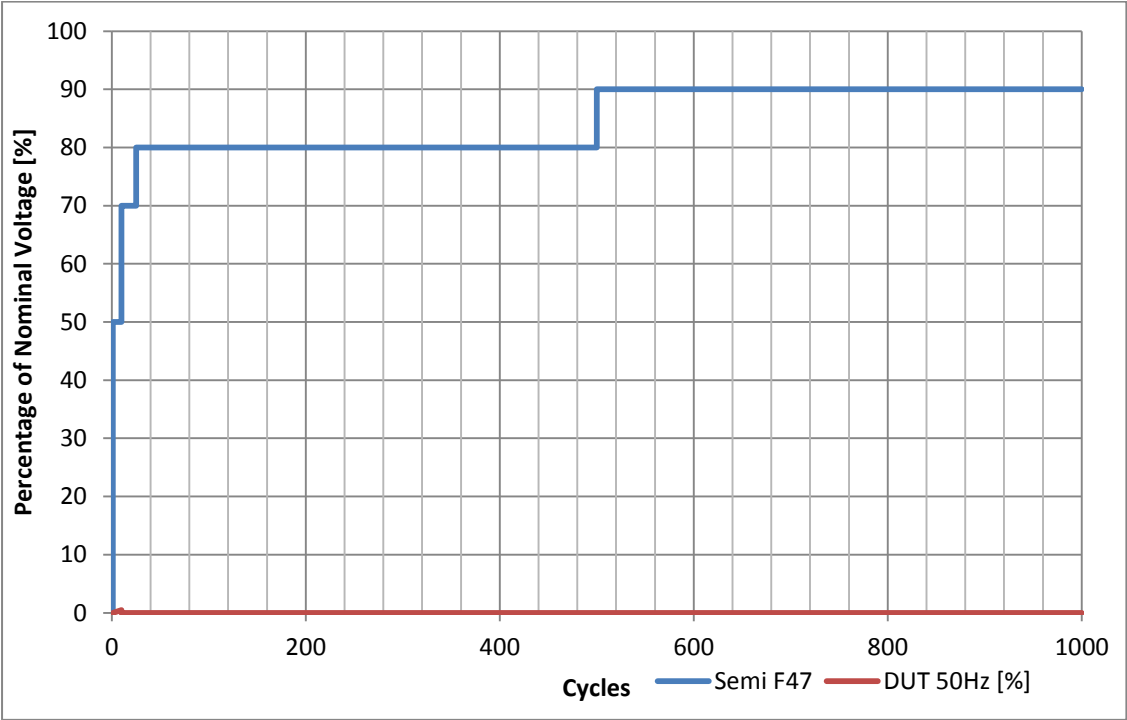


Figure 1: TBL 150-112/ 0-1000 cycles

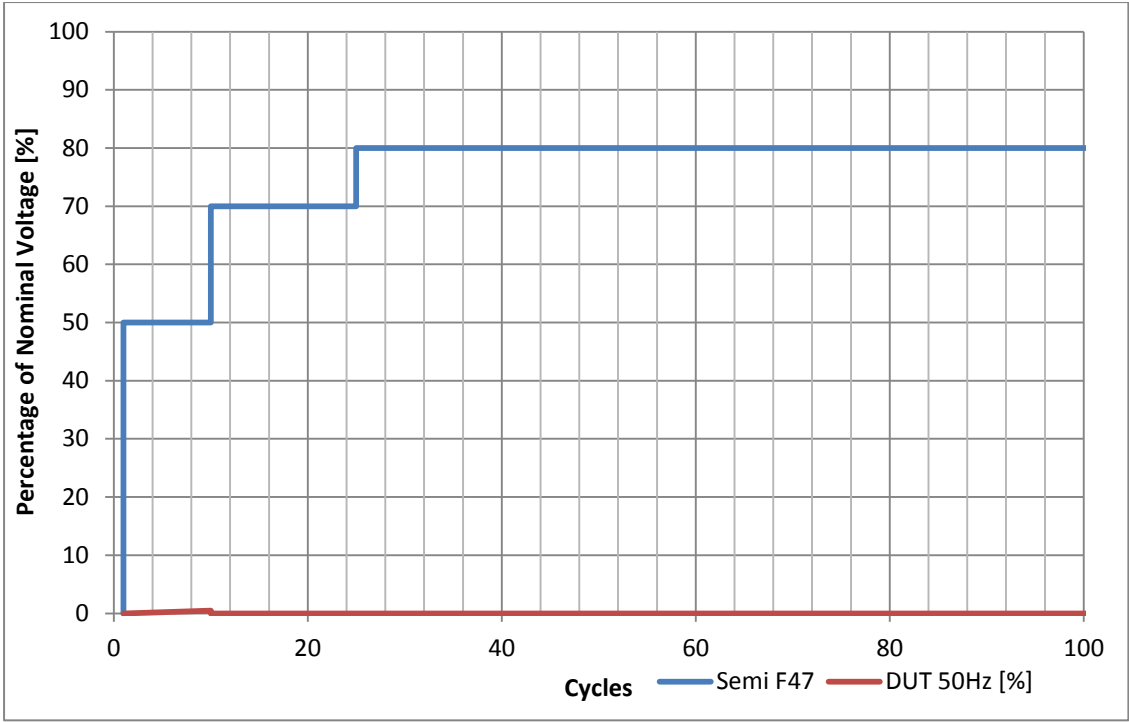
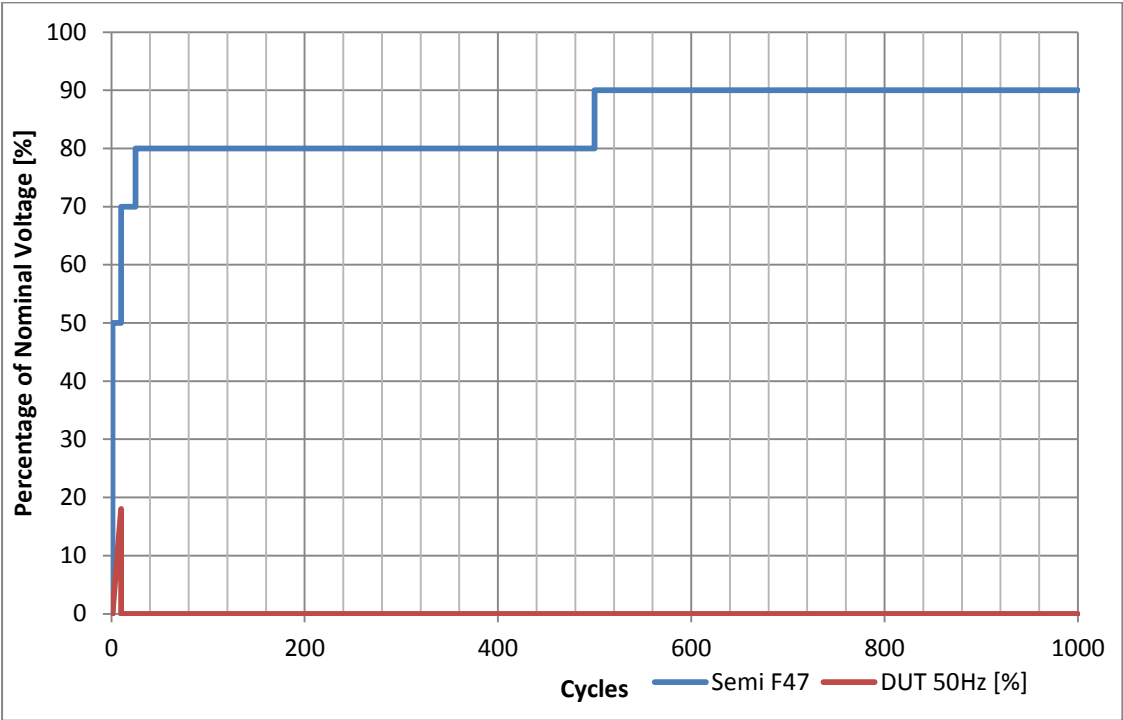


Figure 2: TBL 150-112/ 0-100 cycles



**Input Voltage = 115VAC, Output = 12V, 10A**

Voltage Sag	Duration	Duration	Output Voltage	% delta of nominal output voltage	Semi F47	Criteria
[V]	[s]	[cycles]	[V]	DUT 50Hz [%]	[%]	[Class]
103.5	20	1000	12.02	0.0	90	A
103.5	10	500	12.02	0.0	90	A
92	10	500	12.02	0.0	80	A
92	1	50	12.02	0.0	80	A
92	0.5	25	12.02	0.0	80	A
80.5	0.5	25	12.00	0.0	70	A
80.5	0.5	10	12.00	0.0	70	A
57.5	0.2	10	9.84	18.0	50	B
57.5	0.02	1	12.02	0.0	50	A
0	0.02	1	12.02	0.0	0	A



**Figure 3: TBL 150-112/ 0-1000 cycles**

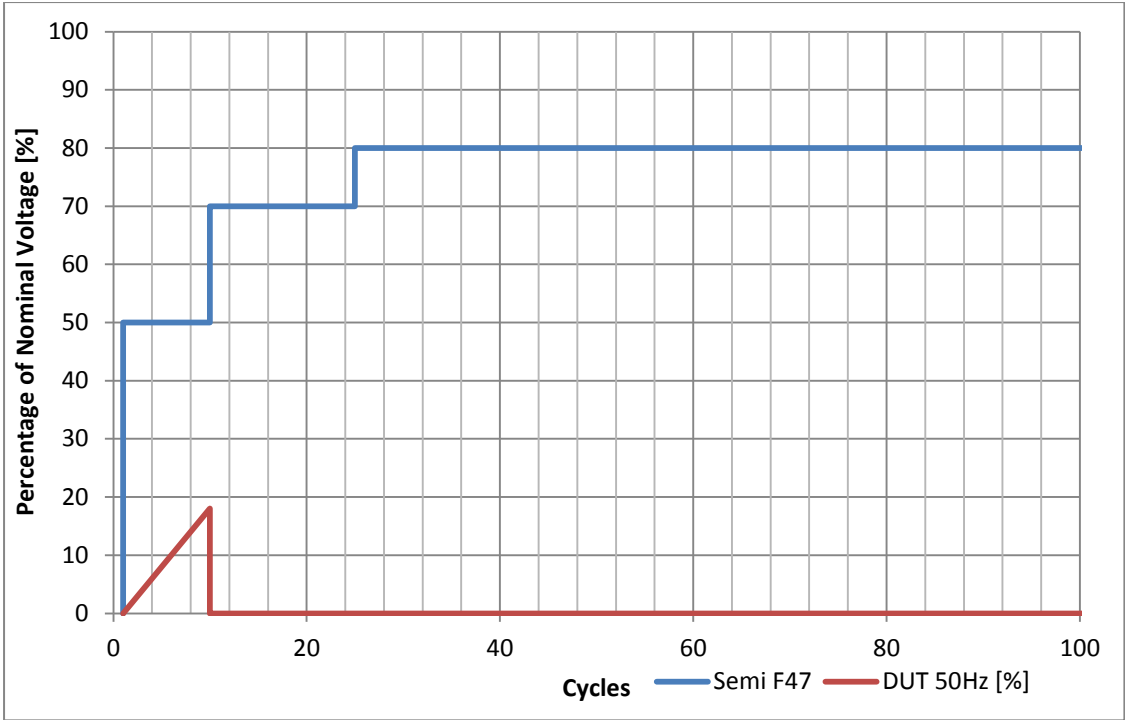


Figure 4: TBL 150-112/ 0-100 cycles

**Conclusion:**

The EUT meets classification B (Ref. SEMI F47-0706). The test results were evaluated in relation to the Customer Specification CS-XXXPSL.doc and the EUT was considered to have PASSED the tests.

**PASS**

## 7. Summary

Regulation	Class/Test Level	Result	Comments
<b>IEC61000-6-2: 2005 + IEC 61000-4-2:2005</b>			
Electrostatic Discharge			
- Air Discharge	+/- 2/8kV (Class B)	PASS	
- Contact Discharge	+/- 2/4kV (Class 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	
Signal Ports RF Immunity	Level III 10V (Class A)	n/a	
<b>IEC61000-6-2: 2005 + IEC61000-4-3:2004</b>			
Radiated RF Immunity	Level III 10V (Class A)	PASS	
<b>IEC61000-6-2: 2005 + IEC61000-4-8: 2001</b>			
Power Frequency Magnetic Field Immunity	Level 5 (Class A)	PASS	
<b>SEMI F47-0706</b>			
Semi F47 Voltage SAG Immunity			
-AC Supply (230VAC and 115VAC)	(Class B)	PASS	

# 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
LISN 3	NSLK 8127	Schwarzbeck	8127683
RF Current Probe	F-33-1	FCC	759
Transient Limiter	11947A	Agilent	3107A03645
Precision Power Meter	LMG95	Zimmer	10790709
ESD Gun	SESD 200	Schloder	142261
Surge Generator	PSURGE 4010	Haefely	583 334-63
Burst generator	PEFT 4010	Haefely	080 981-08
Coupling Capacitor	IP4A	Haefely	171241
Electronic Load	ELA 500	Zentro-Electrik	63145803
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
Oscilloscope	TDS2014C	Tektronix	C010602
Programmable AC Source	61604	Chroma	ABR000000672
DC power supply	SM 7020 - D	Delta electronika	014604000011
DC power supply	SM 7020 - D	Delta electronika	014604000024
Pulse Generator	33220A	AGILENT	MY44044002
Biconical Antenna	BicoLOG 30100 X	AARONIA	79479
<b>Cables</b>	<b>Type</b>	<b>Length</b>	<b>Comments</b>
Mains Supply Cable	3-wire	1m	Unshielded
Mains Supply Cable	3-wire	1.5m	Unshielded
DC Lines Cable	2-wire	1m	Unshielded
DC Lines Cable	2-wire	1.5m	Unshielded