Hong Kong

EMC - TEST REPORT

Report Number	: 60/760.11.257.01	Date of Issue:	29th November 2011
Model	: DEM1499		
Product Type	: Energy Meter		
Applicant	: Eco-logic Manufacturing Limited		
Address	: Room 1614, Block B, Veristrong Industrial Centre, 34-36 Au Pui Wan Street, Fotan, N.T., Hong Kong		
Production Facility	: Dong Guan XinYeYang Plastic MFG Co., Ltd.		
Address	: Waijing Industrial Zone, Gaolong Road, Gaobu Town, 523273 Dongguan City, PEOPLE'S REPUBLIC OF CHINA		
Test Result	: ■ Positive ☐ Negative		
Total pages including Appendices	: 44		

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2 Details about the Test Laboratory

Details about the Test Laboratory

1)

Company name: TÜV SÜD HONG KONG LTD.

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2)

Company name: HONG KONG PRODUCTIVITY COUNCIL – EMC CENTRE

LG1, HKPC Building,
78 Tat Chee Aveneu,
Kowloon
HK.

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	Energy Meter
Model no.:	DEM1499
Serial number:	NIL
Options and accessories:	NIL
Rated Voltage:	- 220VAC-240VAC for UK Version | 3.0VDC for data backup - 230VAC for German,Belium Version, Denmark & Swiss Version | 3.0VDC for data backup
Rated input Current:	16A (Max), German & Belium Version 13A (Max.), UK Version 10A (Max.), Denmark & Swiss Version
Rated input Power:	3680W (Max), German & Belium Version 3120W (Max.), UK Version 2300W (Max.), Denmark & Swiss Version
Frequency:	50Hz
Description of the EUT:	Backup by Battery (1.5VDC x 2 Size LR 44 battery)

4 Summary of Test Standards

Test Standards	
EN55011: 2009 + A1: 2010	Industrial, Scientific and medical (ISM) radio-frequency equipment — Electromagnetic disturbance characteristics — Limits and methods of Measurement
EN61000-3-2: 2006 + A2: 2009	Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)
EN61000-3-3: 2008	Electromagnetic compatibility (EMC) — Part 3-3: Limits — Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection
EN 61326-1:2006	Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 1: General requirements

5 Summary of Test Results

Emission Tests				
EN55011				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
Radiated Emission	9-13	☒	☐	☐
Conducted Emission on AC	14-16	☒	☐	☐
EN61000-3-2				
Harmonic	17-19	☒	☐	☐
EN61000-3-3				
Flicker	20-21	☒	☐	☐

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Summary of Test Results

Immunity Tests				
EN61326-1				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
Electrostatic Discharge (IEC 61000-4-2)	23-24	☒	☐	☐
Radiated Immunity (IEC 61000-4-3)	25-26	☒	☐	☐
Electrical Fast Transient (IEC 61000-4-4)	27-28	☒	☐	☐
Surge (IEC 61000-4-5)	29-30	☒	☐	☐
Conducted Immunity (IEC 61000-4-6)	31-32	☒	☐	☐
Power Frequency Magnetic Field (IEC 61000-4-8)	NIL	☐	☐	☐
Voltage Dips and Interruption (IEC 61000-4-11)	33-34	☒	☐	☐

6 General Remarks

Remarks:

- EUT classify as a Group 1 Class B Equipment for EN 55011.
- Immunity tests were performed on basic immunity testing requirements.
- EMC tests were performed on German Version.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed
☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.
☐ - **Does not** fulfill the general approval requirements.

Sample Received Date:	25th October 2011
Testing Start Date:	27th October 2011
Testing End Date:	04th November 2011

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Reviewed by:

Cheng Kin Yeung
EMC Test Engineer

Prepared by:

Edmond FUNG
EMC Test Engineer

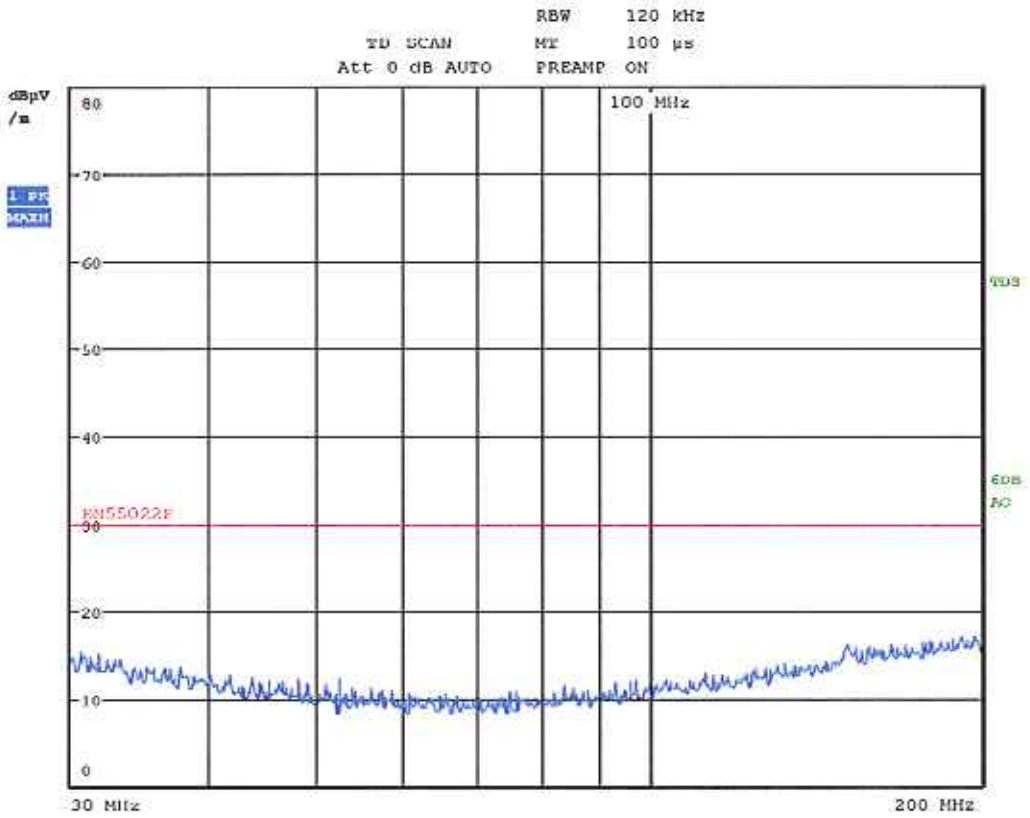
Hong Kong

7 Emission Test Results

7. 1Radiated Emission Test 30MHz – 200MHz

Date of test	:	27th October 2011
Test requirement	:	EN55011
Operating mode	:	On Mode
Antenna polarity	:	Horizontal
Remarks	:	NIL

Test Result
☒ Passed
☐ Not Passed



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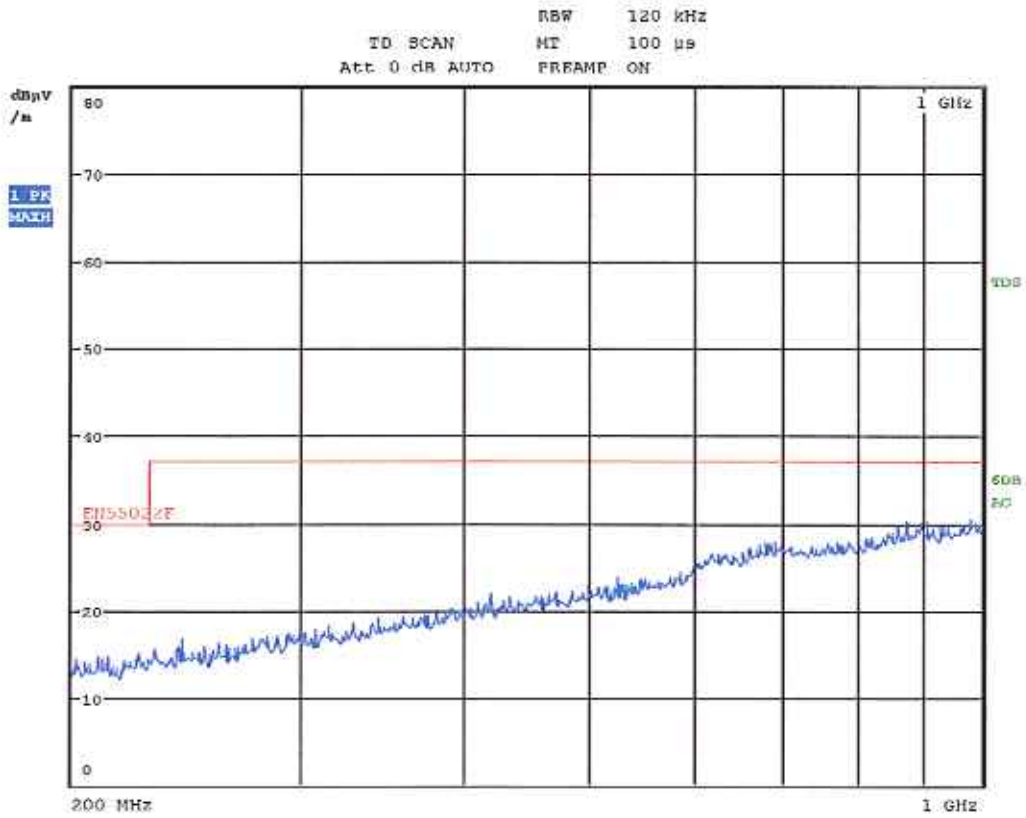
Radiated Emission Test 200MHz – 1000MHz

Date of test	:	27th October 2011
Test requirement	:	EN55011
Operating mode	:	On Mode
Antenna polarity	:	Horizontal
Remarks	:	NIL

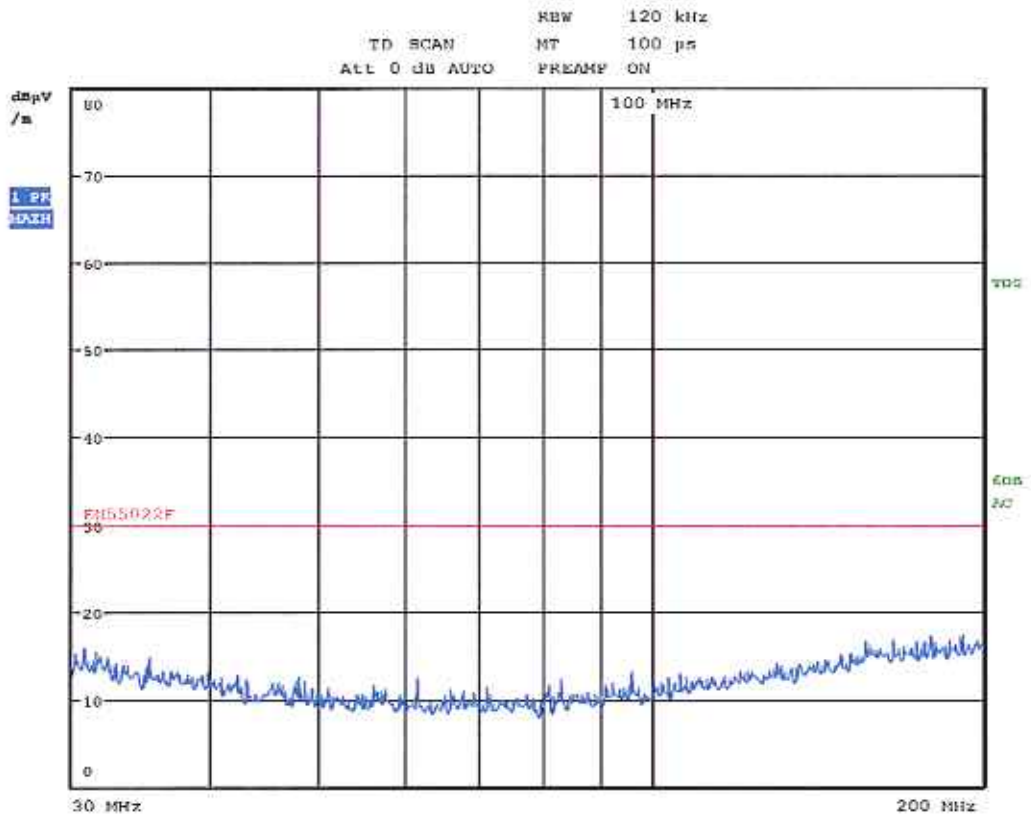
Test Result
☒ Passed
☐ Not Passed



Radiated Emission Test 30MHz – 200MHz

Date of test	:	27th October 2011
Test requirement	:	EN55011
Operating mode	:	On Mode
Antenna polarity	:	Vertical
Remarks	:	NIL

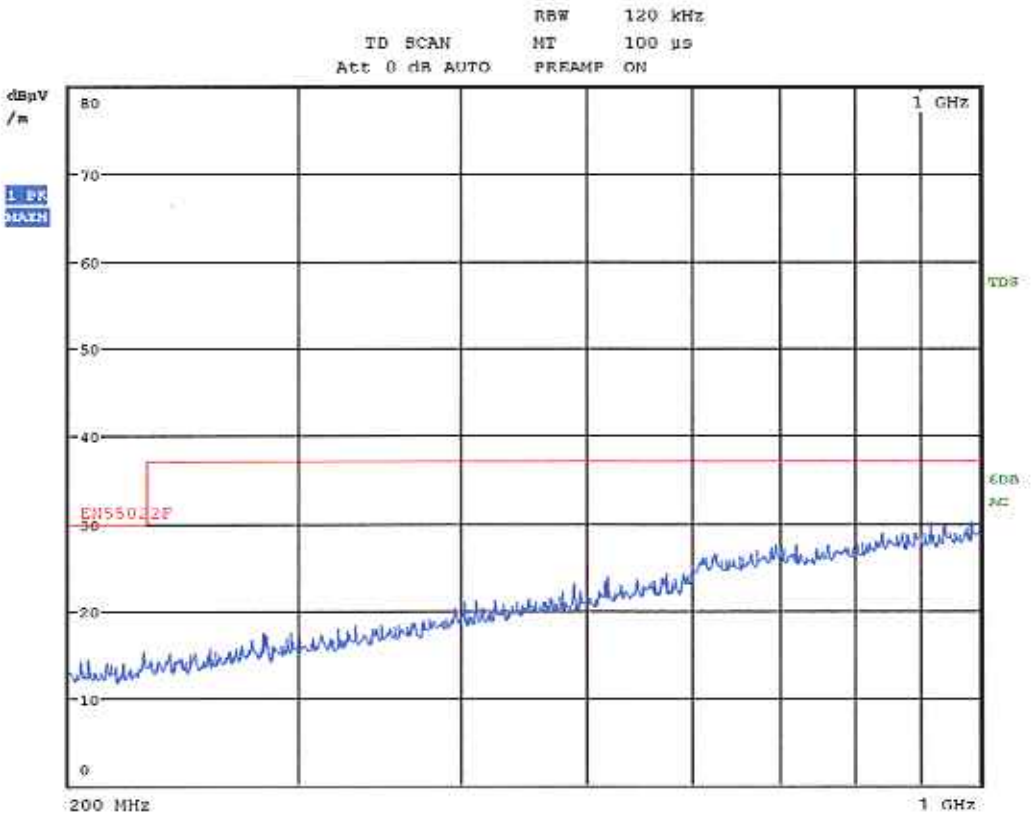
Test Result
☒ Passed
☐ Not Passed



Radiated Emission Test 200MHz – 1000MHz

Date of test	:	27th October 2011
Test requirement	:	EN55011
Operating mode	:	On Mode
Antenna polarity	:	Vertical
Remarks	:	NIL

Test Result
☒ Passed
☐ Not Passed



Test Equipment List

Radiated Emission Test

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
EMC209	Semi-anechoic Chamber	Frankonia	Nil	Nil	27-Feb-12
EMC582	Test Receiver	R & S	ESU8	100141	8-Sep-12
EMC577	Bi-conical Antenna	R & S	HK116	100242	22-May-12
EMC045	Log Periodic Antenna	R & S	HL223	841516/020	21-May-12
EMC406	Coaxial cable 50ohm	Rosenberger	RTK081-05S-05S-10m	LA2-001-10M / 002	15-May-12

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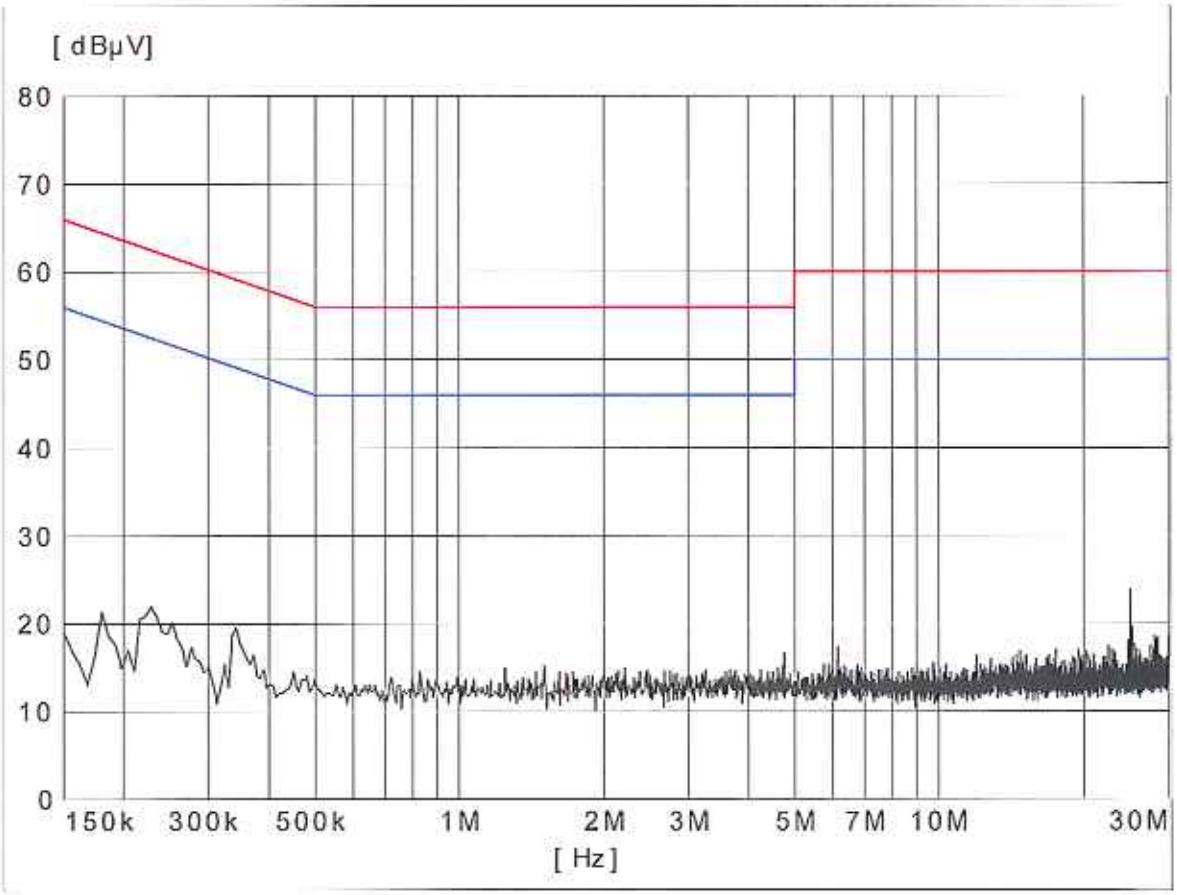
7.2 Conducted Emission Test 150kHz – 30MHz

Date of test	:	29th October 2011
Test requirement	:	EN55011
Operating mode	:	On Mode
Tested on	:	AC Mains - Live
Remarks	:	NIL

Test Result
☒ Passed
☐ Not Passed



Frequency (MHz)	Detector Type	Result (dBµV/m)	Limit (dBµV/m)	Remark
0.228	QP	14.2	62.54	NIL
0.228	AV	0.1	54.06	NIL

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Hong Kong

Conducted Emission Test 150kHz – 30MHz

Date of test : 29th October 2011

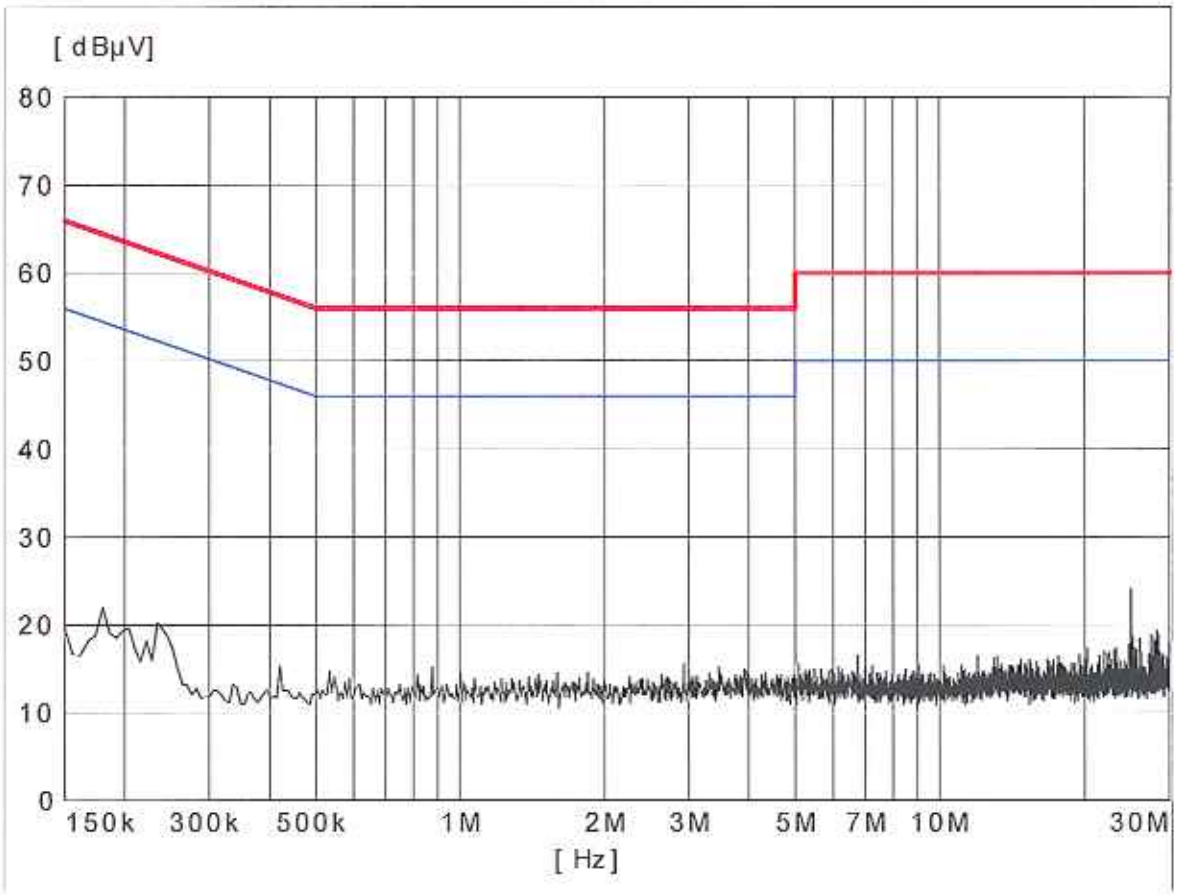
Test requirement : EN 55011

Operating mode : On Mode

Tested on : AC Mains - Neutral

Remarks : NIL

Test Result
☒ Passed
☐ Not Passed



Frequency (MHz)	Detector Type	Result (dBµV/m)	Limit (dBµV/m)	Remark
0.180	QP	15.4	64.49	NIL
0.180	AV	0.2	56.85	NIL

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Test Equipment List

Conducted Emission Test

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
EMC384	Test Receiver	R&S	ESHS30	847115/005	24-Aug-12
EMC160	RF Voltage Probe	Schwarzbeck	TK9416	None	13-Feb-12
EMC407	LISN	R&S	ESH3-Z5	849876/027	24-Aug-12
EMC426	Double Shield Cable	Radiall	RG142	Nil	5-Jun-12
EMC377	Pulse Limiter	R&S	ESH3-Z2	Nil	5-Jun-12

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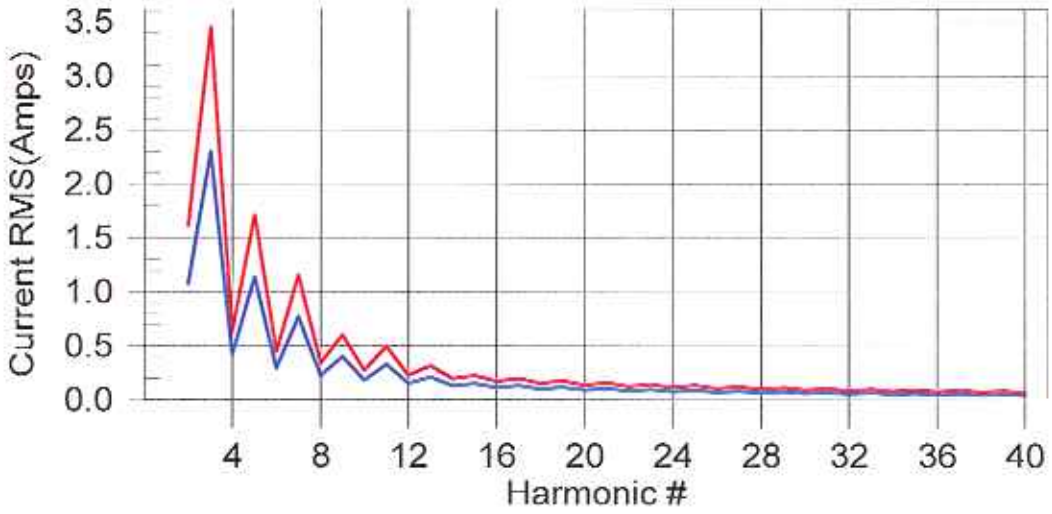
7.3 Harmonic Test

Date of test	:	30th October 2011
Test requirement	:	EN61000-3-2
Operating mode	:	On Mode
Equipment Class	:	Class A
Total Time:		2.5 min
Tested on	:	Power Line
Remarks	:	NIL

Test Result
☒ Passed
☐ Not Passed

Maximum Harmonic Current Results



Maximum Harmonic Current Results

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.000	1.080	0.0	0.001	1.620	0.05	Pass
3	0.008	2.300	0.4	0.008	3.450	0.24	Pass
4	0.000	0.430	0.0	0.000	0.645	0.06	Pass
5	0.006	1.140	0.5	0.006	1.710	0.35	Pass
6	0.000	0.300	0.0	0.000	0.450	0.04	Pass
7	0.000	0.770	0.0	0.001	1.155	0.06	Pass
8	0.000	0.230	0.0	0.000	0.345	0.02	Pass
9	0.000	0.400	0.0	0.001	0.600	0.14	Pass
10	0.000	0.184	0.0	0.000	0.276	0.03	Pass
11	0.000	0.330	0.0	0.000	0.495	0.09	Pass
12	0.000	0.153	0.0	0.000	0.230	0.04	Pass
13	0.000	0.210	0.0	0.000	0.315	0.12	Pass
14	0.000	0.131	0.0	0.000	0.197	0.03	Pass
15	0.000	0.150	0.0	0.000	0.225	0.09	Pass
16	0.000	0.115	0.0	0.000	0.173	0.03	Pass
17	0.000	0.132	0.0	0.000	0.199	0.07	Pass
18	0.000	0.102	0.0	0.000	0.153	0.03	Pass
19	0.000	0.118	0.0	0.000	0.178	0.06	Pass
20	0.000	0.092	0.0	0.000	0.138	0.03	Pass
21	0.000	0.107	0.0	0.000	0.161	0.04	Pass
22	0.000	0.084	0.0	0.000	0.125	0.04	Pass
23	0.000	0.098	0.0	0.000	0.147	0.07	Pass
24	0.000	0.077	0.0	0.000	0.115	0.04	Pass
25	0.000	0.090	0.0	0.000	0.135	0.05	Pass
26	0.000	0.071	0.0	0.000	0.106	0.04	Pass
27	0.000	0.083	0.0	0.000	0.125	0.05	Pass
28	0.000	0.066	0.0	0.000	0.099	0.08	Pass
29	0.000	0.078	0.0	0.000	0.116	0.06	Pass
30	0.000	0.061	0.0	0.000	0.092	0.05	Pass
31	0.000	0.073	0.0	0.000	0.109	0.05	Pass
32	0.000	0.058	0.0	0.000	0.086	0.08	Pass
33	0.000	0.068	0.0	0.000	0.102	0.05	Pass
34	0.000	0.054	0.0	0.000	0.081	0.07	Pass
35	0.000	0.064	0.0	0.000	0.096	0.05	Pass
36	0.000	0.051	0.0	0.000	0.077	0.06	Pass
37	0.000	0.061	0.0	0.000	0.091	0.05	Pass
38	0.000	0.048	0.0	0.000	0.073	0.10	Pass
39	0.000	0.058	0.0	0.000	0.087	0.08	Pass
40	0.000	0.046	0.0	0.000	0.069	0.10	Pass

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Test Equipment List

Harmonic Test

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
60-7/74-08-003	Signal Conditioning Unit	Schaffner	CCN 1000-1	72635	13-05-2012
60-7/68-08-004	AC Power Source	Schaffner	FS300	N/A	13-05-2012

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7.4 Flicker Test

Date of test	:	30th October 2011
Test requirement	:	EN61000-3-3
Operating mode	:	On Mode
Total time	:	10 min
Tested on	:	Power Line
Remarks	:	NIL

Test Result
☒ Passed
☐ Not Passed

Maximum Occurring Level

	Pst	dc(%)	dmax(%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading	0.064	0.00	0.00	0.0

Test Equipment List

Flicker Test

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
60-7/74-08-003	Signal Conditioning Unit	Schaffner	CCN 1000-1	72635	13-05-2012
60-7/68-08-004	AC Power Source	Schaffner	FS300	N/A	13-05-2012

8 Performance Criteria

A	During testing, normal performance within the specification limits. Example 1 If electronic equipment is required to work with high reliability, the EUT shall operate without any apparent degradation from the manufacturer's specification.
B	During testing, temporary degradation, or loss of function or performance which is self- recovering. Example 1 A data transfer is controlled / checked by parity check or by other means. In the case of malfunctioning, such as caused by a lightning strike, the data transfer will be repeated automatically. The reduced data transfer rate at this time is acceptable. Example 2 During testing, an analogue function value may deviate. After the test, the deviation vanishes. Example 3 In the case of a monitor used only for man-machine monitoring, it is acceptable that some degradation takes place for a short time, such as flashes during the burst application.
C	During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs. Example 1 In the case of an interruption in the mains longer than the specified buffer time, the power supply unit of the equipment is switched off. The switch-on may be automatic or carried out by the operator. Example 2 After a programmer interruption caused by a disturbance, the processor functions of the equipment stops at a defined position and is not left in a "crashed state". The operator's decision prompts may be necessary. Example 3 The test results in an opening of an over-current protection device that is replaced or reset by the operator.

9 Immunity Test Results

9.1 Electrostatic Discharge Test

Date of test	:	03rd November 2011
Test requirement	:	EN61326-1 (Table 1)
Operating mode	:	Operate with signal out mode
Performance criteria	:	B
Requirement	:	Contact discharge ± 4 kV Air discharge ± 4 kV
Ambient temperature	:	23 °C
Relative humidity	:	55 %
Atmospheric Pressure	:	102.3 kPa
Remarks	:	NIL

Test Result
☒ Passed
☐ Not Passed

Discharge method	Discharge voltage	Test points	Results	Remarks
Indirect contact	±2kV, ± 4kV	HCP Horizontal coupling plane	Passed	NIL
Indirect contact	±2kV, ± 4kV	VCP Vertical coupling plane	Passed	NIL
Direct contact	±2kV, ± 4kV	All accessible conductive parts of EUT	Passed	NIL
Air	±2kV, ± 4kV	All accessible non conductive parts of EUT	Passed	NIL

Note(s): Performance criteria B were met.
No Abnormality and malfunction was found during and after test.

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Test Equipment List

Electrostatic Discharge Test

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
EMC583	ESD Gun	Schaffner	NSG437	150	7-Sep-12
EMC154	Hygrometer / Thermometer	RS	212-124	None	26-Aug-12

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9.2 Radiated Immunity Test

Date of test	:	03rd November 2011	
Test requirement	:	EN61326-1 (Table 1)	
Operating mode	:	Operate with signal out mode	
Performance criterion	:	A	
Requirement	:	80-1000MHz	3 V/m
	:	1400-2000MHz	3 V/m
	:	2000-2700MHz	1 V/m
Interfering signal	:	Modulation type	AM
	:	Modulation depth	80 %
	:	Modulation frequency	1 kHz
Step size	:	1%	
Dwell time:	:	1 s	
Antenna polarization	:	☒ Horizontal	☒ Vertical
Ambient temperature	:	23 °C	
Relative humidity	:	55 %	
Atmospheric Pressure	:	102.3 kPa	
Remarks	:	NIL	

Test Result
☒ Passed
☐ Not Passed

Frequency (MHz)	Side	Field strength level (V/m)	Results	Remark
80-1000	0°, 90°, 180°, 270°	3	Passed	NIL
1400-2000	0°, 90°, 180°, 270°	3	Passed	NIL
2000-2700	0°, 90°, 180°, 270°	1	Passed	NIL
Note(s): Note(s): Performance criteria A were met. No Abnormality and malfunction was found during and after test.				

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Test Equipment List

Radiated Immunity Test

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
EMC219	Full Anechoic Chamber	Frankonia	Nil	Nil	11-Sep12
EMC286	Function Generator	HP	33120A	US36014729	26-Aug-12
EMC585	Signal Generator (For 80MHz-2GHz)	HP	8657B	3427U05369	24-Aug-12
EMC088	RF Amp (For 200MHz to 1000MHz)	Kalmus	757LC	7620-1	9-Jul-12
EMC089	RF Amp (For 80MHz to 200MHz)	Kalmus	122CC	7620-2	9-Jul-12
EMC566	RF Power Meter	Boonton	4232A	10997	26-Aug-12
EMC386	Isotropic Field Probe	Holaday	HI-4422	97422	26-Aug-12
EMC480	Bilog Antenna	Schaffner	CBL6141A	4130	Cal-in-use
EMC264	Signal Generator (For 2-2.7GHz)	HP	8665A	3546A00855	26-Aug-12
EMC561	Power Amplifier (For 1GHz to 2.7GHz)	MILMEGA	AS0102-30	1004110	Cal-in-use

9.3 Electrical Fast Transient Test

Test Result
☒ Passed
☐ Not Passed

Date of test	:	03rd November 2011
Test requirement	:	EN61326-1 (Table 1)
Operating mode	:	Operate with signal out mode
Performance criterion	:	B
Requirement	:	Signal and control line ± 0.5 kV
	:	AC mains inputs and outputs ± 1 kV
Interfering signal	:	Test pulse 5 ns / 50 ns
	:	Pulse frequency 5 kHz
		Burst duration 15 ms
	:	Repetition period 300 ms
Test time:	:	2 min
Ambient temperature	:	23 °C
Relative humidity	:	55 %
Atmospheric Pressure	:	102.3 kPa
Remarks	:	NIL

Coupling	Level / Polarity	Duration	Result	Remark
L - N - PE	± 1 kV	120	Passed	NIL
Note(s): Performance criteria B were met. No Abnormality and malfunction was found during and after test.				

Test Equipment List

Electrical Fast Transients Test

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
EMC 450	Burst Generator	Schaffner	BEST EMC	199826-011SC	9-Jul-12

9.4 Surges Test

Test Result
☒ Passed
☐ Not Passed

Date of test	:	03rd November 2011	
Test requirement	:	EN61326-1 (Table 1)	
Operating mode	:	Operate with signal out mode	
Performance criterion	:	B	
Requirement	:		
	:	AC mains inputs	± 0.5 kV L to N
		I/O Signal/Control	± 1.0 kV
Interfering signal	:	Test pulse	1.2 µs / 50 µs
	:	Repetition	60 s
		Phase Angle	0°, 90°, 180°, 270°
	:	No. of Surge	5 per voltage level
Ambient temperature	:	23 °C	
Relative humidity	:	55 %	
Atmospheric Pressure	:	102.3 kPa	
Remarks	:	NIL	

Coupling	Level / Polarity	Surge Interval	Result	Remark
L-N	± 0.5 kV	60 s	Passed	NIL
PE - N	± 1 kV	60 s	Passed	NIL
PE - L	± 1 kV	60 s	Passed	NIL
Note(s): Performance criteria B were met. No Abnormality and malfunction was found during and after test.				

Test Equipment List

Surges Test

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
EMC001	Surge Generator	Schaffner	NSG650	280	2-Nov-12
EMC081	Surge Generator	Schaffner	NSG2050	200	2-Nov-12
EMC002	Mains Coupling Network	Schaffner	CDN110	314	Nil

9.5 Conducted Immunity Test

Date of test	:	03rd November 2011	Test Result ☒ Passed ☐ Not Passed
Test requirement	:	EN61326-1 (Table 1)	
Operating mode	:	L to N	
Performance criterion	:	A	
Requirement	:	Frequency range 0.15 - 80MHz	
	:	Signal and control lines 3 Vrms	
	:	AC main inputs and outputs 3 Vrms	
Interfering signal	:	Modulation AM	
	:	Modulation depth 80 %	
	:	Modulation frequency 1 kHz	
Step size	:	1%	
Dwell time:	:	1 s	
Ambient temperature	:	23 °C	
Relative humidity	:	55 %	
Atmospheric Pressure	:	102.3 kPa	
Remarks	:	NIL	

Frequency (MHz)	Coupling	Level (Vrms)	Results	Remark
0.15 – 80	AC mains	3	Passed	NIL
Note(s): Performance criteria A were met. No Abnormality and malfunction was found during and after test.				

Test Equipment List

Conducted Immunity Test

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
EMC585	Signal Generator	HP	8657B	3427U05369	24-Aug-12
EMC088	RF Amp	Kalmus	757LC	7620-1	9-Jul-12
EMC089	RF Amp	Kalmus	122CC	7620-2	9-Jul-12
EMC073	RF Power Meter	Boonton	4232A	10997	26-Aug-12
EMC069	CDN	Fischer	4412-25	9602	Cal-in-use

9.6 Voltage Dips, Voltage Variations and Short Interruptions Test

Date of test	:	03rd November 2011
Test requirement	:	EN61326-1 (Table 1)
Operating mode	:	Charging mode
Performance criterion	:	B for 0% of U_T for 10ms C for other specifications

Test Result
☒ Passed
☐ Not Passed

Requirement :

	Test level in % UT	Duration(periods)
Interruptions % >95	0	250
Voltage dips % >95	0	1
Voltage dips % >95	0	0.5
Voltage dips % 30	70	25

Coupling to	:	AC mains inputs
Test parameters	:	Count 3 per angle Repetition 10 s Angle 0°, 180°
Ambient temperature	:	23 °C
Relative humidity	:	55 %
Atmospheric Pressure	:	102.3 kPa
Remarks	:	NIL

Test level in % U_T	Duration (periods)	Duration in ms	Results	Remark
0	250	5000	Passed	NIL
0	1	20	Passed	NIL
0	0.5	10	Passed	NIL
70	25	500	Passed	NIL

Note(s): Performance criteria B were met for 0% during half and 1 cycle.
Performance criteria C were met for 70% during 25/30 cycle and 0% during 250/300 cycle.
No Abnormality and malfunction was found after test.

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Test Equipment List

Voltage Dips and Interruptions Test

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
EMC006	Variable AC Voltage Source	Schaffner	NSG642	138	17-Nov-11
EMC007	Mains Dropout Simulator	Schaffner	NSG1003	180	17-Nov-11

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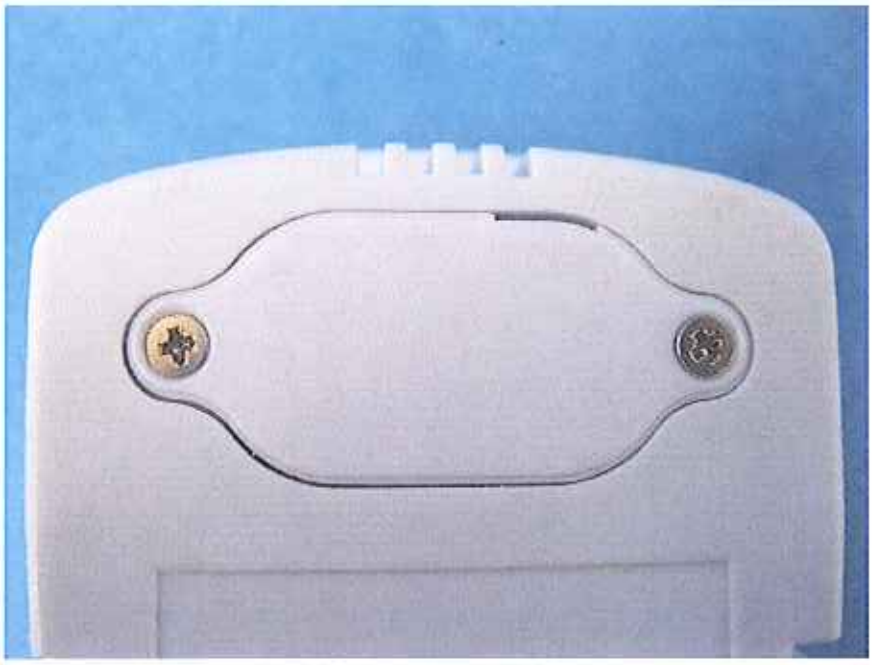
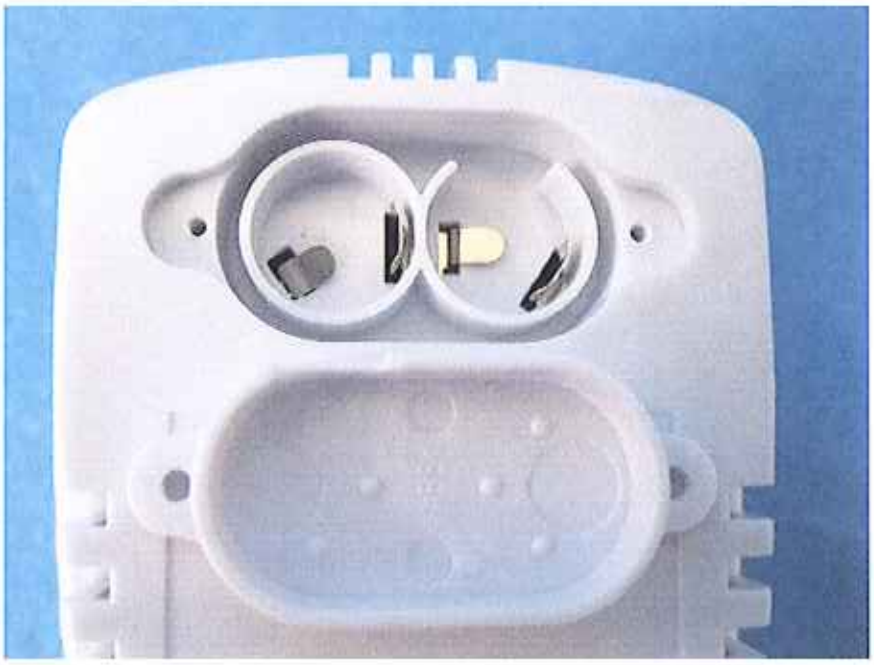
10. Appendix A

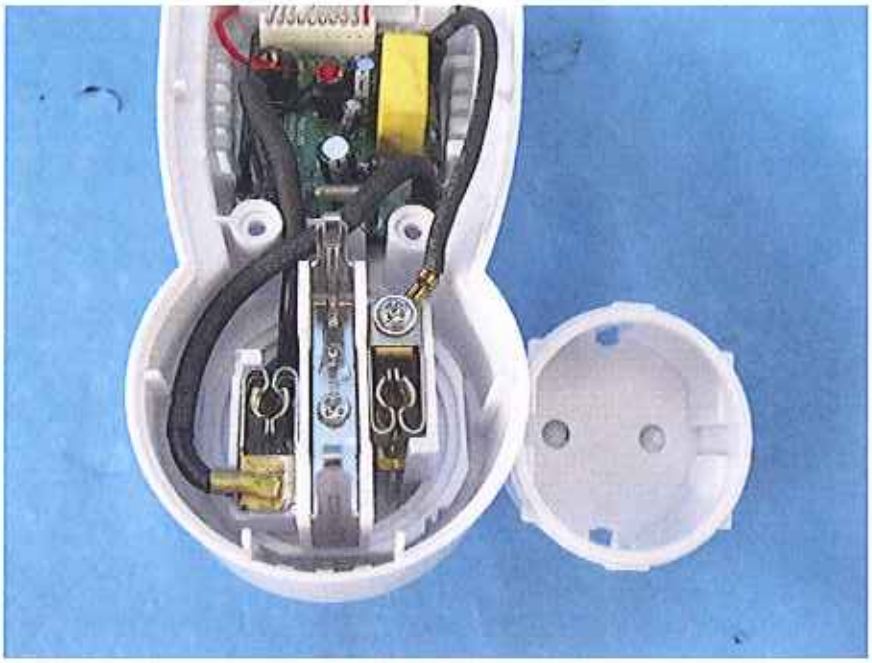
Appendix A

Appendix A

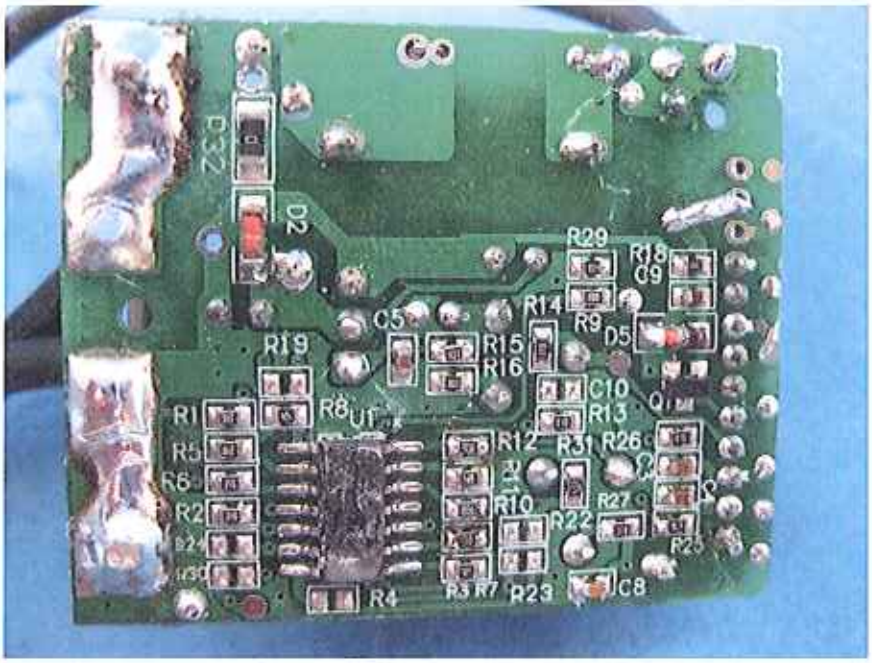


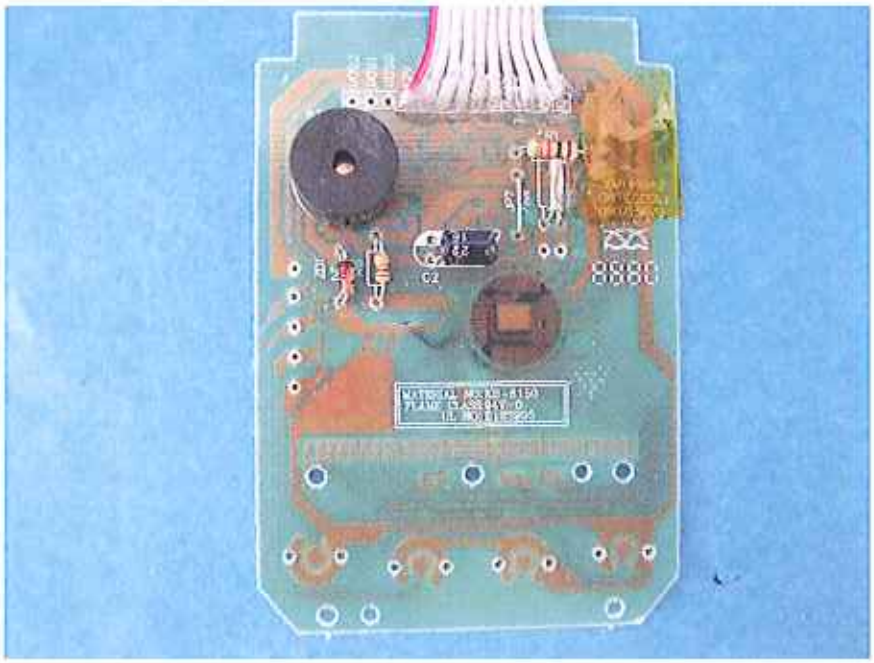


Appendix A

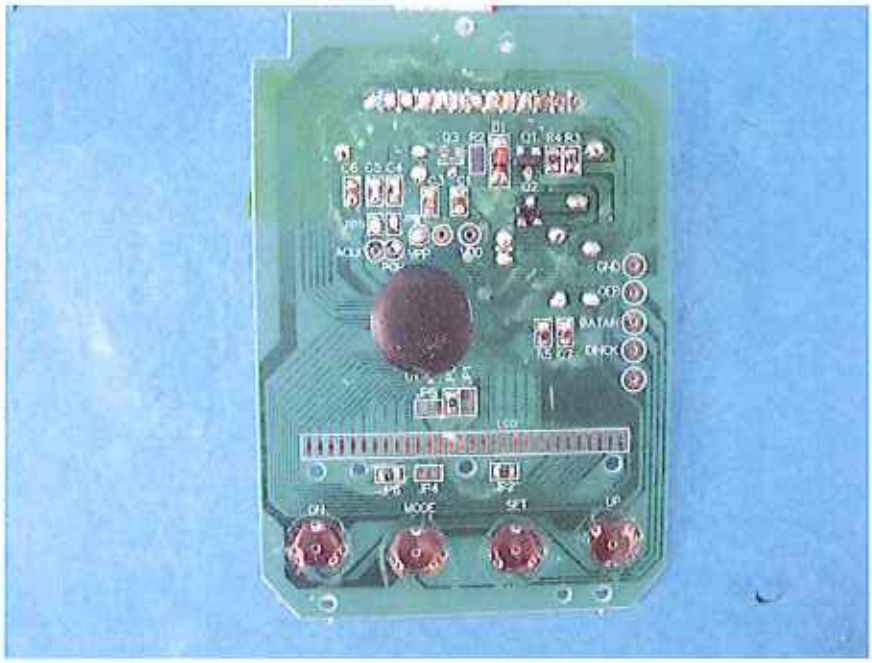


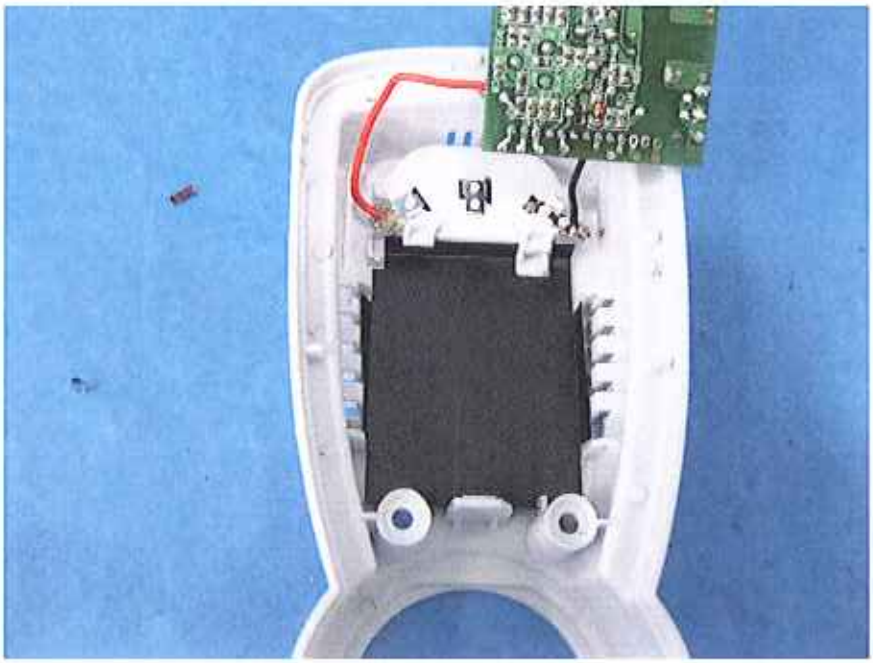
Appendix A


D32
D2
R29
R18
C9
R14
R9
D5
C5
R15
R16
R19
C10
R1
R8
U1
R13
R5
R12
R31
R26
R6
R10
R27
R2
R22
R25
R4
R3
R7
R23
C8


C2

Appendix A





11 Appendix B

TÜV SÜD Hong Kong
IEC - User Manual Team
2011.11.09 11:47:53 +08'00'

RATING LABEL DEM1499

GERMAN

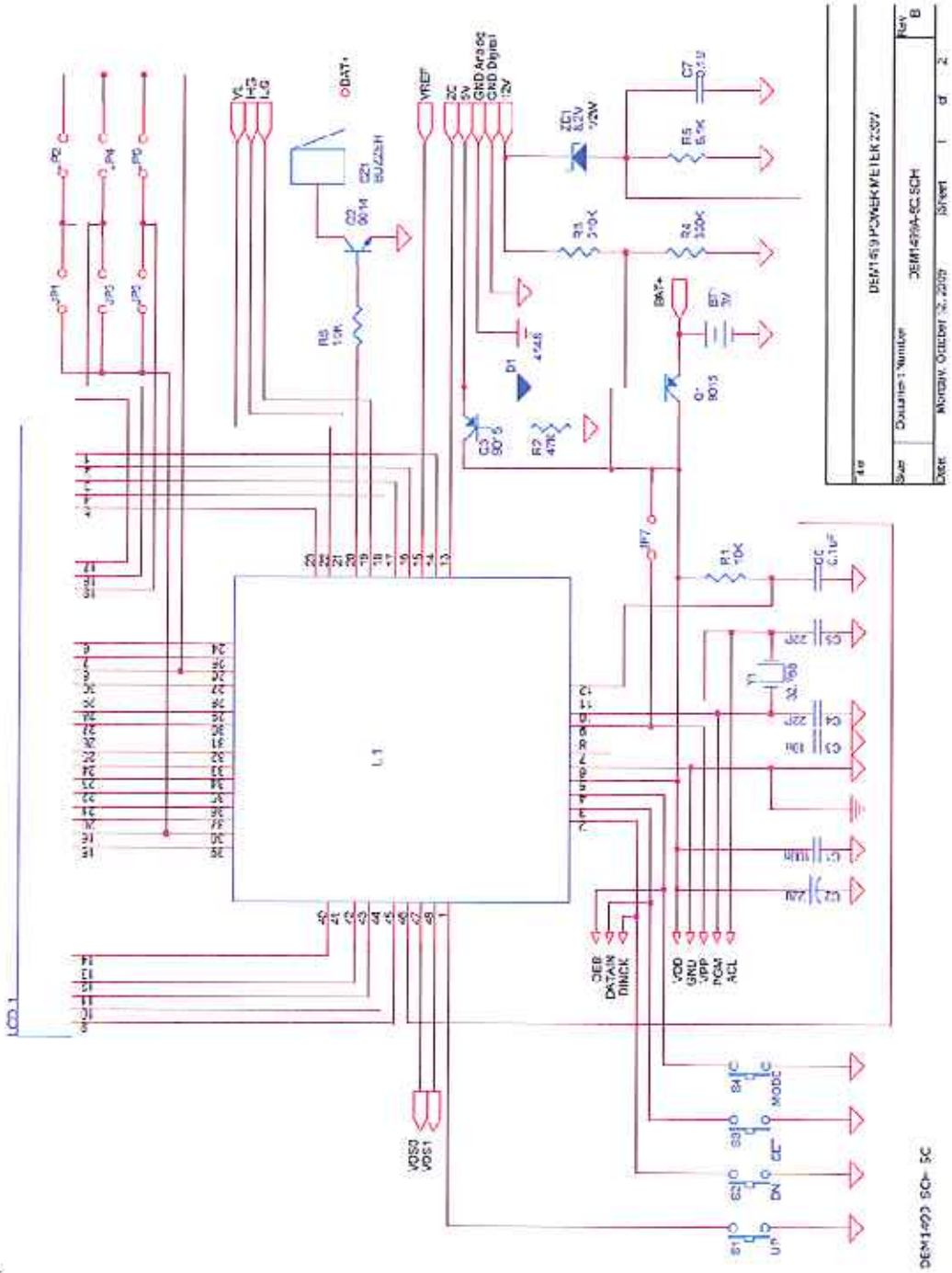
SCALE 1:1

Belgium

Denmark / Swiss

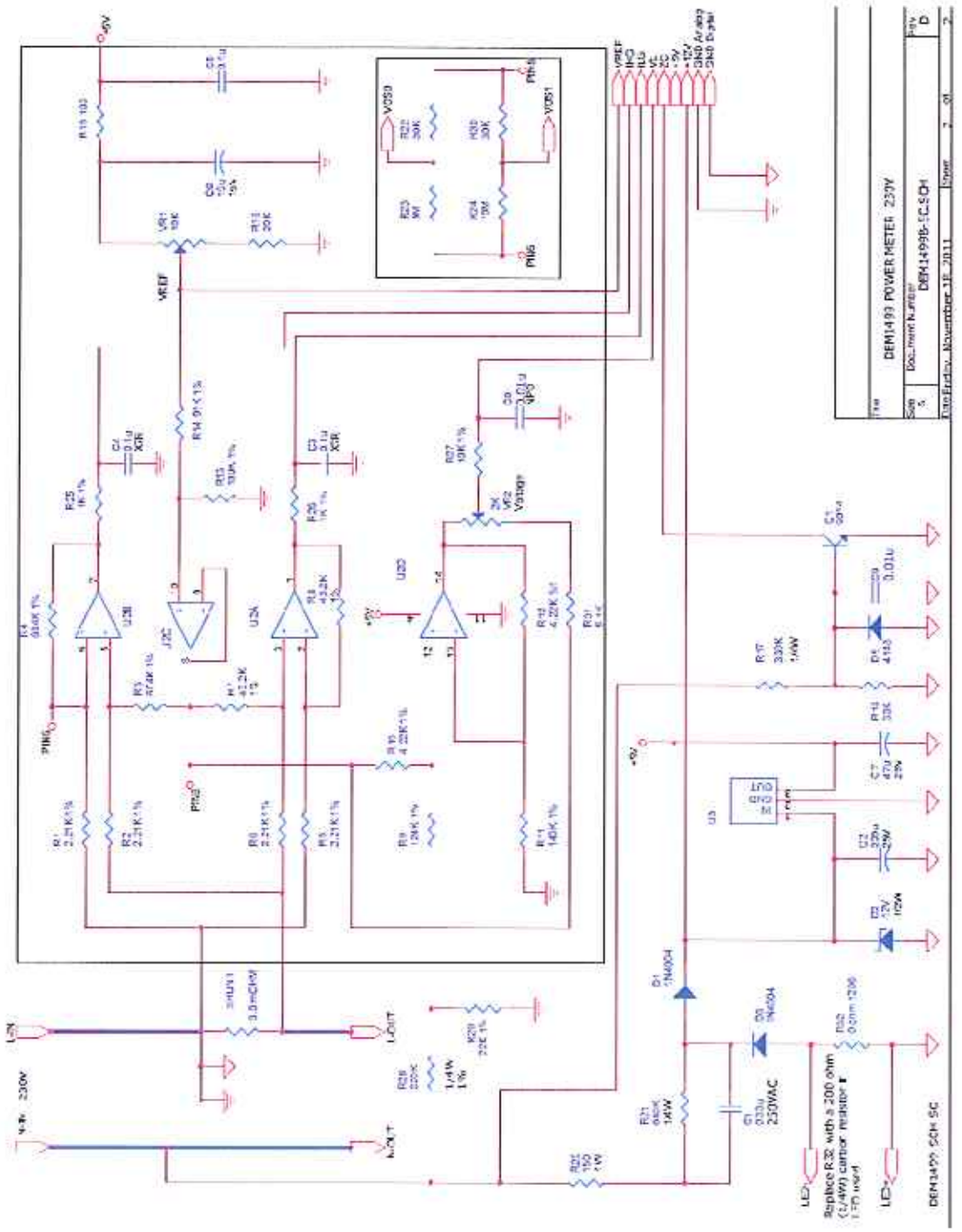
UK

12 Appendix C



3

Appendix C


DEM1493 POWER METER 230V
DEM1493-SCSCH
Replace R32 with a 200 ohm (1/4W) carbon resistor if
DEM1493 SCH SC

Appendix C