



B OCE EMC TEST REPORT

for

AC-DC Converter

Trade Name : **TRACO POWER**
Model Number : TMLM 05103; TMLM 05105;
TMLM 05112; TMLM 05115;
TMLM 05124
Serial Number : N/A
Report Number : T101026205-E-1
Date : November 19, 2010

Issued for

Traco Electronic AG
Jenatschstrasse 1 CH-8002 Zurich

Issued By:

Compliance Certification Services Inc.

Linkuo Laboratory

No. 81-1, Lane 210, Pa-De 2nd Rd., Luchu Hsiang,
Taoyuan Shien, (338), Taiwan, R.O.C.

TEL: 886-3-324-0332

FAX: 886-3-324-5235

E-Mail: service@ccsrf.com

Issued Date: November 19, 2010



Note: This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document. The client should not use it to claim product endorsement by TAF, A2LA, NIST or any government agencies. The test results in the report only apply to the tested sample.



EC-Declaration of Conformity

For the following equipment:

AC-DC Converter

(Product Name)

TMLM 05103; TMLM 05105; TMLM 05112; TMLM 05115; TMLM 05124 /

Traco Power

**TRACO
POWER**

(Model Designation / Trade name)

(Manufacturer Name)

(Manufacturer Address)

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility Directive (89/336/EEC, Amended by 92/31/EEC, 93/68/EEC & 98/13/EC), For the evaluation regarding the Electromagnetic Compatibility (89/336/EEC, Amended by 92/31/EEC, 93/68/EEC & 98/13/EC), the following standards are applied:

☒ EN 55022: 1998

☒ EN 61000-3-2: 1995+A1: 1998+A2: 1998 + A14: 2000

☒ EN 61000-3-3: 1995

☒ EN 55024: 1998

IEC 61000-4-2: 1995 + A2: 2000; IEC 61000-4-3: 1995; IEC 61000-4-4: 1995;

IEC 61000-4-5: 1995; IEC 61000-4-6: 1996; IEC 61000-4-11: 1994

The following manufacturer / importer or authorized representative established within the EUT is responsible for this declaration:

(Company Name)

(Company Address)

Person responsible for making this declaration:

(Name, Surname)

(Position / Title)

(Place)

(Date)

(Legal Signature)



TABLE OF CONTENTS

DESCRIPTION	PAGE
VERIFICATION OF COMPLIANCE	5
GENERAL INFORMATION	6
SYSTRM DESCRIPTION	7
PRODUCT INFORMATION	8
SUPPORT EQUIPMENT	9
TEST FACILITY	10
TEST EQUIPMENT	11
SECTION 1 EN 55022(LINE CONDUCTED & RADIATED EMISSION)	13
MEASUREMENT PROCEDURE & LIMIT (LINE CONDUCTED EMISSION TEST)	13
MEASUREMENT PROCEDURE & LIMIT (RADIATED EMISSION TEST)	15
BLOCK DIAGRAM OF TEST SETUP	18
SUMMARY DATA	19
SECTION 2 EN61000-3-2 & EN 61000-3-3 (Power HARMONICS & VOLTAGE FLUCTUATION/FLICKER)	22
BLOCK DIAGRAM OF TEST SETUP	22
RESULT	22
SECTION 3 IEC 61000-4-2 (ELECTROSTATIC DISCHARGE)	28
BLOCK DIAGRAM OF TEST SETUP	28
TEST PROCEDURE	29
PERFORMANCE & RESULT	29
ESD TESTED POINT TO EUT	30
SECTION 4 IEC 61000-4-3 (RADIATED ELECTROM AGNETIC FIELD)	31
BLOCK DIAGRAM OF TEST SETUP	31
TEST PROCEDURE	32
PERFORMANCE & RESULT	33



DESCRIPTION	PAGE
SECTION 5 IEC 61000-4-4 (FAST TRANSIENTS/BURST)	34
BLOCK DIAGRAM OF TEST SETUP	34
TEST PROCEDURE	35
PERFORMANCE & RESULT	35
SECTION 6 IEC 61000-4-5 (SURGE IMMUNITY)	36
BLOCK DIAGRAM OF TEST SETUP	36
TEST PROCEDURE	37
PERFORMANCE & RESULT	37
SECTION 7 IEC 61000-4-6 (CONDUCTED DISTURBANCE, INDUCED BY RADIO-FREQUENCY FIELDS)	38
BLOCK DIAGRAM OF TEST SETUP	38
TEST PROCEDURE	39
PERFORMANCE & RESULT	39
SECTION 8 IEC 61000-4-8 (AC-DC CONVERTER REQUENCY MAGNETIC FIELD)	40
SECTION 9 IEC 61000-4-11 (VOLTAGE DIP/INTERRUPTION)	41
BLOCK DIAGRAM OF TEST SETUP	41
TEST PROCEDURE	42
PERFORMANCE & RESULT	42
APPENDIX 1 PHOTOGRAPHS OF TEST SETUP	43
EN 55022 TEST EN 61000-3-2 TEST EN 61000-3-3 TEST IEC 61000-4-2 TEST IEC 61000-4-3 TEST IEC 61000-4-4 TEST IEC 61000-4-5 TEST IEC 61000-4-6 TEST IEC 61000-4-11 TEST	
APPENDIX 2 PHOTOGRAPHS OF EUT	53



VERIFICATION OF COMPLIANCE

Equipment Under Test: AC-DC Converter

Trade Name:

Traco Power **TRACO[®]
POWER**

Model Number:

TMLM 05103; TMLM 05105; TMLM 05112;
TMLM 05115; TMLM 05124;

Serial Number:

N/A

Applicant:

Traco Electronic AG
Jenatschstrasse 1 CH-8002 Zurich

Type of Test:

EMC Directive 89/336/EEC, Amended by 92/31/EEC,
93/68/EEC & 98/13/EC for CE Marking

Technical Standards:

EN 55022: 1998
EN 61000-3-2:1995+A1: 1998+A2: 1998 + A14: 2000
EN 61000-3-3:1995
EN 55024: 1998:
(IEC 61000-4-2: 1995 + A2: 2000; IEC 61000-4-3: 1995;
IEC 61000-4-4: 1995; IEC 61000-4-5: 1995; IEC 61000-4-6:
1996;
IEC 61000-4-11: 1994)

File Number:

011180-E

Date of test:

December 18 ~ 21, 2001

Deviation:

N/A

Condition of Test

Sample:

Normal

The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements set forth in EMC Directive 89/336/EEC, Amended by 92/31/EEC, 93/68/EEC & 98/13/EC and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Ethan Huang
Section Manager

Reviewed by:

Stan Lin
Supervisor



GENERAL INFORMATION

Applicant: Traco Electronic AG
Jenatschstrasse 1 CH-8002 Zurich

Contact Person: Vicky Ro

File Number: T101026205-E-1

Date of Test: December 18 ~ 21, 2001

Equipment Under Test: AC-DC Converter

Model Number: TMLM 05103; TMLM 05105; TMLM 05112;
TMLM 05115; TMLM 05124;

Serial Number: N/A

Type of Test: EMC Directive 89/336/EEC, Amended by 92/31/EEC,
93/68/EEC & 98/13/EC for CE Marking

Technical Standards: EN 55022: 1998
EN 61000-3-2:1995+A1: 1998+A2: 1998 + A14: 2000
EN 61000-3-3:1995
EN 55024: 1998:
(IEC 61000-4-2: 1995 + A2: 2000; IEC 61000-4-3: 1995;
IEC 61000-4-4: 1995; IEC 61000-4-5: 1995;
IEC 61000-4-6: 1996; IEC 61000-4-11: 1994)

**Frequency Range
(EN 55022):** 150kHz to 30MHz for Line Conducted Test
30MHz to 1000MHz for Radiated Emission Test

Test Site **Compliance Certification Services Inc.**
No. 81-1, Lane 210, Pa-De 2nd Rd., Luchu Hsiang,
Taoyuan Shien, (338), Taiwan, R.O.C.



SYSTEM DESCRIPTION

EUT Test Procedure:

1. The EUT was connected with a resistive dummy load (customer supply) by full load, during the tests.



PRODUCT INFORMATION

Housing Type:	N/A
EUT Power Rating:	I/P: 90-260VAC; 60/50Hz O/P: See Table 1
AC Power during test:	230VAC/50Hz
AC Power Cord Type:	Unshielded, 1.5m (Detachable)

Table 1:

Model Number	Output Voltage (V.DC)	Output Current (A) Max.
TMLM 05103	3.3	0.125
TMLM 05105	5	1.0
TMLM 05112	12	0.42
TMLM 05115	15	0.333
TMLM 05124	24	0.23



SUPPORT EQUIPMENT

No.	Equipment	Model #	Serial #	FCC ID	Trade Name	Data Cable	Power Cord
1	Resistor Load	N/A	N/A	N/A	N/A	N/A	N/A
2	Multi-meter (Immunity Test only)	DH-505L	N/A	N/A	DHA	Unshielded, 0.7m	N/A

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.



TEST FACILITY

- Location:** No. 81-1, Lane 210, Pa-De 2nd Rd., Luchu Hsiang, Taoyuan, Taiwan, R. O. C.
- Description:** There are four 3/10m open area test sites and three line conducted labs for final test.
The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 22/EN 55022 requirements.
- Site Filing:** A site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.

Registration also was made with Voluntary Control Council for Interference (VCCI).
- Site Accreditation:** Accredited by NEMKO (Authorization #: ELA 124) for EMC & A2LA (Certificate #: 824.01) for Emission

Also accredited by BSMI for the product category of Information Technology Equipment.
- Instrument Tolerance:** All measuring equipment is in accord with ANSI C63.4 and CISPR 22 requirements that meet industry regulatory agency and accreditation agency requirement.

Ground Plane: Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.

Site # 3 & # 4 Line Conducted Test Site: At Shielding Room



TEST EQUIPMENT LIST

Instrumentation: The following list contains equipment used at Compliance Certification Services Inc. for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2-1988 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 9kHz to 1.0 / 2.0 GHz.

Equipment used during the tests:

Open Area Test Site: # 1

Open Area Test Site # 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
Q.P Adaptor	HP	85650A	2811A01399	19/06/2001	18/06/2002
RF Pre-selector	HP	85685A	2947A01064	19/06/2001	18/06/2002
Spectrum Analyzer	HP	8568B	3001A05004	19/06/2001	18/06/2002
S.P.A Display	HP	8568B	3014A18846	19/06/2001	18/06/2002
Precision Dipole	SCHWAZBEC K	VHAP	998/999	05/17/2001	05/16/2002
Precision Dipole	SCHWAZBEC K	UHAP	981/982	05/17/2001	05/16/2002
Bilog Antenna	CHASE	CBL6112A	2309	02/11/2001	02/10/2002
Turn Table	EMCO	2081-1.21	N/A	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2604	N.C.R	N.C.R
Controller	EMCO	2090	N/A	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M54367	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	11/03/2001	11/02/2002
Spectrum Analyzer	ADVANTEST	R3261A	21070279	08/16/2001	08/15/2002

Conducted Emission Test Site: # 4

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
EMI Test Receiver	R&S	ESCS30	845552/030	12/12/2001	12/11/2002
LISN	R&S	ESH2-Z5	848773/014	10/27/2001	10/26/2002
LISN	EMCO	3825/2	9003/1382	02/08/2001	02/07/2002

The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

**TEST EQUIPMENT LIST**

Power Harmonic & Voltage Fluctuation/Flicker Measurement (61000-3-2&-3-3)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Harmonic & Flicker Tester	HAEFELY TRENCH	PHF555	080 419-25	10/12/2001	10/11/2002
ESD test (61000-4-2)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
ESD Generator	HAEFELY TRENCH	PESD 1600	H710203	09/01/2001	08/31/2002
Radiated Electromagnetic Field immunity Measurement (61000-4-3)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Signal Generator	Maconi	2022D	119246/003	08/20/2001	08/19/2002
Power Amplifier	M2S	A00181/ 1000	9801-112	N/A	N/A
Power Amplifier	M2S	AC8113/ 800-250A	9801-179	N/A	N/A
Power Antenna	EMCO	93141	9712-1083	N/A	N/A
EM PROBE	GW	EMR-30	L-0013	03/13/2001	03/12/2002
Fast Transients/Burst test (61000-4-4)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Fast Transients/Burst Generator	HAEFELY TRENCH	PEFT-JUNIOR	583 333-117	08/21/2001	08/20/2002
Clamp	HAEFELY TRENCH	093 506.1	080 421.13	N/A	N/A
Surge Immunity test (61000-4-5)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Surge Tester	HAEFELY TRENCH	PSUGER 4010	583 334-71	09/01/2001	08/31/2002
CDN	HAEFELY TRENCH	IP6.2	148342	03/22/2001	03/21/2002
CDN	HAEFELY TRENCH	DEC1A	148050	01/17/2001	01/16/2002
CS test (61000-4-6)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Signal Generator	Maconi	2022D	119246/003	08/20/2001	08/19/2002
CDN	MEB	M3	3683	09/14/2001	09/13/2002
CDN	Lüthi	801-M3	1879	03/05/2001	03/04/2002
CDN	MEB	M2	A3002010	04/17/2001	04/16/2002
Power Amplifier	M2S	A00181/ 1000	9801-112	N/A	N/A
Clamp	MEB	KEMZ-801	13 602	N/A	N/A
Voltage Dips/Short Interruption and Voltage Variation Immunity test (61000-4-11)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Dips/Interruption and Variations Simulator	HAEFELY TRENCH	PLINE 1610	080 344-05	02/08/2001	02/07/2002



SECTION 1 EN 55022 (LINE CONDUCTED & RADIATED EMISSION)

MEASUREMENT PROCEDURE (PRELIMINARY LINE CONDUCTED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- 4) The EUT received AC power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5) All support equipment received power from a second LISN supplying power of 110VAC/60Hz, if any.
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test model(s) were scanned during the preliminary test:

Model(s):

1. **Output TMLM 05103 (Full Load)**
 2. **Output TMLM 05105 (Full Load)**
 3. **Output TMLM 05112 (Full Load)**
 4. **Output TMLM 05115 (Full Load)**
 5. **Output TMLM 05124 (Full Load)**
- 10) After the preliminary scan, we found the following test mode producing the highest emission level.

Model: 5.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.



MEASUREMENT PROCEDURE (FINAL LINE CONDUCTED EMISSION TEST)

- 1) EUT and support equipment was set up on the test bench as per step 10 of the preliminary test.
- 2) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Q.P. mode, then the emission signal was re-checked using an A.V. detector.
- 3) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

Freq. MHz	Q.P. Raw dBuV	Average Raw dBuV	Q.P. Limit dBuV	Average Limit dBuV	Q.P. Margin dB	Average Margin dB	Note
x.xx	43.95	---	56	46	-12.05	---	L1

Freq.	= Emission frequency in MHz
Raw dBuV	= Uncorrected Analyzer / Receiver reading
Limit dBuV	= Limit stated in standard
Margin dB	= Reading in reference to limit
Note	= Current carrying line of reading
“---”	= The emission level complied with the Average limits, with at least 2dB margin limits, so no further recheck.

LINE CONDUCTED EMISSION LIMIT (EN 55022)

Frequency	Maximum RF Line Voltage	
	Q.P.	AVERAGE
150kHz-500kHz	66-56dBuV	56-46dBuV
500kHz-5MHz	56dBuV	46dBuV
5MHz-30MHz	60dBuV	50dBuV

Note: The lower limit shall apply at the transition frequency.



MEASUREMENT PROCEDURE (PRELIMINARY RADIATED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- 4) The EUT received AC power source from the outlet socket under the turntable. All support equipment received 110VAC/60Hz power from another socket under the turntable, if any.
- 5) The antenna was placed at 10 meter away from the EUT as stated in EN 55022. The antenna connected to the analyzer via a cable and at times a pre-amplifier would be used.
- 6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 7) The following test model(s) were scanned during the preliminary test:

Model(s):

1. Output TMLM 05103 (Full Load)
2. Output TMLM 05105 (Full Load)
3. Output TMLM 05112 (Full Load)
4. Output TMLM 05115 (Full Load)
5. Output TMLM 05124 (Full Load)

- 8) After the preliminary scan, we found the following test model producing the highest emission level.

Model: 2.

Then, the EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for final testing.



MEASUREMENT PROCEDURE (FINAL RADIATED EMISSION TEST)

- 1) EUT and support equipment were set up on the turntable as per step 8 of the preliminary test.
- 2) The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 3) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- 4) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
xx.xx	14.0	11.2	26.2	30	-3.8

Freq.	= Emission frequency in MHz
Raw Data (dBuV/m)	= Uncorrected Analyzer / Receiver reading
Corr. Factor (dB)	= Correction factors of antenna factor and cable loss
Emiss. Level	= Raw reading converted to dBuV and CF added
Limit dBuV/m	= Limit stated in standard
Margin dB	= Reading in reference to limit



RADIATED EMISSION LIMIT

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBu V/m/ Q.P.)
30-230	10	30
230-1000	10	37

Note: The lower limit shall apply at the transition frequency.



BLOCK DIAGRAM OF TEST SETUP

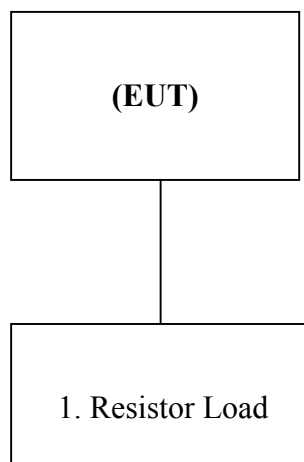
System Diagram of Connections between EUT and Simulators

EUT: AC-DC Converter

Trade Name: **TRACO[®]
POWER**

Model Number: TMLM 05105; TMLM 05124;

AC Power Cord: Unshielded, 1.5m





SUMMARY DATA

(LINE CONDUCTED TEST)

Model Number: TMLM 05124**Location:** Site # 4**Tested by:** Markba Lee**Test Model:** Model 5**Test Results:** Passed**Temperature:** 18°C**Humidity:** 70%RH

(The chart below shows the highest readings taken from the final data)

FREQ MHz	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.204	55.20	43.1	63.45	53.45	-8.3	-10.35	L1
2.124	45.10	41.7	56.00	46.00	-10.9	-4.30	L1
2.528	44.50	41.3	56.00	46.00	-11.5	-4.70	L1
4.470	39.80	---	56.00	46.00	-16.2	---	L1
5.990	34.80	---	60.00	50.00	-25.2	---	L1
7.010	33.80	---	60.00	50.00	-26.2	---	L1
0.204	57.10	44.2	63.45	53.45	-6.4	-9.25	L2
2.128	44.90	41.4	56.00	46.00	-11.1	-4.60	L2
2.741	42.30	---	56.00	46.00	-13.7	---	L2
4.270	39.80	---	56.00	46.00	-16.2	---	L2
6.090	36.80	---	60.00	50.00	-23.2	---	L2
7.120	34.00	---	60.00	50.00	-26.0	---	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

****NOTE:** “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.



SUMMARY DATA (RADIATED EMISSION TEST)

Model Number: TMLM 05105

Location: Site # 1

Tested by: Markba Lee

Polar: Vertical – 10m

Test Mode: Model 2

Detector Function: Quasi-Peak

Test Results: Passed

Temperature: 18°C

Humidity: 66%RH

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
49.44	12.1	9.8	21.9	30.0	-8.1
114.89	8.2	13.2	21.4	30.0	-8.6
135.93	15.6	12.1	27.7	30.0	-2.3
171.20	15.2	11.2	26.4	30.0	-3.6
188.98	14.4	11.0	25.4	30.0	-4.6
194.40	16.3	10.9	27.2	30.0	-2.8



SUMMARY DATA (RADIATED EMISSION TEST)

Model Number: TMLM 05105

Location: Site # 1

Tested by: Markba Lee

Test Mode: Model 2

Polar: Horizontal -- 10m

Detector Function: Quasi-Peak

Test Results: Passed

Temperature: 18°C

Humidity: 66%RH

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
134.06	7.6	12.3	19.9	30.0	-10.1
140.52	5.0	11.8	16.8	30.0	-13.2
167.99	9.0	11.2	20.2	30.0	-9.8
188.99	12.1	11.0	23.1	30.0	-6.9
197.87	11.6	10.9	22.5	30.0	-7.5
219.51	4.7	11.4	16.1	30.0	-13.9



SECTION 2 EN 61000-3-2 & EN 61000-3-3 (POWER HARMONICS & VOLTAGE FLUCTUATION/FLICKER)

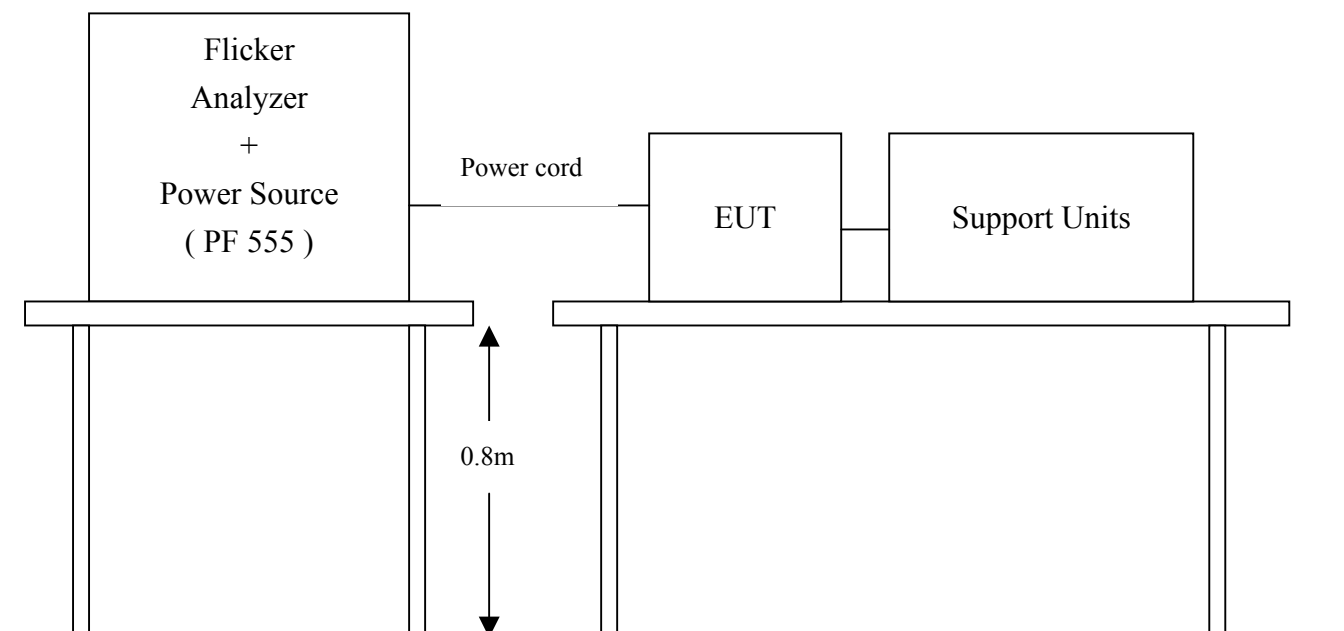
POWER HARMONICS MEASUREMENT

Port : AC mains
Basic Standard : EN 61000-3-2 (1995 + A1: 1998 + A2: 1998 + A14: 2000)
Limits : ☒ CLASS A ; ☐ CLASS D
Tester : Markba Lee
Temperature : 18°C
Humidity : 66%
Test Model : Model 2

VOLTAGE FLUCTUATION/FLICKER MEASUREMENT

Port : AC mains
Basic Standard : EN 61000-3-3 (1995)
Limits : §5 of EN 61000-3-3
Tester : Markba Lee
Temperature : 18°C
Humidity : 66%
Test Model : Model 2

Block Diagram of Test Setup:



Result:

Please see the attached test data.



Test Model: Model 2

EN 61000-3-2 TEST REPORT 2001/12/18 10:11 AM

Unit: AC-DC CONVERTER

Model No.: TMLM 05105

Remarks: Temp:18°C Hum:66%

Operator: Markba Lee

=====

TEST SETUP

Test Freq.: 50.00 Hz. Test Voltage: 230.0 vac
Waveform : SINE Test Time: 2.5 min.
Classification : CLASS A Test Type: STEADY-STATE

Prog. Zo Enabled: YES Prog. Zo: 0.000

Motor Driven with Phase Angle Control: NO
Impedance selected: DIRECT

Synthetic R+L Enabled: NO
Resistance: 0.380 Ohms Inductance: 460.000 uH

Max Watts:10.6W



TEST DATA

Result: PASS

Harmonic Current Results

Hn	AMPS	LO Limit	HI Limit	Result
0	0.000	0.000	0.000	PASS
1	0.042	NaN	NaN	PASS
2	0.001	1.080	1.080	PASS
3	0.025	2.300	2.300	PASS
4	0.000	0.430	0.430	PASS
5	0.021	1.140	1.140	PASS
6	0.000	0.300	0.300	PASS
7	0.020	0.770	0.770	PASS
8	0.000	0.230	0.230	PASS
9	0.017	0.400	0.400	PASS
10	0.000	0.184	0.184	PASS
11	0.015	0.330	0.330	PASS
12	0.000	0.153	0.153	PASS
13	0.013	0.210	0.210	PASS
14	0.000	0.131	0.131	PASS
15	0.011	0.150	0.150	PASS
16	0.000	0.115	0.115	PASS
17	0.009	0.132	0.132	PASS
18	0.000	0.102	0.102	PASS
19	0.008	0.118	0.118	PASS
20	0.000	0.092	0.092	PASS



21	0.007	0.107	0.107	PASS
22	0.000	0.084	0.084	PASS
23	0.006	0.098	0.098	PASS
24	0.000	0.077	0.077	PASS
25	0.006	0.090	0.090	PASS
26	0.000	0.071	0.071	PASS
27	0.006	0.083	0.083	PASS
28	0.000	0.066	0.066	PASS
29	0.006	0.078	0.078	PASS
30	0.000	0.061	0.061	PASS
31	0.006	0.073	0.073	PASS
32	0.000	0.058	0.058	PASS
33	0.006	0.068	0.068	PASS
34	0.000	0.054	0.054	PASS
35	0.006	0.064	0.064	PASS
36	0.000	0.051	0.051	PASS
37	0.005	0.061	0.061	PASS
38	0.000	0.048	0.048	PASS
39	0.005	0.058	0.058	PASS
40	0.000	0.046	0.046	PASS

END OF REPORT



EN 61000-3-3 TEST REPORT 2001/12/18 10:26 AM

Unit: AC-DC CONVERTER

Model No.: TMLM 05105

Remarks: Temp:18°C Hum:66%

Operator: Markba Lee

=====

TEST SETUP

Test Freq.:	50.00 Hz.	Test Voltage:	230.0 vac
Waveform :	SINE		
Test Time:	10.0 min.	Tshort:	10.0 min.
Prog. Zo Enabled:	YES	Prog. Zo:	0.000
Voltage Change less than once per Hour:	NO		
Impedance selected:	DIRECT		
Synthetic R+L Enabled:	NO		
Resistance:	0.380 Ohms	Inductance:	460.000 uH



TEST DATA

Result: PASS

	EUT Data	Limit	Result	Test Enabled
Pst max	0.001	1.00	PASS	true
Plt max	0.001	0.65	PASS	true
dc %	0.00	3.00	PASS	true
dmax %	0.00	4.00	PASS	true
d(t) sec.	0.00	0.20	PASS	true

Power Source Data

Source Pst max	0.020	0.400	PASS	true
% THD	0.03	3.00	PASS	true

END OF REPORT



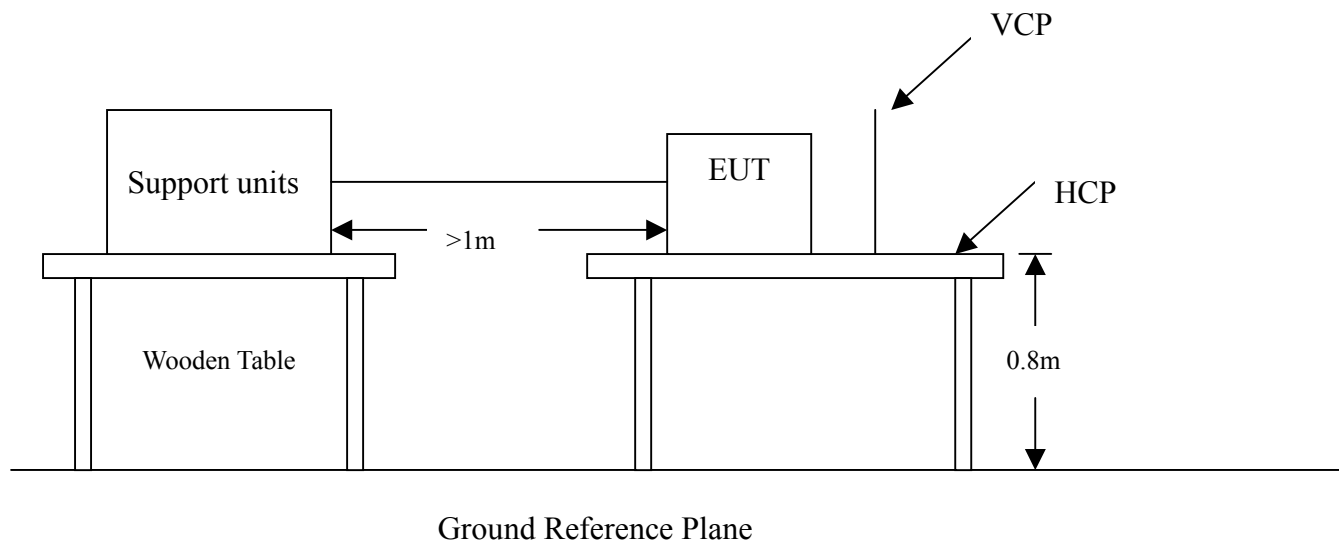
SECTION 3 IEC 61000-4-2 (ELECTROSTATIC DISCHARGE)

ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

Port : Enclosure
Basic Standard : IEC 61000-4-2
Requirements : ± 8 kV (Air Discharge)
 ± 4 kV (Contact Discharge)
 ± 4 kV (Indirect Discharge)
Performance Criteria : B (Standard require)
Tested by : Markba Lee
Temperature/Humidity: 18°C / 66%
Test Model : Model 2

Block Diagram of Test Setup:

(The 470 k ohm resistors are installed per standard requirement)



**Test Procedure:**

1. The EUT was located 0.1 m minimum from all side of the HCP.
2. The support units were located 1 m minimum away from the EUT.
3. Selecting appropriate points of EUT for Air discharge and put a mark on EUT to show tested points.
4. The following test condition was followed during the tests.

The electrostatic discharges were applied as follows:

Amount of Discharges	Voltage	Coupling	Result (Pass/Fail)
Mini 10 /Point	±8kV	Air Discharge	Pass
Mini 25 /Point	±4kV	Contact Discharge	**N/A
Mini 25 /Point	±4kV	Indirect Discharge HCP (Front)	Pass
Mini 25 /Point	±4kV	Indirect Discharge VCP (Back)	Pass
Mini 25 /Point	±4kV	Indirect Discharge VCP (Left)	Pass
Mini 25 /Point	±4kV	Indirect Discharge VCP (Right)	Pass

The tested points to EUT, please refer to attached pages.

(Blue arrow mark for contact discharge, red arrow mark for air discharge.)

****No any contact discharge events occurred on the test**

Performance & Result:

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**☐ **FAILED**

Observation: No any function degraded during the tests.



The Tested Points of EUT



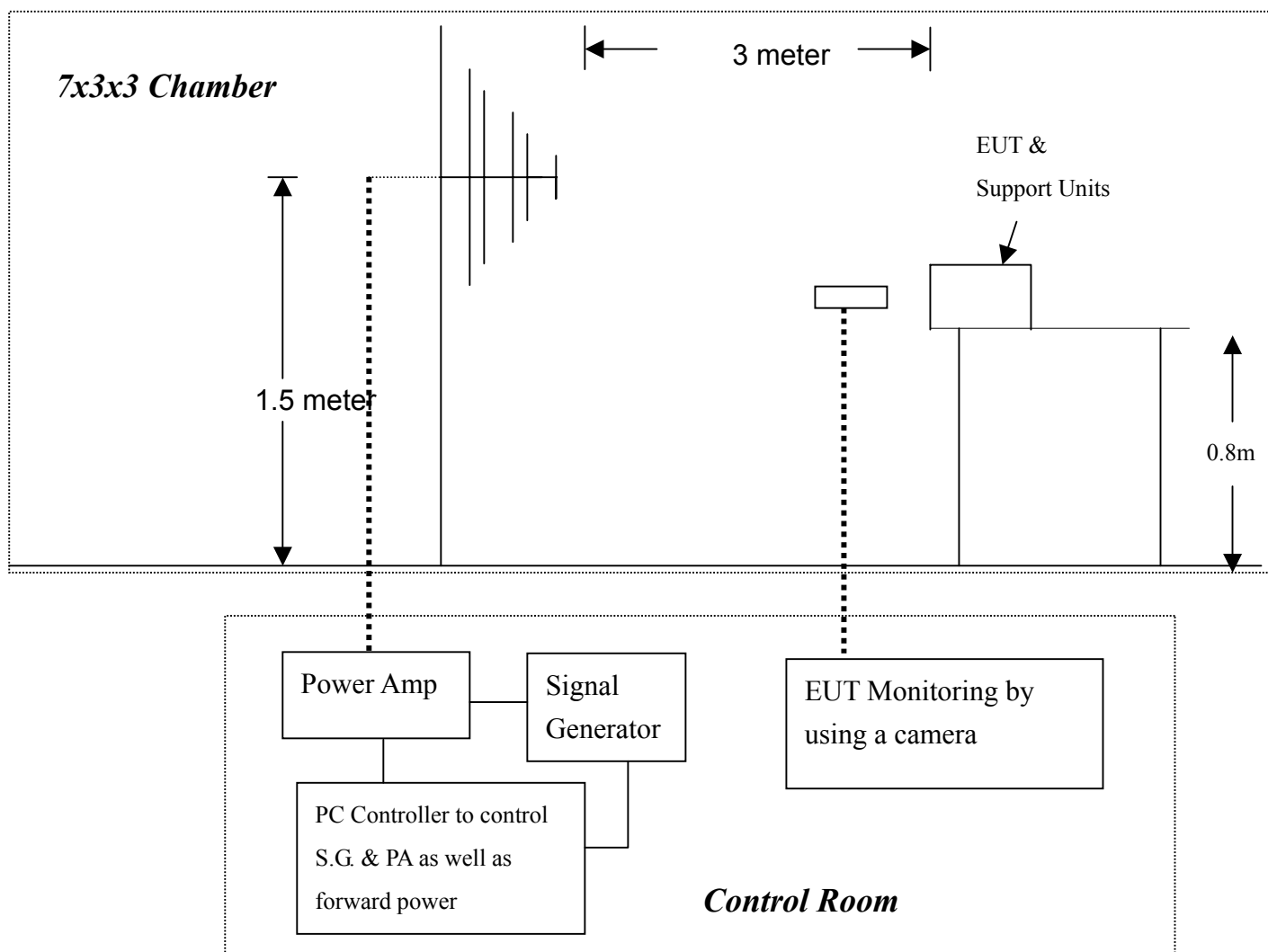


SECTION 4 IEC 61000-4-3 (RADIATED ELECTROMAGNETIC FIELD)

RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

Port : Enclosure
Basic Standard : IEC 61000-4-3
Requirements : 3 V/m / with 80% AM. 1kHz Modulation
Performance Criteria : A (Standard require)
Tester : Markba Lee
Temperature : 28°C
Humidity : 66%
Test Model : Model 2

Block Diagram of Test Setup:



**Test Procedure:**

1. The EUT and support units were located at the edge of supporting table keep 3 meter away from transmitting antenna, it just the calibrated square area of field uniformity.
2. Adjusting the cables to be exposed to the electromagnetic field as possible.
3. Performing a Radiated Emission Scan in range of 30 to 1000 MHz prior to do RS test and records the more higher emission frequencies for the reference of RS test, due to antenna effectiveness.
4. Adjusting the monitoring camera to monitor the multi-meter scale as clear as possible.
5. Setting the testing parameters of RS test software per IEC 61000-4-3.
6. Referring to the tested data of step 3 to performing the RS test from 80 to 1000 MHz.
7. Recording the test result in following table.
8. Changing the EUT to the other side and repeat step 3 to 6, until 4 sides of EUT were verified.
9. For ENV 50204 tested at 900 ± 5 MHz individually and keep same set up as IEC 61000-4-3 testing.

IEC 61000-4-3 Preliminary test conditions:

Test level : 6V/m
Steps : 4 % of fundamental
Dwell Time : 3 sec

Range (MHz)	Field	Modulation	Polarity	Position (°)	Result (Pass/Fail)
80-1000	3V	Yes	H	Front	Pass
80-1000	3V	Yes	V	Front	Pass
80-1000	3V	Yes	H	Right	Pass
80-1000	3V	Yes	V	Right	Pass
80-1000	3V	Yes	H	Back	Pass
80-1000	3V	Yes	V	Back	Pass
80-1000	3V	Yes	H	Left	Pass
80-1000	3V	Yes	V	Left	Pass

IEC 61000-4-3 Final test conditions:

Test level : 3V/m
Steps : 1 % of fundamental
Dwell Time : 3 sec

Range (MHz)	Field	Modulation	Polarity	Position (°)	Result (Pass/Fail)
80-1000	6V	Yes	H	Back	Pass
80-1000	6V	Yes	V	Back	Pass



Performance & Result:

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

Observation: No any function degraded during the tests.

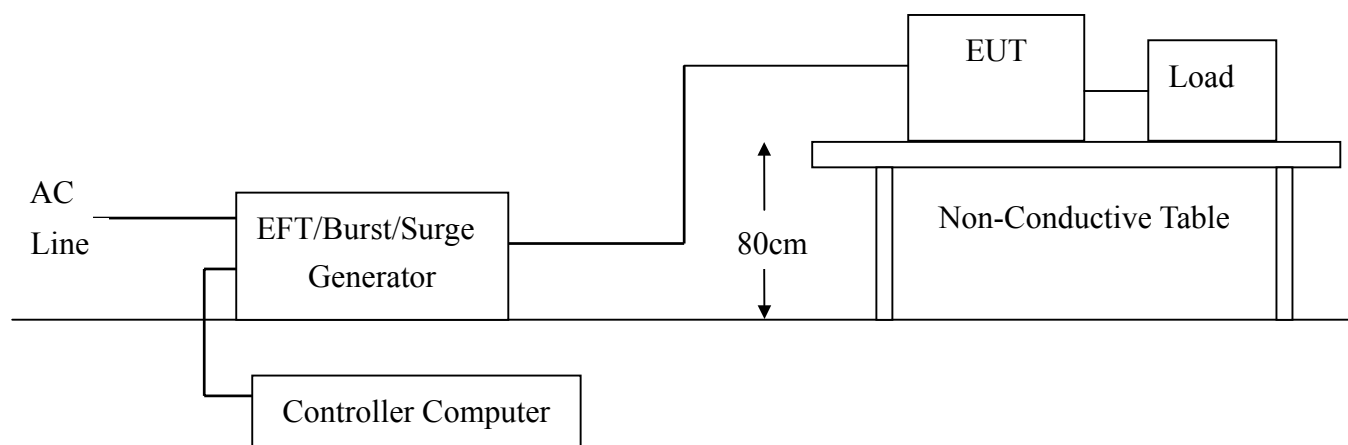


SECTION 5 IEC 61000-4-4 (FAST TRANSIENTS/BURST)

FAST TRANSIENTS/BURST IMMUNITY TEST

Port : On Power Supply Lines
Basic Standard : IEC 61000-4-4
Requirements : +/- 1kV for Power Supply Lines
Performance Criteria : B (Standard require)
Tester : Markba Lee
Temperature : 18°C
Humidity : 66%
Test Model : Model 2

Block Diagram of Test Setup:



**Test Procedure:**

1. The EUT and support units were located on a wooden table 0.8 m away from ground reference plane.
2. EUT connected with multi-meter and resistive Load by Full Load.
3. Recording the test result as shown in following table and increase test voltage to the EUT ports from minimum to standard request or client request.

Test conditions:

Impulse Frequency: 5kHz

Tr/Th: 5/50ns

Burst Duration: 15ms

Burst Period: 3Hz

Inject Line	Voltage kV	Inject Method	Result (Pass/Fail)
Anode (+)	+/- 1	Direct	Pass
Cathode (-)	+/- 1	Direct	Pass
Anode + Cathode	+/- 1	Direct	N/A

Performance & Result:

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**☐ **FAILED****Observation: No any function degraded during the tests.**

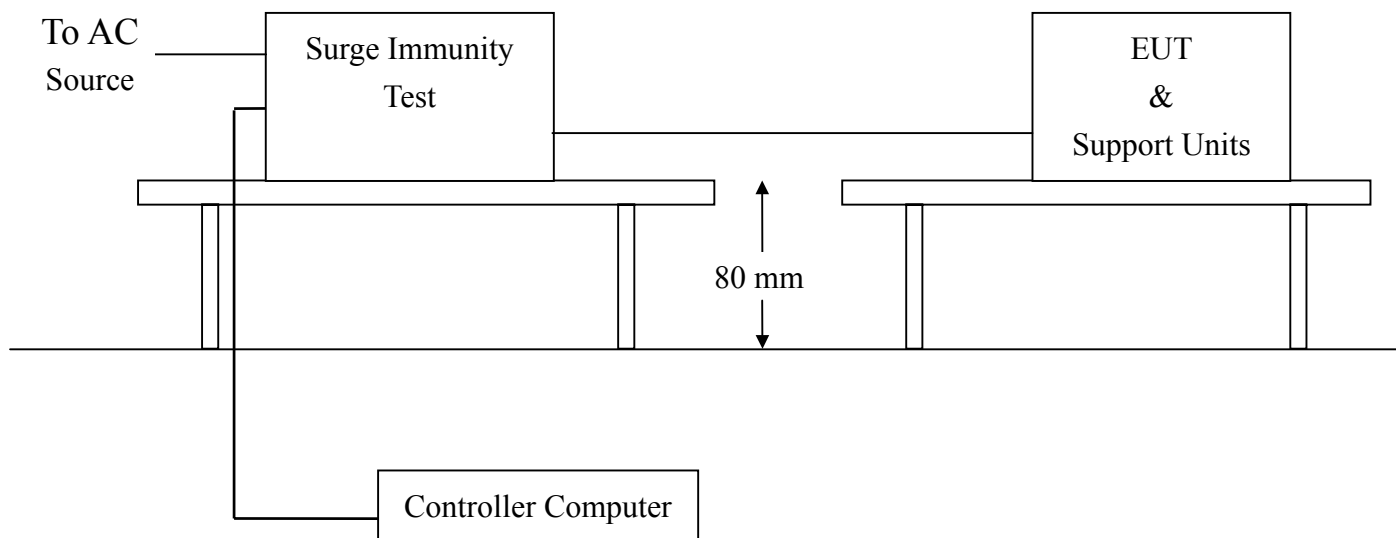


SECTION 6 IEC 61000-4-5 (SURGE IMMUNITY)

SURGE IMMUNITY TEST

Port : Power Cord
Basic Standard : IEC 61000-4-5
Requirements : +/- 1kV (Power Cord: Line to Line)
Performance Criteria : B (Standard require)
Tester : Markba Lee
Temperature : 18°C
Humidity : 66%
Test Model : Model 2

Block Diagram of Test Setup:



**Test Procedure:**

1. The EUT was located 0.1 m minimum from all side of the HCP.
2. The support units were located 1 m minimum away from the EUT.
3. A scroll 'H' test program was loaded and executed in Windows mode.
4. The PC sent above message to EUT and related peripherals through the test.
5. Selecting appropriate points of EUT for discharge and put a mark on EUT to show tested points.
6. The following test condition was followed during the tests and increase test voltage to the EUT ports from minimum to standard request or client request.

Test conditions:

Voltage Waveform : 1.2/50 us
Current Waveform : 8/20 us
Polarity : Positive/Negative
Phase angle : 0°, 90°, 270°
Number of Test : 5

Coupling Line	Voltage (kV)	Polarity	Coupling Method	Result (Pass/Fail)
L1-L2	1	Positive	Capacitive	Pass
L1-L2	1	Negative	Capacitive	Pass

Performance & Result:

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**☐ **FAILED**

Observation: No any function degraded during the tests.



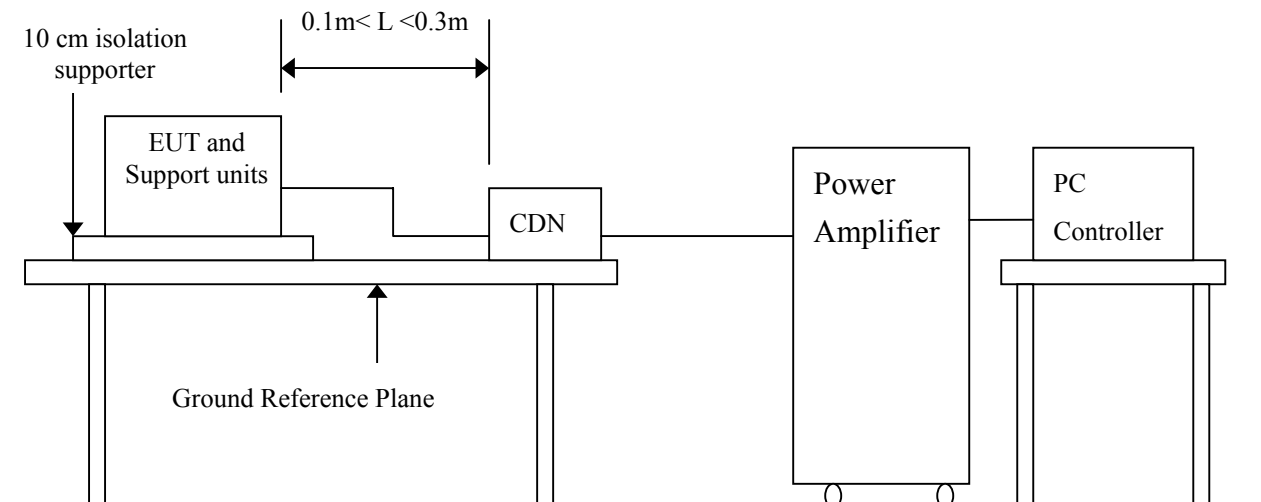
SECTION 7 IEC 61000-4-6 (CONDUCTED DISTURBANCE/INDUCED BY

RADIO-FREQUENCY FIELD)

Port : AC Port
Basic Standard : IEC 61000-4-6
Requirements : 3V with modulated
Performance Criteria: A (Standard require)
Tester : Markba Lee
Temperature : 18°C
Humidity : 66%
Test Model : Model 2

Block Diagram of Test Setup:

Side view:







Test Procedure:

1. The EUT and support units were located at a ground reference plane with the interposition of a 0.1 m thickness insulating support and the CDN was located on GRP directly.
2. EUT connected with multi-meter and resistive Load by Full Load.
3. Adjusting the monitoring camera to monitor the multi-meter scale as clear as possible.
4. Setting the testing parameters of CS test software per IEC 61000-4-6.
5. Recording the test result in following table.

Test conditions:

Frequency Range: 0.15MHz-80MHz

Frequency Step : 1% of fundamental

Dwell Time : 3 sec

Range (MHz)	Field	Modulation	Result (Pass/Fail)
0.15-80	3V	Yes	Pass

Performance & Result:

- ☒ **Criteria A:** The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self-recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

Observation: No any function degraded during the tests.



SECTION 8 IEC 61000-4-8 (POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST)

POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

Port	: Enclosure
Basic Standard	: IEC 61000-4-8
Requirements	: 1 A/m
Performance Criteria	: A (Standard Required)
Tester	: N/A
Temperature	: N/A
Humidity	: N/A

****Note:** Not applicable, because no any component can be influenced by power magnetic fields.



SECTION 9 IEC 61000-4-11 (VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS)

VOLTAGE DIPS / SHORT INTERRUPTIONS

Port : AC mains
Basic Standard : IEC 61000-4-11 (1994)
Requirement : Phase angles 0, 45, 90, 135, 180, 225, 270, 315

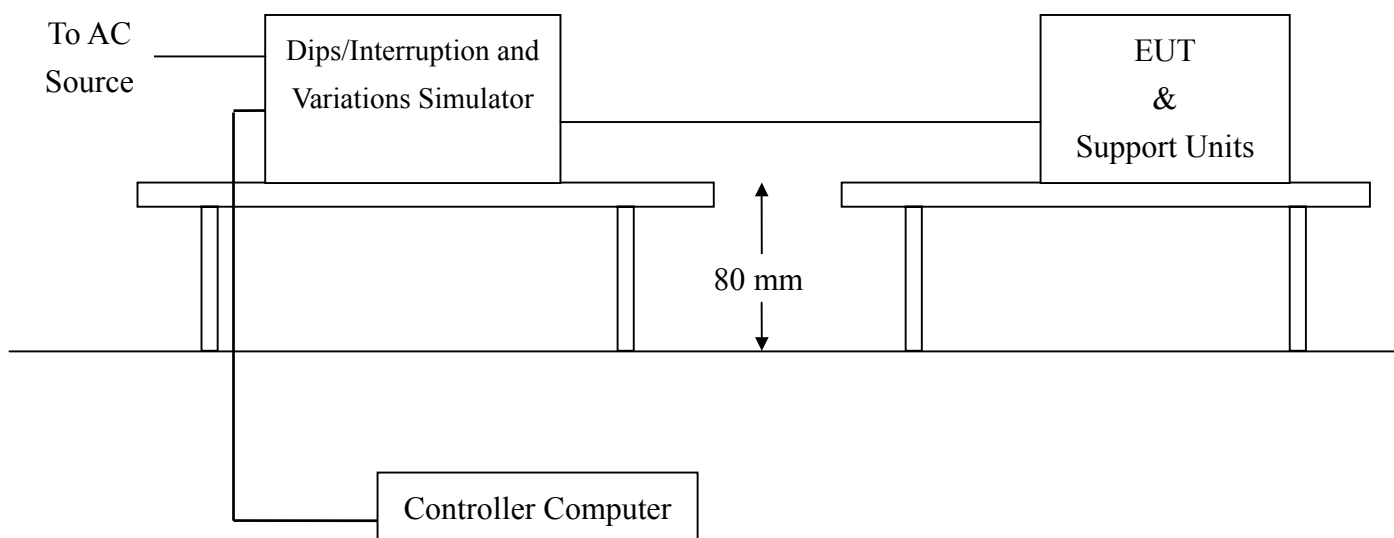
degrees.

Voltage Dips	Test Level % U_T	Reduction (%)	Duration (periods)	Performance Criteria
	<5	>95	0.5	B
	70	30	25	C

Voltage Interruptions	Test Level % U_T	Reduction (%)	Duration (periods)	Performance Criteria
	<5	>95	250	C

Test Interval : Min. 10 sec.
Tester : Markba Lee
Temperature : 18°C
Humidity : 66%
Test Model : Model 2

Block Diagram of Test Setup:



**Test Procedure:**

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. A test program was loaded and executed in Windows mode.
3. The test program exercised related support units sequentially.
4. Setting the parameter of tests and then executed the test software of test simulator.
5. Repeating step 3 to 4 through the test.
6. Recording the test result in test record form.

Test conditions:

The duration with a sequence of three dips/interruptions with interval of 10 s minimum
(Between each test event)

Voltage Dips:

Test Level % U _T	Reduction (%)	Duration (periods)	Observation	Meet Performance Criteria
0	100	0.5	Normal	A
70	30	25	Normal	A

Voltage Interruptions:

Test Level % U _T	Reduction (%)	Duration (periods)	Observation	Meet Performance Criteria
0	100	250	EUT shut down but can be auto recovered, as the events disappear.	B

Normal: No any functions degrade during and after the test.

Performance & Result:

Criteria A: The apparatus continues to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance.

Criteria B: The apparatus continues to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.

Criteria C: Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

**PASS****FAILED**



APPENDIX 1

PHOTOGRAPHS OF TEST SETUP



LINE CONDUCTED EMISSION TEST (EN55022)

Front View



Back View





RADIATED EMISSION TEST (EN 55022)

Front View



Back View





POWER HARMONIC & VOLTAGE FLUCTUATION / FLICKER TEST (EN 61000-3-2 & EN 61000-3-3)





ELECTROSTATIC DISCHARGE TEST(IEC 61000-4-2)





RADIATED ELECTROMAGNETIC FIELD (IEC 61000-4-3)



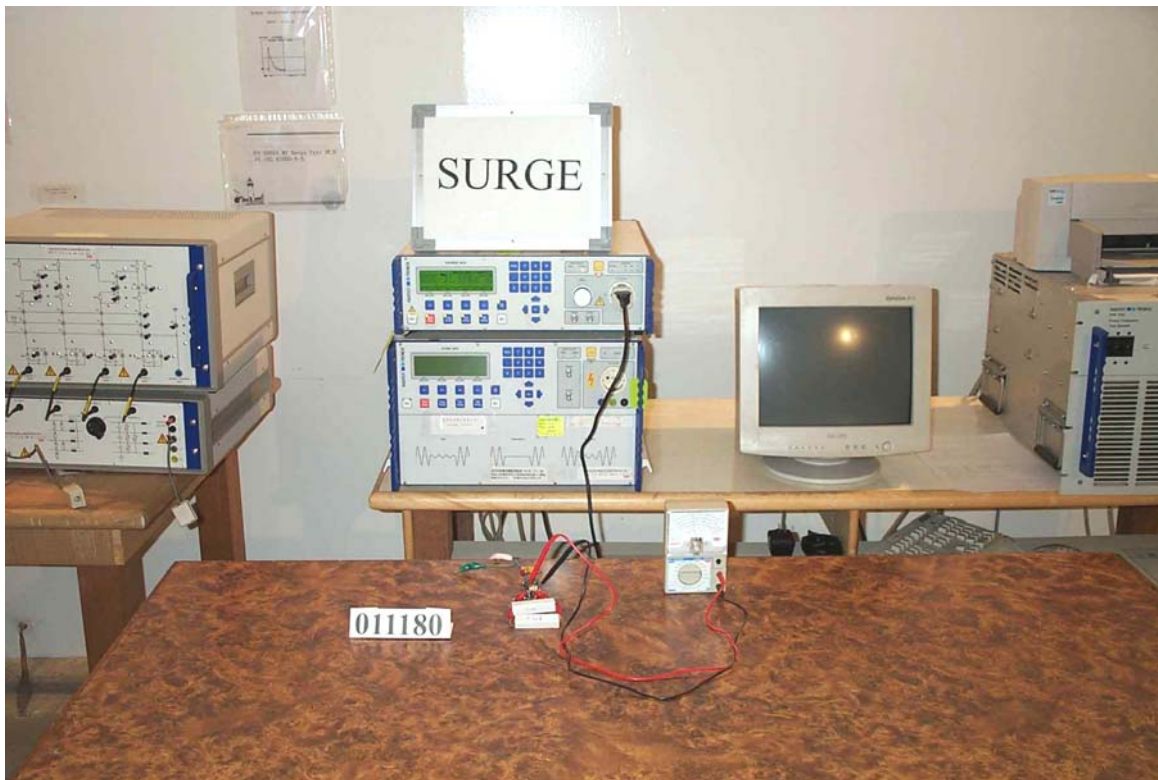


FAST TRANSIENTS/BURST TEST (IEC 61000-4-4)



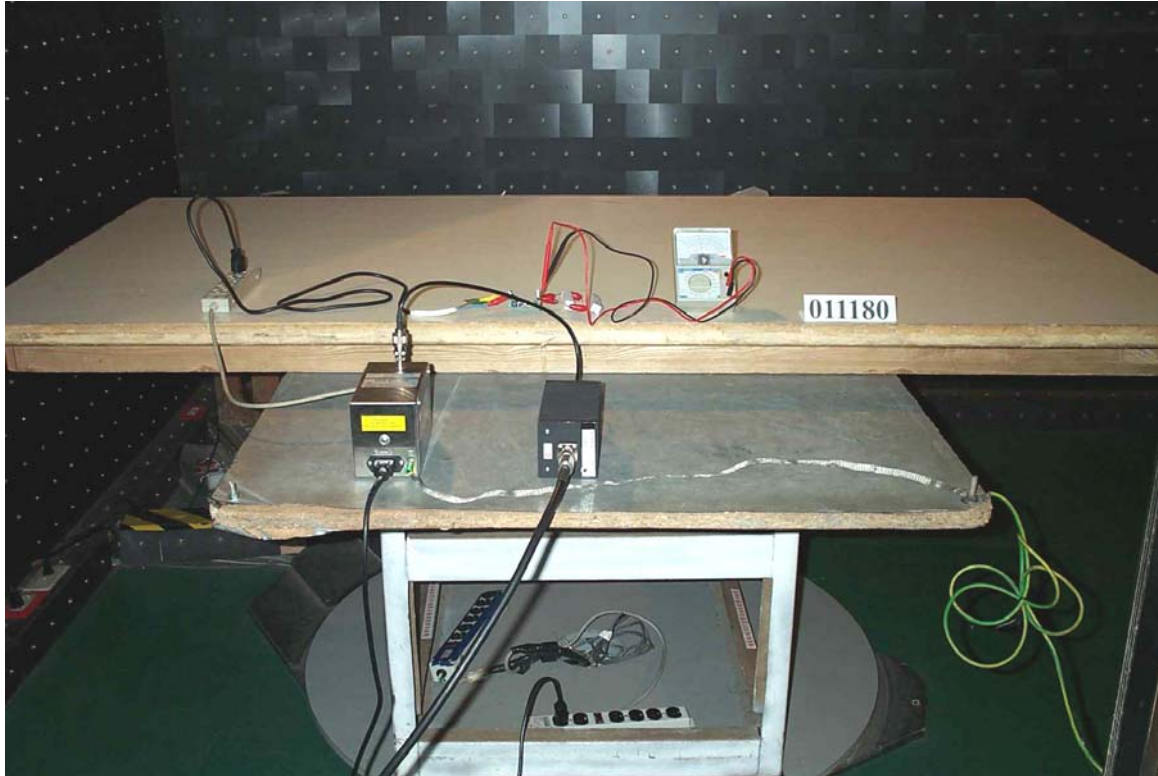


SURGE IMMUNITY TEST (IEC 61000-4-5)



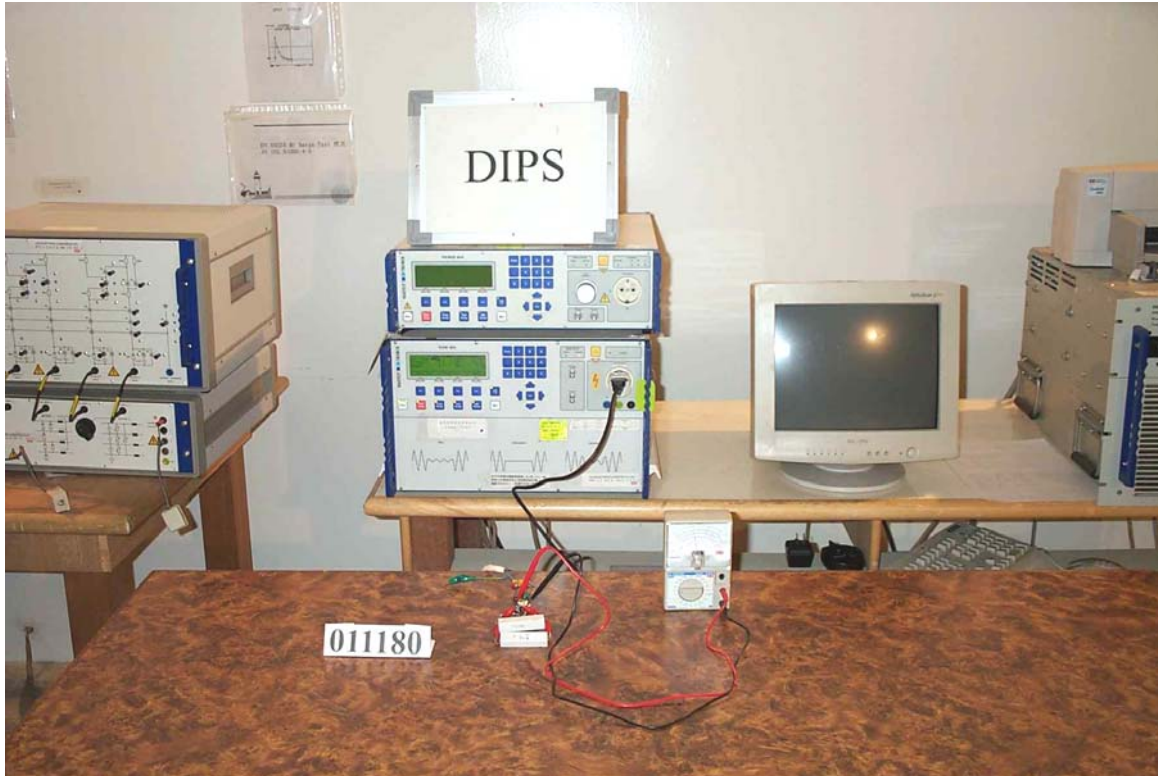


CONDUCTED DISTURBANCE, INDUCED BY RADIO-FREQUENCY FIELDS TEST (IEC 61000-4-6)





VOLTAGE DIPS / INTERRUPTION TEST (IEC 61000-4-11)





APPENDIX 2

PHOTOGRAPHS OF EUT



Front view of TMLM 05103



Back view of TMLM 05103





Front view of TMLM 05105



Back view of TMLM 05105





Front view of TMLM 05112



Back view of TMLM 05112

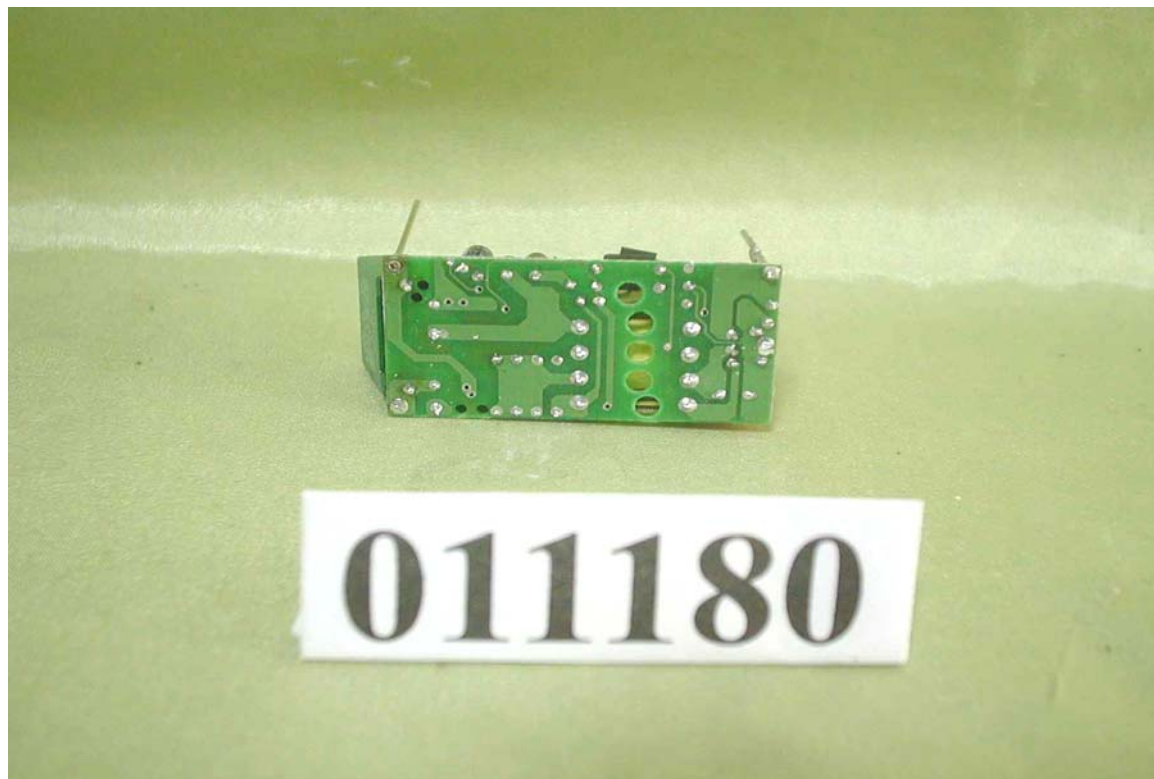




Front view of TMLM 05115



Back view of TMLM 05115





Front view of TMLM 05124



Back view of TMLM 05124

