

No 003007

**LABORATORIUM UJI KOMPONEN SISTEM FOTOVOLTAIK
PHOTOVOLTAIC COMPONENT TEST LABORATORY**

**SERTIFIKAT PENGUJIAN
TESTING CERTIFICATE**

No. Referensi : 003007
Reference Number

No. Kontrak : 15/BPT/B2TE/BPPT/IX/2004
Contract Number

Identitas Pelanggan / Customer Identity

Nama / Name : PT. Sundrya Indonesia

Alamat / Address : Jl. Pondok Randu No 38 Cengkareng, Jakarta Barat 11750, Indonesia.

Identitas Sampel / Sample Identity

Nama / Name : Sundrya Alight-xx

Nama Pabrik / Vendor : PT. Sundrya Indonesia

Type / No. Seri : Armature for fluorescent light 12 Vdc version, dengan 6 buah sampel mewakili
Type / Serial Number 1000 unit

Pengujian / Testing

Metoda / Methode : Prosedur pengujian karakteristik dan kapasitas sistem Lampu

Tanggal / Lamanya : 10 September s/d 18 September 2004.
Date / Duration

Sampel tersebut diatas telah lulus uji berdasarkan SNI 04-6393-2000
"Prosedur pengujian karakteristik & kapasitas system lampu flouresen"
Sertifikat ini merupakan bagian yang tidak terpisahkan dengan Laporan Pengujian No. 003007
The sample(s) has/have been complied based on SNI 04-6391-2000 Procedure electric performance & capacity of
fluorescent lighting system.
This certification is part of testing report number 003007

Sertifikat ini berlaku sampai dengan adanya perubahan desain
This certification valid until change of design

Serpong, 18 September 2004

Ka. Balai Besar Teknologi Energi


Dr. Agus Rusyana Hoetman Mks
Nip 680000820



**BADAN PENGKAJIAN DAN PENERAPAN TEKNOLOGI
(BPPT)**

TEST REPORT

SUNDAYA ALIGHT XX

Armature for Fluorescent Light
(12 Vdc Version)

LSDE

**UNIT PELAKSANA TEKNIS
LABORATORIUM SUMBER DAYA ENERGI
PUSPIPTEK - SERPONG, TANGERANG 15314
TELP. (021) 7560550, 7560092 (DIRECT)
7560562 EXT. 1306, 1325, 1329
FAX. (021) 7560904**

TEST REPORT

Order number : 003007
 Administrative number : 08 /LAP.JATEK/B2TE/BPPT/IX/2004
 Contract number : 15/BPT/B2TE/BPPT/IX/2004

SAMPLE IDENTIFICATION

Name : SUNDAYA ALIGHT XX
 Manufacturer : PT.SUNDAYA INDONESIA
 Type / Serial Number : Armature for fluorescent light 12Vdc version

OWNER IDENTIFICATION

Name : PT. SUNDAYA INDONESIA
 Address : Jl. Pondok Randu 38, Cengkareng
 Jakarta Barat 11750, Indonesia
 Telp : (021) 5416103/4
 Fax : (021) 5416106

This report comprises of 7 pages

Date of issue September 18, 2004

Ka. Bidang Energi Terbarukan
 dan Elektro-kimia,

Dr. Markus Sumarsono
 NIP. 680001698

Kepala Laboratorium
 Uji komponen Fotovoltaik

Ir. Pramusito
 Nip. 680001941

*Dilarang keras mengutip/memperbanyak dan/atau mempublikasikan sebagian isi Laporan ini tanpa izin B2TE - BPPT
 Laporan ini sah apabila telah dibubuhi cap B2TE - BPPT*

Unit Pelaksana Teknis
Laboratorium Sumber Daya Energi (UPT LSDE)

Laboratorium Uji Komponen Fotovoltaik
Photovoltaic Component Test Laboratory (PCTL)

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Attachment (Annex) :

- A *Wave form of current and voltage*
- B *Wave form of starting moment*
- C *List of Measuring Equipment*

TEST REPORT
SUNDAYA ALIGHT XX
Product code : 12 VDC version

1. OBJECTIVE

The objective of this test is to inspect the quality of Sundaya Alight XX product code : 12 VDC version by observing its function, electrical efficiency, waveform, and starting moment. The test is intended to explore the possibility of using this electronic ballast and DC lamp in the "Indonesia Solar Home System, World Bank Project" which match to their requirement.

2. BASIS OF TESTING

- Internal Procedure of Photovoltaic Component Test Laboratory, BPPT
- "Indonesia National Standard (SNI), Performance test procedure of PV Lighting system", 2000.

3. DESCRIPTION OF SAMPLE

- Sample collection was made by personnel on be half of PT. Sundaya Indonesia.
- Sampling was accomplished by selecting six sets of sample of ballasts and lamps (TL -10W) randomly from the same production/ batch.
- Technical specification of the samples is shown in Figure 1.

4. DESCRIPTION OF TEST PROCEDURE

- DC electronic ballast test consist of six sets of samples were conducted for TL-10W lamp, and individually is labeled and named as S-1, S-2, S-3, S-4, S-5 and S-6.
- Scope of lamp system test and DC-electronic ballast test are as follows:
 1. Pre-test, which consists of visual and technical documentation inspection of the samples component.
 2. Function test, which consists of measurement and check the suitability of the ballast as it is declared in manufacturer specification.
 3. Detail test, which consists of electrical efficiency, crest factor, waveform, protection against reverse polarity, over voltage and open circuit condition.
 4. Efficacy test, which consist of measurement of the luminaries efficiency, it is tested by the appropriate testing laboratory in PUSPIPTEK, Serpong
 5. In addition, the symetrical wave-test which based on the World Bank requirement.

The test sequence is design so that all destructive test (e.g. reverse polarity test, over voltage and open circuit test) are made at the end of the sequence.



Figure 1. Sample of SUNDAYA ALIGHT XX

Component specification :

DC-electronic ballast type	:	INTL-12D10
Fluorescent lamp type	:	Philips Fluotone TLD 10W/54
Tube base	:	
Lamp armature material	:	White ABS Plastic
Lamp fitting/cover material	:	Brass / nickel plated
Material of End caps	:	Cream, black or grey ABS
Product dimension	:	428 x 125 x 51 mm
Nett product weight	:	0.28 kg

Electrical specification :

Nominal voltage	:	12 Volt DC
Voltage range	:	10.00 ~ 14.00 Volt DC
Operating current	:	0.68 Amp
Operating current range	:	0.69 ~ 0.70 Amp
Nominal Operating frequency	:	34 kHz
Lumen output	:	approx. 280 lumens
Life time of tube	:	> 7,500.. cycles
Life time of tube (burning)	:	> 8,000.. hrs
Life time of electronic ballast	:	> 30,000 hrs

All of the specimens (six pcs) complete with lamp armatures are received and checked on September 10, 2004.

5. TEST RESULT

a. Function Test

Lamp type	Input Voltage (Vdc)	Lamp operation		Remarks
		Function	Not	
Sundaya Alight XX	10,0 V	Yes		All samples operate well
	14,5 V	Yes		

b. Detail Test

Lamp type : Sundaya Alight XX

Room temperature : 29.5°C ~ 31.1°C

Description	Working voltage (Volt-DC)					
	10.5	11	12	13	14	14.5
Sample #S 1:						
Electrical efficiency (%)	84.09	84.85	84.10	82.97	82.14	81.39
Crest factor	1.61	1.60	1.56	1.57	1.56	1.55
Frequency (kHz)	38.47	38.43	38.38	38.35	38.32	38.31
Reverse polarity	After 1 hour, OK					
Open circuit	After 4 hours, OK					
Over voltage	After 4 hours at 15 V, OK					
Temperature	After 6 haours at maximum 40°C, OK					
Sample #S 2:						
Electrical efficiency (%)	83.15	83.14	82.15	81.67	80.35	80.25
Crest factor	1.62	1.62	1.62	1.60	1.59	1.59
Frequency (kHz)	38.64	38.61	38.62	38.55	38.52	38.51
Reverse polarity	After 1 hour, OK					
Open circuit	After 4 hours, OK					
Over voltage	After 4 hours at 15 V, OK					
Temperature	After 6 hours at maximum 40°C, OK					

c. Lumen Test

Voltage (DC-Volt)	Watt	Lumen	Efficacy (Lumen/Watt)
Sample #S-1 :			
10.50	7.51	306.4	40.80
11.00	7.85	319.4	40.69
12.00	8.55	343.6	40.19
13.00	9.25	366.6	39.63
14.00	9.96	388.6	39.02
Sample #S-2 :			
10.50	7.59	289.1	38.09
11.00	7.95	301.0	37.86
12.00	8.67	324.5	37.43
13.00	9.42	344.7	36.59
14.00	10.18	365.0	35.85

d. Starting Moment Test

Description	Result at 12 V		Remarks
Ignation Voltage (V)	560	605	
Preheating time (Sec)	0.056	0.056	
Switching (cycles)	>5000	>5000	ON 60 sec, OFF 120 sec

e. Waveforms

Voltage and current output waveforms of the electronic ballast in the range of testing voltage are shown in attachment (Annex – A). While voltage output waveforms of the electronic ballast at "starting moment" condition with 12 Volt-DC working voltage are shown in attachment (Annex – B).

6. DISCUSSION

- All lamp and ballast samples work normally at DC input voltage range between 10,0 Volt~ 14,5 Volt at room temperature 30°C.
- Average electrical efficiency for the electronic ballast and TL-10W lamp is higher than 80% and average crest factor (ratio of maximum value to rms value of ballast current output) is less than 2 at working voltage from 10.5 V up to 14.5 V. Accordingly, the manufacturer have to strive for their production uniformity.
- Ballast output frequencies with TL-10W lamp is nearly 38.5 kHz. However, output ballast waveform with TL-10W lamp show a non-pure sinusoidal and distortion at their basic frequency.
- All ballast samples have been protected from disruption of voltage input caused by incorrect/ reverse voltage polarity and open-circuit.

7. CONCLUSION

Based on the test and measurement result, some important parameters that can be used as a consideration to meet the technical requirement are shown as follow :

Description	Specification/ Requirement	Test result with lamp	Remarks
		Sundaya Alight XX	
Operating voltage	10 V ~ 14.5 V	10 V ~ 14.5 V	Comply
Electrical efficiency (%)	> 80 %	80.25 % ~ 84.85 %	Comply
Crest factor	≤ 2	1.56 ~ 1.61	Comply
Frequency (kHz)	> 20 kHz	38.31 ~ 38.64	Comply
Efficacy (Lumen/Watt)	> 35	>35	Comply
Starting moment	< 5 sec	0.056 sec.	Comply
Switching Durability (Cycle)	> 5000 cycle	>> 5000 cycle	Comply
Temperature Test	Protected	Protected	Comply
Over voltage	Protected	Protected	Comply
Reverse polarity	Protected	Protected	Comply
Open circuit	Protected	Protected	Comply

Therefore it can be concluded that:

SUNDAYA ALIGHT XX with TLD10W lamp can be declared **to have meet** the requirement /technical specification.

Date: September 22, 2004

Supervisor,



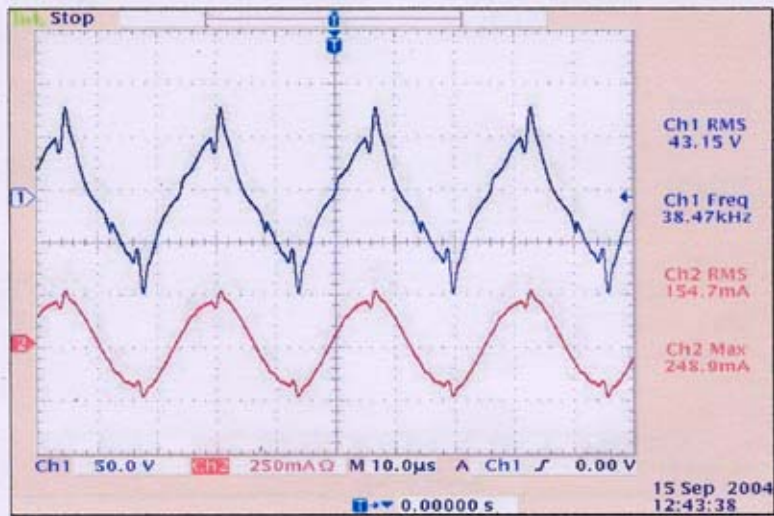
M.Syafri Syarif

Nip. 680001636

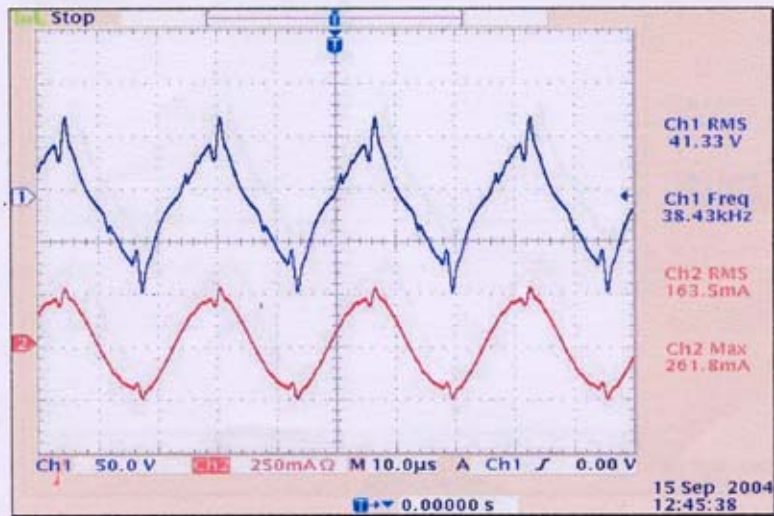
ANNEX - A

A-1. Voltage and Current waveform of Sample S#1

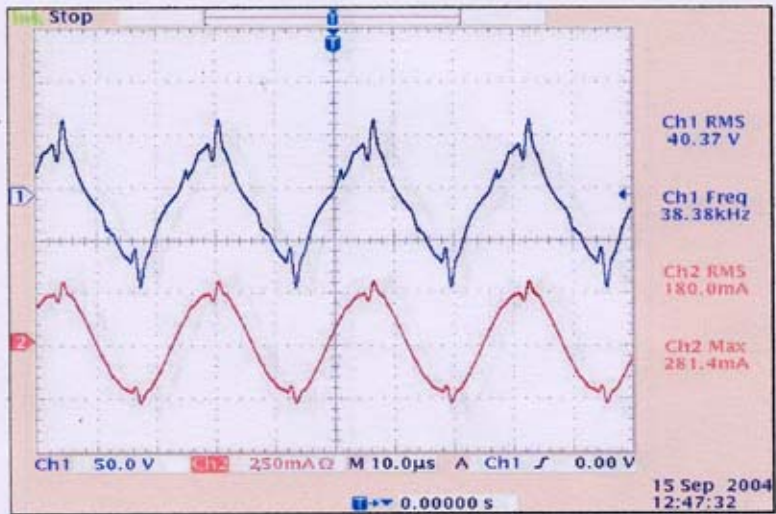
Nominal voltage : 10.5 Volt



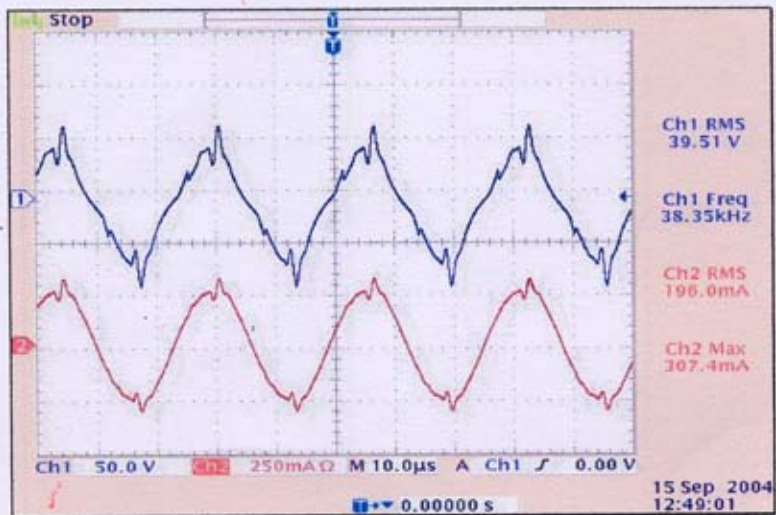
Nominal voltage : 11 Volt



Nominal voltage : 12 Volt

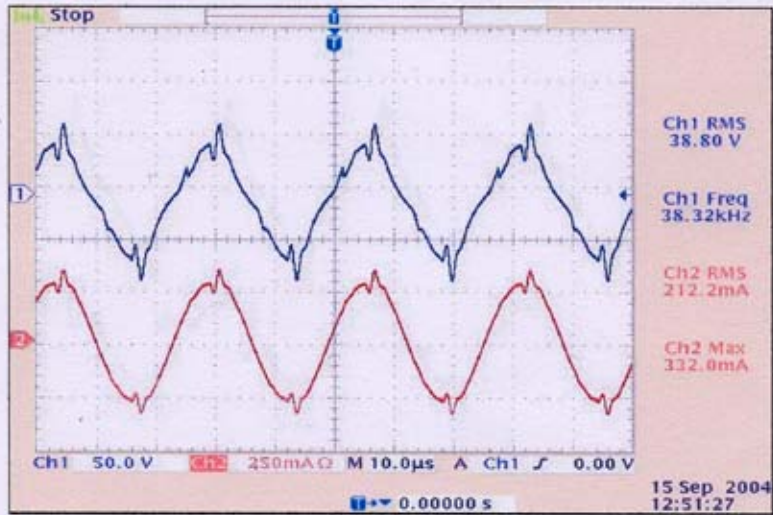


Nominal voltage : 13 Volt

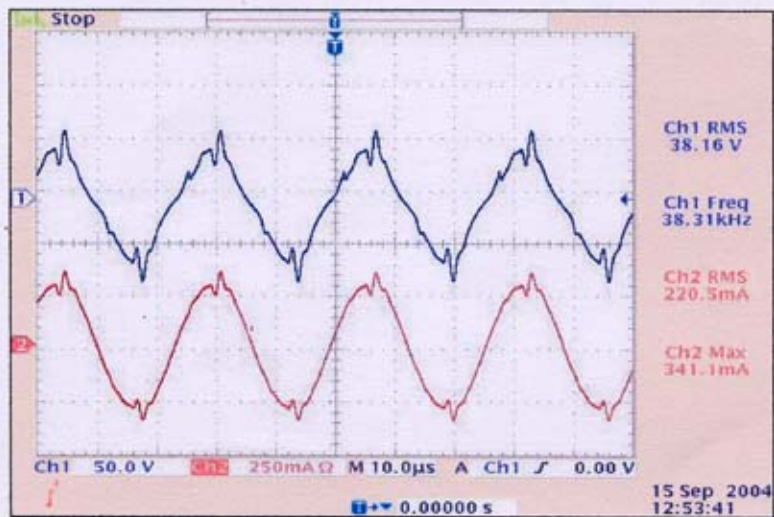


A.2. Voltage and Current Waveform of Jarak 100

Nominal voltage : 14 Volt

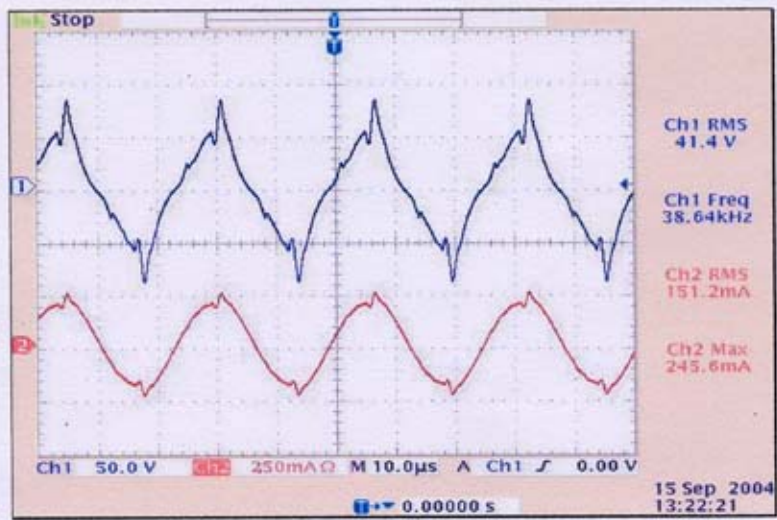


Nominal voltage : 14.5 Volt

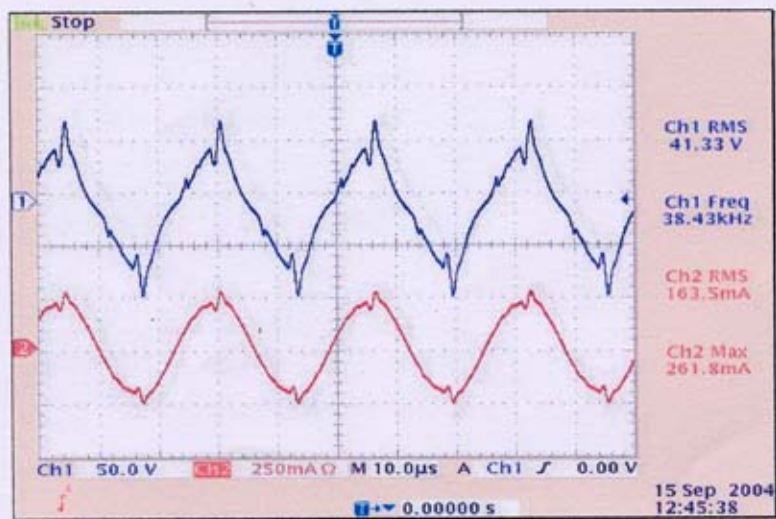


A-2. Voltage and Current waveform of Sample S#2

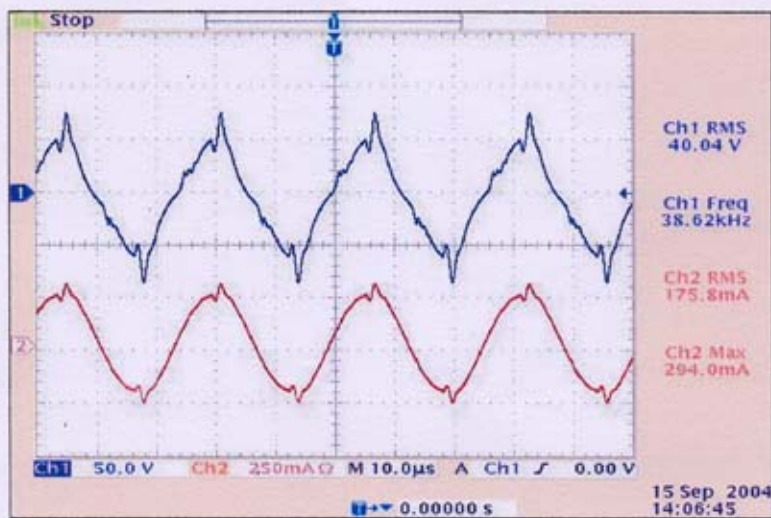
Nominal voltage : 10.5 Volt



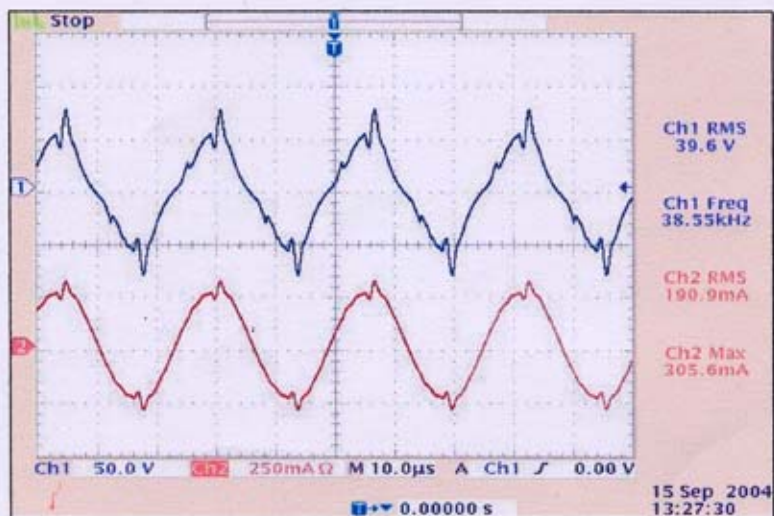
Nominal voltage : 11 Volt



Nominal voltage : 12 Volt

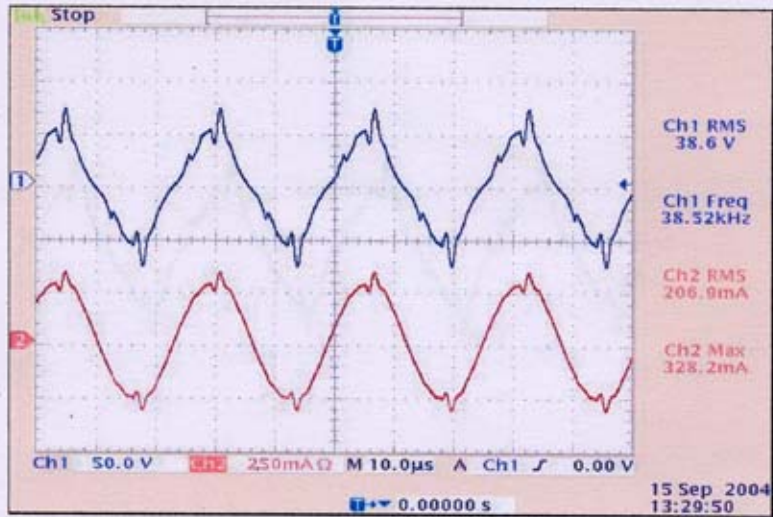


Nominal voltage : 13 Volt



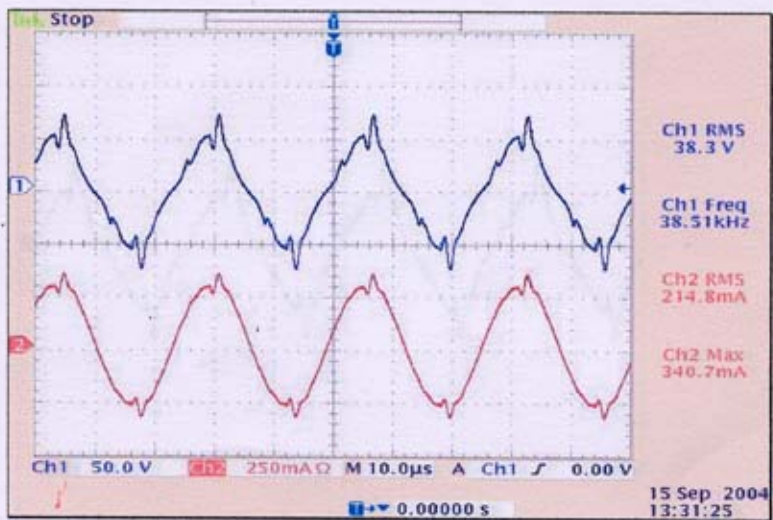
Nominal voltage : 14 Volt

Sample # 1



Nominal voltage : 14.5 Volt

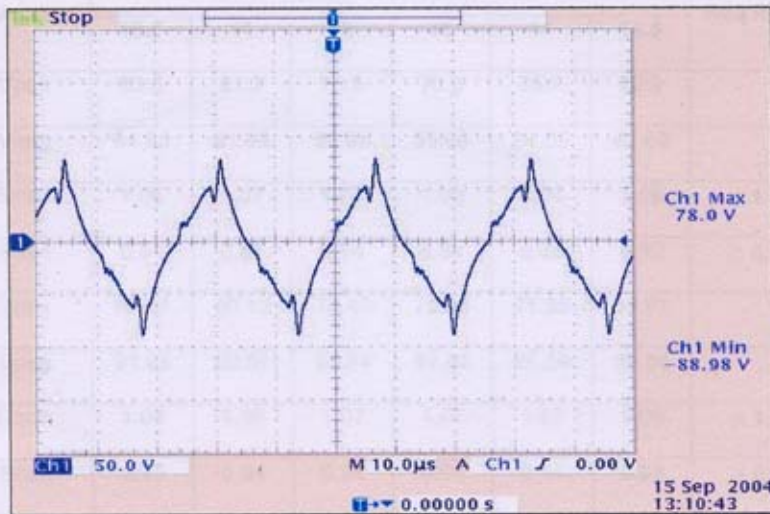
Sample # 2



A-3. Symetrical waveform

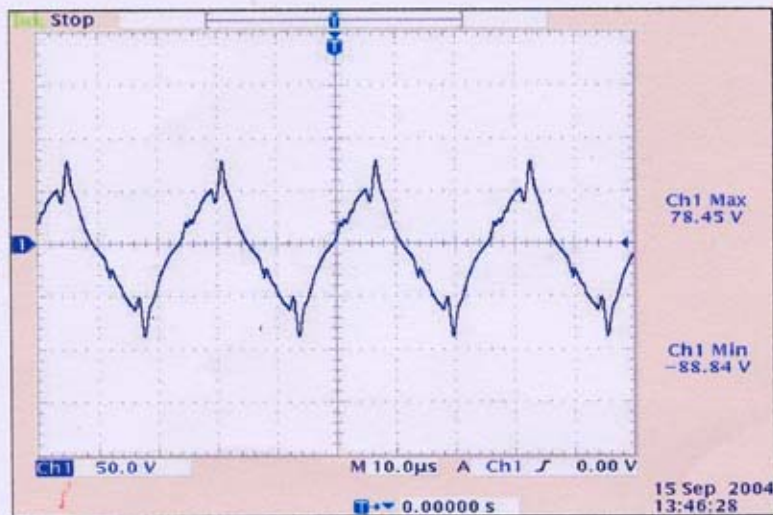
Nominal voltage : 12.0 Volt

Sample # 1



Nominal voltage : 12.0 Volt

Sample # 2



ANNEX - B

Sample No. :
 Nominal voltage :
 Spiking voltage :

Symetrical Waveform Test

Light type : High Xi TLD10W

Producing time : 0.058 second

Sample No	Peak Value	DC-Input Voltage (Volt)						WB Req'ment	Note
		10.5	11	12	13	14	14.5		
# 1	Vpos	83.6	81.3	78.0	76.0	73.1	69.9		
	Vneg	94.53	91.98	88.98	85.86	84.05	82.69		
	Smax	1.06	1.07	1.07	1.06	1.06	1.09	≤ 1.1	Comply
	Smin	0.94	0.94	0.94	0.94	0.93	0.92	≥ 0.9	Comply
# 2	Vpos	82.61	80.12	78.45	75.88	71.55	69.91		
	Vneg	91.85	90.07	88.84	87.08	81.59	80.84		
	Smax	1.06	1.06	1.07	1.07	1.07	1.08	≤ 1.1	Comply
	Smin	0.95	0.94	0.94	0.94	0.94	0.93	≥ 0.9	Comply

Sample No. : 582

Nominal voltage : 12 Volt

Spiking voltage : 60V Vrms

582

12 Volt

60V Vrms

Light type :

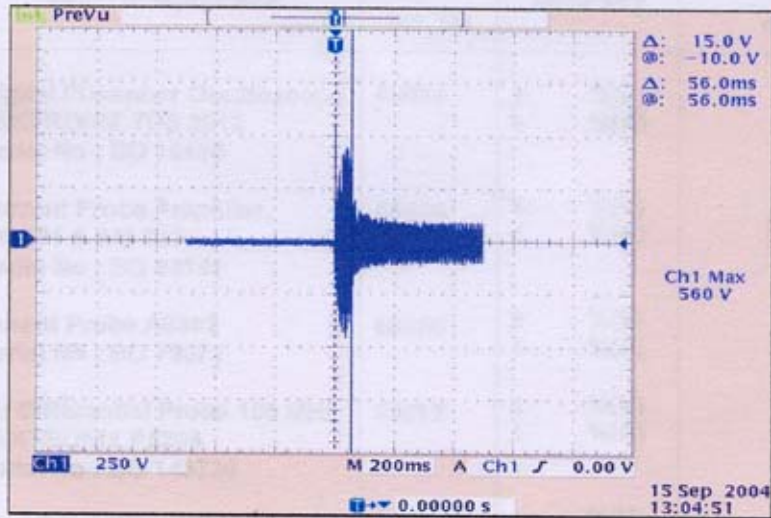
High Xi TLD10W

Producing time :

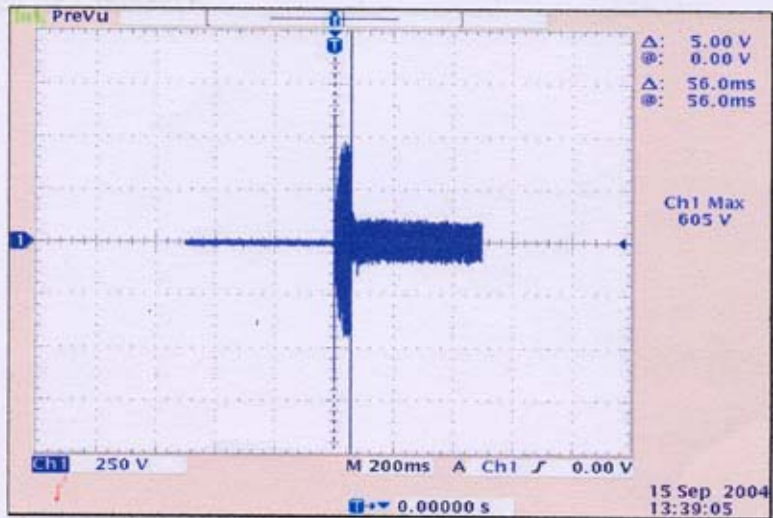
0.058 second

ANNEX - B

Sample No.	: S#1	Lamp type	: Alight XX TLD10W
Nominal voltage	: 12 Volt	Preheating time	: 0.056 second
Striking voltage	: 560 Volt		



Sample No.	: S#2	Lamp type	: Alight XX TLD10W
Nominal voltage	: 12 Volt	Preheating time	: 0.056 second
Striking voltage	: 605 Volt		



ANNEX - C

LIST OF MEASURING EQUIPMENT

No	Name of equipment	PCTL Inv. No	Accuracy	Calibration date
1.	Digital Phosphor Oscilloscope TEKTRONIX TDS 3012 Serial No : BO 10498	60034	± % (V) ± % (A)	
2.	Current Probe Amplifier, TM 501 & AM 503 Serial No : BO 93141	60036	± % (V) ± % (A)	
3.	Curent Probe A6302 Serial No : BO 78071	60036	± % (V) ± % (A)	
4.	HV Differential Probe 100 MHz TEKTRONIX P5205 Serial No : BO 143736	60012	± % (V) ± % (A)	
5.	Regulated Power Supply, KENWOOD PDS36-10	60039	± % (V) ± % (A)	
6.	True RMS Voltmeter FLUKE Seri No : 68630158	40012	± % (V) ± % (A)	
7.	True RMS Voltmeter FLUKE Seri No : 68630073	40018	± % (V) ± % (A)	

Lembaga Ilmu Pengetahuan Indonesia

Pusat Penelitian Kalibrasi, Instrumentasi dan Metrologi

Pengelola Teknis Ilmiah Standar Nasional untuk Satuan Ukuran

SERTIFIKAT KALIBRASI

CALIBRATION CERTIFICATE

IDENTITAS ALAT*Instrument Details*

Nama : **Lampu Inverter**
Name
Merek Pabrik : **Sundaya Solar Light**
Manufacturer
Tipe/Nomor Seri : **TL 10 Watt**
Type/Serial Number
Lain-lain : **-**
Others

IDENTITAS PEMILIK*Owner Identification*

Nama : **UPT LSDE**
Designation
Alamat : **Komplek Puspiptek Serpong, Tangerang**
Address

Sertifikat ini terdiri atas **2** halaman
This certificate comprises **2** *pages*

Diterbitkan tanggal **24 Nopember 2004**
Date of issue



S.021104

Keppres No. 7/1989 - Kep. Ketua LIPI No. 425/A/1989 - Kep.Ses./Ketua PH DSN No. 955/IV.2.06/HK.01.04/3/92

Alamat : Puslit KIM-LIPI, Kompleks PUSPIPTER, Serpong - Tangerang 15314
 Telp. (62-021) - 7560533 - 7560534 - 7560571 - 7560562 - Fax. (62-021) - 7560568 Telex 45512 PPIT IA



s.021104

Nomor Order : E - 04.11.18.
Lab. Metrologi Radiometri & Fotometri.
Lembar ke 2 dari 2 lembar.

Nama Alat : Lampu Inverter.
Tipe / No. Seri : TL 10 Watt / -
Merk / Pabrik : Sundaya Solar Light.
Tanggal Pengukuran : 10 November 2004.
Tempat Pengukuran : Puslit KIM-LIPI

Suhu ruang : 21 ± 1 °C.
Kelembaban : 71 ± 5 %.

HASIL PENGUKURAN

No. Lampu	Tegangan (Volt DC)	Arus (A)	Daya (VA)	Kuat Cahaya (Lumen)
01 AS	10.50	0.7156	7.51	306.4
	11.00	0.7141	7.85	319.4
	12.00	0.7123	8.55	343.6
	13.00	0.7114	9.25	366.6
	14.00	0.7118	9.96	388.6
01 BS	10.50	0.7229	7.59	289.1
	11.00	0.7224	7.95	301.0
	12.00	0.7222	8.67	324.5
	13.00	0.7244	9.42	344.7
	14.00	0.7275	10.18	365.0

Catatan :

Standar Acuan : Goniometer dan Lampu Standar GEC 39.7 Watt, 99.13 Volt DC.
Kuat Cahaya 376 Lumen.
Sumber cahaya : -
Ketertelusuran : Tertelusur ke SI melalui PTB - Jerman.
Prosedur Kalibrasi : PK-UKTO-OP08.

Ketidakpastian pengukuran dilakukan pada tingkat kepercayaan 95 %, faktor cakupan $k = 2$,
adalah : ± 0.8 %.

