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DATE OF ISSUE	2014. 06. 30



# LED Driver

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# SPECIFICATION

Model : SI-EPF006650WW

CUSTOMER :	
CHECKED	APPROVED
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SAMSUNG			
DRAWN	CHECKED		APPROVED
	SALES	QA	
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## REVISION OF SPECIFICATION

	02	Modify the item 10(packing Spec)		2014.07.23	SK.Choi	CH.Back
	01	modify the item 1.4,2.2.2.3,5.4,8,9		2014.06.30	SK.Choi	CH.Back
	00	The First Specification established.		2014.05.26	SK.Choi	CH.Back
SYMBOL	REV	REVISION	PAGE	DATE	TRACED	APPRO.

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## 1. AC Input Characteristics

### 1.1. Input Voltage

The PSU is capable of supplying full rated output power over the input range of 108 to 305VAC RMS. Its nominal voltages are 120 and 277VAC. The PSU is capable of start-up (power-on) at 108VAC and 47 Hz minimum

Condition	Minimum	Maximum	Units
Nominal	120	277	Vrms
Variable	108	305	Vrms

### 1.2. Input Frequency

The PSU operates with an input frequency range of 47 – 63Hz.

Condition	Minimum	Maximum	Units
Nominal	50	60	Hz
Variable	47	63	Hz

### 1.3. Input Current

Maximum steady state input current is 0.36A (Max.) @120Vac.

Input Voltage	Maximum	Units
120Vac/60Hz	0.36A	Amps(RMS)

### 1.4. Range Switching

The PSU can accept 120Vac to 277Vac full input range. No range switching is necessary or possible.

### 1.5. Inrush Current

The cold or hot start inrush current should be less than 20A and not cause the fuse open or component damaged. (The Time duration at 50% of Ipeak is 350usec.)

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## 1.6. Power Factor

Power factor must higher than 0.9 @ 120-277Vac with the output current greater than 57% of rated current and the total output power higher than half load conditions.

Parameter	Symbol	Condition	Specifications			Units
			min.	typ.	max.	
Power Factor	PF	Vac= 120-277Vac Io= 0.578-1.05A, Vo=20-50V Po>15W	0.9	-	1.00	

## 1.7. THD (Total Harmonic Distortion)

The THD of PSU should < 20% at input 120VAC to 277VAC with the output current higher than 55% of rated current and the total output power higher than half load conditions

Parameter	Symbol	Condition	Specifications			Units
			min.	typ.	max.	
THD	TH	Vac= 120-277Vac Io= 0.578-1.05A, Vo=20-50V Po>15W	-	-	20	%

## 1.8. Power Saving

At stand-by mode, the power consumption should less than 1W. The stand-by mode is definition by the AD pin supplied from external DC voltage under 1V.

Parameter	Symbol	Condition	Specifications			Units
			min.	typ.	max.	
Power saving	--	Vac= 120-277Vac	--	--	1	Watts

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## 2. DC Output Characteristics

### 2.1. Output Voltage and Output Current

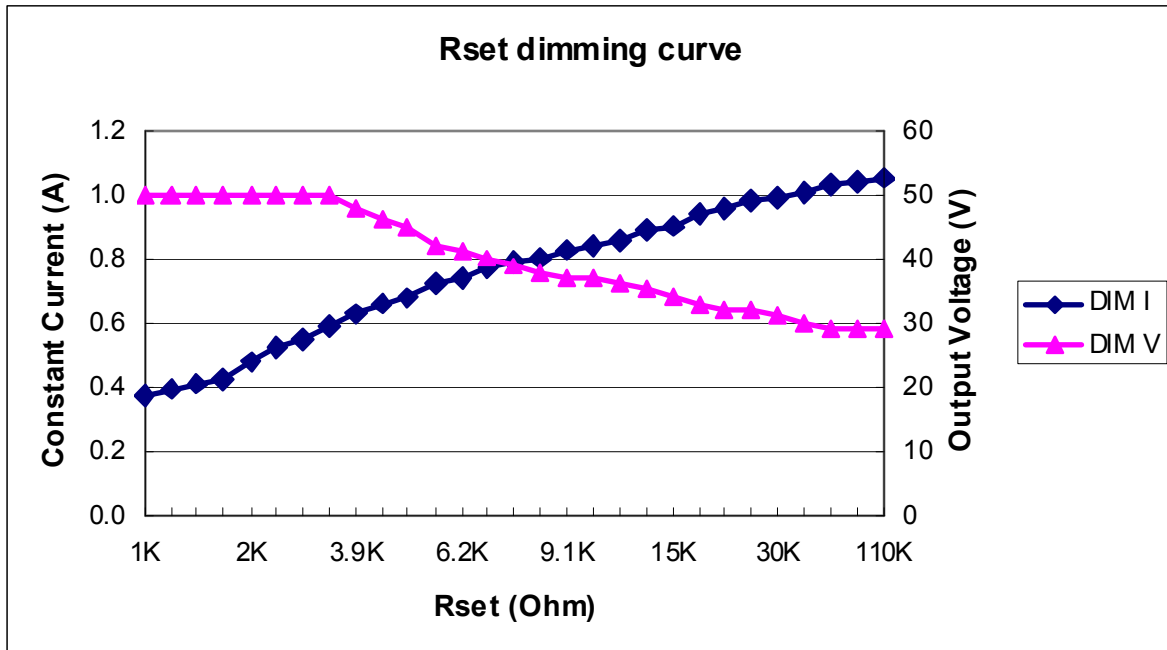
The output current can be adjusted by the Rset resistor. This item is tested under LED mode of E-load and the Rd coefficient should setting at 0.21.

The output condition is as following curve. The tolerance of output voltage should be within  $\pm 2\%$  of setting value and output current should be within  $\pm 5\%$  of rated current.

The output current adjusted method is following below:

1. Disconnected Rset resistor to set full load at 29V/1.05A condition.
2. Connected the Rset resistor value to adjust the output current\*. The Rset resistor connected to 3.3KOhm, the output is setting to full load at 50V/0.6A condition.
3. The PSU should has the minimum output current at 0.35A when the Rset resistor less than 1Kohm

\* The Rset value is referring to Appendix A.





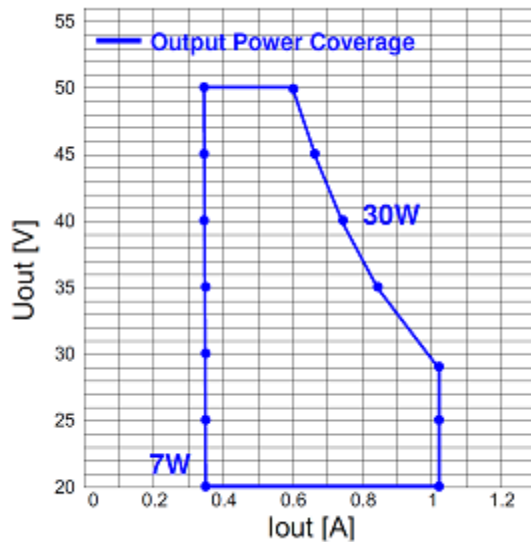
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The output Voltage range is referring from following form :

Parameter	Condition	Minimum	Normal	Maximum	Units
Operating Voltage	$I_o = 0.35 \sim 1.05A$	20	--	50	Volts
Output Power	$I_o = 0.35 \sim 1.05A$ $V_o = 20 \sim 50V$	7	--	30	Watts

\* The output voltage is limited by max output power. When the output current is 1.05A, the maximum output voltage will be 29 volts. If the output current is setting to 0.6A by Rset resistor, the maximum output voltage will be up to 50 volts. The detail value is referring from Appendix A.

The output power coverage is referring from following:



## 2.2. Turn-On Delay Time

DC output turn-on delay time should less than 1 second at 108Vac input and typical load condition. (29V/1.05A)

The turn-on delay time is measured from “AC turn on” to “output reach 95% of rated current”.

## 2.3. Efficiency

The efficiency should greater than 83% at output condition 29V/1.05A and 50V/0.6A under 120V/60Hz and 277V/50Hz. (The PSU should warm up under full load condition at least 30 minutes).

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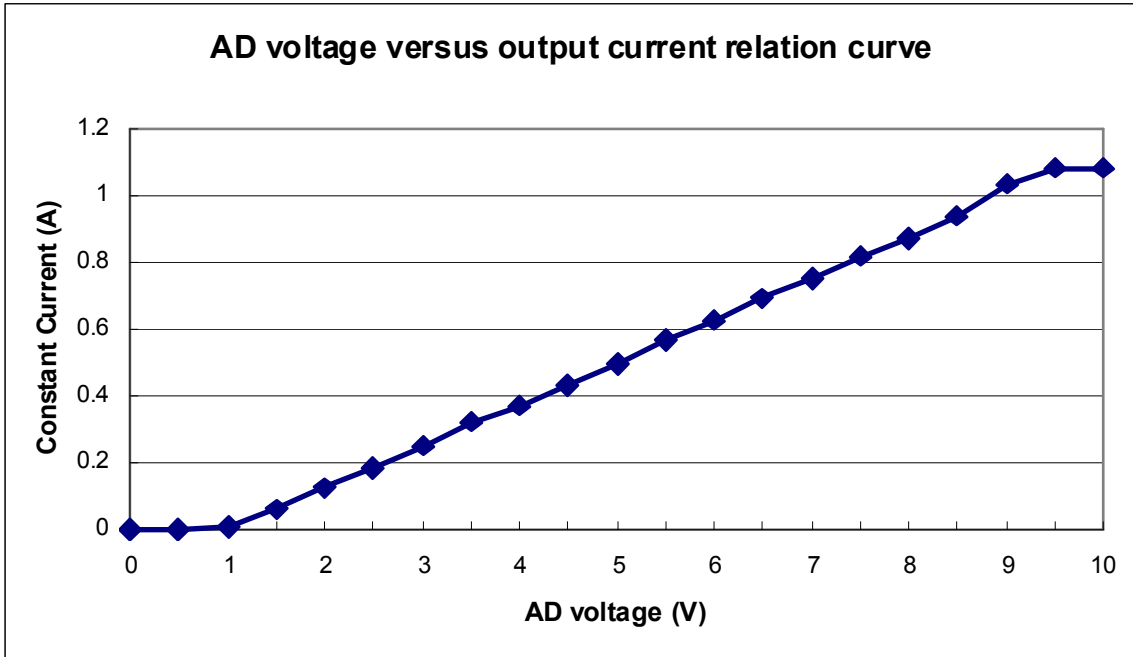
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## 2.4. Dimming

The PSU has AD dimming function. It must be used with DC 0~10V. Dimming Curve is as below:

(The current of LED module is 0.5A ± 5% at full load condition.)



## 3. Protection Requirements

### 1.1. Short Circuit Protection

The PSU should be protected when the output short and do not result in a fire hazard, shock hazard, or damage to the PSU. The protection is auto-recovery mode. The test procedure is setup at LED mode and short V+ to GND, after the fault condition removed, the PSU should be auto-recovery and works normally.

### 1.2. OVP Protection

When No Load Condition occurs, the PSU should Clamp output voltage at the OVP Voltage and not to damage the PSU. The OVP Voltage can adjust by Rset. After the Load is switch on, the PSU should be works normally. The OVP Voltage can adjust by Rset. OVP Voltage is referring from following curve.

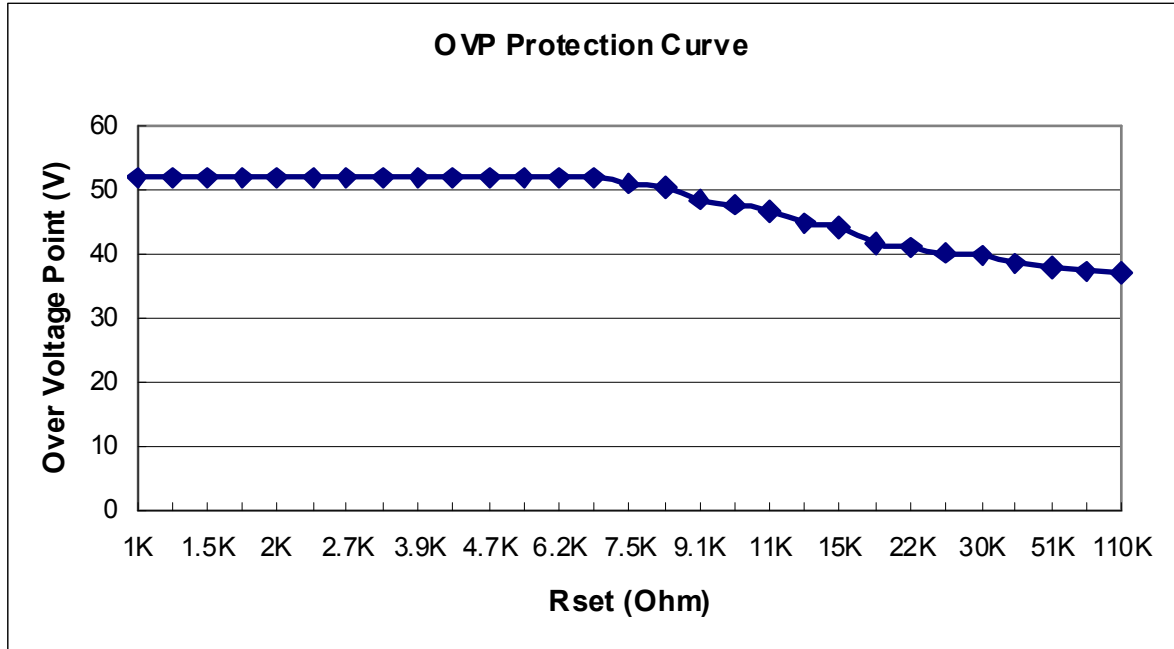
The maximum OVP voltage should be under 56V





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Output Name	Over Voltage Limit	Protection
Vo	< 56V	Auto-reovery



## 4. Environmental (Temperature and Humidity)

### 4.1. Operating

Temperature	The PSU shall operate from -20°C to 50°C.
Relative Humidity	10% to 90% relative humidity.
Altitude	2,000 feet above sea level or 10,000 feet above sea level with a 32°C maximum ambient air temperature.

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## 4.2. Shipping / Storage

Temperature	The PSU can be storage from ambient -25°C to 80°C.
RelativeHumidity	20% to 90% relative humidity.
Altitude	20,000 feet above sea level.

## 5. Isolation (High Potential Testing)

### 5.1. Dielectric Strength (HI-POT)

One hundred percent (100%) of PSU shall comply with the minimum production line Hi-Pot (High Potential) test as noted below. The test shall be applied between the L/N (AC Line and Neutral) to Output Terminal (Vout and RTN).

Parameters	Setting
Voltage	3750 Vac minimum
Trip Current Sensitivity	10 milli-amperes maximum
Voltage Ramp Time	500 V/Second ramp minimum
Dwell Time	60 seconds for safety apply, 3 seconds for mass production(4000 Vac)
Breakdown Arc Detection	10 microseconds maximum

One hundred percent (100%) of PSU shall comply with the minimum production line Hi-Pot (High Potential) test as noted below. The test shall be applied between the L/N (AC Line and Neutral) to PE (Chassis/Input receptacle ground terminal).

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Parameters	Setting
Voltage	1500 Vac minimum
Trip Current Sensitivity	10 milli-amperes maximum
Voltage Ramp Time	500 V/Second ramp minimum
Dwell Time	60 seconds for safety apply, 3 seconds for mass production(1800 Vac)
Breakdown Arc Detection	10 microseconds maximum

## 5.2. Insulation Resistance

One hundred percent (100%) of PSU shall comply with the minimum production line Insulation Resistance test as noted below.

The test shall be applied between the L/N (AC Line and Neutral) to Output Terminal (Vout and RTN).

Parameters	Setting
Voltage	500Vdc minimum
Dwell Time	60 seconds for safety apply, 3 seconds for mass production
Insulation Resistance	4 M ohms

One hundred percent (100%) of PSU shall comply with the minimum production line Insulation Resistance test as noted below. The test shall be applied between the L/N (AC Line and Neutral) to PE (Chassis/Input receptacle ground terminal).

Parameters	Setting
Voltage	500Vdc minimum
Dwell Time	60 seconds for safety apply, 3 seconds for mass production
Insulation Resistance	2 M ohms

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## 5.3. Leakage current

The maximum leakage current is 700uA at 277Vac 60Hz with resistive load.

(Please refer to IEC 60950).

Parameters	Setting
Input Voltage	277Vac/60Hz
Leakage Current	700 micro-amperes maximum

## 5.4. Earth continuity(IEC61347)

One hundred percent (100%) of PSU shall comply with the minimum production line Insulation Resistance test as noted below. The test shall be applied between the PE (Input receptacle ground terminal) to PE (Chassis).

Maximum resistance: 0.50Ω. Measured by passing a minimum current of 10 A with a no-load voltage not exceeding 12 V for at least 1 s.

Parameters	Setting
Voltage	12V maximum
Current	10A minimum
Dwell Time	60 seconds for safety apply 3 seconds for mass production
Maximum Resistance	0.5 ohms

## 6. Safety & Requirements

### 6.1. Safety

The PSU should meet following requirements:

<b>Standard</b>	UL/cUL	UL60950 + UL8750
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## 6.2. EMI

The PSU should meet following requirements. The test voltage has tested under 120Vac/60Hz at full load. The margin limit is under 3dB.

<b>Standard</b>	FCC	FCC Part 15 Class B
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## 6.3 Surge

The PSU Should meet floolwing requirements :

<b>Standard</b>	IEC / EN	IEC/EN61547
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Characteristics	Test Level		
	Equipment		
	Semi-luminaire	Independent driver	
		Input Power Level	
	$\leq 25W$	$> 25W$	
Waveform	-	-	1.2/50 $\mu s$
Test Level	L-N	-	$\pm 1$ kV
	L/N - GND	-	$\pm 2$ KV

Note: L-N use low impedance (2 ohm) five times for each phase. L/N - GND use high impedance (12 ohm) five times for each phase.

## 6.4. ESD(Electrostatic Discharges)

The PSU with lighting fixture should meet following requirements:

Standard		Test Specification
ESD	IEC 61000-4-2	Contact Discharge $\pm 4KV$
		Air Discharge $\pm 8KV$

\*For built-in type PSU, the test must be done under simulating assembling method in the system; the model is using screws attached to the lighting fixture so it only need to test ESD for outer case.

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## 7. Reliability

Item	Descriptions	Specification
Electrolytic Capacitor Life	Input Vac :120~277Vac Ambient: 50°C Output Loading: 100% of full load	$\geq 50,000$ hours
CMTBF	Input Vac :120~277Vac Ambient: 25°C Output Loading: Full load	$\geq 100,000$ hours
Burn-in (MP stage)	AC 120V/60Hz 100% Burn-in with 100% load (ORT random test) AC 277V/60Hz 100% Burn-in with 100% load (100% MP stage) 35~45°C Environment temperature Burn-in 2 hours	No function error No damage

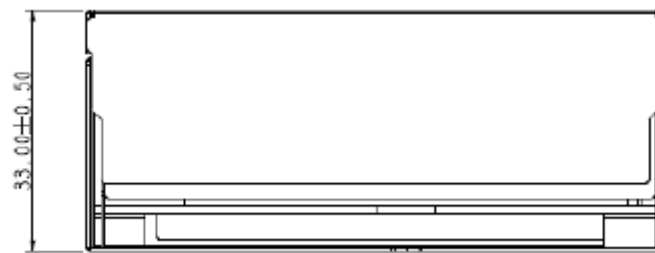
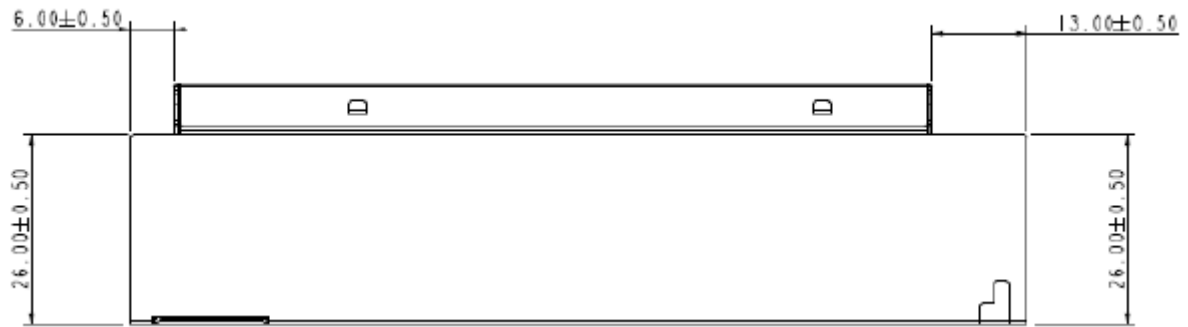
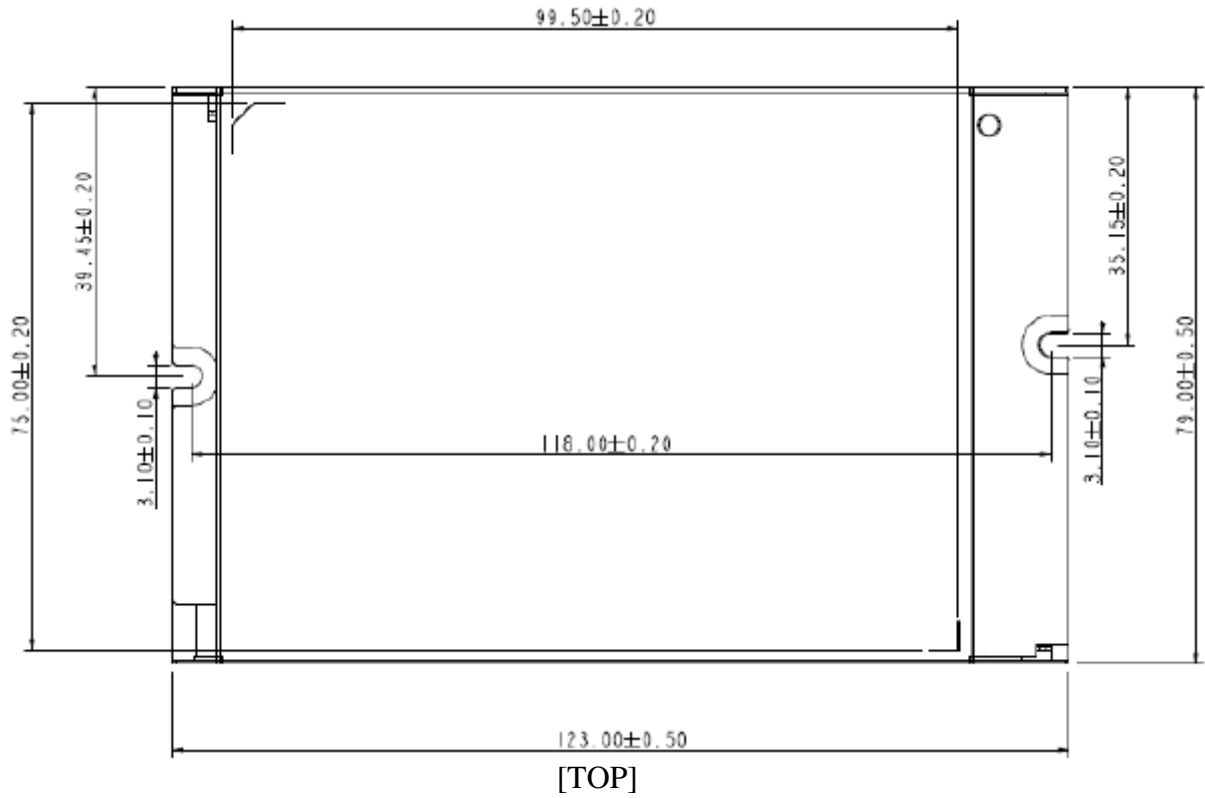
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## 8. Outline Dimensions: 123 \* 79 \* 33mm



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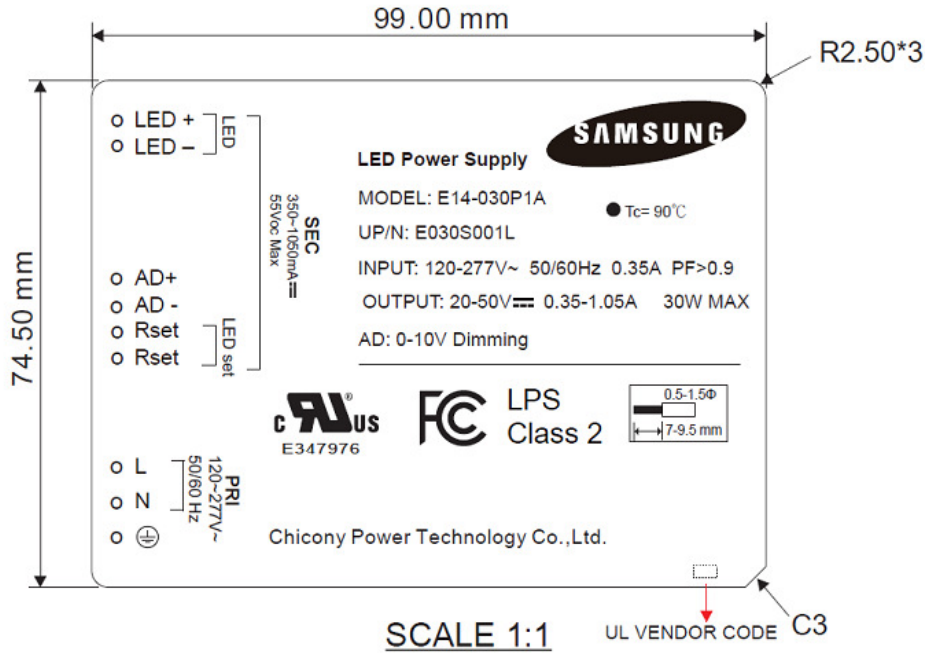
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## 9. Label Drawing:





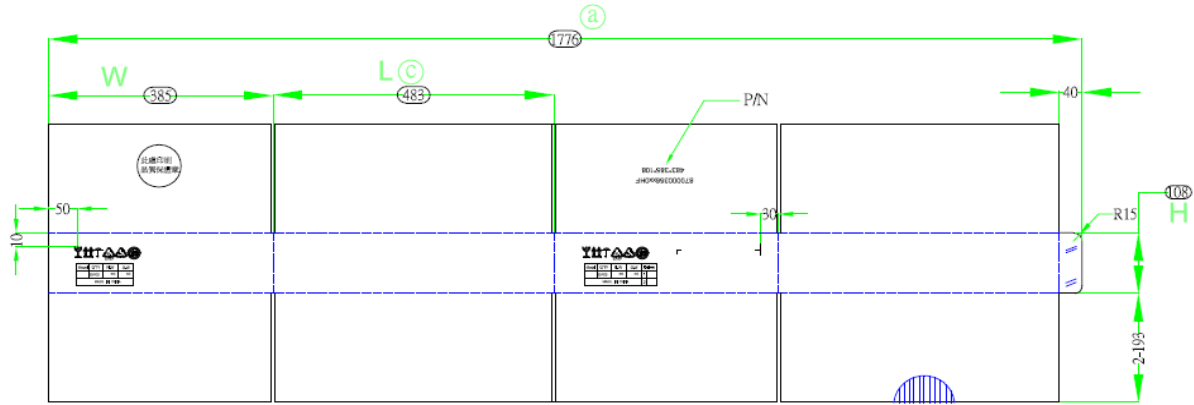
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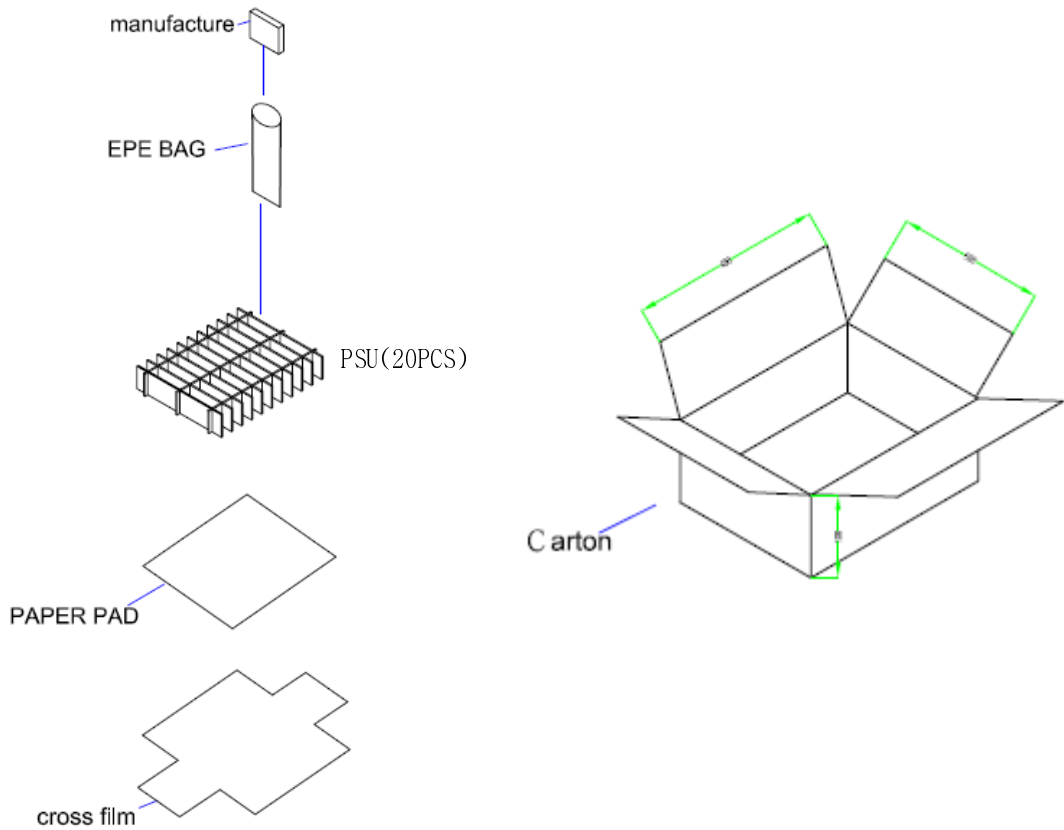
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## 10. Packing Specification



### 10.2. Stock pattern





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## 11. Appendix A

The Rset resistor set-up table is as below:

Rset Dimming Function Test Data				
Rset Value	Output Current	Output Voltage	Max Operating Voltage	OVP Voltage
1K	0.3700A	20~50V	50V	52V
1.3K	0.3900A	20~50V	50V	52V
1.5K	0.4100A	20~50V	50V	52V
1.6K	0.4200A	20~50V	50V	52V
2K	0.4800A	20~50V	50V	52V
2.4K	0.5200A	20~50V	50V	52V
2.7K	0.5500A	20~50V	50V	52V
3.3K	0.5900A	20~50V	50V	52V
3.9K	0.6300A	20~48V	48V	52V
4.3K	0.6600A	20~46V	46V	52V
4.7K	0.6800A	20~45V	45V	52V
5.6K	0.7200A	20~42V	42V	52V
6.2K	0.7400A	20~41V	41V	52V
6.8K	0.7700A	20~40V	40V	52V
7.5K	0.7900A	20~39V	39V	51V
8.2K	0.8000A	20~38V	38V	51V
9.1K	0.8300A	20~37V	37V	49V
10K	0.8400A	20~37V	37V	48V
11K	0.8600A	20~36V	36V	47V
13K	0.8900A	20~35V	35V	45V
15K	0.9000A	20~34V	34V	44V
20K	0.9400A	20~33V	33V	42V
22K	0.9600A	20~32V	32V	41V
24K	0.9800A	20~32V	32V	40V
30K	0.9900A	20~31V	31V	40V
43K	1.0100A	20~30V	30V	39V
51K	1.0300A	20~29V	29V	38V
82K	1.0400A	20~29V	29V	37V
110K	1.0500A	20~29V	29V	37V