

## LED Driver

# Indoor 30 W Dimmable SI-EPF006650WW



## Constant Current LED Driver Wide Operating Range up to 1.05 A – Dimmable

### Features & Benefits

- Output Current Range: 0.35 ~ 1.05 A (adjustable via LED set)
- Output Voltage Range: 20 ~ 50 Vdc
- Output Power Range: 7 ~ 30 W
- Dimming Control: 0-10 V
- Input Voltage: 120 ~ 277 Vac, 50/60 Hz
- Safety: UL / cUL (UL 60950 + UL 8750)
- EMI: FCC Part 15 Class B
- Protections: Open Load, Short Circuit,
- $t_a$  Range: -20 ~ +50 °C
- Expected lifetime: 50,000 hours at  $t_a = 50$  °C
- Long lasting & high reliability
- Small compact housing

### Applications

- Downlights, Spotlights and other Indoor Lighting Applications



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## 1. Characteristics

| Article                   |            | Symbol          | Specification |      |      | Unit            | Note                                                                                         |
|---------------------------|------------|-----------------|---------------|------|------|-----------------|----------------------------------------------------------------------------------------------|
|                           |            |                 | Min.          | Typ. | Max. |                 |                                                                                              |
| INPUT SPECIFICATIONS      |            |                 |               |      |      |                 |                                                                                              |
| Nominal Voltage           |            | V <sub>in</sub> | 120           |      | 277  | Vac             | Full input range, no range switching                                                         |
| Voltage Range             |            |                 | 108           |      | 305  | Vac             |                                                                                              |
| Nominal Frequency         |            | f <sub>in</sub> | 50            |      | 60   | Hz              |                                                                                              |
| Frequency Range           |            |                 | 47            |      | 63   | Hz              |                                                                                              |
| Input Current             | At 120 Vac | I <sub>in</sub> |               |      | 0.36 | A               | At full load                                                                                 |
|                           | At 277 Vac | I <sub>in</sub> |               |      | 0.16 | A               | At full load                                                                                 |
| Total Harmonic Distortion |            | THD             |               |      | 20   | %               | At P <sub>o</sub> >17 W, 120-277 Vac                                                         |
| Power Factor              |            | PF              | 0.9           |      |      | -               | At P <sub>o</sub> >17 W, 120-277 Vac                                                         |
| Efficiency                |            | η               | 83            | 86   |      | %               | At full load, 120-277 Vac                                                                    |
| Stand-by Power            |            |                 |               |      | 1    | W               | At <1 V dimming voltage, 120-277 Vac                                                         |
| Protection Class          |            |                 | 2             |      |      | -               |                                                                                              |
| In-rush Current           |            |                 |               |      | 20   | A <sub>pk</sub> | Cold or hot start (t <sub>width</sub> = 350 μs measured at 50 % I <sub>pk</sub> ) at 277 Vac |
| OUTPUT SPECIFICATIONS     |            |                 |               |      |      |                 |                                                                                              |
| Nominal Voltage           |            | V <sub>o</sub>  | 20 ~ 50       |      |      | Vdc             | ±2 %;    at I <sub>o</sub> = 0.35-1.05 A                                                     |
| Max. Voltage              |            |                 |               |      | 59   | Vdc             | Open circuit, No-load protection                                                             |
| Nominal Current           |            | I <sub>o</sub>  | 0.35 ~ 1.05   |      |      | A               | ±5 % (1.05 A),    ±10 % (0.5 A)                                                              |
| Nominal Power             |            | P <sub>o</sub>  | 7 ~ 30        |      | 30   | W               | At I <sub>o</sub> = 0.35-1.05 A, V <sub>o</sub> = 20-50 V                                    |
| Turn-on Delay Time        |            | T <sub>d</sub>  |               |      | 1    | s               | At full load, 108 Vac input                                                                  |

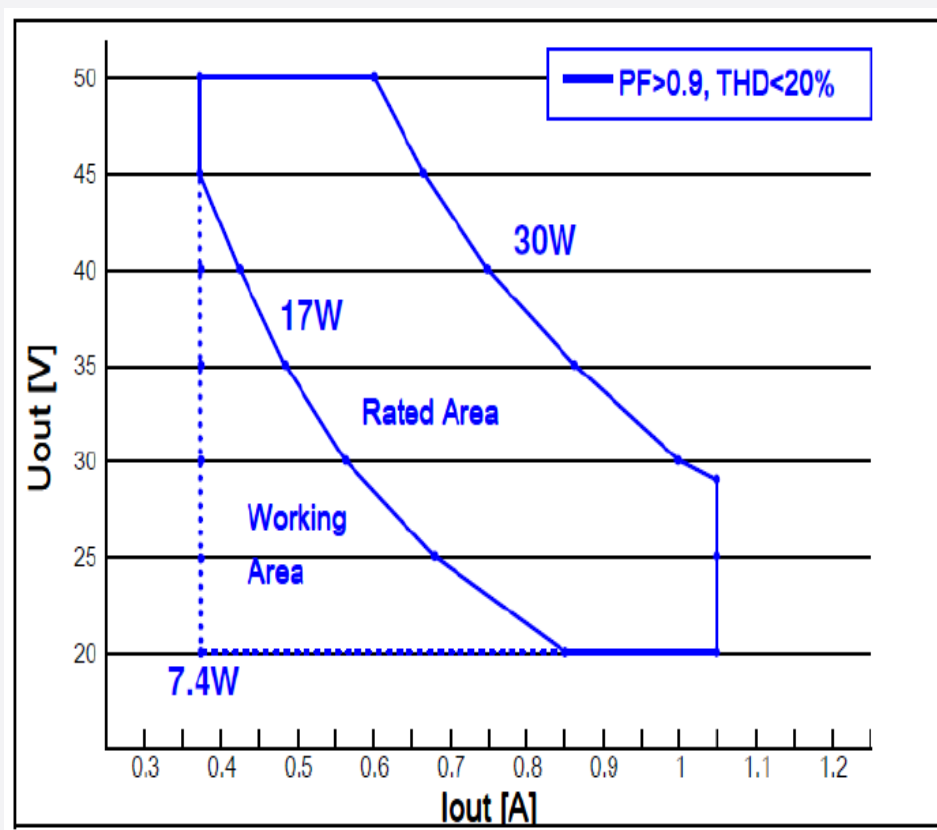


| Article                      | Symbol         | Specification   |      |      | Unit                              | Note                                                               |
|------------------------------|----------------|-----------------|------|------|-----------------------------------|--------------------------------------------------------------------|
|                              |                | Min.            | Typ. | Max. |                                   |                                                                    |
| DIMMING SPECIFICATIONS       |                |                 |      |      |                                   |                                                                    |
| Dimming Control              |                | 0-10 V          |      |      | See Dimming Specification section |                                                                    |
| ENVIRONMENTAL SPECIFICATIONS |                |                 |      |      |                                   |                                                                    |
| Ambient Temperature          | t <sub>a</sub> | -20             |      | 50   | °C                                |                                                                    |
| Case Temperature             | t <sub>c</sub> |                 |      | 90   | °C                                | Measured at t <sub>c</sub> point as indicated on the product label |
| Storage Temperature          | t <sub>s</sub> | -25             |      | 80   | °C                                | Cool down before operating                                         |
| Relative Humidity            |                | 20              |      | 90   | %                                 | Not condensing                                                     |
| Surge Transient Protection   | L / N          |                 |      | ±1   | kV                                | According to IEC/EN 61547                                          |
|                              | LN / GND       |                 |      | ±2   | kV                                |                                                                    |
| IP Rating                    |                |                 | 20   |      | -                                 | Suitable for indoor environment                                    |
| Expected Lifetime (e-cap)    |                | 50,000          |      |      | h                                 | At t <sub>a</sub> = 50 °C, full load, 120-277 Vac                  |
| MTBF                         |                | 100,000         |      |      | h                                 | At t <sub>a</sub> = 25 °C, full load, 120-277 Vac                  |
| Dimensions                   | L x W x H      | 4.8 x 3.1 x 1.3 |      |      | inch                              |                                                                    |
|                              |                | 123 x 79 x 33   |      |      | mm                                |                                                                    |
| Net Weight                   |                |                 | 240  |      | g                                 | ± 25 g                                                             |

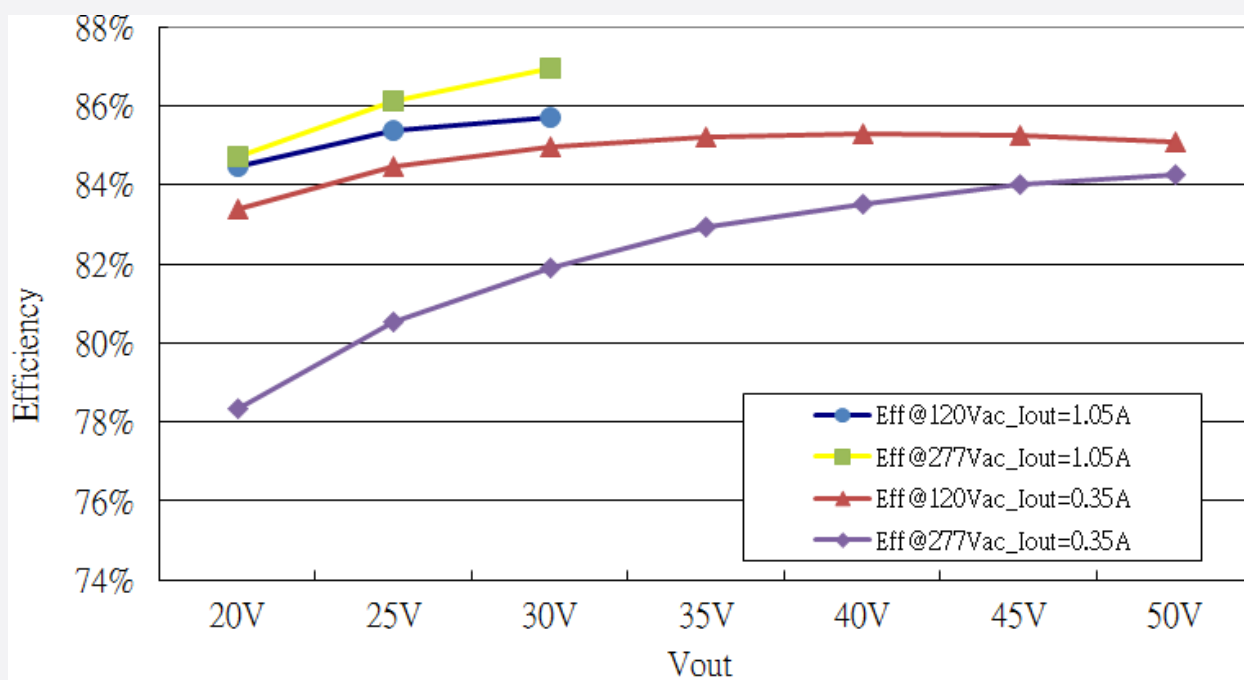


## 2. Typical Characteristics Graphs

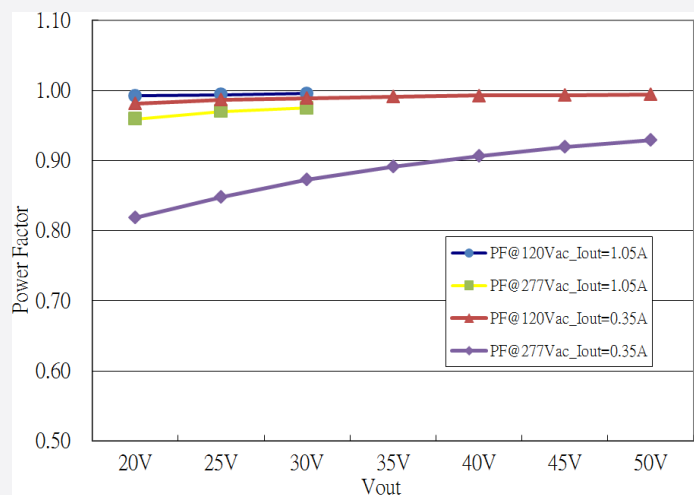
### a) Operating Window



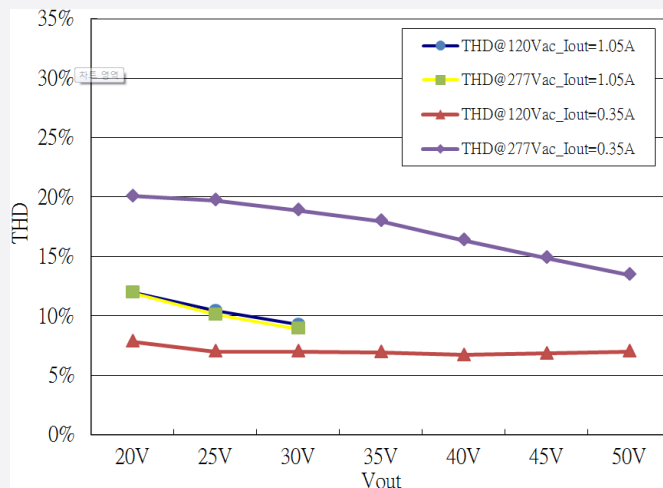
### b) Efficiency vs. Load



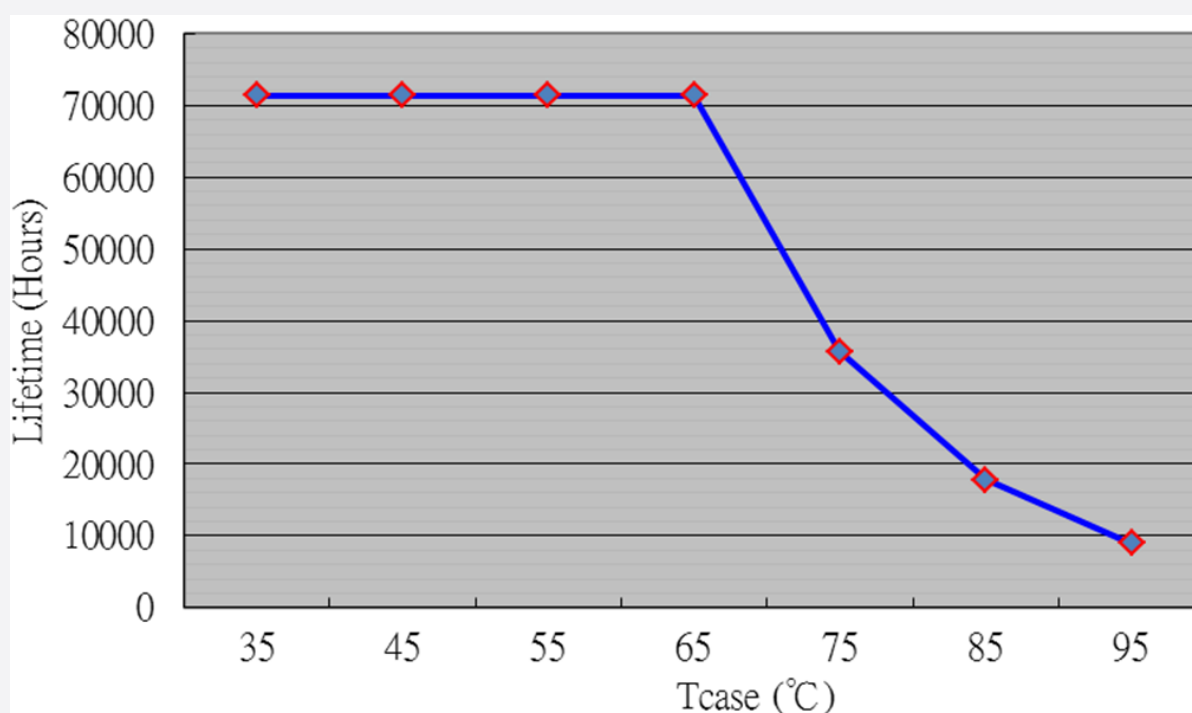
### c) Power Factor vs. Load



### d) Total Harmonic Distortion vs. Load



### e) Tcase VS. Lifetime



### f) Current Setting

The output current can be adjusted using Rset resistor:

- Disconnect Rset resistor to set full load at 1.05 A / 29 V condition
- Connect Rset resistor to set output current (see below table and curve); for Rset = 3.3 kOhm, the output is full load at 0.59 A / 50 V condition
- The unit has minimum output current at 0.37A when the Rset is less than 1 kOhm
- The output voltage is limited by maximum output power (if the output current is set at 1.05 A, the maximum output voltage will be 29 V; if the output current is set at 0.6 A, the maximum output voltage will be 50 V)
-

| Rset Dimming Function Test Data |                |                |                       |             |
|---------------------------------|----------------|----------------|-----------------------|-------------|
| Rset Value                      | Output Current | Output Voltage | Max Operating Voltage | OVP Voltage |
| 1K                              | 0.3500A        | 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         |

### 3. Protection

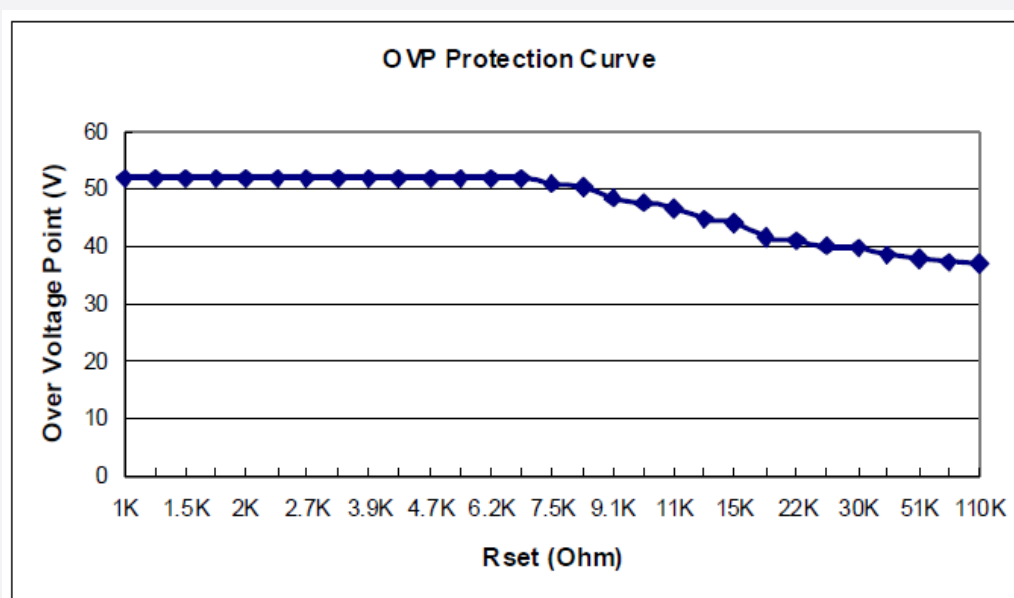
#### a) Output Short Circuit Protection

The unit is protected when output is short thus avoiding fire hazard, shock hazard and damage to the unit. After the short circuit fault condition is removed, the unit will be in auto recovery mode.

#### b) Output Over Voltage Protection

When no load condition occurs, the unit will clamp output voltage to the OVP Voltage avoiding damage to the unit. After the load is connected, the unit will be in auto recovery mode.

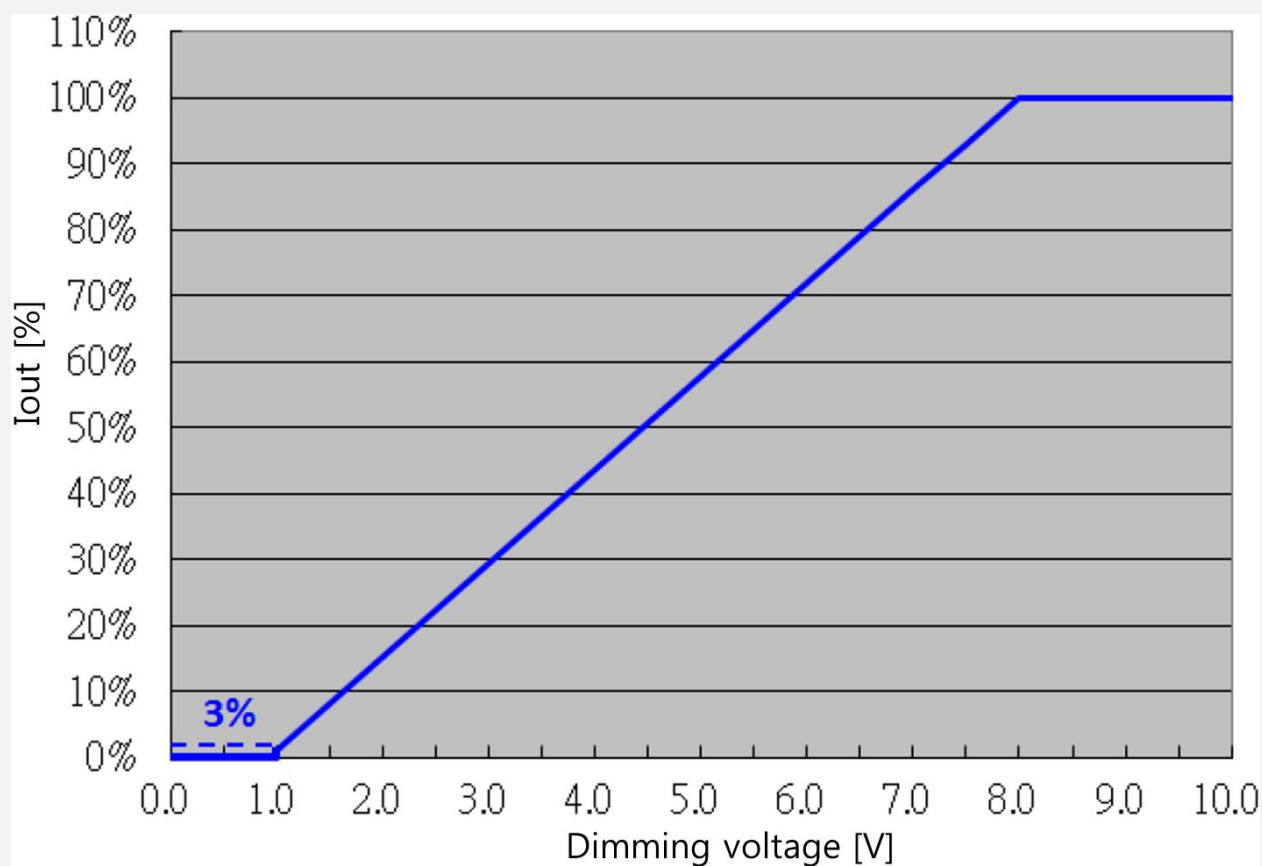
The OVP Voltage varies according to the Rset resistor value (see below curve and table) and under 55 V.



| Protection Specification | Protection Mode         | Condition                       |
|--------------------------|-------------------------|---------------------------------|
| Short Circuit Protection | Auto-Recovery           | (1)AC turn on then output short |
|                          |                         | (2)Output short then AC turn on |
| Open Load Protection     | Clamp Open Load Voltage | (1)AC turn on then output open  |
|                          | (Refers to OLP curve)   | (2)Output open then AC turn on  |
| AC Transient Protection  | Auto-Recovery           | 120~277Vac range switching      |

#### 4. Dimming Specification

The unit has Analog Dimming (AD) function, using 0-10 Vdc. The typical dimming curve is shown below:  
(the current of LED module is 1.05 A at full load condition)



|         | Symbol              | Unit | Min | Typ | Max | Remark                                |
|---------|---------------------|------|-----|-----|-----|---------------------------------------|
| Dimming | Range               | V    | 0   |     | 10  |                                       |
|         | Dim off             | V    | 0   |     | 1   | MIN Dimming off<br>Tolerance : 1 ~ 3% |
|         | Dim. Min.           | V    | 1   |     |     |                                       |
|         | Dim Max.            | V    | 8   |     | 10  |                                       |
|         | I <sub>SOURCE</sub> | mA   |     |     | 0.6 |                                       |

## 5. Reliability

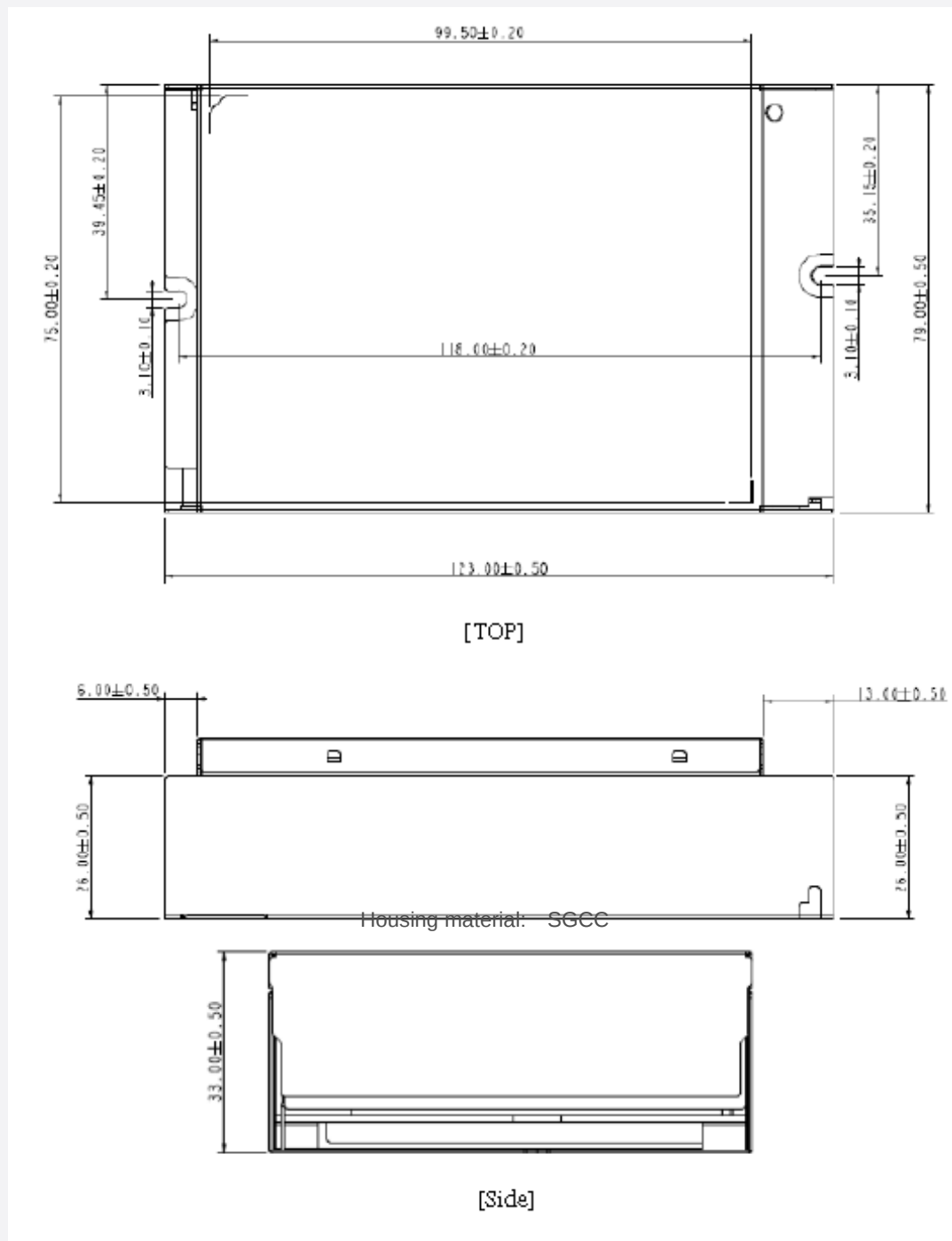
### Test Items and Conditions

| Test Item             |                | Specification                                     | Condition                                                    |
|-----------------------|----------------|---------------------------------------------------|--------------------------------------------------------------|
| Leakage Current       |                | < 0.7 mA                                          | According to IEC/EN 60950                                    |
| Earth Continuity      |                | < 0.5 $\Omega$                                    | According to IEC/EN 61347<br>100 % tested in production line |
| Hi-Pot                | Input – Output | 3750 Vac, 60 s, cut-off current 10 mA             | 100 % tested in production line                              |
|                       | Input – Case   | 1500 Vac, 60 s, cut-off current 10 mA             | 100 % tested in production line                              |
| Insulation Resistance | Input – Output | 500 Vdc, 60 s, insulation resistance 4 M $\Omega$ | 100 % tested in production line                              |
|                       | Input – Case   | 500 Vdc, 60 s, insulation resistance 2 M $\Omega$ | 100 % tested in production line                              |
| Surge                 | L / N          | $\pm 1$ kV                                        | According to IEC/EN 61547                                    |
|                       | LN / GND       | $\pm 2$ kV                                        |                                                              |
| ESD                   | Contact        | $\pm 4$ kV                                        | According to IEC 61000-4-2                                   |
|                       | Air            | $\pm 8$ kV                                        |                                                              |



## 6. Outline Drawing & Dimension

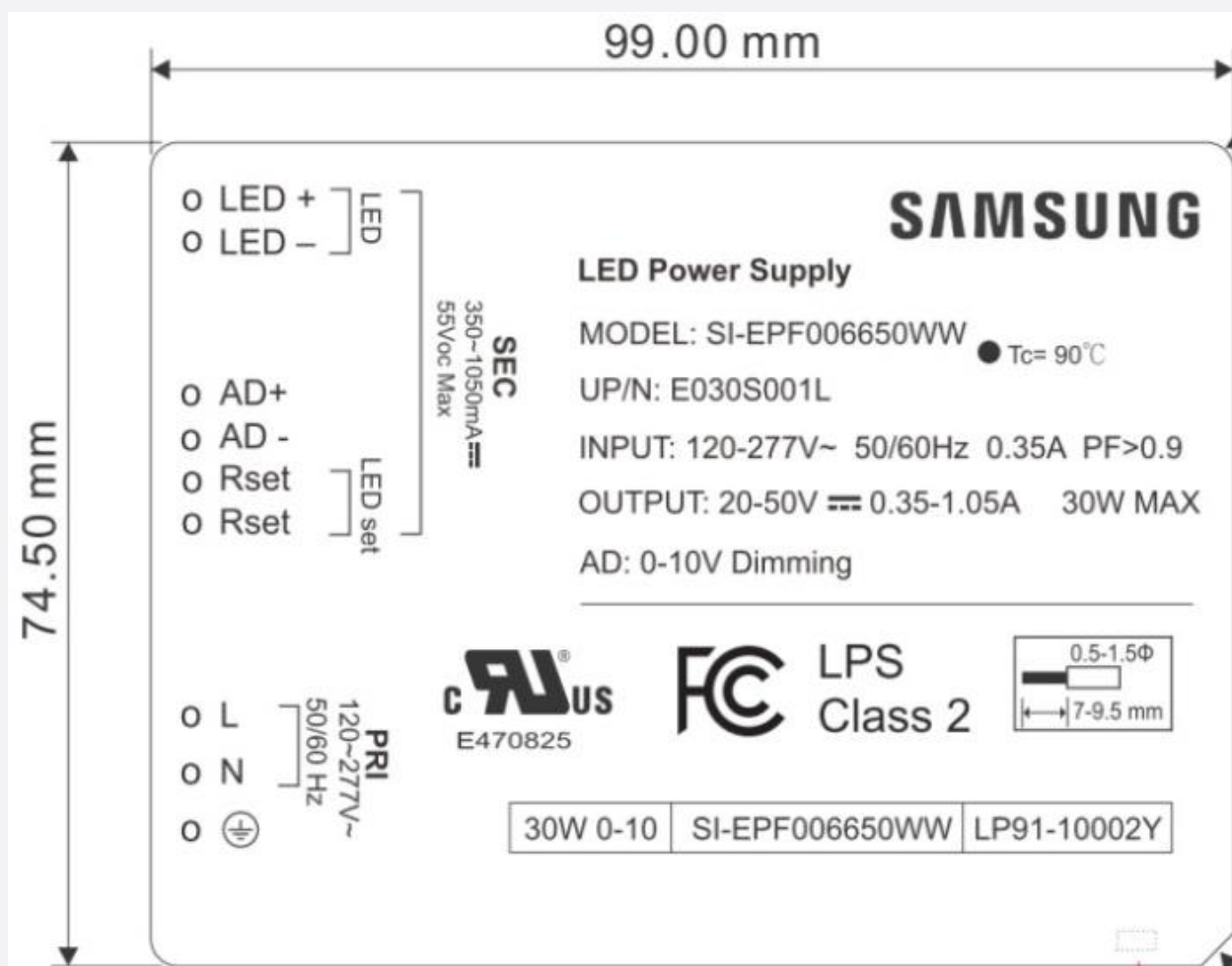
### a) Dimension (mm)



### b) Wiring

|                                     |                      |
|-------------------------------------|----------------------|
| Connectors type (input and output): | DN250A or compatible |
| Wire cross-section:                 | 0.5 - 1.5 Ø          |
| Wire peeling length:                | 7 - 9.5 mm           |

## 7. Label Structure



## 8. Packing Structure

| Packing material | Max. quantity (pcs)  | Dimension (mm) |       |        |
|------------------|----------------------|----------------|-------|--------|
|                  |                      | Length         | Width | Height |
| Outer Box        | 20                   | 483            | 385   | 108    |
| Pallet           | 960 (48 outer boxes) | 1220           | 1020  | 120    |



## 9. Precautions in Handling & Use

- 1) To prevent the LED Driver from any defect, please handle and store it with care
  - Do not drop or give shock
  - Do not store in very humid location or at extreme temperature
  - Do not open or disassemble the product
- 2) Static electricity or surge voltage may damage the components inside LED Driver, as such please observe proper anti-electrostatic working process
  - People handling the Driver should be well grounded (e.g. using ESD wrist band) and wear anti-static working clothes and gloves
  - All related devices and instruments in the production line should be well grounded (e.g. working table, measuring equipment, assembly jigs)
- 3) Observe the correct polarity of output terminal
- 4) Avoid input voltage exceeds the maximum rating, which will cause damage to the circuit and result in malfunction



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