

## Features

- Leading Edge and Trailing Edge AC Dimmable
- Constant Current Output
- High Efficiency (Up to 86%)
- Active Power Factor Correction (Up to 0.95)
- All-Around Protection: SCP and OLP
- Class 2 Output



## Description

The LLC-040SxxxRSP series operates from a 90 ~ 132 Vac input range. They are designed to be highly efficient and reliable. Features include dimming control with leading edge and trailing edge, open lamp, short circuit and thermal protections.

## Models

| Output Current | Input Voltage Range(1) | Output Voltage Range | Max. Output Power | Efficiency (2) | Power Factor (2) | Model Number                     |
|----------------|------------------------|----------------------|-------------------|----------------|------------------|----------------------------------|
| 350 mA         | 90 ~ 132 Vac           | 60-100Vdc            | 35 W              | 86%            | 0.95             | LLC-040S035RSP                   |
| 500 mA         | 90 ~ 132 Vac           | 40-70 Vdc            | 35 W              | 85%            | 0.95             | LLC-040S050RSP                   |
| 700 mA         | 90 ~ 132 Vac           | 30-50 Vdc            | 35 W              | 85%            | 0.95             | LLC-040S070RSP <sup>(3)</sup>    |
| 820 mA         | 108 ~ 132 Vac          | 30-42 Vdc            | 35 W              | 85%            | 0.95             | LLC-040S082RSP <sup>(3)</sup>    |
| 1050 mA        | 90 ~ 132 Vac           | 20-33 Vdc            | 35 W              | 83%            | 0.95             | LLC-040S105RSP <sup>(3)(4)</sup> |

**Notes:** (1) Certified input voltage range: 108-120Vac(LLC-040S082RSP), 100-120Vac(other models).

(2) Measured in 120 Vac input with full conduction angle at full load.

(3) UL Class 2 (US).

(4) CUL Class 2 (Canada).

## Input Specifications

| Parameter                        | Min.   | Typ. | Max.                  | Notes                                                             |
|----------------------------------|--------|------|-----------------------|-------------------------------------------------------------------|
| Input Voltage                    | 90 Vac | -    | 132 Vac               |                                                                   |
| Input Frequency                  | 57 Hz  | -    | 63 Hz                 |                                                                   |
| Leakage Current                  | -      | -    | 0.5 mA                | At 120Vac, 60Hz input.                                            |
| Input AC Current                 | -      | -    | 0.5 A                 | Measured at full load and 120 Vac input.                          |
| Inrush Current                   | -      | -    | 50 A                  | At 120Vac input, 25°C cold start, duration=200 us, 10%Ipk-10%Ipk. |
| Inrush Current(I <sup>2</sup> t) | -      | -    | 0.05 A <sup>2</sup> s |                                                                   |
| Power Factor                     | 0.93   | -    | -                     | At 120Vac, 75%load-100%load(30~40W)                               |
| THD                              | -      | -    | 20%                   |                                                                   |

## Output Specifications

| Parameter                 | Min.  | Typ.  | Max.     | Notes                                                    |
|---------------------------|-------|-------|----------|----------------------------------------------------------|
| Output Current Tolerance  | -5%Io | -     | 5%Io     | Full load condition, Input voltage from 110Vac to 132Vac |
| Startup Overshoot Current | -     | -     | 10%Io    | Full load condition                                      |
| No Load Output Voltage    |       |       |          |                                                          |
| Io = 350 mA               | -     | -     | 120V     |                                                          |
| Io = 500 mA               | -     | -     | 84V      |                                                          |
| Io = 700 mA               | -     | -     | 60V      |                                                          |
| Io = 820 mA               | -     | -     | 50.5V    |                                                          |
| Io = 1050 mA              | -     | -     | 39.5V    |                                                          |
| Line Regulation           | -     | -     | ±30%     | 90Vac to 110Vac input.                                   |
|                           | -     | -     | ±3%      | 110Vac to 132Vac input.                                  |
| Load Regulation           | -     | -     | ±30%     | 90Vac to 110Vac input.                                   |
|                           | -     | -     | ±3%      | 110Vac to 132Vac input.                                  |
| Turn-on Delay Time        | -     | 0.40s | 0.75s    | Measured at 120Vac input, 75%load-100%load               |
| Dimming Range             | 0%Io  | -     | 100%Io   |                                                          |
| Temperature coefficient   | -     | -     | 0.03%/°C | Case temperature = 0°C ~Tc max                           |

**Note:** All specifications are typical at 25 °C unless otherwise stated.

## General Specifications

| Parameter                                    | Min.   | Typ.          | Max.   | Notes                                                                                                   |
|----------------------------------------------|--------|---------------|--------|---------------------------------------------------------------------------------------------------------|
| Efficiency at 120Vac Input:                  |        |               |        |                                                                                                         |
| Io = 350 mA                                  | 84%    | 86%           | -      | Measured at full load with full conduction angle and steady-state temperature in 25°C ambient.          |
| Io = 500 mA                                  | 83%    | 85%           | -      |                                                                                                         |
| Io = 700 mA                                  | 83%    | 85%           | -      |                                                                                                         |
| Io = 820 mA                                  | 83%    | 85%           | -      |                                                                                                         |
| Io = 1050 mA                                 | 81%    | 83%           | -      |                                                                                                         |
| No Load Power Dissipation                    | -      | -             | 3 W    |                                                                                                         |
| MTBF                                         | -      | 448,300 Hours | -      | Measured at 120Vac input, 80%load and 25°C ambient temperature (MIL-HDBK-217F)                          |
| Lifetime                                     | -      | 62,500 Hours  | -      | Measured at 120Vac input, 80%Load and 60°C case temperature; See life time vs. Tc curve for the details |
| Operating Case Temperature for Safety Tc_s   | -20 °C | -             | +90 °C |                                                                                                         |
| Operating Case Temperature for Warranty Tc_w | -20 °C | -             | +65 °C | Humidity: 10% RH to 90% RH.                                                                             |
| Storage Temperature                          | -30 °C | -             | +65 °C | Humidity: 5% RH to 90% RH                                                                               |

## General Specifications

| Parameter                                                   | Min. | Typ.                                 | Max. | Notes |
|-------------------------------------------------------------|------|--------------------------------------|------|-------|
| Dimensions<br>Inches (L × W × H)<br>Millimeters (L × W × H) |      | 5.31 × 1.73 × 1.2<br>135 × 44 × 30.5 |      |       |
| Net Weight                                                  | -    | 275 g                                | -    |       |

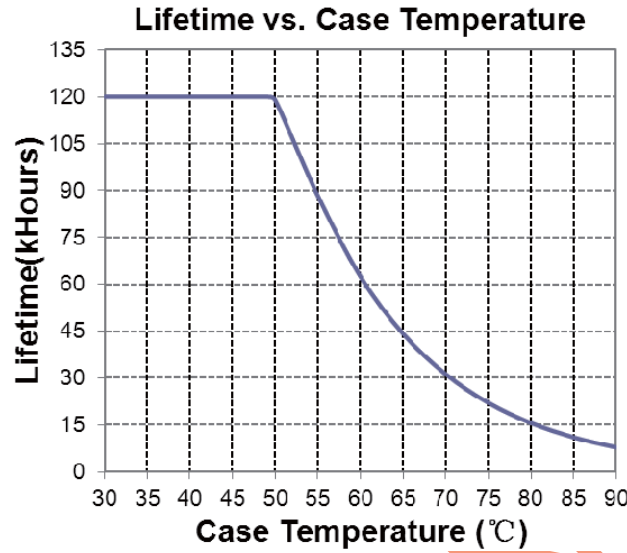
**Note:** All specifications are typical at 25 °C unless otherwise stated.

## Safety & EMC Compliance

| Safety Category            | Standard                                                                                                                                                                                                                                                                            |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UL/CUL                     | UL8750, UL1310, UL1012, CAN/CSA-C22.2 No. 223-M91, CSA C22.2 No. 107.1-01                                                                                                                                                                                                           |
| EMI Standards              | Notes                                                                                                                                                                                                                                                                               |
| EN 55015 <sup>(1)</sup>    | Conducted emission Test & Radiated emission Test                                                                                                                                                                                                                                    |
| EN 61000-3-2               | Harmonic Current Emissions                                                                                                                                                                                                                                                          |
| EN 61000-3-3               | Voltage Fluctuations & Flicker                                                                                                                                                                                                                                                      |
| FCC Part 15 <sup>(1)</sup> | ANSI C63.4:2009 Class B                                                                                                                                                                                                                                                             |
|                            | This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: [1] this device may not cause harmful interference, and [2] this device must accept any interference received, including interference that may cause undesired operation. |
| EMS Standards              | Notes                                                                                                                                                                                                                                                                               |
| EN 61000-4-2               | Electrostatic Discharge (ESD): 8 kV air discharge, 4 kV contact discharge                                                                                                                                                                                                           |
| EN 61000-4-3               | Radio-Frequency Electromagnetic Field Susceptibility Test-RS                                                                                                                                                                                                                        |
| EN 61000-4-4               | Electrical Fast Transient / Burst-EFT: level 3, criteria A                                                                                                                                                                                                                          |
| EN 61000-4-5               | Surge Immunity Test: AC Power Line: line to line 1 kV                                                                                                                                                                                                                               |
| EN 61000-4-6               | Conducted Radio Frequency Disturbances Test-CS                                                                                                                                                                                                                                      |
| EN 61000-4-8               | Power Frequency Magnetic Field Test                                                                                                                                                                                                                                                 |
| EN 61000-4-11              | Voltage Dips                                                                                                                                                                                                                                                                        |
| EN 61547                   | Electromagnetic Immunity Requirements Applies To Lighting Equipment                                                                                                                                                                                                                 |

**Note:** (1) This LED driver meets the EMI specifications above, but EMI performance of a luminaire that contains it depends also on the other devices connected to the driver and on the fixture itself.

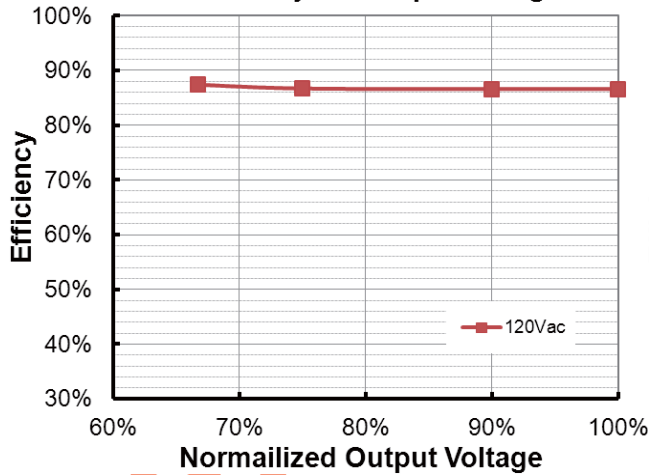
## Lifetime vs. Case Temperature Curve



## Efficiency vs. Load

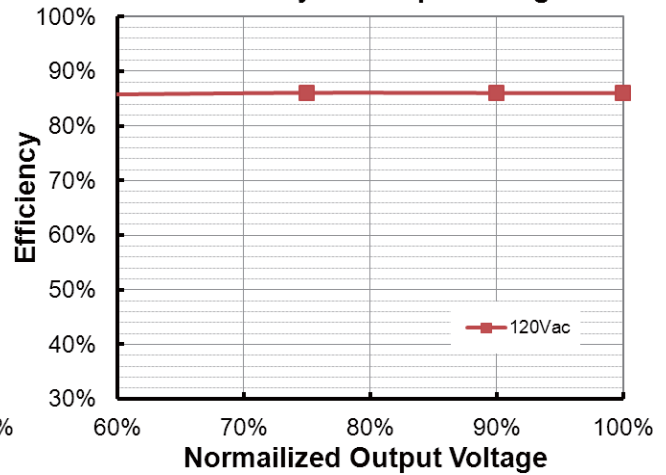
LLC-040S035RSP

Efficiency vs. Output Voltage



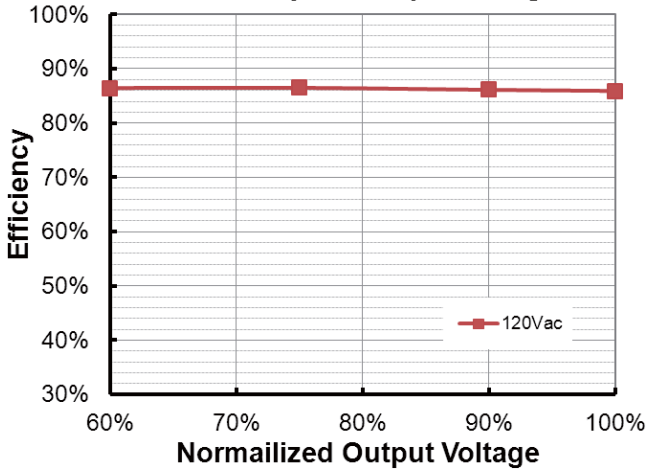
LLC-040S050RSP

Efficiency vs. Output Voltage



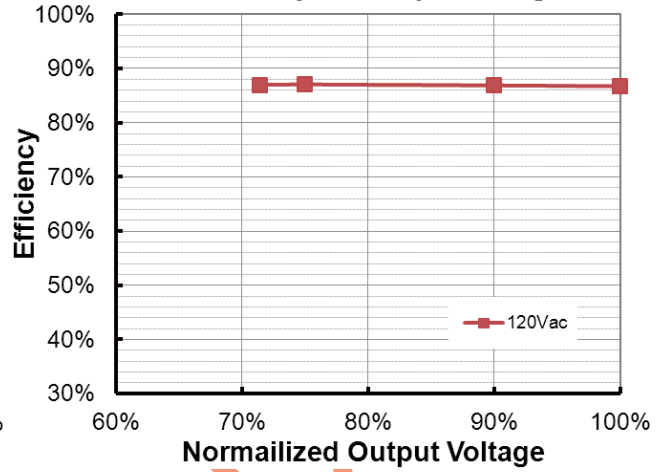
LLC-040S070RSP

Efficiency vs. Output Voltage



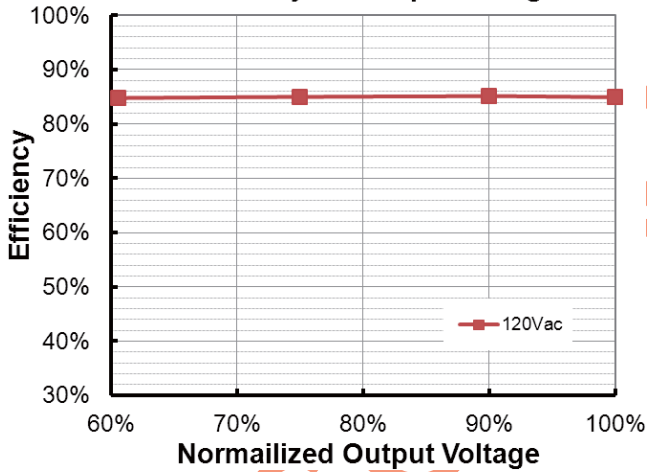
LLC-040S082RSP

Efficiency vs. Output Voltage



LLC-040S105RSP

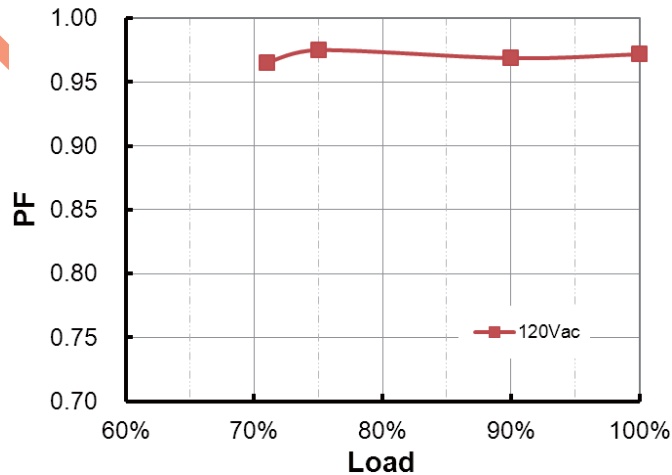
Efficiency vs. Output Voltage



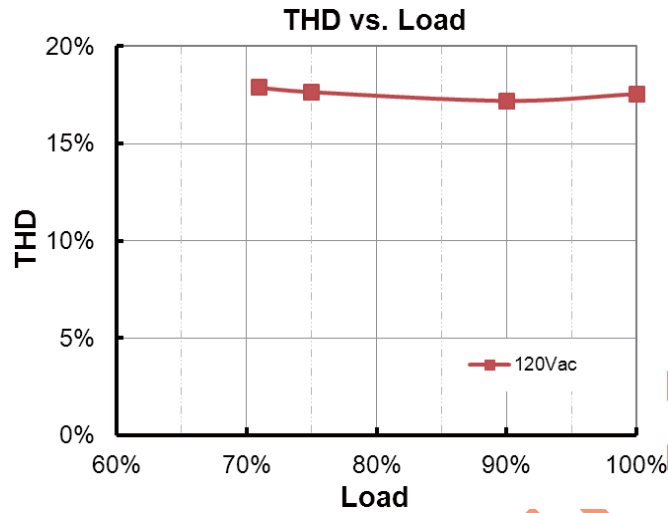
DISCOUNT

## Power Factor

PF vs. Load



## Total Harmonic Distortion



## Protection Functions

| Parameter                | Min.                                                                                 | Typ. | Max. | Notes |
|--------------------------|--------------------------------------------------------------------------------------|------|------|-------|
| Short Circuit Protection | Hiccup. The power supply shall be self-recovery when the fault condition is removed. |      |      |       |

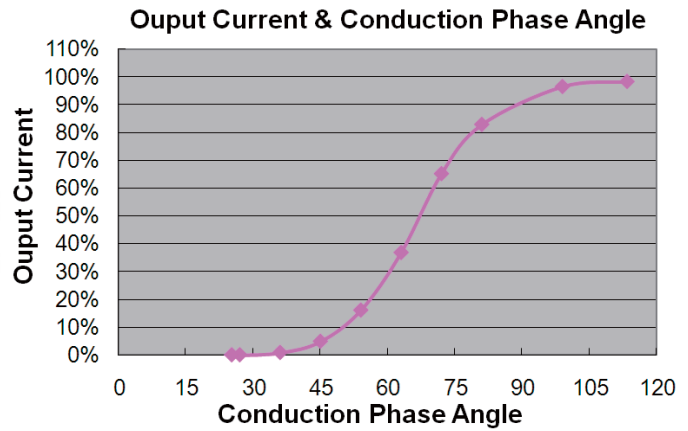
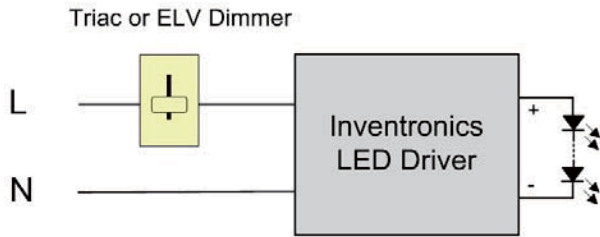
## Dimmer Recommendation

| Manufacturer | Type                | Applicable Voltage | Power Rating | Notes |
|--------------|---------------------|--------------------|--------------|-------|
| LUTRON       | SKYLARK CTCL-153PDH | 120Vac             | 600W         |       |
| LUTRON       | DIVA DVF-103P       | 120Vac             | 600W         |       |
| LUTRON       | SKYLARK S-600P-WH   | 120Vac             | 600W         |       |
| LUTRON       | SKYLARK CT-600PR-WH | 120Vac             | 600W         |       |
| LUTRON       | SKYLARK LX-103PL-WH | 120Vac             | 1000W        |       |

## Dimmer Recommendation (Continued)

| Manufacturer | Type               | Applicable Voltage | Power Rating | Notes |
|--------------|--------------------|--------------------|--------------|-------|
| LUTRON       | MAESTRO MA-1000-WH | 120Vac             | 600W         |       |
| LEVITON      | 011-IP106-1LZ      | 120Vac             | 600W         |       |
| LEVITON      | 011-IP110-1LZ      | 120Vac             | 1000W        |       |

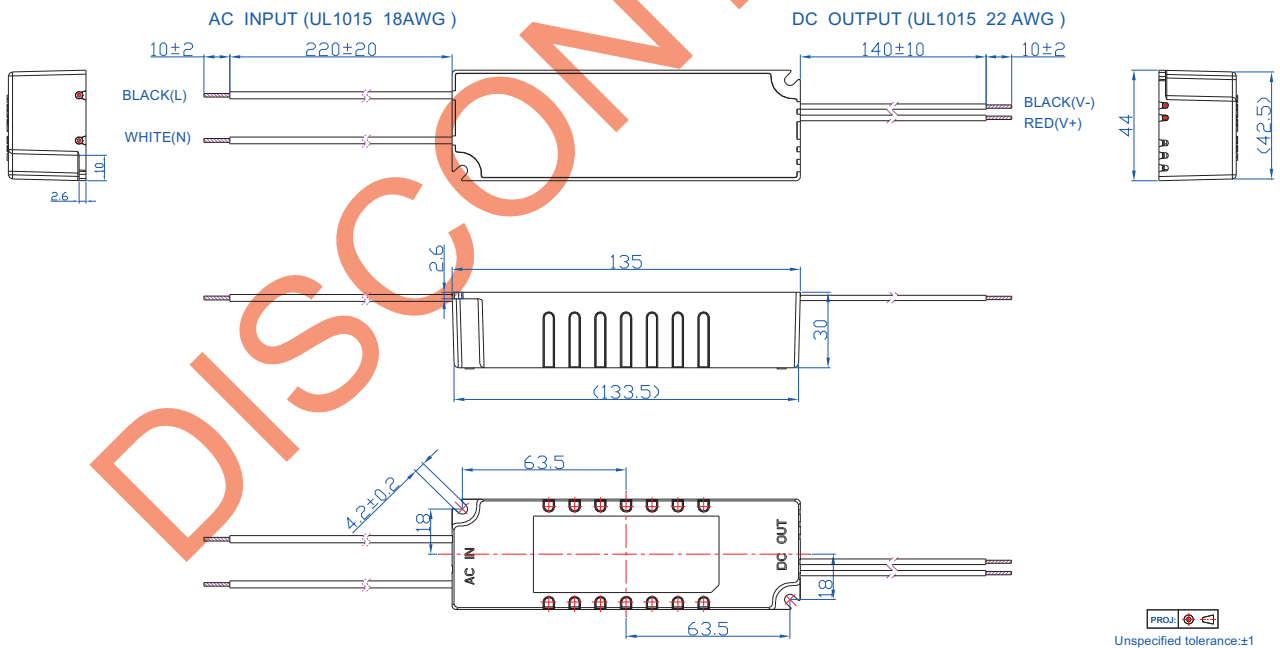
## TRIAC Dimming Control



Implementation: Dimming with Triac or ELV Dimmer

| Parameter        | Min. | Typ. | Max.   | Notes                      |
|------------------|------|------|--------|----------------------------|
| Dimming Range    | 0%lo | -    | 100%lo | Measured at 120 Vac input. |
| Conduction Angle | 0°   | -    | 180°   | Measured at 120 Vac input. |

## Mechanical Outline



PROJ: [Symbol] [Symbol]  
Unspecified tolerance: ±1

## RoHS Compliance

Our products comply with the European Directive 2011/65/EC, calling for the elimination of lead and other hazardous substances from electronic products.

## Revision History

| Change Date | Rev. | Description of Change                        |                    |                    |
|-------------|------|----------------------------------------------|--------------------|--------------------|
|             |      | Item                                         | From               | To                 |
| 2012-10-16  | A    | Datasheet Release                            | /                  | /                  |
| 2013-03-21  | B    | Line Regulation (110Vac to 132 Vac)          | ±2%                | ±3%                |
|             |      | PF                                           | 0.98               | 0.95               |
|             |      | PF curve updated                             | 350 mA model curve | 820 mA model curve |
|             |      | THD curve (820 mA)                           | /                  | Added              |
|             |      | Dimming curve                                | /                  | Updated            |
| 2017-01-06  | C    | Turn-on Delay Time at 120Vac                 | Max.=1.0 s         | Max.=0.75 s        |
|             |      | Operating Case Temperature for Warranty Tc_w | /                  | Added              |
|             |      | Environmental Specifications                 | /                  | Deleted            |
|             |      | Net Weight                                   | 255 g              | 275 g              |
|             |      | Note of EMI Standard                         | /                  | Added              |
|             |      | Derating Curve                               | /                  | Deleted            |

DISCONTINUED