

## Features

- Ultra High Efficiency (Up to 95.0%)
- Full Power at Wide Output Current Range (Constant Power)
- Thermal Sensing and Protection for LED Module
- 0-10V/PWM/3-Timer-Modes Dimmable
- Dim-to-Off with Standby Power  $\leq 1.5$  W
- Output Lumen Compensation
- Input Surge Protection: DM 6kV, CM 10kV
- All-Around Protection: OVP, SCP, OTP
- IP67
- SELV Output
- 5 Years Warranty



## Description

The ESD-600SxxxDV series is a 600W, constant-current, programmable LED driver that operates from 249-528 Vac input with excellent power factor. Created for many lighting applications including high mast, sports, aquaculture and horticulture, it provides a dim-to-off mode with low standby power. The high efficiency of these drivers and compact metal case enables them to run cooler, significantly improving reliability and extending product life. To ensure trouble-free operation, protection is provided against input surge, input over voltage, output over voltage, short circuit, and over temperature.

## Models

| Adjustable Output Current Range | Full-Power Current Range(1) | Default Output Current | Input Voltage Range(2)   | Output Voltage Range | Max. Output Power | Typical Efficiency (3) | Typical Power Factor |        | Model Number                 |
|---------------------------------|-----------------------------|------------------------|--------------------------|----------------------|-------------------|------------------------|----------------------|--------|------------------------------|
|                                 |                             |                        |                          |                      |                   |                        | 277Vac               | 480Vac |                              |
| 0.136-1.70A                     | 1.36-1.70A                  | 1.7A                   | 249~528Vac<br>352~500Vdc | 176 ~ 441Vdc         | 600 W             | 95.0%                  | 0.96                 | 0.95   | ESD-600S170DV                |
| 0.168-2.10A                     | 1.68-2.10A                  | 2.1A                   | 249~528Vac<br>352~500Vdc | 143 ~ 357Vdc         | 600 W             | 95.0%                  | 0.96                 | 0.95   | ESD-600S210DV                |
| 0.224-2.80A                     | 2.24-2.80A                  | 2.8 A                  | 249~528Vac<br>352~500Vdc | 108 ~ 268Vdc         | 600 W             | 94.5%                  | 0.96                 | 0.95   | ESD-600S280DV                |
| 0.336-4.20A                     | 3.36-4.20A                  | 4.2 A                  | 249~528Vac<br>352~500Vdc | 72 ~ 178Vdc          | 600 W             | 95.0%                  | 0.96                 | 0.95   | ESD-600S420DV                |
| 0.448-5.60A                     | 4.48-5.60A                  | 5.6 A                  | 249~528Vac<br>352~500Vdc | 54 ~ 134Vdc          | 600 W             | 95.0%                  | 0.96                 | 0.95   | ESD-600S560DV                |
| 0.592-7.40A                     | 5.92-7.40A                  | 7.0 A                  | 249~528Vac<br>352~500Vdc | 41 ~ 101Vdc          | 600 W             | 94.5%                  | 0.96                 | 0.95   | ESD-600S740DV <sup>(4)</sup> |
| 0.784-9.80A                     | 7.84-9.80A                  | 9.8 A                  | 249~528Vac<br>352~500Vdc | 31 ~ 76Vdc           | 600 W             | 94.0%                  | 0.96                 | 0.95   | ESD-600S980DV <sup>(4)</sup> |
| 1.0-12.5 A                      | 10-12.5 A                   | 12.5 A                 | 249~528Vac<br>352~500Vdc | 24 ~ 60Vdc           | 600 W             | 94.0%                  | 0.96                 | 0.95   | ESD-600S12ADV <sup>(4)</sup> |

**Notes:** (1) Output current range with constant power at 600W.

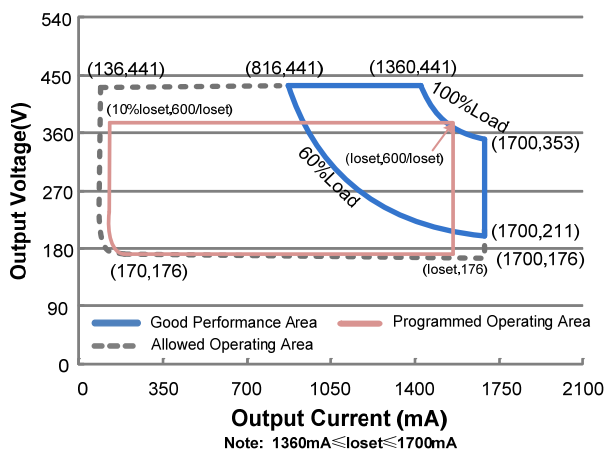
(2) Certified voltage range: 277-480Vac or 352-500Vdc.

(3) Measured at 100% load and 480Vac input (see below "General Specifications" for details).

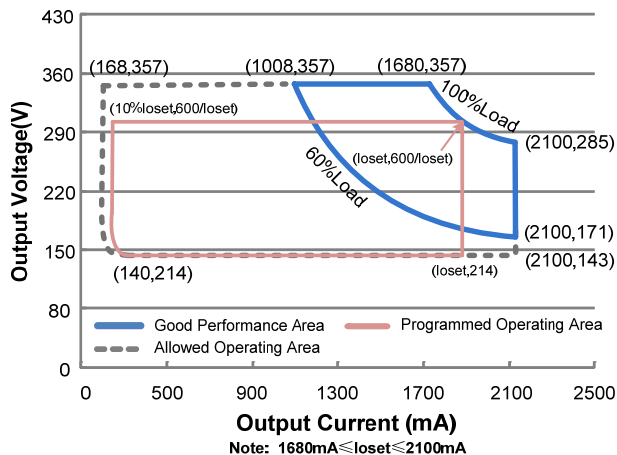
(4) SELV output.

## I-V Operating Area

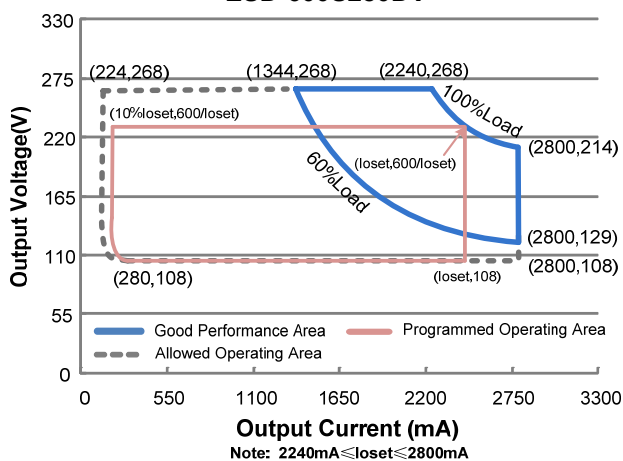
ESD-600S170DV



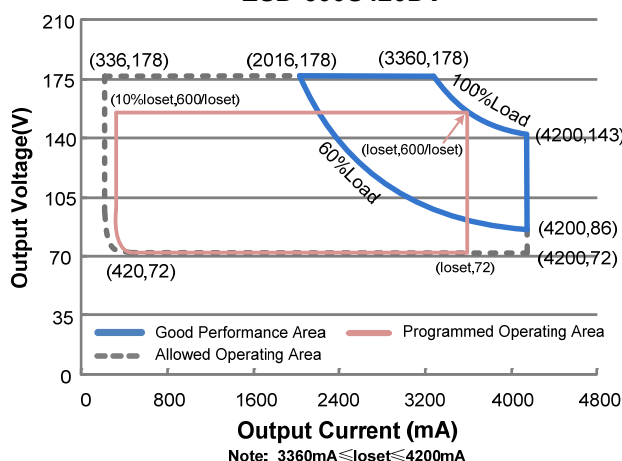
ESD-600S210DV



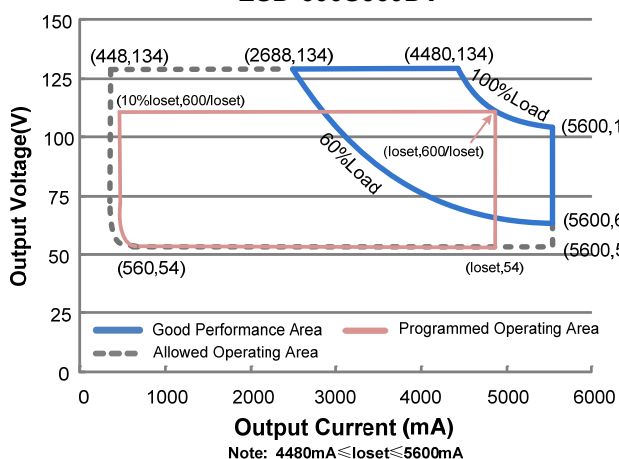
ESD-600S280DV



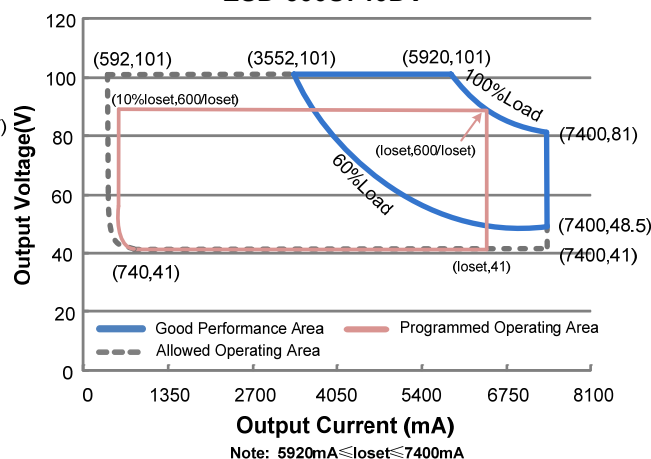
ESD-600S420DV

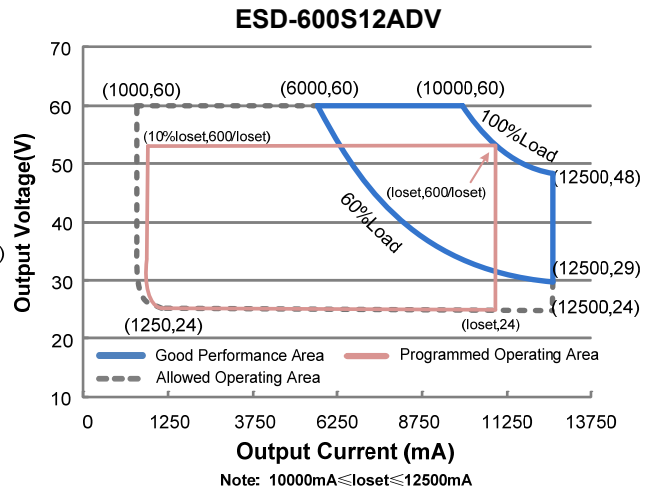
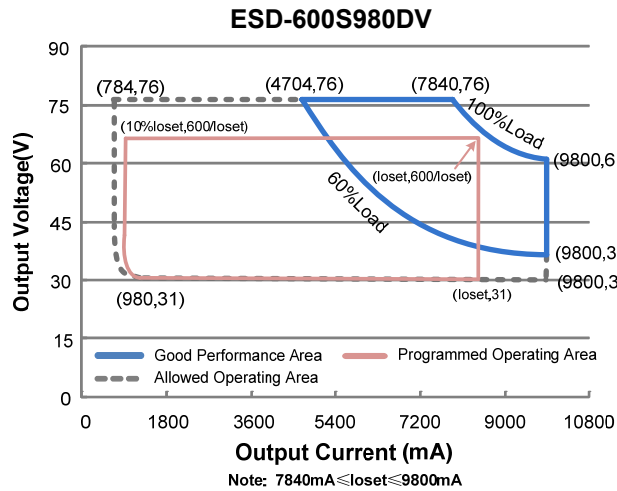


ESD-600S560DV



ESD-600S740DV





## Input Specifications

| Parameter                        | Min.    | Typ. | Max.                  | Notes                                                                                                          |
|----------------------------------|---------|------|-----------------------|----------------------------------------------------------------------------------------------------------------|
| Input AC Voltage                 | 249 Vac | -    | 528 Vac               |                                                                                                                |
| Input DC Voltage                 | 325 Vdc | -    | 500 Vdc               |                                                                                                                |
| Input Frequency                  | 47 Hz   | -    | 63 Hz                 |                                                                                                                |
| Leakage Current                  | -       | -    | 0.70 mA               | IEC60598-1; 480Vac/ 60Hz, Grounding effectively                                                                |
| Input AC Current                 | -       | -    | 2.50 A                | Measured at 100% load and 277 Vac input.                                                                       |
|                                  | -       | -    | 1.45 A                | Measured at 100% load and 480 Vac input.                                                                       |
| Inrush Current(I <sup>2</sup> t) | -       | -    | 20.4 A <sup>2</sup> s | At 480Vac input, 25°C cold start, duration=869 μs, 10%Ipk-10%Ipk. See Inrush Current Waveform for the details. |
| PF                               | 0.90    | -    | -                     | At 277-480Vac, 50-60Hz, 60%-100% Load (360 - 600W)                                                             |
| THD                              | -       | -    | 20%                   |                                                                                                                |

## Output Specifications

| Parameter                           | Min.     | Typ. | Max.     | Notes     |
|-------------------------------------|----------|------|----------|-----------|
| Output Current Tolerance            | -5%Ioset | -    | 5%Ioset  | 100% load |
| Output Current Setting(Ioset) Range |          |      |          |           |
| ESD-600S170DV                       | 136 mA   | -    | 1700 mA  |           |
| ESD-600S210DV                       | 168 mA   | -    | 2100 mA  |           |
| ESD-600S280DV                       | 224 mA   | -    | 2800 mA  |           |
| ESD-600S420DV                       | 336 mA   | -    | 4200 mA  |           |
| ESD-600S560DV                       | 448 mA   | -    | 5600 mA  |           |
| ESD-600S740DV                       | 592 mA   | -    | 7400 mA  |           |
| ESD-600S980DV                       | 784 mA   | -    | 9800 mA  |           |
| ESD-600S12ADV                       | 1000 mA  | -    | 12500 mA |           |

## Output Specifications (Continued)

| Parameter                                        | Min.     | Typ.                | Max.                 | Notes                                       |
|--------------------------------------------------|----------|---------------------|----------------------|---------------------------------------------|
| Output Current Setting Range with Constant Power |          |                     |                      |                                             |
| ESD-600S170DV                                    | 1360 mA  | -                   | 1700 mA              |                                             |
| ESD-600S210DV                                    | 1680 mA  | -                   | 2100 mA              |                                             |
| ESD-600S280DV                                    | 2240 mA  | -                   | 2800 mA              |                                             |
| ESD-600S420DV                                    | 3360 mA  | -                   | 4200 mA              |                                             |
| ESD-600S560DV                                    | 4480 mA  | -                   | 5600 mA              |                                             |
| ESD-600S740DV                                    | 5920 mA  | -                   | 7400 mA              |                                             |
| ESD-600S980DV                                    | 7840 mA  | -                   | 9800 mA              |                                             |
| ESD-600S12ADV                                    | 10000 mA | -                   | 12500 mA             |                                             |
| Total Output Current Ripple (pk-pk)              | -        | 5%I <sub>omax</sub> | 10%I <sub>omax</sub> | 100% load, 20 MHz BW                        |
| Output Current Ripple at < 200 Hz (pk-pk)        | -        | 2%I <sub>omax</sub> | -                    | 100% load                                   |
| Startup Overshoot Current                        | -        | -                   | 10%I <sub>omax</sub> | 100% load                                   |
| No Load Output Voltage                           |          |                     |                      |                                             |
| ESD-600S170DV                                    | -        | -                   | 480 V                |                                             |
| ESD-600S210DV                                    | -        | -                   | 420 V                |                                             |
| ESD-600S280DV                                    | -        | -                   | 300 V                |                                             |
| ESD-600S420DV                                    | -        | -                   | 200 V                |                                             |
| ESD-600S560DV                                    | -        | -                   | 160 V                |                                             |
| ESD-600S740DV                                    | -        | -                   | 120 V                |                                             |
| ESD-600S980DV                                    | -        | -                   | 95 V                 |                                             |
| ESD-600S12ADV                                    | -        | -                   | 80 V                 |                                             |
| Line Regulation                                  | -        | -                   | ±0.5%                | 100% load                                   |
| Load Regulation                                  | -        | -                   | ±1.5%                |                                             |
| Turn-on Delay Time                               | -        | -                   | 0.75 s               | Measured at 277-480Vac input, 60%-100% Load |
| Temperature Coefficient of I <sub>oSet</sub>     | -        | 0.03%/°C            | -                    | Case temperature = 0°C ~T <sub>c</sub> max  |
| 12V Auxiliary Output Voltage                     | 10.8 V   | 12 V                | 13.2 V               |                                             |
| 12V Auxiliary Output Source Current              | 0 mA     | -                   | 200 mA               | Return terminal is "Dim-"                   |

## General Specifications

| Parameter                    | Min.  | Typ.  | Max. | Notes |
|------------------------------|-------|-------|------|-------|
| Efficiency at 277 Vac input: |       |       |      |       |
| ESD-600S170DV                |       |       |      |       |
| Io= 1360 mA                  | 92.0% | 94.0% | -    |       |
| Io= 1700 mA                  | 92.0% | 94.0% | -    |       |
| ESD-600S210DV                |       |       |      |       |
| Io= 1680 mA                  | 92.0% | 94.0% | -    |       |
| Io= 2100 mA                  | 91.5% | 93.5% | -    |       |
| ESD-600S280DV                |       |       |      |       |
| Io= 2240 mA                  | 91.5% | 93.5% | -    |       |
| Io= 2800 mA                  | 91.0% | 93.0% | -    |       |
| ESD-600S420DV                |       |       |      |       |
| Io= 3360 mA                  | 92.0% | 94.0% | -    |       |
| Io= 4200 mA                  | 91.5% | 93.5% | -    |       |
| ESD-600S560DV                |       |       |      |       |
| Io= 4480 mA                  | 92.0% | 94.0% | -    |       |
| Io= 5600 mA                  | 91.5% | 93.5% | -    |       |
| ESD-600S740DV                |       |       |      |       |
| Io= 5920 mA                  | 91.5% | 93.5% | -    |       |
| Io= 7400 mA                  | 90.5% | 92.5% | -    |       |
| ESD-600S980DV                |       |       |      |       |
| Io= 7840 mA                  | 90.5% | 92.5% | -    |       |
| Io= 9800 mA                  | 89.5% | 91.5% | -    |       |
| ESD-600S12ADV                |       |       |      |       |
| Io=10000 mA                  | 91.0% | 93.0% | -    |       |
| Io=12500 mA                  | 90.0% | 92.0% | -    |       |
| Efficiency at 347 Vac input: |       |       |      |       |
| ESD-600S170DV                |       |       |      |       |
| Io= 1360 mA                  | 92.5% | 94.5% | -    |       |
| Io= 1700 mA                  | 92.5% | 94.5% | -    |       |
| ESD-600S210DV                |       |       |      |       |
| Io= 1680 mA                  | 93.0% | 95.0% | -    |       |
| Io= 2100 mA                  | 92.0% | 94.0% | -    |       |
| ESD-600S280DV                |       |       |      |       |
| Io= 2240 mA                  | 92.0% | 94.0% | -    |       |
| Io= 2800 mA                  | 91.5% | 93.5% | -    |       |
| ESD-600S420DV                |       |       |      |       |
| Io= 3360 mA                  | 92.5% | 94.5% | -    |       |
| Io= 4200 mA                  | 92.0% | 94.0% | -    |       |
| ESD-600S560DV                |       |       |      |       |
| Io= 4480 mA                  | 92.5% | 94.5% | -    |       |
| Io= 5600 mA                  | 92.0% | 94.0% | -    |       |
| ESD-600S740DV                |       |       |      |       |
| Io= 5920 mA                  | 92.0% | 94.0% | -    |       |
| Io= 7400 mA                  | 91.0% | 93.0% | -    |       |
| ESD-600S980DV                |       |       |      |       |
| Io= 7840 mA                  | 91.0% | 93.0% | -    |       |
| Io= 9800 mA                  | 90.5% | 92.5% | -    |       |
| ESD-600S12ADV                |       |       |      |       |
| Io= 10000 mA                 | 91.5% | 93.5% | -    |       |
| Io= 12500 mA                 | 90.5% | 92.5% | -    |       |

## General Specifications (Continued)

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                            | Min.                                                                                                                       | Typ.                                                                                                                                | Max.                                                               | Notes                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Efficiency at 480 Vac input:<br>ESD-600S170DV<br>Io= 1360 mA<br>Io= 1700 mA<br>ESD-600S210DV<br>Io= 1680 mA<br>Io= 2100 mA<br>ESD-600S280DV<br>Io= 2240 mA<br>Io= 2800 mA<br>ESD-600S420DV<br>Io= 3360 mA<br>Io= 4200 mA<br>ESD-600S560DV<br>Io= 4480 mA<br>Io= 5600 mA<br>ESD-600S740DV<br>Io= 5920 mA<br>Io= 7400 mA<br>ESD-600S980DV<br>Io= 7840 mA<br>Io= 9800 mA<br>ESD-600S12ADV<br>Io=10000 mA<br>Io=12500 mA | 93.0%<br>93.0%<br>93.0%<br>92.5%<br>92.5%<br>92.0%<br>93.0%<br>92.5%<br>93.0%<br>92.5%<br>92.0%<br>91.0%<br>92.0%<br>91.0% | 95.0%<br>95.0%<br>95.0%<br>94.5%<br>94.0%<br>95.0%<br>94.5%<br>95.0%<br>94.5%<br>94.5%<br>93.5%<br>94.0%<br>93.0%<br>94.0%<br>93.0% | -<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>- | Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.) |
| Standby power                                                                                                                                                                                                                                                                                                                                                                                                        | -                                                                                                                          | -                                                                                                                                   | 1.5 W                                                              |                                                                                                                                                  |
| MTBF                                                                                                                                                                                                                                                                                                                                                                                                                 | -                                                                                                                          | 200,000 Hours                                                                                                                       | -                                                                  |                                                                                                                                                  |
| Lifetime                                                                                                                                                                                                                                                                                                                                                                                                             | -                                                                                                                          | 101,000 Hours                                                                                                                       | -                                                                  |                                                                                                                                                  |
| Operating Case Temperature for Safety Tc_s                                                                                                                                                                                                                                                                                                                                                                           | -40°C                                                                                                                      | -                                                                                                                                   | +89°C                                                              |                                                                                                                                                  |
| Operating Case Temperature for Warranty Tc_w                                                                                                                                                                                                                                                                                                                                                                         | -40°C                                                                                                                      | -                                                                                                                                   | +75°C                                                              |                                                                                                                                                  |
| Storage Temperature                                                                                                                                                                                                                                                                                                                                                                                                  | -40°C                                                                                                                      | -                                                                                                                                   | +85°C                                                              |                                                                                                                                                  |
| Dimensions<br>Inches (L × W × H)<br>Millimeters (L × W × H)                                                                                                                                                                                                                                                                                                                                                          | 9.84 × 5.67 × 1.91<br>250 × 144 × 48.5                                                                                     |                                                                                                                                     |                                                                    |                                                                                                                                                  |
| Net Weight                                                                                                                                                                                                                                                                                                                                                                                                           | -                                                                                                                          | 3330 g                                                                                                                              | -                                                                  |                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                            |                                                                                                                                     |                                                                    |                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                            |                                                                                                                                     |                                                                    |                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                            |                                                                                                                                     |                                                                    |                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                            |                                                                                                                                     |                                                                    |                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                            |                                                                                                                                     |                                                                    |                                                                                                                                                  |

## Dimming Specifications

| Parameter                                                | Min.   | Typ.   | Max.   | Notes                      |
|----------------------------------------------------------|--------|--------|--------|----------------------------|
| Absolute Maximum Voltage on the V <sub>dim</sub> (+) Pin | -20 V  | -      | 20 V   |                            |
| Source Current on V <sub>dim</sub> (+)Pin                | 200 μA | 300 μA | 450 μA | V <sub>dim</sub> (+) = 0 V |

## Dimming Specifications (Continued)

| Parameter                         |                                                                                                                                      | Min.                                                                          | Typ.  | Max.   | Notes                                                                                                                                                                                                                                          |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimming Output Range              | ESD-600S170DV<br>ESD-600S210DV<br>ESD-600S280DV<br>ESD-600S420DV<br>ESD-600S560DV<br>ESD-600S740DV<br>ESD-600S980DV<br>ESD-600S12ADV | 10%loset                                                                      | -     | loset  | 1360 mA ≤ loiset ≤ 1700 mA<br>1680 mA ≤ loiset ≤ 2100 mA<br>2240 mA ≤ loiset ≤ 2800 mA<br>3360 mA ≤ loiset ≤ 4200 mA<br>4480 mA ≤ loiset ≤ 5600 mA<br>5920 mA ≤ loiset ≤ 7400 mA<br>7840 mA ≤ loiset ≤ 9800 mA<br>10000 mA ≤ loiset ≤ 12500 mA |
|                                   | ESD-600S170DV<br>ESD-600S210DV<br>ESD-600S280DV<br>ESD-600S420DV<br>ESD-600S560DV<br>ESD-600S740DV<br>ESD-600S980DV<br>ESD-600S12ADV | 136 mA<br>168 mA<br>224 mA<br>336 mA<br>448 mA<br>592 mA<br>784 mA<br>1000 mA | -     | loset  | 136 mA ≤ loiset < 1360 mA<br>168 mA ≤ loiset < 1680 mA<br>224 mA ≤ loiset < 2240 mA<br>336 mA ≤ loiset < 3360 mA<br>448 mA ≤ loiset < 4480 mA<br>592 mA ≤ loiset < 5920 mA<br>784 mA ≤ loiset < 7840 mA<br>1000 mA ≤ loiset < 10000 mA         |
| Recommended Dimming Input Range   |                                                                                                                                      | 0 V                                                                           | -     | 10 V   | Default 0-10V dimming mode.                                                                                                                                                                                                                    |
| Dim off Voltage                   |                                                                                                                                      | 0.35 V                                                                        | 0.5 V | 0.65 V |                                                                                                                                                                                                                                                |
| Dim on Voltage                    |                                                                                                                                      | 0.55 V                                                                        | 0.7 V | 0.85 V |                                                                                                                                                                                                                                                |
| Hysteresis                        |                                                                                                                                      | -                                                                             | 0.2 V | -      |                                                                                                                                                                                                                                                |
| PWM_in High Level                 |                                                                                                                                      | 3 V                                                                           | -     | 10 V   | Dimming mode set to PWM in PC interface.                                                                                                                                                                                                       |
| PWM_in Low Level                  |                                                                                                                                      | -0.3 V                                                                        | -     | 0.6 V  |                                                                                                                                                                                                                                                |
| PWM_in Frequency Range            |                                                                                                                                      | 200 Hz                                                                        | -     | 3 KHz  |                                                                                                                                                                                                                                                |
| PWM_in Duty Cycle                 |                                                                                                                                      | 1%                                                                            | -     | 99%    |                                                                                                                                                                                                                                                |
| PWM Dimming off (Positive Logic)  |                                                                                                                                      | 3%                                                                            | 5%    | 8%     |                                                                                                                                                                                                                                                |
| PWM Dimming on (Positive Logic)   |                                                                                                                                      | 5%                                                                            | 7%    | 10%    |                                                                                                                                                                                                                                                |
| PWM Dimming off ( Negative Logic) |                                                                                                                                      | 92%                                                                           | 95%   | 97%    |                                                                                                                                                                                                                                                |
| PWM Dimming on ( Negative Logic)  |                                                                                                                                      | 90%                                                                           | 93%   | 95%    |                                                                                                                                                                                                                                                |
| Hysteresis                        |                                                                                                                                      | -                                                                             | 2%    | -      |                                                                                                                                                                                                                                                |

## Safety & EMC Compliance

| Safety Category         | Standard                                         |
|-------------------------|--------------------------------------------------|
| ENEC & TUV & CE         | EN 61347-1, EN61347-2-13                         |
| CB                      | IEC 61347-1, IEC 61347-2-13                      |
| EMI Standards           | Notes                                            |
| EN 55015 <sup>(1)</sup> | Conducted emission Test & Radiated emission Test |



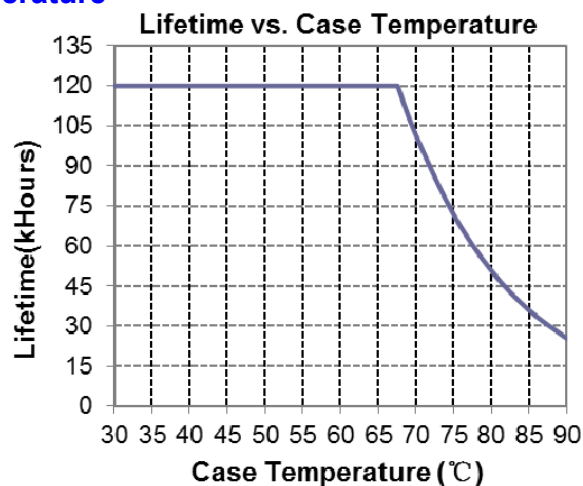
## Safety & EMC Compliance (Continued)

| EMI Standards | Notes                                                                                        |
|---------------|----------------------------------------------------------------------------------------------|
| EN 61000-3-2  | Harmonic current emissions                                                                   |
| EN 61000-3-3  | Voltage fluctuations & flicker                                                               |
| 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                                                        |
| EN 61000-4-5  | Surge Immunity Test: AC Power Line: Differential Mode 6 kV, Common Mode 10 kV <sup>(2)</sup> |
| 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.

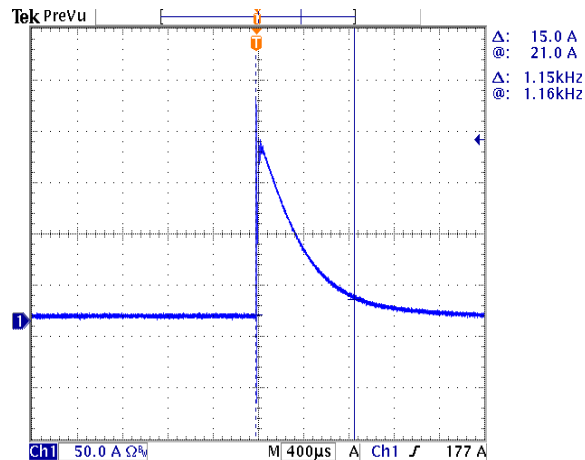
(2) To perform electric strength (hi-pot) testing, the "GDT ground disconnect" (nut and metal lock sheet) on the driver end-cap should be removed temporarily to prevent the internal gas discharge tube from conducting (as allowed by IEC 60598-1 Clause 10.2). After testing is completed, these items must be reinstalled to restore line-to-earth surge protection and secure the end cap.

## Lifetime vs. Case Temperature





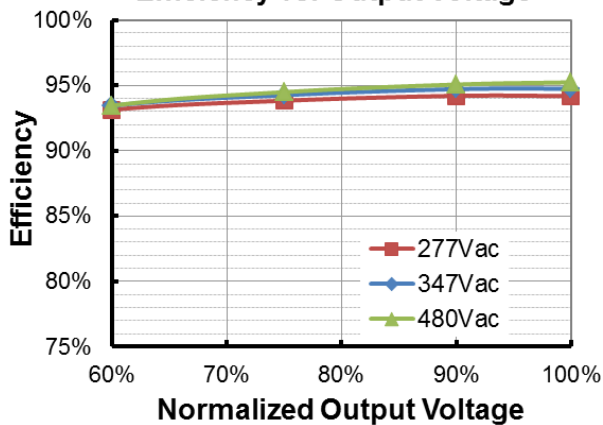
## Inrush Current Waveform



## Efficiency vs. Load

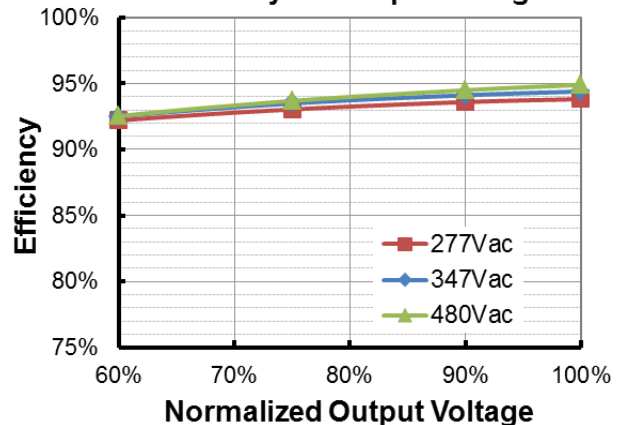
ESD-600S170DV( $I_o=1360$ mA)

Efficiency vs. Output Voltage



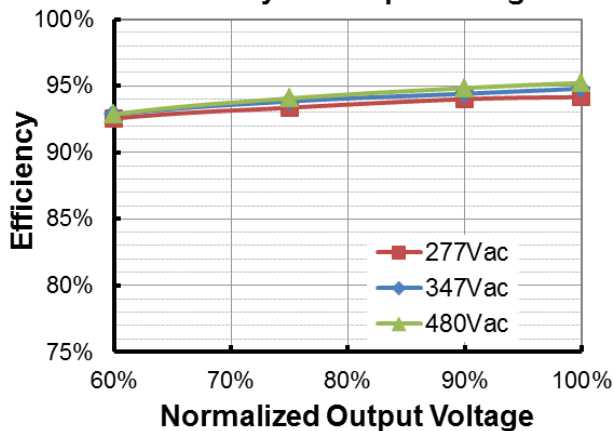
ESD-600S170DV( $I_o=1700$ mA)

Efficiency vs. Output Voltage



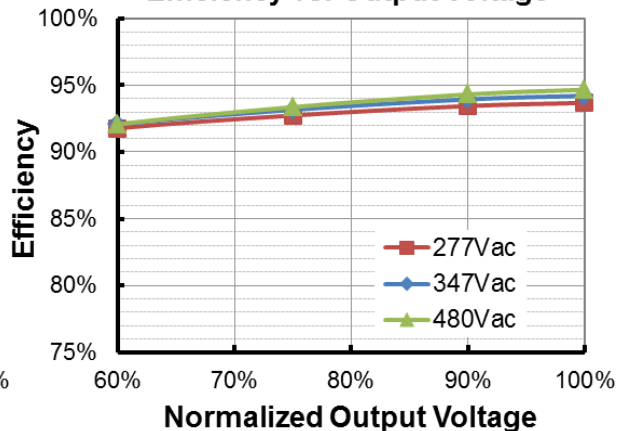
ESD-600S210DV( $I_o=1680$ mA)

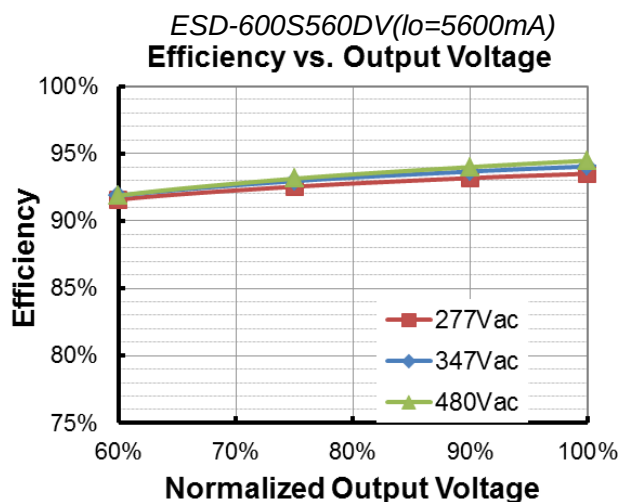
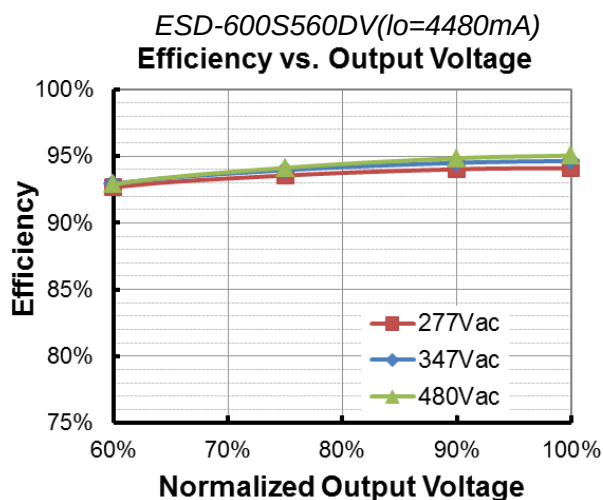
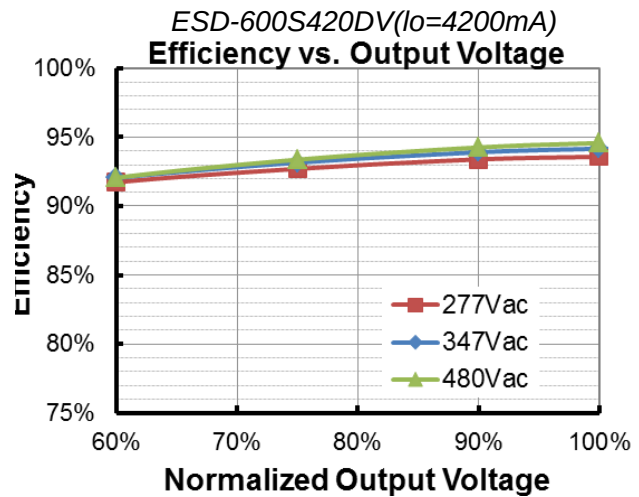
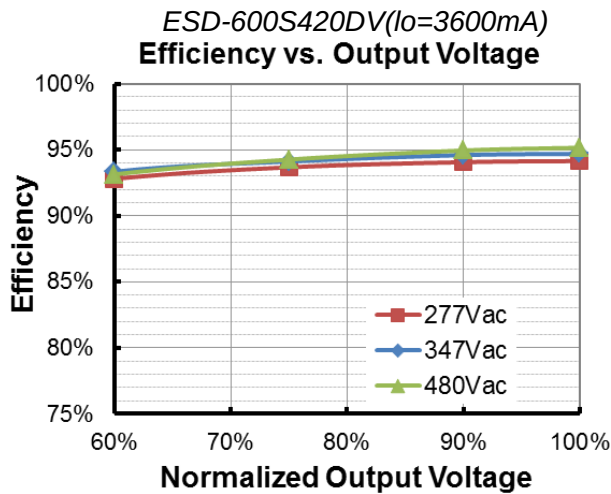
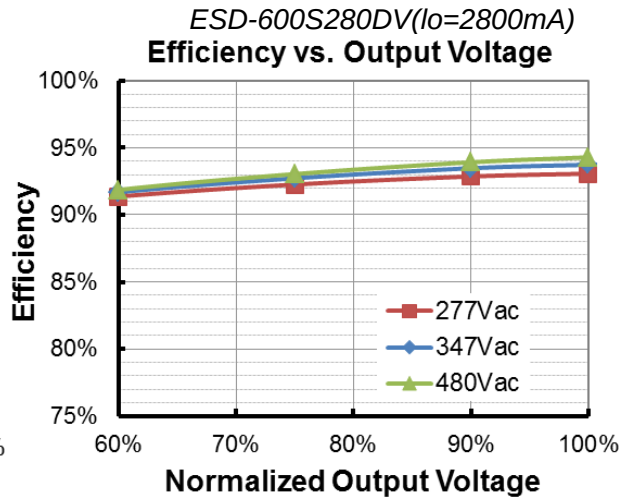
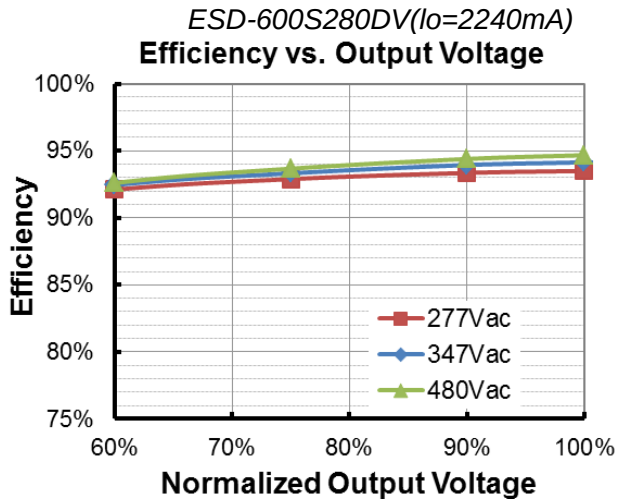
Efficiency vs. Output Voltage



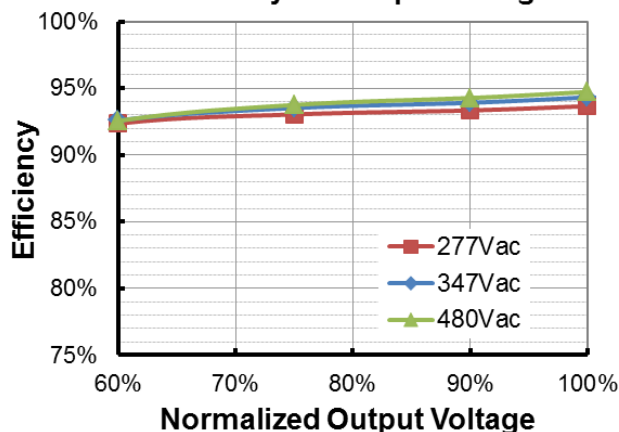
ESD-600S210DV( $I_o=2100$ mA)

Efficiency vs. Output Voltage

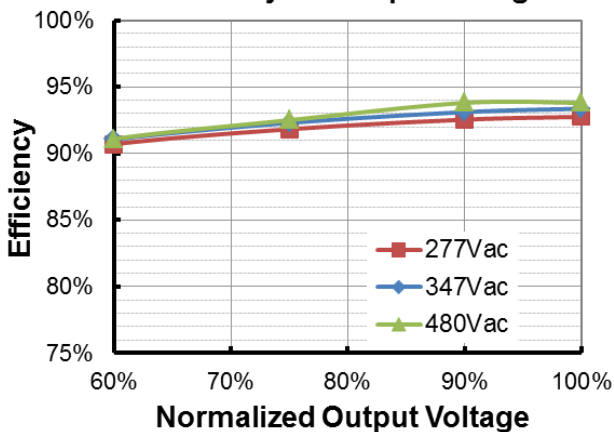




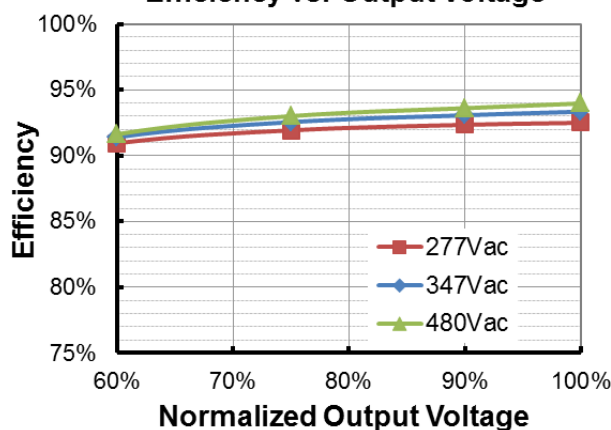
*ESD-600S740DV(I<sub>o</sub>=5920mA)*  
**Efficiency vs. Output Voltage**



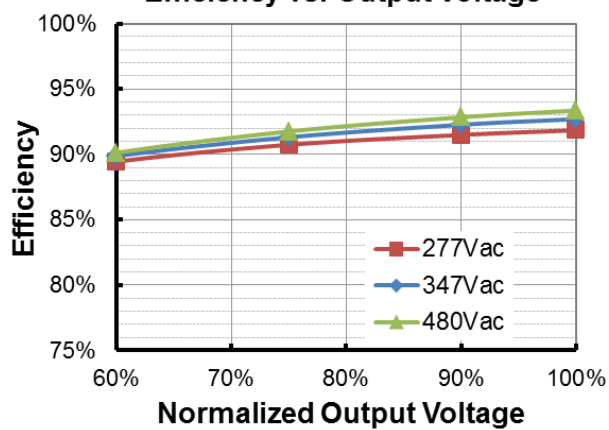
*ESD-600S740DV(I<sub>o</sub>=7400mA)*  
**Efficiency vs. Output Voltage**



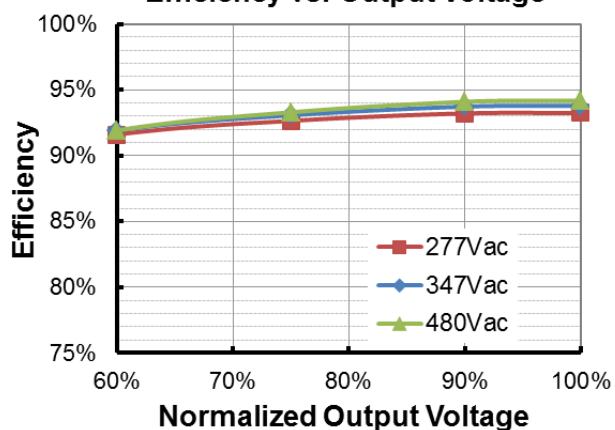
*ESD-600S980DV(I<sub>o</sub>=7840mA)*  
**Efficiency vs. Output Voltage**



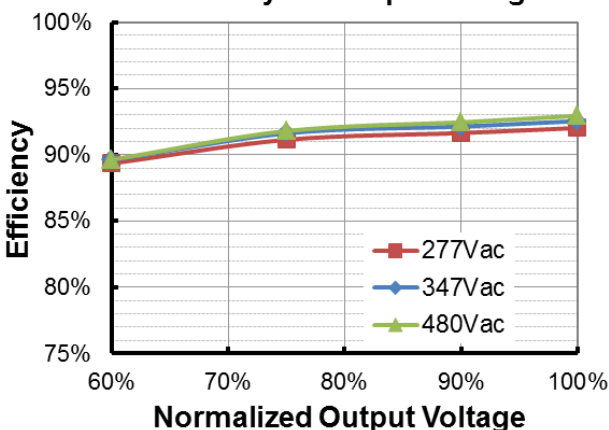
*ESD-600S980DV(I<sub>o</sub>=9800mA)*  
**Efficiency vs. Output Voltage**



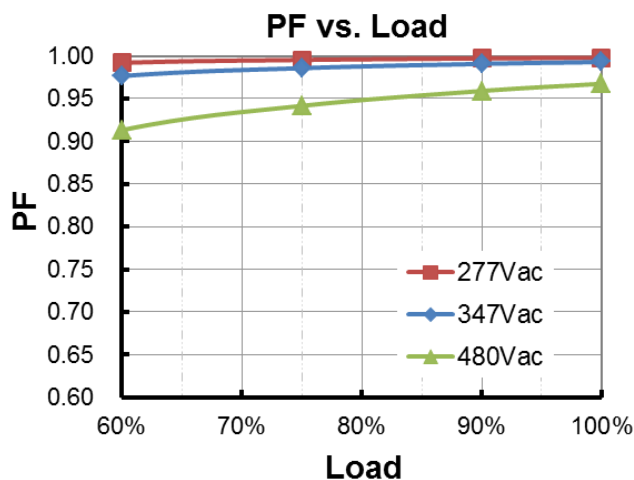
*ESD-600S12ADV(I<sub>o</sub>=10000mA)*  
**Efficiency vs. Output Voltage**



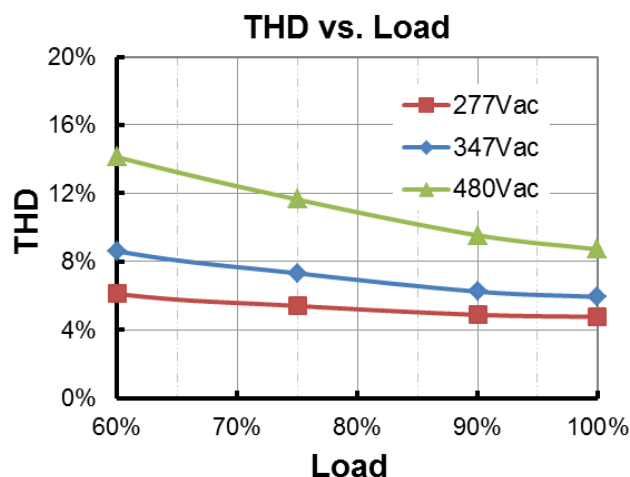
*ESD-600S12ADV(I<sub>o</sub>=12500mA)*  
**Efficiency vs. Output Voltage**



## Power Factor



## Total Harmonic Distortion



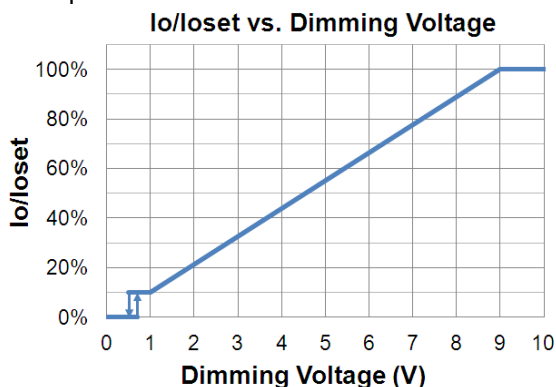
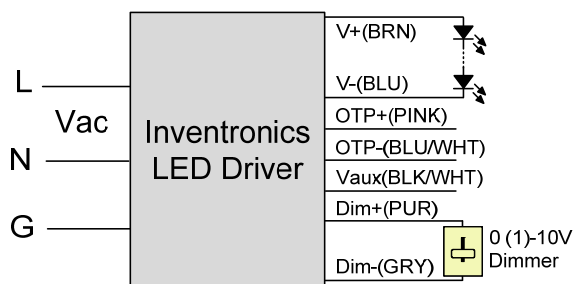
## Protection Functions

| Parameter                       |                          | Min.                                                                                                                                           | Typ.      | Max.      | Notes                                                                                                             |
|---------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------|
| External Thermal Protection NTC | R1                       | -                                                                                                                                              | 7.81 kOhm | -         | When R_NTC falls below R1, External Thermal Protection is triggered, reducing output current until R2 is reached. |
|                                 | R2                       | -                                                                                                                                              | 4.16 kOhm | -         | When R_NTC is less than R2, output current is reduced to the programmed "Protection Current Floor."               |
|                                 | Protection Current Floor | 10%loset                                                                                                                                       | 60%loset  | 100%loset | 10%loset>lomin (default setting is 60%)                                                                           |
|                                 |                          | lomin                                                                                                                                          | 60%loset  | 100%loset | 10%loset≤lomin (default setting is 60%)                                                                           |
| Over Temperature Protection     |                          | Decreases output current, returning to normal after over temperature is removed.                                                               |           |           |                                                                                                                   |
| Short Circuit Protection        |                          | Auto Recovery. No damage will occur when any output is short circuited. The output shall return to normal when the fault condition is removed. |           |           |                                                                                                                   |
| Over Voltage Protection         |                          | Limits output voltage at no load and in case the normal voltage limit fails.                                                                   |           |           |                                                                                                                   |

## Dimming

### ● 0-10V Dimming

The recommended implementation of the dimming control is provided below.



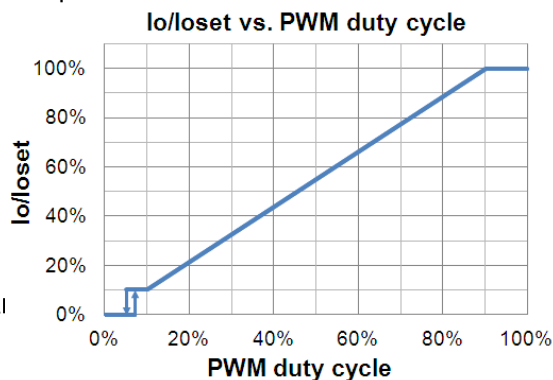
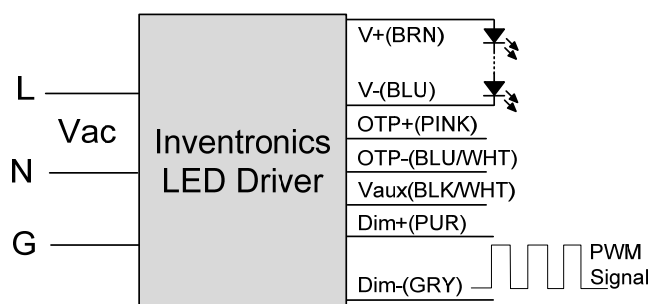
#### Implementation 1: DC Input

#### Notes:

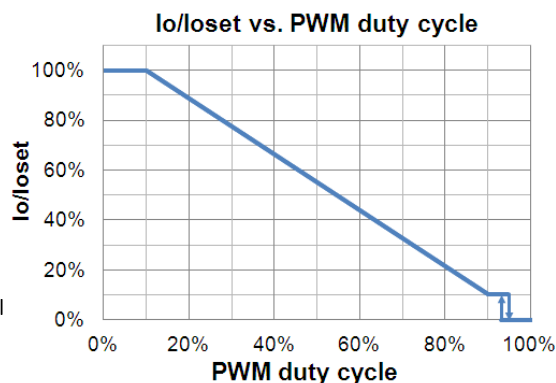
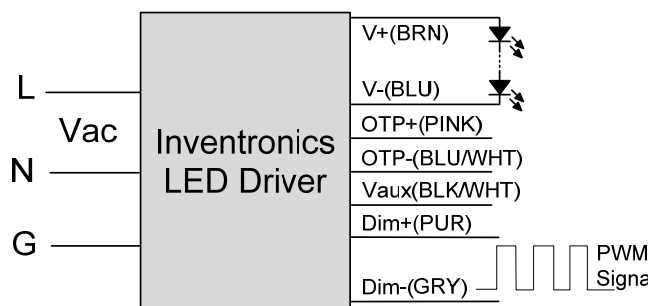
1. Do NOT connect Dim- to the output V- or V+, otherwise the driver will not work properly.
2. The dimmer can also be replaced by an active 0-10V voltage source signal or passive components like zener.

### ● PWM Dimming

The recommended implementation of the dimming control is provided below.



#### Implementation 2: Positive logic



#### Implementation 3: Negative logic

**Notes:**

1. Do NOT connect Dim- to the output V- or V+, otherwise the driver will not work properly.
2. When PWM negative logic dimming mode and Dim+ is open, the driver will output minimum current.

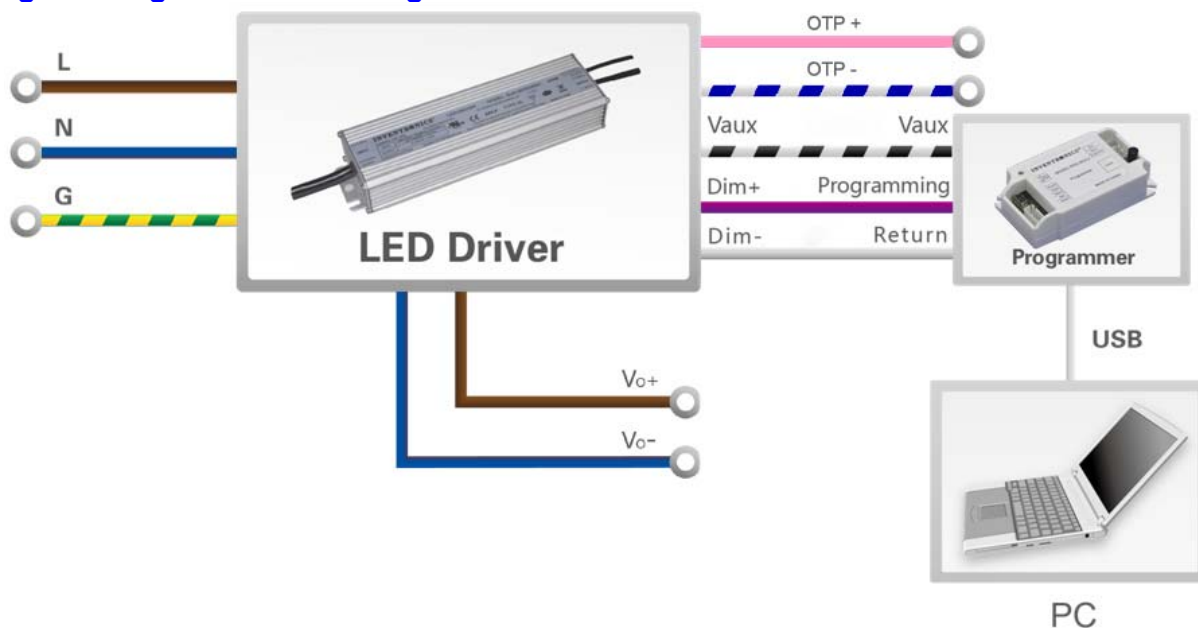
**● Time Dimming**

Time dimming control includes 3 kinds of modes, they are Self Adapting-Midnight, Self Adapting-Percentage and Traditional Timer.

- **Self Adapting-Midnight:** Automatically adjusts the dimming curve based on the on-time of past two days (if difference <15 minutes), assuming that the center point of the dimming curve is midnight local time.
- **Self Adapting-Percentage:** Automatically adjusts the on-time of each step by a constant percentage = (actual on-time for the past 2 days if difference <15 min) / (programmed on-time from the dimming curve).
- **Traditional Timer:** Follows the programmed timing curve after power on with no changes.

**● Output Lumen Compensation**

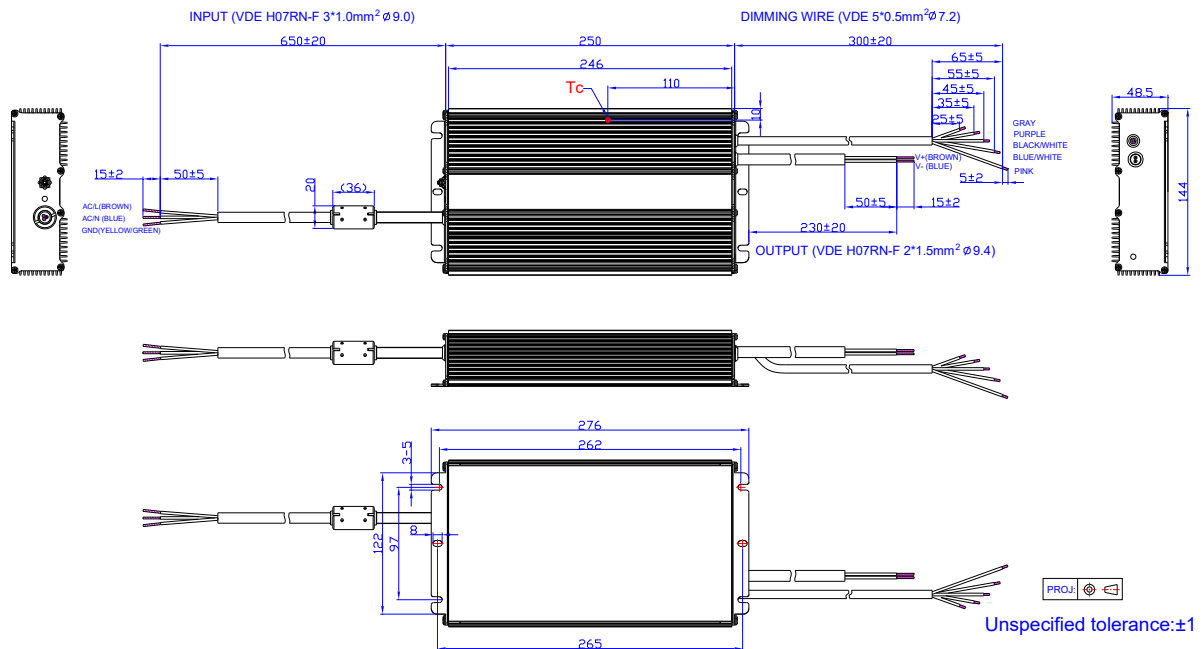
Output Lumen Compensation (OLC) may be used to maintain constant light output over the life of the LEDs by driving them at a reduced current when new, then gradually increasing the drive current over time to counteract LED lumen degradation.

**Programming Connection Diagram**

**Note:** The driver does not need to be powered on during the programming process.

- Please refer to [PRG-MUL2](#) (Programmer) datasheet for details.

## Mechanical Outline



## RoHS Compliance

Our products comply with reference to RoHS Directive (EU) 2015/863 amending 2011/65/EU, calling for the elimination of lead and other hazardous substances from electronic products.



## Revision History

| Change Date | Rev. | Description of Change                            |                                              |         |
|-------------|------|--------------------------------------------------|----------------------------------------------|---------|
|             |      | Item                                             | From                                         | To      |
| 2017-05-16  | A    | Datesheets Release                               | /                                            | /       |
| 2017-09-22  | B    | Operating Area                                   | ESD-600S420/560DV                            | Added   |
|             |      | Input Specifications                             | PF/THD                                       | Updated |
|             |      | Output Current Setting(Isolet) Range             | ESD-600S420/560DV                            | Added   |
|             |      | Output Current Setting Range with Constant Power | ESD-600S420/560DV                            | Added   |
|             |      | No Load Output Voltage                           | ESD-600S420/560DV                            | Added   |
|             |      | Efficiency at 277 Vac input                      | ESD-600S420/560DV                            | Added   |
|             |      | Efficiency at 347 Vac input                      | ESD-600S420/560DV                            | Added   |
|             |      | Efficiency at 480 Vac input                      | ESD-600S420/560DV                            | Added   |
|             |      | Dimming Output Range                             | ESD-600S420/560DV                            | Added   |
|             |      | Efficiency vs. Load                              | ESD-600S420/560DV                            | Added   |
| 2017-12-15  | C    | Features                                         | 5 Years Warranty                             | Added   |
|             |      | Models                                           | ESD-600S210DV                                | Added   |
|             |      | I-V Operation Area                               | ESD-600S210DV                                | Added   |
|             |      | Output Current Setting(Isolet) Range             | ESD-600S210DV                                | Added   |
|             |      | Output Current Setting Range with Constant Power | ESD-600S210DV                                | Added   |
|             |      | No Load Output Voltage                           | ESD-600S210DV                                | Added   |
|             |      | Efficiency at 277 Vac input                      | ESD-600S210DV                                | Added   |
|             |      | Efficiency at 347 Vac input                      | ESD-600S210DV                                | Added   |
|             |      | Efficiency at 480 Vac input                      | ESD-600S210DV                                | Added   |
|             |      | General Specifications                           | Operating Case Temperature for Warranty Tc_w | Updated |
|             |      | Dimming Specifications                           | ESD-600S210DV                                | Added   |
|             |      | Efficiency vs. Load                              | ESD-600S210DV                                | Added   |
| 2018-05-17  | D    | Description                                      | /                                            | Updated |
|             |      | Models                                           | ESD-600S170DV                                | Added   |
|             |      | I-V Operating Area                               | ESD-600S170DV                                | Added   |
|             |      | Output Current Setting(Isolet) Range             | ESD-600S170DV                                | Added   |
|             |      | Output Current Setting Range with Constant Power | ESD-600S170DV                                | Added   |
|             |      | Output Specifications                            | No Load Output Voltage                       | Updated |

## Revision History (Continued)

| Change Date | Rev. | Description of Change       |                                                                                                                                               |                        |
|-------------|------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
|             |      | Item                        | From                                                                                                                                          | To                     |
| 2018-05-17  | D    | Efficiency at 277 Vac input | ESD-600S170DV                                                                                                                                 | Added                  |
|             |      | Efficiency at 347 Vac input | ESD-600S170DV                                                                                                                                 | Added                  |
|             |      | Efficiency at 480 Vac input | ESD-600S170DV                                                                                                                                 | Added                  |
|             |      | Dimming Specifications      | Dimming Output Range                                                                                                                          | Updated                |
|             |      | Efficiency vs. Load         | ESD-600S170DV                                                                                                                                 | Added                  |
| 2019-12-02  | E    | Independent Logo            | /                                                                                                                                             | Added                  |
|             |      | Features                    | Timer Dimmable (3 Timer Modes)                                                                                                                | 3-Timer-Modes Dimmable |
|             |      | Features                    | 6kV line-line, 10kV line-earth                                                                                                                | DM 6kV, CM 10kV        |
|             |      | Features                    | Waterproof (IP67)                                                                                                                             | IP67                   |
|             |      | Features                    | Suitable for Independent Use                                                                                                                  | Deleted                |
|             |      | Description                 | under voltage lock out                                                                                                                        | Deleted                |
|             |      | Safety & EMC Compliance     | ENEC                                                                                                                                          | Added                  |
|             |      | Safety & EMC Compliance     | TUV                                                                                                                                           | Added                  |
|             |      | Safety & EMC Compliance     | CB                                                                                                                                            | Added                  |
|             |      | Safety & EMC Compliance     | EN 61000-4-5                                                                                                                                  | Updated                |
|             |      | RoHS Compliance             | /                                                                                                                                             | Updated                |
| 2021-04-15  | F    | Format                      | /                                                                                                                                             | Updated                |
|             |      | Output Specifications       | No Load Output Voltage<br>ESD-600S210DV<br>ESD-600S280DV<br>ESD-600S420DV<br>ESD-600S560DV<br>ESD-600S740DV<br>ESD-600S980DV<br>ESD-600S12ADV | Updated                |