

Features

- Ultra High Efficiency (Up to 94.5%)
- Full Power at Wide Output Current Range (Constant Power)
- 0-10V/PWM/3-Timer-Modes Dimmable
- Dim-to-Off with Standby Power $\leq 1.5W$
- Output Lumen Compensation
- Input Surge Protection: DM 4kV, CM 6kV
- All-Around Protection: OVP, SCP, OTP
- IP67
- SELV Output
- 5 Years Warranty



Description

The ESD-320SxxxDV series is a 320W, constant-current, programmable LED driver that operates from 249-528 Vac input with excellent power factor. Created for many lighting applications including high bay, high mast, sports and roadway, 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, 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)	Power Factor		Model Number
							277Vac	480Vac	
105-1500mA	1050-1500mA	1400 mA	249~528Vac 352~500Vdc	107~305Vdc	320 W	94.0%	0.96	0.95	ESD-320S150DV
154-2200mA	1540-2200mA	2100 mA	249~528Vac 352~500Vdc	73~208Vdc	320 W	94.5%	0.96	0.95	ESD-320S220DV
217-3100mA	2170-3100mA	2800 mA	249~528Vac 352~500Vdc	52~148Vdc	320 W	94.0%	0.96	0.95	ESD-320S310DV
308-4400mA	3080-4400mA	4200 mA	249~528Vac 352~500Vdc	37~104Vdc	320 W	94.0%	0.96	0.95	ESD-320S440DV
434-6200mA	4340-6200mA	4900 mA	249~528Vac 352~500Vdc	26 ~74Vdc	320 W	93.5%	0.96	0.95	ESD-320S620DV ⁽⁴⁾

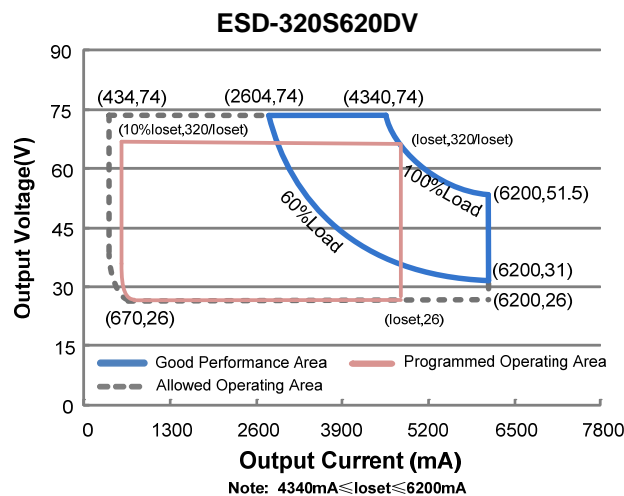
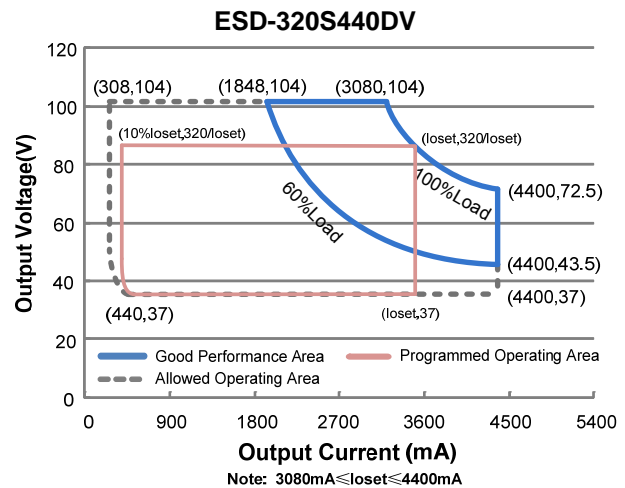
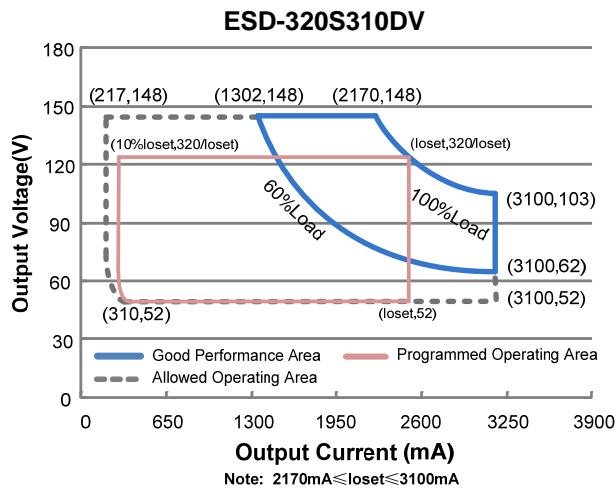
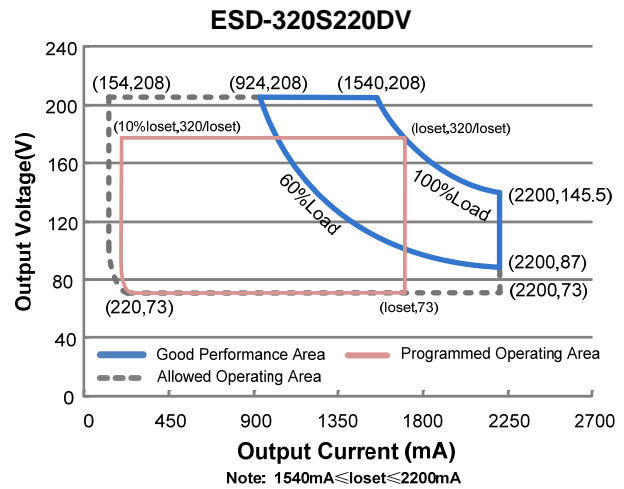
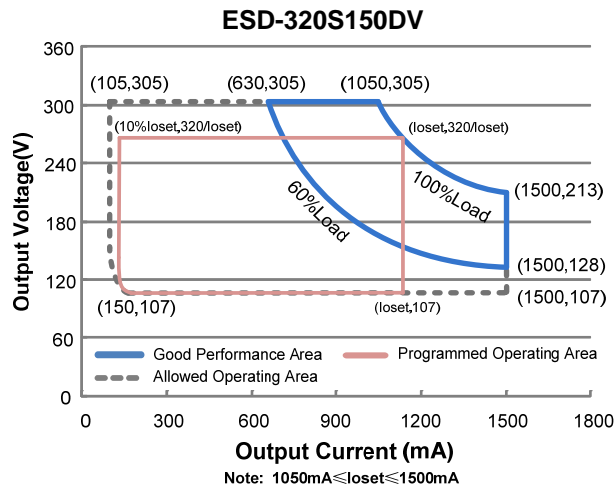
Notes: (1) Output current range with constant power at 320W

(2) Certified voltage range: 277-480Vac

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

(4) SELV Output

I-V Operating Area



Input Specifications

Parameter	Min.	Typ.	Max.	Notes
Input AC Voltage	249 Vac	-	528 Vac	
Input DC Voltage	352Vdc	-	500Vdc	
Input Frequency	47 Hz	-	63 Hz	
Leakage Current	-	-	0.70 mA	IIEC60598-1; 480Vac/ 60Hz; Grounding effectively.
Input AC Current	-	-	1.5 A	Measured at 100% load and 277 Vac input.
	-	-	0.8 A	Measured at 100% load and 480 Vac input.
Inrush Current(I^2t)	-	-	3.87 A ² s	At 480Vac input, 25°C Cold Start, Duration=1.77 ms, 10%Ipk-10%Ipk. See Inrush Current Waveform for the details.
PF	0.90	-	-	At 277-480Vac, 50-60Hz, 60%-100% Load (192-320W)
THD	-	-	20%	

Output Specifications

Parameter	Min.	Typ.	Max.	Notes
Output Current Tolerance	-5%loset	-	5%loset	100% load
Output Current Setting(loset) Range				
ESD-320S150DV	105 mA	-	1500 mA	
ESD-320S220DV	154 mA	-	2200 mA	
ESD-320S310DV	217 mA	-	3100 mA	
ESD-320S440DV	308 mA	-	4400 mA	
ESD-320S620DV	434 mA	-	6200 mA	
Output Current Setting Range with Constant Power				
ESD-320S150DV	1050 mA	-	1500 mA	
ESD-320S220DV	1540 mA	-	2200 mA	
ESD-320S310DV	2170 mA	-	3100 mA	
ESD-320S440DV	3080 mA	-	4400 mA	
ESD-320S620DV	4340 mA	-	6200 mA	
Total Output Current Ripple (pk-pk)	-	5%lomax	10%lomax	100% load, 20 MHz BW
Output Current Ripple at < 200 Hz (pk-pk)	-	2%lomax	-	100% load. Only this component of ripple is associated with visible flicker.
Startup Overshoot Current	-	-	10%lomax	100% load
No Load Output Voltage				
ESD-320S150DV	-	-	329V	
ESD-320S220DV	-	-	223V	
ESD-320S310DV	-	-	158V	
ESD-320S440DV	-	-	121V	
ESD-320S620DV	-	-	84V	
Line Regulation	-	-	±0.5%	Measured at 100% load
Load Regulation	-	-	±1.5%	
Turn-on Delay Time	-	0.5 s	0.75 s	Measured at 277Vac and 480Vac input, 60%-100% Load

Output Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
Temperature Coefficient of I _o set	-	0.03%/°C	-	Case temperature = 0°C ~T _c 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-320S150DV I _o =1050mA I _o =1500mA ESD-320S220DV I _o =1540mA I _o =2200mA ESD-320S310DV I _o =2170mA I _o =3100mA ESD-320S440DV I _o =3080mA I _o =4400mA ESD-320S620DV I _o =4340mA I _o =6200mA	90.5% 89.5% 91.0% 90.0% 90.5% 90.0% 91.0% 90.0% 90.5% 89.5%	92.5% 91.5% 93.0% 92.0% 92.5% 92.0% 93.0% 92.0% 92.5% 91.5%	- - - - - - - - - -	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)
Efficiency at 347 Vac input: ESD-320S150DV I _o =1050mA I _o =1500mA ESD-320S220DV I _o =1540mA I _o =2200mA ESD-320S310DV I _o =2170mA I _o =3100mA ESD-320S440DV I _o =3080mA I _o =4400mA ESD-320S620DV I _o =4340mA I _o =6200mA	91.5% 90.5% 92.0% 91.0% 91.5% 90.5% 91.5% 90.5% 91.0% 90.0%	93.5% 92.5% 94.0% 93.0% 93.5% 92.5% 93.5% 92.5% 93.0% 92.0%	- - - - - - - - - -	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)
Efficiency at 480 Vac input: ESD-320S150DV I _o =1050mA I _o =1500mA ESD-320S220DV I _o =1540mA I _o =2200mA ESD-320S310DV I _o =2170mA I _o =3100mA ESD-320S440DV I _o =3080mA I _o =4400mA ESD-320S620DV I _o =4340mA I _o =6200mA	92.0% 91.0% 92.5% 91.5% 92.0% 91.0% 92.0% 91.0% 91.5% 90.5%	94.0% 93.0% 94.5% 93.5% 94.0% 93.0% 94.0% 93.0% 93.5% 92.5%	- - - - - - - - - -	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)

General Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
Standby power	-	-	1.5 W	Measured at 480Vac/50Hz; Dimming off
MTBF	-	200,000 Hours	-	Measured at 480Vac input, 80%Load and 25°C ambient temperature (MIL-HDBK-217F)
Lifetime	-	120,000 Hours	-	Measured at 480Vac input, 80%Load and 70°C case temperature; See lifetime vs. Tc curve for the details
Operating Case Temperature for Safety Tc_s	-40°C	-	+90°C	
Operating Case Temperature for Warranty Tc_w	-40°C	-	+75°C	Case temperature for 5 years warranty. Humidity: 10% RH to 95% RH;
Storage Temperature	-40°C	-	+85°C	Humidity: 5% RH to 95% RH;
Dimensions Inches (L × W × H) Millimeters (L × W × H)	9.21 × 3.86 × 1.76 234 × 98 × 44.8			With mounting ear 10.28 × 3.86 × 1.76 261 × 98 × 44.8
Net Weight	-	1935g	-	

Dimming Specifications

Dimming Specifications

Parameter		Min.	Typ.	Max.	Notes
Absolute Maximum Voltage on the Vdim (+) Pin		-20 V	-	20 V	
Source Current on Vdim (+)Pin		200 uA	300 uA	450 uA	Vdim(+) = 0 V
Dimming Output Range	ESD-320S150DV ESD-320S220DV ESD-320S310DV ESD-320S440DV ESD-320S620DV	10%loset	-	loset	1050mA ≤ loiset ≤ 1500mA 1540mA ≤ loiset ≤ 2200mA 2170mA ≤ loiset ≤ 3100mA 3080mA ≤ loiset ≤ 4400mA 4340mA ≤ loiset ≤ 6200mA
	ESD-320S150DV ESD-320S220DV ESD-320S310DV ESD-320S440DV ESD-320S620DV	105 mA 154 mA 217 mA 308 mA 434 mA	-	loset	105mA ≤ loiset < 1050mA 154mA ≤ loiset < 1540mA 217mA ≤ loiset < 2170mA 308mA ≤ loiset < 3080mA 434mA ≤ loiset < 4340mA
Recommended Dimming Input Range		0 V	-	10 V	Default 0-10V dimming mode.
Dim off Voltage		0.4 V	0.55V	0.7 V	
Dim on Voltage		0.6 V	0.75 V	0.9 V	
Hysteresis		-	0.2 V	-	

Dimming Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
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%	-	

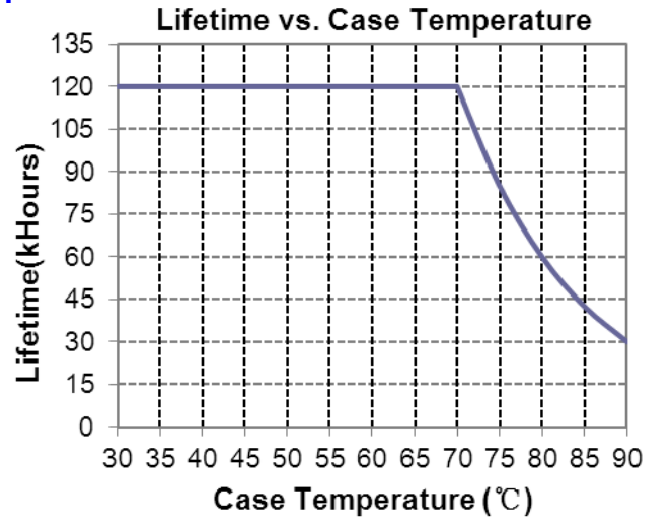
Safety & EMC Compliance

Safety Category	Standard
ENEC & CE	EN 61347-1, EN61347-2-13
EMI Standards	Notes
EN 55015 ⁽¹⁾	Conducted emission Test & Radiated emission Test
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 4 kV, Common Mode 6 kV ⁽²⁾
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

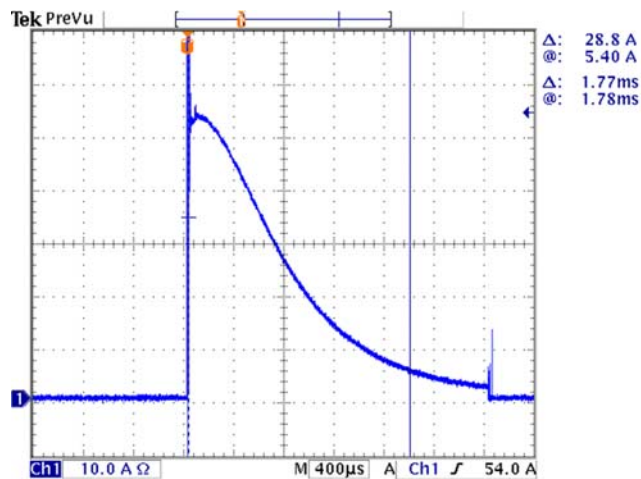
Note: (1) This LED driver meets the EMI specifications above, but EMI performance of a luminaire that contains it depends also on the other devices connected to the driver and on the fixture itself.

(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.

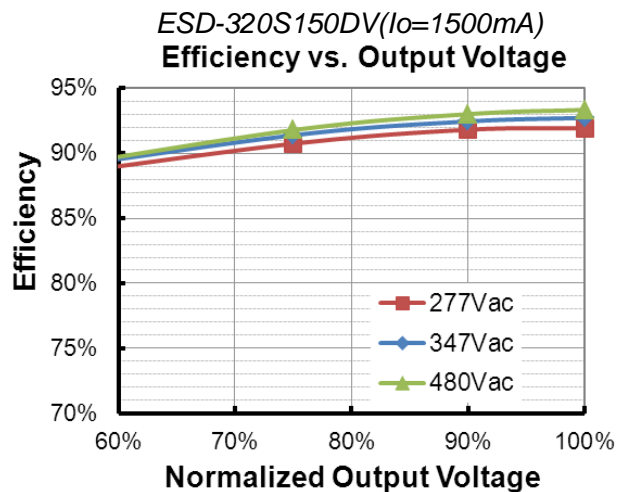
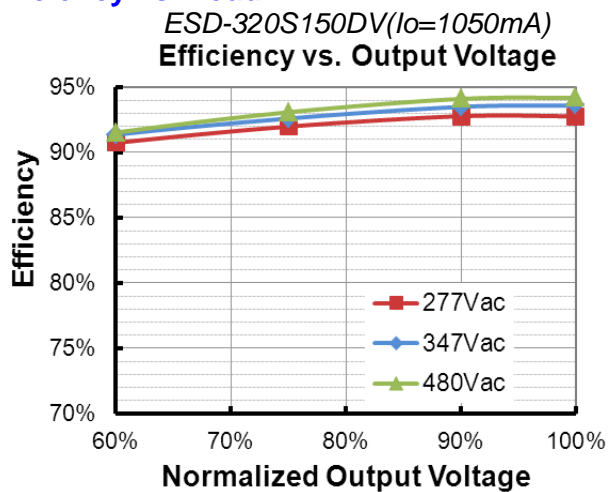
Lifetime vs. Case Temperature

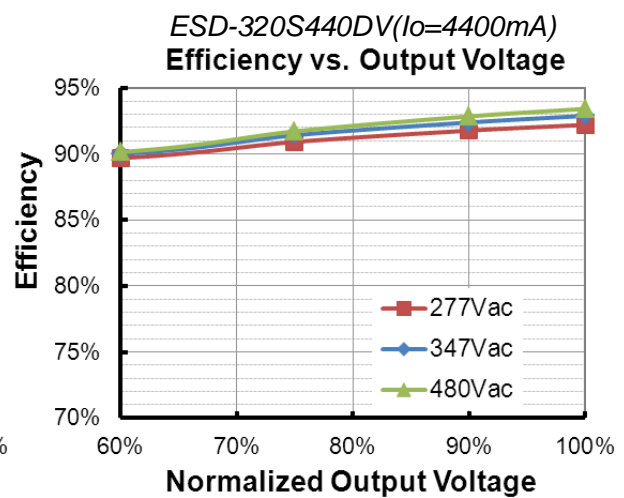
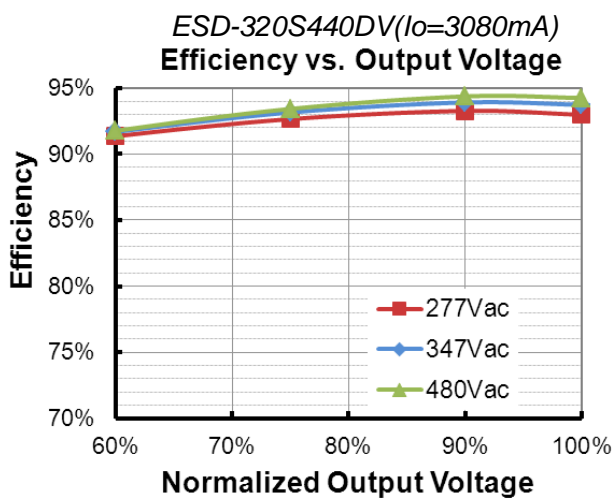
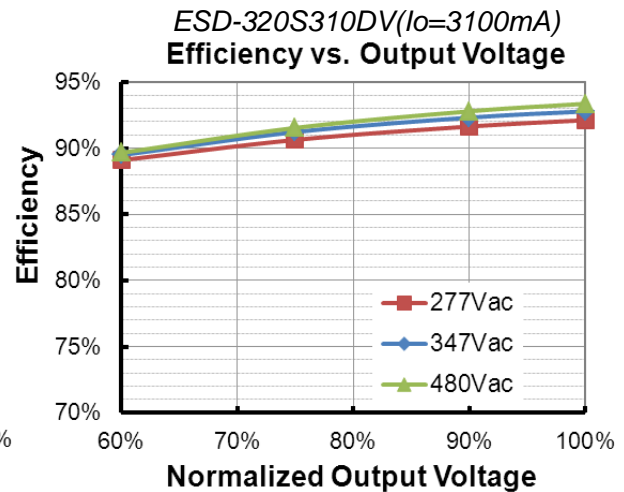
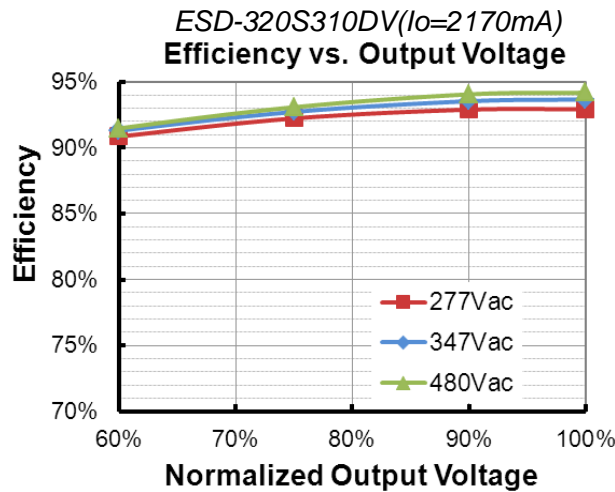
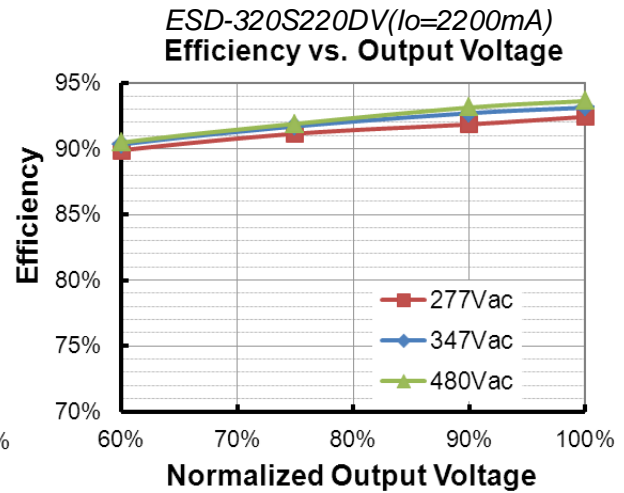
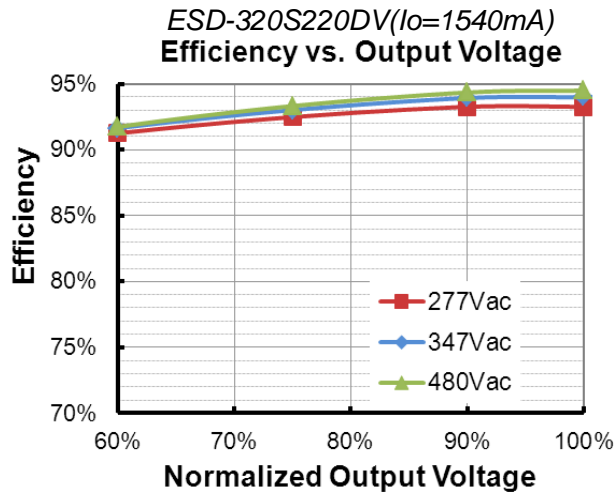


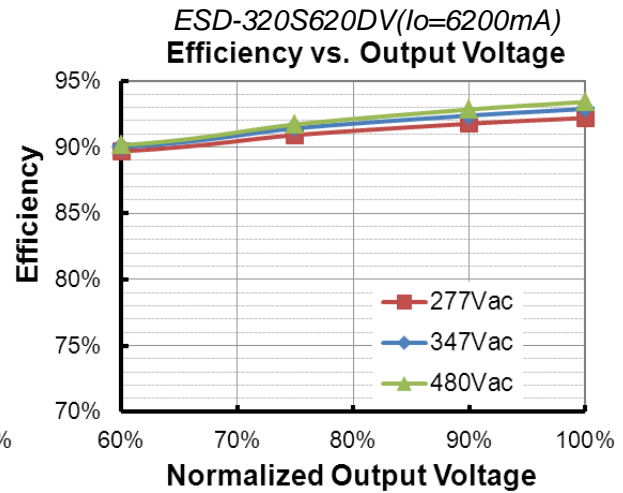
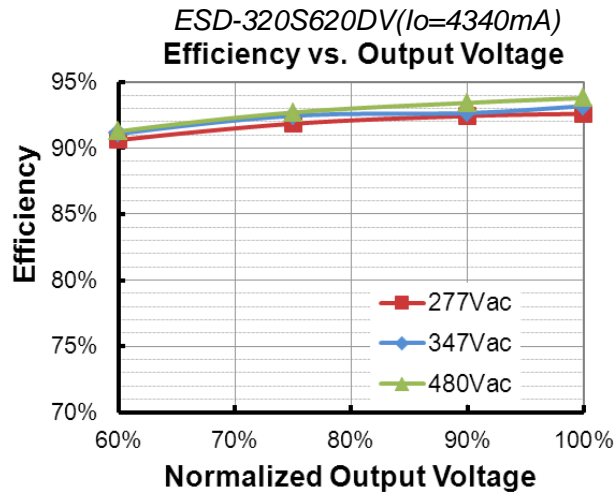
Inrush Current Waveform



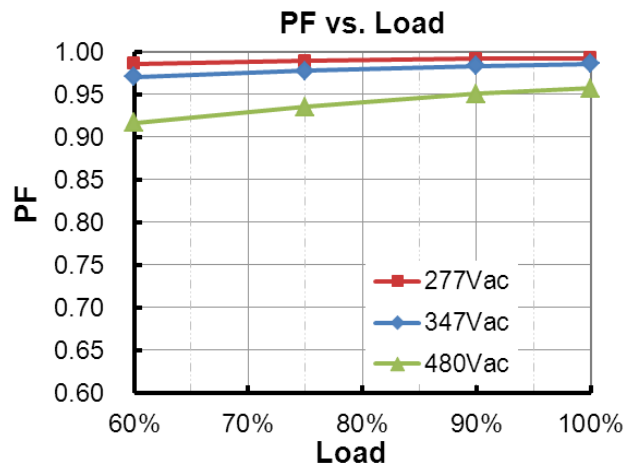
Efficiency vs. Load



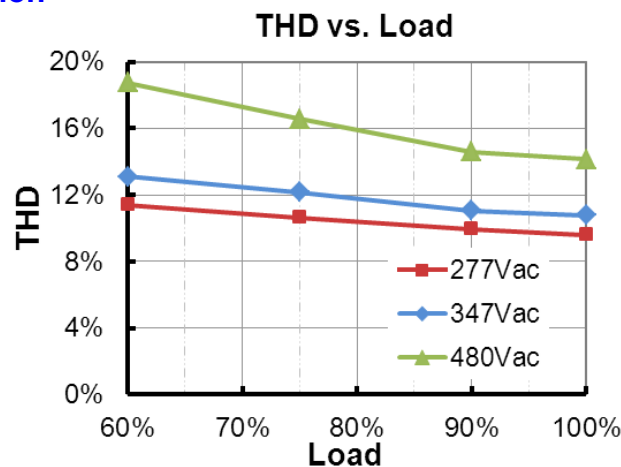




Power Factor



Total Harmonic Distortion



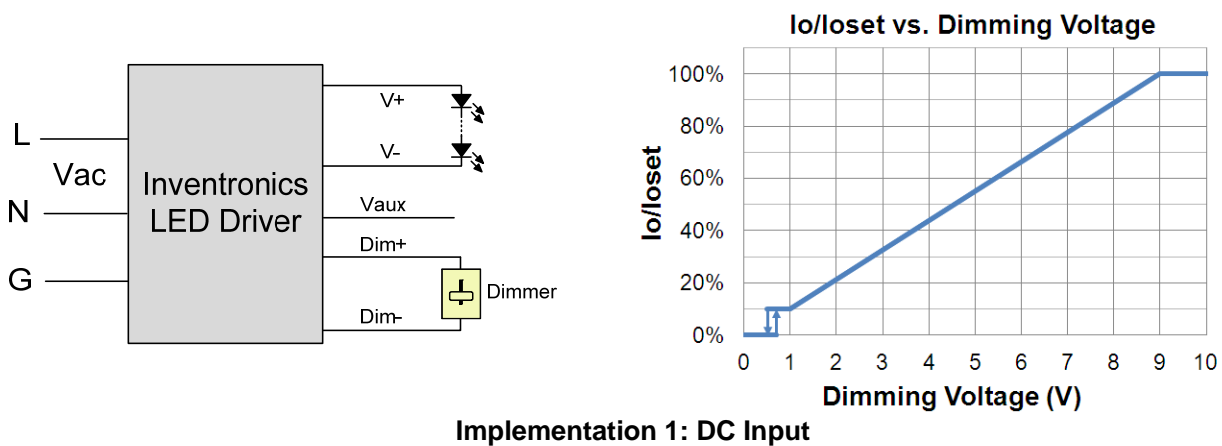
Protection Functions

Parameter	Notes
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.

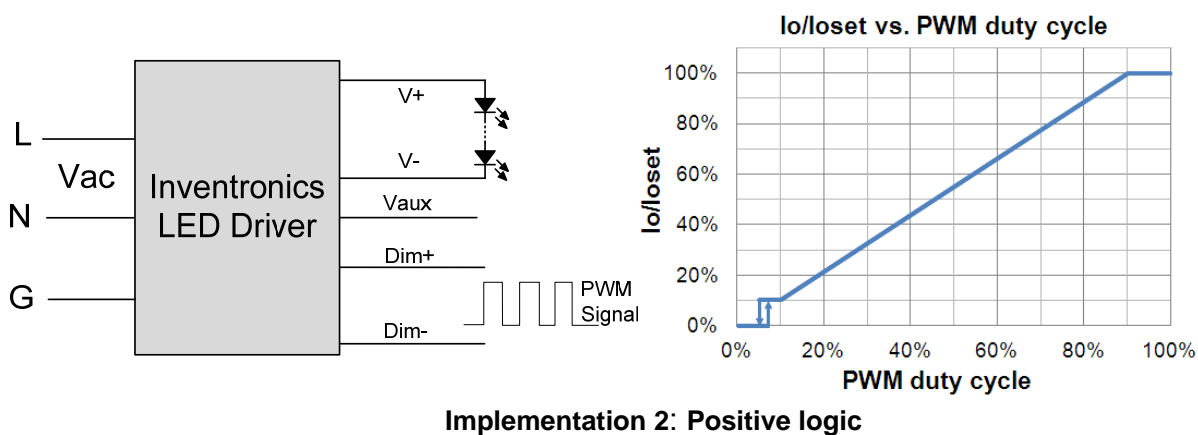


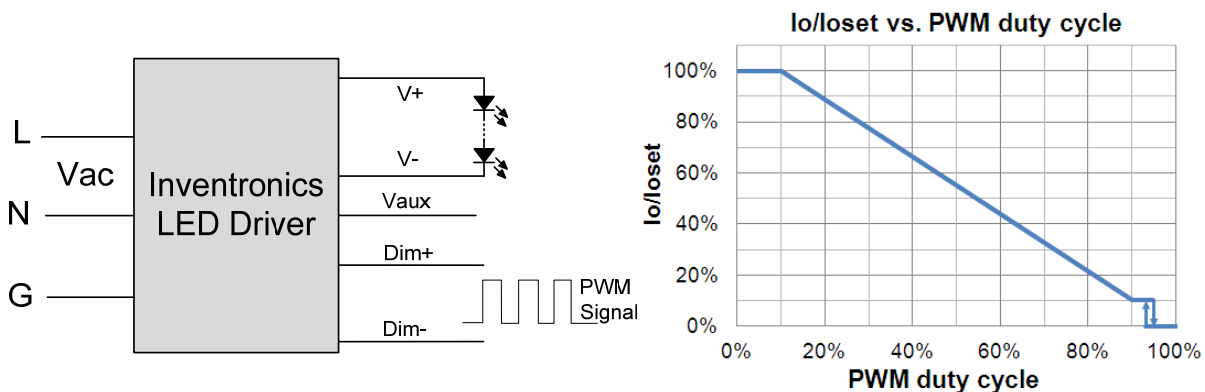
Notes:

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

● PWM Dimming

The recommended implementation of the dimming control is provided below.





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 dim to off and be standby.

● Time Dimming

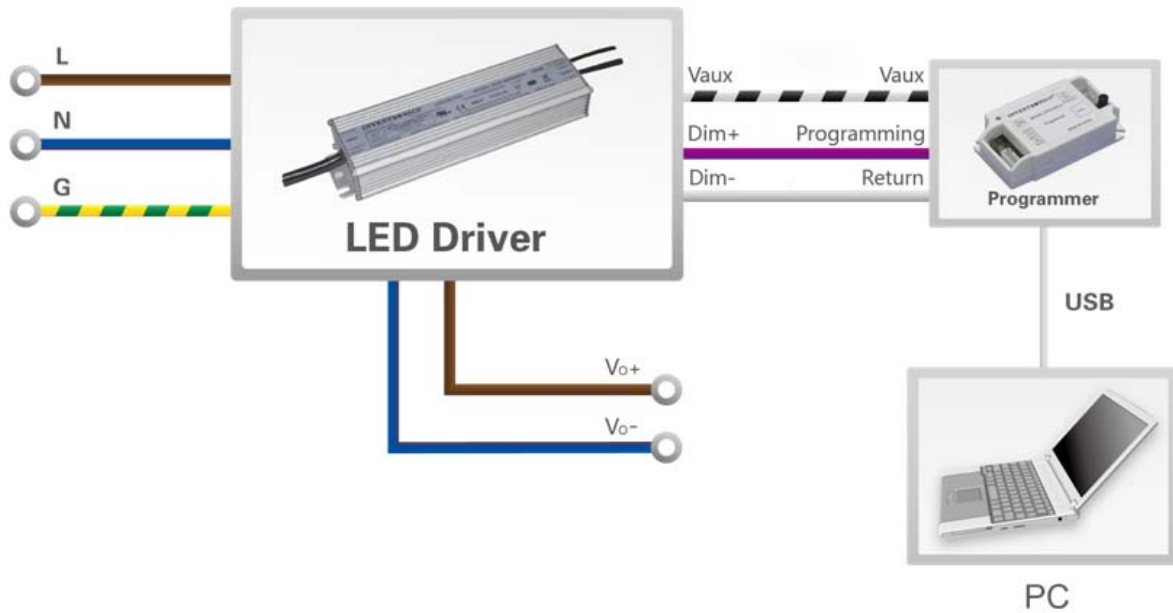
Time dimming control includes 3 kinds of modes, they are Self Adapting-Midnight, Self Adapting-Percentage and Traditional Timer.

- **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

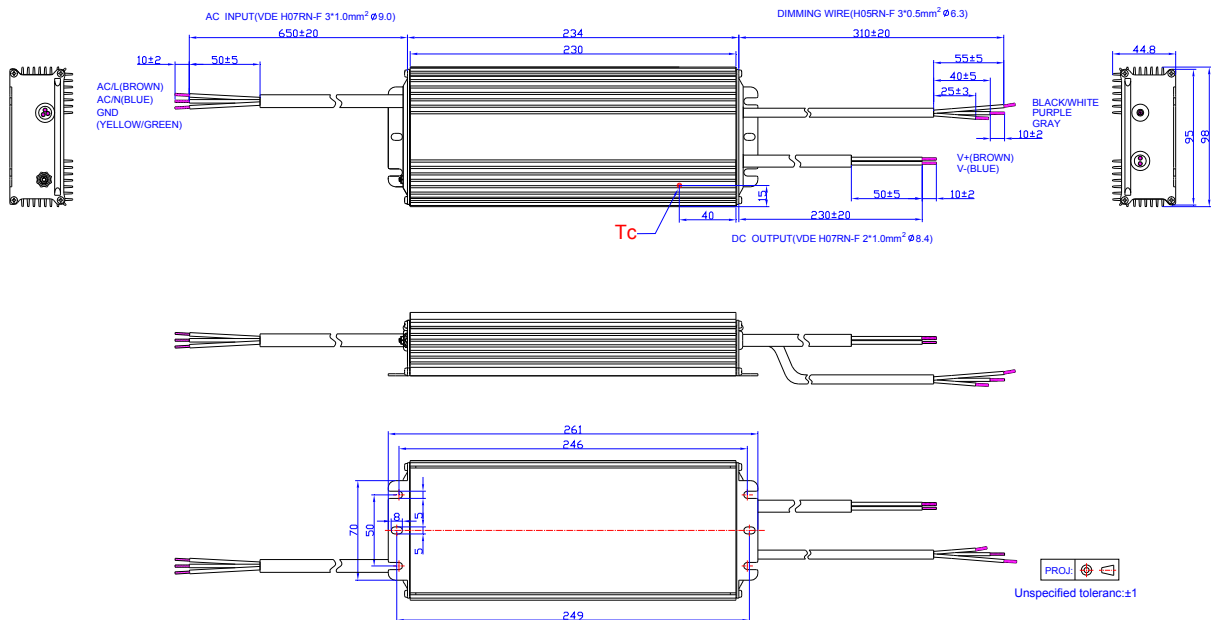


Note: The driver does not need to be powered on during the programming process.

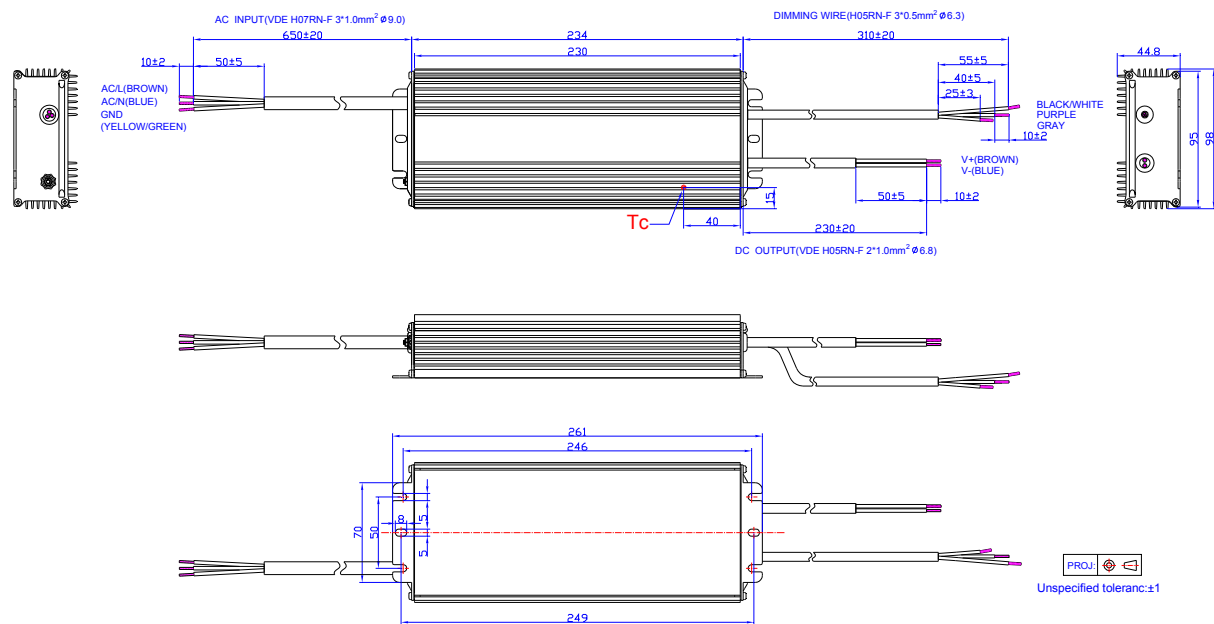
- Please refer to [PRG-MUL2](#) (Programmer) datasheet for details.

Mechanical Outline

ESD-320S150DV



Others



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
2020-03-05	A	Datasheets Release	/	/
2020-04-21	B	Input Specifications	Input AC Voltage	Updated
		Input Specifications	Input DC Voltage	Added
		0-10V Dimming	Notes	Updated
		PWM Dimming	Notes	Updated
		Mechanical Outline	/	Updated