Features

- Ultra High Efficiency (Up to 94.5%)
- Full Power at 70-100% Max Current (Constant Power)
- 0-10V/PWM/Timer Dimmable and Dim-to-Off
- Standby Power ≤1.5W
- Input Surge Protection: 4kV line-line, 6kV line-earth
- All-Around Protection: OVP, SCP, OTP
- Suitable for UL Dry / Damp / Wet Location
- TYPE HL, for use in a Class I, Division 2 hazardous (Classified) location

Description

The *ESD-320SxxxDT* series is a 320W, constant-current, programmable outdoor LED driver that operates from 249-528 Vac input with excellent power factor. Created for high bay, high mast, arena and roadway lights, 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

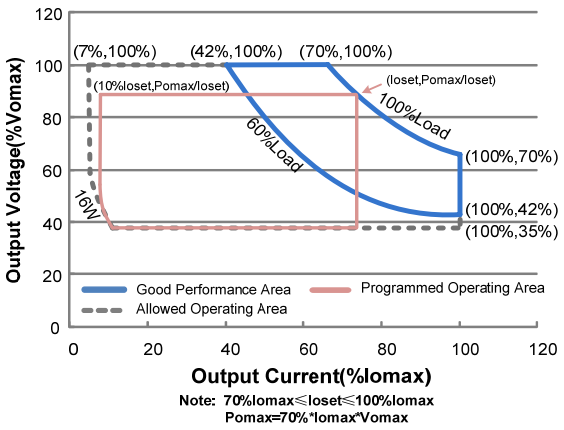
Output Current Range	Full-Power Current Range (1)	Default Output Current	Input Voltage Range	Output Voltage Range	Max. Output Power	Typical Efficiency (2)	Power Factor		Model Number
							277Vac	480Vac	
105-1500mA	1050-1500mA	1400 mA	249~528Vac	107~305Vdc	320 W	94.0%	0.96	0.95	ESD-320S150DT
154-2200mA	1540-2200mA	2100 mA	249~528Vac	73~208Vdc	320 W	94.5%	0.96	0.95	ESD-320S220DT
217-3100mA	2170-3100mA	2800 mA	249~528Vac	52~148Vdc	320 W	94.0%	0.96	0.95	ESD-320S310DT
308-4400mA	3080-4400mA	4200 mA	249~528Vac	37~104Vdc	320 W	94.0%	0.96	0.95	ESD-320S440DT
434-6200mA	4340-6200mA	4900 mA	249~528Vac	26 ~74Vdc	320 W	93.5%	0.96	0.95	ESD-320S620DT

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

(2) Measured at a 480Vac input with 70% maximum output current or 100% maximum output voltage.

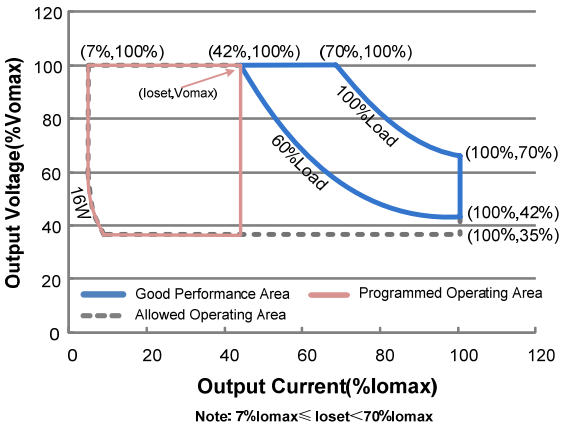
I-V Operating Area

Power-Limited



Note: 70%Iomax≤Ioset≤100%Iomax
Pomax=70%*Iomax*Vomax

Voltage-Limited



Note: 7%Iomax≤ Ioset≤70%Iomax

Specifications are subject to changes without notice.

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Input Specifications

Parameter	Min.	Typ.	Max.	Notes
Input Voltage	249 Vac	-	528 Vac	
Input Frequency	47 Hz	-	63 Hz	
Leakage Current	-	-	1.0 mA	At 480Vac 60Hz input; Grounding effectively.
Input AC Current	-	-	1.5 A	Measured at full load and 277 Vac input.
	-	-	0.8 A	Measured at full load and 480 Vac input.
Inrush Current(I^2t)	-	-	3.87 A^2s	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, 60%-100% Load (192-320W)
THD	-	-	20%	

Output Specifications

Parameter	Min.	Typ.	Max.	Notes
Output Current Tolerance	-5%Ioset	-	5%Ioset	At full load condition
Output Current Setting(Ioset) Range	7%Iomax	-	100%Iomax	
Output Current Setting Range with Constant Power	70%Iomax	-	100%Iomax	
Total Output Current Ripple (pk-pk)	-	5%Iomax	10%Iomax	At full load condition, 20 MHz BW
Output Current Ripple at < 200 Hz (pk-pk)	-	2%Iomax	-	At full load condition. Only this component of ripple is associated with visible flicker.
Startup Overshoot Current	-	-	10%Iomax	At full load condition
No Load Output Voltage ESD-320S150DT ESD-320S220DT ESD-320S310DT ESD-320S440DT ESD-320S620DT	 - - - - -	 - - - - -	 329V 223V 158V 121V 84V	
Line Regulation	-	-	±0.5%	Measured at full load
Load Regulation	-	-	±1.5%	
Turn-on Delay Time	-	1.0 s	2.0 s	Measured at 277Vac and 480Vac input.
Temperature Coefficient of Ioset	-	-	0.03%/°C	Case temperature = 0°C ~Tc 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−“

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

General Specifications

Parameter	Min.	Typ.	Max.	Notes
Efficiency at 277 Vac input:				
ESD-320S150DT				
Io=1050mA	90.5%	92.5%	-	
Io=1500mA	89.5%	91.5%	-	
ESD-320S220DT				
Io=1540mA	91.0%	93.0%	-	
Io=2200mA	90.0%	92.0%	-	Measured at full load and steady-state temperature in 25°C ambient;
ESD-320S310DT				
Io=2170mA	90.5%	92.5%	-	(Efficiency will be about 2.0% lower if
Io=3100mA	90.0%	92.0%	-	measured immediately after startup.)
ESD-320S440DT				
Io=3080mA	91.0%	93.0%	-	
Io=4400mA	90.0%	92.0%	-	
ESD-320S620DT				
Io=4340mA	90.5%	92.5%	-	
Io=6200mA	89.5%	91.5%	-	
Efficiency at 347 Vac input:				
ESD-320S150DT				
Io=1050mA	91.5%	93.5%	-	
Io=1500mA	90.5%	92.5%	-	
ESD-320S220DT				
Io=1540mA	92.0%	94.0%	-	
Io=2200mA	91.0%	93.0%	-	Measured at full load and steady-state temperature in 25°C ambient;
ESD-320S310DT				
Io=2170mA	91.5%	93.5%	-	(Efficiency will be about 2.0% lower if
Io=3100mA	90.5%	92.5%	-	measured immediately after startup.)
ESD-320S440DT				
Io=3080mA	91.5%	93.5%	-	
Io=4400mA	90.5%	92.5%	-	
ESD-320S620DT				
Io=4340mA	91.0%	93.0%	-	
Io=6200mA	90.0%	92.0%	-	
Efficiency at 480 Vac input:				
ESD-320S150DT				
Io=1050mA	92.0%	94.0%	-	
Io=1500mA	91.0%	93.0%	-	
ESD-320S220DT				
Io=1540mA	92.5%	94.5%	-	
Io=2200mA	91.5%	93.5%	-	Measured at full load and steady-state temperature in 25°C ambient;
ESD-320S310DT				
Io=2170mA	92.0%	94.0%	-	(Efficiency will be about 2.0% lower if
Io=3100mA	91.0%	93.0%	-	measured immediately after startup.)
ESD-320S440DT				
Io=3080mA	92.0%	94.0%	-	
Io=4400mA	91.0%	93.0%	-	
ESD-320S620DT				
Io=4340mA	91.5%	93.5%	-	
Io=6200mA	90.5%	92.5%	-	
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	-	110,000 Hours	-	Measured at 480Vac input, 80%Load and 60°C case temperature; See lifetime vs. Tc curve for the details

General Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
Operating Case Temperature for Safety Tc_s	-40°C	-	87°C	
Operating Case Temperature for Warranty Tc_w	-40°C	-	70°C	
Storage Temperature	-40°C	-	+85°C	Humidity: 5%RH to 100%RH
Dimensions Inches (L × W × H) Millimeters (L × W × H)	9.21 × 3.86 × 1.75 234 × 98 × 44.5			
Net Weight	-	1750g	-	

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

Dimming Specifications

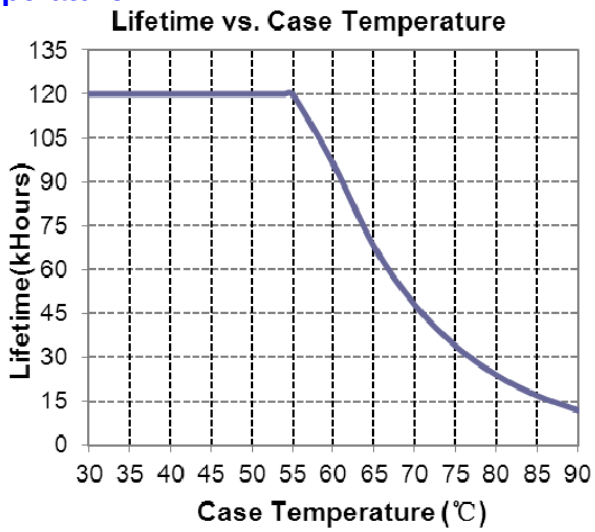
Parameter	Min.	Typ.	Max.	Notes
Absolute Maximum Voltage on the Vdim (+) Pin	-20 V	-	20 V	
Source Current on Vdim (+)Pin	200 uA	300 uA	450 uA	Vdim(+) = 0 V
Dimming Output Range	10%Ioset	-	Ioset	70%Iomax ⩽ Ioset ⩽ 100%Iomax
	7%Iomax	-	Ioset	7%Iomax ⩽ Ioset ＜ 70%Iomax
Recommended Dimming Input Range	0 V	-	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	-	
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%	-	

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

Safety &EMC Compliance

Safety Category	Standard
UL/CUL	UL8750,CAN/CSA-C22.2 No. 250.13-12
EMI Standards	**Notes**
FCC Part 15	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
EN 61000-4-5	Surge Immunity Test: AC Power Line: line to line 4 kV, line to earth 6 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

Lifetime vs. Case Temperature



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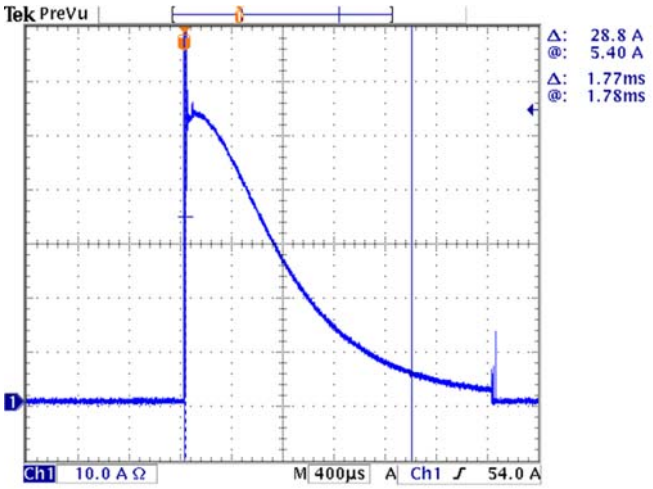
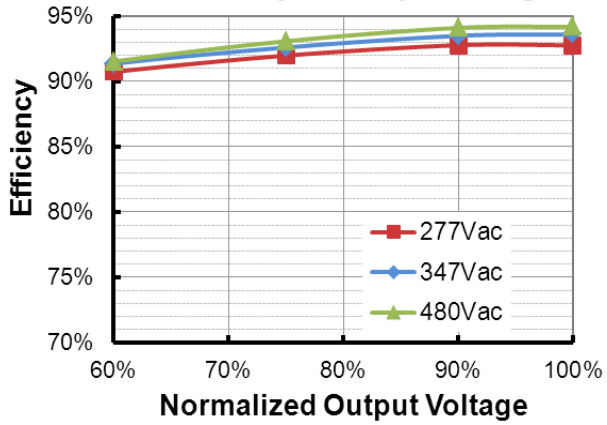
Inrush Current Waveform

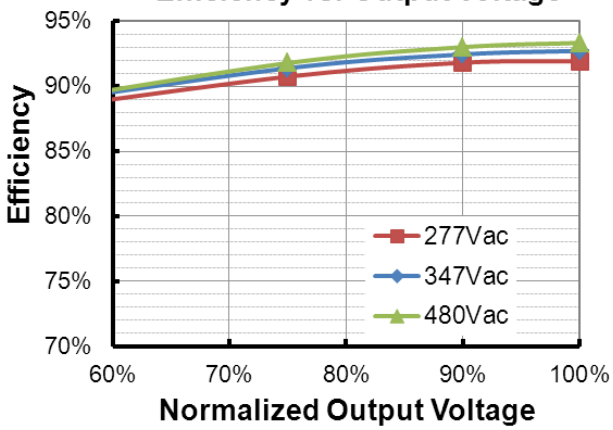


Efficiency vs. Load

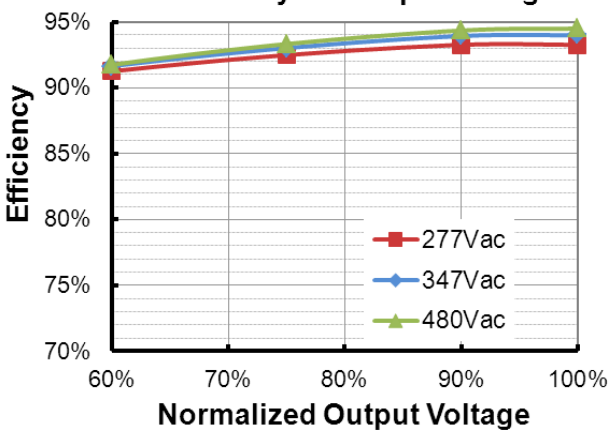
ESD-320S150DT(Io=1050mA)



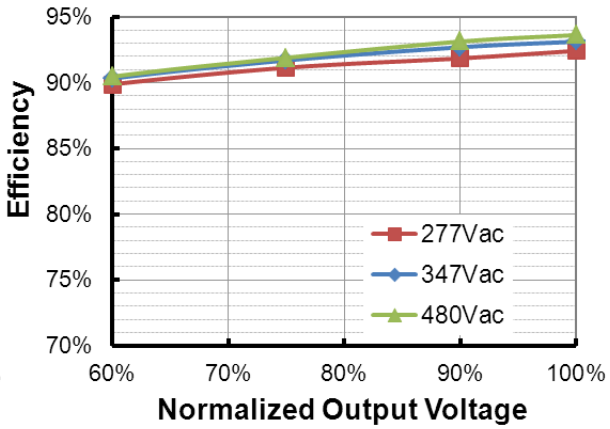
ESD-320S150DT(Io=1500mA)



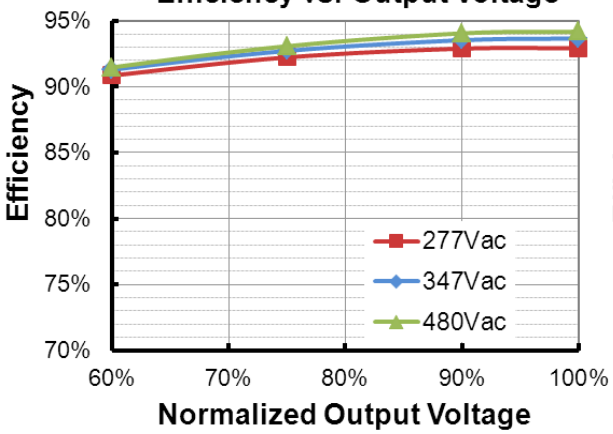
ESD-320S220DT(Io=1540mA)



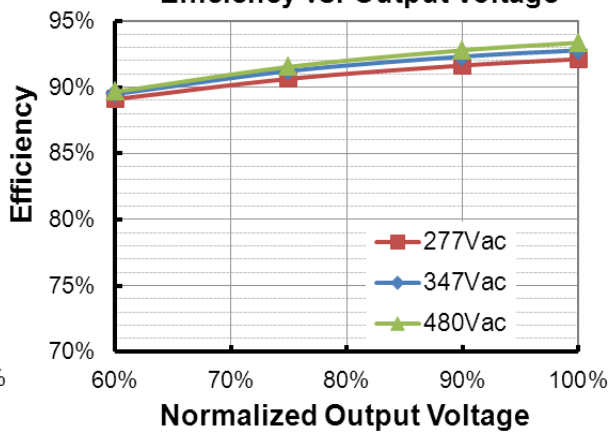
ESD-320S220DT(Io=2200mA)



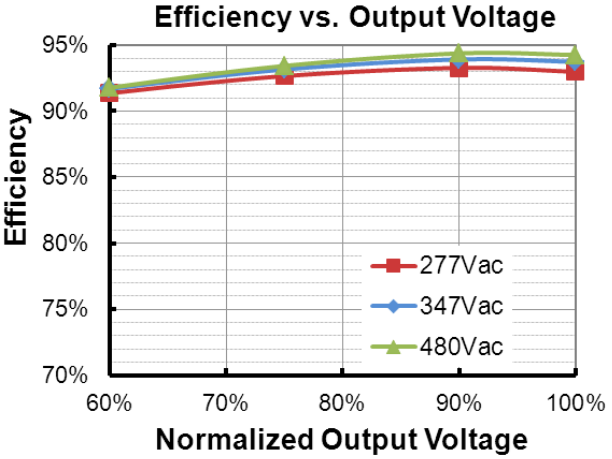
ESD-320S310DT(Io=2170mA)



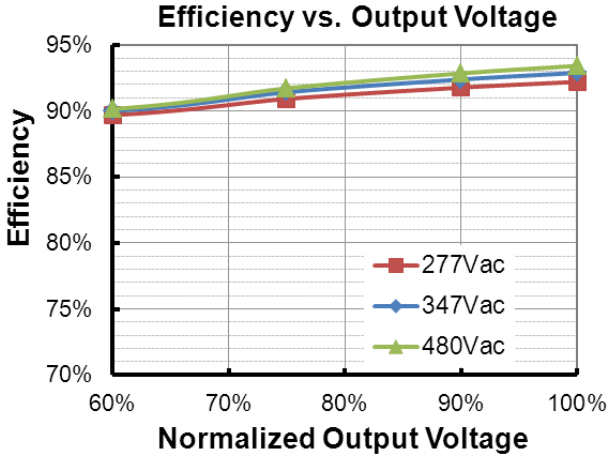
ESD-320S310DT(Io=3100mA)



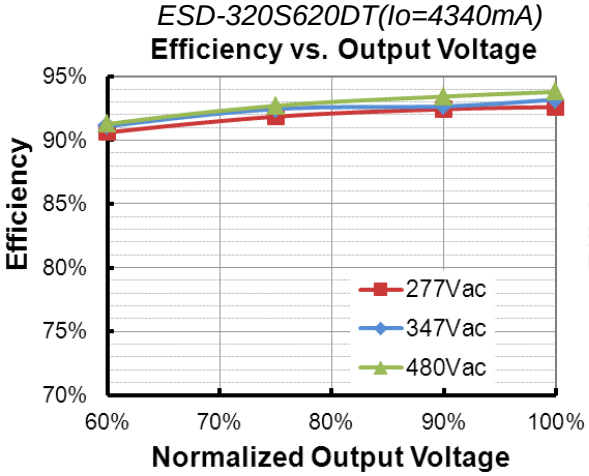
ESD-320S440DT(Io=3080mA)



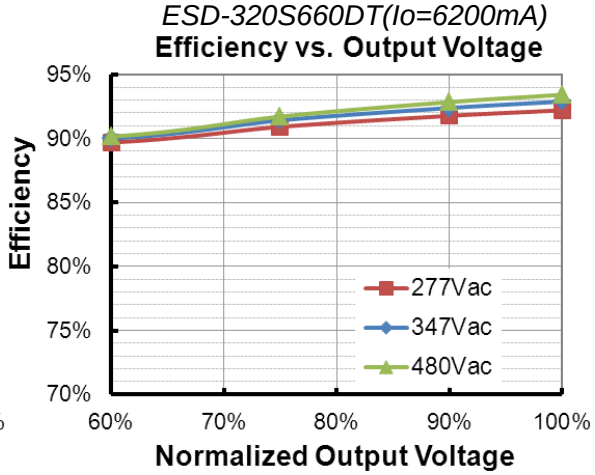
ESD-320S440DT(Io=4400mA)



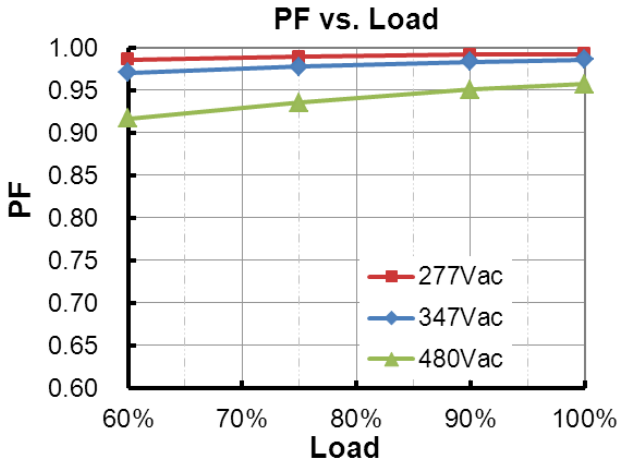
ESD-320S620DT(Io=4340mA)



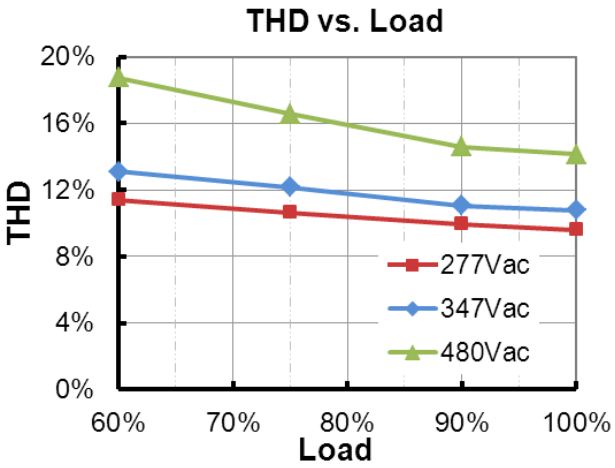
ESD-320S660DT(Io=6200mA)



Power Factor



Total Harmonic Distortion



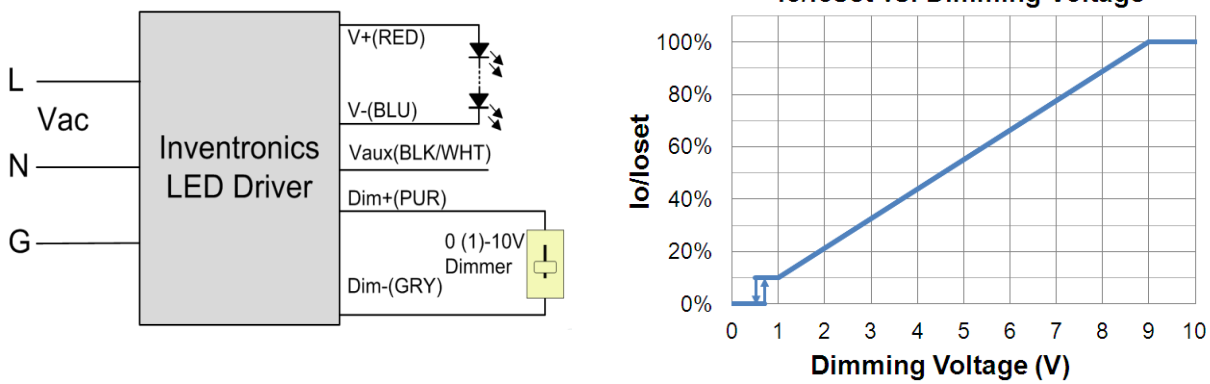
Protection Functions

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.

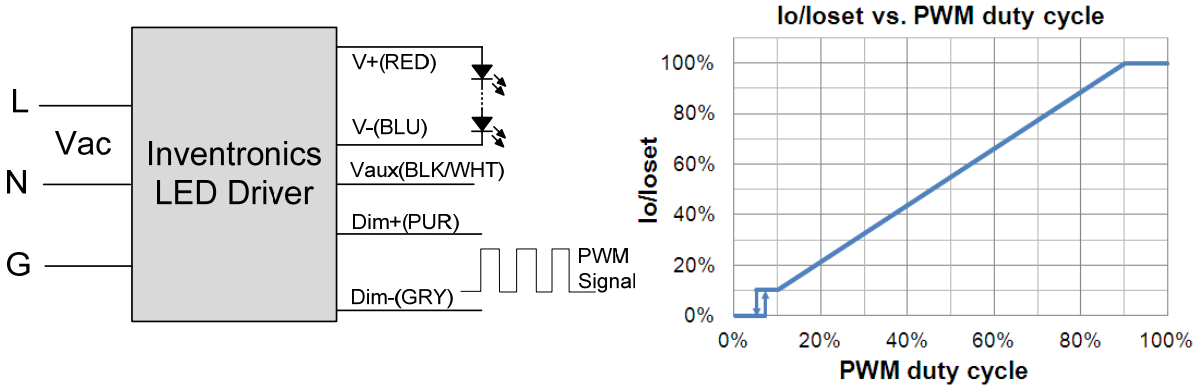


Implementation 1: DC Input

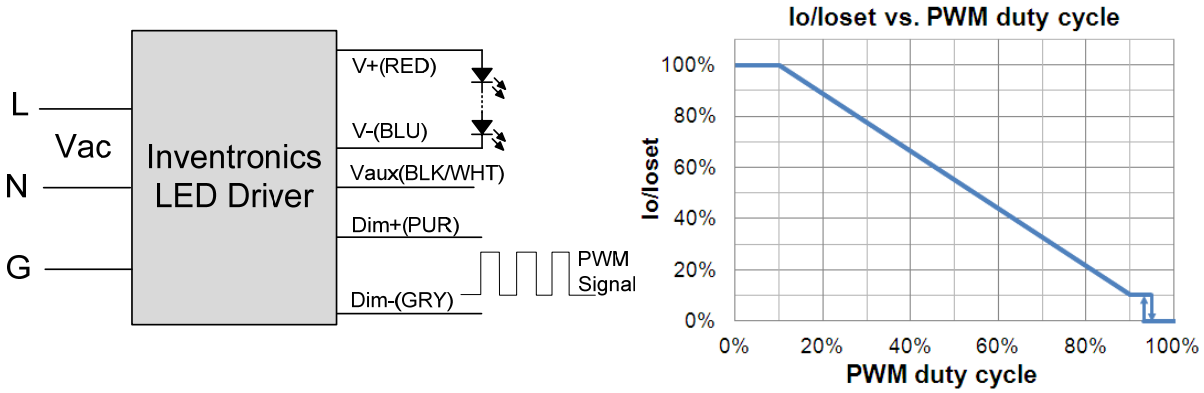
Notes:

1. The dimmer can also be replaced by an active 0-10V voltage source signal or passive components like resistors and zener.
2. Do NOT connect Dim− to the output V− or V+, otherwise the driver will not work properly.
3. If 0-10V dimming is not used, Dim + should be open.

- **PWM Dimming**

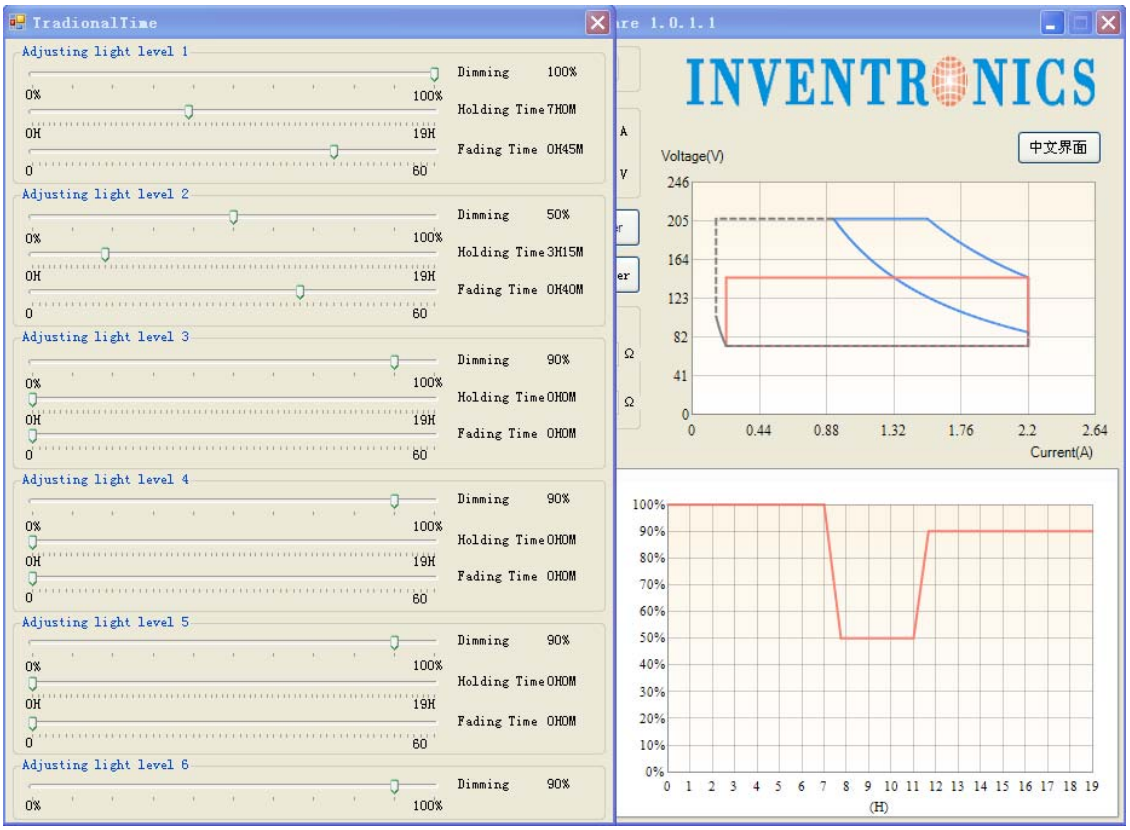


Implementation 2: Positive logic



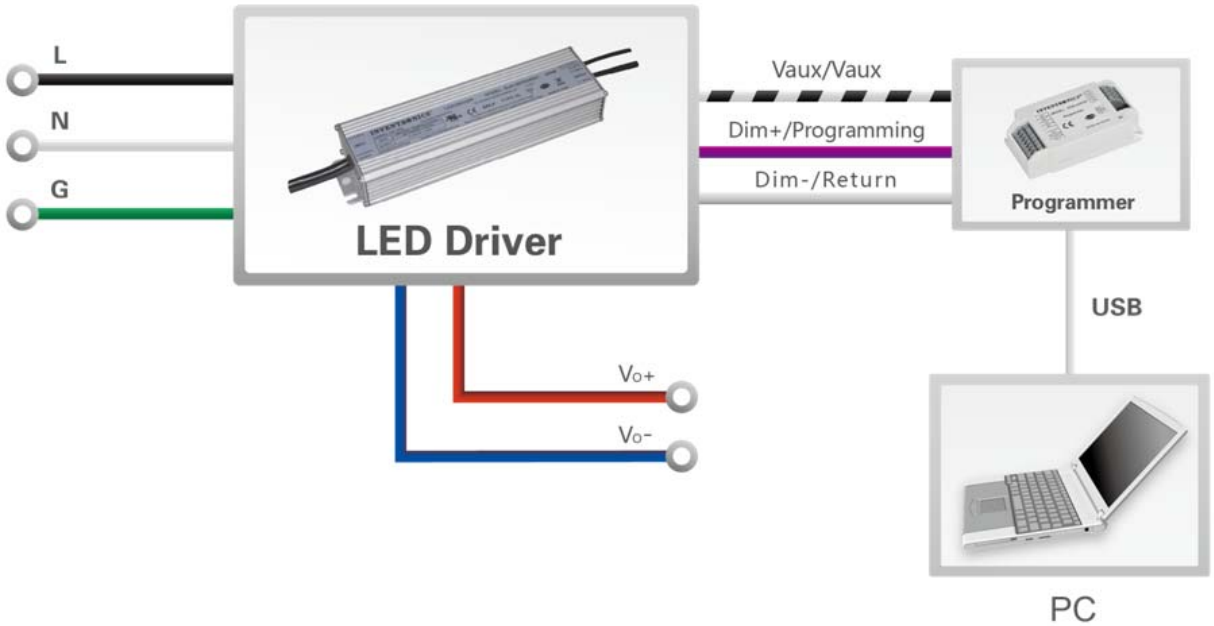
Implementation 3: Negative logic

- **Time Dimming**



Set the timing curve by pulling the sliders.

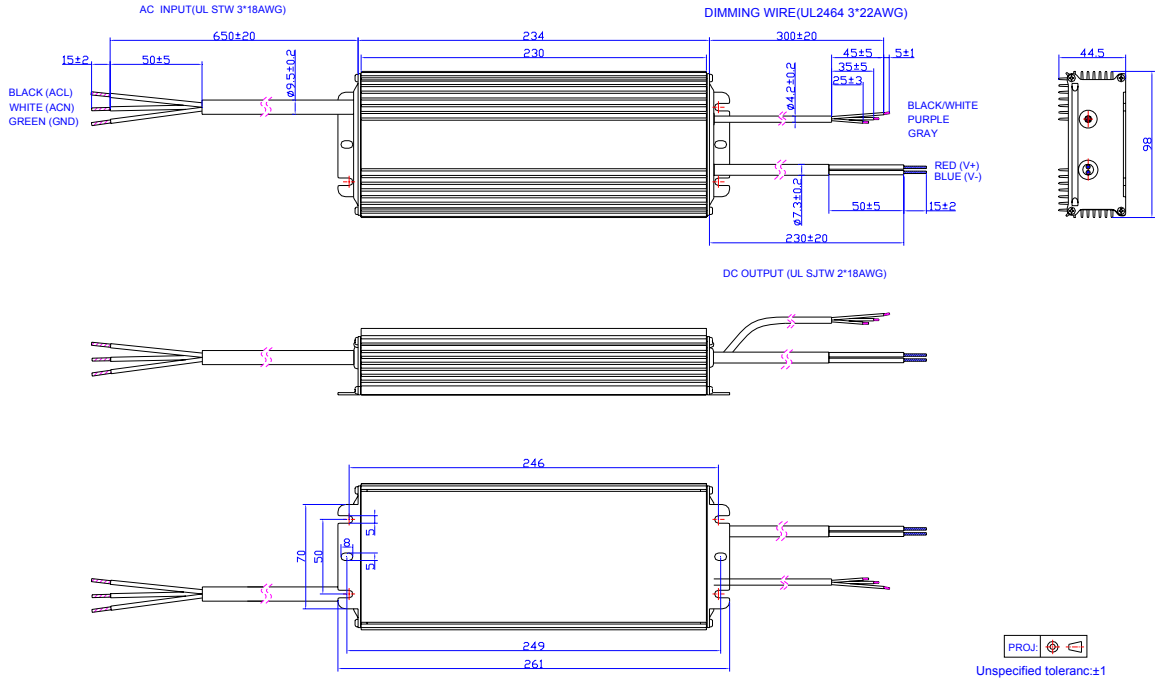
Programming Connection Diagram



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

- **Please refer to PRG-MUL2 Multi-Programmer datasheet for details.**

Mechanical Outline



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
2015-01-14	A	Datasheets Release	/	/
2015-03-09	B	Features	Input Surge Protection: 4kV line-line, 6kV line-earth	Added
		Model: ESD-320S150DT	/	Added
		Output Current Ripple(pk-pk)	Output Current Ripple(pk-pk)	Total Output Current Ripple (pk-pk)
		Output Current Ripple at < 200 Hz (pk-pk)	/	Added
		Operating Case Temperature for Safety Tc_s	/	Updated
		Operating Case Temperature for Warranty Tc_w	/	Updated
		General Specifications	Storage Temperature	Added
		Environmental Specifications	/	Delete
		Derating	/	Delete