

## Features

- High Efficiency (Up to 91%)
- Full Power at 50-100% Max Current (Constant Power)
- 0-10V/PWM/Timer Dimmable
- Dim-to-Off with Standby Power  $\leq 1$  W
- Input Surge Protection: DM 4kV, CM 6kV
- All-Around Protection: OVP, SCP, OTP
- IP67
- SELV Output



## Description

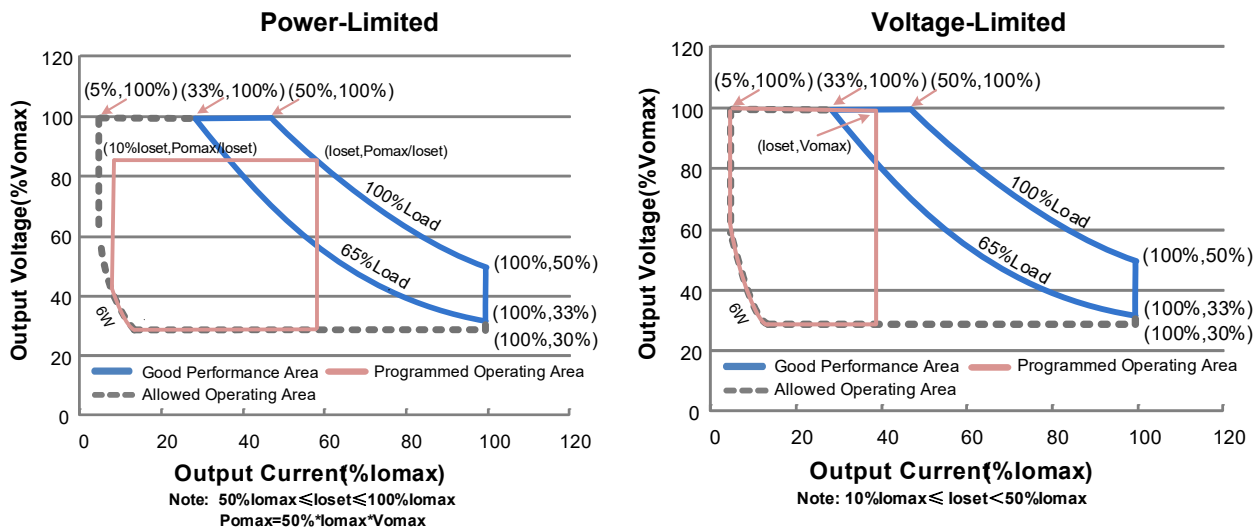
The EUD-096SxxxDV series is a 96W, constant-current, programmable LED driver that operates from 90-305 Vac input with excellent power factor. Created for many lighting applications including low bay, tunnel and street, etc, it provides a dim-to-off mode with low standby power. The high efficiency of 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)	Typical Power Factor		Model Number
							120Vac	220Vac	
45-900mA	450-900mA	700 mA	90~305 Vac/ 127~250 Vdc	64~214Vdc	96 W	91.0%	0.99	0.96	EUD-096S090DV
90-1800mA	900-1800mA	1050 mA	90~305 Vac/ 127~250 Vdc	32~107Vdc	96 W	90.5%	0.99	0.96	EUD-096S180DV <sup>(4)</sup>
180-3600mA	1800-3600mA	2100 mA	90~305 Vac/ 127~250 Vdc	16~53 Vdc	96 W	90.0%	0.99	0.96	EUD-096S360DV <sup>(4)</sup>

- Notes:** (1) Output current range with constant power at 96W  
 (2) Certified input voltage range: 100-240Vac or 127-250Vdc  
 (3) Measured at a 220 Vac input with 50% maximum output current and 100% maximum output voltage.  
 (4) SELV output

## I-V Operating Area



## Input Specifications

Parameter	Min.	Typ.	Max.	Notes
Input AC Voltage	90 Vac	-	305 Vac	
Input DC Voltage	127 Vdc	-	250 Vdc	
Input Frequency	47 Hz	-	63 Hz	
Leakage Current	-	-	0.70 mA	IEC60598-1; 240Vac/ 60Hz
Input AC Current	-	-	1.3 A	Measured at 100% load and 100 Vac input.
	-	-	0.6 A	Measured at 100% load and 220 Vac input.
Inrush Current(I <sup>2</sup> t)	-	-	2.4 A <sup>2</sup> s	At 220Vac input, 25°C Cold Start, Duration=1.0 ms, 10%Ipk-10%Ipk. See Inrush Current Waveform for the details.
PF	0.90	-	-	At 100-277Vac, 50-60Hz, 65%-100% Load (63-96W)
THD	-	-	20%	

## Output Specifications

Parameter	Min.	Typ.	Max.	Notes
Output Current Tolerance	-5%I <sub>oset</sub>	-	5%I <sub>oset</sub>	At 100% load condition
Output Current Setting(I <sub>oset</sub> ) Range	10%I <sub>omax</sub>	-	100%I <sub>omax</sub>	
Output Current Setting Range with Constant Power	50%I <sub>omax</sub>	-	100%I <sub>omax</sub>	
Total Output Current Ripple (pk-pk)	-	5%I <sub>omax</sub>	10%I <sub>omax</sub>	At 100% load condition, 20 MHz BW
Output Current Ripple at < 200 Hz (pk-pk)	-	1%I <sub>omax</sub>	-	At 100% load condition. Only this component of ripple is associated with visible flicker.

## Output Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
Startup Overshoot Current	-	-	10%Iomax	At 100% load condition
No-load Output Voltage				
EUD-096S090DV	-	-	240 V	
EUD-096S180DV	-	-	119 V	
EUD-096S360DV	-	-	59.5 V	
Line Regulation	-	-	±0.5%	Measured at 100% load
Load Regulation	-	-	±1.5%	
Turn-on Delay Time	-	0.8 s	1.5 s	Measured at 120Vac and 220Vac input. 65%-100% Load
Temperature Coefficient of I <sub>o</sub> set	-	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 120 Vac input:				
EUD-096S090DV				
I <sub>o</sub> =450 mA	85.5%	88.5%	-	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)
I <sub>o</sub> =900 mA	84.5%	87.5%	-	
EUD-096S180DV				
I <sub>o</sub> =900 mA	85.0%	88.0%	-	
I <sub>o</sub> =1800mA	84.0%	87.0%	-	
EUD-096S360DV				
I <sub>o</sub> =1800mA	84.5%	87.5%	-	
I <sub>o</sub> =3600mA	83.0%	86.0%	-	
Efficiency at 220 Vac input:				
EUD-096S090DV				
I <sub>o</sub> =450 mA	89.0%	91.0%	-	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)
I <sub>o</sub> =900 mA	88.0%	90.0%	-	
EUD-096S180DV				
I <sub>o</sub> =900 mA	88.5%	90.5%	-	
I <sub>o</sub> =1800mA	87.5%	89.5%	-	
EUD-096S360DV				
I <sub>o</sub> =1800mA	88.0%	90.0%	-	
I <sub>o</sub> =3600mA	86.5%	88.5%	-	
Efficiency at 277 Vac input:				
EUD-096S090DV				
I <sub>o</sub> =450 mA	89.5%	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.)
I <sub>o</sub> =900 mA	88.5%	90.5%	-	
EUD-096S180DV				
I <sub>o</sub> =900 mA	89.0%	91.0%	-	
I <sub>o</sub> =1800mA	88.0%	90.0%	-	
EUD-096S360DV				
I <sub>o</sub> =1800mA	88.5%	90.5%	-	
I <sub>o</sub> =3600mA	87.0%	89.0%	-	
Standby power	-	-	1 W	Measured at 230Vac/50Hz; Dimming off

## General Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
MTBF	-	212,000 Hours	-	Measured at 220Vac input, 80%Load and 25°C ambient temperature (MIL-HDBK-217F)
Lifetime	-	111,000 Hours	-	Measured at 220Vac input, 80%Load and 60°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	-	+70°C	
Storage Temperature	-40°C	-	+85°C	Humidity: 5%RH to 100%RH
Dimensions Inches (L × W × H) Millimeters (L × W × H)	7.64 × 2.66 × 1.44 194 × 67.5 × 36.5			With mounting ear 8.70 × 2.66 × 1.44 221 × 67.5 × 36.5
Net Weight	-	985 g	-	

## 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%I <sub>o</sub> max	-	I <sub>o</sub> max	50%I <sub>o</sub> max ≤ I <sub>o</sub> ≤ 100%I <sub>o</sub> max
	5%I <sub>o</sub> max	-	I <sub>o</sub> max	10%I <sub>o</sub> max ≤ I <sub>o</sub> < 50%I <sub>o</sub> max
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%	-	

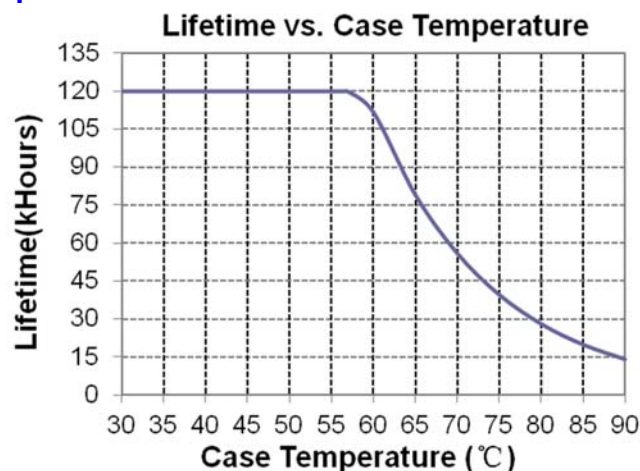
## Safety & EMC Compliance (Continued)

Safety Category	Standard
ENEC & TUV & CE <sup>(1)</sup>	EN 61347-1, EN 61347-2-13
CB	IEC 61347-1, IEC 61347-2-13
KS	KS C 7655
EMI Standards	Notes
EN 55015 <sup>(2)</sup>	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): 8kV air discharge, 4kV 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
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

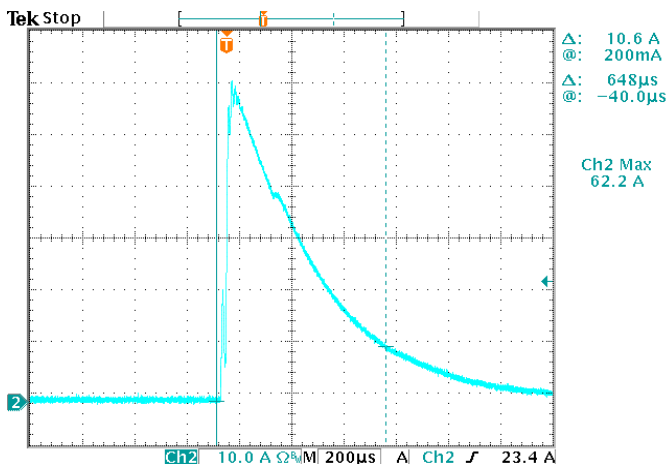
**Note:** (1) For compliance with EU Directive 2009/125/EC (ecodesign requirements for energy-related products) the Dim-to-Off function shall not be used or alternatively be interrupted through use of a relay or similar device to prevent excessive standby power consumption (as illustrated in Implementation 4).

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

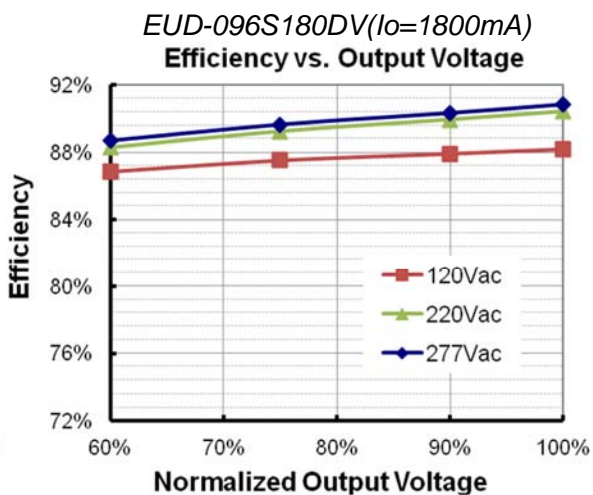
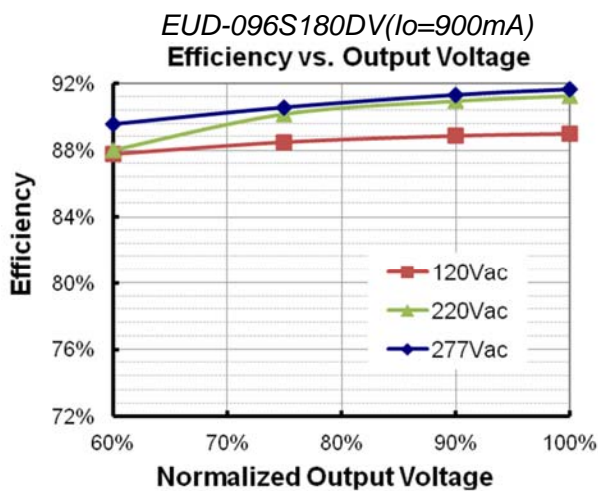
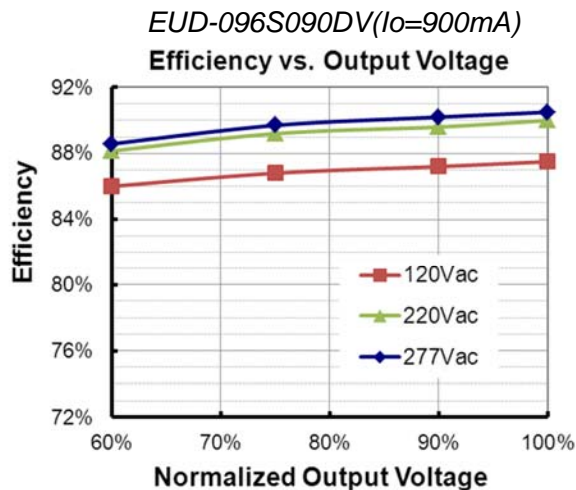
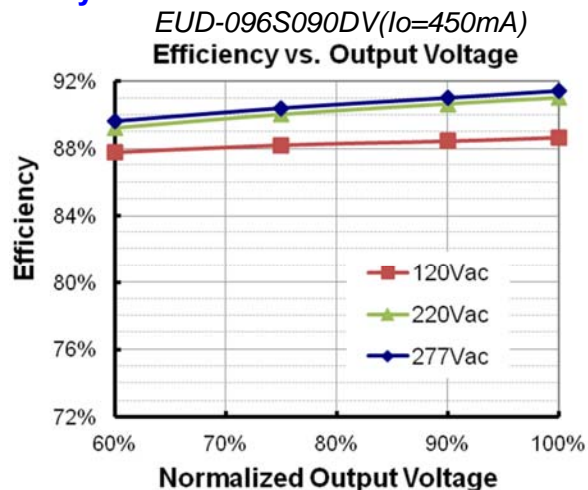
## Lifetime vs. Case Temperature

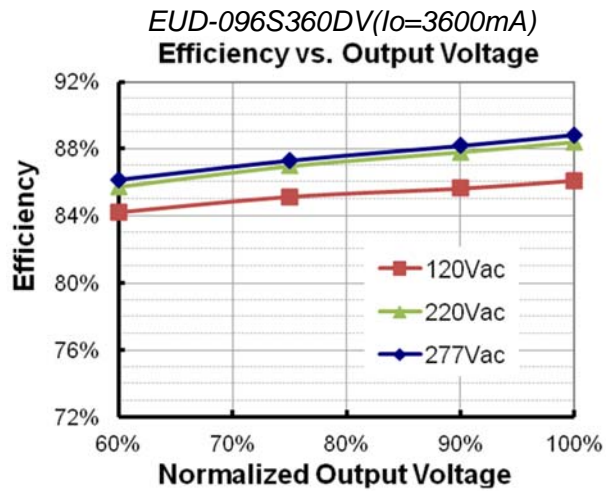
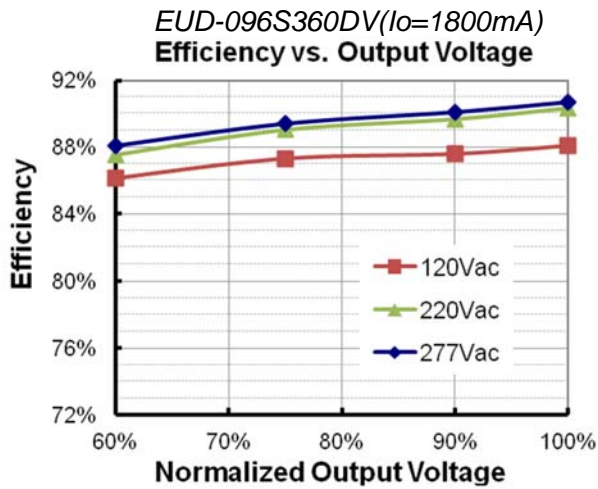


## Inrush Current Waveform

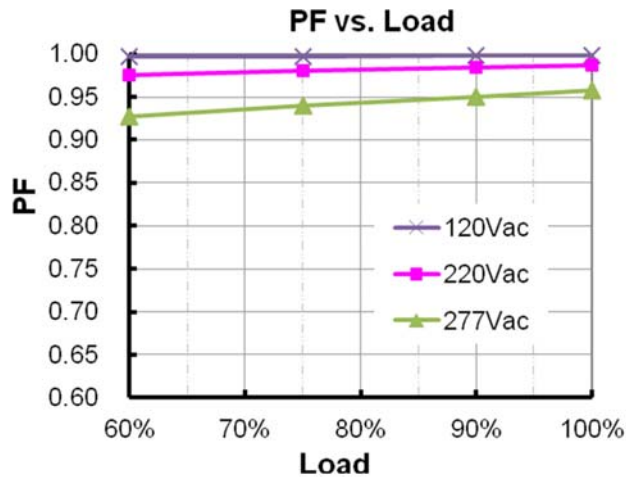


## Efficiency vs. Load

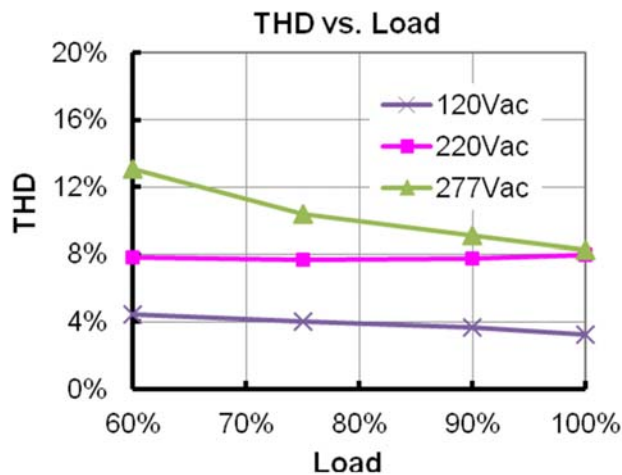




## Power Factor



## Total Harmonic Distortion



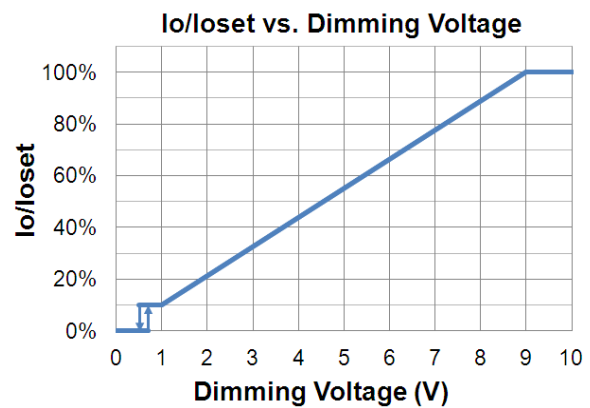
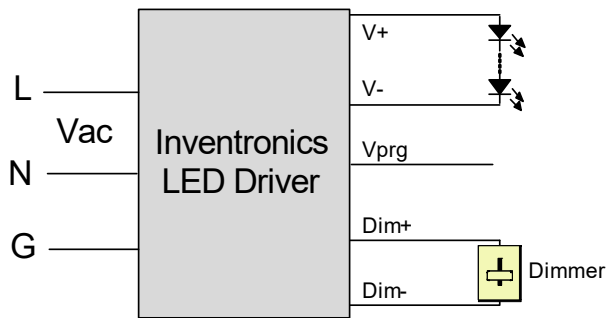
## Protection Functions

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.



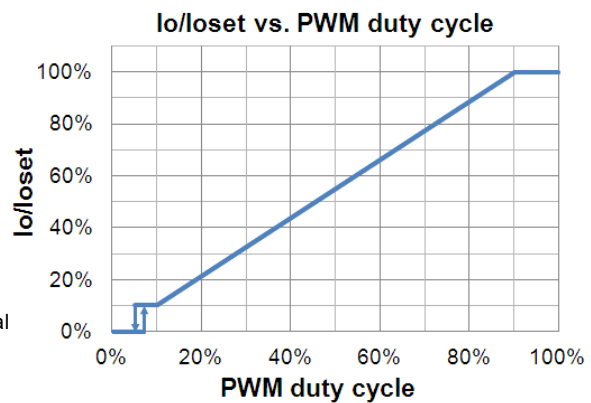
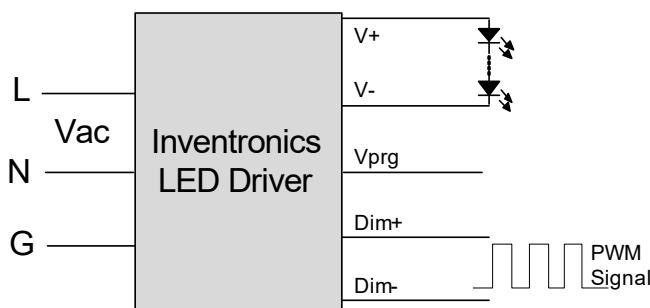
Implementation 1: DC Input

#### 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.

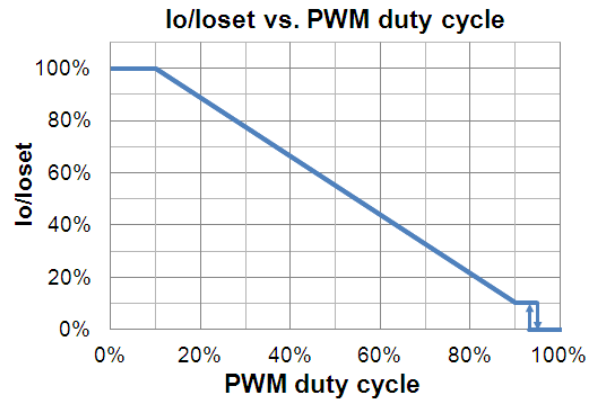
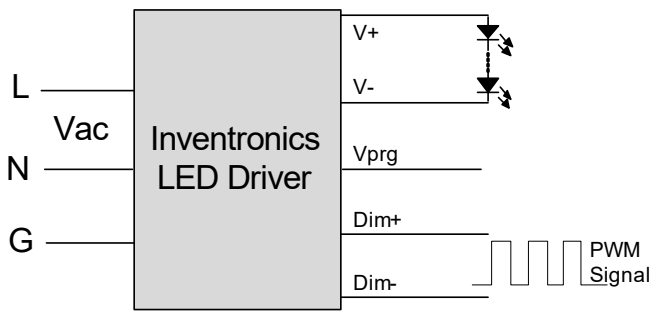
### ● PWM Dimming

The recommended implementation of the dimming control is provided below.



Implementation 2: Positive logic





### Implementation 3: Negative logic

**Notes:**

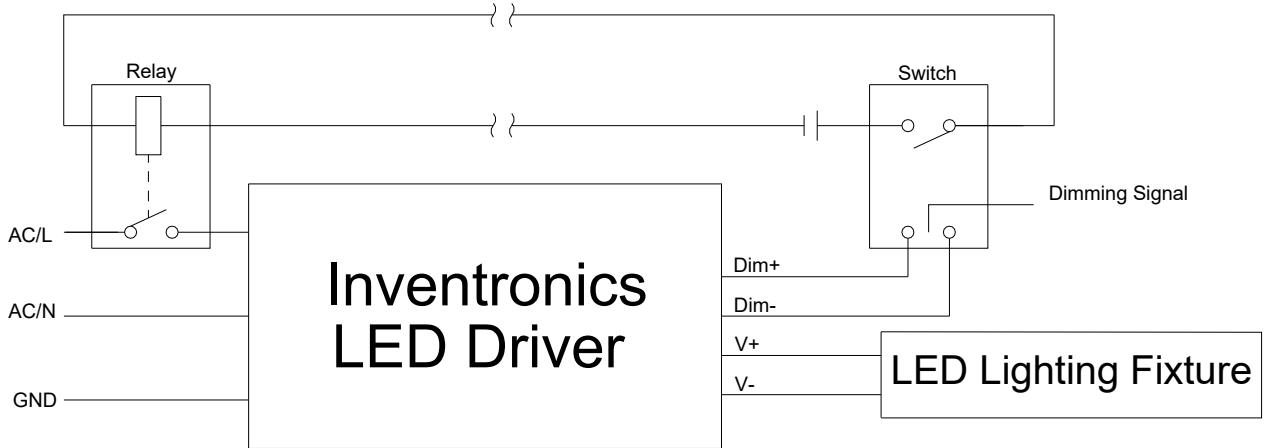
1. Do NOT connect Dim- to the output V- or V+, otherwise the driver will not work properly.
2. When PWM negative logic dimming mode and Dim+ is open, the driver will output minimum current.

● **Time Dimming**

Set the timing curve by pulling the sliders.

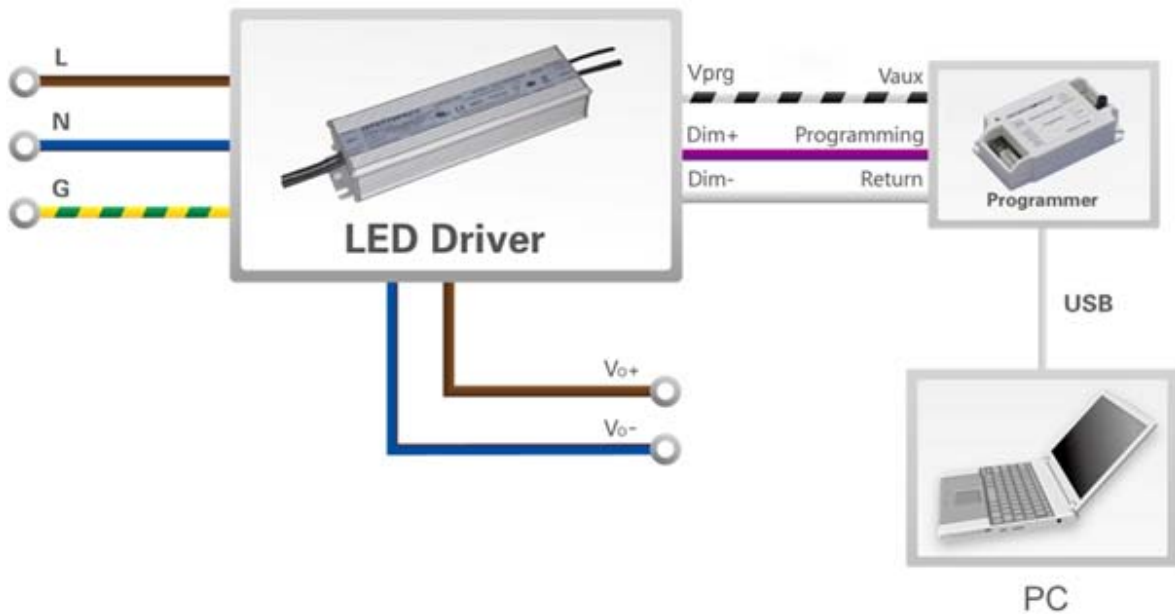
● **0% Light Brightness**

If the brightness of the LED lighting fixture down to 0%, please refer to the following wiring method. The lamp can be turned on/off using a switch and relay.



**Implementation 4: 0% Light Brightness Wiring Method**

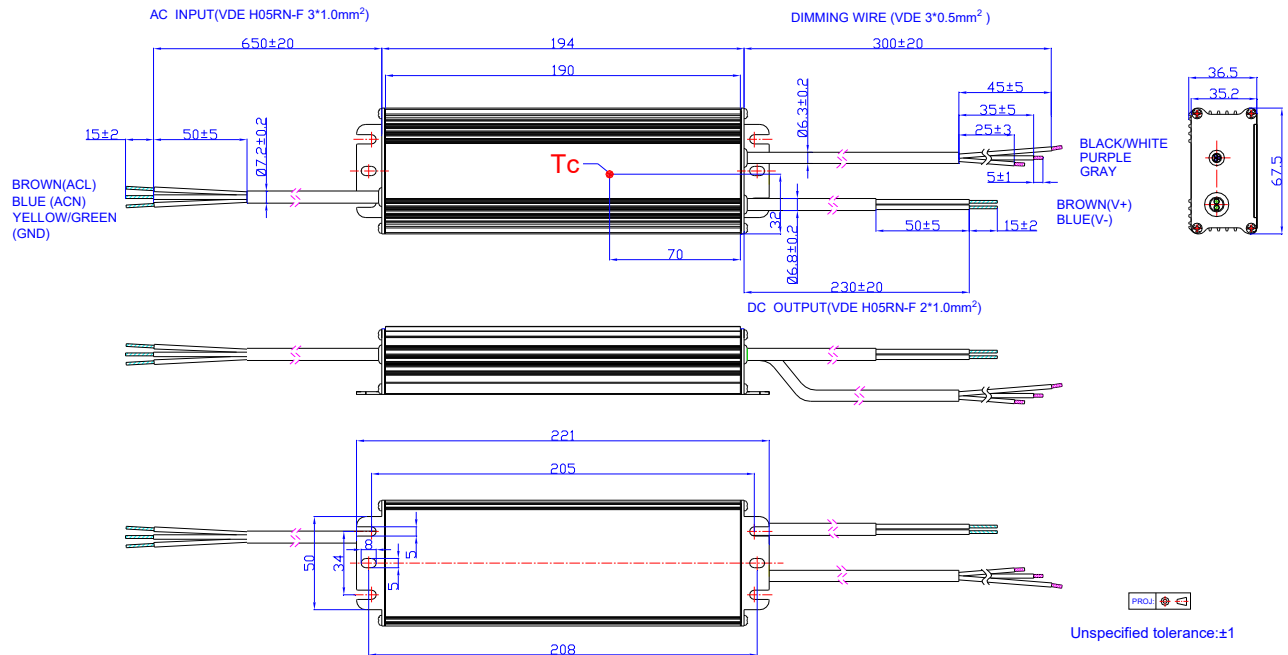
**Programming Connection Diagram**



**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 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
2014-08-30	A	Datasheets Release	/	/
2015-03-30	B	CCC	/	Added
		Features	/	Input Surge Protection: 4kV line-line, 6kV line-earth
		Input Specifications	Leakage Current	Updated
		Output Specifications	Output Current Ripple(pk-pk)	Total Output Current Ripple (pk-pk)
		Output Current Ripple at < 200 Hz (pk-pk)	/	Added
		General Specifications	Case Temperature	Operating Case Temperature for Safety Tc_s
		General Specifications	/	Operating Case Temperature for Warranty Tc_w
		General Specifications	/	Storage Temperature
		Environmental Specifications	/	Delete
		Derating	/	Delete
2016-04-13	C	Time Dimming	/	Updated
		Mechanical Outline	/	Updated
		Input Specifications	Leakage Current	Updated
		General Specifications	With mounting ear	Added
		General Specifications	Net Weight	Updated
		Dimming Specifications	/	Updated
2016-07-11	D	Safety & EMC Compliance	/	Updated
		Programming Connection Diagram	/	Updated
		Models	Adjustable Output Current Range	Updated
		I-V Operating Area	/	Updated
		Output Specifications	Output Current Setting(losset) Range	Updated
2019-08-21	E	Dimming Specifications	Dimming Output Range	Updated
		Mechanical Outline	/	Updated
		TUV Logo	/	Updated
		ENEC Logo	/	Updated
		CCC Logo	/	Deleted

## Revision History (Continued)

Change Date	Rev.	Description of Change		
		Item	From	To
2019-08-21	E	Features	Input surge protection	Updated
		Features	Suitable for Independent Use	Independent Logo
		Description	/	Updated
		Input Specifications(PF/THD)	50-60Hz	Added
		Output Specifications (Turn-on Delay Time)	65%-100% Load	Added
		Safety &EMC Compliance	ENEC	Added
		Safety &EMC Compliance	TUV	Added
		Safety &EMC Compliance	CB	Added
		Safety &EMC Compliance	KS	Updated
		Safety &EMC Compliance	EN 61000-4-5	Updated
		RoHS Compliance	/	Updated
2021-11-19	F	Features	/	Updated
		Safety &EMC Compliance	Note (1)	Added
		0% Light Brightness	/	Added
		Programming Connection Diagram	/	Updated