

## Features

- Full Power at Wide Output Current Range (Constant Power)
- Adjustable Output Current (AOC) with Programmability
- Isolated 1-10V/10V PWM/3-Timer-Modes Dimmable
- Output Lumen Compensation
- End-of-Life Indicator
- Input Surge Protection: DM 6kV, CM 10kV
- All-Around Protection: OVP, SCP, OTP
- IP66 / IP67 and UL Dry / Damp / Wet Location
- TYPE HL, for use in a Class I, Division 2 hazardous (Classified) location
- 5 Years Warranty



## Description

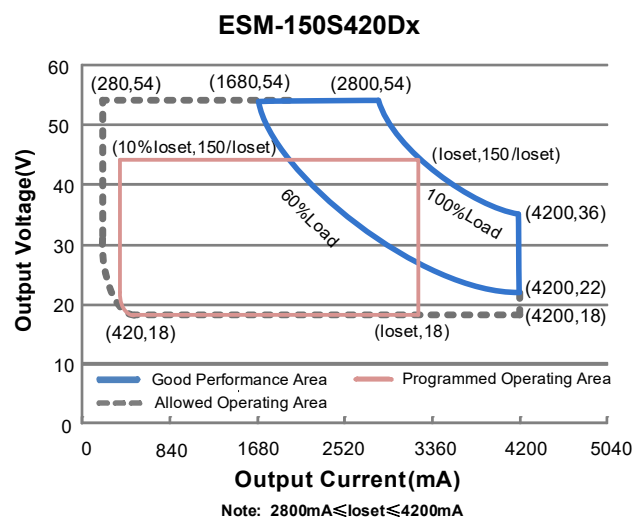
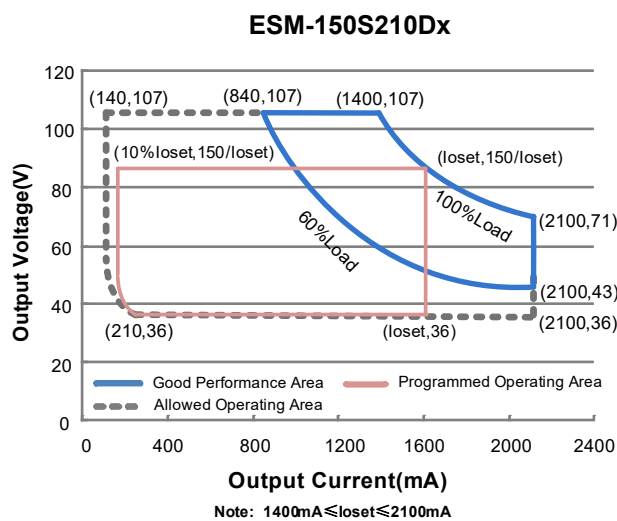
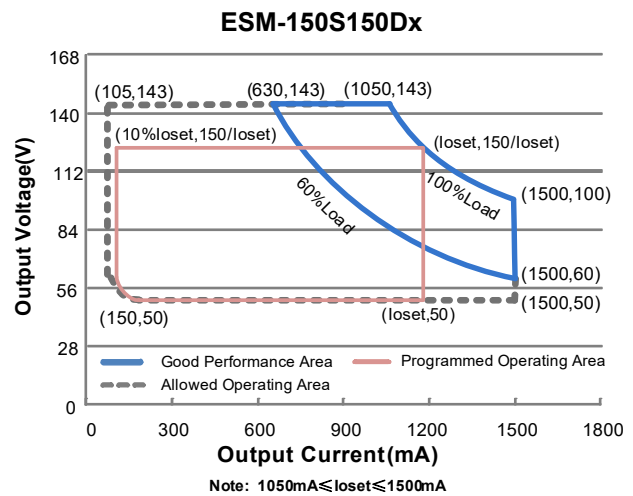
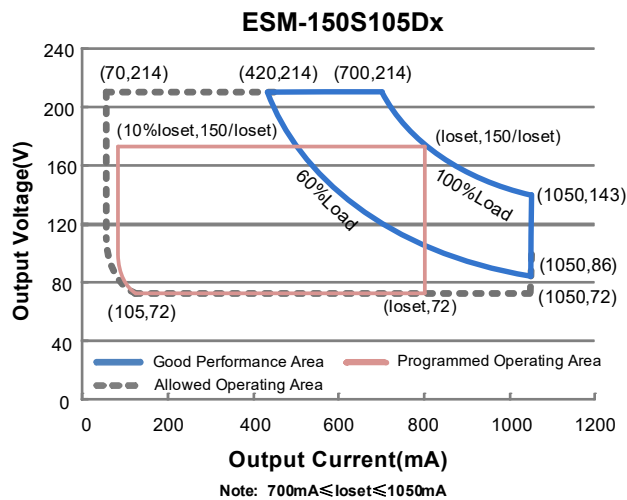
The ESM-150SxxxDx series is a 150W, constant-current, programmable and IP66/IP67 rated LED driver that operates from 249-528Vac input with excellent power factor. It is created for many lighting applications including high bay, high mast and roadway, etc. The high efficiency of these drivers and compact 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 (5)
							277Vac	480Vac	
70-1050mA	700-1050mA	700mA	249~528 Vac/ 352~500 Vdc	72~214 Vdc	150W	93.5%	0.99	0.95	ESM-150S105Dx
105-1500mA	1050-1500mA	1050mA	249~528 Vac/ 352~500 Vdc	50~143 Vdc	150W	93.0%	0.99	0.95	ESM-150S150Dx
140-2100mA	1400-2100mA	1400mA	249~528 Vac/ 352~500 Vdc	36~107 Vdc	150W	93.0%	0.99	0.95	ESM-150S210Dx <sup>(4)</sup>
280-4200mA	2800-4200mA	3150mA	249~528 Vac/ 352~500 Vdc	18 ~ 54 Vdc	150W	91.5%	0.99	0.95	ESM-150S420Dx <sup>(4)</sup>

- Notes:** (1) Output current range with constant power at 150W  
 (2) Certified input voltage range: 277-480Vac.  
 (3) Measured at 100% load and 480Vac input (see below "General Specifications" for details).  
 (4) SELV Output.  
 (5) x = G are UL Recognized and ENEC, etc. models; x = T are UL Class P models.

## I-V Operation Area



## Input Specifications

Parameter	Min.	Typ.	Max.	Notes
Input AC Voltage	249 Vac	-	528 Vac	
Input DC Voltage	352 Vdc	-	500 Vdc	
Input Frequency	47 Hz	-	63 Hz	
Leakage Current	-	-	0.75 MIU	UL8750; 480Vac/ 60Hz
	-	-	0.70 mA	IEC60598-1; 480Vac/ 60Hz
Input AC Current	-	-	0.67 A	Measured at 100% load and 277 Vac input.
	-	-	0.40 A	Measured at 100% load and 480 Vac input.
Inrush Current(I <sup>2</sup> t)	-	-	2.30 A <sup>2</sup> s	At 480Vac input, 25°C cold start, duration=460 μs, 10%I <sub>pk</sub> -10%I <sub>pk</sub> . See Inrush Current Waveform for the details.

## Input Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
PF	0.9	-	-	At 277-480Vac, 50-60Hz, 60%-100% Load (90-150W)
THD	-	-	20%	

## Output Specifications

Parameter	Min.	Typ.	Max.	Notes
Output Current Tolerance	-5%loset	-	5%loset	At 100% load condition
Output Current Setting(loset) Range				
ESM-150S105Dx	70 mA	-	1050 mA	
ESM-150S150Dx	105 mA	-	1500 mA	
ESM-150S210Dx	140 mA	-	2100 mA	
ESM-150S420Dx	280 mA	-	4200 mA	
Output Current Setting Range with Constant Power				
ESM-150S105Dx	700 mA	-	1050 mA	
ESM-150S150Dx	1050 mA	-	1500 mA	
ESM-150S210Dx	1400 mA	-	2100 mA	
ESM-150S420Dx	2800 mA	-	4200 mA	
Total Output Current Ripple (pk-pk)	-	5%lomax	10%lomax	At 100% load condition. 20 MHz BW
Output Current Ripple at < 200 Hz (pk-pk)	-	2%lomax	-	At 100% load condition. Only this component of ripple is associated with visible flicker.
Startup Overshoot Current	-	-	10%lomax	At 100% load condition
No Load Output Voltage				
ESM-150S105Dx	-	-	240 V	
ESM-150S150Dx	-	-	160 V	
ESM-150S210Dx	-	-	120 V	
ESM-150S420Dx	-	-	60 V	
Line Regulation	-	-	±0.5%	Measured at 100% load
Load Regulation	-	-	±1.5%	
Turn-on Delay Time	-	-	0.5 s	Measured at 277-480Vac input, 60%-100% Load
Temperature Coefficient of loset	-	0.03%/°C	-	Case temperature = 0°C ~Tc max

## General Specifications

Parameter	Min.	Typ.	Max.	Notes
Efficiency at 277 Vac input: ESM-150S105Dx				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> = 700 mA	90.5%	92.5%	-	
I <sub>o</sub> =1050 mA	89.5%	91.5%	-	
ESM-150S150Dx				
I <sub>o</sub> =1050 mA	90.0%	92.0%	-	
I <sub>o</sub> =1500 mA	89.0%	91.0%	-	
ESM-150S210Dx				
I <sub>o</sub> =1400 mA	90.0%	92.0%	-	
I <sub>o</sub> =2100 mA	88.5%	90.5%	-	
ESM-150S420Dx				
I <sub>o</sub> =2800 mA	88.5%	90.5%	-	
I <sub>o</sub> =4200 mA	87.0%	89.0%	-	
Efficiency at 400 Vac input: ESM-150S105Dx				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> = 700 mA	91.0%	93.0%	-	
I <sub>o</sub> =1050 mA	90.0%	92.0%	-	
ESM-150S150Dx				
I <sub>o</sub> =1050 mA	91.0%	93.0%	-	
I <sub>o</sub> =1500 mA	90.0%	92.0%	-	
ESM-150S210Dx				
I <sub>o</sub> =1400 mA	90.5%	92.5%	-	
I <sub>o</sub> =2100 mA	89.5%	91.5%	-	
ESM-150S420Dx				
I <sub>o</sub> =2800 mA	89.5%	91.5%	-	
I <sub>o</sub> =4200 mA	88.0%	90.0%	-	
Efficiency at 480 Vac input: ESM-150S105Dx				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> = 700 mA	91.5%	93.5%	-	
I <sub>o</sub> =1050 mA	90.5%	92.5%	-	
ESM-150S150Dx				
I <sub>o</sub> =1050 mA	91.0%	93.0%	-	
I <sub>o</sub> =1500 mA	90.0%	92.0%	-	
ESM-150S210Dx				
I <sub>o</sub> =1400 mA	91.0%	93.0%	-	
I <sub>o</sub> =2100 mA	89.5%	91.5%	-	
ESM-150S420Dx				
I <sub>o</sub> =2800 mA	89.5%	91.5%	-	
I <sub>o</sub> =4200 mA	88.0%	90.0%	-	
MTBF	-	259,000 Hours	-	Measured at 480Vac input, 80%Load and 25°C ambient temperature (MIL-HDBK-217F)
Lifetime	-	105,000 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 T <sub>c_s</sub>	-40°C	-	+90°C	
Operating Case Temperature for Warranty T <sub>c_w</sub>	-40°C	-	+80°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)		6.34 × 2.66 × 1.52 161 × 67.5 × 38.5		With mounting ear 7.01 × 2.66 × 1.52 178 × 67.5 × 38.5
Net Weight	-	855 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	ESM-150S105Dx ESM-150S150Dx ESM-150S210Dx ESM-150S420Dx	10%loset	-	loset	700 mA ≤ loset ≤ 1050 mA 1050 mA ≤ loset ≤ 1500 mA 1400 mA ≤ loset ≤ 2100 mA 2800 mA ≤ loset ≤ 4200 mA
	ESM-150S105Dx ESM-150S150Dx ESM-150S210Dx ESM-150S420Dx	70 mA 105 mA 140 mA 280 mA	-	loset	70 mA ≤ loset < 700 mA 105 mA ≤ loset < 1050 mA 140 mA ≤ loset < 1400 mA 280 mA ≤ loset < 2800 mA
Recommended Dimming Range for 1-10V		1 V	-	9 V	Default 1-10V dimming mode with positive logic.
PWM_in High Level		-	10V	-	
PWM_in Low Level		-	0V	-	
PWM_in Frequency Range		200 Hz	-	2 KHz	
PWM_in Duty Cycle		0%	-	100%	

## Safety & EMC Compliance

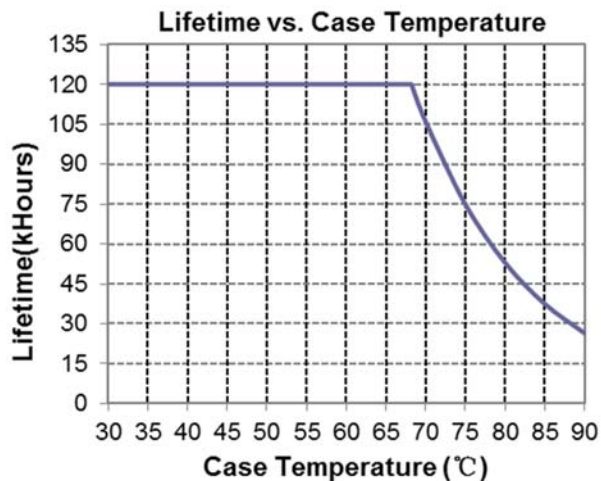
Safety Category	Standard
UL/CUL	UL8750,CAN/CSA-C22.2 No. 250.13
ENEC & CE	EN 61347-1, EN 61347-2-13
UKCA	BS EN 61347-1, BS EN 61347-2-13
CB	IEC 61347-1, IEC 61347-2-13
EAC	ГОСТ Р МЭК 61347-1, ГОСТ IEC 61347-2-13
NOM	NOM-058-SCFI
EMI Standards	Notes
BS EN/EN 55015 <sup>(1)</sup>	Conducted emission Test & Radiated emission Test
BS EN/EN 61000-3-2	Harmonic current emissions
BS EN/EN 61000-3-3	Voltage fluctuations & flicker
FCC Part 15 <sup>(1)</sup>	ANSI C63.4 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.

## Safety & EMC Compliance (Continued)

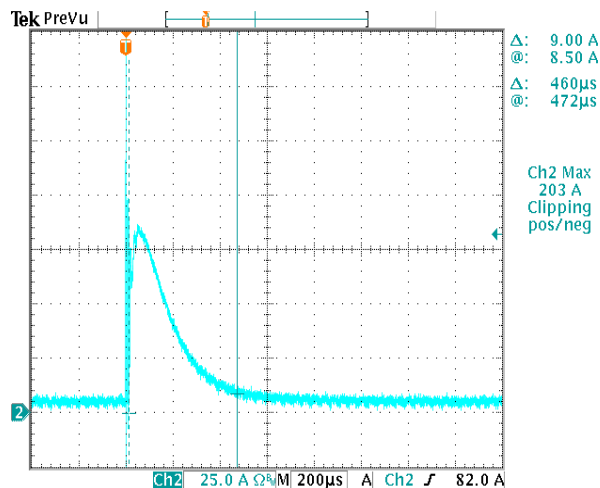
EMS Standards	Notes
BS EN/EN 61000-4-2	Electrostatic Discharge (ESD): 8 kV air discharge, 4 kV contact discharge
BS EN/EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test-RS
BS EN/EN 61000-4-4	Electrical Fast Transient / Burst-EFT
BS EN/EN 61000-4-5	Surge Immunity Test: AC Power Line: Differential Mode 6 kV, Common Mode 10 kV
BS EN/EN 61000-4-6	Conducted Radio Frequency Disturbances Test-CS
BS EN/EN 61000-4-8	Power Frequency Magnetic Field Test
BS EN/EN 61000-4-11	Voltage Dips
BS EN/EN 61547	Electromagnetic Immunity Requirements Applies To Lighting Equipment

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

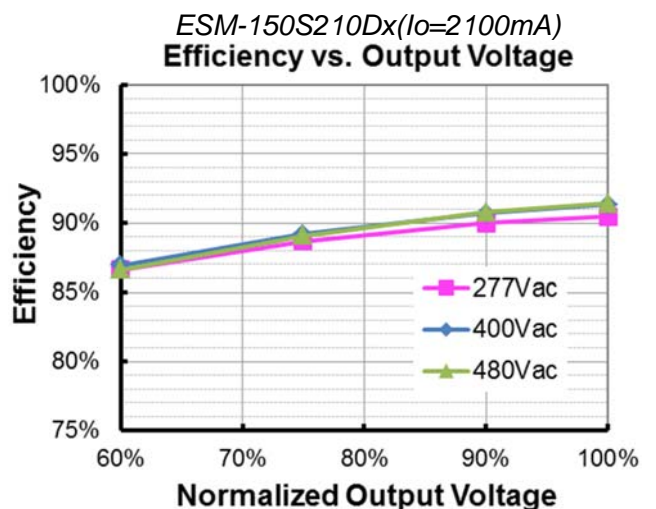
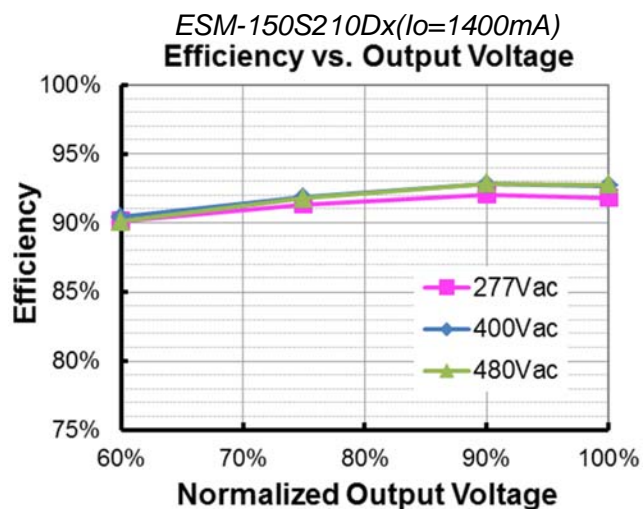
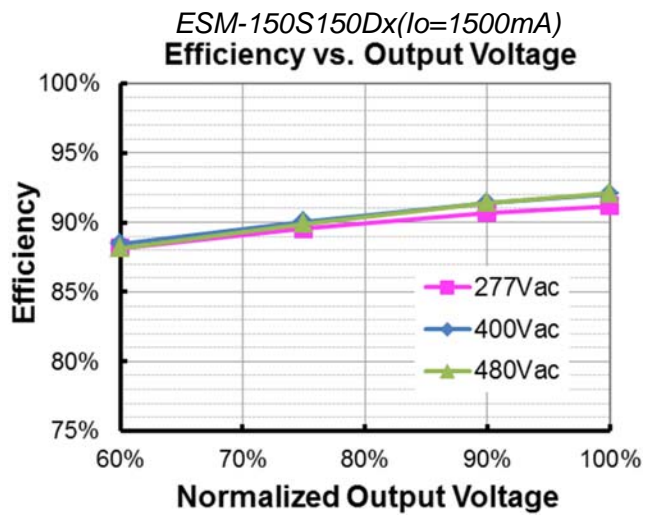
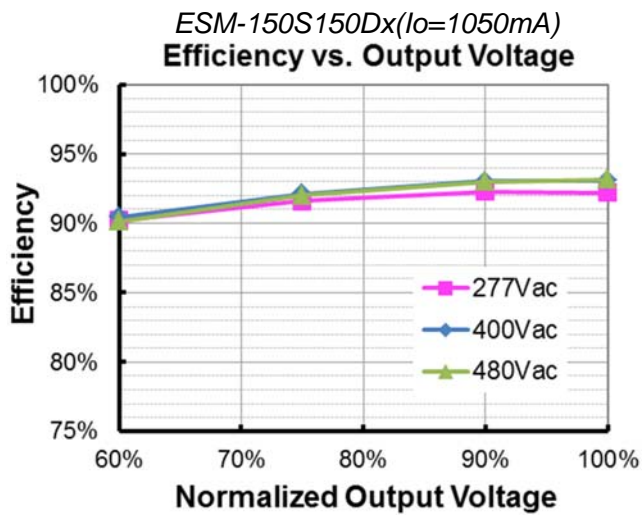
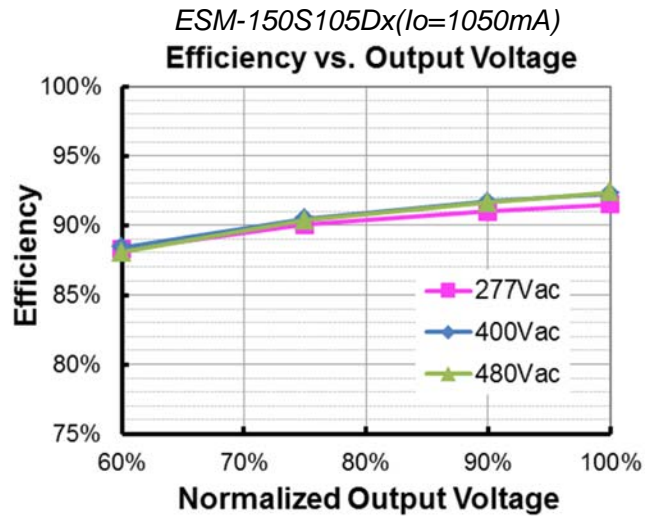
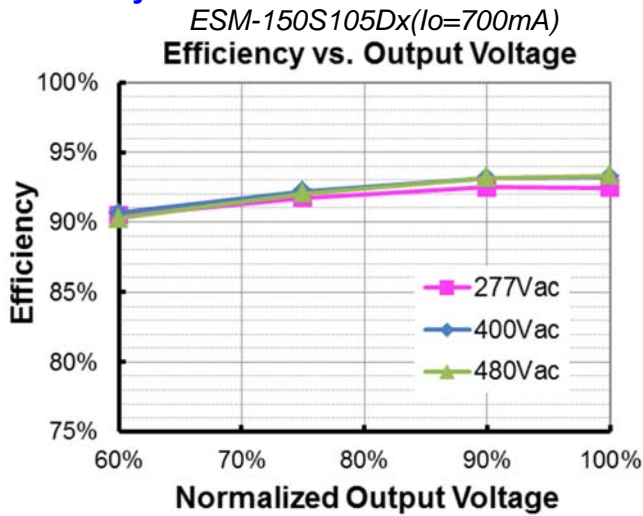
## Lifetime vs. Case Temperature

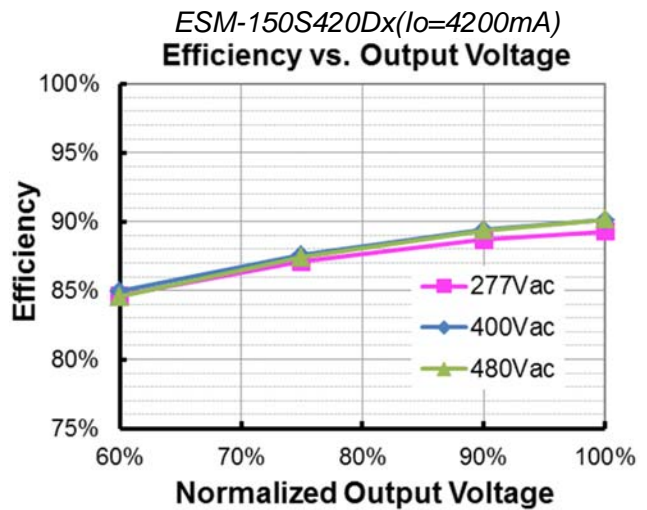
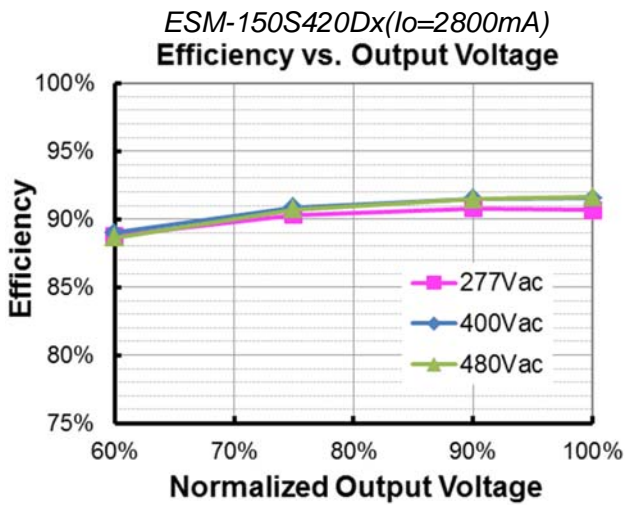


## Inrush Current Waveform

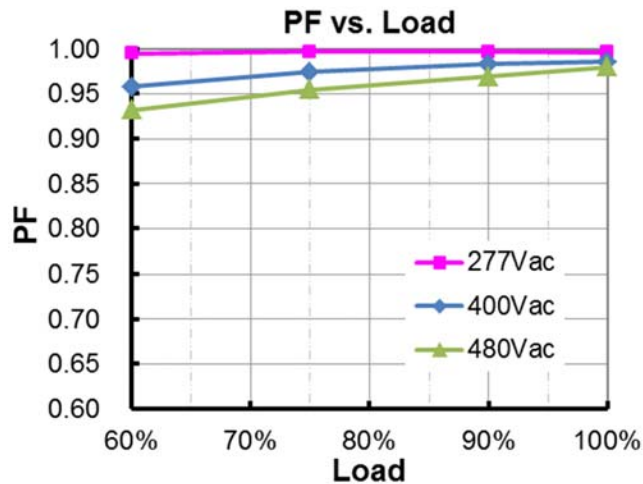


## Efficiency vs. Load

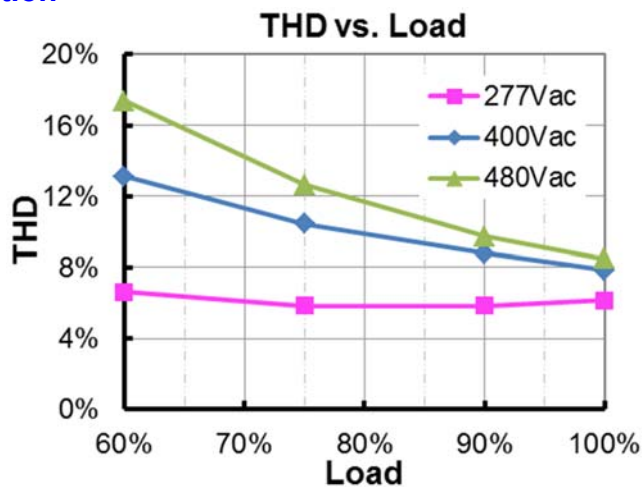




## Power Factor



## Total Harmonic Distortion





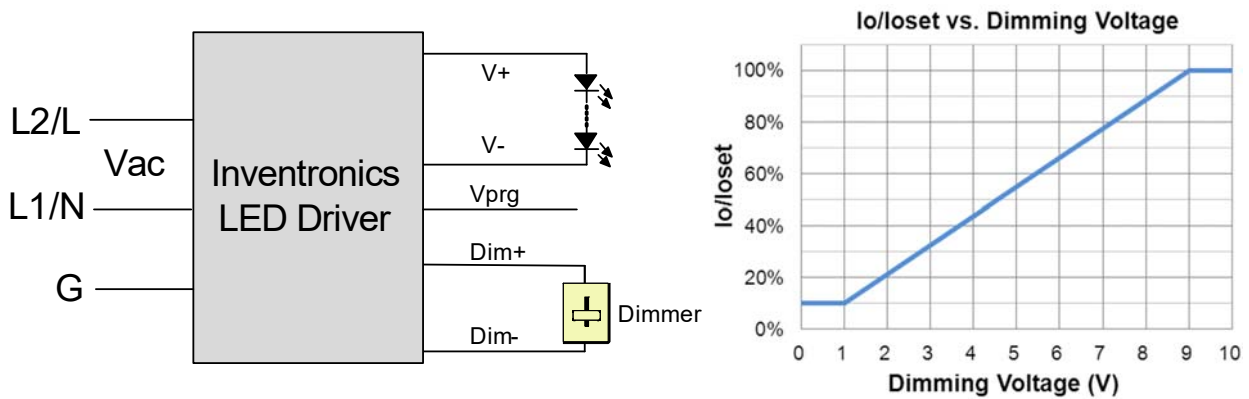
## Protection Functions

Parameter	Notes
Over Voltage Protection	Limits output voltage at no load and in case the normal voltage limit fails.
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 Temperature Protection	Decreases output current, returning to normal after over temperature is removed.

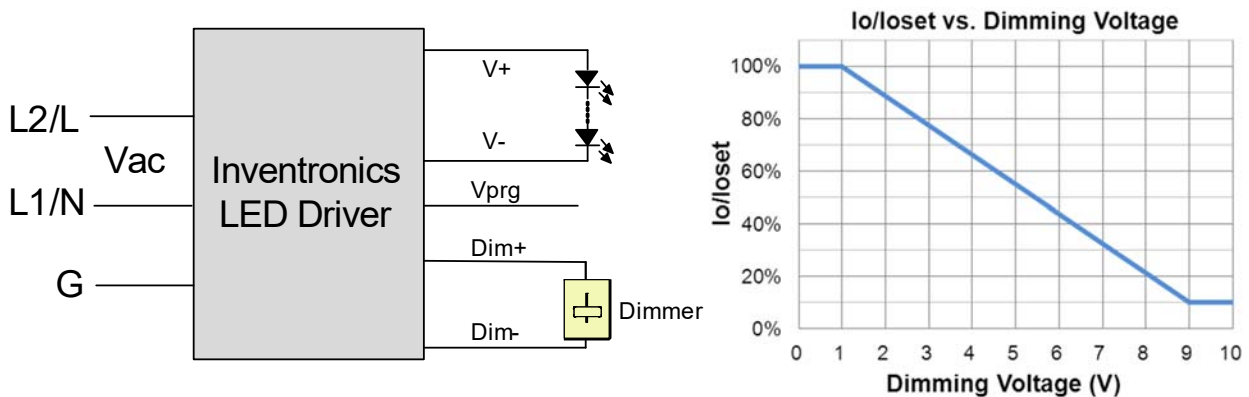
## Dimming

### ● 1-10V Dimming

The recommended implementation of the dimming control is provided below.



**Implementation 1: Positive logic**



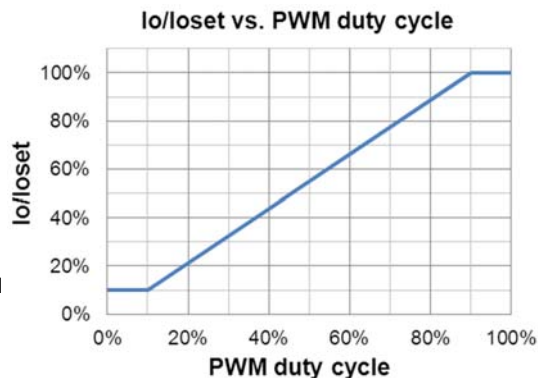
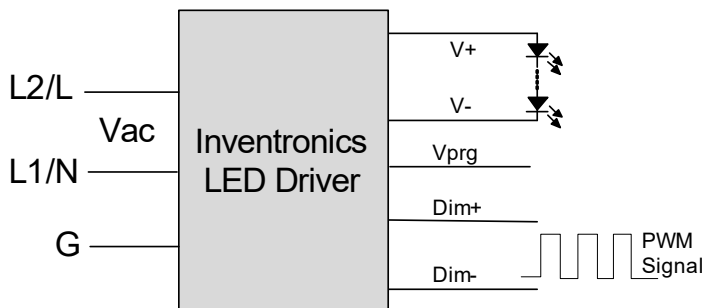
**Implementation 2: Negative logic**

### Notes:

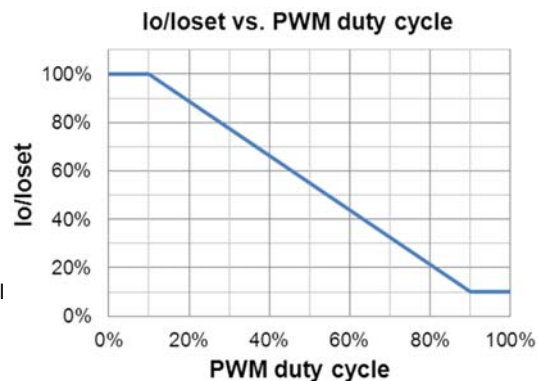
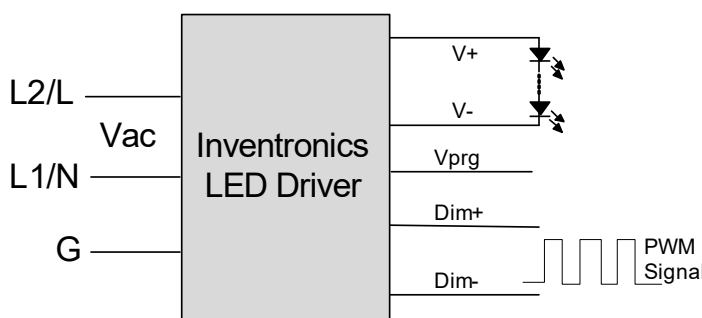
1. Do NOT connect Dim- to the output V- or V+, otherwise the driver will not work properly.
2. The dimmer can also be replaced by an active 1-10V voltage source signal or passive components like zener.
3. When 1-10V negative logic dimming mode and Dim+ is open, the driver will output minimum current.

## ● 10V PWM Dimming

The recommended implementation of the dimming control is provided below.



Implementation 3: Positive logic



Implementation 4: Negative logic

### Notes:

1. Do NOT connect Dim- to the output V- or V+, otherwise the driver will not work properly.
2. When 10V 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

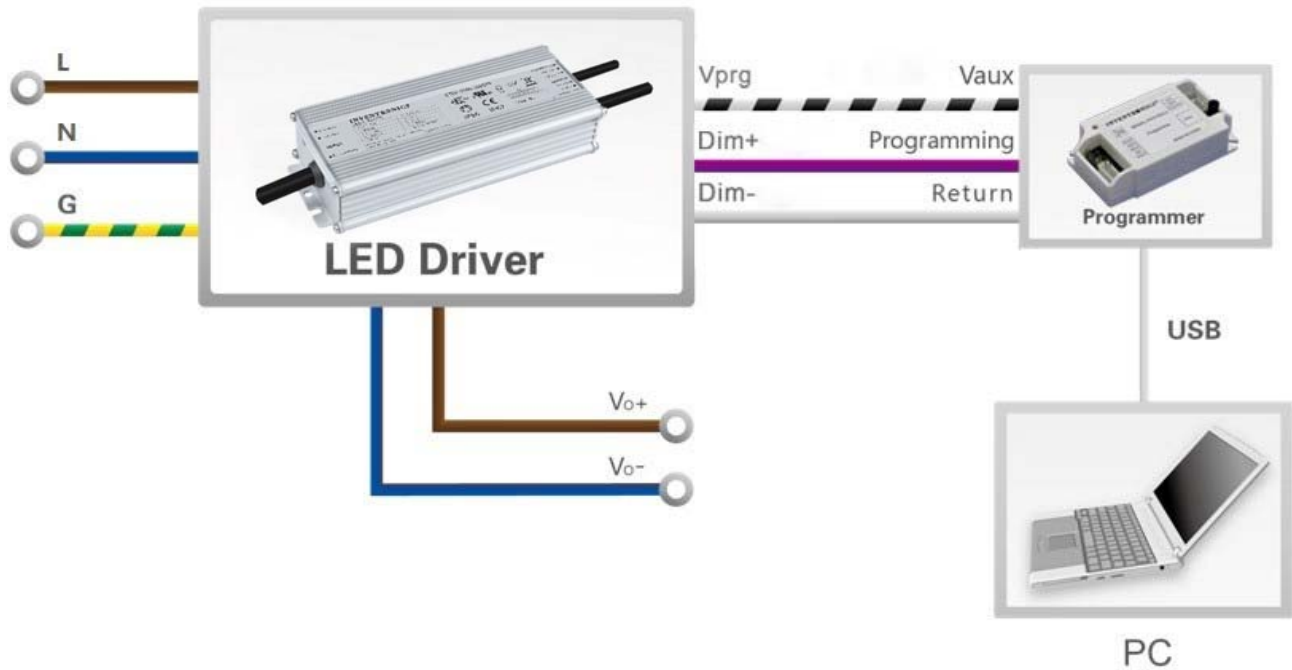
Output Lumen Compensation (OLC) may be used to maintain constant light output over the life of the LEDs by driving them at a reduced current when new, then gradually increasing the drive current over time to counteract LED lumen degradation.

● **End Of Life**

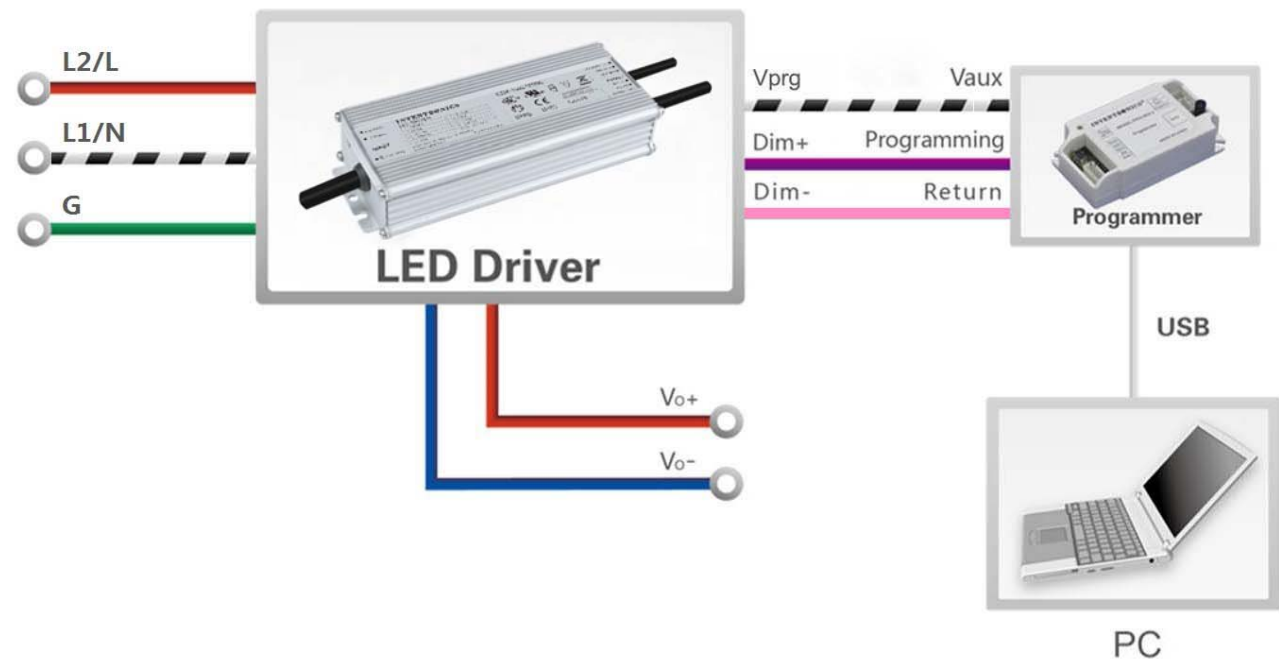
End-of-Life (EOL) is providing a visual notification to a user that the LED module has reached the end of manufacturer-specified life and that the replacement is recommended. Once active, an indication is given at each power-up of the driver, which the driver indicates this through a lower light output during the first 1 minute before normal operation is continued.

**Programming Connection Diagram**

ESM-150SxxxDG



ESM-150SxxxDT

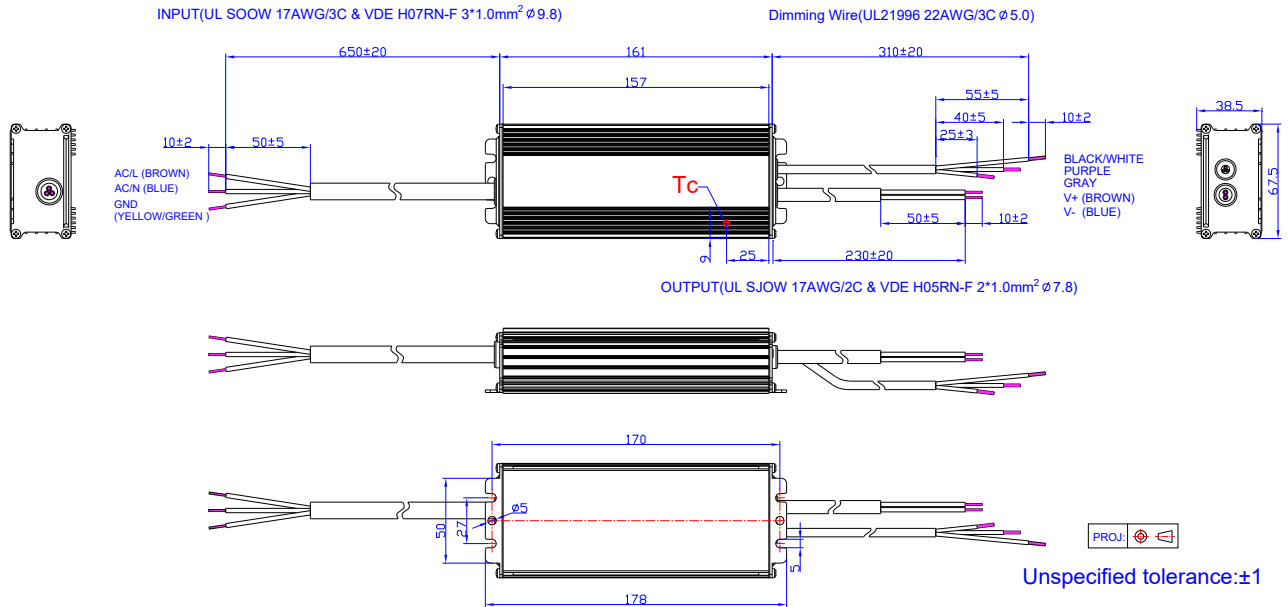


**Note:** The driver does not need to be powered on during the programming process.

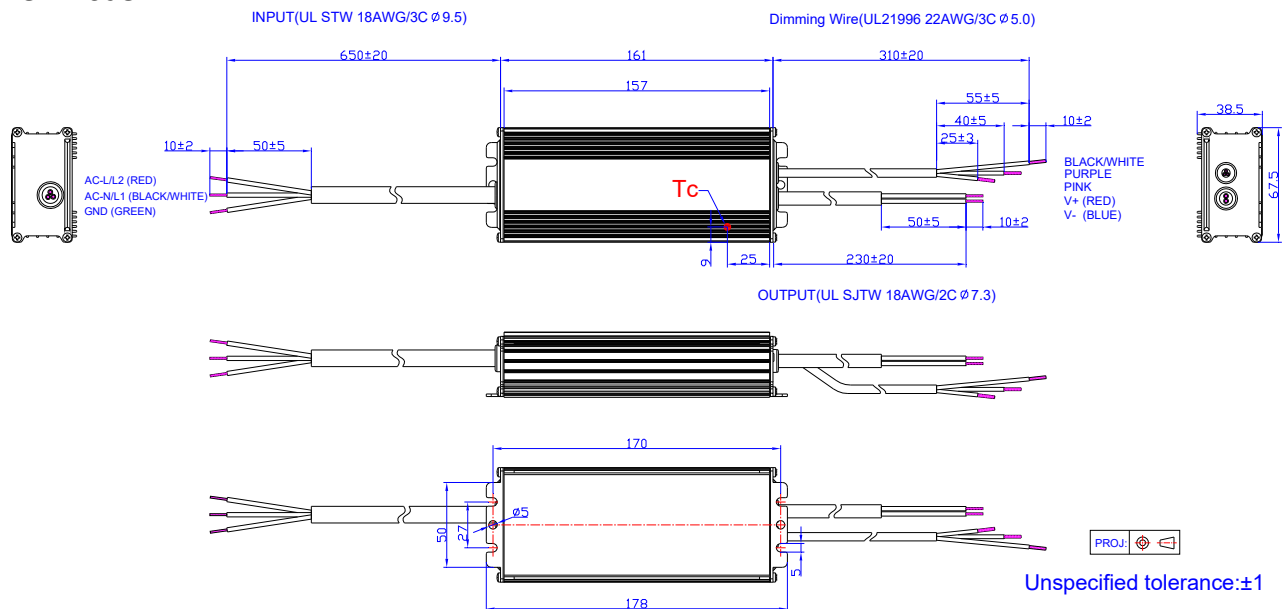
- Please refer to [PRG-MUL2](#) (Programmer) datasheet for details.

## Mechanical Outline

### ESM-150SxxxDG



### ESM-150SxxxDT



## 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
2020-10-15	A	Datasheet Release	/	/
2022-01-26	B	UKCA / EAC / NOM logo	/	Added
		Safety & EMC Compliance	/	Updated
		Programming Connection Diagram	/	Updated
		Mechanical Outline	ESM-150SxxxDT	Updated