



## INVENTRONICS SSM-760S MGR Series 760W Programmable Driver with INV Digital Dimming Owner's Manual

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INVENTRONICS SSM-760S MGR Series 760W Programmable Driver with INV Digital Dimming



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## Features

- Panel Mount Connectors Facilitates Installation
- Rotary Switch+RJ12 Connector
- Hot-plugging Protection
- Parallel LED Protection
- Ultra High Efficiency (Up to 95%)
- Full Power at Wide Output Current Range (Constant Power)
- Adjustable Output Current (AOC) with Programmability
- Isolated 0-10V/PWM/Resistor/3-Timer-Modes Dimmable
- INV Digital Dimming, UART Based Communication Protocol

- Dim-to-Off
- Minimum Dimming Level with 5% or 10% Selectable
- Maximum Dimming Level with 9V or 10V Selectable
- Fade Time Adjustable
- Low Inrush Current
- Output Lumen Compensation
- End-of-Life Indicator
- Input Surge Protection: DM 6kV, CM 10kV
- All-Around Protection: IOVP, IUVP, OVP, SCP, OTP
- IP66 and UL Dry/Damp/Wet Location
- 5 Years Warranty

## Description

The SSM-760SxxxMGR series is a 760W, constant-current, programmable and IP66 rated LED driver that operates from 249-528Vac input with excellent power factor. Created for many lighting applications including high mast, sports, UV-LED, aquaculture and horticulture, etc. It provides rotary switch, RJ12 connector and dim-to-off functionality. The dimming control supports 0-10V dimming as well as two-way communication via Digital Dimming, a UART based communication protocol. 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 under voltage, input over voltage, output over voltage, short circuit, and over temperature.

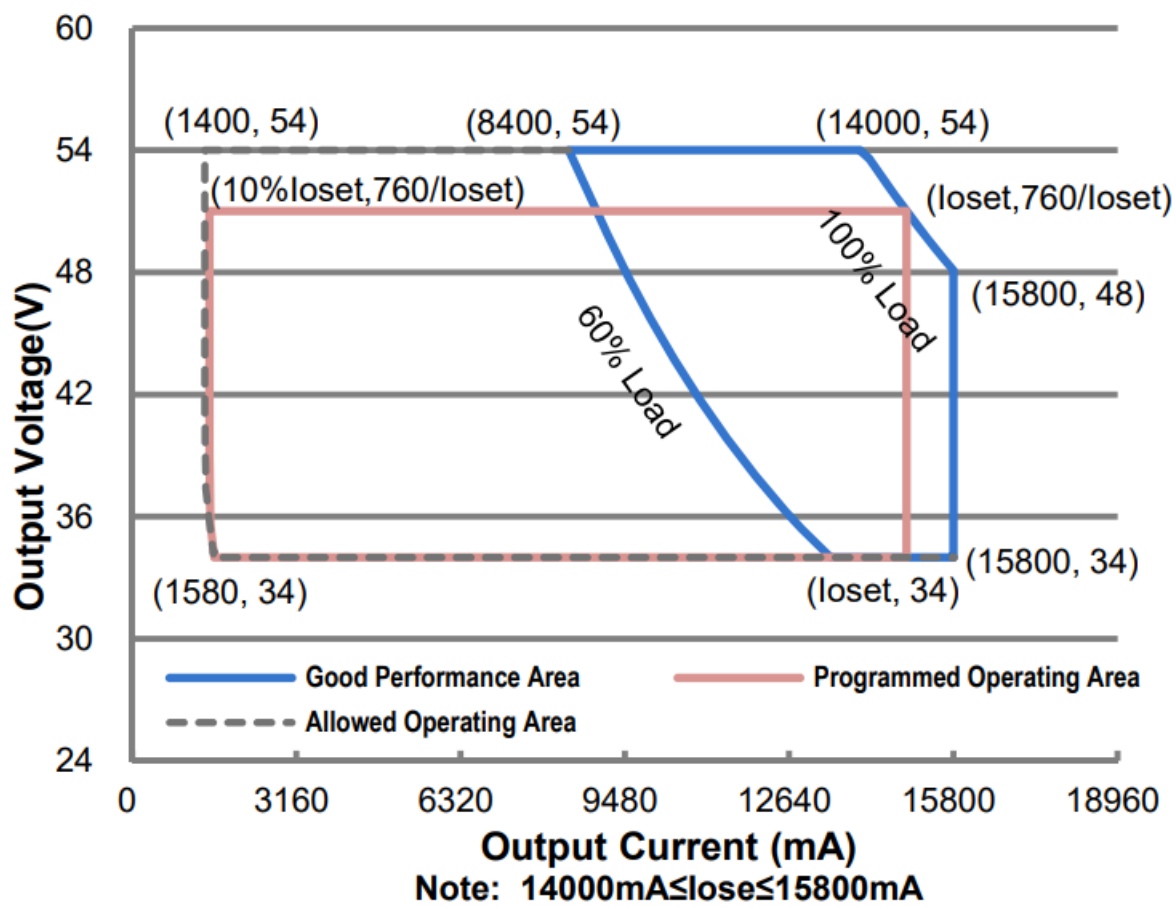
## Models

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
							277V ac	480V ac	
1.4-15.8 A	14-15.8A	14A	249~528V ac 352~500V dc	34 ~ 54 Vdc	760 W	95.0%	0.99	0.96	SSM-760S15AMGR(4)

### Notes:

1. Output current range with constant power at 760W.
2. Certified voltage range: UL, FCC 277-480Vac; otherwise: 277-400Vac.
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	352 Vdc	–	500 Vdc	
Input Frequency	47 Hz	–	63 Hz	
Leakage Current	–	–	0.75 MIU	UL 8750; 480Vac/ 60Hz
	–	–	0.70 mA	IEC 60598-1; 480Vac/ 60Hz
Input AC Current	–	–	3.24 A	Measured at 100% load and 277 Vac input.
	–	–	1.87 A	Measured at 100% load and 480 Vac input.
Inrush Current(I <sub>2t</sub> )	–	–	1.80 A2s	At 480Vac input, 25°C cold start, duration=6.06 ms, 10%I <sub>pk</sub> -10%I <sub>pk</sub> . See Inrush Current Waveform for the details.
PF	0.90	–	–	At 277-480Vac,50-60Hz, 60%-100%Load (456 – 760W)
THD	–	–	20%	

## Output Specifications

Parameter	Min.	Typ.	Max.	Notes
Output Current Tolerance	-5%I <sub>o</sub> set	–	5%I <sub>o</sub> set	100% load
Output Current Setting(I <sub>o</sub> set Range) SSM-760S15AMGR	1400 mA	–	15800 mA	
Output Current Setting Range with Constant Power SSM-760S15AMGR	14000 mA	–	15800 mA	
Total Output Current Ripple (pk-pk)	–	5%I <sub>o</sub> max	10%I <sub>o</sub> max	100% load, 20 MHz BW
Output Current Ripple at < 200 Hz (pk-pk)	–	–	2%I <sub>o</sub> max	70%-100% load
Startup Overshoot Current	–	–	10%I <sub>o</sub> max	100% load

Parameter	Min.	Typ.	Max.	Notes
No Load Output Voltage SSM-760S15AMGR	–	–	60 V	
Line Regulation	–	–	±0.5%	100% load
Load Regulation	–	–	±3.0%	
Turn-on Delay Time	–	–	0.5 s	Measured at 277-480Vac input, 60%-100% Load
Temperature Coefficient of I <sub>o</sub> set	–	0.03%/°C	–	Case temperature = 0°C ~T <sub>c</sub> max

## General Specifications

Parameter	Min.	Typ.	Max.	Notes
Efficiency at 277 Vac input: SSM-760S15AMGR I <sub>o</sub> = 14000 mA I <sub>o</sub> = 15800 mA	91.5% 91.5%	93.5% 93.5%	– –	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 400 Vac input: SSM-760S15AMGR I <sub>o</sub> = 14000 mA I <sub>o</sub> = 15800 mA	92.5% 92.5%	94.5% 94.5%	– –	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 480 Vac input: SSM-760S15AMGR I <sub>o</sub> = 14000 mA I <sub>o</sub> = 15800 mA	93.0% 93.0%	95.0% 95.0%	– –	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)
Standby Power	–	1.5 W	–	Measured at 480Vac/50Hz; Dimming off
MTBF	–	224,000 Hour	–	Measured at 480Vac input, 80%Load and 25°C ambient temperature (MIL-HDBK- 217F)
Lifetime	–	111,000 Hours	–	Measured at 480Vac input, 80%Load and 70°C case temperature; See lifetime vs. T <sub>c</sub> curve for the details

	–	50,000 Hours	–	Measured at 277Vac input, 100%Load and 40°C ambient temperature
Operating Case Temperature f or Safety Tc_s	-40°C	–	+90°C	
Operating Case Temperature f or Warranty Tc_w	-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)	15.35 × 4.25 × 1.91 390 × 108 × 48.5			With mounting ear 16.34 × 4.25 × 1.91 415 × 108 × 48.5
Net Weight	–	3360 g	–	

## Dimming Specifications

Parameter	Min.	Typ.	Max.	Notes
Absolute Maximum Voltage on the Vdim (+) Pin	-20 V	–	20 V	
Source Current on Vdim (+)Pin	90 $\mu$ A	100 $\mu$ A	110 $\mu$ A	Vdim(+) = 0 V

Parameter		Min.	Typ.	Max.	Notes
Dimming Output Range with 10%-100% (Default)	SSM-760S15AM GR	10%loset	–	loset	14000 mA ≤ loiset ≤ 15800 mA
	SSM-760S15AM GR	1400 mA	–	loset	1400 mA ≤ loiset 14000 mA
Dimming Output Range with 5%-100% (Settable)	SSM-760S15AM GR	5%loset	–	loset	14000 mA ≤ loiset ≤ 15800 mA
	SSM-760S15AM GR	700 mA	–	loset	1400 mA ≤ loiset 14000 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 Inventronics Programming Software.
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

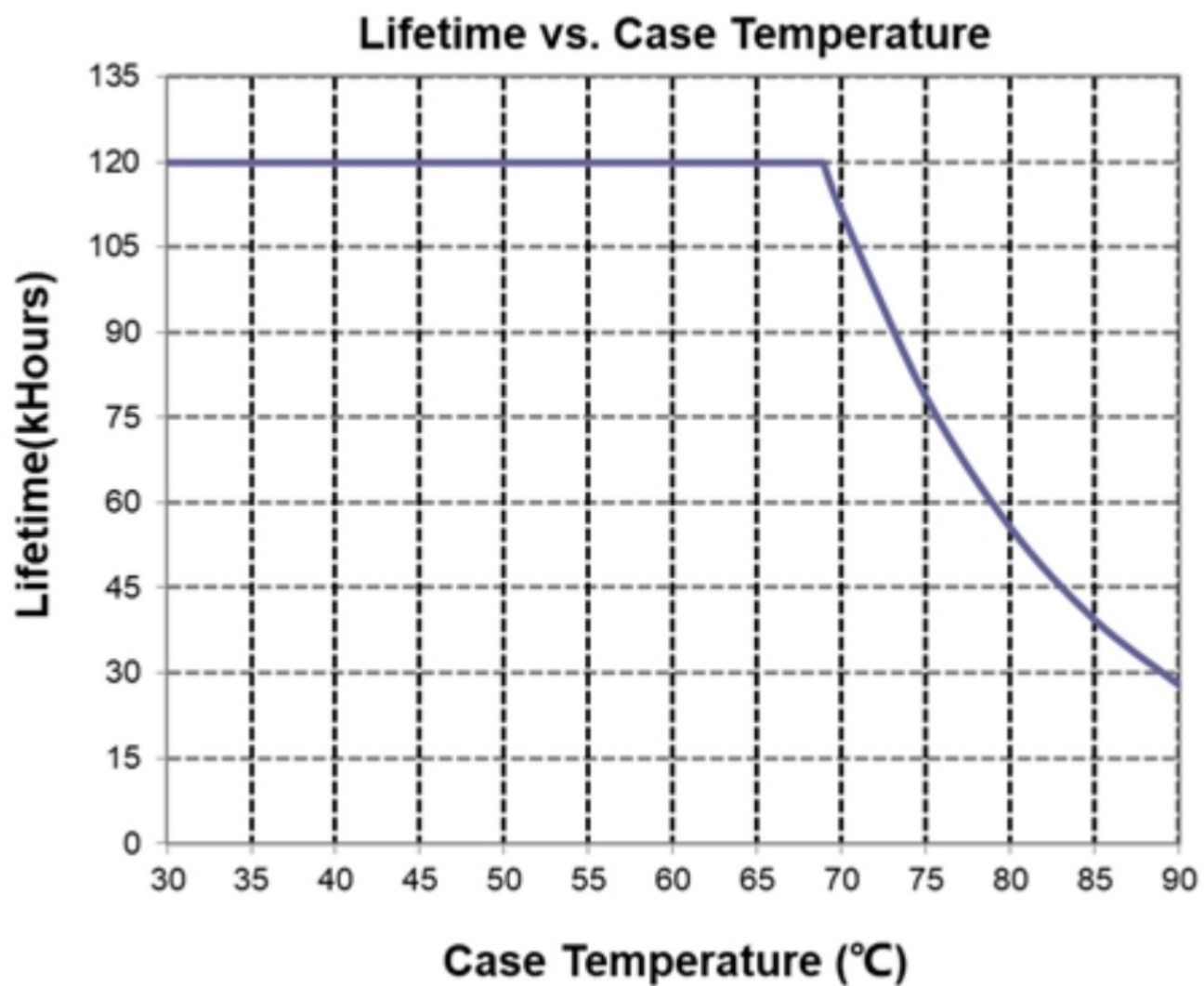


Safety Category	Standard
UL/CUL	UL 8750,CAN/CSA-C22.2 No. 250.13
CE	EN 61347-1, EN 61347-2-13
CB	IEC 61347-1, IEC 61347-2-13
EMI Standards	Notes
EN 55015(1)	Conducted emission Test &Radiated emission Test
EN 61000-3-2	Harmonic current emissions
EN 61000-3-3	Voltage fluctuations & flicker
FCC Part 15(1)	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.

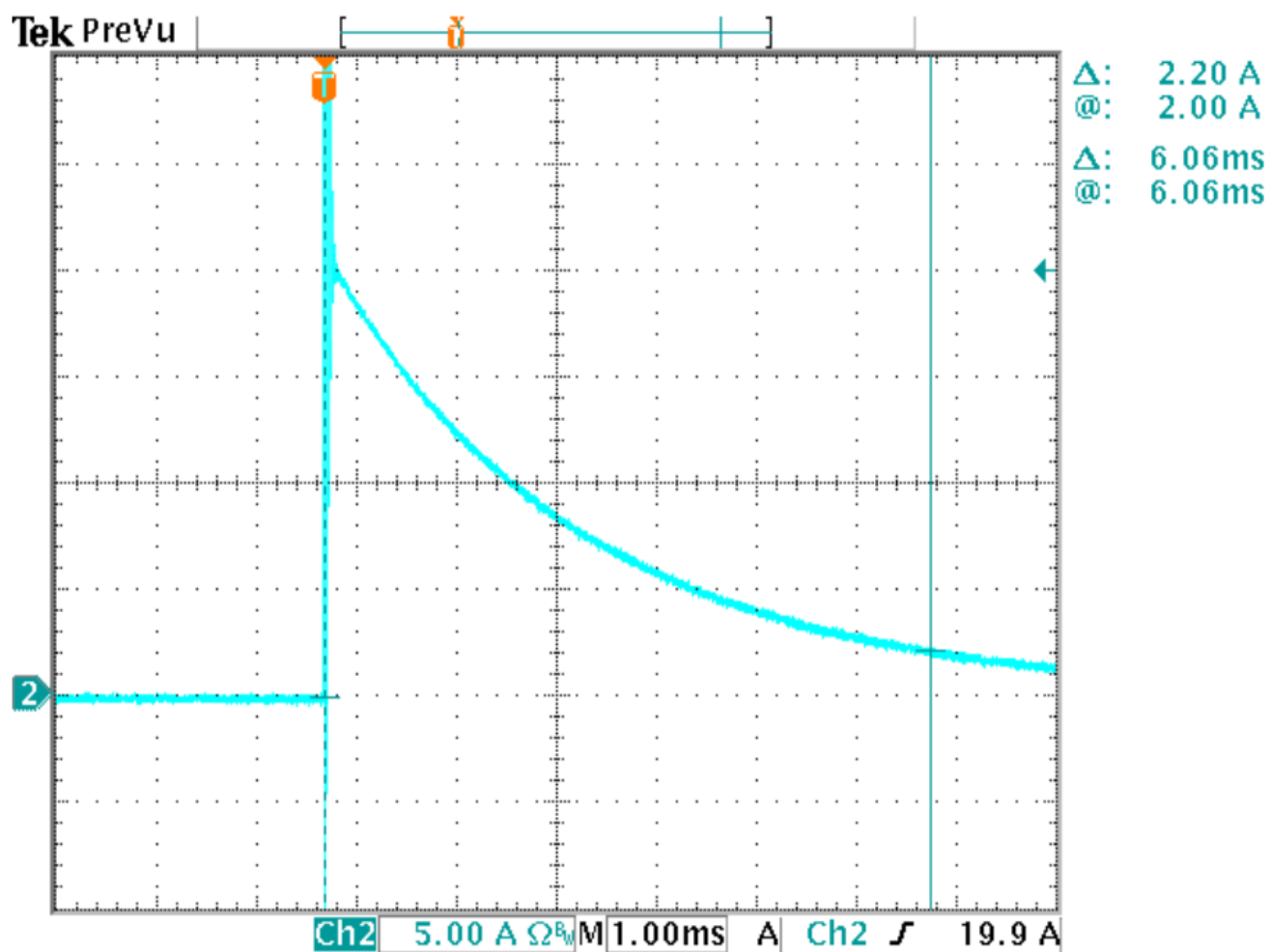
EMS Standards	Notes
EN 61000-4-2	Electrostatic Discharge (ESD): 8 kV air discharge, 4 kV contact discharge
EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test-RS
EN 61000-4-4	Electrical Fast Transient / Burst-EFT
EN 61000-4-5	Surge Immunity Test: AC Power Line: Differential Mode 6 kV, Common Mode 10 kV
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

### Lifetime vs. Case Temperature

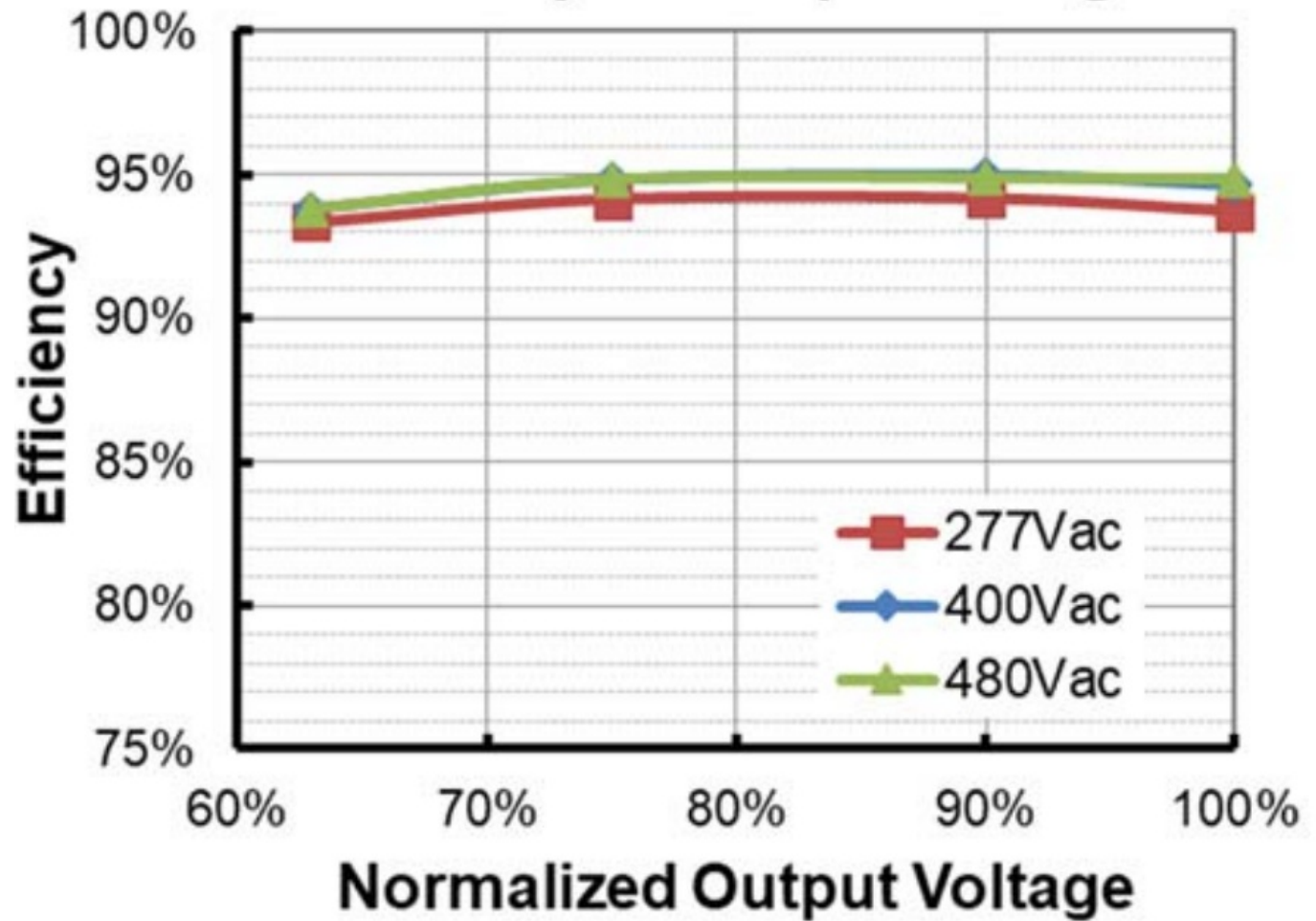


[Inrush Current Waveform](#)

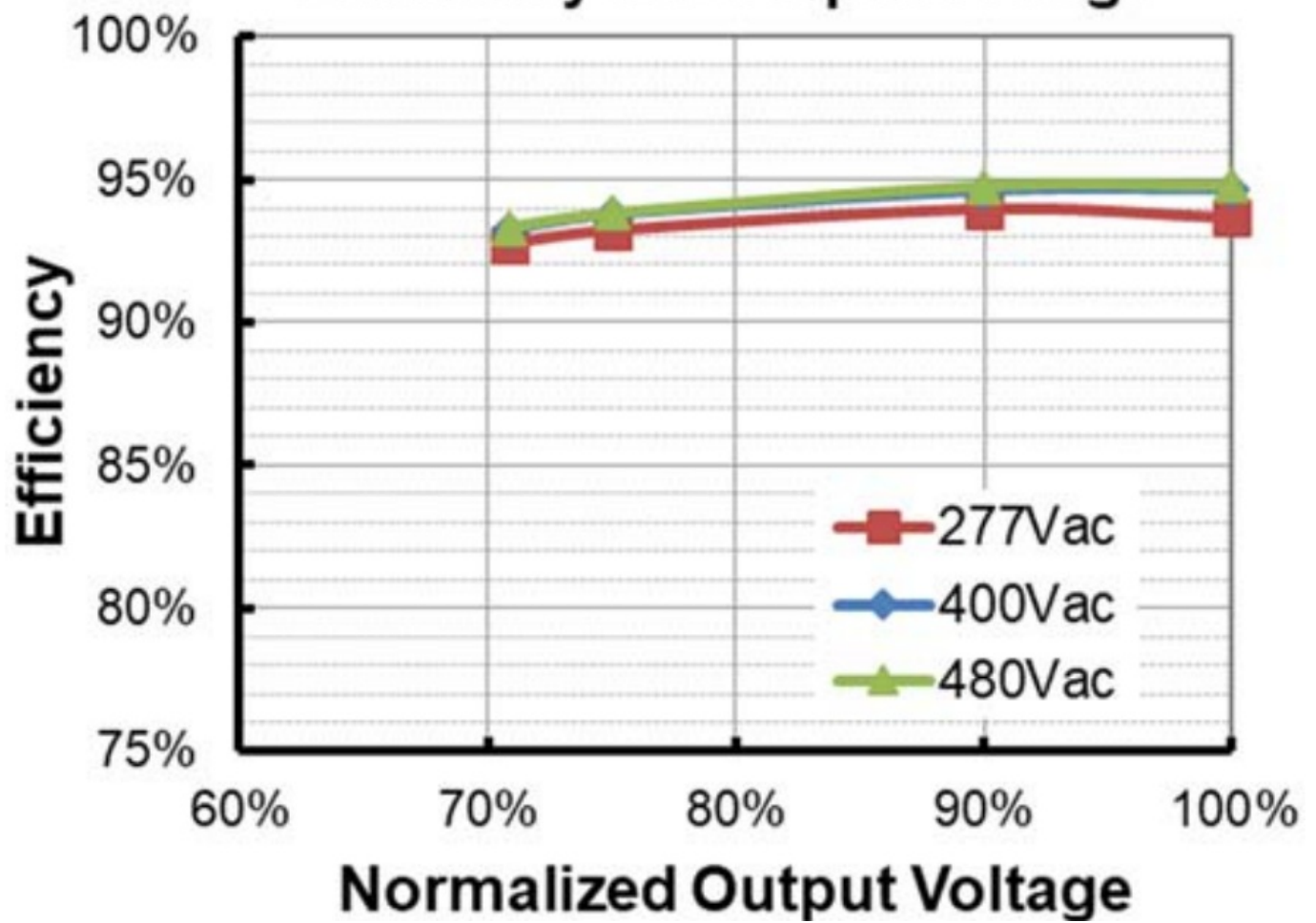


Efficiency vs. Load

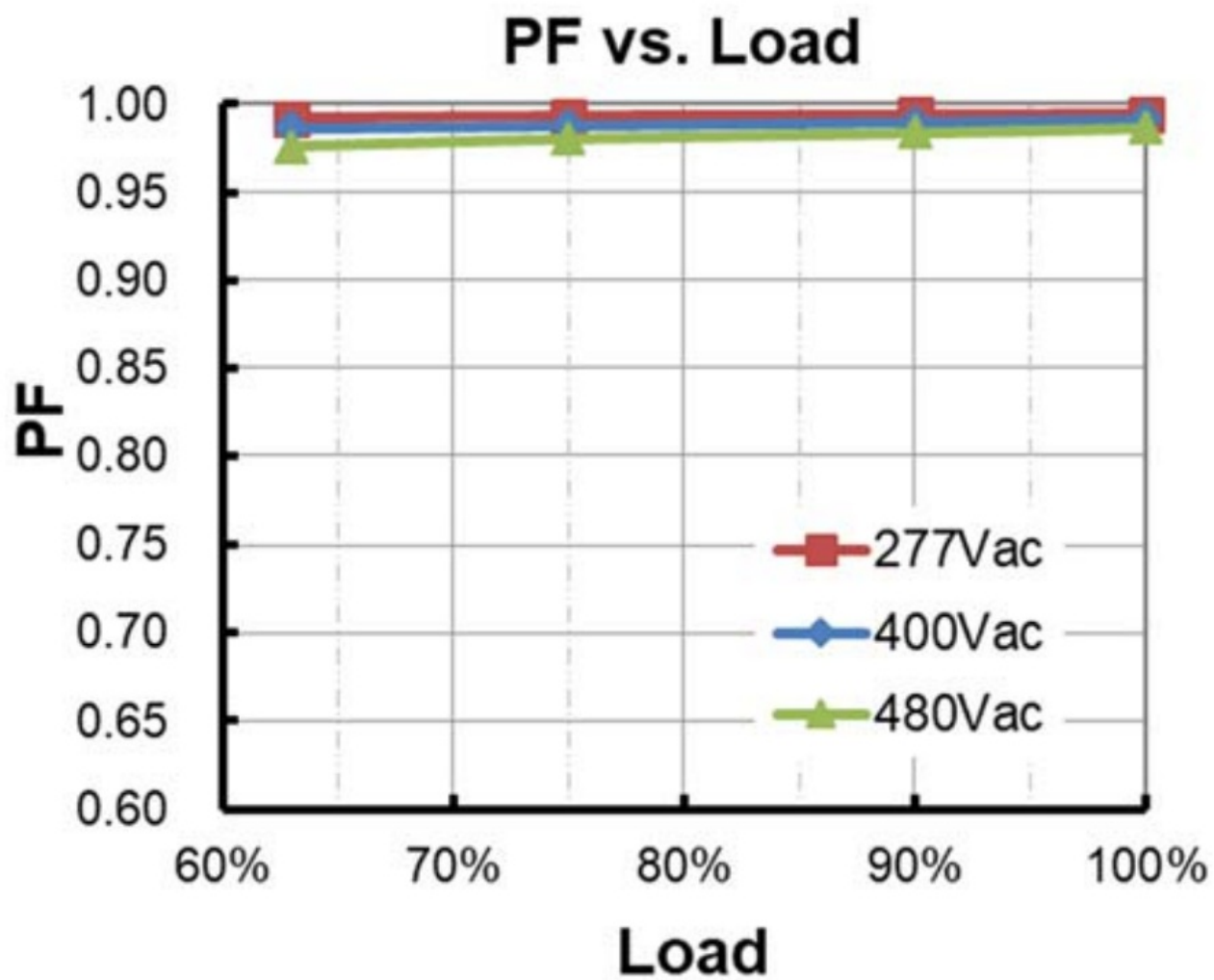
*SSM-760S15AMGR(I<sub>o</sub>=14000mA)*  
**Efficiency vs. Output Voltage**



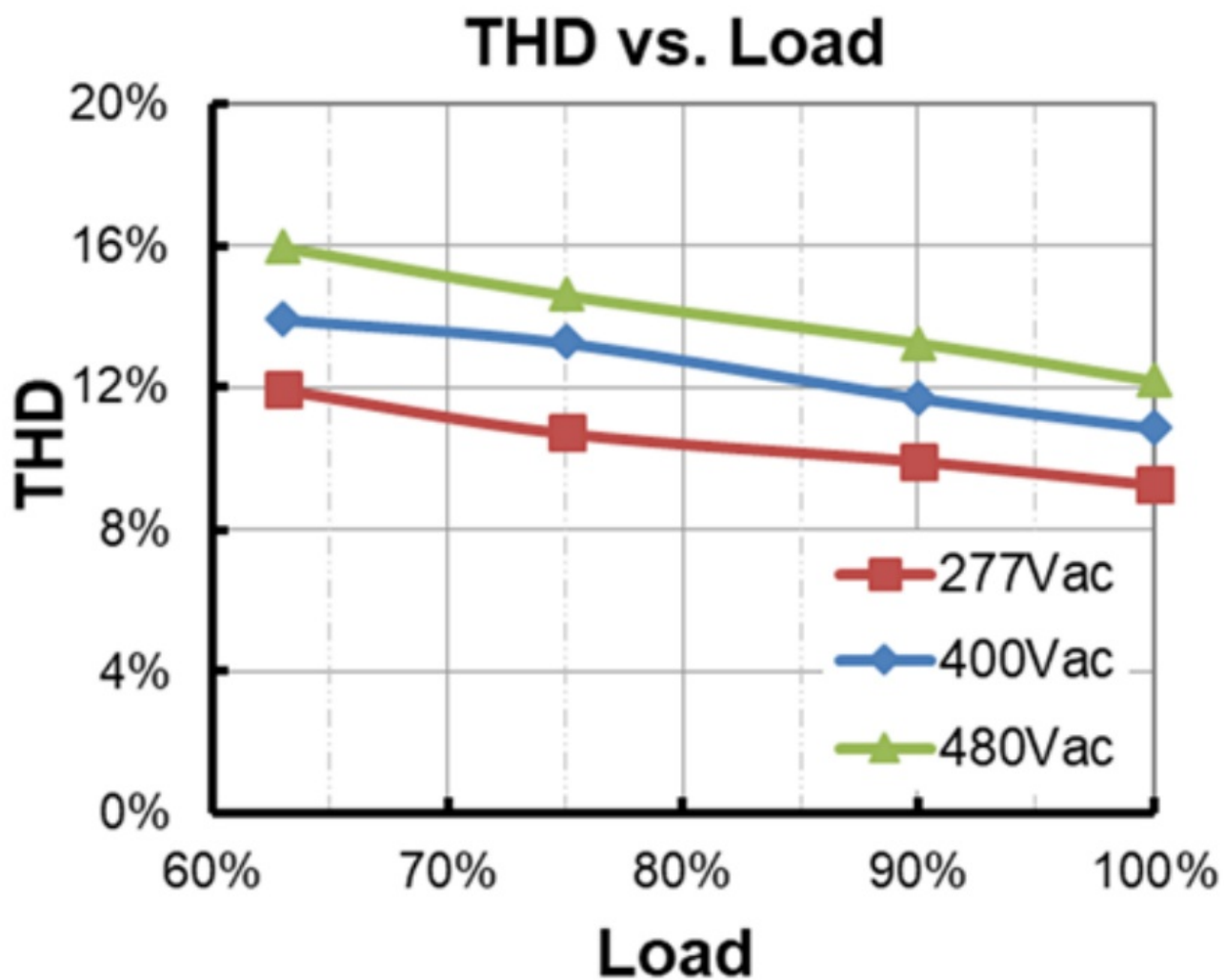
*SSM-760S15AMGR(I<sub>o</sub>=15800mA)*  
**Efficiency vs. Output Voltage**



Power Factor

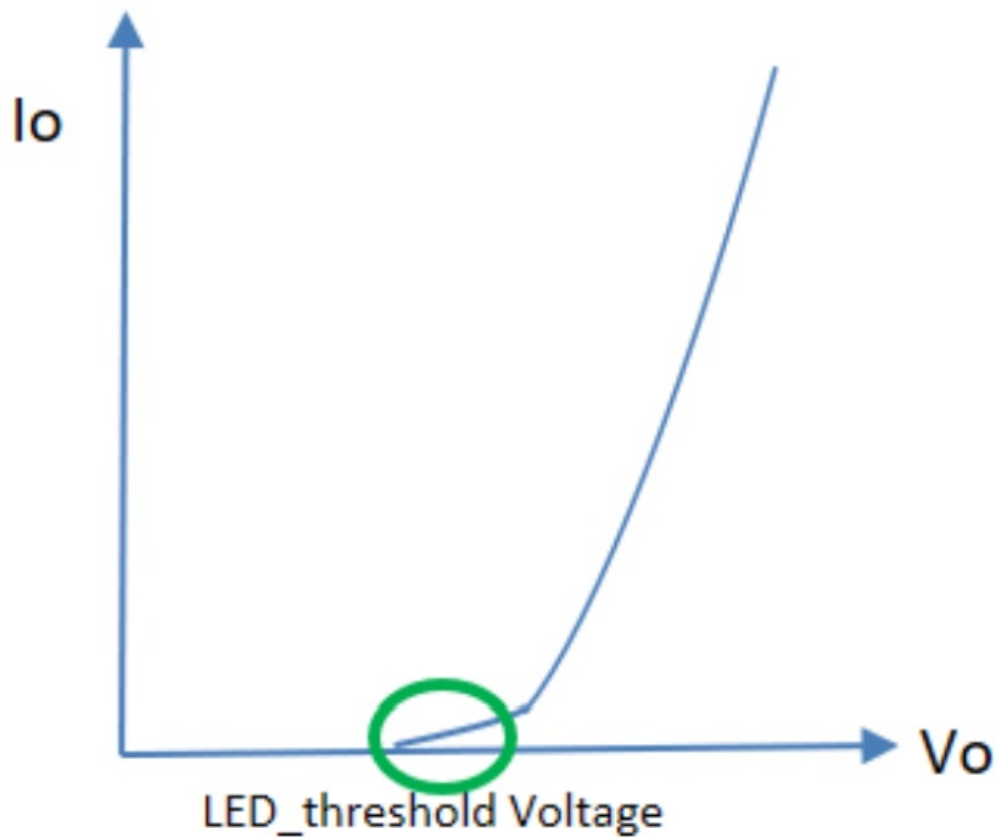


Total Harmonic Distortion



#### Hot-plugging Protection

This feature protects LEDs when connecting to a driver that is already powered on. This is disabled by default and can be enabled through the Inventronics Programming Software.



LED threshold voltage ( $V_{th}$ ) is the minimum voltage required for current to flow through the LED load. After this threshold is met, the LED forward voltage ( $V_f$ ) increases as the current increases. Set  $V_{th}$  close to, but higher than the actual LED threshold voltage for optimized performance. The greater the difference between the  $V_{th}$  setting and the actual LED threshold voltage, the higher the overshoot current will be. The  $V_{th}$  setting must be lower than  $V_f$ .

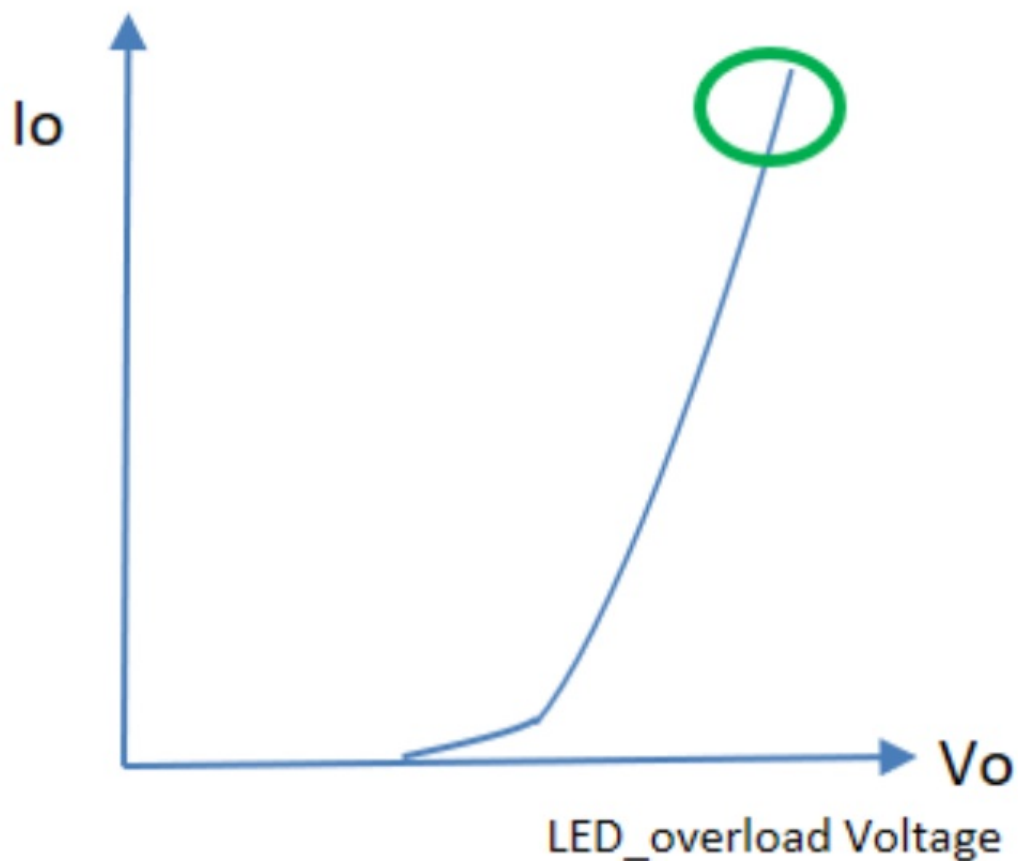
Please test, program, and tune this feature for each LED load design.

Parameter		Min.	Typ.	Max.	Notes
Hot-plugging Protection	LED Threshold Voltage Setting Range	44 V	–	54 V	Set $V_{th}$ close to, but higher than the actual LED threshold voltage
	Setting Tolerance	-2%	–	2%	

### Parallel LED Protection

This feature helps protect parallel LEDs from a high, overcurrent condition by limiting the voltage. This is disabled by default and can be enabled through the Inventronics Programming Software.





Set  $V_{\text{overload}}$  close to, but higher than the maximum forward voltage for optimized performance. The greater the difference between the  $V_{\text{overload}}$  setting and the maximum forward voltage, the higher the overload stress will be. The  $V_{\text{overload}}$  setting must be higher than  $V_f$ .

Please test, program, and tune this feature for each LED load design.

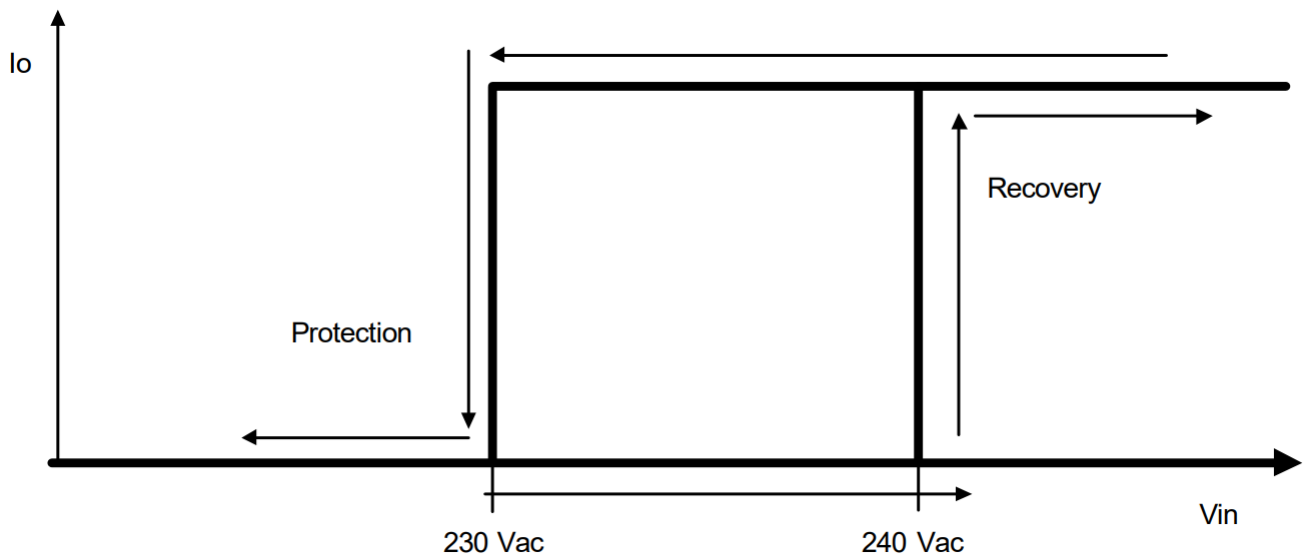
Parameter		Min.	Typ.	Max.	Notes
Parallel LED Protection	Overload Voltage Setting Range	47 V	–	56 V	Set $V_{\text{overload}}$ close to, but higher than the maximum LED forward voltage
	Setting Tolerance	-2%	–	2%	

## Protection Functions

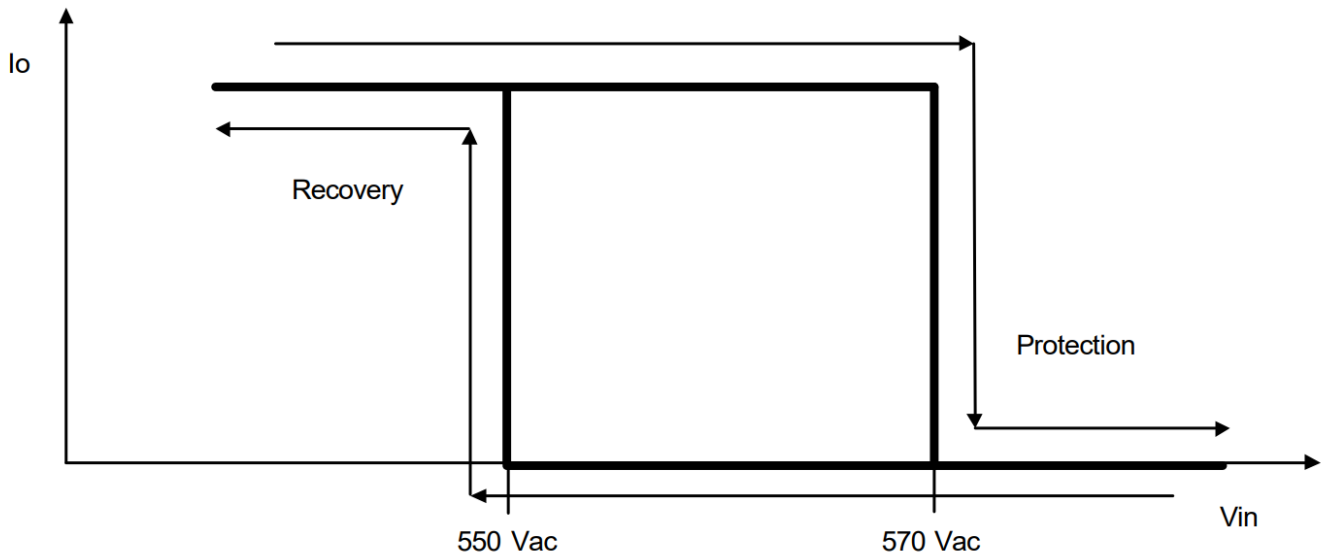
Parameter		Min.	Typ.	Max.	Notes
Over Temperature Protection		Decreases output current, returning to normal after over temperature is removed.			
Short Circuit Protection		Auto Recovery. No damage will occur when any output is short circuited. The output shall return to normal when the fault condition is removed.			
Over Voltage Protection		Limits output voltage at no load and in case the normal voltage limit fails.			
Input Under Voltage Protection (IUVP)	Input Protection Voltage	220 Vac	230 Vac	240 Vac	Turn off the output when the input voltage falls below protection voltage.
	Input Recovery Voltage	230 Vac	240 Vac	250 Vac	Auto Recovery. The driver will restart when the input voltage exceeds recovery voltage.
Input Over Voltage Protection (IOVP)	Input Over Voltage Protection	550 Vac	570 Vac	590 Vac	Turn off the output when the input voltage exceeds protection voltage.
	Input Over Voltage Recovery	530 Vac	550 Vac	570 Vac	Auto Recovery. The driver will restart when the input voltage falls below recovery voltage.
	Max. of Input Over Voltage	—	—	590 Vac	The driver can survive for 8 hours with a stable input voltage stress of 590Vac.

**Note:** When removing the protective cap of RJ12, the waterproof protection performance should be evaluated together with external connected system by users.

#### Input Under Voltage Protection Diagram

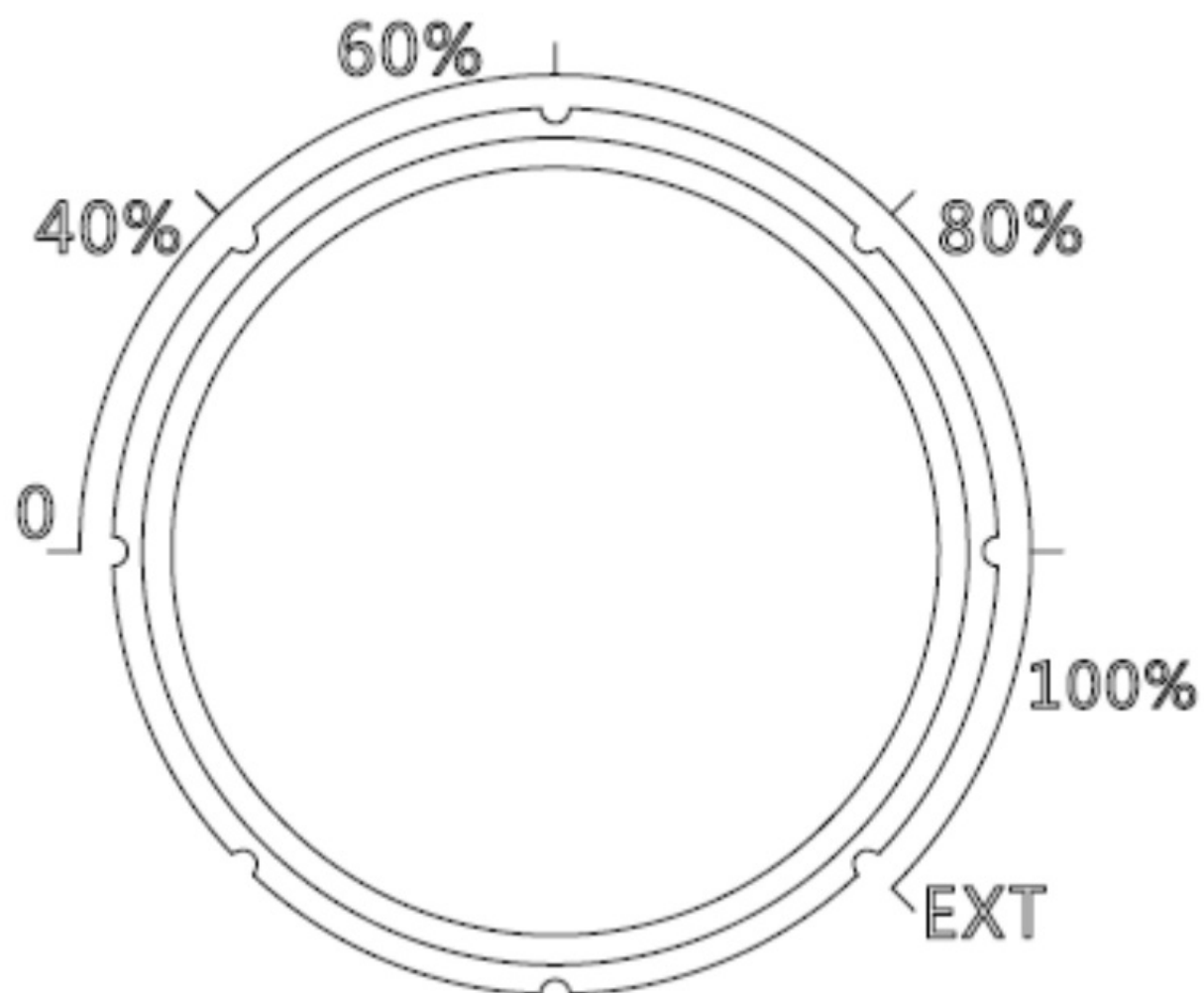


**Input Over Voltage Protection Diagram**

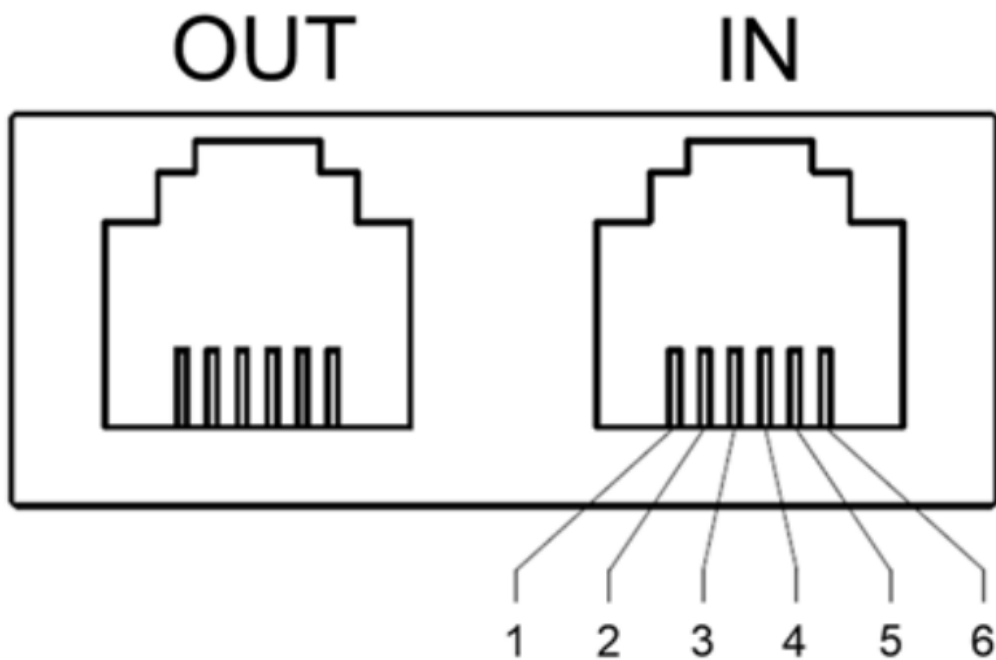


### Rotary Switch and RJ12 Connector

Output current can be set as 0, 40%, 60%, 80%, 100% level by rotary switch and the output current can be dimmed by dimming wire in RJ12 connector when rotary switch is at 'EXT' position. The default mode is in 'EXT'



Pin	Function
1,6	Vprg
2,5	Dim+
3,4	Dim-

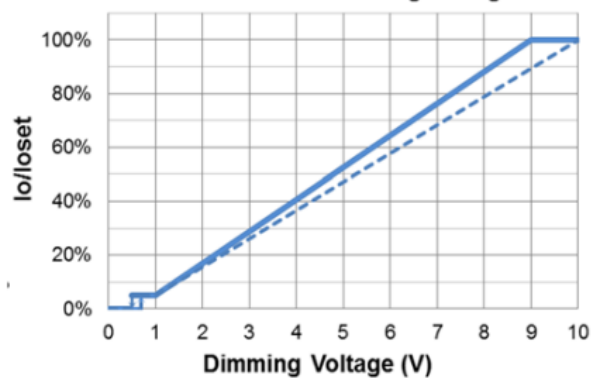
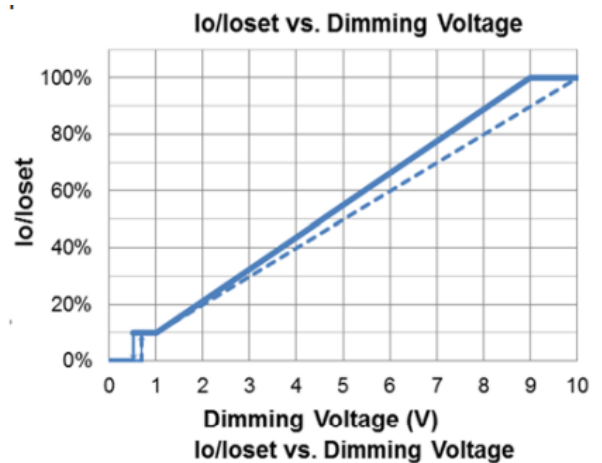
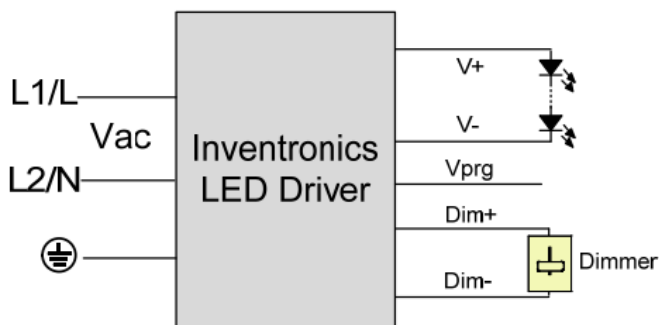


## RJ12 Connector

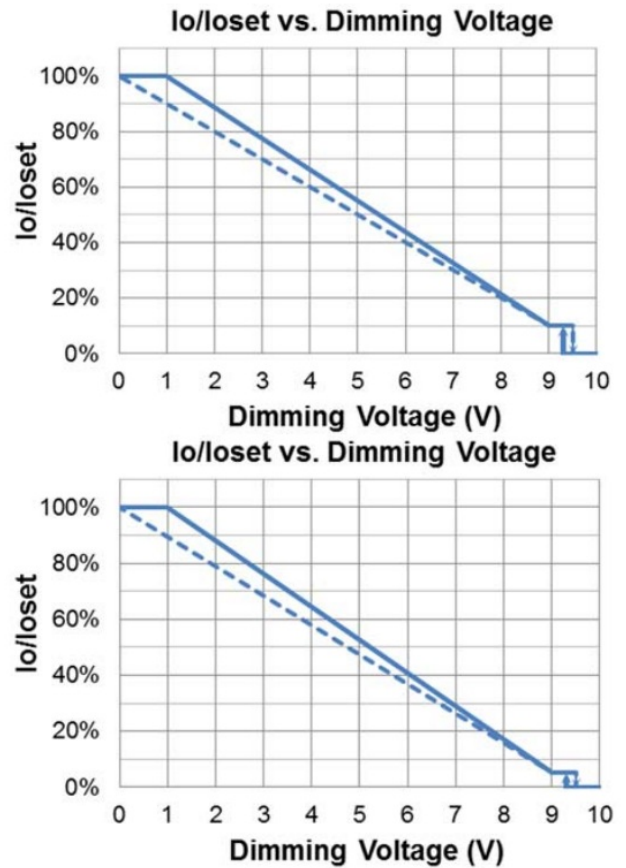
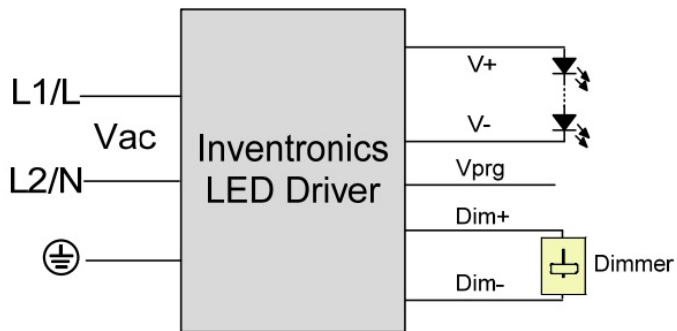
### Dimming

#### 0-10V Dimming

The recommended implementation of the dimming control is provided below



**Implementation 1: Positive logic**



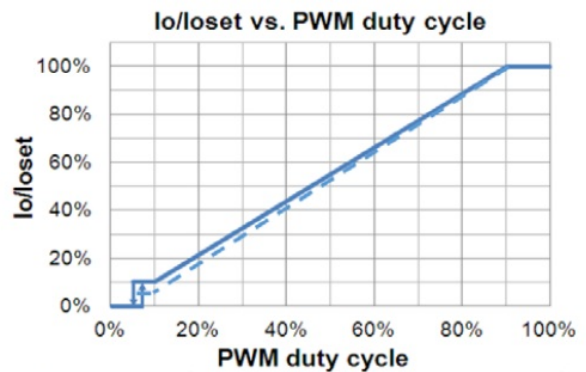
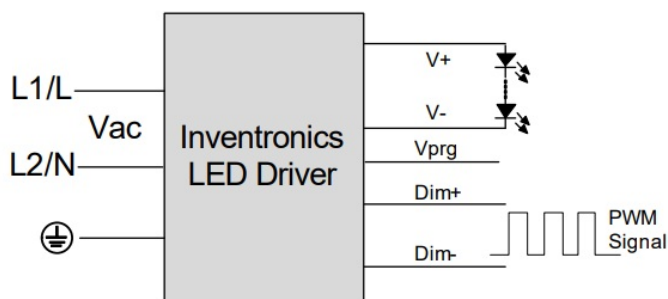
### Implementation 2: Negative logic

#### Notes:

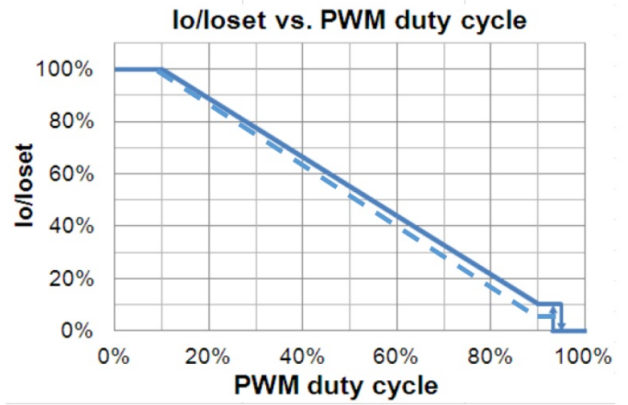
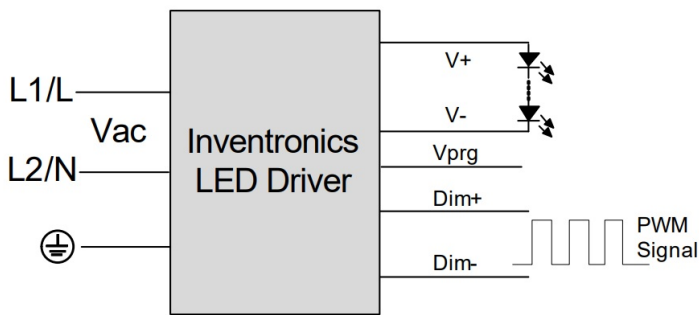
1. Do NOT connect Dim- to the output V- or V+, otherwise the driver will not work properly.
2. The dimmer can also be replaced by an active 0-10V voltage source signal or passive components like zener.
3. When 0-10V negative logic dimming mode and Dim+ is open, the driver will dim to off and be standby.

#### PWM Dimming

The recommended implementation of the dimming control is provided below.



### Implementation 3: Positive logic



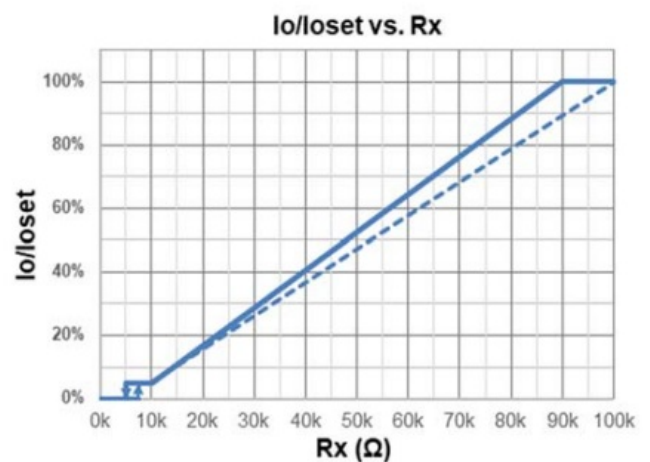
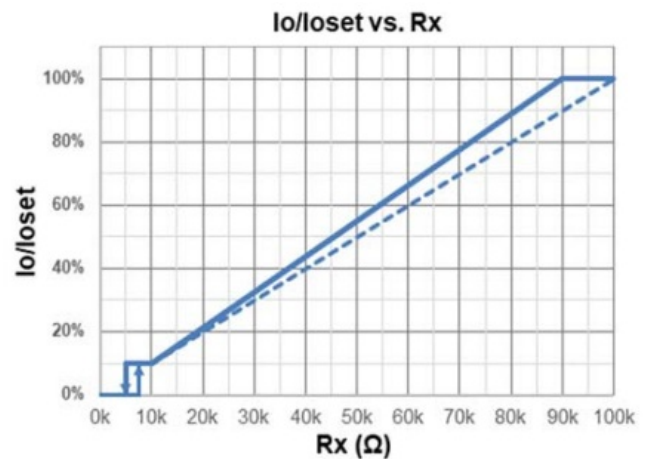
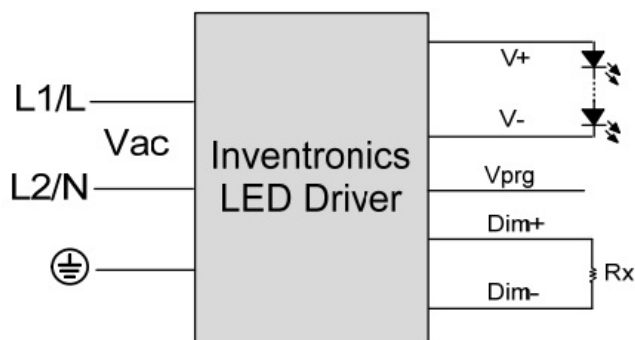
**Implementation 4: Negative logic**

#### Notes:

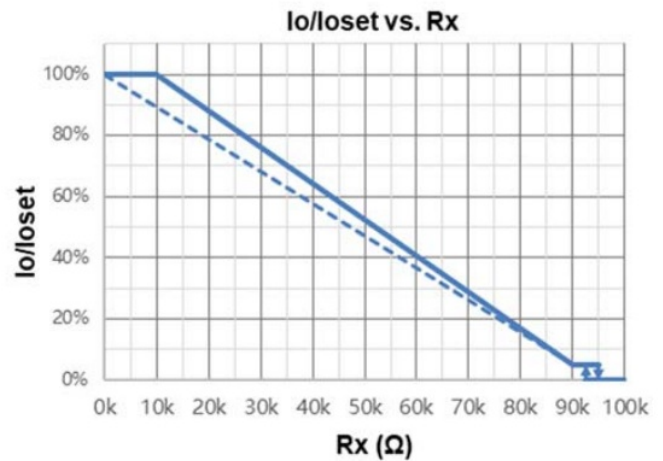
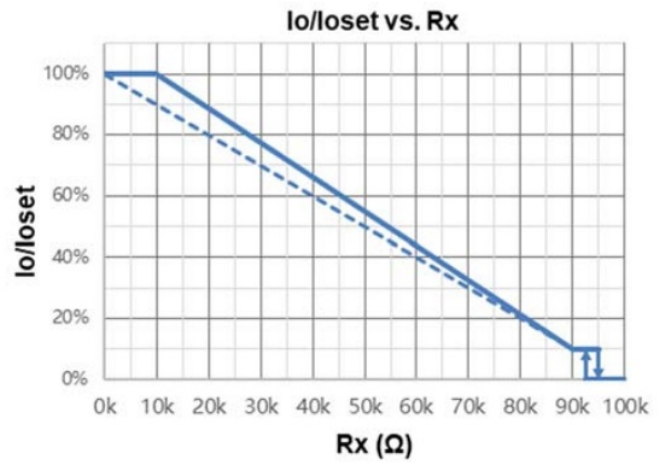
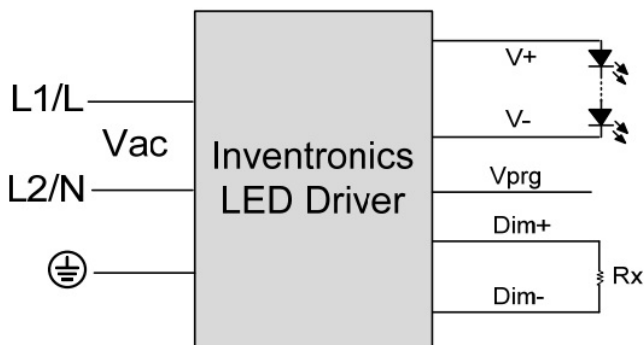
1. Do NOT connect Dim- to the output V- or V+, otherwise the driver will not work properly.
2. When PWM negative logic dimming mode and Dim+ is open, the driver will dim to off and be standby.

#### Resistor Dimming

The recommended implementation of the dimming control is provided below.



**Implementation 5: Positive logic**



## Implementation 6: Negative logic

### Notes:

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



### **Minimum Dimming Level with 5% or 10% Selectable**

The minimum dimming level can be set as 5% or 10% by Inventronics Multi Programmer, 10% is default.

### **Maximum Dimming Level with 9V or 10V Selectable**

The maximum dimming level can be set as corresponding dimming voltage is 9V or 10V by Inventronics Multi Programmer, 9V is default.

### **Fade Time Adjustable**

Soft-start time and dimming slope can be adjusted by Inventronics Multi Programmer to get customized fade time experience, disable mode is default.

### **End Of Life**

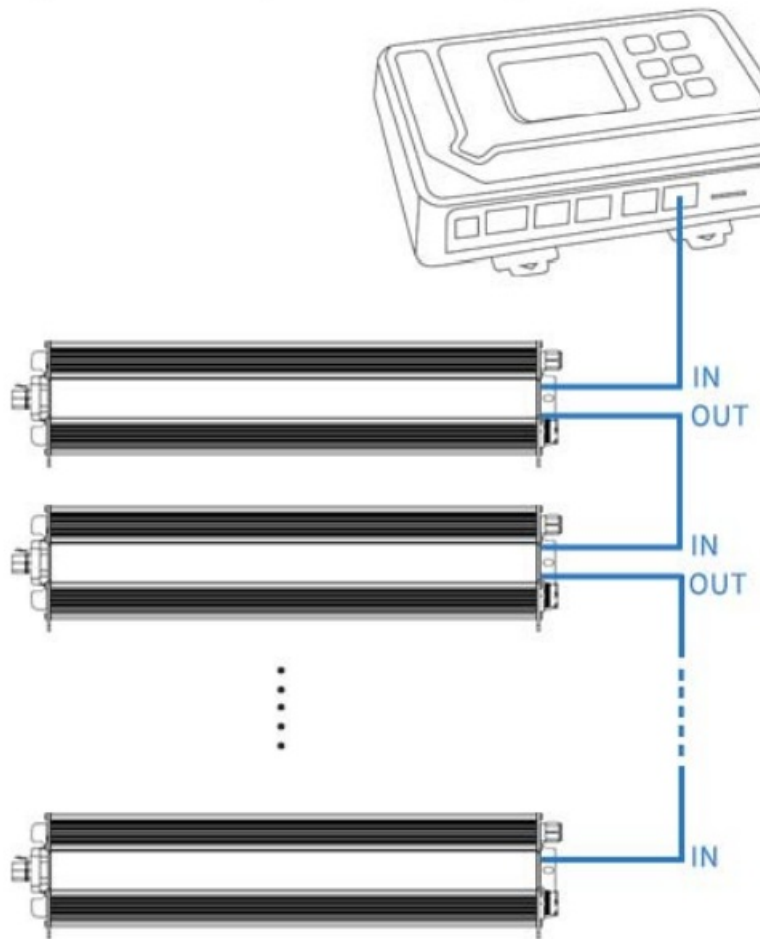
End-of-Life (EOL) is providing a visual notification to a user that the LED module has reached the end of manufacturer-specified life and that the replacement is recommended. Once active, an indication is given at each power-up of the driver, which the driver indicates this through a lower light output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

### **Digital Dimming**

Inventronics Digital Dimming is a UART (Universal Asynchronous Receive Transmitter) based communication protocol. Please refer to Inventronics Digital Dimming file for details

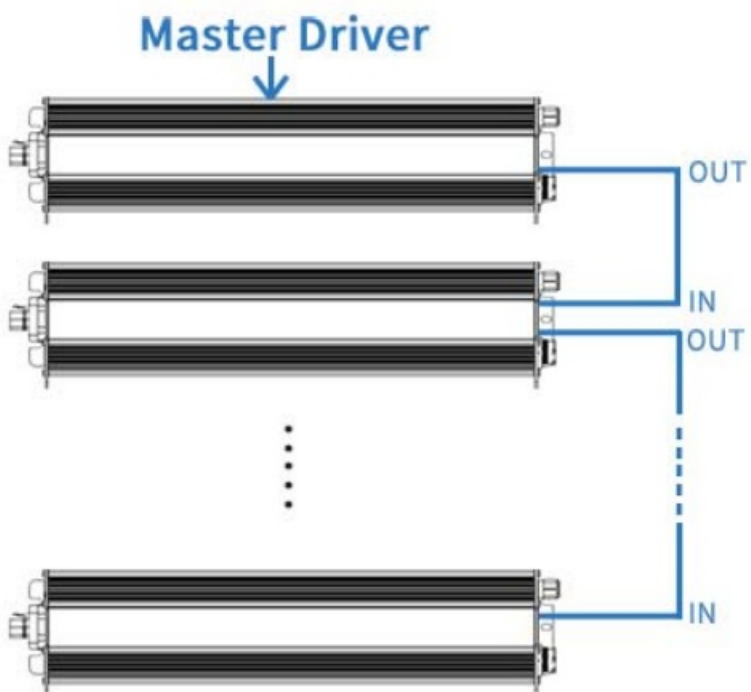
### **Daisy Chain Application**

Daisy chain system can support synchronous dimming of up to 100 drivers due to unique dimming interface design, please pay attention to right sequence of 'IN' and 'OUT' port for RJ12 connection



Daisy chain controlled by External Controller

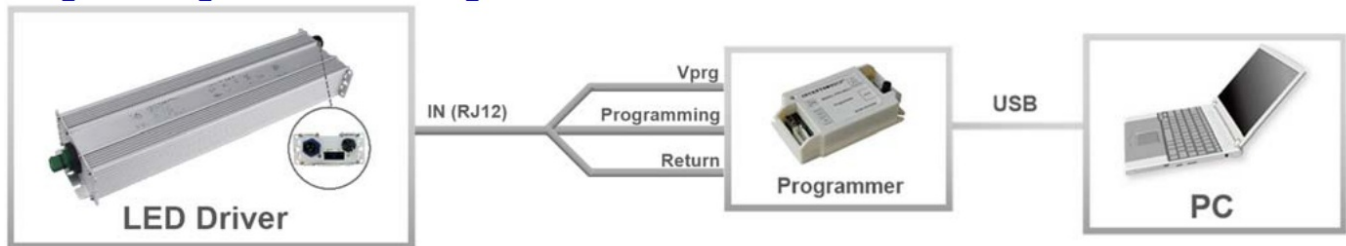
Inventronics supports daisy chain connection for drivers that is dimmed by external controller. All drivers' rotary switch need to be tuned to 'EXT'.



Daisy chain controlled by Driver-self

Inventronics offers the solution to use driver itself to control daisy chain dimming without the controller. The rotary switch of the master driver is tuned to required dimming level when the rest of drivers are tuned to 'EXT'.

## Programming Connection Diagram

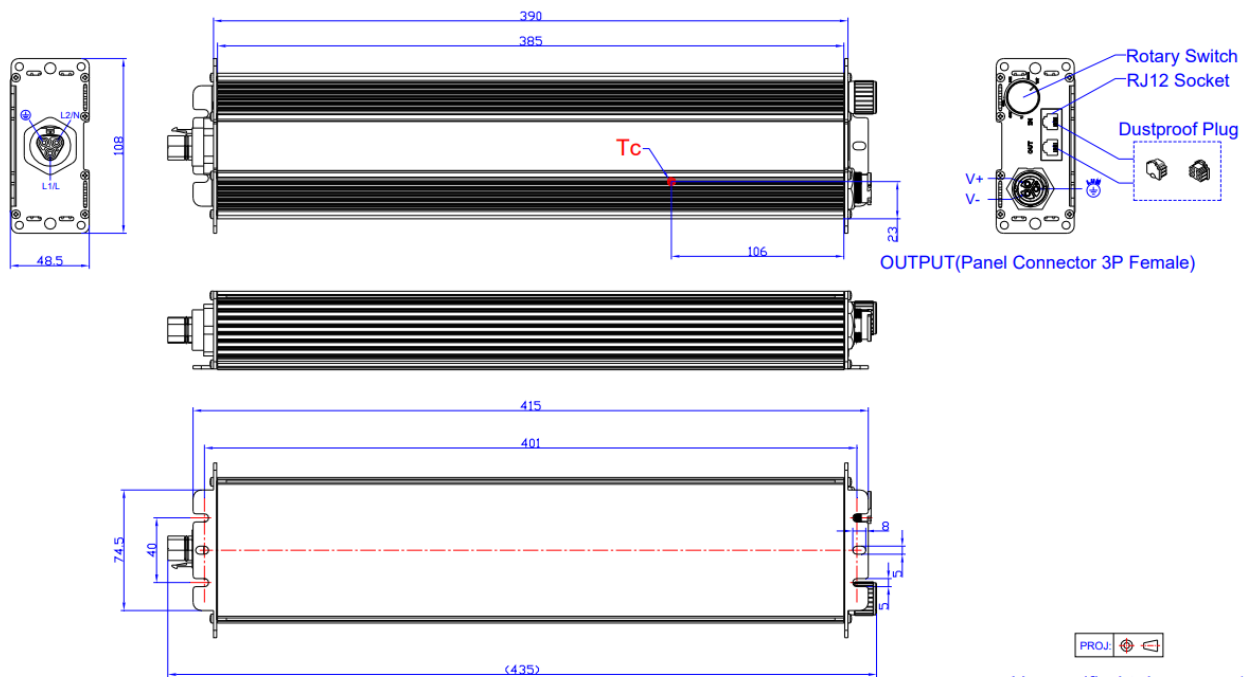


**Note:** The driver does not need to be powered on during the programming process.

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

## Mechanical Outline

### INPUT(Panel Connector 3P Male)



Unspecified tolerance:  $\pm 1$

**Note:** This driver features UL Wet Location, IP66 panel mount connectors to streamline wiring in the field while still supporting stringent environmental conditions. The mating push-lock are not supplied by Inventronics. Please contact Wieland and Amphenol LTW or one of their suppliers for assistance sourcing the mating pushlock

Location	Series	Rating voltage /current	PN of connector on driver	PN of mating push-lock
Vin	Wieland RST20i3	600V/10A	96.032.1055.7	96.031.0055.7 (Spring) or 96.031.4055.7 (Screw)
Vo	ALTW X-Lok,C-Size	300V/20A	ABAB-CAQ03000100	CC-03BFMB-QL8APP

## 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
2023-02-10	A	Datasheet Release	/	/



## Customer Support

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# INVENTRONICS

## Documents / Resources

	<p><b><a href="#">INVENTRONICS SSM-760S MGR Series 760W Programmable Driver with INV Digital Dimming</a></b> [pdf] Owner's Manual</p> <p>SSM-760SxxxMGR 760W Programmable Driver with INV Digital Dimming, SSM-760S MGR Series 760W Programmable Driver with INV Digital Dimming, SSM-760S MGR Series, 760W Programmable Driver with INV Digital Dimming, SSM-760S MGR Series 760W Programmable Driver, 760W Programmable Driver, Programmable Driver</p>
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