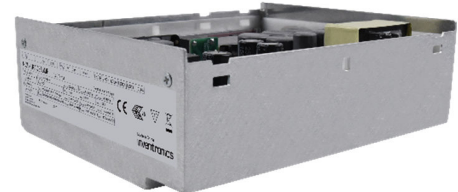


## Features

- Non-Isolated Design with Low Residual Output Voltage
- Independent Four Output Channels
- Dynamic Power Transfer (Optional)
- Ultra High Efficiency (Up to 97%)
- Full Power at Wide Output Current Range (Constant Power)
- Adjustable Output Current (AOC) with Programmability
- Adjustable Output Current (AOC) with NFC
- INV Digital Dimming, UART Based Communication Protocol
- Integrated Power Metering with High Accuracy up to  $\pm 1\%$
- Dim-to-Off
- Hold Time Adjustable
- Fade Time Adjustable
- Always-on Auxiliary Power: 12Vdc, 500mA
- Low Inrush Current
- Output Lumen Compensation
- End-of-Life Indicator
- Input Surge Protection: DM 4kV, CM 6kV
- All-Around Protection: IUVP, IOVP, OVP, SCP, OTP, OPP
- 5 Years Warranty



## Description

The NCU-1K4QxxxMP series is a 1400W, 4-channel, constant-current, programmable LED driver that operates from 312-457Vac input with excellent power factor. It provides an auxiliary voltage and dim-to-off functionality for powering low voltage, wireless controls. The dimming control supports two-way communication via Digital Dimming, a UART based communication protocol. The high efficiency of these drivers 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, over temperature and over power.

## Models

Channel	Adjustable Output Current Range(A)	Full-Power Current Range(A) <sup>(1)</sup>	Default Output Current(A)	Output Voltage Range (Vdc)	Max. Output Power (W)	Typical Efficiency <sup>(2)</sup>	Typical Power Factor		Model Number <sup>(3)</sup>
							347Vac	400Vac	
1	0.21-3.5	2.1-3.5	2.1	180-429	900	97.0%	0.99	0.98	NCU-1K4Q350MP
2	0.14-2.1	1.4-2.1	1.4	57-143	200				
3	0.14-2.1	1.4-2.1	1.4	57-143	200				
4	0.07-1.4	0.7-1.4	0.7	40-143	100				

**Notes:** (1) Output current range with constant power at 1400W.

(2) Measured at 100% load and 400Vac input (see below "General Specifications" for details).

(3) Certified input voltage range: 347-415Vac;

## ● Dynamic Power Transfer

This function is optional. the real-time power of main channel (CH1) can be dynamically varied follows the power change of other three sub-channels, and ensure the total power of all channel is constant, the total output power can be set based on the application demand through Inventronics Programing Software.

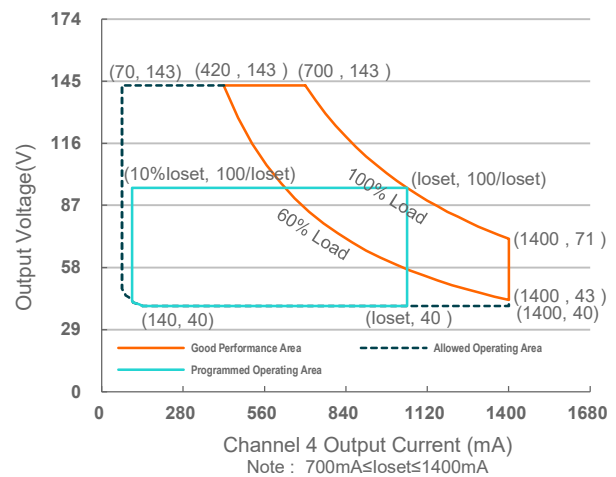
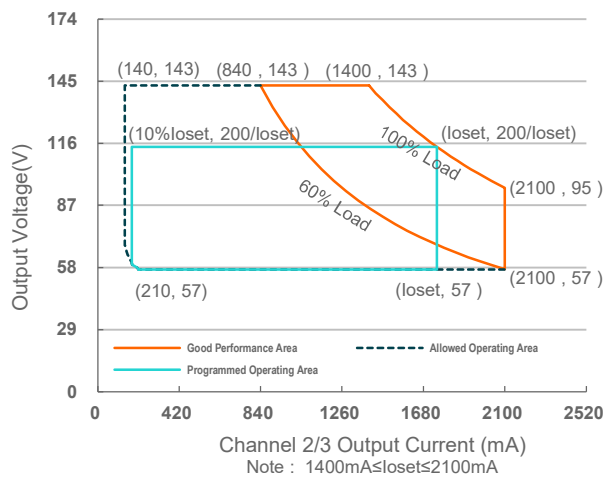
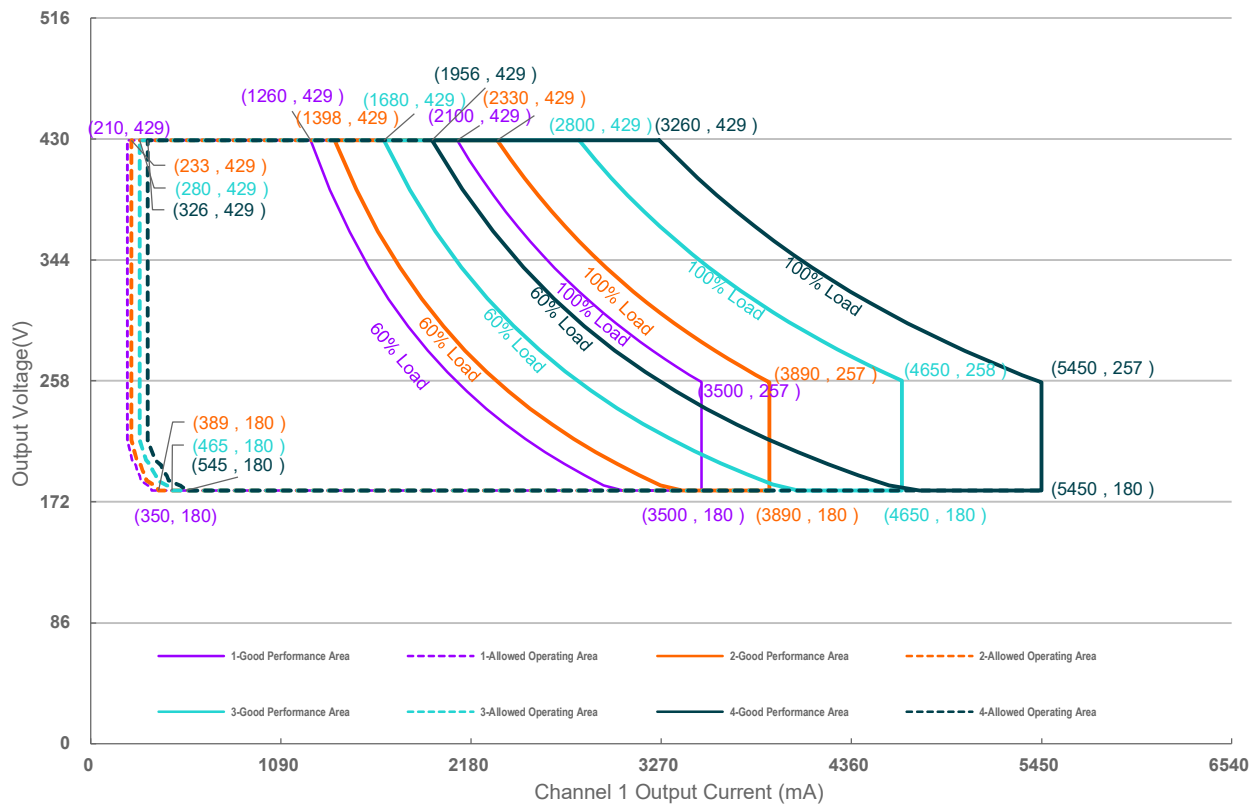
## ● Power Transfer Combination

Channel	Adjustable Output Current Range(A)	Full-Power Current Range(A) <sup>(1)</sup>	Default Output Current (A)	Output Voltage Range (Vdc)	Max. Output Power (W)	Typical Efficiency <sup>(2)</sup>	Notes
1	0.21-3.5	2.1-3.5	2.1	180-429	900	96.0%	Mode 1 CH2, CH3, CH4 are all on
2	0.14-2.1	1.4-2.1	1.4	57-143	200		
3	0.14-2.1	1.4-2.1	1.4	57-143	200		
4	0.07-1.4	0.7-1.4	0.7	40-143	100		
1	0.23-3.89	2.33-3.89	2.33	180-429	1000	96.5%	Mode 2 One of CH2, CH3. CH4 is off
2/3/4	0.14-2.1	1.4-2.1	1.4	57-143	200		
	0.14-2.1	1.4-2.1	1.4	57-143	200		
	-	-	-	-	-		
1	0.28-4.65	2.8-4.65	2.8	180-429	1200	97.0%	Mode 3 Two of CH2, CH3, CH4 are off
2/3/4	0.14-2.1	1.4-2.1	1.4	57-143	200		
	-	-	-	-	-		
	-	-	-	-	-		
1	0.326-5.45	3.26-5.45	3.26	180-429	1400	97.0%	Mode 4 CH2, CH3, CH4 are all off
2/3/4	-	-	-	-	-		
	-	-	-	-	-		
	-	-	-	-	-		

**Notes:** (1) Output current range with constant power at 1400W.

(2) Measured at 100% load, default output current and 400Vac input.

## I-V Operation Area



## Input Specifications

Parameter	Min.	Typ.	Max.	Notes
Input AC Voltage	312 Vac	-	457 Vac	
Input Frequency	47 Hz	-	63 Hz	

## Input Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
Leakage Current	-	-	0.70 mA	IEC 60598-1; 415Vac/60Hz, grounding effectively
Input AC Current	-	-	4.62 A	Measured at 100% load and 347 Vac input.
	-	-	4.02 A	Measured at 100% load and 400 Vac input.
Inrush Current(I <sup>2</sup> t)	-	-	1.04 A <sup>2</sup> s	At 400Vac input, 25°C cold start, duration=40.0 ms, 10%I <sub>peak</sub> -10%I <sub>peak</sub> .
PF	0.90	-	-	At 347-415Vac, 50-60Hz, 60%-100% Load (840-1400W)
THD	-	-	20%	
THD	-	-	10%	At 347-415Vac, 50-60Hz, 100% Load

## Output Specifications

Parameter	Min.	Typ.	Max.	Notes
Output Current Tolerance	-5%loset	-	5%loset	At 100% load condition
Output Current Setting(loset) Range				
CH1	210 mA	-	3500 mA	
CH2	140 mA	-	2100 mA	
CH3	140 mA	-	2100 mA	
CH4	70 mA	-	1400 mA	
Output Current Setting Range with Constant Power				
CH1	2100 mA	-	3500 mA	
CH2	1400 mA	-	2100 mA	
CH3	1400 mA	-	2100 mA	
CH4	700 mA	-	1400 mA	
Total Output Current Ripple (pk-pk)	-	5%I <sub>omax</sub>	10%I <sub>omax</sub>	100% load. 20 MHz BW
Output Current Ripple at < 200 Hz (pk-pk)	-	2%I <sub>omax</sub>	-	70%-100% load
Startup Overshoot Current	-	-	10%I <sub>omax</sub>	100% load
No Load Output Voltage				
CH1	-	-	500 V	
CH2	-	-	200 V	
CH3	-	-	200 V	
CH4	-	-	200 V	
Line Regulation	-	-	±2.5%	100% load
Load Regulation	-	-	±5%	
Turn-on Delay Time	-	-	3 s	Measured at 347-415Vac input, 65%-100% load
Temperature Coefficient of loset	-	0.06%/°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	-	500 mA	Return terminal is "Dim-"

## Output Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
12V Auxiliary Output Transient Peak Current@10W	-	-	850 mA	850mA peak for a maximum duration of 1.3ms in a 5.2ms period during which time the average should not exceed 500mA.

## General Specifications

Parameter	Min.	Typ.	Max.	Notes
Efficiency at 347 Vac input: CH1+CH2+CH3+CH4 Io= (2100+1400+1400+700) mA Io= (3500+2100+2100+1400) mA	94.5% 94.0%	96.5% 96.0%	- -	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 400 Vac input: CH1+CH2+CH3+CH4 Io= (2100+1400+1400+700) mA Io= (3500+2100+2100+1400) mA	95.0% 94.0%	97.0% 96.0%	- -	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 400Vac/50Hz; Dimming off
MTBF	-	156,000 Hours	-	Measured at 400Vac input, 80%load and 25°C ambient temperature (MIL-HDBK-217F)
Lifetime	-	100,000 Hours	-	Measured at 400Vac input, 80%load and 70°C case temperature; See lifetime vs. Tc curve for the details
Operating Case Temperature for Safety Tc s	-20°C	-	+90°C	
Operating Case Temperature for Warranty Tc w	-20°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)	7.10 × 5.94 × 2.44 180.4 × 151 × 62			
Net Weight	-	2095 g	-	

## Dimming Specifications

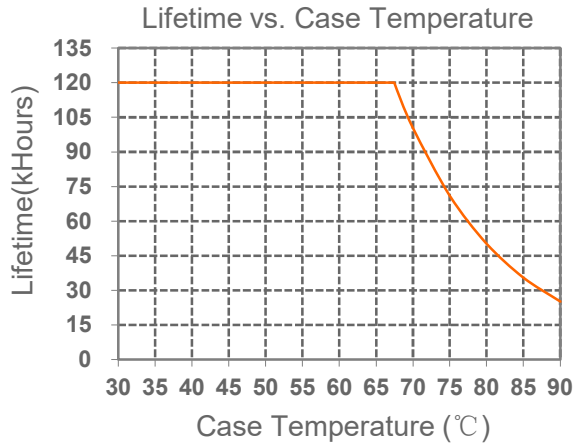
Parameter		Min.	Typ.	Max.	Notes
Absolute Maximum Voltage on the Vdim (+) Pin		-20 V	-	20 V	
Source Current on Vdim (+) Pin		90 μA	100 μA	110 μA	Vdim(+) = 0 V
Dimming Output Range	CH1 CH2/CH3 CH4	10%loset	-	loset	2100 mA ≤ loiset ≤ 3500 mA 1400 mA ≤ loiset ≤ 2100 mA 700 mA ≤ loiset ≤ 1400 mA
	CH1 CH2/CH3 CH4	210 mA 140 mA 70 mA	-	loset	210 mA ≤ loiset ≤ 2100 mA 140 mA ≤ loiset ≤ 1400 mA 70 mA ≤ loiset ≤ 700 mA

## Safety & EMC Compliance

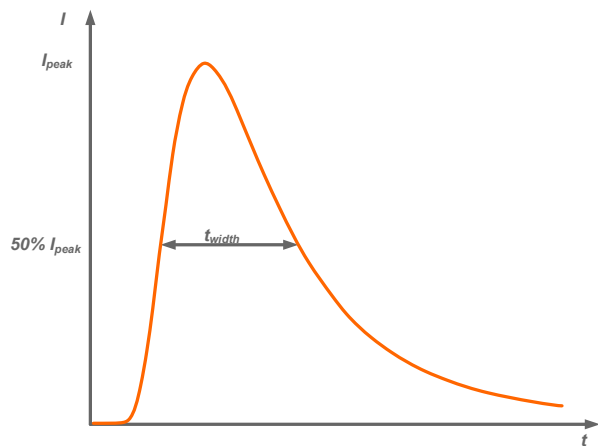
Safety Category	Standard
ENEC	EN 61347-1, EN 61347-2-13
CE	EN 61347-1, EN 61347-2-13 EN 301 489-1 EN 301 489-3 EN 300 330 EN 62479/EN 50663/EN 50665/EN 50364
Performance	Standard
ENEC	EN IEC 62384
EMI Standards	Notes
EN IEC 55015 <sup>(1)</sup>	Conducted emission Test & Radiated emission Test
EN IEC 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
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



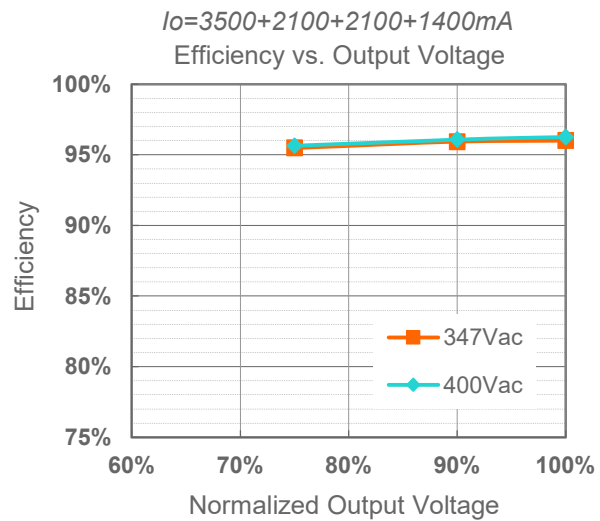
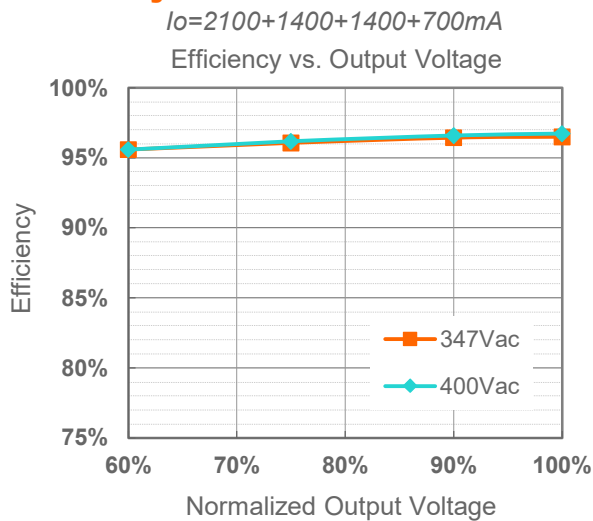
## Inrush Current Waveform



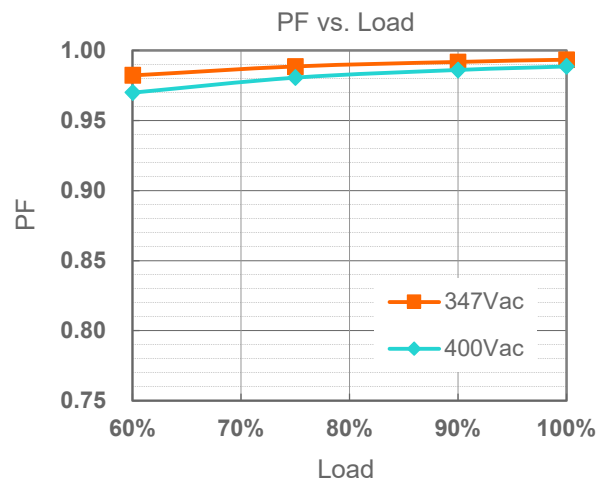
Input AC Voltage	$I_{peak}$	$t_{width}$ (@ 50% $I_{peak}$ )
347Vac	4.65 A	9.40 ms
400Vac	5.90 A	8.40 ms

MCB	Tripping Curves	B	B	B	B	C	C	C	C
	Rated Current	10A	16A	20A	25A	10A	16A	20A	25A
The Number of LED Driver can be Configured	347Vac	0	1+1+1	1+1+1	2+2+2	0	1+1+1	1+1+1	2+2+2
	400Vac	0	1+1+1	1+1+1	2+2+2	1+1+1	1+1+1	2+2+2	2+2+2

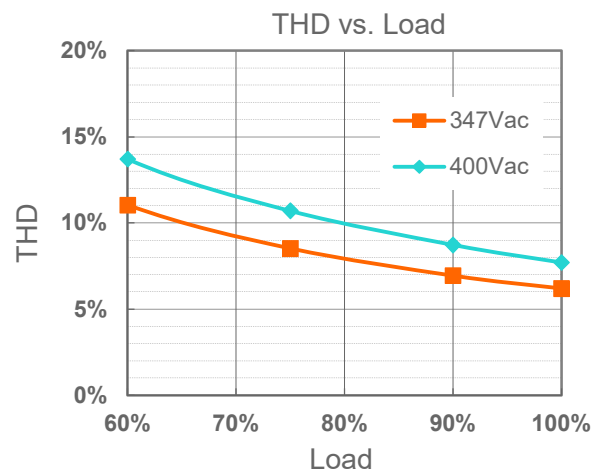
## Efficiency vs. Load



## Power Factor



## Total Harmonic Distortion





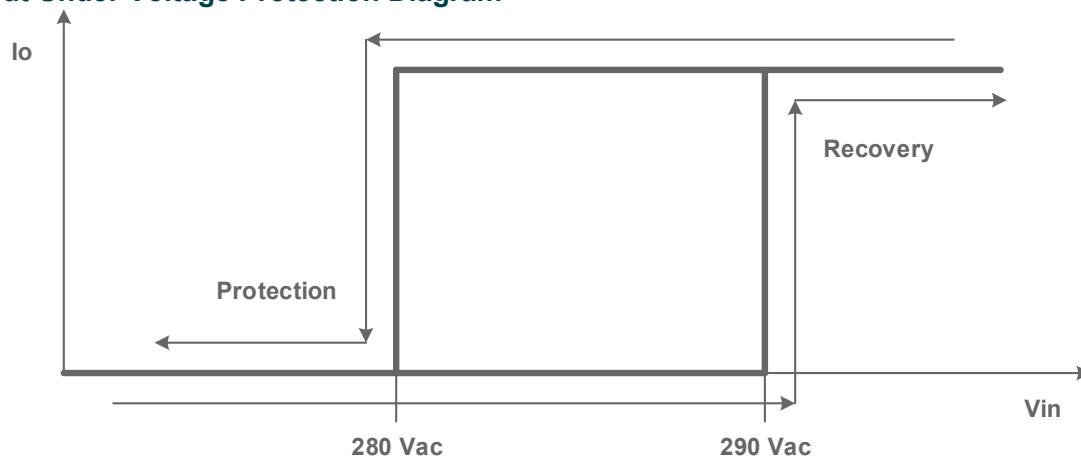
## Protection Functions

Parameter		Min.	Typ.	Max.	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 gradually, returning to normal after over temperature is removed			
Over Power Protection <sup>(1)</sup>		102%	107%	112%	
Input Under Voltage Protection (IUVP)	Input Under Voltage Protection	270 Vac	280 Vac	290 Vac	Turn off the output when the input voltage falls below protection voltage.
	Input Under Voltage Recovery	280 Vac	290 Vac	300 Vac	Auto Recovery. The driver will restart when the input voltage exceeds recovery voltage.
Input Over Voltage Protection (IOVP)	Input Over Voltage Protection	480 Vac	490 Vac	500 Vac	Turn off the output when the input voltage exceeds protection voltage.
	Input Over Voltage Recovery	470 Vac	480 Vac	490 Vac	Auto Recovery. The driver will restart when the input voltage falls below recovery voltage.
	Max. of Input Over Voltage	-	-	510 Vac	The driver can survive for 8 hours with a stable input voltage stress of 590Vac.

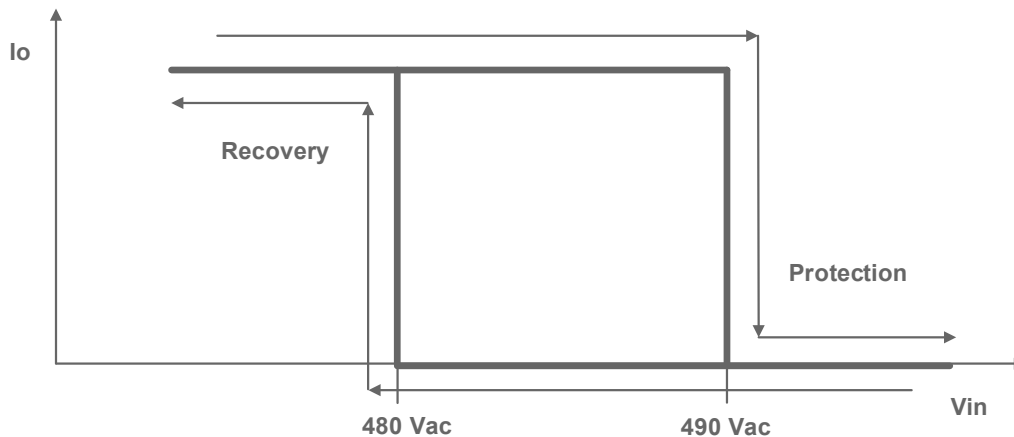
**Notes:** (1) When driver works in dynamic power transfer mode, channel 1 exceeds 107% (typical) actual working power\*, or one of channel 2, 3, 4 exceeds 107% (typical) rated power, the driver will decrease this channel output current automatically.

\* The power of main channel (CH1) = Setting total output power - real-time output power of channel 2.3.4.

### ● Input Under Voltage Protection Diagram



## ● Input Over Voltage Protection Diagram



## ● 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.

## ● Hold Time Adjustable

When AC power is first applied to the LED driver, enabling a "Hold" period can allow devices powered by the Auxiliary voltage to stabilize before the driver fades up to the maximum dimming level. During this period, the driver will not respond to external dimming commands but will respond again after the hold time ends. Both the initial dimming percentage and the duration of this hold period can be adjusted by the Inventronics Multi Programmer. This function is disabled by default.

## ● Fade Time Adjustable

There is a "Fade" period after the "Hold" period. The soft-start time and dimming slope applied to all dimming transitions can be adjusted individually. It is adjusted by the Inventronics Multi Programmer. This function is disabled by 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

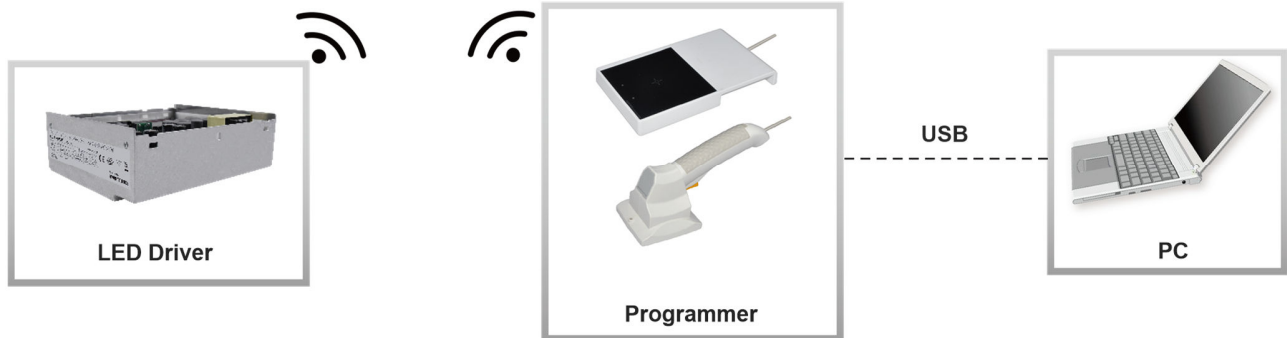
Inventronics Digital Dimming is a UART (Universal Asynchronous Receive Transmitter) based communication protocol. Please refer to [Inventronics Digital Dimming](#) file for details.

## ● Connection Diagram

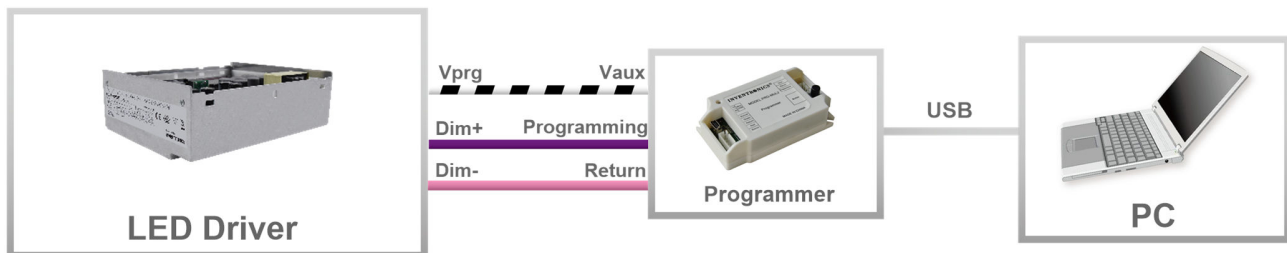


## Programming Connection Diagram

NFC programming



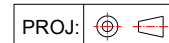
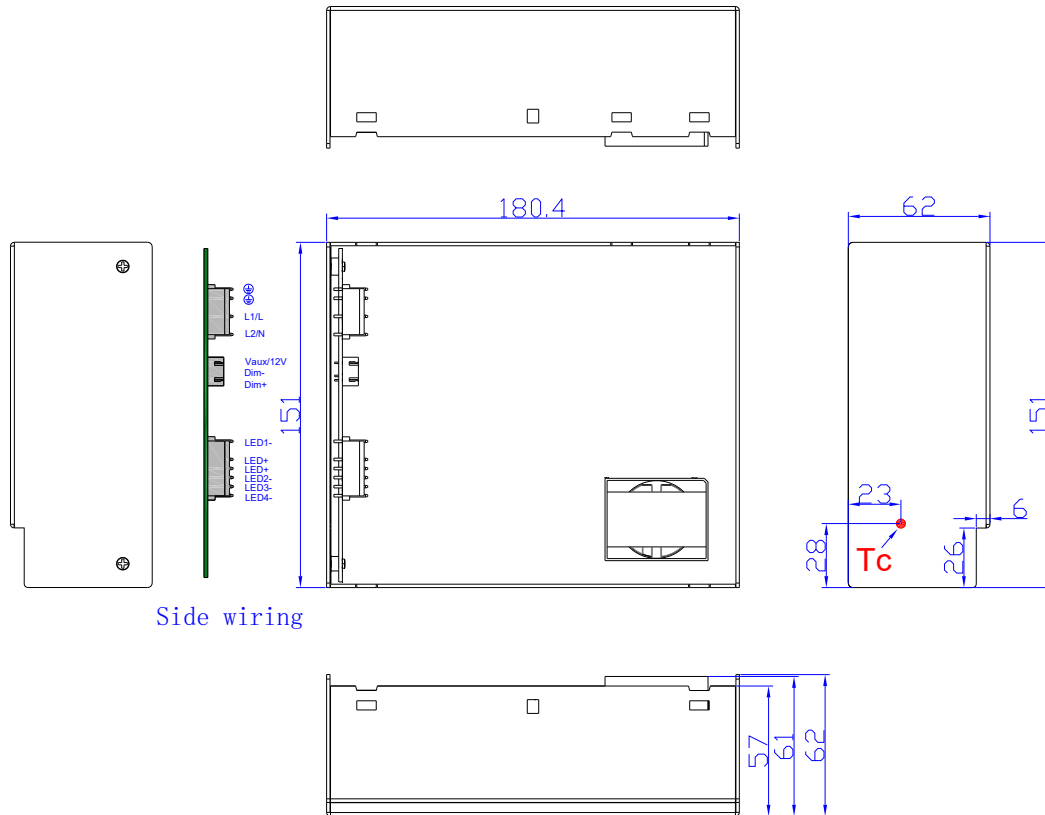
**Note:** The driver does not need to be powered on during the programming process.



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

- Please refer to [PRG-NFC-H](#) or [PRG-NFC-D2](#) (Programmer) datasheet for details.
- Please refer to [PRG-MUL2](#) (Programmer) datasheet for details.

## Mechanical Outline



Unspecified tolerance:  $\pm 1$

## Installations

To download the Installation Guidelines, please click here: [Inventronics Considerations for Non-Isolated LED Drivers](#).

## 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
2025-09-05	A	Datasheet Release	/	/
2025-09-15	B	Dimming Specifications	/	Updated