

## Description

The X6-60W series is a 60W outdoor off-line programmable LED driver that operates in constant current with universal input voltage range of 90~305Vac. 0/1-10V/PWM/Timer dimming; reverse dimming optional(10V-1/0V, 5V-1/0V), Monitored off-line by dimming cable connected with an USB kit programming device, the fully programmed drivers offer all dimming, constant lumen output options and a wide range of output current in a single driver, providing maximum flexibility with customized operating settings and intelligent control options for lighting manufacturers, as one driver can be programmed for many different luminaire designs. X6 provides built-in timer dimming schedules that further increase the energy savings and CO<sub>2</sub> reductions achieved with LED lighting. It also helps customers to improve logistics and inventory management. The compact metal case and high efficiency enables the driver to operate with high reliability and extend product life. Overall protection is provided against lightning surge, output over voltage, short circuit, and over temperature, to ensure low failure rate.



## Product Features

- Universal input voltage: 90~305Vac;
- Isolated constant current design;
- 0-10V/ PWM/timer dimming (Dim-to-off), Reverse dimming optional;
- Off-line programmable;
- High surge protection: 4KV line-line, 6KV line-earth;
- Protections: Output SCP / OVP / OTP;
- Dim line surge protection: 2KV line-line, 4KV line-earth;
- IP67 design for indoor and outdoor applications;
- Suitable for dry / damp / wet locations;
- 5 years warranty;

## Application

Road lighting,  
Tunnel lighting.

## Models

| Model Number | Input Voltage Range (Vac) | Max Output Power (W) | Output Voltage Range (Vdc) | Full Power Output Current Range (A) | Default Current(A) | Eff. (Typ.) | PF(Typ.) | THD(Typ.) |
|--------------|---------------------------|----------------------|----------------------------|-------------------------------------|--------------------|-------------|----------|-----------|
| X6-060M120-F | 90~305                    | 60                   | 50~120                     | 0.50~0.94                           | 0.94               | 90%         | 0.97     | 10%       |

### NOTES:

- [1]. M means 0-10V/ PWM dimming;
- [2]. All specifications are measured at 25℃ ambient temperature, input voltage 230Vac, and the typical value tested by full load, if no specific note.

## Input Specifications

| Parameter                       | Min   | Typ.       | Max    | Notes                           |
|---------------------------------|-------|------------|--------|---------------------------------|
| Input Voltage Range             | 90Vac | 100-277Vac | 305Vac |                                 |
| Input Frequency AC              | 47Hz  | 50/60Hz    | 63Hz   |                                 |
| Max Input Current               | -     | -          | 0.85A  | 100Vac & 100%Load               |
| Max Input Power                 | -     | -          | 76W    | 100Vac & 100%Load               |
| Leakage Current                 | -     | -          | 0.70mA | IEC60598-1;240Vac/60Hz          |
| Inrush Current                  | -     | -          | 60A    | 240Vac, Ta=25°C (cold start)    |
| Power Factor (PF)               | 0.92  | 0.95       | -      | 220-240Vac, 60Hz, 50%-100% load |
| Power Factor (PF)               | 0.95  | 0.97       | -      | 220Vac, 50Hz, 100% load         |
| Total Harmonic Distortion (THD) | -     | 10%        | 15%    | 220-240Vac, 60Hz, 50%-100% load |
| Total Harmonic Distortion (THD) | -     | 5%         | 10%    | 220Vac, 50Hz, 100% load         |
| MCB(B16)                        | -     | 20         | -      | 230Vac; 100%load                |

## Output Specifications

| Parameter                           | Min                 | Typ. | Max                 | Notes                                                                                      |
|-------------------------------------|---------------------|------|---------------------|--------------------------------------------------------------------------------------------|
| Output Voltage Range                | 50Vdc               | -    | 120Vdc              | The dim-to-off function is not recommended when the output voltage is below 69 Vdc.        |
| Open Circuit Voltage                | -                   | -    | 150Vdc              |                                                                                            |
| Output Current Range                | 0.09A               | -    | 0.94A               | Adjustable Output Current with programmer                                                  |
| Full Power Current Range            | 0.50A               | -    | 0.94A               |                                                                                            |
| Current Accuracy                    | -5%I <sub>max</sub> | -    | +5%I <sub>max</sub> | I <sub>max</sub> is full power maximum current                                             |
| Total Output Current Ripple (pk-pk) | -                   | 80%  | 120%                | 20MHz BW full load & LED load the LED load ripple is slightly different for different leds |
| Startup Overshoot Current           | -                   | -    | 10%                 | 220-240Vacfull load condition, LED load                                                    |
| Line Regulation                     | -3%                 | -    | +3%                 | 25°C±10°C ambient temperature, input changes from 200Vac to 264Vac                         |
| Load Regulation                     | -5%                 | -    | +5%                 | Load varies from 70% to 100% with 230Vac<br>Input at 25°C±10°C ambient temperature         |
| Turn-on Delay Time                  | -                   | -    | 1.0s                | 240Vac,100% load                                                                           |

## General Specifications

| Parameter                                 | Min                                           | Typ.           | Max   | Notes                                                                               |
|-------------------------------------------|-----------------------------------------------|----------------|-------|-------------------------------------------------------------------------------------|
| Efficiency@230Vac<br>Io=0.50A<br>Io=0.94A | 88.0%<br>87.0%                                | 90.0%<br>89.0% | -     | 100% load, 25°C ambient temperature                                                 |
| Mean Time Between Failure                 | -                                             | 200Khours      | -     | 25°C±10°C ambient temperature, 230Vac, 80% load condition (MIL-HDBK-217/SR-332)     |
| Lifetime                                  | -                                             | 50Khours       | -     | 230Vac&100% load, Tc 75°C, reference lifetime vs. case temperature curve            |
| Operating Temperature Ta                  | -40°C                                         | -              | +50°C | 90~120Vac, Output Power vs. Ambient Temperature curve                               |
| Operating Temperature Ta                  | -40°C                                         | -              | +55°C | 120~277Vac, Output Power vs. Ambient Temperature curve                              |
| Operating Tc for Safety Tc_s              | -40°C                                         | -              | +90°C |                                                                                     |
| Operating Tc for Warranty Tc_w            | -40°C                                         | -              | +75°C | 5-year warranty shell temperature, humidity: 10% to 95% RH                          |
| Storage Temperature Ta                    | -40°C                                         | -              | +85°C | Humidity: 5% to 100% RH                                                             |
| Altitude                                  | -60m                                          | -              | 4000m |                                                                                     |
| Over Temperature Protection Tc            | -                                             | 95°C           | -     | Decreases output current, returning to normal after over temperature is removed.    |
| Short Circuit Protection                  | -                                             | -              | -     | Hiccup mode. The output shall return to normal when the fault condition is removed. |
| Dimming cable surge Protection            | -                                             |                |       | DM 2KV, CM 4KV; Incorrect connection to 220Vac input will not damage the driver.    |
| Dimensions (L*W*H)                        | 116*64*33mm                                   |                |       |                                                                                     |
| Net Weight                                | 480±50g/PCS                                   |                |       |                                                                                     |
| Package (L*W*H)                           | 488*298*200mm; 15PCS/Ctn, Gross Weight: 8.5Kg |                |       |                                                                                     |

## Dimming

| Parameter                     | Min                  | Typ.  | Max                   | Notes                   |
|-------------------------------|----------------------|-------|-----------------------|-------------------------|
| Absolute Maximum Voltage      | -                    | 12V   | 15V                   | On the Vdim (+) Pin     |
| Source Current on Vdim (+)Pin | -                    | 200uA | 400uA                 |                         |
| Dimming Range                 | 10% I <sub>max</sub> | -     | 100% I <sub>max</sub> | I <sub>max</sub> =0.94A |
| Suggest Dimming Input 0-10V   | 0V                   | -     | 10V                   |                         |
| Turn-on Voltage (0-10V)       | 0.7V                 | -     | 1.0V                  |                         |
| Turn-off Voltage (0-10V)      | 0.4V                 | -     | 0.7V                  |                         |
| Turn-on Voltage (10-0V)       | 9.3V                 | -     | 9.0V                  |                         |
| Turn-off Voltage (10-0V)      | 9.6V                 | -     | 9.3V                  |                         |
| PWM in High Level             | 9.7V                 | -     | 10.3V                 |                         |
| PWM in Low Level              | 0V                   | -     | 0.3V                  |                         |
| PWM in Frequency Range        | 300Hz                | -     | 2KHz                  |                         |
| PWM in Duty Cycle             | 1%                   | -     | 99%                   |                         |
| Turn-on Duty Cycle (0-10V)    | 7%                   | -     | 10%                   |                         |
| Turn-Off Duty Cycle (0-10V)   | 4%                   | -     | 7%                    |                         |
| Turn-on Duty Cycle (10-0V)    | 93%                  | -     | 90%                   |                         |
| Turn-Off Duty Cycle (10-0V)   | 96%                  | -     | 93%                   |                         |

## Safety Specification

| Parameter                            | Min  | Typ.    | Max  | Notes                                                 |
|--------------------------------------|------|---------|------|-------------------------------------------------------|
| Dielectric Strength (Input-Output)   | -    | 3200Vac | -    | 60s, Current not exceeding 5mA                        |
| Dielectric Strength (Input-Ground)   | -    | 1554Vac | -    | 60s, Current not exceeding 5mA                        |
| Dielectric Strength (Output-Ground)  | -    | 1300Vac | -    | 60s, Current not exceeding 5mA                        |
| Dielectric Strength (Input-Dimming)  | -    | 3200Vac | -    | 60s, Current not exceeding 5mA                        |
| Dielectric Strength (Dimming-Ground) | -    | 500Vac  | -    | 60s, Current not exceeding 5mA                        |
| Grounding Resistance                 | -    | -       | 0.1Ω | 25°C±10°C Ambient Temperature, pass 25A Current, 60s. |
| Insulation Resistance                | 10MΩ | -       | -    | Input-Output, Input-PE, Output-PE, 500Vdc/60s/25°C    |

## Safety Compliance

| Safety Category | Standards                               | Approved | Notes |
|-----------------|-----------------------------------------|----------|-------|
| CCC             | GB19510.1, GB19510.14                   | √        |       |
| CE              | EN61347-1, EN61347-2-13, EN62493        | √        |       |
| ENEC            | EN61347-1, EN61347-2-13, EN62384        | √        |       |
| CB              | IEC61347-1, IEC61347-2-13               | √        |       |
| BIS             | IS 15885(PART 2/SEC 13)                 |          |       |
| UL              | UL 8750                                 |          |       |
| CUL             | CSA C22.2 No.250.13                     |          |       |
| KC              | K61347-1, K61347-2-13                   |          |       |
| PSE             | J61347-1, J61347-2-13                   |          |       |
| SAA             | AS/NZS IEC 61347.2.13<br>AS/NZS 61347.1 |          |       |

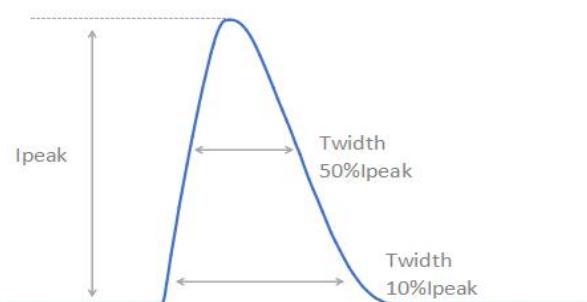
## EMC Compliance

| EMC Category         | Standards                  | Approved | Notes |
|----------------------|----------------------------|----------|-------|
| CCC                  | GB/T 17743, GB 17625.1     | √        |       |
| CE                   | EN 55015                   | √        |       |
| CE                   | EN 61000-3-2, EN 61000-3-3 | √        |       |
| CE                   | EN61000-4-2,3,4,5,6,11     | √        |       |
| CE                   | EN 61547                   | √        |       |
| KC                   | K61547                     |          |       |
| KC                   | K00015                     |          |       |
| PSE                  | J55015                     |          |       |
| FCC                  | FCC part 15                |          |       |
| Surge Shock Immunity | ANSI/C82.77-5-2017         |          |       |
| Ringing Wave         |                            |          |       |

## RoHS

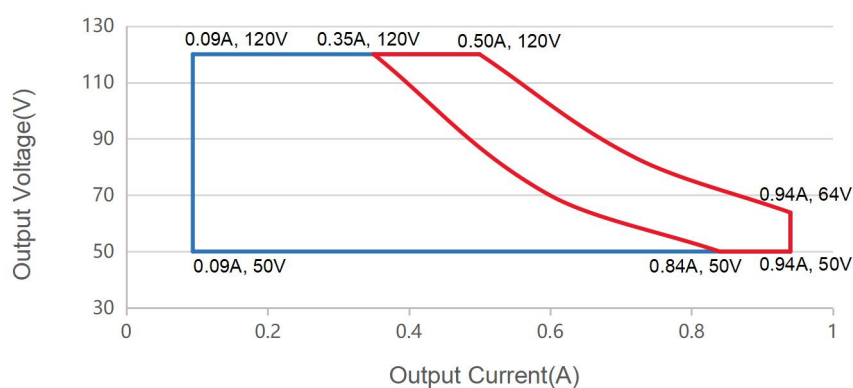
Our products comply with reference to RoHS Directive (EU) 2015/863 amending 2011/65/EU.

## Inrush Current



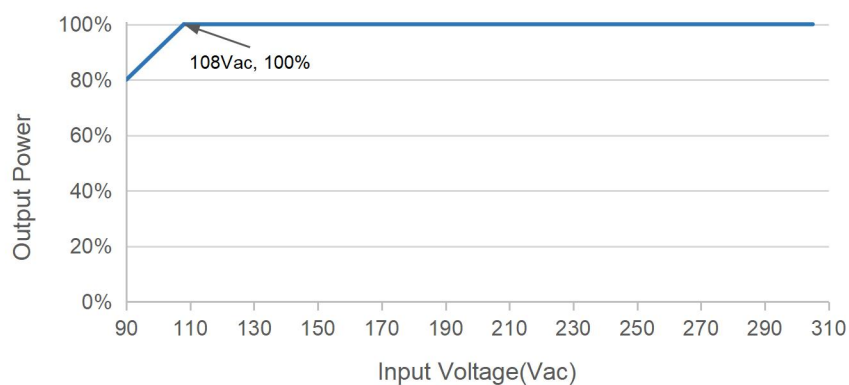
| $V_{in}$ | $I_{peak}$ | $T(@10\% \text{ of } I_{peak})$ | $T(@50\% \text{ of } I_{peak})$ |
|----------|------------|---------------------------------|---------------------------------|
| 230Vac   | 45A        | 158uS                           | 110uS                           |

## Output Voltage vs. Output Current

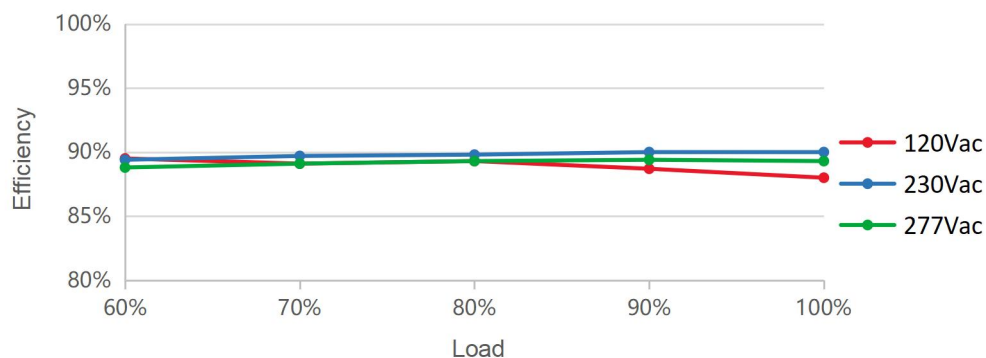


Red curve: good performance area

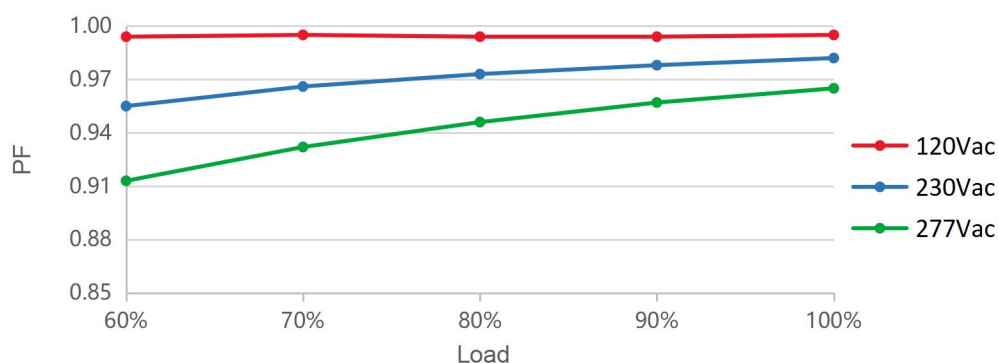
## Output Power vs. Input Voltage



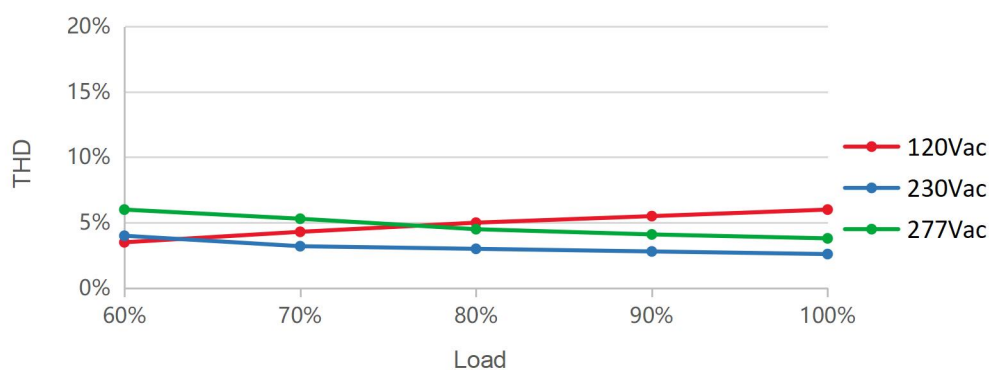
## Efficiency vs. Load



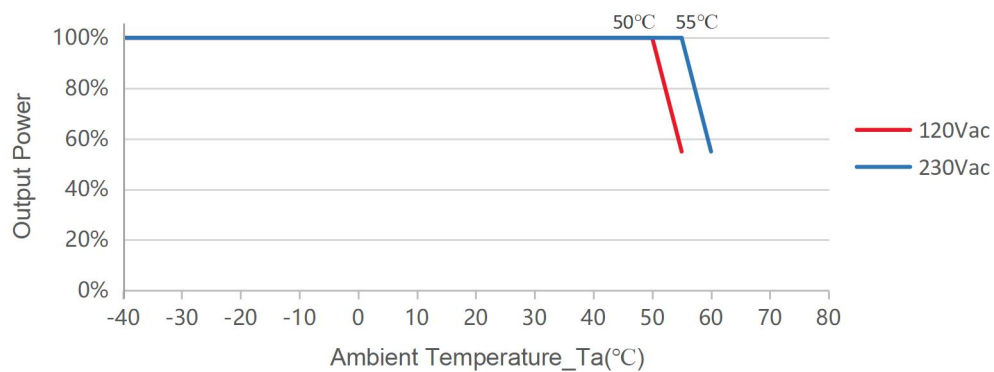
### PF vs. Load



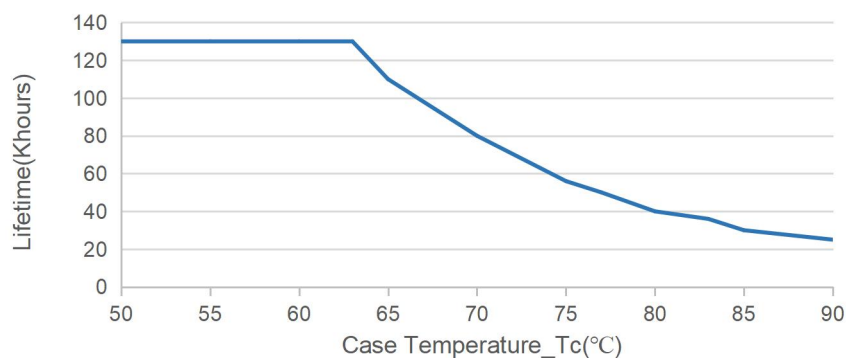
### THD vs. Load



### Output Power vs. Ambient Temperature

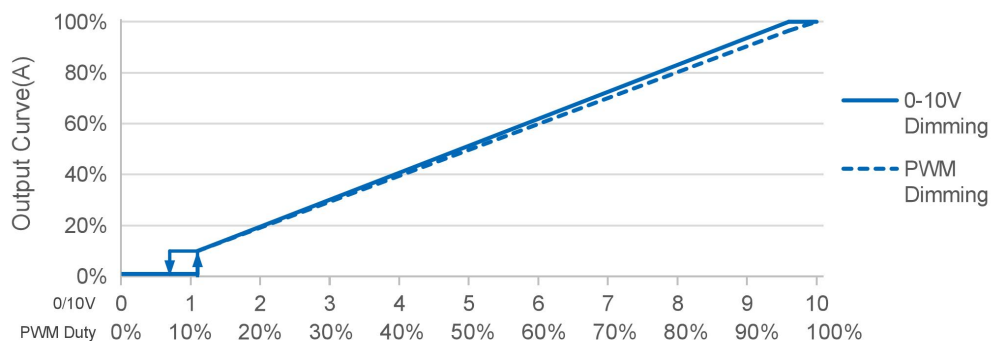


### Lifetime vs. Case Temperature



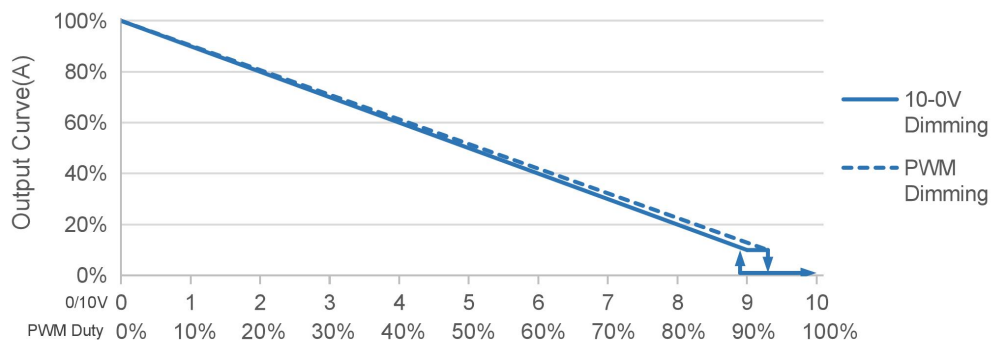
## Dimming Curve

### 0-10V/PWM Dimming (Default)



Note: Afterglow may appear after switching off dimming due to the difference of lamp panel. Thus, lighting fixture grounding test is suggested.

### 10-0V/PWM Dimming



Note: Afterglow may appear after switching off dimming due to the difference of lamp panel. Thus, lighting fixture grounding test is suggested.

## Off-line Programming

User-friendly connection of programming without necessary to power on device(suitable for X6, XCP, X6I,X6ESeries).

### Programming mode 1



#### Visual Intelligent Programming

1. Set the output parameters through the control signal line 0-5V/0-10V optional.
2. Timer dimming. Set the timer control function, support up to 7 segments;
3. Set output CLO;
4. Read the recorded system parameters; Record the working time working temperature, and software version information of the LED driver.
5. Configure the driving parameters. After setting is completed, then click the configured parameters to complete programming.
6. Download it to the offline programmer.

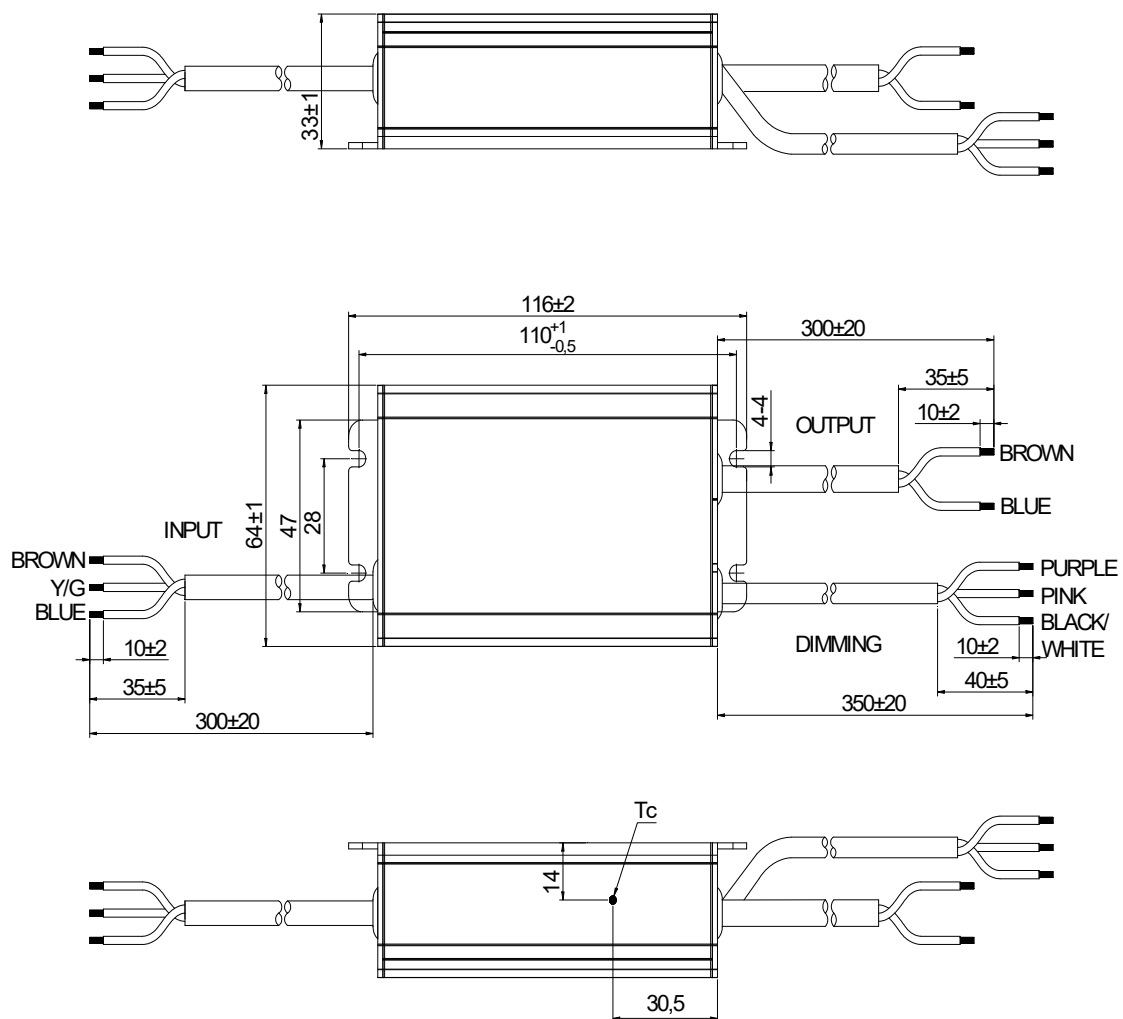
### Programming mode 2



#### Instructions of one touch programmer:

1. Open the software interface and download the program to the offline programmer;
2. Connect the dimming wire with the programmer, press the programmer button, the programmer will give you a subtle reminder "( Beep) " to tell you the installation completed.

## Mechanical Outline



## Specification

|         |                                                |        |
|---------|------------------------------------------------|--------|
| Input   | CCC+VDE 2*1.0 mm <sup>2</sup> L=300±20mm       | CCC/CE |
| Output  | CCC+VDE 2*1.0 mm <sup>2</sup> L=300±20mm       | CCC/CE |
| Dimming | UL 21996 22AWG 3x1.0mm <sup>2</sup> L=350±20mm | UL     |

## Label

47.00 mm

**输入端  
(Input)**

L 棕色 (Brown)

G 黄/绿 (Y/G)

N 蓝色 (Blue)

**MOSO**<sup>®</sup> X6-060M120-F

LED DRIVER (LED控制装置)  
Constant current type (恒流模式)  
Integrated SPD (内置防雷管)

|                |                                                                                                                                                                                  |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INPUT<br>(输入)  | 100-240V/277V ~ 50/60Hz, 76W Max. 0.85A Max.<br>PF: (Pout ≥ 50W) = 0.9C - 0.97<br>100-240V ~ For CCC Certification range CCC认证范围<br>100-277V ~ For EU Certification range 欧盟认证范围 |
| OUTPUT<br>(输出) | 50-120V ~~, 0.094-0.940A Max. 60W                                                                                                                                                |
| tc: 90°C       | ta: 50°C Input: 100-200V ~<br>ta: 55°C Input: 200-240V/277V ~                                                                                                                    |

**输出端  
(Output)**

棕色 (Brown) "+"

蓝色 (Blue) "-"

紫 (Purple) DIM "+"

粉 (Pink) PROG/DIM "-"

黑/白 (Black/White) PROG "+"

(0-10Vdc, PWM, Timer Dimming)  
(Dimming Range 10%-100%)

深圳茂硕电子科技有限公司/深圳市南山区西丽松白路1061号  
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 No.1061, Songbai Road, Xili Town, Nanshan District, Shenzhen,  
 CHINA.

中国制造  
 仅适用于LED模块  
**MADE IN CHINA**  
 For LED module only

Version

|     |                       |            |
|-----|-----------------------|------------|
| A.1 | Preliminary datasheet | 2024-07-16 |
|     |                       |            |
|     |                       |            |
|     |                       |            |
|     |                       |            |
|     |                       |            |
|     |                       |            |

## Specification for Approval

Product Name: 60W LED Driver

Product Model: X6-060M120-F

Rev: A.1

Address: XiLiSongbai Road 1061, Nanshan District, Shenzhen City, Guangdong, China

Tel: 0755-27657000

FAX: 755-27657908

E-mail: [info@mosopower.com](mailto:info@mosopower.com)

Web Site: <http://www.mosopower.com>

| Prepared By | Checked By | Approved By |
|-------------|------------|-------------|
|             |            |             |

## Specification for Approval

Product Name: 60W LED Driver

Product Model: X6-060M120-F

Rev: A.1

| CUSTOMER AUTHORIZED SIGNATURE                                                   |            |             |
|---------------------------------------------------------------------------------|------------|-------------|
| Tested By                                                                       | Checked By | Approved By |
|                                                                                 |            |             |
| (Company seal)Return one copy to MOSO with approved signature and company seal. |            |             |

Address:XiLiSongbai Road 1061, Nanshan District, Shenzhen City, Guangdong, China

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| Prepared By | Checked By | Approved By |
|-------------|------------|-------------|
|             |            |             |