

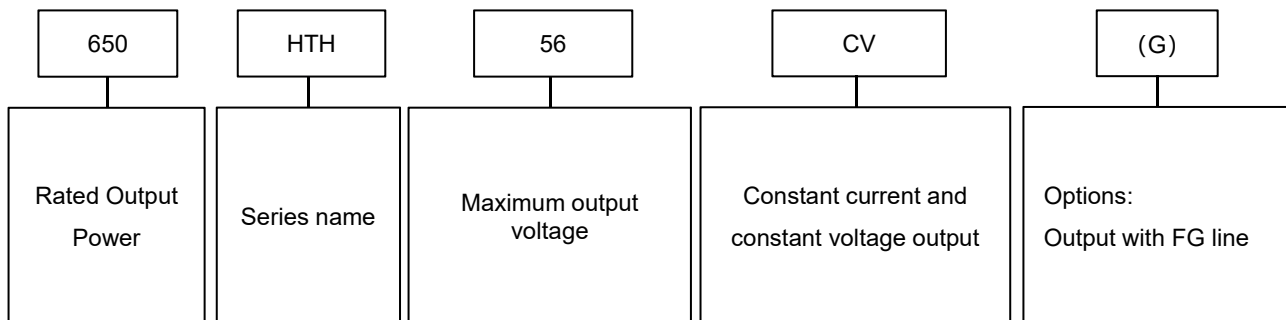
**650HTH56CV 650W AC/DC CC/CV LED Driver****Features**

- Dimming port programming without driver power on
- CC/CV hybrid output
- High efficiency: 95% typical @400 VAC, full load
- Ultra low THD at light load
- Isolated 0~10V/ PWM/Rset dimming, Dim to off option
- 12V/200mA AUX Output

**Description**

650W LED Drivers offers digital programmable drivers with wide-range adjustable output current, together with 12V/200mA auxiliary output (optional) for smart lighting.

The output current of this series are programmable, and designed for 0-10V/PWM/Rset dimming applications.

**Model Name Definition****Specifications**

| Part Number | PO_MAX (W) | IO_RANGE @ CC (A) | VO_RANGE (V) | VO_RANGE @CV (V) | Typical $\eta$ (%)<br>@ 400 VAC |
|-------------|------------|-------------------|--------------|------------------|---------------------------------|
| 650HTH56CV  | 650        | 5.42-13.54        | 36-56        | 48-56            | 95                              |

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## 1. Input Specifications

|                        | Parameter              | Min. | Typ. | Max. | Unit | Notes                                                                             |
|------------------------|------------------------|------|------|------|------|-----------------------------------------------------------------------------------|
| V <sub>IN_AC</sub>     | Rated Input AC Voltage | 208  | -    | 480  | VAC  | The upper limit voltage of CE certification:400 VAC                               |
| V <sub>IN_RANGE</sub>  | Input AC Voltage Range | 187  | -    | 528  | VAC  |                                                                                   |
| F <sub>LINE</sub>      | Input Frequency        | 47   | -    | 63   | Hz   |                                                                                   |
| I <sub>LKG</sub>       | Leakage Current        | -    | -    | 0.75 | mA   | At 480 VAC/ 60 Hz input , grounding effectively                                   |
| I <sub>IN_AC</sub>     | Input AC Current       | -    | -    | 1.6  | A    | Measured at 25°C, full load and 480 VAC input.                                    |
|                        |                        | -    | -    | 3.6  | A    | Measured at 25°C, full load and 208 VAC input.                                    |
| I <sub>PK_INRUSH</sub> | Inrush Peak Current    | -    | -    | 35   | A    | At 230 VAC input, 25°C cold start. See Inrush Current Waveform for the details.   |
| PF                     | Power Factor           | 0.9  | -    | -    |      | At 208-480 VAC, full load, 25°C and 50 Hz                                         |
| THD                    | Total Harmonic         | -    | -    | 20   | %    |                                                                                   |
| η                      | Efficiency             | 94   | 95   | -    | %    | Measured at 400 VAC input, 100% load and steady-state temperature in 25°C ambient |

## 2. Output Specifications

|                          | Parameter                                                          | Min.  | Typ. | Max. | Unit | Notes                                                                                                  |
|--------------------------|--------------------------------------------------------------------|-------|------|------|------|--------------------------------------------------------------------------------------------------------|
| I <sub>O_ACCU</sub>      | Output Current Accuracy relative to I <sub>o</sub> set             | -5    | -    | 5    | %    | At 25°C and full load condition.                                                                       |
| I <sub>O_RIPPLE</sub>    | Total Output Current Ripple (pk-pk) relative to I <sub>o</sub> max | -     | -    | 10   | %    | At 25°C and full load condition, 8 kHz BW                                                              |
| I <sub>O_OVERSHOOT</sub> | Startup Overshoot Current relative to I <sub>o</sub> max           | -     | -    | 20   | %    | At 25°C and full load condition, 8 kHz BW                                                              |
| V <sub>O_OCV</sub>       | No Load Output Voltage                                             | -     | -    | 62   | V    |                                                                                                        |
| V <sub>O_LINE</sub>      | Line Regulation                                                    | -     | -    | ±1   | %    | Measured at 25°C and full load                                                                         |
| V <sub>O_LOAD</sub>      | Load Regulation                                                    | -     | -    | ±1   | %    | At 25°C condition. The current setting value is within the range of full load constant power interval. |
| T <sub>ON_DELAY</sub>    | Turn-on Delay Time                                                 | -     | 0.8  | 1.5  | s    | Measured at 277 VAC input.                                                                             |
| I <sub>O_TC</sub>        | Temperature Coefficient of I <sub>o</sub> set                      | -0.05 | -    | 0.05 | %/°C | Case temperature = 0°C ~T <sub>c</sub> max                                                             |
| V <sub>O_AUX</sub>       | 12V Auxiliary Output Voltage                                       | 11    | 12   | 15   | V    |                                                                                                        |
| I <sub>O_AUX</sub>       | 12V Auxiliary Output Current                                       | 0     | -    | 200  | mA   | Return terminal is “Dim-“                                                                              |
| T <sub>OTP</sub>         | Over Temperature Protection Threshold                              | 85    | -    | 100  | °C   | Output current will drop to 50%, or shut down.                                                         |

|     |                                    |  |  |  |  |                                                                                    |
|-----|------------------------------------|--|--|--|--|------------------------------------------------------------------------------------|
| SCP | Short Circuit Protection Threshold |  |  |  |  | Auxiliary source: Hiccup mode, Auto recover<br>Main output: Locked or auto recover |
| OCP | Over Current Protection Threshold  |  |  |  |  | Locked or auto recover                                                             |

### 3.General Specifications

|                       | Parameter                     | Min.            | Typ. | Max. | Unit  | Notes                                                                                                     |
|-----------------------|-------------------------------|-----------------|------|------|-------|-----------------------------------------------------------------------------------------------------------|
| P <sub>STANDBY</sub>  | Standby power                 | -               | -    | 1.5  | W     | Measured at 277 VAC/60 Hz ; Dimming off                                                                   |
| T <sub>MTBF</sub>     | Mean Time Between Failure     | 234,000         | -    | -    | Hours | Measured at 277 VAC input, 80% load and 25°C ambient temperature (MIL-HDBK- 217F)                         |
| T <sub>LIFETIME</sub> | Lifetime                      | 50,000          | -    | -    | Hours | Measured at 480 VAC input, 100% load and 75°C case temperature; See lifetime vs. Tc curve for the details |
| T <sub>C</sub>        | Operating Case Temperature    | -40             | -    | 90   | °C    | When tc > 85°C, it is possible to trigger the output reduction.                                           |
| T <sub>A</sub>        | Operating Ambient Temperature | -40             | -    | 50   | °C    |                                                                                                           |
| T <sub>STG</sub>      | Storage Temperature           | -40             | -    | 85   | °C    | Humidity: 5%RH to 95%RH                                                                                   |
|                       | IP Grade                      | IP65            |      |      |       |                                                                                                           |
|                       | Dimensions                    | 13.23×3.89×1.81 |      |      | inch  |                                                                                                           |
|                       | L × W × H                     | 336×98.8×46.1   |      |      | mm    |                                                                                                           |
|                       | Net Weight                    | -               | 2.57 | -    | kg    |                                                                                                           |

Note1: There are two points could be maximum Tc point, depending on different Vac input and Vdc output. These two points (Tc, Tc1) position are shown in below mechanical drawing.

### 4.Dimming Specifications

| Parameter                                    | Min. | Typ.                  | Max.               | Unit | Notes                                                                 |
|----------------------------------------------|------|-----------------------|--------------------|------|-----------------------------------------------------------------------|
| Absolute Maximum Voltage on the Vdim (+) Pin | -1   | -                     | 12                 | V    |                                                                       |
| Source Current on Vdim (+) Pin               | 90   | 100                   | 110                | uA   |                                                                       |
| Dimming Output Range                         | -    | 10 I <sub>o set</sub> | I <sub>o set</sub> | %    | 80% I <sub>o max</sub> ≤ I <sub>o set</sub> ≤ 100% I <sub>o max</sub> |
|                                              | -    | 8 I <sub>o max</sub>  | I <sub>o set</sub> | %    | I <sub>o set</sub> < 80% I <sub>o max</sub>                           |
| Recommended Dimming Input Range              | 0    | -                     | 10                 | V    | Default 0-10V dimming mode.                                           |
| Dim off Voltage                              | 0.6  | 0.8                   | 1.0                | V    |                                                                       |
| Dim on Voltage                               | 0.8  | 1.0                   | 1.2                | V    |                                                                       |
| Dim off Resistance                           | 5    | 8                     | 10                 | kΩ   |                                                                       |
| Dim on Resistance                            | 7    | 10                    | 12                 | kΩ   |                                                                       |
| Hysteresis                                   | -    | 0.2                   | -                  | V    |                                                                       |

|                        |      |    |      |     |  |
|------------------------|------|----|------|-----|--|
| PWM_in High Level      | 9.8  | 10 | 10.2 | V   |  |
| PWM_in Low Level       | -0.3 | -  | 0.6  | V   |  |
| PWM_in Frequency Range | 0.5  | -  | 3    | KHz |  |
| PWM_in Duty Cycle      | 1    | -  | 100  | %   |  |
| PWM Dimming off        | 4    | 7  | 10   | %   |  |
| PWM Dimming on         | 6    | 9  | 12   | %   |  |

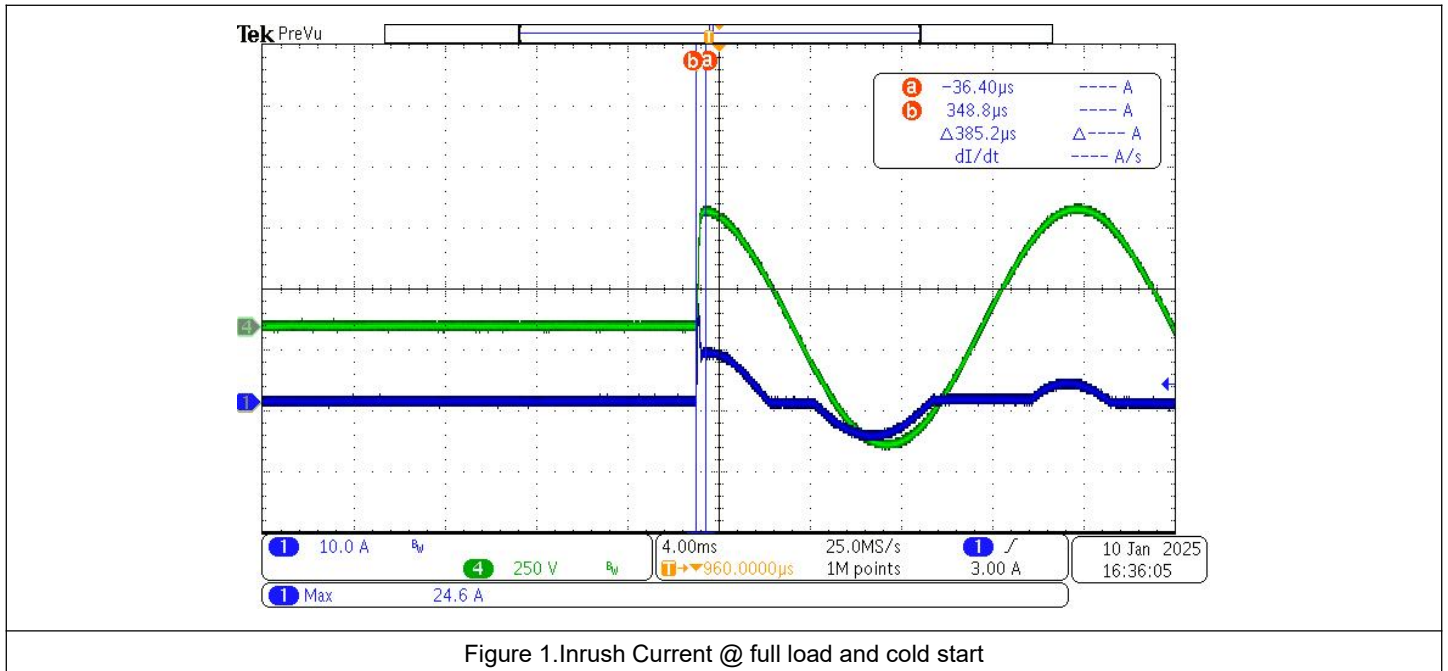
## 5.Safety & EMC Compliance

| Safety Category             | Standard                                                                                                                                                                                                                                                                            |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dielectric Strength(Hi-pot) | Primary to Secondary: 3600 VAC 10mA max                                                                                                                                                                                                                                             |
|                             | Primary to Earth: 1960 VAC 10mA max.                                                                                                                                                                                                                                                |
|                             | Secondary to Earth: 500 VAC 10mA max.                                                                                                                                                                                                                                               |
|                             | Dimming to Secondary: 500 VAC 10mA max.                                                                                                                                                                                                                                             |
| Insulation Resistance       | 50Mohm min.@ primary to secondary add 500 VDC test voltage                                                                                                                                                                                                                          |
| Grounded Resistance         | 0.1Ω max. @ 25A, 1 minute                                                                                                                                                                                                                                                           |
| EMI Standards               | Notes                                                                                                                                                                                                                                                                               |
| EN55015                     | ANSI C63.4:2009 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, criteria B                                                                                                                                                                                               |
| EN 61000-4-3                | Radio-Frequency Electromagnetic Field Susceptibility Test-RS, criteria A                                                                                                                                                                                                            |
| EN 61000-4-4                | Electrical Fast Transient / Burst-EFT: level 3, criteria B                                                                                                                                                                                                                          |
| EN 61000-4-5                | Surge Immunity Test: AC Power Line: line to line 4 kV, line to earth 6 kV, criteria B                                                                                                                                                                                               |
| EN 61000-4-6                | Conducted Radio Frequency Disturbances Test-CS, criteria A                                                                                                                                                                                                                          |
| EN 61000-4-8                | Power Frequency Magnetic Field Test, criteria A                                                                                                                                                                                                                                     |
| EN 61000-4-11               | Voltage Dips, criteria B                                                                                                                                                                                                                                                            |
| EN IEC 61547                | Electromagnetic Immunity Requirements Applies To Lighting Equipment                                                                                                                                                                                                                 |

Note2: 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.

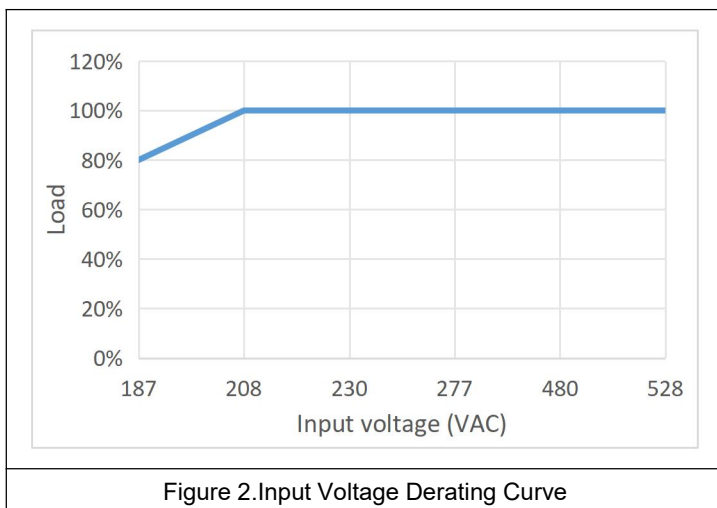
## 6. Performance Curve

### 6.1. Inrush Current Curve



| Vin(VAC) | F <sub>LINE</sub> (Hz) | Spec(A) | I <sub>PK_INRUSH</sub> (A) | T <sub>DURATION</sub> (ms) | I <sup>2</sup> T(A <sup>2</sup> S) |
|----------|------------------------|---------|----------------------------|----------------------------|------------------------------------|
| 230      | 50                     | 65      | 24.6                       | 0.385                      | 0.12                               |

### 6.2. Derating Curve



### 6.3.Lifetime Curve

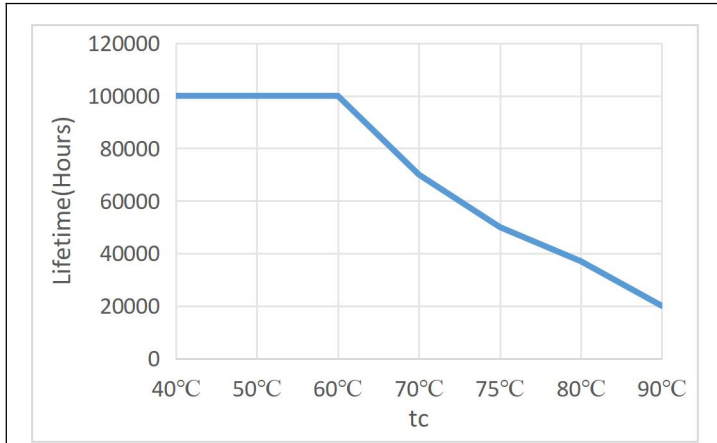


Figure 3.Life vs Case Temperature

### 6.4.Operation Range Curve

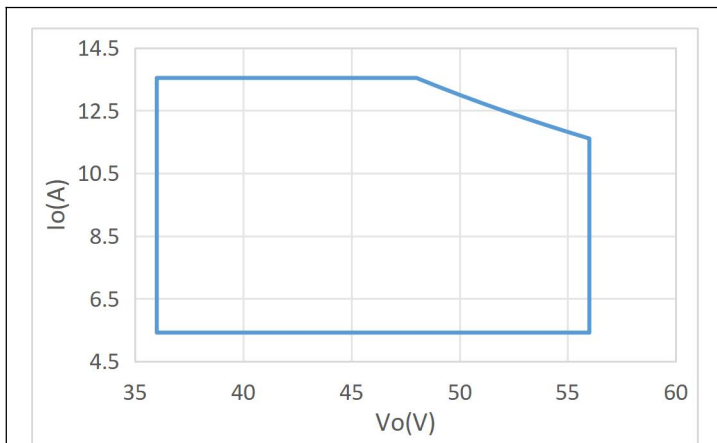


Figure 4.I/V Operating Area

### 6.5.General Performance Curve

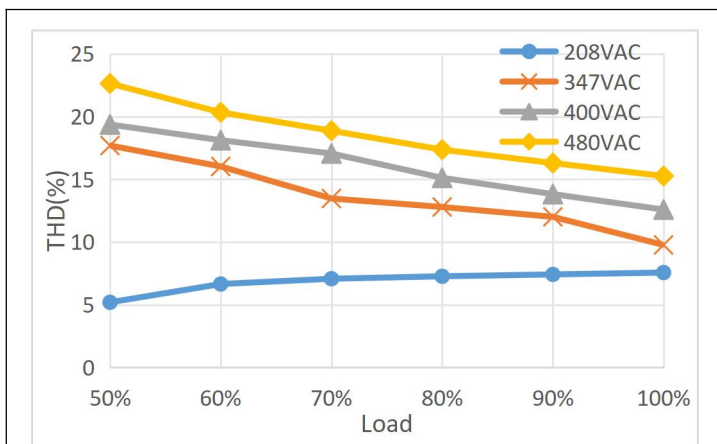


Figure 5.Total Harmonics vs Different Loads

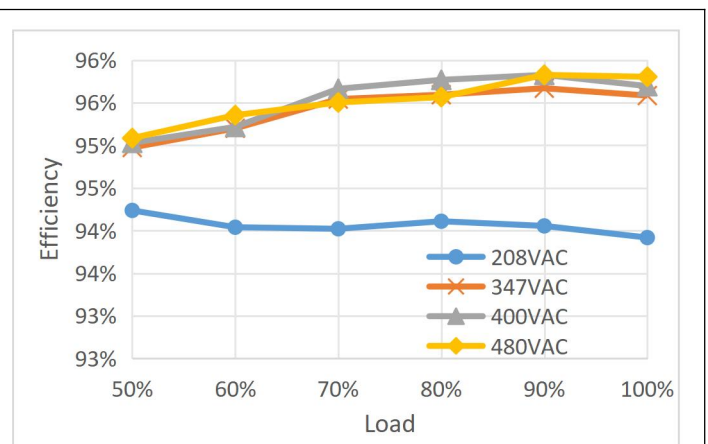


Figure 6.Efficiency vs Different Loads

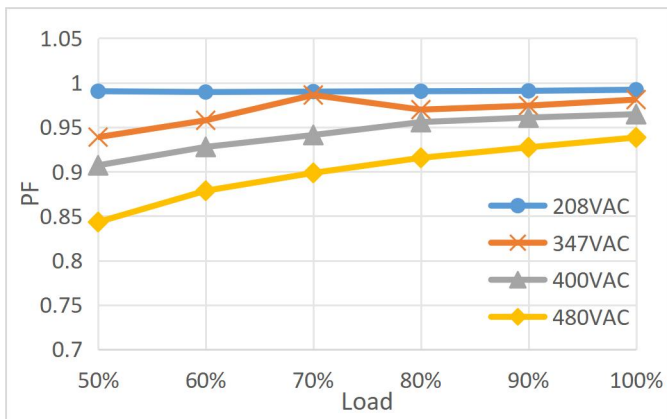


Figure 7. Power Factor vs Different Loads

### 6.6.0-10V Analog Dimming & PWM Dimming

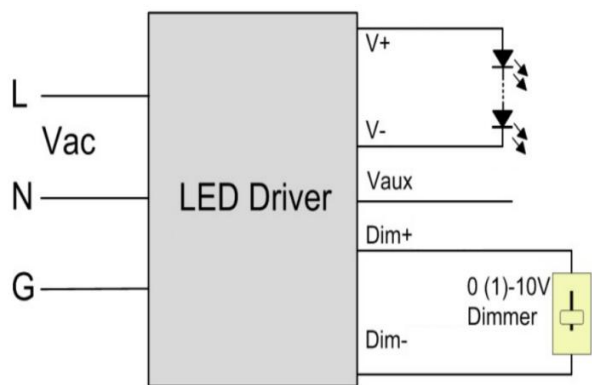


Figure 8. The Block Diagram of 0-10V Analog Dimming

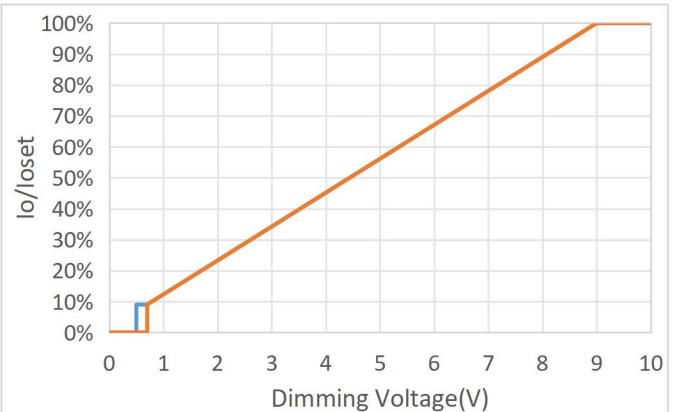


Figure 9.  $I_o/I_{oSet}$  vs Dimming Voltage

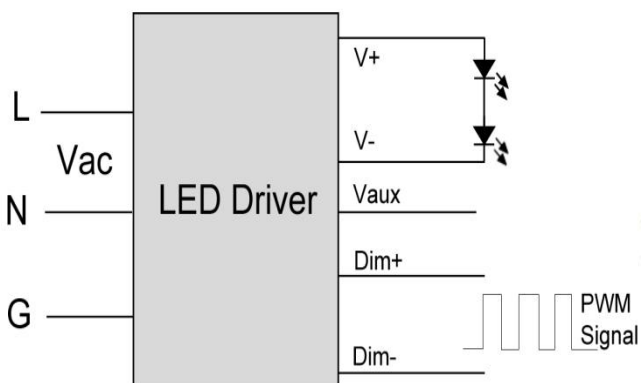


Figure 10. The Block Diagram of PWM Dimming

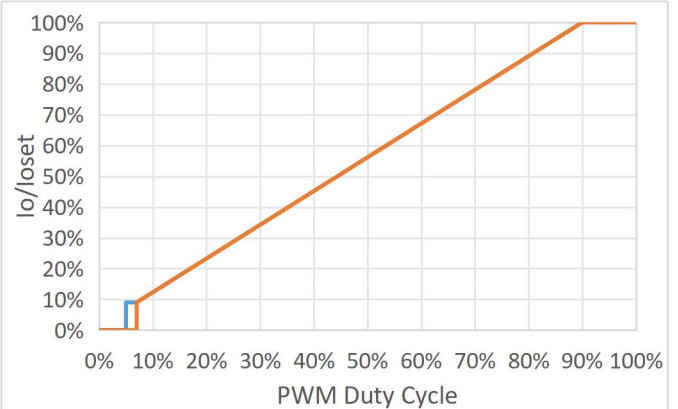


Figure 11.  $I_o/I_{oSet}$  vs PWM Duty Cycle

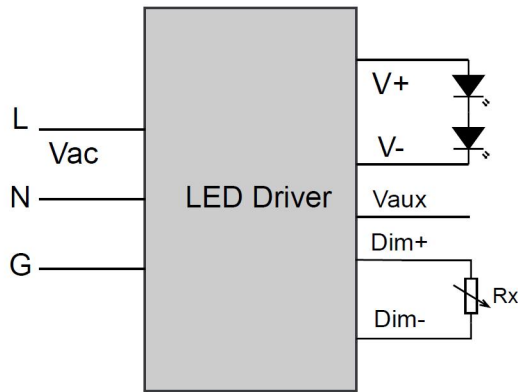


Figure 12.The Block Diagram of Resistor Dimming

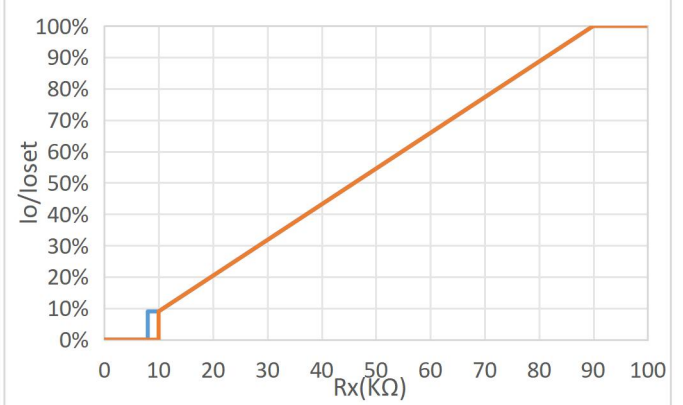


Figure 13.Io/IoSet vs Rx

## 7.Programming wiring diagram

- Programmer:Supro1.0
- Software:Supro1.0

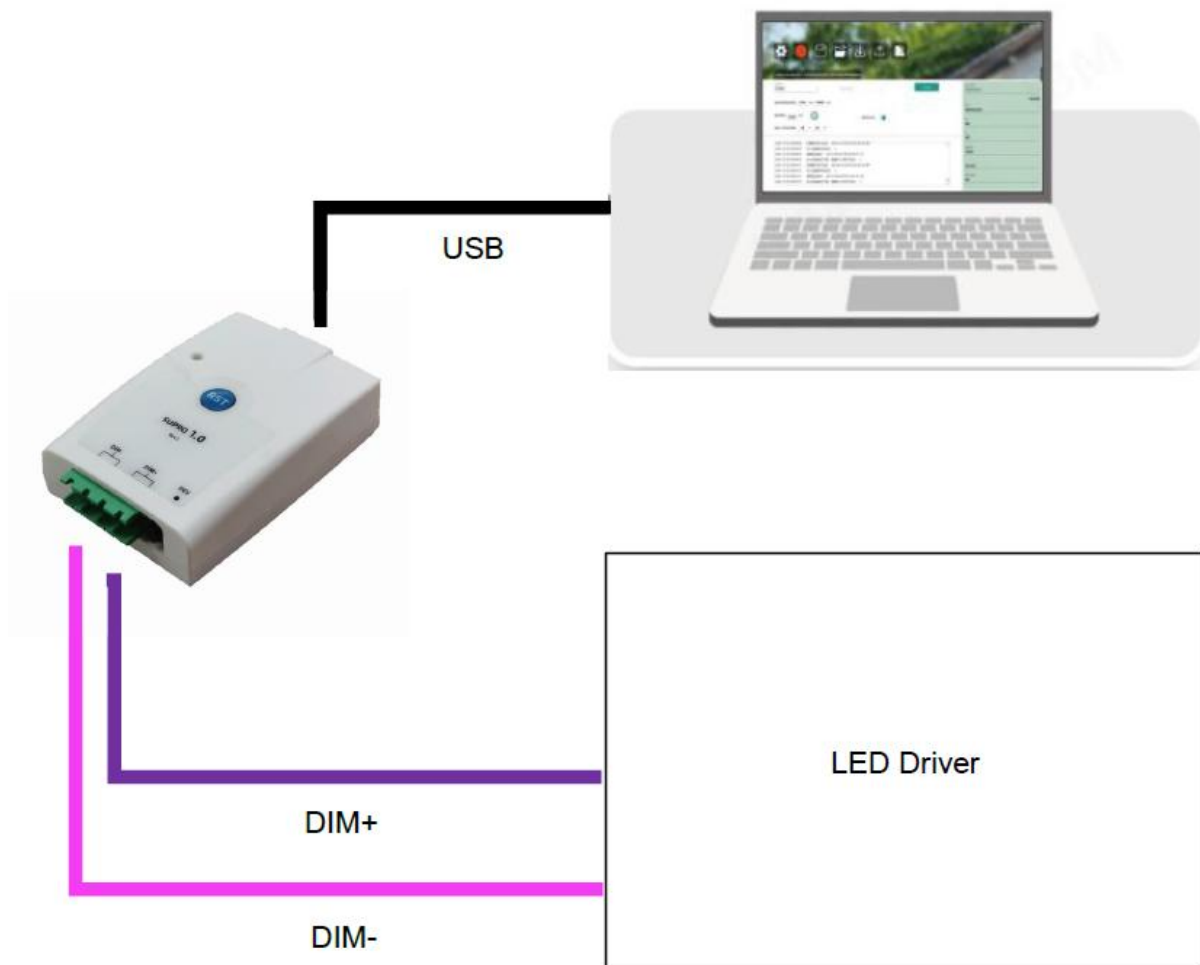
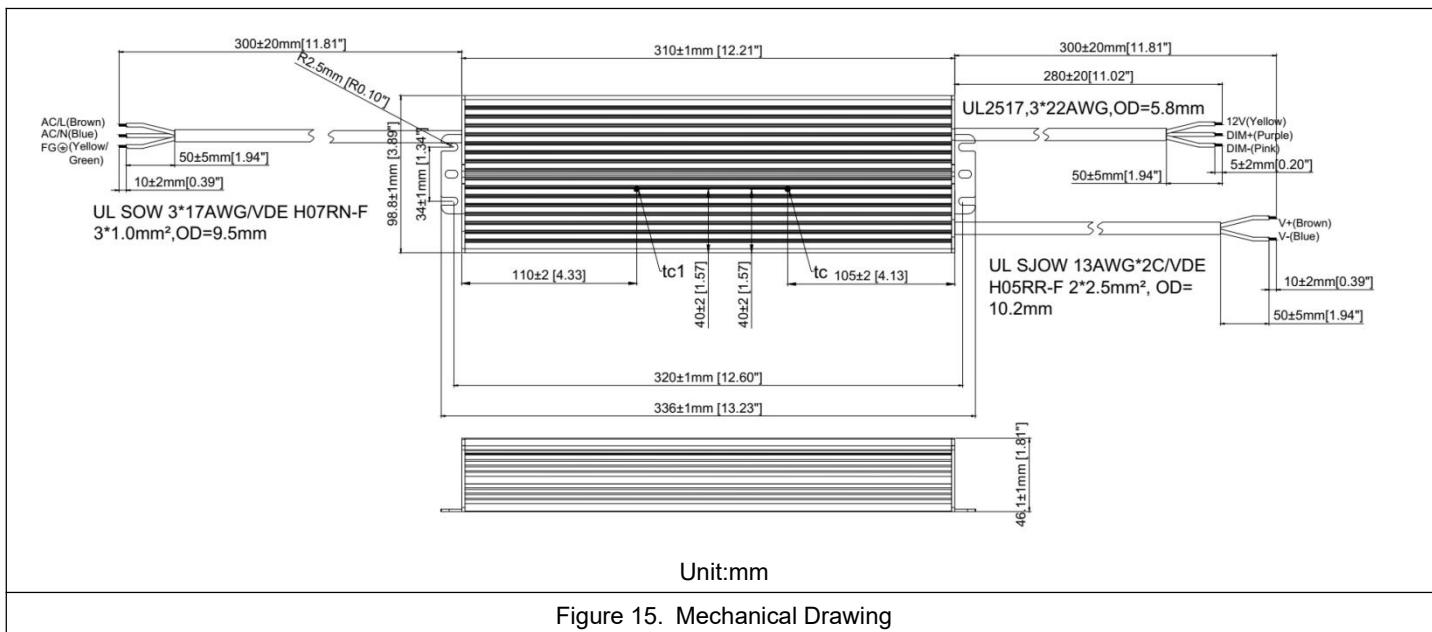


Figure 14. Programming Wiring

Note3:Please download related documents on the website or ask sales for help.

Website like:[https://led.powerlandtech.com/product\\_new/Other](https://led.powerlandtech.com/product_new/Other).

## 8. Mechanical Specification



## 9. Revision History

| Change Date | Rev. | Description of Change                        |                                     |                                                                                          |
|-------------|------|----------------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------|
|             |      | Item                                         | From                                | To                                                                                       |
| 2025/7/17   | V1.0 |                                              |                                     |                                                                                          |
| 2025/8/15   | V1.1 | Load Regulation                              |                                     | Add: The current setting value is within the range of full load constant power interval. |
|             |      | Temperature Coefficient of loset             | ±0.03%/°C                           | ±0.05%/°C                                                                                |
|             |      | OTP Tc                                       | Min: 90°C                           | Min: 85°C                                                                                |
|             |      | Operating Case Temperature Tc                |                                     | Add: When tc > 85°C, it is possible to trigger the output reduction.                     |
|             |      | Dielectric Strength(Hi-pot)                  | Primary to Earth: 1800Vac 10mA max. | Primary to Earth: 1960Vac 10mA max.                                                      |
| 2026/8/19   | V1.2 | Modify:format                                |                                     |                                                                                          |
|             |      | EMS Standards                                | EN 61547                            | EN IEC 61547                                                                             |
|             |      | Absolute Maximum Voltage on the Vdim (+) Pin | Max:15V                             | Max:12V                                                                                  |
|             |      | 0-10V Analog Dimming &PWM Dimming            | Io/Iomax vs Rx                      | Io/loset vs Rx                                                                           |
|             |      |                                              |                                     |                                                                                          |