

Features

- High Efficiency (Up to 89.5%)
- Full Power at Wide Output Current Range (Constant Power)
- Thermal Sensing and Protection for LED Module
- DALI/AC Dim/Timer Dimmable (3 Timer Modes)
- Dim-to-Off with Standby Power ≤ 0.5 W
- Always-on Auxiliary Power: 12Vdc, 200mA (Transient Peak Current up to 400mA)
- Output Lumen Compensation
- Long Lifetime Over 90K Hours at 75°C Case Temperature
- Input Surge Protection: DM 6 kV, CM 10 kV
- All-Around Protection: OVP, SCP, OTP,
- IP20 Design and Suitable for Outdoor Applications in Luminaires with IP>54
- SELV Output
- Suitable for Luminaires with Protection Class I and II
- Complies with Zhaga Interface Specification Book 13
- 7 Years Warranty



Description

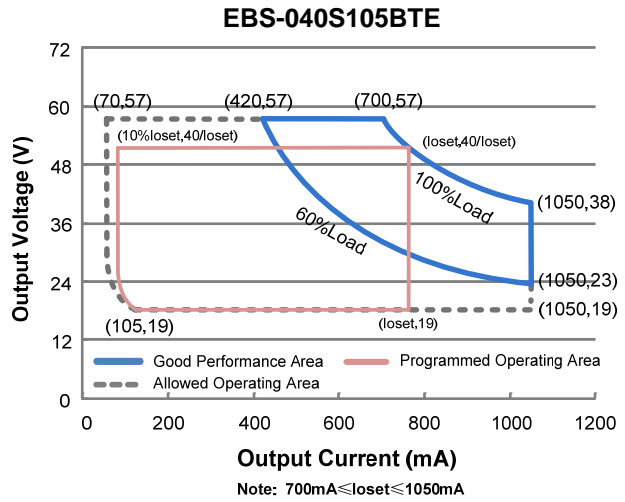
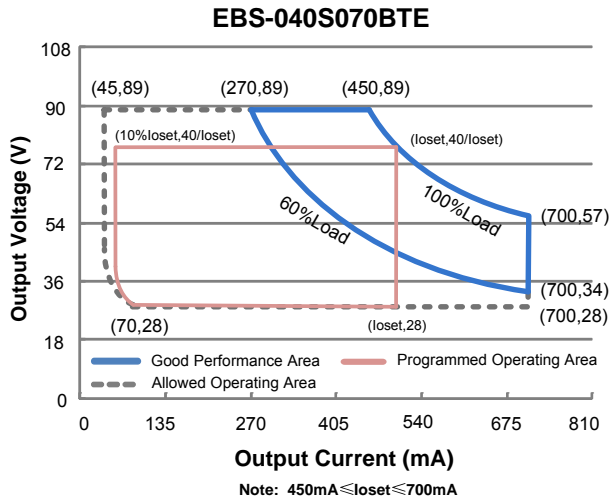
The EBS-040SxxxBTE series is a 40W, constant-current, programmable LED driver that operates from 176-305 Vac input with excellent power factor. Created for many lighting applications including street, tunnel and low bay, it provides a dim-to-off mode with low standby power. The high efficiency of these drivers and better thermal design enable 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 of both the driver and the external LED array.

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) | Power Factor (3) | Model Number (4) |
|---------------------------------|------------------------------|------------------------|----------------------------|----------------------|-------------------|------------------------|------------------|------------------|
| 45-700 mA | 450-700 mA | 700 mA | 176~305 Vac 190~250 Vdc | 28~89 Vdc | 40 W | 89.5% | 0.96 | EBS-040S070BTE |
| 70-1050mA | 700-1050 mA | 1050 mA | 176~305 Vac 190~250 Vdc | 19 ~57Vdc | 40 W | 89.5% | 0.96 | EBS-040S105BTE |

- Notes:** (1) Output current range with constant power at 40W
 (2) Certified voltage range: 200-240Vac or 190-250Vdc (except CCC and KS)
 (3) Measured at full load and 220Vac input (see below "General Specifications" for details).
 (4) SELV Output.

I-V Operating Area



Input Specifications

| Parameter | Min. | Typ. | Max. | Notes |
|----------------------------------|---------|------|-----------------------|---|
| Input Voltage | 176 Vac | - | 305 Vac | 190~250 Vdc |
| Input Frequency | 47 Hz | - | 63 Hz | |
| Leakage Current | - | - | 0.70 mA | IEC60598-1; 240Vac/ 60Hz |
| Input AC Current | - | - | 0.30 A | Measured at full load and 220 Vac input. |
| Inrush Current(I ² t) | - | - | 0.35 A ² s | At 220Vac input, 25°C Cold Start, Duration =368 μs, 10%Ipk-10%Ipk. See Inrush Current Waveform for the details. |
| PF | 0.90 | - | - | At 200-240Vac, 50-60Hz, 60%-100% Load (24-40W) |
| THD | - | - | 20% | |
| THD | - | - | 10% | |

Output Specifications

| Parameter | Min. | Typ. | Max. | Notes |
|--|----------------------|---------------------|----------------------|---|
| Output Current Tolerance | -5%I _{load} | - | 5%I _{load} | At full load condition |
| Output Current Setting(I _{load}) Range | | | | |
| EBS-040S070BTE | 45 mA | - | 700 mA | |
| EBS-040S105BTE | 70 mA | - | 1050 mA | |
| Output Current Setting Range with Constant Power | | | | |
| EBS-040S070BTE | 450 mA | - | 700 mA | |
| EBS-040S105BTE | 700 mA | - | 1050 mA | |
| Total Output Current Ripple (pk-pk) | - | 5%I _{load} | 10%I _{load} | At full load condition, 20 MHz BW |
| Output Current Ripple at < 200 Hz (pk-pk) | - | 2%I _{load} | - | At full load condition. Only this component of ripple is associated with visible flicker. |

Output Specifications (Continued)

| Parameter | Min. | Typ. | Max. | Notes |
|---|--------|----------|----------|--|
| Startup Overshoot Current | - | - | 10%Iomax | At full load condition |
| No Load Output Voltage | | | | |
| EBS-040S070BTE | - | - | 119 V | |
| EBS-040S105BTE | - | - | 68 V | |
| Line Regulation | - | - | ±0.5% | Measured at full load |
| Load Regulation | - | - | ±1.5% | |
| Turn-on Delay Time | - | - | 0.5 s | Measured at 220Vac input, 60%-100% Load |
| Temperature Coefficient of I _o set | - | 0.04%/°C | - | Case temperature = 0°C ~T _c max |
| 12V Auxiliary Output Voltage | 10.8 V | 12 V | 13.2 V | |
| 12V Auxiliary Output Source Current | 0 mA | - | 200 mA | Return terminal is "Return" |
| 12V Auxiliary Output Transient Peak Current | - | - | 400 mA | 400mA peak for a maximum duration of 300ms in a 2s period during which time the average should not exceed 200mA. |

Note: All specifications are typical at 25°C unless otherwise stated.

General Specifications

| Parameter | Min. | Typ. | Max. | Notes |
|--|--------------------|---------------|-------|--|
| Efficiency at 220 Vac input: | | | | |
| EBS-040S070BTE | | | | Measured at full load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.) |
| I _o = 450 mA | 87.5% | 89.5% | - | |
| I _o = 700 mA | 87.0% | 89.0% | - | |
| EBS-040S105BTE | | | | |
| I _o = 700 mA | 87.5% | 89.5% | - | |
| I _o = 1050 mA | 86.5% | 88.5% | - | |
| Standby Power | - | - | 0.5 W | Measured at 230Vac/50Hz; Dimming off |
| MTBF | - | 340,000 hours | - | Measured at 220Vac input, 80% Load and 25°C ambient temperature (MIL-HDBK-217F) |
| Lifetime | - | 93,000 hours | - | Measured at 220Vac input, 80%Load and 75°C case temperature; See lifetime vs. T _c curve for the details |
| Operating Case Temperature for Safety T _{c_s} | -40°C | - | +90°C | |
| Operating Case Temperature for Warranty T _{c_w} | -40°C | - | +75°C | Case temperature for 7 years warranty. Please see Inventronics Warranty Statement for complete details. No condensation |
| Storage Temperature | -40°C | - | +85°C | Humidity: 5%RH to 85%RH; No condensation. |
| Dimensions | | | | |
| Inches (L × W × H) | 4.85 x 3.12 x 1.30 | | | |
| Millimeters (L × W ×H) | 123 x 79 x 33 | | | |
| Net Weight | - | 220 g | - | |

Note: All specifications are typical at 25°C unless otherwise stated.

Dimming Specifications

| Parameter | | Min. | Typ. | Max. | Notes |
|----------------------|---|----------------|-------|---------|---|
| DALI | DA, DA High Level | 9.5 V | 16 V | 22.5 V | |
| | DA, DA Low Level | -6.5 V | 0 V | 6.5 V | |
| | DA, DA Current | 0 mA | - | 2 mA | |
| AC Dim | Start Input Voltage | 180 Vac | - | 250 Vac | Default is 220 Vac |
| | Start Output Level | 30% | - | 100% | Default is 100% |
| | Stop Input Voltage | 160 Vac | - | 230 Vac | Default is 170 Vac |
| | Stop Output Level | 30% | - | 85% | Default is 30% |
| | Gap between Start and Stop Input Voltage | 20 Vac | - | - | |
| | Increment of Start and Stop Input Voltage | - | 1 Vac | - | |
| | Increment of Start and Stop Output Level | - | 1% | - | |
| Dimming Output Range | EBS-040S070BTE EBS-040S105BTE | 10%loset | - | loset | 450 mA ≤ loiset ≤ 700 mA 700 mA ≤ loiset ≤ 1050 mA |
| | EBS-040S070BTE EBS-040S105BTE | 45 mA 70 mA | - | loiset | 45 mA ≤ loiset < 450 mA 70 mA ≤ loiset < 700 mA |

Note: All specifications are typical at 25 °C unless stated otherwise.

Safety & EMC Compliance

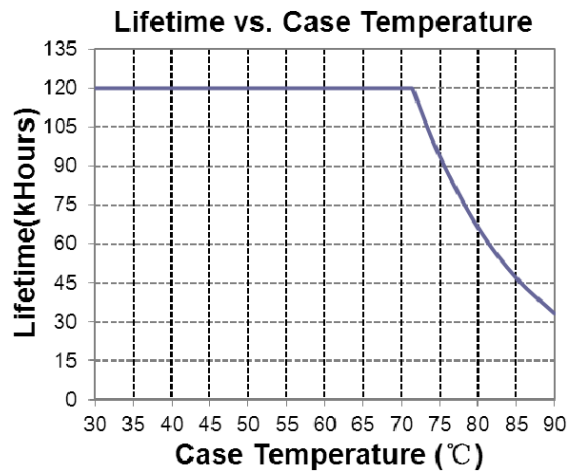
| Safety Category | Standard |
|-------------------------|--|
| ENEC & TUV & CE | EN 61347-1, EN61347-2-13 |
| CCC | GB 19510.1, GB 19510.14 |
| KS | KS C 7655 |
| Performance | Standard |
| ENEC | EN 62384 |
| EMI Standards | Notes |
| EN 55015 ⁽¹⁾ | Conducted emission Test & Radiated emission Test |
| EN 61000-3-2 | Harmonic current emissions Class C |
| 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 |

Safety & EMC Compliance (Continued)

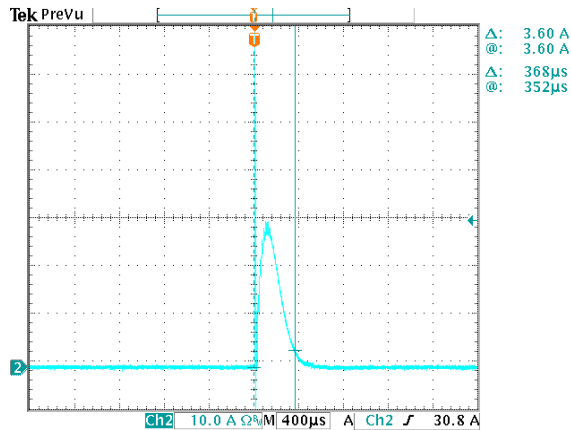
| EMS Standards | Notes |
|----------------|---|
| EN 61000-4-5 | Surge Immunity Test: AC Power Line: Differential Mode 6 kV, Common Mode 8 kV |
| EN 61000-4-6 | Conducted Radio Frequency Disturbances Test-CS |
| EN 61000-4-8 | Power Frequency Magnetic Field Test |
| EN 61000-4-11 | Voltage Dips |
| EN 61547 | Surge Immunity Test: AC Power Line: Differential Mode 6 kV, Common Mode 10 kV |
| | Electromagnetic Immunity Requirements Applies to Lighting Equipment |
| DALI Standards | Notes |
| DALI | IEC62386-101,102 & part of 207 ⁽²⁾ |

Notes: (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.
 (2) Optional Commands Implemented: 242 (query short circuit), 243 (query open circuit).

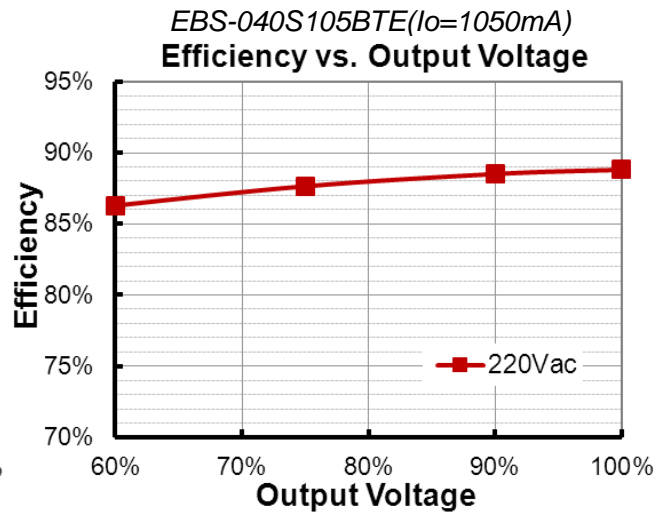
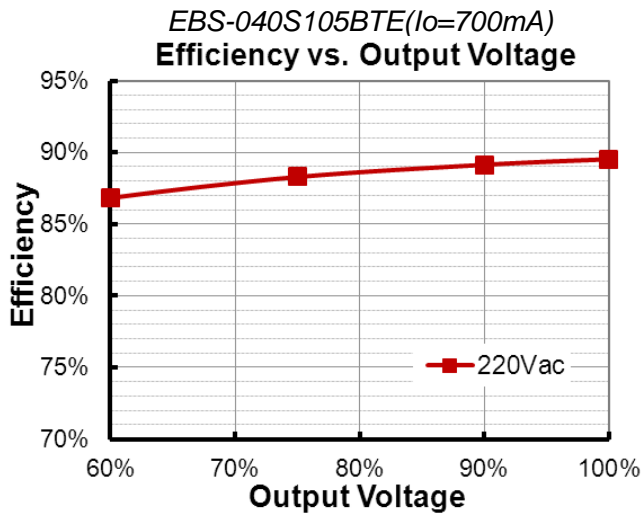
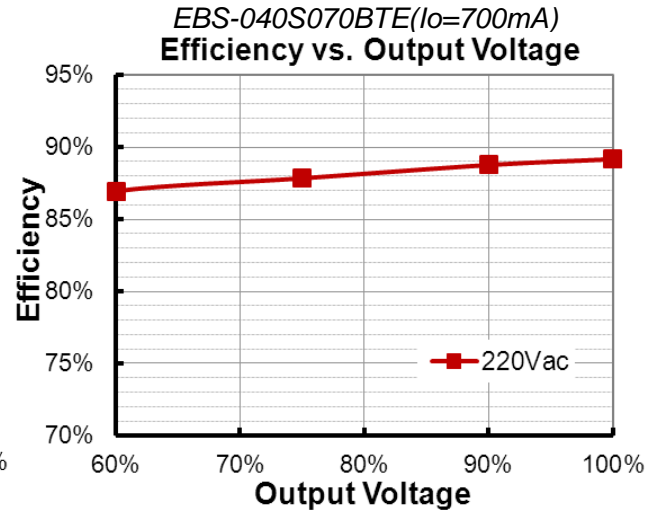
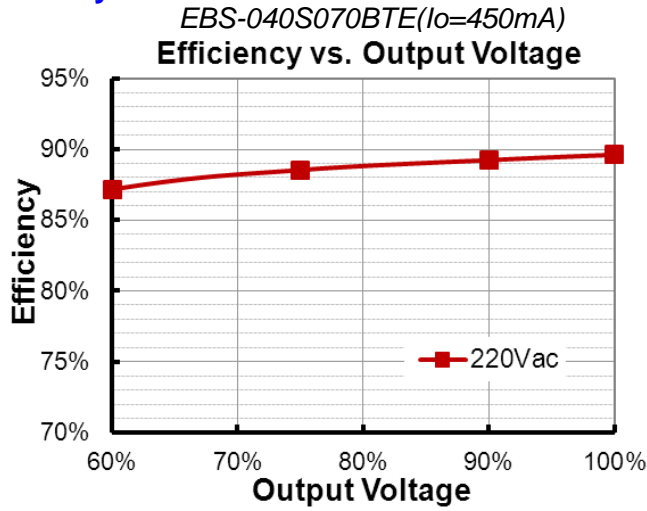
Lifetime vs. Case Temperature



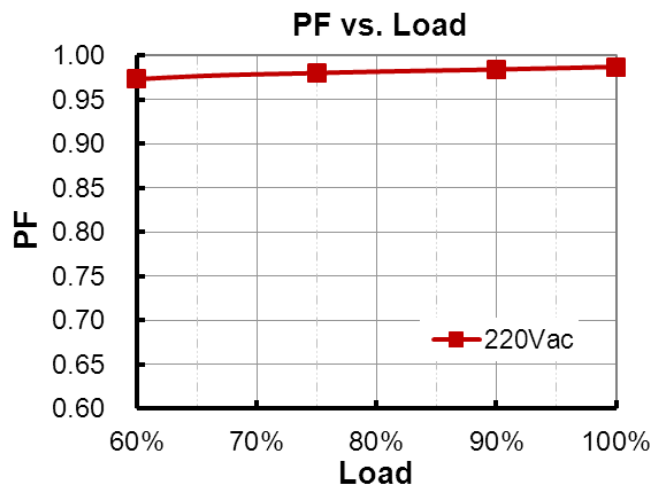
Inrush Current Waveform



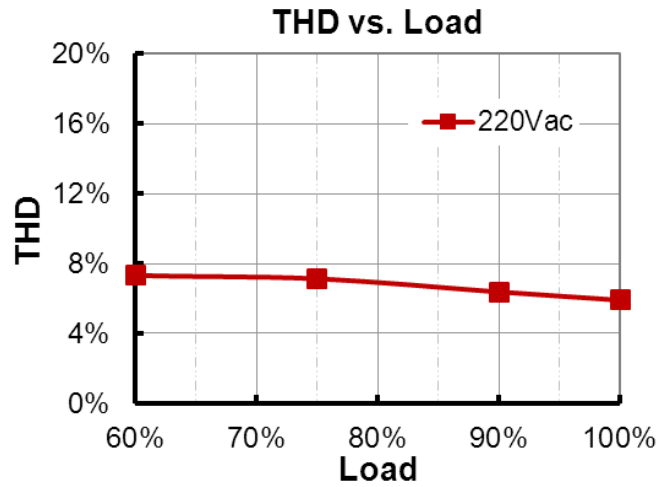
Efficiency vs. Load



Power Factor



Total Harmonic Distortion



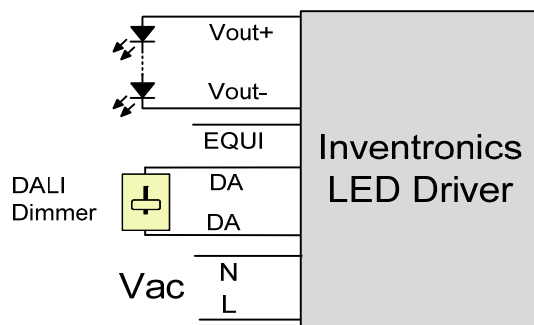
Protection Functions

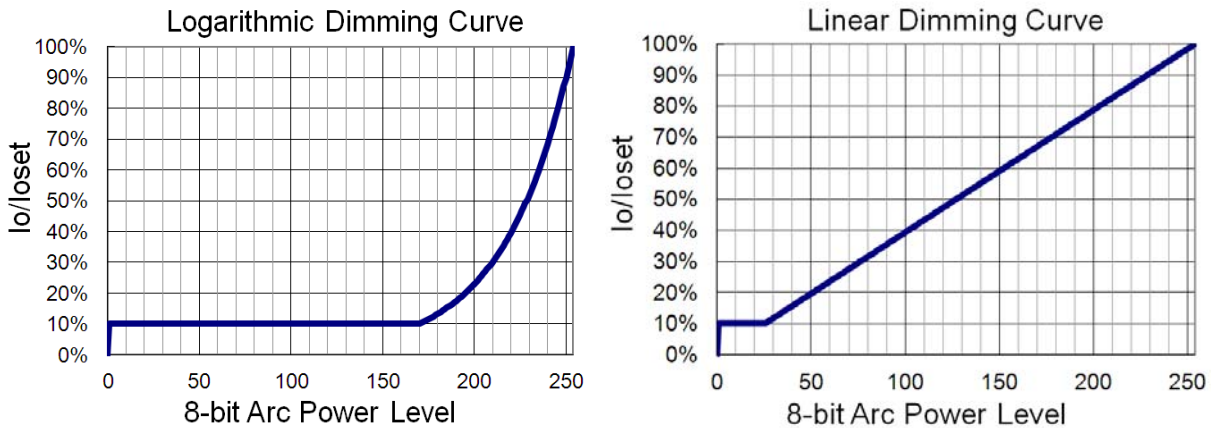
| Parameter | | Min. | Typ. | Max. | Notes |
|---------------------------------|--------------------------|--|-----------|-----------|---|
| External Thermal Protection NTC | R1 | - | 7.81 kOhm | - | When R_NTC falls below R1, External Thermal Protection is triggered, reducing output current until R2 is reached. |
| | R2 | - | 4.16 kOhm | - | When R_NTC is less than R2, output current is reduced to the programmed "Protection Current Floor." |
| | Protection Current Floor | 10%loset | 60%loset | 100%loset | 10%loset > lomin (default setting is 60%) 10%loset ≤ lomin (default setting is 60%) |
| 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. | | | |

Dimming

● DALI Dimming

The recommended implementation of the dimming control is provided below.





Implementation: DALI Dimming

● **Time Dimming**

Time dimming control includes 3 kinds of modes, they are Self Adapting-Midnight, Self Adapting-Percentage and Traditional Timer.

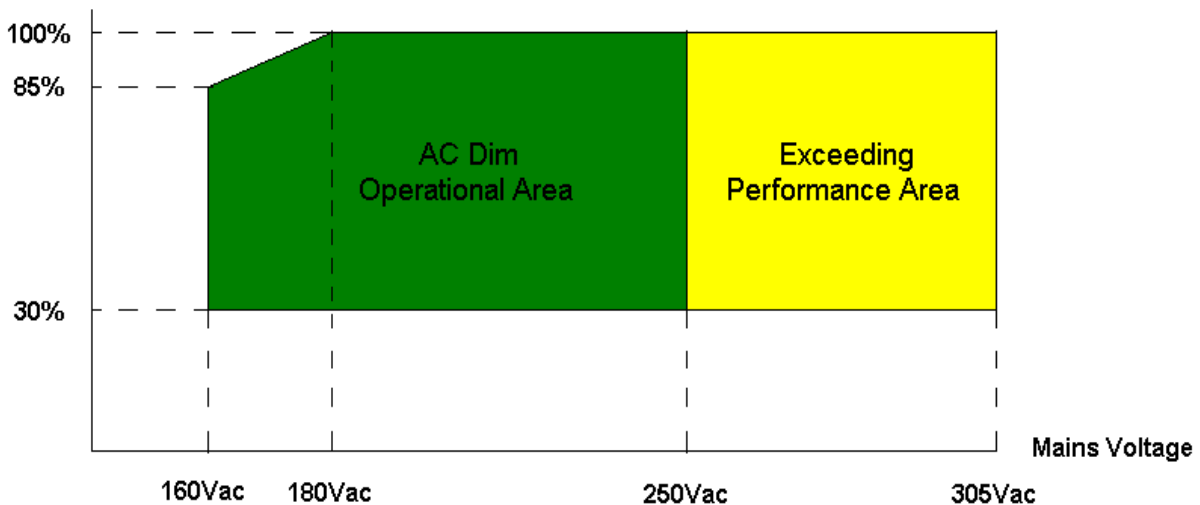
- **Self Adapting-Midnight:** Automatically adjusts the dimming curve based on the on-time of past two days (if difference <15 minutes), assuming that the center point of the dimming curve is midnight local time.
- **Self Adapting-Percentage:** Automatically adjusts the on-time of each step by a constant 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.

● **AC Dimming**

The default range of AC Dim is 160-250Vac. The range can be adjusted via the programming interface. Also, the Start Input Voltage, Start Output Level, Stop Input Voltage and Stop Output Level can be set. There needs to be a minimum of 20V difference between Start and Stop Input Voltage settings when programming the driver.

There must be a minimum voltage difference of 5V from the Start Input Voltage before the driver starts dimming.

Output Level



Notes:

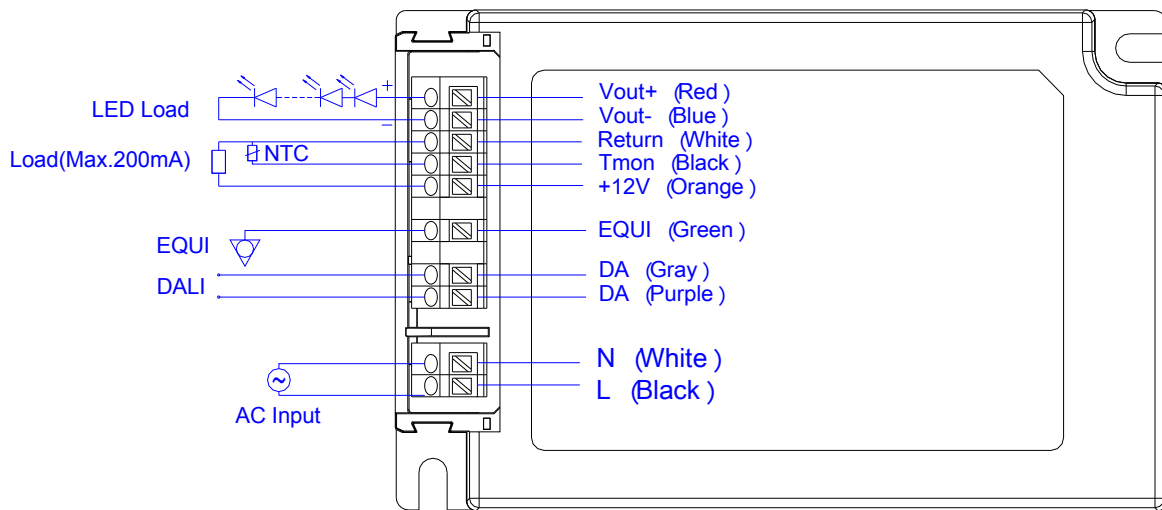
1. In the green area, the driver will operate normally.
2. In the yellow area, the driver will operate safely but not fulfill requirements.

● **Output Lumen Compensation**

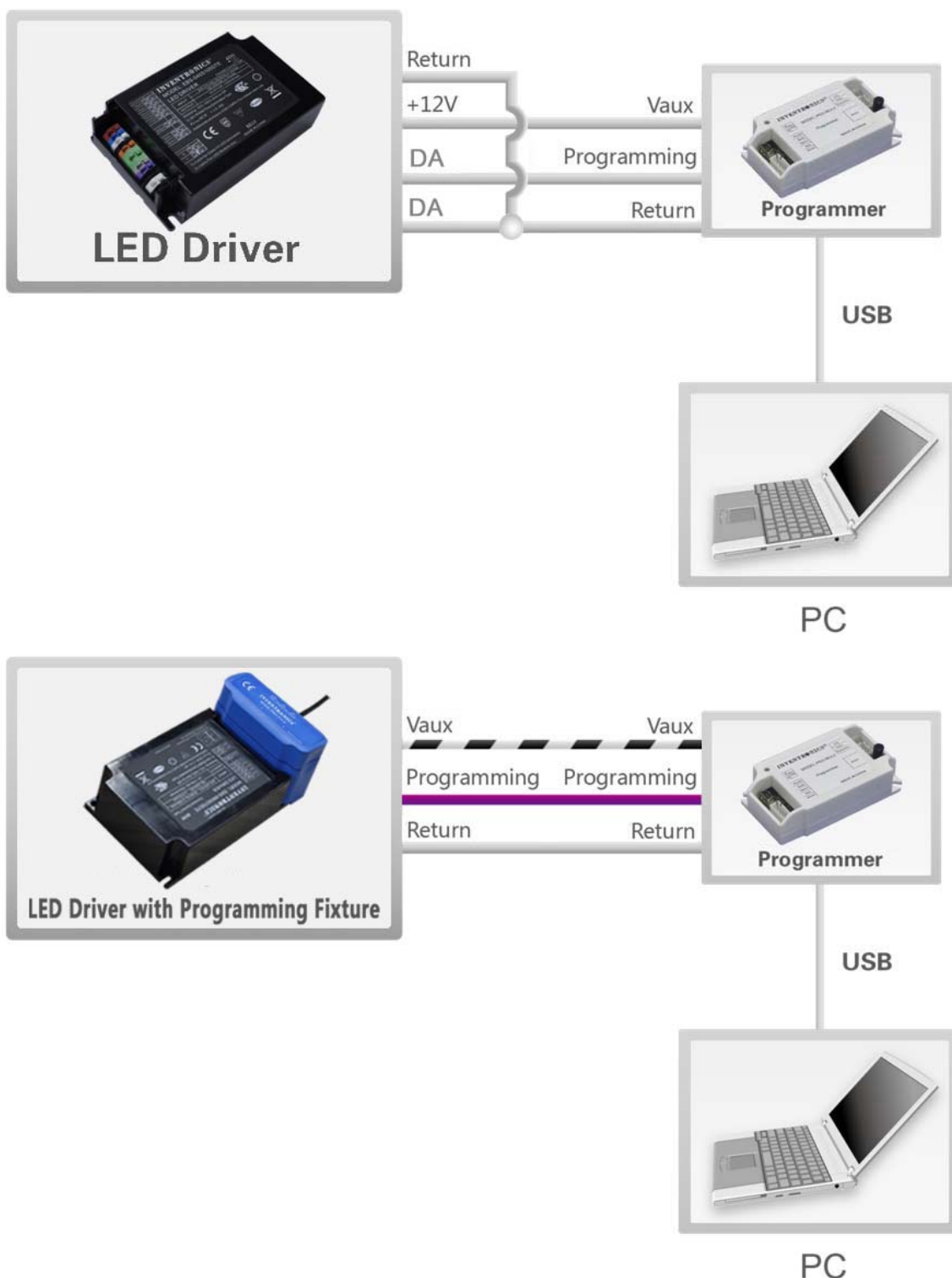
Output Lumen Compensation (OLC) may be used to maintain constant light output over the life of the LEDs by driving them at a reduced current when new, then gradually increasing the drive current over time to counteract LED lumen degradation.

Wire Connection Diagram

| Parameter | | Min. | Typ. | Max. | Notes |
|--|--------------------|---------------------|------|---------------------|---|
| L, N, EQUI | Wire Cross-section | 0.4 mm ² | - | 1.5 mm ² | Push-in at 45° angle, solid and stranded wire |
| | | 20 AWG | - | 16 AWG | |
| | Strip Length | 8.5 mm | - | 9.5 mm | |
| Vout+, Vout-, Return, Tmon, +12V, DA, DA | Wire Cross-section | 0.2 mm ² | - | 1.5 mm ² | Push-in at 45° angle, solid and stranded wire |
| | | 22 AWG | - | 16 AWG | |
| | Strip Length | 8.5 mm | - | 9.5 mm | |



Programming Connection Diagram

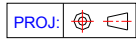
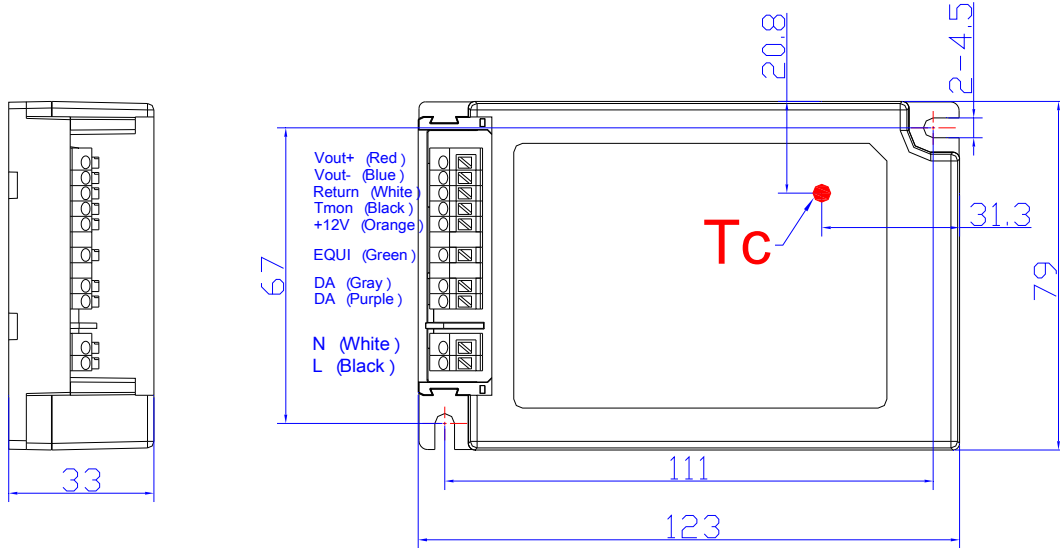


Note: The driver does not need to be powered on during the programming process.

- Please refer to [PRG-MUL2](#) (Programmer) and [PRG-FIX-E](#) (Programming Fixture) datasheet for details.

Mechanical Outline

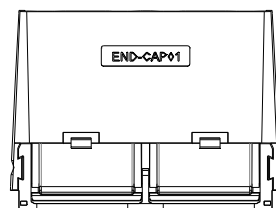
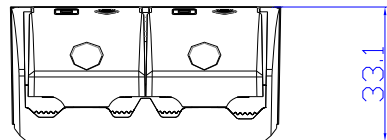
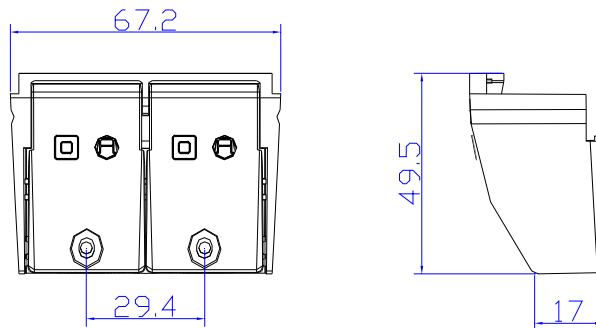
EBS-040SxxxBTE



Unspecified tolerance: ±1

Optional Cable Clamp

END-CAP01



Unspecified tolerance: ±1

Note: The cable clamp is to be installed with EBS-040SxxxBTE drivers for independent application. Please refer to [END-CAP01](#) datasheet for details.

RoHS Compliance

Our products comply with the European Directive 2011/65/EC, calling for the elimination of lead and other hazardous substances from electronic products.

Revision History

| Change Date | Rev. | Description of Change | | |
|-------------|------|--|--|---------|
| | | Item | From | To |
| 2016-11-29 | A | Datasheets Release | / | / |
| 2017-10-24 | B | Features | 7 Years Warranty | Added |
| | | Features | Always-on Auxiliary Power | Added |
| | | Input Specifications | PF/THD | Updated |
| | | Output Specifications | Temperature Coefficient of loset | Updated |
| | | Output Specifications | 12V Auxiliary Output Transient Peak Current | Added |
| | | General Specifications | Operating Case Temperature for Warranty Tc_w | Updated |
| 2018-01-26 | C | Description | / | Updated |
| | | Operating Case Temperature for Warranty Tc_w | Notes | Updated |
| | | Wire Connection Diagram | / | Updated |
| 2018-11-14 | D | CCC Logo | / | Updated |
| | | Safety &EMC Compliance | / | Updated |
| | | Programming Connection Diagram | / | Updated |