

The ICUTRONIC DEXAL 40W Class I/II NFC Driver with DALI-2 and D4i series is a 40W, constant-current, NFC programmable and IP20 rated LED driver that operates from 170-264 Vac input with excellent power factor. Created for many lighting applications including street, tunnel, and low bay, etc., this family provides integrated AC power monitoring with an auxiliary voltage and dim-to-off functionality for powering low voltage, wireless controls.



Features

- Full Power at Wide Output Current Range (Constant Power)
- Adjustable Output Current (AOC) with NFC
- AstroDIM(Timer) for Autonomous Dimming with Five Independent Levels (Astro, Time Mode)
- Dim-to-Off with Standby Power ≤ 0.5 W
- Integrated 16Vdc Bus Power Supply Based on DALI-2
- Constant Lumen
- End-of-Life Indicator
- Input Surge Protection: DM 6kV, CM 10kV
- All-Around Protection: OTP, OVP, SCP, OLP, NLP
- Support DALI Programming and NFC Programming
- DEXAL Interface Based on DALI-2 Communication
- DALI-2 and D4i Certified
- Always-on Auxiliary Power: 24Vdc, 125mA, 3W (Transient Peak Power up to 6W)
- Complies with Zhaga Interface Specification Book 13
- Integrated Power Monitoring with Accuracy up to $\pm 5\%$
- Enables Programming via DALI Cables up to 15m Length
- Full Compatibility with T4T(Tuner4TRONIC) and T4T Field App

Application

- IP20 Design and Suitable for Outdoor Applications in Luminaires with IP>54
- Suitable for Luminaires with Protection Class I and II
- Suitable for Built-in Use
- Street and Urban Lighting

Models

| Adjustable Output Current Range (mA) | Full Power Current Range (mA) ⁽¹⁾ | Default Output Current (mA) | Nominal Output Voltage Range (Vdc) | Maximum Output Power (W) | Typical Efficiency ⁽²⁾ | Power Factor λ | Product Name ⁽³⁾⁽⁴⁾ |
|--------------------------------------|--|-----------------------------|------------------------------------|--------------------------|-----------------------------------|------------------------|--------------------------------|
| 200-1050 | 525-1050 | 700 | 20-77 | 40 | 90.0% | 0.95 | IT DX 40/220-240/1A0 NFC E |

Notes: (1) Output current range with constant power at 40W

(2) Measured at 100% load and 230Vac input (see below "General Specifications" for details).

(3) Nominal input voltage: 220-240Vac.

(4) SELV output.

Input Specifications

| Parameter | Min. | Typ. | Max. | Notes |
|-----------------------|---------|------|---------|--|
| Input Voltage AC | 170 Vac | - | 264 Vac | |
| Input Voltage DC | 176 Vdc | - | 276 Vdc | Derating 80% for the Whole Range |
| Mains Frequency | 47 Hz | - | 63 Hz | |
| Touch Current | - | - | 0.7 mA | IEC 60598-1 (mA peak) |
| Nominal Input Current | - | - | 0.22 A | Measured at 100% load and 230 Vac input. |

Input Specifications (Continued)

| Parameter | Min. | Typ. | Max. | Notes |
|---|------------|------|------|---|
| Suitable for Fixtures with Protection Class | Class I/II | | | |
| Power Factor λ | 0.95 | - | - | At 230Vac, 50Hz, 60%-100% Load (24 - 40W) |
| Total Harmonic Distortion | - | - | 7% | |
| Total Harmonic Distortion Extended Range | - | - | 10% | At 230Vac, 50Hz, 25%-100% Load (10 - 40W) |

Output Specifications

| Parameter | Min. | Typ. | Max. | Notes |
|---|--------|----------|----------------------|---|
| Number of Channels | 1 | | | |
| Programmable Output Current | 200 mA | - | 1050 mA | |
| Minimum Output Current | 50 mA | - | - | |
| Nominal Output Voltage | 20 V | - | 77 V | |
| Output Current Tolerance | -5% | - | +5% | At 100% load condition |
| Total Output Current Ripple HF | - | - | 10%I _{omax} | At 100% load condition, >1k Hz (pk-pk). |
| Output Current Ripple LF | - | - | 4%I _{omax} | At 100% load condition, <1k Hz (pk-pk). |
| P _{stLM} | - | - | 1.0 | |
| SVM | - | - | 0.4 | |
| Startup Overshoot Current | - | - | 10%I _{omax} | At 100% load condition |
| U _{out} | - | - | 100 V | |
| Galvanic Isolation | SELV | | | |
| Line Regulation | - | - | ± 1% | Measured at 100% load |
| Load Regulation | - | - | ± 5% | |
| Turn-on Delay Time | - | - | 1 s | Measured at DALI-2 dimming mode, and 230Vac input, 60%-100% Load |
| Temperature Coefficient | - | 0.06%/°C | - | Case temperature = 0°C ~T _c max |
| Auxiliary Output Voltage | 21.6 V | 24 V | 26.4 V | |
| Auxiliary Output Source Current | 0 mA | - | 125 mA | Return terminal is "DA--" |
| Auxiliary Output Transient Peak Current @6W | - | - | 250 mA | 250mA peak for a maximum duration of 2.2ms in a 6.0ms period during which time the average should not exceed 125mA. |
| Integrated DALI-2 Bus Power Supply Voltage | 12 Vdc | 16 Vdc | 20 Vdc | Voltage is depending on loading. |
| Integrated DALI-2 Bus Power Maximum Supply Current | 62 mA | | | |
| Integrated DALI-2 Bus Power Guaranteed Supply Current | 53 mA | | | DALI-2 bus power supply voltage ≥12V |

Notes: (1) DALI-2 bus power supply is enabled by default and can be disabled via programming interface.
 (2) DALI-2 bus power supply supports automatic shut-down and restart after short-circuit.

General Specifications

| Parameter | Min. | Typ. | Max. | Notes |
|---|---|----------------|--------|--|
| Efficiency at 230Vac Input $I_o=525\text{ mA}$ $I_o=1050\text{ mA}$ | 88.0% 87.5% | 90.0% 89.5% | - - | Measured at 100% load and Steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.) |
| Device Power Loss | - | - | 5.7W | |
| Power Monitoring Accuracy | -5% | - | +5% | Measured at 230Vac input and 100% load |
| Networked Standby Power | - | - | 0.5 W | Measured at 230Vac/50Hz; DALI-2 bus power supply off. ≤0.5W DALI-2 bus power supply on. |
| MTBF | - | 485,000 Hours | - | Measured at 230Vac input, 80%load and 25°C ambient temperature (MIL-HDBK-217F) |
| Operating Case Temperature for Safety T_{c_s} | -40°C | - | +80°C | |
| Max. Housing Temperature in Case of Fault | - | - | +120°C | |
| Operating Case Temperature for Warranty T_{c_w} | -40°C | - | +80°C | T_{c_w} = case temperature for 5 years warranty. $T_{c_w} - 10^\circ\text{C}$ = case temperature for 8 years warranty. Please see Inventronics Warranty Statement for complete details. Humidity: 5% RH to 85% RH, No condensation |
| Lifetime at T_{c_w} . | - | 50,000 Hours | - | Measured at 230Vac input, 100% load. See lifetime vs. T_{c_w} curve for the details |
| Lifetime at $T_{c_w} - 10^\circ\text{C}$. | - | 100,000 Hours | - | Measured at 230Vac input. |
| Ambient Temperature | -40°C | - | +55°C | Measured at 230Vac input, 100% load @ T_{c_w} |
| Permitted rel. Humidity During Operation | 5% | - | 85% | No Condensation |
| Temperature at Storage | -40°C | - | +85°C | Humidity: 5% RH to 85% RH, No condensation |
| Mains Switching Cycles | 100,000 | - | - | |
| IP Rating | IP20 | | | |
| Dimensions (L × W × H) | 4.85 x 3.14 x 1.31 Inches 123.3 x 79.7 x 33.4 mm | | | |
| Net Weight | - | 250 g | - | |

Inrush Current Waveform

| Input AC Voltage | Inrush Current I_{peak} | Inrush Current Width t_{width} (@ 50% I_{peak}) | The Number of LED Driver can be Configured (MCB) | | | | | | | |
|------------------|------------------------------|---|--|------|------|------|------|------|------|------|
| | | | B10A | B16A | B20A | B25A | C10A | C16A | C20A | C25A |
| 230Vac | 52.8A | 116μs | 13 | 21 | 27 | 34 | 22 | 36 | 45 | 57 |

Notes: The maximum number of units per circuit breaker is an indicative value.

Dimming Specifications

| Parameter | | Min. | Typ. | Max. | Notes |
|------------------|---------------------|------------|------|--------|---------------------------|
| DALI-2 | DA+, DA- High Level | 9.5 V | 16 V | 22.5V | |
| | DA+, DA- Low Level | -6.5 V | 0 V | 6.5 V | |
| | DA+, DA- Current | 0 mA | - | 2 mA | |
| Dimming Output | | 10% loiset | - | loiset | 500 mA ≤ loiset ≤ 1050 mA |
| | | 50 mA | - | loiset | 200 mA ≤ loiset < 500 mA |
| AstroDIM (Timer) | | 10% | - | 100% | |

Certificates & Standards

| Safety Category | Standard |
|-----------------|--|
| ENEC | EN 61347-1, EN 61347-2-13, EN IEC 62384 |
| 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, EN IEC 55015, EN 61547, EN IEC 61000-3-2, EN 61000-3-3 |
| CB | IEC 61347-1, IEC 61347-2-13 |
| KS | KS C 7655 |
| CCC | GB 19510.1, GB 19510.14, GB/T 17743, GB 17625.1 |
| DALI-2 | IEC 62386-101, 102 & 207 |

Note: (1) This product meets the requirements for EN/IEC 61347-1 [Annex O (Double insulation)].

(2) 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.

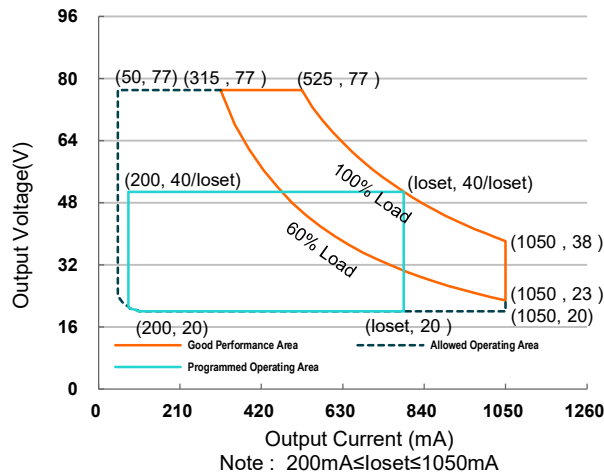
(3) The control terminal serves as a local wired port. The maximum allowable length of the control connection wire shall be shorter than 3 meters.

(4) DALI Parts: 101, 102, 150, 151, 152, 207, 250, 251, 252, 253.

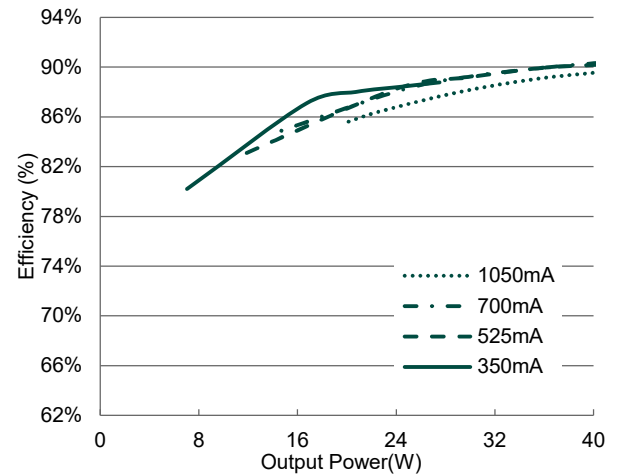
Isolation Levels

| | Input | Output | Dimming | Aux | External OTP | EQUI |
|--------------|------------|------------|------------|------------|--------------|------------|
| Input | N/A | Reinforced | Reinforced | Reinforced | N/A | Reinforced |
| Output | Reinforced | N/A | Basic | Basic | N/A | Basic |
| Dimming | Reinforced | Basic | N/A | N/A | N/A | Basic |
| Aux | Reinforced | Basic | N/A | N/A | N/A | Basic |
| External OTP | N/A | N/A | N/A | N/A | N/A | N/A |
| EQUI | Reinforced | Basic | Basic | Basic | N/A | N/A |

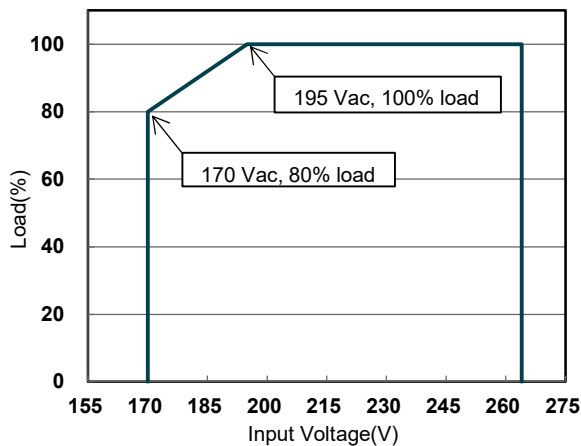
Operating Window



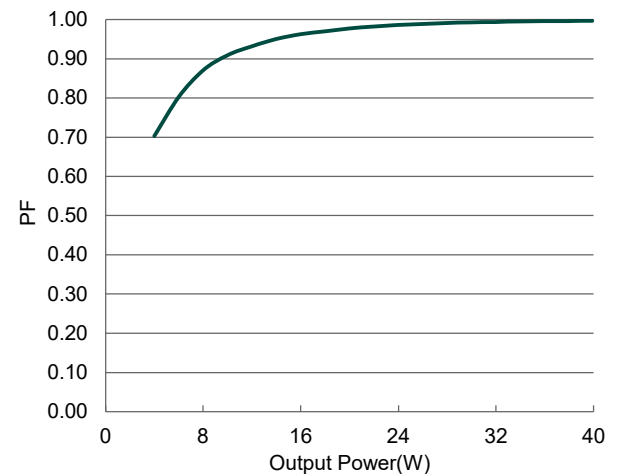
Efficiency vs. Load@230Vac



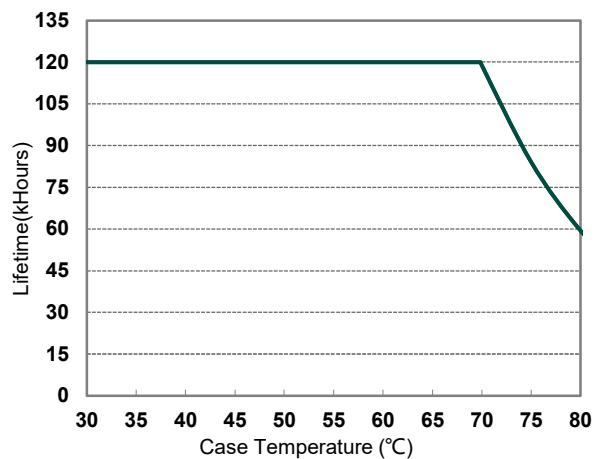
Derating



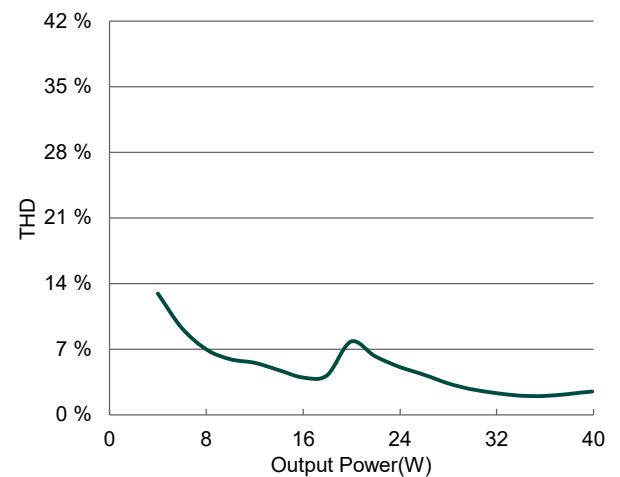
Power Factor



Lifetime vs. Case Temperature



Total Harmonic Distortion



Protection Functions

Over Temperature Protection(OTP)

Protection based on safety: decreases output current if maximum internal temperature is reached, returning to normal value after over temperature is removed.

When output current reaches 55%, switch-off until over temperature is removed.

Driver Guard

Default setting: disabled

Protection based on lifetime: It can be activated via T4T. Set a lower internal temperature threshold (Thermal Settings: reduce the temperature threshold by 5°C, 10°C, 15°C or 20°C) to activate the over temperature protection - see description.

The driver is protected against temporary overheating by automatically reduction of the output current.

Over Voltage Protection(OVP)

Limits output voltage at no load and in case the normal voltage limit fails.

Over Load Protection(OLP)

The driver automatically limits the output current to keep its output power in the specified range.

Short Circuit Protection(SCP)

Auto Recovery. No damage will occur when any output is short circuited. The output shall return to normal when the fault condition is removed.

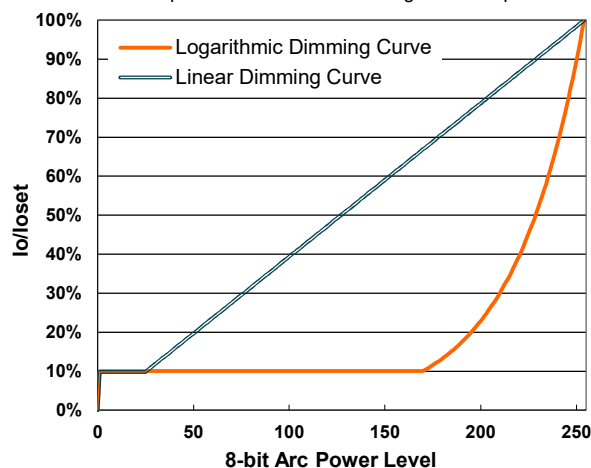
No Load Protection(NLP)

The driver automatically adjusts the output voltage to the maximum output voltage if no load is connected. Hot-plug of the load or external switching on the secondary side is not allowed.

Dimming

DALI-2 Dimming

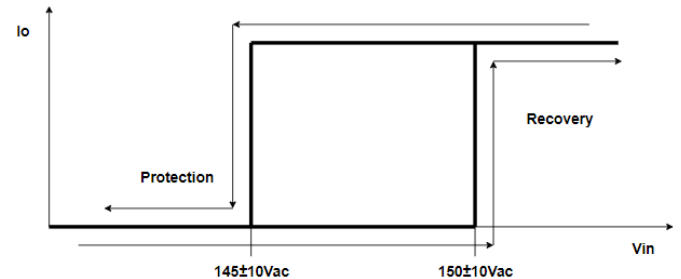
The recommended implementation of the dimming control is provided below.



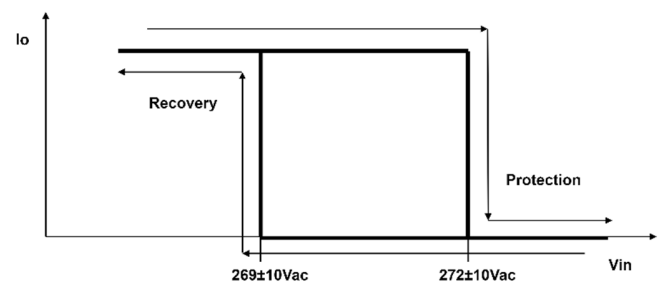
AstroDIM(Timer)

AstroDIM (Timer) includes 2 kinds of modes, they are Astro Based and Time Based.

Input Under Voltage Protection(IUVP)



Input Over Voltage Protection(IOVP)



Notes: (1) The driver can survive stabilized input over voltage conditions up to 350Vac for a total of 2 hours.

- **Astro Based:** The benchmark for the dimming profile is based on the average midnight each year, which is precisely calculated using theoretical sunrise and sunset times. The LED driver strictly adheres to daily power-on and power-off times to execute the corresponding dimming configuration file. Furthermore, the adjustment of the dimming schedule is dynamic, automatically adapting according to the actual length of the night to ensure that the lighting effect aligns with nighttime environmental needs.
- **Time Based:** The dimming profile defined in the reference schedule is referenced to the switch-on time of the LED driver.

Constant Lumen

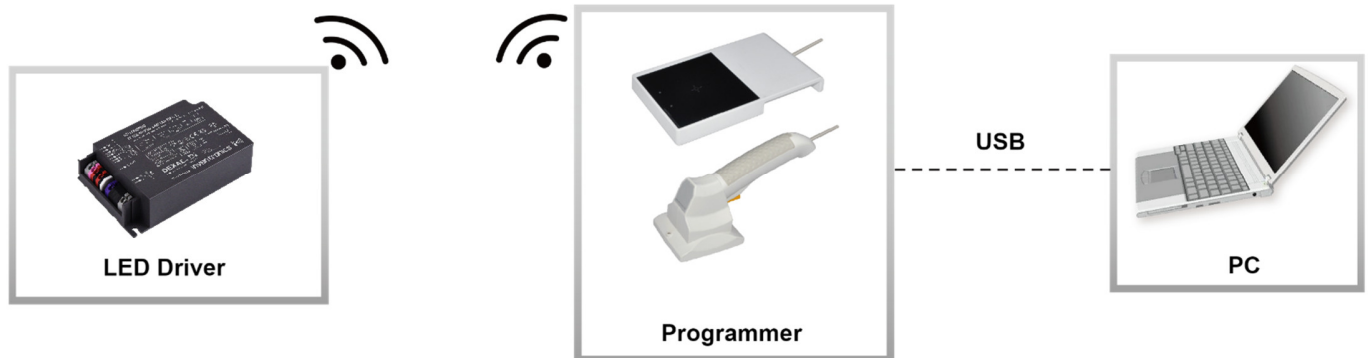
Constant lumen function may be used to maintain constant light output over the life of the LEDs by driving them at a reduced current when new, then gradually increasing the drive current over time to counteract LED lumen degradation. This function is disabled by default.

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 (minimum output current level) during the first 10 minutes before normal operation is continue.

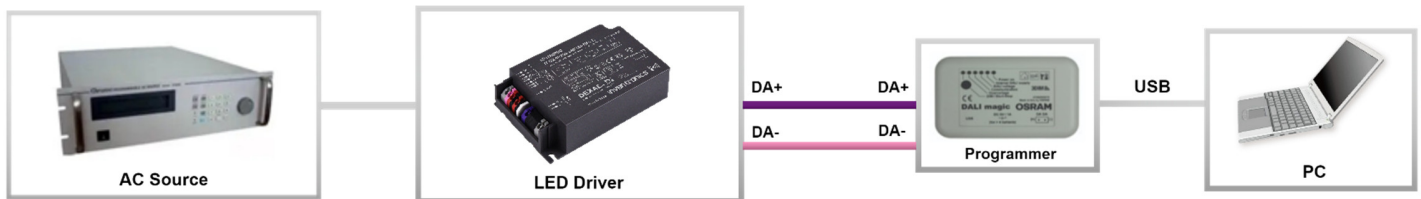
Programming Connection Diagram

NFC Programming Device



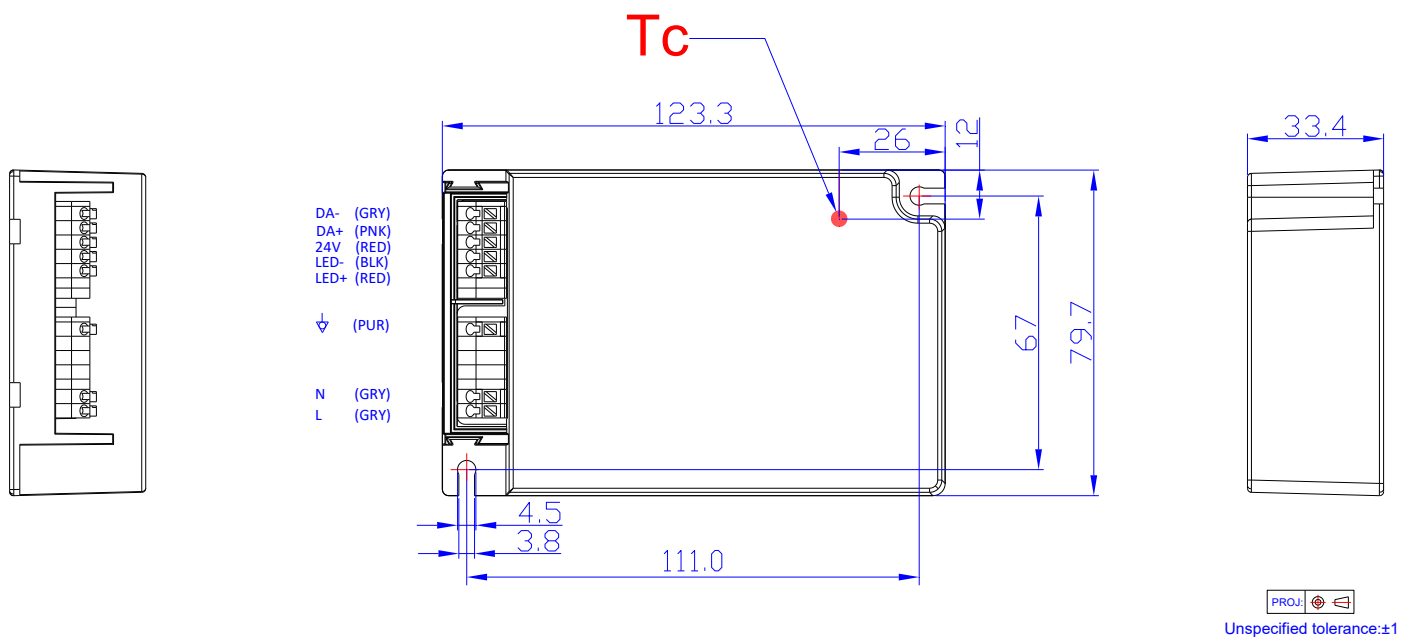
Note: (1) The driver does not need to be powered on during the programming process.
 (2) Please refer to [PRG-NFC-H](#) or [PRG-NFC-D2](#) (Programmer) datasheet for details.
 (3) Supports both [T4T](#) and [Tuner4TRONIC Field App](#) functionality.

DALI Programming Device




Note: (1) The driver **needs to be powered on** during the programming process.
 (2) Please refer to [DALI magic](#) (Programmer) datasheet for details.
 (3) Supports both [T4T](#) and [Tuner4TRONIC Field App](#) functionality.

Mechanical Outline



Connection Diagram

| Parameter | | Min. | Typ. | Max. | Notes |
|---|--------------------|---------------------|------|---------------------|--|
| <div>L, N, </div> <div>24V, DA+, DA-</div> | 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 | |
| LED+, LED- | 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 | |

Environmental Compliance

RoHS

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.

Product Order Overview

Order Code & Packaging

| Order Code (EAN) | Product Version Name | Certification Markings on Product | Packaging unit (Pieces/Box) | Packing Dimensions (L × W × H)(mm) |
|------------------|----------------------------|-----------------------------------|-----------------------------|------------------------------------|
| 6977078998826 | IT DX 40/220-240/1A0 NFC E | CE, ENEC, CCC, D4i | 18 | 272 x 260 x 125 |

Logistical Data

| Region | Commodity Code |
|--------|----------------|
| Europe | 85044083900 |