TRIDONIC

Driver LC 27W 100–500mA 54V D4i NF SR PRE4

premium series

Product description
_ D4i (DALI-2 part 250, 251, 252 and 253)
_ Independent dimmable D4i constant current LED driver with strain-relief
_ Dimming range 1 to 100 %
_ Intended for use in class II luminaires without earth connection
_ Output current adjustable between 100 –500 mA with DALI or NFC
_ Max. output power 27 W
_ Up to 86 % efficiency
_ Power input on stand-by < 0.4 W
_ Nominal lifetime up to 100,000 h
_ 5 years guarantee (conditions at https://www.tridonic.com/manufacturer-guarantee-conditions)

Housing properties
_ Casing: makrolon, white
_ Type of protection IP20
_ Strain relief with loop through function

Interfaces
_ Near field communication (NFC)
_ D4i (DALI-2)
_ Terminal blocks: 45° push terminals

Functions
_ Adjustable output current in 1-mA-steps (NFC, DALI)
_ Fulfills DALI-2 parts: 105 (DALI firmware update), 250 (Integrated bus power supply), 251 (Luminaire data), 252 (Energy reporting) and 253 (Diagnostics & Maintenance)
_ SELV sensor supply with DALI bridge functionality
_ Constant light output function (eCLO)
_ Power-up fading at AC
_ Switch off the driver with fade2zero
_ Protective features (overtemperature, short-circuit, overload, no-load)
_ Suitable for emergency escape lighting systems acc. to EN 50172

Benefits
_ Flexible configuration via companionSUITE
_ Support NFC multiple programming (full carton box)
_ Application-oriented operating window for maximum compatibility
_ Best energy savings due to low stand-by losses and high efficiency
_ Reliability proven by lifetime up to 100,000 h and 5 years guarantee (conditions at https://www.tridonic.com/manufacturer-guarantee-conditions)

Typical applications
_ For linear/area lighting in office applications

Website
http://www.tridonic.com/28005359

Spotlights | Downlights | **Linear** | **Area** | Floor | Wall | Free-standing | Street | Decorative | High bay

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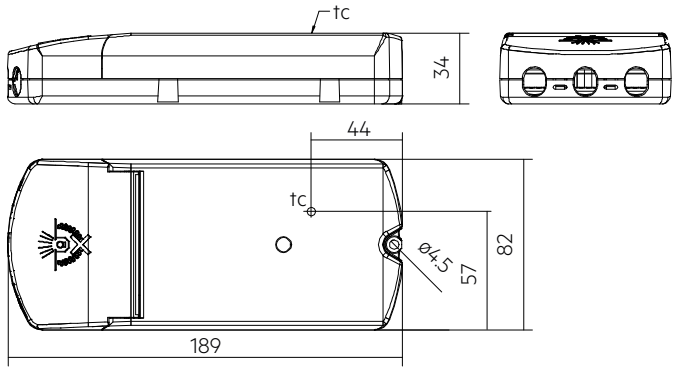


Ordering data

Type	Article number	Packaging, carton	Packaging, pallet	Weight per pc.
LC 27/100-500/54 D4i NF SR PRE4	**28005359**	10 pc(s).	600 pc(s).	0.234 kg

Technical data

Rated supply voltage	220 – 240 V
AC voltage range	198 – 264 V
DC voltage range	176 – 280 V
Mains frequency	0 / 50 / 60 Hz
Overvoltage protection	320 V AC, 48 h
Typ. rated current (at 230 V, 50 Hz, full load) ①②	137 mA
Typ. current (220 V, 0 Hz, full load, EOFx dimlevel) ②	35 mA
Max. input power	31.4 W
Output power range (P_rated)	1.5 – 27 W
Typ. efficiency (at 230 V, 50 Hz, full load) ②	86 %
λ over full operating range (max.) ①	0.99
λ over full operating range (min.)	0.5C
Typ. power consumption on stand-by ③	< 0.4 W
Typ. input current in no-load operation	15.2 mA
Typ. input power in no-load operation	0.9 W
In-rush current (peak / duration)	16.7 A / 392 µs
THD (at 230 V, 50 Hz, full load) ①	< 10 %
Starting time (AC mode)	< 0.66 s
Starting time (DC mode)	< 0.65 s
Switchover time (AC/DC) ④	< 0.3 s
Turn off time (at 230 V, 50 Hz, full load)	< 0.1 s
Output current tolerance ①	± 3 %
Max. output current peak (non-repetitive)	≤ output current + 15 %
Output LF current ripple (< 120 Hz)	± 3.3 %
Output P_ST_LM (at full load)	≤ 1
Output SVM (at full load)	≤ 0.4
Max. output voltage (U-OUT)	60 V
Dimming range	1 – 100 %
Mains surge capability (between L - N)	1 kV
Mains surge capability (between L/N - PE)	2 kV
Surge voltage at output side (against PE)	< 2 kV
Type of protection	IP20
Lifetime	up to 100,000 h
Guarantee (conditions at www.tridonic.com)	5 Year(s)
Dimensions L x W x H	190 x 82 x 34 mm

Approval marks

NFC DALI IP20 EL RoHS

Standards

EN 55015, EN 61000-3-2, EN 61000-3-3, EN 61000-4-4, EN 61000-4-5, EN 61347-1, EN 61347-2-13, EN 62384, EN 61547, EN 62386-101, EN 62386-102, EN 62386-207 (DALI-2), according to EN 50172, according to EN 60598-2-22

Specific technical data

Type	Output current[5]	Min. output voltage	Max. output voltage	Max. output power	Typ. power consumption (at 230 V, 50 Hz, full load)	Typ. current consumption (at 230 V, 50 Hz, full load)	tc point max.	Ambient temperature ta
LC 27/100-500/54 D4i NF SR PRE4	100 mA	15 V	54 V	5.4 W	8.4 W	43 mA	72 °C	-20 … +65 °C
LC 27/100-500/54 D4i NF SR PRE4	200 mA	15 V	54 V	10.8 W	14.1 W	63 mA	72 °C	-20 … +65 °C
LC 27/100-500/54 D4i NF SR PRE4	300 mA	15 V	54 V	16.2 W	19.8 W	88 mA	72 °C	-20 … +60 °C
LC 27/100-500/54 D4i NF SR PRE4	400 mA	15 V	54 V	21.6 W	25.6 W	112 mA	72 °C	-20 … +60 °C
LC 27/100-500/54 D4i NF SR PRE4	500 mA	15 V	54 V	27.0 W	31.4 W	137 mA	72 °C	-20 … +55 °C

① Valid at 100 % dimming level. Output current is mean value.
② Depending on the selected output current.
③ Depending on the DALI traffic at the interface. DALI bus power supply deactivated.
④ Valid for immediate change of power supply type otherwise the starting time is valid.
⑤ The table only lists a number of possible operating points but does not cover each single point. The output current can be set within the total value range in 1-mA-steps. Output current is mean value.

1. Standards

EN 55015
EN 61000-3-2
EN 61000-3-3
EN 61000-4-4
EN 61000-4-5
EN 61347-1
EN 61347-2-13
EN 62384
EN 61547
EN 62386-101 (DALI-2)
EN 62386-102 (DALI-2)
EN 62386-207 (DALI-2, including part 105, 250, 251, 252, 253)
According to EN 50172 for use in central battery systems
According to EN 60598-2-22 suitable for emergency lighting installations

2. Thermal details and lifetime

2.1 Expected lifetime

Expected lifetime

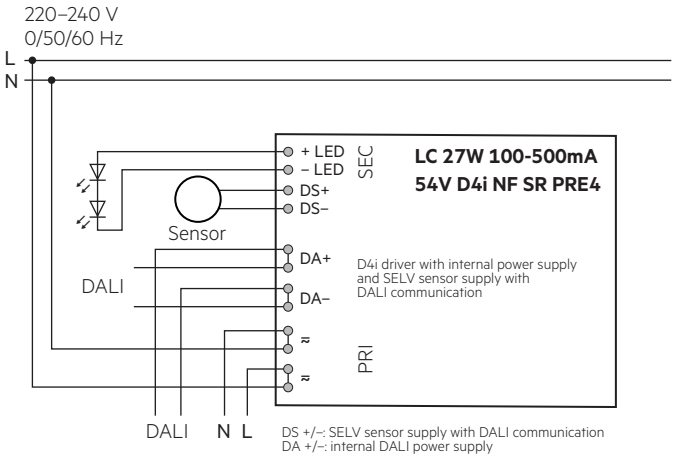
Type	Output current	ta	55 °C	60 °C	65 °C
LC 27/100-500/54 D4i NF SR PRE4	100 – 200 mA	tc	64 °C	68 °C	72 °C
		Lifetime	>100,000 h	>100,000 h	97,000 h
	> 200 – 400 mA	tc	68 °C	72 °C	–
		Lifetime	>100,000 h	97,000 h	–
	> 400 – 500 mA	tc	72 °C	–	–
		Lifetime	97,000 h	–	–

The LED driver is designed for a lifetime stated above under reference conditions and with a failure probability of less than 10 %.

The relation of tc to ta temperature depends also on the luminaire design.
If the measured tc temperature is approx. 5 K below tc max., ta temperature should be checked and eventually critical components (e.g. ELCAP) measured. Detailed information on request.

3. Installation / wiring

3.1 Circuit diagram

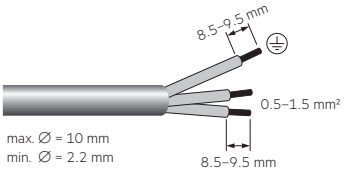


Recommendation to check glowing at standby in combination with class I luminaires.

Both of DA and DS interfaces does not allow to connect mains AC or >30VDC, otherwise they will be damaged; Both of DA and DS are polarity sensitivity should follow the polarity indecation.

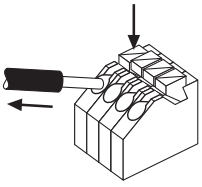
3.2 Wiring type and cross section

Mains supply wires
For wiring use stranded wire with ferrules or solid wire from 0.5–1.5 mm².
Strip 8.5–9.5 mm of insulation from the cables to ensure perfect operation of the push terminals.
Use one wire for each terminal connector only.
Use each strain relief channel for one cable only.



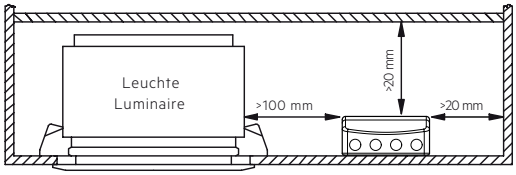
3.3 Loose wiring

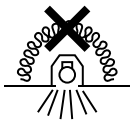
Press down the “push button” and remove the cable from front.



3.4 Fixing conditions

Dry, acidfree, oilfree, fatfree. It is not allowed to exceed the maximum ambient temperature (ta) stated on the device. Minimum distances stated below are recommendations and depend on the actual luminaire.
Is not suitable for fixing in corner.





Device not suitable for covering with thermally insulating material

3.5 Wiring guidelines

- Run the secondary lines separately from the mains connections and lines to achieve good EMC performance.
- The max. secondary cable (LED module) length is 2 m (4 m circuit).
- For good EMC performance, keep the LED wiring as short as possible.
- To comply with the EMC regulations run the secondary wires (LED module) in parallel.
- Secondary switching is not permitted.
- The LED driver has no inverse-polarity protection on the secondary side. Wrong polarity can damage LED modules with no inverse-polarity protection.
- Wrong wiring of the LED driver can lead to malfunction or irreparable damage.
- Through wiring of mains is for connecting additional LED driver only. Max. permanent current of 8A may not be exceeded.
- To avoid damage of the Driver, the wiring must be protected against short circuits to earth (sharp edged metal parts, metal cable clips, louver, etc.).

3.6 Hot plug-in

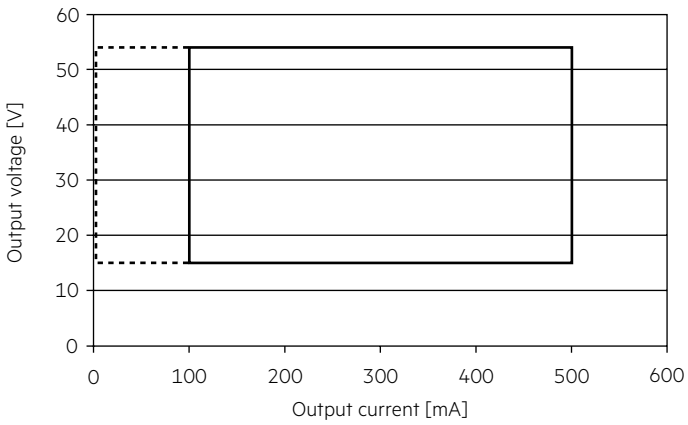
Hot plug-in is not supported due to residual output voltage of > 0 V up to mains voltage. Danger to life.
When connecting an LED load, restart the device to activate the LED output. This can be done via mains reset or via interface (DALI).

3.8 Independent control gear classification

“Do not cover”, “non-IC” and “IC” classified control gear are recommended to be installed according to the Fixing conditions in 3.4.

4. Electrical values

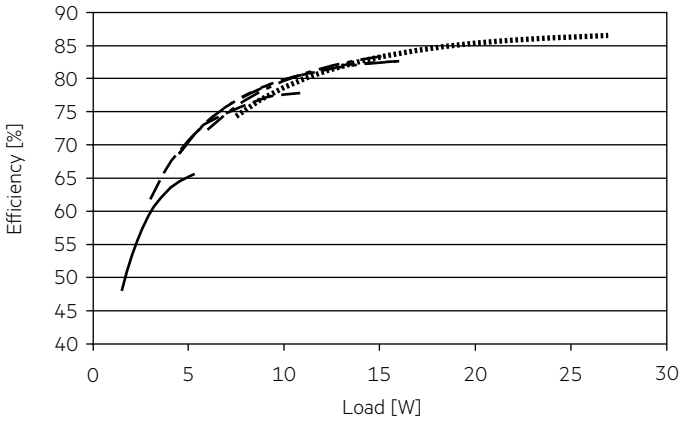
4.1 Operating window



Operating window 100 %
Operating window dimmed

Make sure that the LED driver is operated within the given window under all operating conditions. Special attention needs to be paid at dimming and DC emergency operation as the forward voltage of the connected LED modules varies with the dimming level, due to the implemented amplitude dimming technology. Coming below the specified minimum output voltage of the LED driver may cause the device to shut-down. See chapter “6.8 DC operation” for more information.

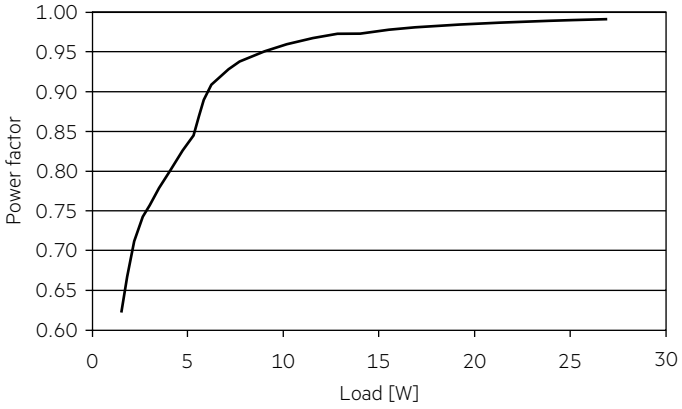
4.2 Efficiency vs load



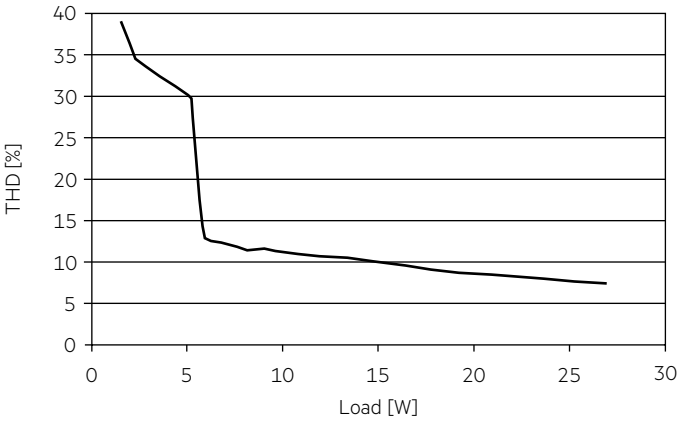
DALI bus power supply deactivated.

100 mA
200 mA
300 mA
400 mA
500 mA

4.3 Power factor vs load



4.4 THD vs load



4.5 Maximum loading of automatic circuit breakers in relation to inrush current

Automatic circuit breaker type	C10	C13	C16	C20	B10	B13	B16	B20	Inrush current	
Installation Ø	1.5 mm²	1.5 mm²	2.5 mm²	2.5 mm²	1.5 mm²	1.5 mm²	2.5 mm²	2.5 mm²	I_{max}	time
LC 27/100-500/54 D4i NF SR PRE4	20	26	33	41	12	16	20	25	16.7 A	392 µs

These are max. values calculated out of inrush current! Please consider not to exceed the maximum rated continuous current of the circuit breaker.
Calculation uses typical values from ABB series S200 as a reference.
Actual values may differ due to used circuit breaker types and installation environment.

4.6 Harmonic distortion in the mains supply (at 230 V / 50 Hz and full load) in %

	THD	3.	5.	7.	9.	11.
LC 27/100-500/54 D4i NF SR PRE4	< 10	< 10	< 10	< 7	< 5	< 3

4.7 Dimming

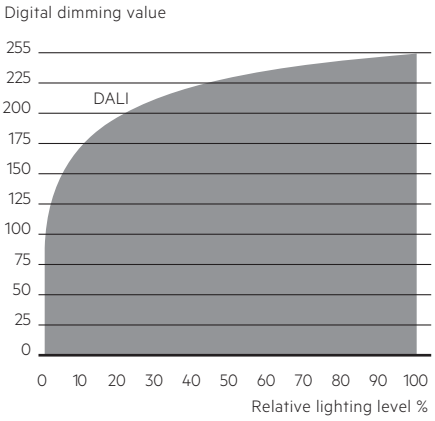
Dimming range 1 % to 100 %
Digital control with:

- DALI signal:
  16 bit Manchester Code Speed 1 % to 100 % in 0.2 s
  Programmable parameter:
  Minimum dimming level Maximum dimming level
  Default minimum = 1 % Programmable range 1 % ≤ MIN ≤ 100 %
  Default maximum = 100 % Programmable range 100 % ≥ MAX ≥ 1 %

Dimming curve is adapted to the eye sensitiveness.
Dimming is realized by amplitude dimming.

Phsyical minimal current is 1 % of max current of the driver.

4.8 Dimming characteristics



Dimming characteristics as seen by the human eye

5. Software / Programming / Interfaces

5.1 Software / programming

With appropriate software and interface different functions can be activated and various parameters can be configured in the LED driver. The Driver supports the following software and interfaces:

Software / hardware for configuration:
- companionSUITE (deviceGENERATOR, deviceCONFIGURATOR, deviceANALYSER)

Interfaces for data transfer:
- NFC
- Control input DALI

5.2 Nearfield communication (NFC)

The NFC Interface allows wireless communication with the LED driver. This interface offers the option to write configuration and to read configuration, errors and events with the companionSUITE.
A correct communication between the LED driver and the NFC antenna can only be guaranteed if the antenna is placed directly on the Driver.
Any material placed between the LED driver and the NFC antenna can cause a deterioration of the communication quality.
After programming the device via NFC power up the device one time for one second till the deviceANALYSER can read out the parameters.
We recommend the use of following NFC antenna:
www.tridonic.com/nfc-readers

NFC is complied with ISO/IEC 15963 standard.

Changing parameters via NFC shall be done by qualified engineers only.

5.3 Control input DALI

The control input is polarity-dependent for digital control signals (DALI). The control signal is not SELV. The control cable has to be installed in accordance to the requirements of low voltage installations.

Digital control with:
- DALI signal: 16 bit

6. Functions

⊙ companionSUITE:
DALI-USB, NFC
The companionSUITE with deviceGENERATOR, deviceCONFIGURATOR and deviceANALYSER is available via our WEB page:
https://www.tridonic.com/com/en/products/companionsuite.asp

Icon	Function	NFC	DALI-2
	OEM Identification	⊙	⊙
	OEM GTIN	⊙	⊙
	Luminaire data	⊙	⊙
mA	LED current	⊙	⊙
	Device operating mode	⊙	⊙
	Enhanced constant light output (eCLO)	⊙	⊙
%	DC level	⊙	⊙
T	Enhanced power on level (ePOL)	⊙	⊙
DALI-2	DALI default parameters	⊙	⊙
	Scenes and groups	⊙	⊙
	fade2zero	⊙	⊙
	Power-up fading	⊙	⊙
	Intelligent voltage guard (IVG)	⊙	⊙
	Dimming curve	⊙	⊙
DALI	pDALI integrated DALI bus voltage	⊙	⊙

6.1 OEM Identification

The OEM (Original Equipment Manufacturer) can set his own identification number.
DALI Part 251: Memory bank 1 extension.

6.2 OEM GTIN

The Original Equipment Manufacturer (OEM) can set his own Global Trade Item Number (GTIN).
DALI Part 251: Memory bank 1 extension.

6.3 Luminaire data

This function provides the asset management with accurate data about the luminaire.
DALI Part 251: Memory bank 1 extension.

6.4 LED current

The LED output current must be adapted to the connected LED module.
The value is limited by the current range of the respective device.

The output current of the LED driver can be adjusted in a certain range.
For adjustment there are 2 options available.

Option 1: DALI
Adjustment is done by companionSUITE.

Option 2: NFC
Adjustment is done by companionSUITE via NFC.

6.5 Device operating mode

A Tridonic Driver supports several control signals.
These control signals are automatically detected and the mode is adapted.
If only one special device mode is required, this mode can be selected.
“Automatic detection” is the default setting.

6.6 Enhanced Constant Light Output (eCLO)

With this function the light output of the LED module can be kept equal over the lifetime.
The light output of an LED module reduces over the course of its lifetime.
The Constant Light Output (eCLO) function compensates for this natural decline by constantly increasing the output current of the LED driver throughout its lifetime.
Enhanced eCLO shall be achieved by limitation of the LED current at the commissioning of the LED driver and providing a linear interpolation of the current over the time, depending on the data points given by the user. The user has to insert up to eight pairs of data (time, level). The output curve is the result of connecting the user data points linear. Detailed description for eCLO see product manual.

6.7 DC operation

In emergency light systems with a central battery supply the DC recognition function uses the input voltage to detect if emergency mode is present.
The LED driver then automatically switches to DC mode and dims the light to the defined DC level.
Without DC recognition different and more complex solutions would have to be applied in order to detect emergency mode.
DC recognition is integrated in the device as standard.
No additional commissioning is necessary for activation.

This is a safety-relevant parameter.
The setting is relevant for the dimensioning of the central battery system.

The LED driver is designed to operate on DC voltage and pulsed DC voltage. For a reliable operation, make sure that also in DC emergency operation the LED driver is run within the specified conditions as stated in chapter “4.1 operating window”.

Light output level in DC operation: programmable 1 – 100 %
(factory default = 15 %, EOF_i = 0.13).

The voltage-dependent input current of Driver incl. LED module is depending on the used load.

The voltage-dependent no-load current of Driver (without or defect LED module and DALI bus power supply deactivated) is for:
AC: < 16.1 mA
DC: < 3.8 mA

In DC operation dimming mode can be activated.
If Dimming on DC is activated the requirements of the DC recognition function are ignored.
Even if DC is detected, the LED driver continues to behave as in AC mode

- The present dimming level is retained
- An emergency light level defined for the DC recognition function (DC level) is ignored
- Control signals via DALI continue to be executed

If Dimming on DC is activated then emergency mode is not recognised.
The device no longer automatically switches to the emergency light level.

6.8 Enhanced power on level (ePOL)

The Enhanced Power On Level parameter defines the power level that is set automatically when power is restored after a power failure.
The Enhanced Power On Level can be set to a fixed value (0 – 100 %) or can recall the memory value.
The memory value is the last value the LED driver was set to before the power failure.

6.9 DALI default parameters

In order for all luminaires to react the same for each operation (switching, dimming, scene recall ...), these values must be set the same.
These DALI standard parameters are supported by every DALI-2 device.

6.10 Scenes and groups

Each device can be a member of up to 16 groups.
Also, 16 different scene values can be stored in each device.

6.11 Integrated DALI bus power supply

This function complies to DiiA specification DALI Part 250 - Integrated bus power supply (DA +/-).
The output power of the integrated DALI Bus Power Supply has an output current of 50 mA (max. 62.5 mA).
It is activated by factory default.
Sensors and also external drivers could be directly connected to this power supply. The DALI power supply could be deactivated via software.

Maximum current is 200mA. Max 4 devices could be connected together. Not exceed 250mA in total.

If the DALI power supply is activated, the driver must not be integrated into an existing, already with 250 mA powered DALI network.

6.12 Integrated DALI sensor SELV output

The function fulfils the current requirements (not yet finally specified by DiiA) for the DALI Part 351 - Integrated DALI sensor supply (DS +/-).
DALI signal shall be transferred between both interfaces.
This DALI repeater meets DALI timing requirements and is designed according to D4i standard.

6.13 fade2zero

When the Driver is switched off, fade2zero allows a smooth dimming down to almost zero.
Activate the fade2zero function when programming with companionSUITE and set a DALI fade time. fade2zero only works if the minimum dimming level of the Driver is the default value.
The device then dims to far below the limit of its working window (dimming range).
This function is deactivated by default.

6.14 Power-up fading

The power-up function offers the opportunity to modify the on behavior.
The time for fading on can be adjusted in a range of 0.2 to 16 seconds.
According to this value, the device dims from 0 % up to the power-on level.
By factory default no fading time is set (= 0 seconds).

6.15 Dimming curve

DALI:
The desired dimming behaviour is selected via two different dimming curves (logarithmic or linear).
The default setting of the dimming behaviour is logarithmic.

7. Protective features

7.1 Intelligent temperature guard (ITG)

The Intelligent temperature guard (ITG) function provides effective protection against thermal overloads by slowly reducing the output if a defined internal temperature is exceeded.
The reduction of overtemperatures takes place in small steps every two minutes. As soon as the temperature drops again, the output power is gradually increased every 10 minutes.
On DC operation this function is deactivated to fulfill emergency requirements.

7.2 Intelligent Voltage Guard (IVG)

The Intelligent Voltage Guard (IVG) function warns of possible damage due to overvoltage or undervoltage.
The mains voltage is constantly monitored and if necessary appropriate responses are made:

- If the mains voltage is too low (< 70 V), the LED driver is switched off.
- At a mains voltage between 70 and 187 V, the LED driver switches on and off cyclically until the main voltage is correct.
- In case of an overvoltage (> 318 V), the LED driver switches on and off cyclically until the main voltage is correct.

7.3 Short-circuit behaviour

In case of a short-circuit at the LED output the LED output is switched off.
After restart of the LED driver the output will be activated again. The restart can either be done via mains reset or via interface (DALI)

7.4 No-load operation

The LED driver will not be damaged in no-load operation. The output will be deactivated and is therefore free of voltage. If a LED load is connected the device has to be restarted before the output will be activated again.

7.5 Overload protection

If the maximum load is exceeded by a defined internal limit, the LED driver turns off the LED output. After restart of the LED driver the output will be activated again.
The restart can either be done via mains reset or via interface (DALI).

7.6 Insulation between terminals

Insulation	Mains	LED	DA+/-	DS+/-
Mains	–	double	double	double
LED	double	–	double	basic
DA+/-	double	double	–	basic
DS+/-	double	basic	basic	–

basic ... represents basic insulation.
double ... represents double or reinforced insulation.

8. Miscellaneous

8.1 Insulation and electric strength testing of luminaires

Electronic devices can be damaged by high voltage. This has to be considered during the routine testing of the luminaires in production.

According to IEC 60598-1 Annex Q (informative only!) or ENEC 303-Annex A, each luminaire should be submitted to an insulation test with 500 V DC for 1 second. This test voltage should be connected between the interconnected phase and neutral terminals and the earth terminal.
The insulation resistance must be at least 2 MΩ.

As an alternative, IEC 60598-1 Annex Q describes a test of the electrical strength with 1500 V AC (or 1.414 x 1500 V DC). To avoid damage to the electronic devices this test must not be conducted.

8.2 Conditions of use and storage

Humidity:	5 % up to max. 85 %, not condensed (max. 56 days/year at 85 %)
Storage temperature:	-40 °C up to max. +80 °C

The devices have to be acclimatised to the specified temperature range (ta) before they can be operated.

The LED driver is declared as inbuilt LED controlgear, meaning it is intended to be used within a luminaire enclosure.
If the product is used outside a luminaire, the installation must provide suitable protection for people and environment (e.g. in illuminated ceilings).

8.3 Maximum number of switching cycles

All LED driver are tested with 50,000 switching cycles.
The actually achieved number of switching cycles is significantly higher.

8.4 Additional information

Additional technical information at www.tridonic.com → Technical Data

Lifetime declarations are informative and represent no warranty claim.
No warranty if device was opened.