

LEDIM/D1C



Flicker-Free Analog Single Channel Intelligent LED Dimming Driver
CASAMBI®/Touch/Pushbutton Dimming Control
Part-No.: LD1C-G1

Designed and produced in Germany



Features

- High efficiency driver with constant current output up to 30 W, 1.5 A
- Analog dimming – 100% flicker-free
- Dimming down to 0% (Dim-To-Dark)
- Simple DC power-supply up to 24 V depending on application.
- 20 mm width – ready to fit extreme compact applications
- Dimming controls: CASAMBI Wireless, Touch, Pushbutton
- Easy extension to multiple outputs via LDX control signal output. LDX is used within the LEDIM/ModularSystem as the interconnect signal between LEDIM devices, for more details, please see section 7.

LEDIM/Solutions

- Open frame solution for 2-wire Dim-To-Warm (single channel)
- Dim-To-Warm with mating LEDIM/Cx or 3rd party LED engines: Dimmed light gets warmer with decreasing brightness - from cold white to candle light
- Best lighting with common state-of-the-art COBs and various linear LED engines
- Bridge functionality: LDX Output for controlling additional LEDIM/Dx in Multiplying- or Tunable White use cases

Applications

- Household appliances
- Decorative lighting
- Restaurant, Bar & Hotel
- Task lighting
- Architectural lighting

1. Technical Data

Parameter	Value	Tolerance	Unit
Dimensions	L = 70 x W = 20 x h = 6.5	-	mm
Operating Temp.	-20 ... +70 (see 8.2 for details)	-	°C
Storage Temp.	-40 ... +80	-	°C
Humidity	non condensing	-	-
Supply Voltage (V ₊)	6 ... 24	-	V DC
Max. Output Voltage	0.96 x V ₊	-	V DC
Min. Output Voltage	4.2	+/- 0.5	V DC
Max. Output Current	1.5	-	A
Max. Output Power	30	-	W
Standby Power	0.40	+/- 0.05	W

2. Ordering Information

Part Number	Product	Dimming
LD1C-G1	D1C, Open-Frame	CASAMBI/Touch/Pushbutton

Please note: LEDIM/Dx devices normally come in preconfigured maximal output currents (“nominal current”), which in this case would be: 0350/0500/0700/1000/1500 mA. As LEDIM/D1C is configurable by using CASAMBI’s “fixtures” feature, **only one variant** is orderable (preconfigured with 350 mA). But all values above are offered as fixtures, which can be simply selected in the CASAMBI app. All other current values are available on request or can be tailored. Please see section 5.2 for details.

3. Outline Dimensions

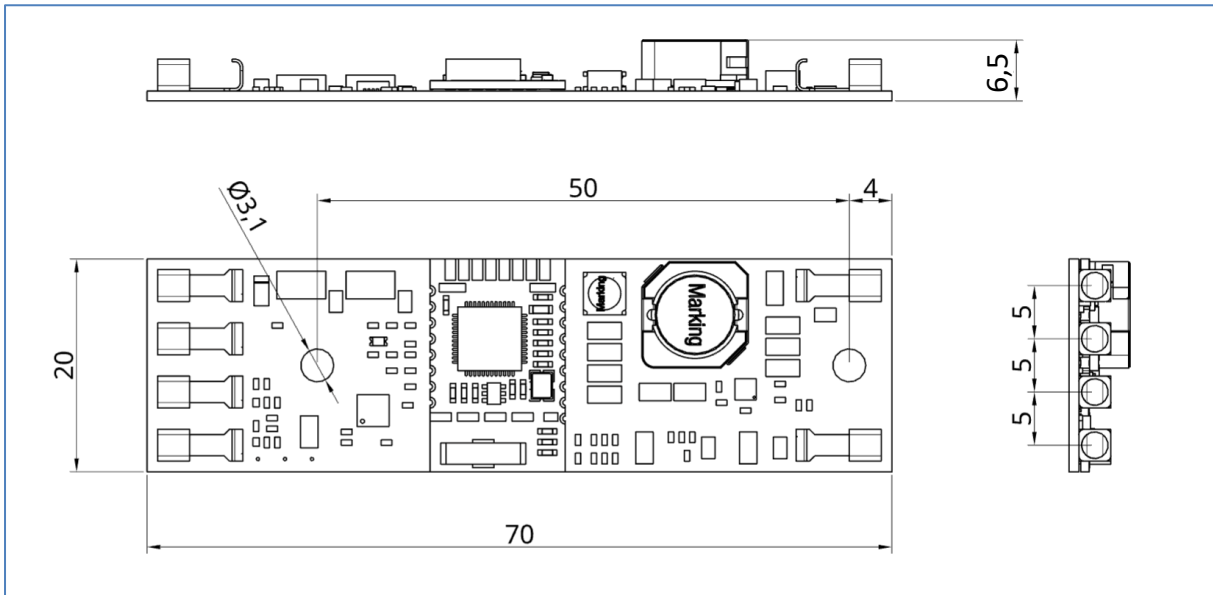
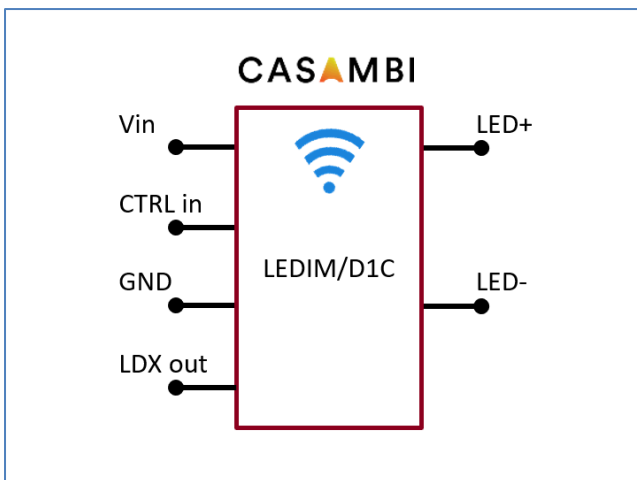


Figure 1: Outline Dimensions LEDIM/D1C

4. Block Diagram



- **Vin:** Input voltage (supply).
- **CTRL in (Dimming Input):** The dim level is set by either CTRL in (Touch/Pushbutton) or CASAMBI Wireless Dimming. The dim level is set by the latter.
- **GND:** Ground
- **LDX out:** The LDX control signal is driven according to the dim level determined by the active dimming input and the selected dimming characteristic.
- **LED+/LED-:** Constant current outputs for LED

5. CASAMBI Dimming

LEDIM/D1C's main dimming control is CASAMBI¹ wireless dimming.

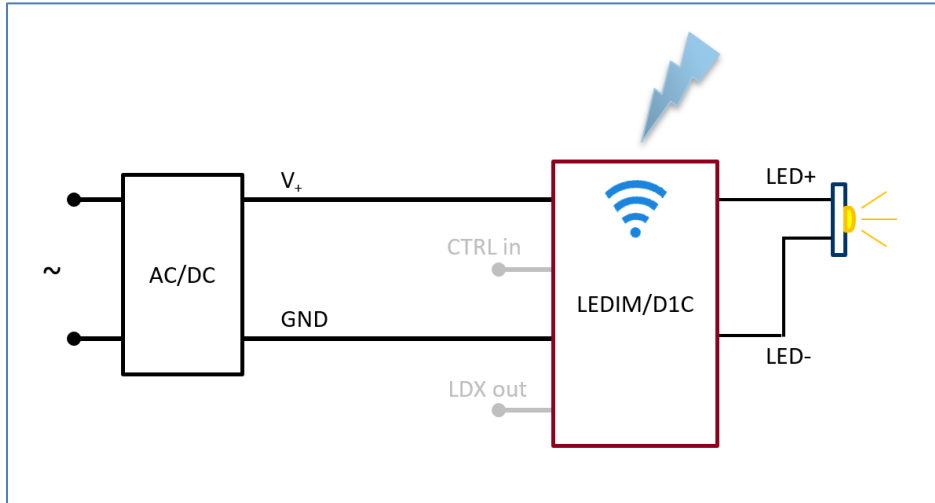


Figure 2: CASAMBI Dimming illustrated

LEDIM/D1C appears in the CASAMBI app as a device with one single color light source or as a device with a tunable white light source - according to the chosen CASAMBI fixture. LEDIM offers a bunch of fixtures representing the most common constant current values (see below). Those can be customized by copying the fixture to your own CASAMBI account² and modifying it to your specific needs. These modifications might include the appearance of the device in the CASAMBI app (e.g., with your own logo) as well as the basic functionality (single color vs tunable white) and the nominal output current.

5.1 CASAMBI Dimming Sources

As dimming sources all CASAMBI switches (e.g. LEDIM/LEPUK) or the almighty CASAMBI app can be used:



Figure 3: CASAMBI Dimming sources illustrated

¹ For more information about the CASAMBI technology and ecosystem, please refer to <https://casambi.com/>.

² Please reach out to your CASAMBI representative to learn more about getting your own account.

5.2 LEDIM configurations

The following configurations are offered in the CASAMBI fixture group named “LEDIM/D1C” (Group #2349). These can be used in the CASAMBI app to configure the LEDIM/D1C device – also by end customers. **Please note:** To prevent end customers from doing so, simply copy the appropriate fixture to your own CASAMBI account, modify it according to your needs and apply it using the **CASAMBI Utility app** to the device before delivery. Thus, the end customer cannot modify the configuration any more.

ID	Name	Owner	Offered by	Functionality	Nominal CC
14505	LEDIM/D1C 350mA	ledim	LEDIM GmbH	Single Color	350 mA
25286	LEDIM/D1C 500mA	ledim	LEDIM GmbH	Single Color	500 mA
26338	LEDIM/D1C 700mA	ledim	LEDIM GmbH	Single Color	700 mA
26339	LEDIM/D1C 1000mA	ledim	LEDIM GmbH	Single Color	1000 mA
25612	LEDIM/D1C 1500mA	ledim	LEDIM GmbH	Single Color	1500 mA
26344	LEDIM/D1C TW 350mA	ledim	LEDIM GmbH	Tunable White	350 mA
26331	LEDIM/D1C TW 500mA	ledim	LEDIM GmbH	Tunable White	500 mA
26345	LEDIM/D1C TW 700mA	ledim	LEDIM GmbH	Tunable White	700 mA
26346	LEDIM/D1C TW 1000mA	ledim	LEDIM GmbH	Tunable White	1000 mA
26347	LEDIM/D1C TW 1500mA	ledim	LEDIM GmbH	Tunable White	1500 mA

5.3 Setting Configurations

The configuration of a device is set by selecting it in the CASAMBI mobile app, tapping on *Change Profile* and then selecting the desired profile from the list. The basic LEDIM profiles will only appear as long as the device has an original LEDIM profile (“fixture”). After changing to a customer specific profile, only profiles grouped with it will be shown.

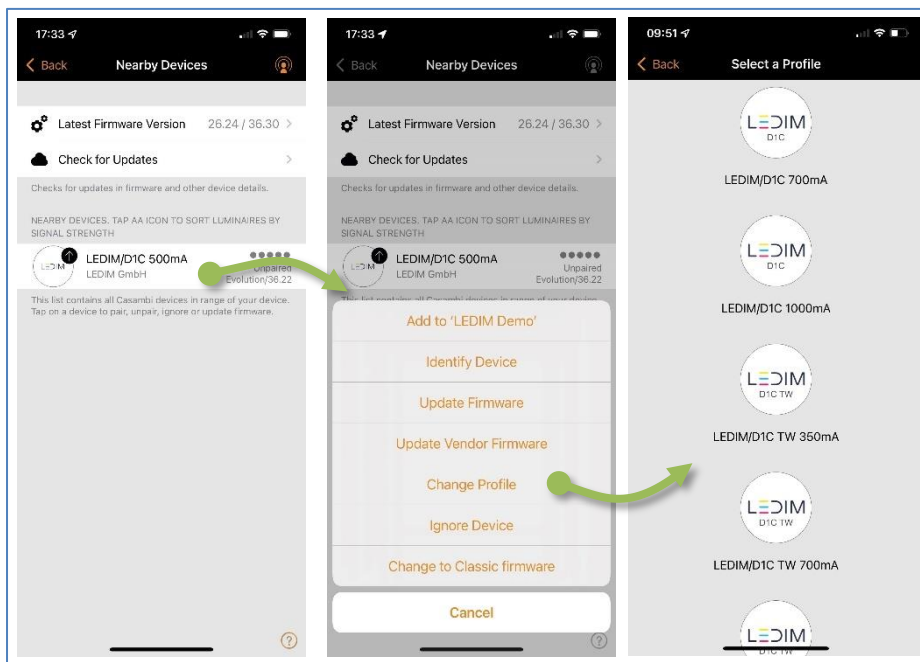
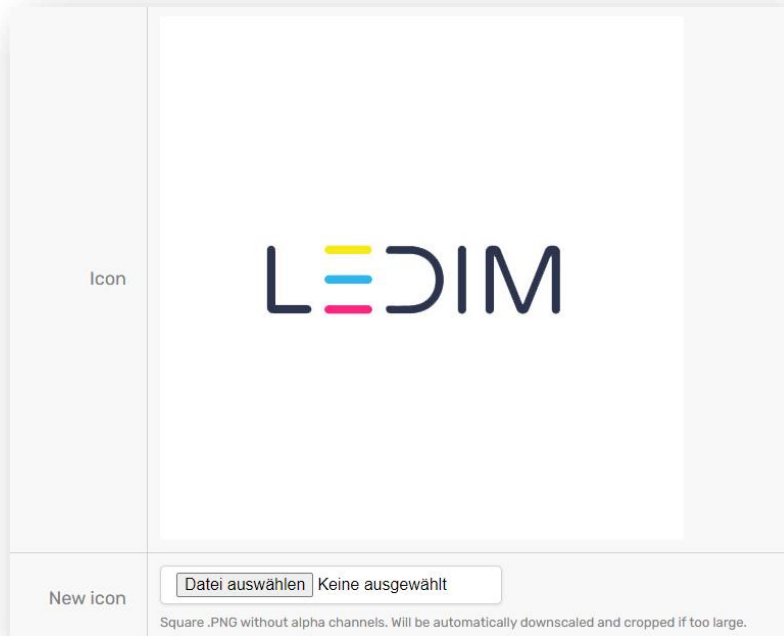


Figure 4: Selecting the configuration

5.4 Customizing Configurations

After copying the fixture in the CASAMBI **web** app to your own account, the main two things, you want to change are fixture's logo and the nominal (resp. maximum) CC output current. The logo can be changed right on the very beginning of the fixture configuration page, like here:



Simply click on the button and upload a "New icon".

The CC output current you'll find literally on the bottom of the page in the "Parameters" section:

Name	Min	Value	Max	Unit	On App?	Visibility
MAXCURRENT	0	<input type="text" value="1500"/>	1500	mA	<input type="button" value="No"/>	<input type="button" value="Normal"/>

Parameter visibility affects how the parameter can be configured further when the profile is used in Casambi Ready Design:

- **Normal:** new default value and visibility in the client application can be changed.
- **Locked:** parameter has a fixed value in the OEM profile and shown as read-only for derived profiles; locked parameters should not
- **Hidden:** parameter is internal to the OEM profile, not shown in derived profiles.

Change the "Value" field to your needed value in mA and apply to the new fixture. Now select the fixture in the respective device in the CASAMBI **Utility** app.

5.5 Firmware Update

LEDIM/D1C is able to update its vendor firmware “over-the-air” by using CASAMBI’s appropriate feature. When a new vendor firmware is available, end users will be notified by the CASAMBI mobile app and can conduct the update process as like any other device within the app.



REMARK:

Please keep in mind, after the update process has successfully ended, the device needs to be restarted. Therefore a power-down-power-up cycle has to be performed.

6. Touch/Pushbutton Dimming

LEDIM/D1C can also be dimmed by ‘relative dimming’ using a pushbutton connected to its control input or in touch dimming configuration. As both pushbutton and touch are using the same principle of dimming relative to the current state, they are bespoken equal in the following section.

6.1 Touch/Pushbutton Dimming Wiring

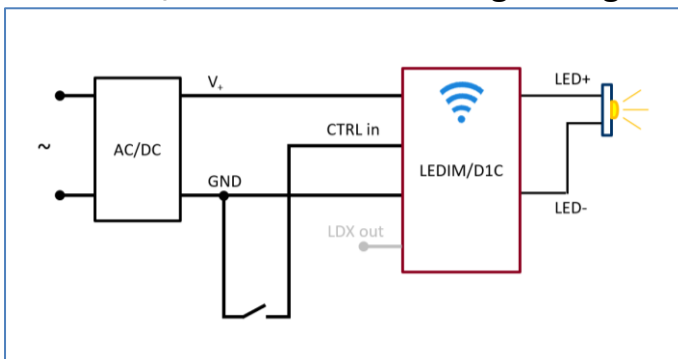


Figure 5: Pushbutton wiring illustrated

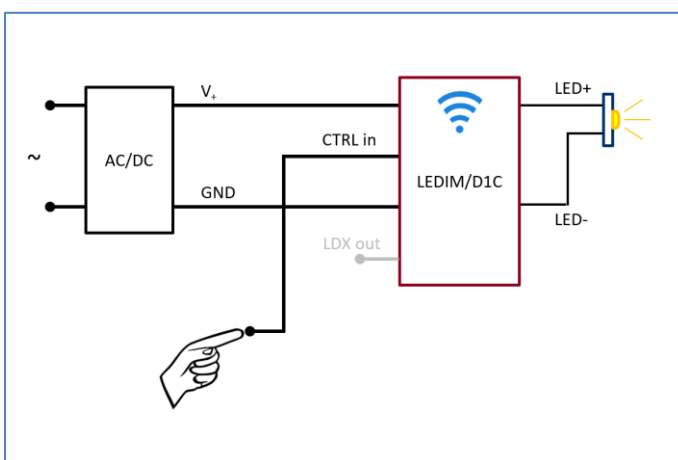


Figure 6: Touch wiring illustrated

6.2 Touch/Pushbutton Dimming Commands

LEDIM/D1C's touch/pushbutton commands are pretty straight forward: Short touches³ switch on and off, while long touches are dimming. As the touches are handled by the CASAMBI module, the behavior might be slightly different compared to other LEDIM/Dx devices. While the latter dim through the maximum and minimum during long touches, the CASAMBI handling doesn't. Which means, dimming brighter will stop when the maximum is reached, while reducing the brightness will stop when the luminaire is off.

7. Bridge Functionality

LEDIM/D1C offers a control signal for LDX dimming like LEDIM's Bridge Devices, which are part of the LEDIM ModularSystem⁴.

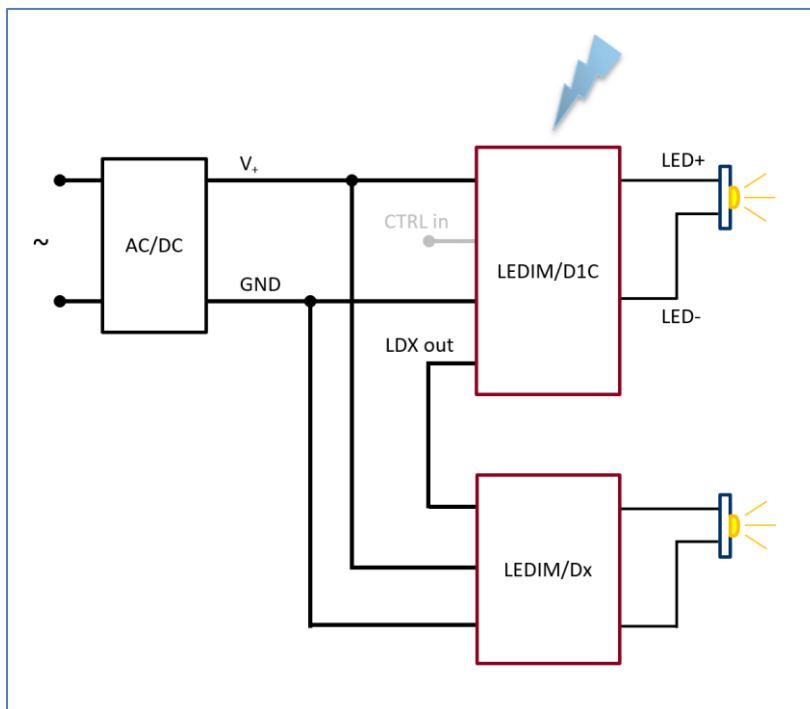


Figure 7: Bridge mode illustrated

Up to 5 LDX receivers can be connected directly to one LDX source.

³ We use the term “touch” here synonymous to “push the pushbutton” for better readability.

⁴ For further information about the ModularSystem, please refer to your sales representative or www.ledim.de

7.2 Tunable White Mode

In 'Tunable White Mode' all subsequent LEDIM/Dx devices are seen as pairs of warm white (WW) and (CW) driving devices. These pairs of course also include the controlling D1C. So, the first connected LEDIM/Dx will be the corresponding WW driver for the CW driven by D1C. The next two LEDIM/Dx (configured to LDX address 0 and 1) are the next pair of WW and CW drivers. And so on with the third. This means – like before – all WW and all CW channels receive the same brightness level (in %) via LDX from the controlling LEDIM/D1C device. Which means again, all controlled Dx devices with WW drive the **same percentage** of their particular nominal current as the D1C device, not the same current. And likewise all controlled Dx devices connected to CW. Also, as in every TW scenario, the overall brightness is divided according to the ratio between WW and CW⁶.

For 'Tunable White Mode', LEDIM/D1C needs to be configured with a TW-fixture (see above).

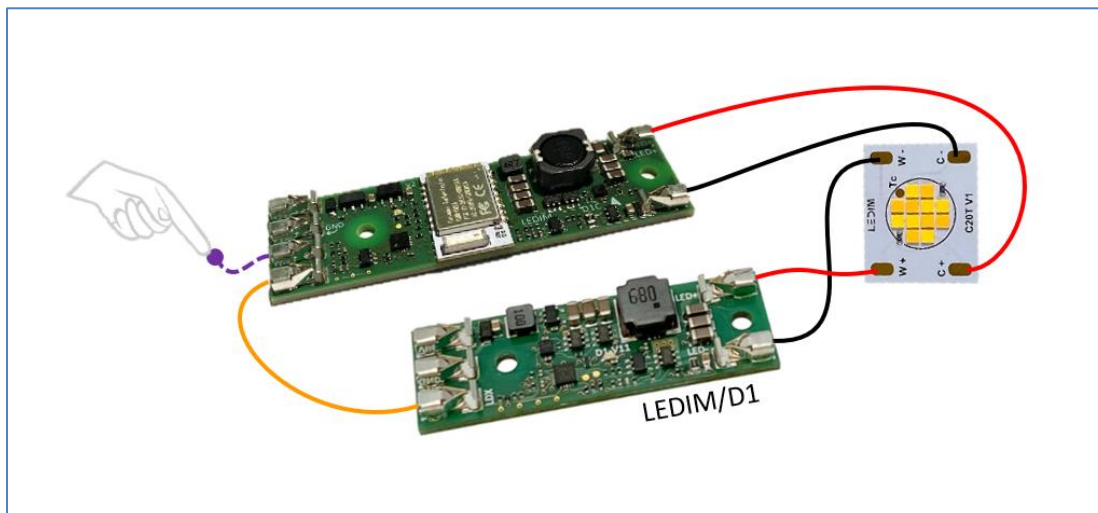


Figure 9: Tunable White Mode illustrated

⁶ Example: If the overall brightness is set to 50 % and the slider for color temperature is right in the center, both channels will be driven by 25 % brightness. If the overall brightness is set to 100 % and the slider for color temperature is full on the CW side, the CW channel will be driven by 100 %, the WW channel by 0 % brightness.

8. Integration

8.1 Touch Dimming Requirements

As touch dimming only can work, when user contact “makes a difference”, please consider:

- When integrating D1C into a (metal) lamp housing, which is also the touch surface, D1C's CC outputs must be decoupled to reduce parasitic capacity.
- When the LED engine's PCB is made of Aluminum, it might be a critical condition to have the engine's heat sink electrically connected to the touch surface (e.g., the lamp housing). The parasitic capacity of the LED engine can cause malfunctions in touch dimming here. Please use thermal conducting pads⁷ instead of thermal paste (blue pad in Figure 10) to avoid.
- COBs or LED engines made of ceramic material are less critical in terms of parasitic capacity. So are cases, where the LED engine is electrically separated from the touch surface (see Figure 11).
- For further questions please contact support@ledim.de.

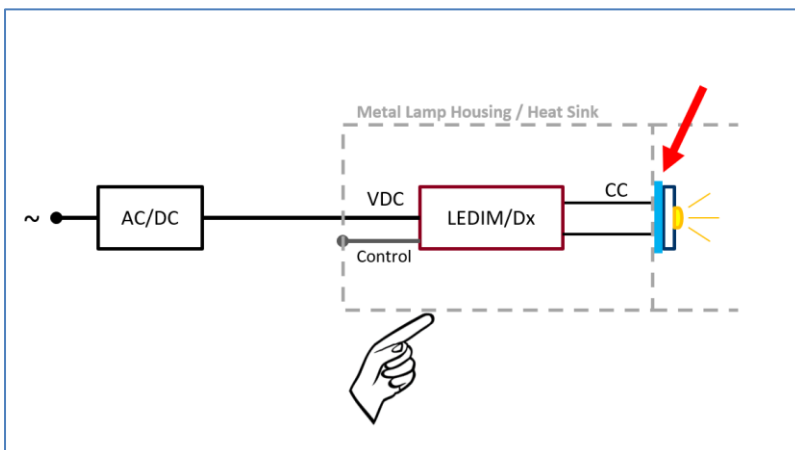


Figure 10: Critical Condition: Heat Sink connected to lamp housing with Alu PCB

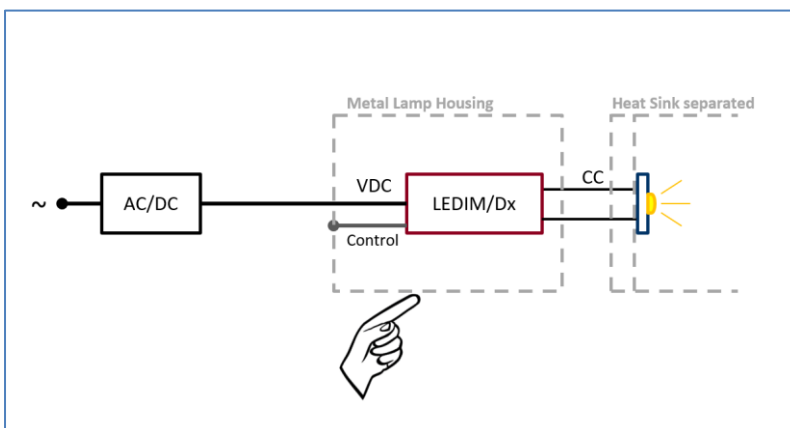


Figure 11: Less Critical Condition: Heat Sink not connected to lamp housing

⁷ Use thermal pads with thickness of at least 0.3 mm.

8.2 Radio Communication Requirements

As LEDIM/D1C does radio transmission, the integration into enclosing structures must be engineered carefully. Especially the coverage of the CASAMBI antenna with conductive or other materials must be considered to have impact on function, on the signal strength, as well as on certification and conformity.



CAUTION:

Conformity and compliances of the final product are not covered by the conformity and the certifications of LEDIM/D1C. Thus, the certification of the final product is the duty of the integrator.

8.3 Other Requirements



CAUTION:

The device must not be stressed. The mounting area flatness must be chosen reasonable.



The device must be protected against electrostatic discharge during manufacturing, as well as during regular operation. Users must neither touch the device nor the components on it.



CAUTION:

The device must not be used outside the operating temperature range. Please refer to the derating diagram below for proper usage.

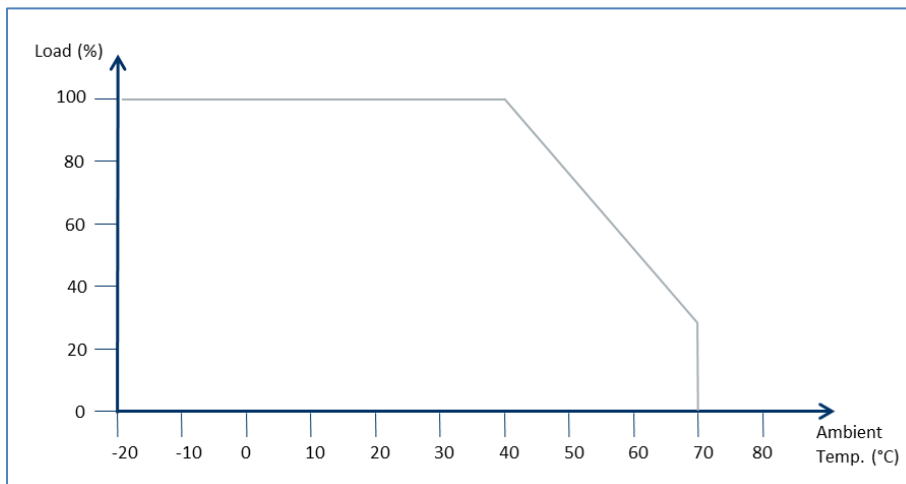


Figure 12: Derating Diagram

8.4 Typical Integration/Mounting the Device

D1C is typically integrated into a luminaire by mounting it to an even surface using screws and standoffs or spacers. Proper cooling must be ensured. The device can be mounted using M3 screws and standoffs or spacers. Please always consider the requirements mentioned in section 8.2. When D1C's touch dimming feature is used, please refer to section 8.1. Damages caused by wrong mounting are not covered by warranty.



CAUTION:

- D1C must not be used outside the operating temperature range. Please refer to section 8.2 for proper usage.
- The device must not be stressed.
- Proper insulation must be ensured. The top or the bottom side of the PCB must not be in contact with any conductive material.

8.5 Connector Pinout D1

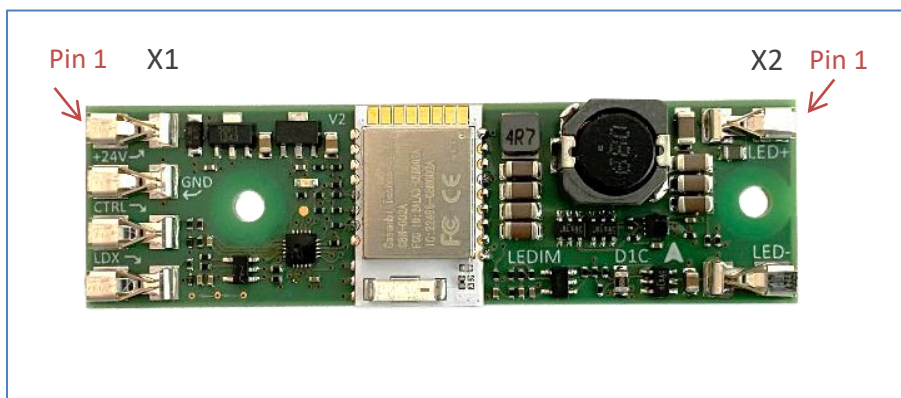


Figure 13: Connector Pinout

X1 – Supply voltage and dimming input:

Pin 1: Supply input (V_{in})
Pin 2: GND
Pin 3: CTRL in
Pin 4: LDX out

X2 – Load Output (CC):

Pin 1: LED output +
Pin 2: LED output –

8.6 Connecting multiple Devices

Multiple LEDIM/Dx devices can be attached to LEDIM/D1C simply by realizing a parallel arrangement.



CAUTION:

Please ensure, the power supply and cabling meet the electrical requirements (e.g. maximum current and voltage). Do not connect **more than 5 devices to the LDX output!**

Please see the LEDIM/Dx Application Notes for further details.

8.7 Output Wiring Scenarios

As the general wiring approach is quite simple – LED engines in a row – there are some aspects to consider. For an in-depth discovery of the various possibilities please refer to the LEDIM Dx Application Notes.



CAUTION:

Both LED+ and LED- lines must be free of any other potentials. Connect only to the appropriate LED signals. Do not connect to LED+ or LED- outputs of other drivers.

9. Maintenance/Service

The device has no serviceable parts inside. Thus, the device itself is to be the field replaceable unit (FRU). When replacing the unit, please ensure to apply the same measures as during the manufacturing process (e.g. the use of thermal paste, screw torque etc.).

10. Standard Compliance

LEDIM devices and accessories comply or will comply with all relevant standards and guarantee safe operation.

- Conformity: CE (2014/53/EU, 2009/125/EG+EC)
- Environment: RoHS (2011/65/EU, 2015/863)
- EMC/Safety: EN 55015, EN 61547, EN 62311, EN 62368-1, EN 62493, ETSI EN 301489-1, ETSI EN 301489-17

11. Safety Information and Precautions ⚠

- The device must only be utilized for its intended use.
- The LEDs are hot during operation and must never be touched.
- Eye safety/photobiological safety: Even though all used components comply with EN 62471, direct viewing into the light emitting areas must be avoided under all circumstances. Measures must be taken to prevent users from directly viewing into the light emitting areas.
- The device itself and all its components must not be mechanically stressed.
- During assembly, manufacturing and operation conducting paths on the circuit board must not be damaged or destroyed.
- To avoid mechanical damage to the connecting cables, the module should be attached securely to the intended counterpart. Heavy vibration should be avoided.
- To operate the device safely, it is absolutely necessary to operate it with an electronically stabilized power supply protecting against short circuits, overload and overheating.
- To ease the luminaire/installation approval, power supplies and additional electronic control gear should carry the CE mark and must be certified. The declarations of conformity must include the appropriate standards. Check for the mark of an independent authorized certification institute.
- Installation of LED modules (with power supplies) needs to be made with regard to all applicable electrical and safety standards. Only qualified personnel should be allowed to perform installations.
- Correct electrical polarity needs to be observed. Wrong polarity will destroy the module and might cause further damages.
- Pay attention to standard ESD precautions when installing the module.
- The module, as manufactured, has no conformal coating and therefore offers no inherent protection against corrosion.
- Damage by corrosion will not be honored as a materials defect claim. It is the user's responsibility to provide suitable protection against corrosive agents such as moisture and condensation and other harmful influences.
- If the IP rating of the fixture should be higher than IP20, the design of the housing should be according to the IP standards in the application.
- Pay attention not to exceed the maximum operation temperature at T_c point, especially when the device is used in enclosed environment. Appropriate measures must be taken.

Room for your notes and sketches:
