

# AstraDriver

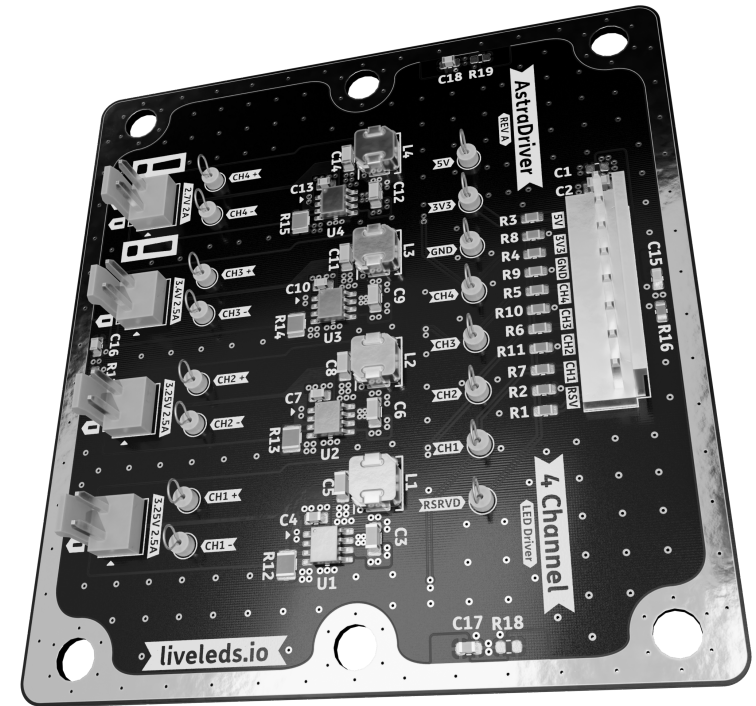
23 June 2024

In review

4 Channel LED Driver with PWM dimming input. LED2001PHR is the driver IC, it can support up to 4A, 3V - 18V at 850KHz switching frequency. Tuned for 3.5V at 2.5A and 2.7V at 2.0A.

## Features

- JST VH Connectors
- 4x LED2001PHR
- Test plugs for each input & output for easy debugging
- 2.55V 2.1A channel for red
- 3.25V 2.5A channel for blue and converted yellow
- 3.4V 2.5A channel for green



Render for reference only



File: overview.kicad\_sch



File: block\_diagram.kicad\_sch

Board Name	Project Name	Company	Sheet Title	Sheet Path & File Name	Date	Revision	Size	Sheet
<b>AstraDriver</b>	AstraBeam	LiveAstra Technologies	AstraDriver - Schematic	/ AstraDriver.kicad_sch	2024-08-26	<b>A</b>	<b>A4</b>	<b>1</b> of <b>8</b>

22 April 2024

# Overview

## Page Description

- 1 Cover
- 2 Overview
- 3 Block Diagram
- 4 Channel 1 Blue and CY
- 5 Channel 2 Blue and CY
- 6 Channel 3 Green
- 7 Channel 4 Red
- 8 Misc

## Notes

The center of the board will have a 102x30mm heat sink pad.  
Vias will be plugged and capped to avoid issues with exposed pads.  
Test plugs will be hand-soldered on a single test board.

QST1

### Question

Something is unclear or a missing piece of information potentially needs to be explored further.

INF1

### Information

Generic information box to inform about specifics of the part or layout, notes, helpful information.

CRT1

### Critical

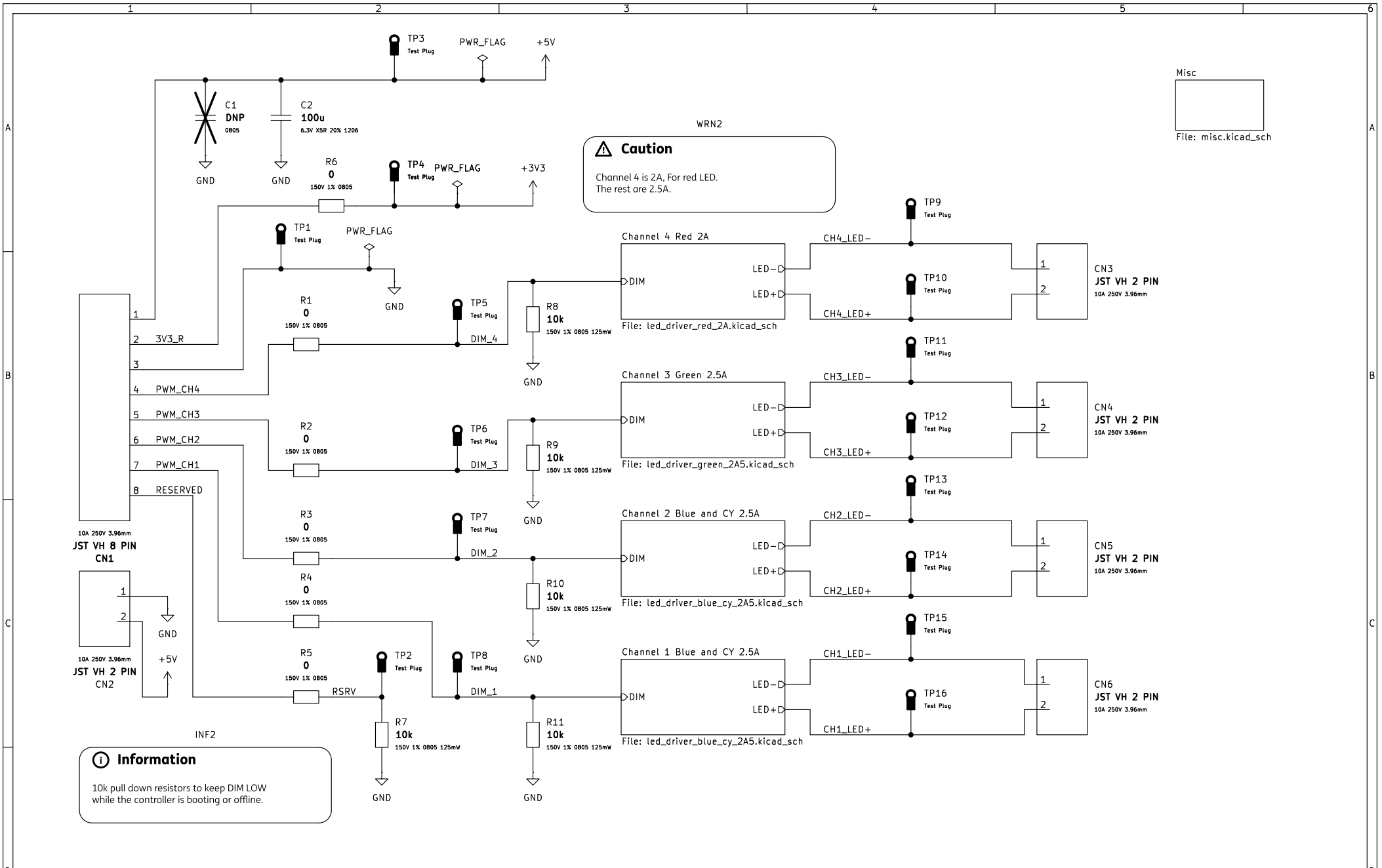
It is critical to follow the instructions here. Failure to do so will result in poor performance or failure.

WRN1

### Caution

Extra care is required here. Pay attention to details, routing, and try your best to follow the advice.

Board Name	Project Name	Company	Sheet Title	Sheet Path & File Name	Date	Revision	Size	Sheet
AstraDriver	AstraBeam	LiveAstra Technologies	AstraControl - Overview	/Overview/ overview.kicad_sch	2024-08-26	A	A4	2 of 8



**Caution**  
Channel 4 is 2A, For red LED.  
The rest are 2.5A.

Misc  
File: misc.kicad\_sch

**Information**  
10k pull down resistors to keep DIM LOW while the controller is booting or offline.

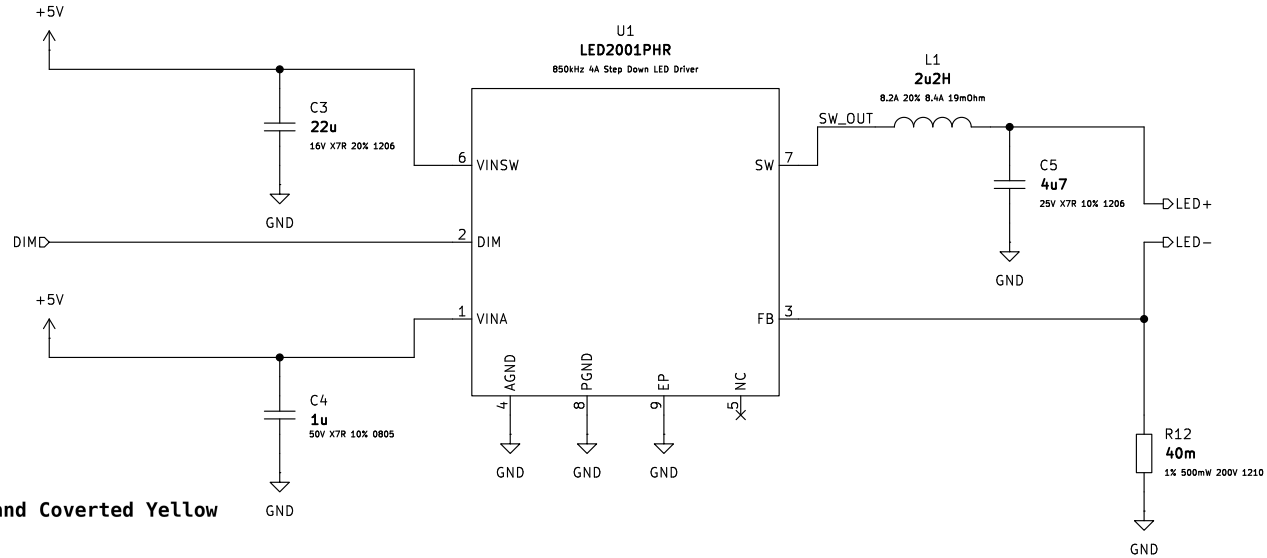
Board Name	Project Name	Company	Sheet Title	Sheet Path & File Name	Date	Revision	Size	Sheet
AstraDriver	AstraBeam	LiveAstra Technologies	AstraControl - Block Diagram	/Block Diagram/ block_diagram.kicad_sch	2024-08-26	A	A4	3 of 8

# Blue and CY

## Information

LED Current: 2.5A (3A Max)  
 LED Current Ripple: 4%  
 Inductor Current Ripple: 30%

INF3



Vf: 3.25V If: 2.5A Dynamic resistance: 181 mΩ

### Operating Conditions

@Vin - from 5 to 5 V: 5 V  
 @Iout - from 2.5 to 2.5 A: 2.5 A  
 @Ta - from -55 to 150 °C: 25 °C

### LED2001 For Blue and Covered Yellow

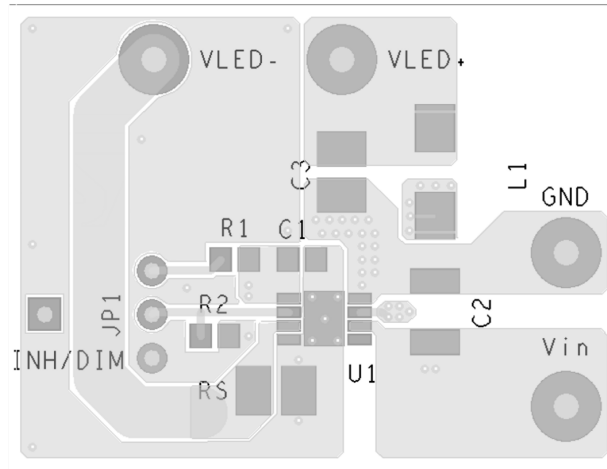
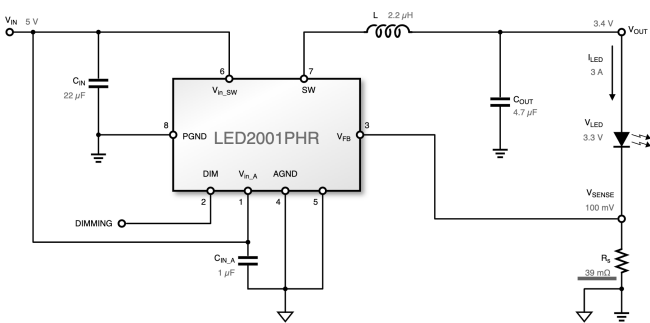
#### CURRENT RIPPLE DIMMING

LED Current  
 LED Current Ripple:  %  from 1% to 20%  
 Dimming Setting  
 Use dimming  
 Inductor Current  
 IL Ripple:  %  from 10% to 60%

#### Actuals

fsw: 850 kHz  
 Ton: 822.56 ns  
 ILED: 2.56 A  
 bandwidth: 129.04 kHz  
 phase margin: 84.19°  
 IC Tj: 63 °C  
 ΔTj: 38 °C

#### Circuit - Schematic



Board Name	Project Name	Company	Sheet Title	Sheet Path & File Name	Date	Revision	Size	Sheet
AstraDriver	AstraBeam	LiveAstra Technologies		/Block Diagram/Channel 1 Blue and CY 2.5A/ led_driver_blue_cy_2A5.kicad_sch	2024-08-26	A	A4	4 of 8

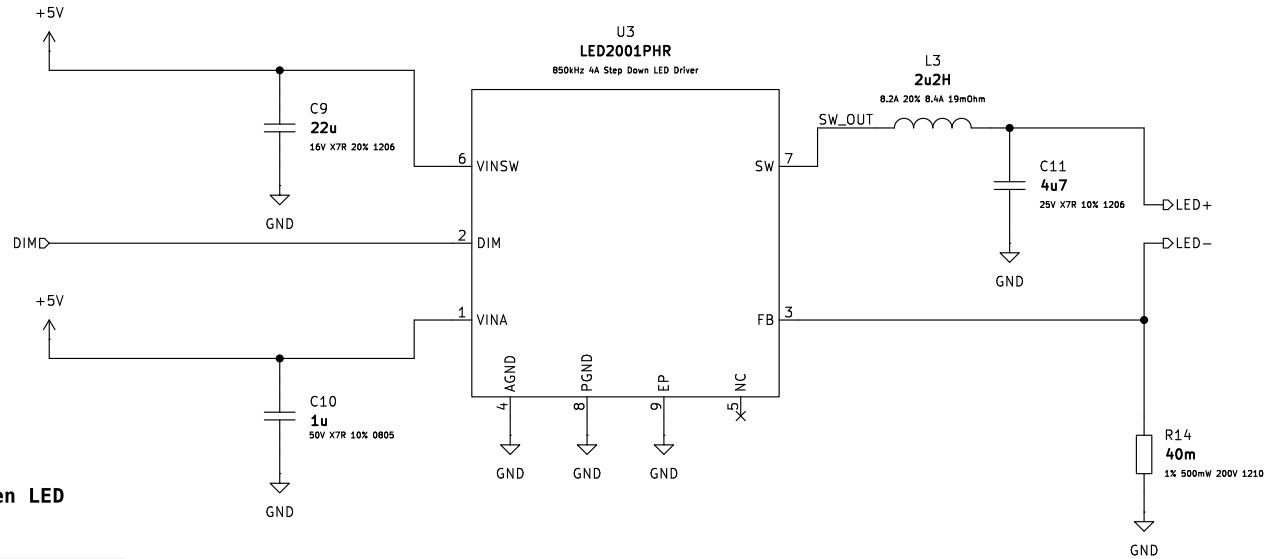


# Green

## Information

LED Current: 2.5A (3A Max)  
 LED Current Ripple: 3%  
 Inductor Current Ripple: 30%

INF5



VF: 3.4V IF: 2.5A Dynamic resistance: 250 mΩ

Operating Conditions  
 @Vin - from 5 to 5 V: 5 V  
 @Iout - from 2.5 to 2.5 A: 2.5 A  
 @Ta - from -55 to 150 °C: 25 °C

Actuals  
 fsw: 850 kHz  
 Ton: 857.55 ns  
 ILED: 2.56 A  
 bandwidth: 115.09 kHz  
 phase margin: 86.85°  
 IC Tj: 62.9 °C  
 ΔTj: 37.9 °C

### LED2001 For Green LED

#### CURRENT RIPPLE DIMMING

LED Current

LED Current Ripple:  %  from 1% to 20%

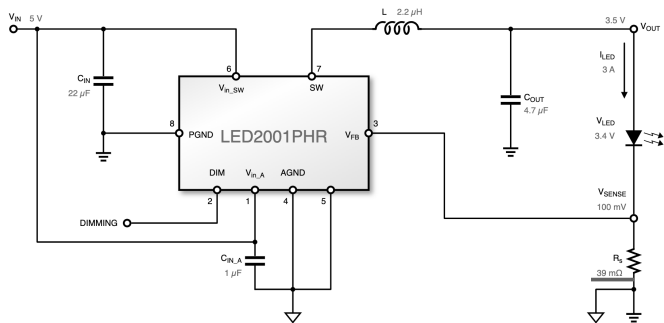
Dimming Setting

Use dimming

Inductor Current

IL Ripple:  %  from 10% to 60%

#### Circuit - Schematic



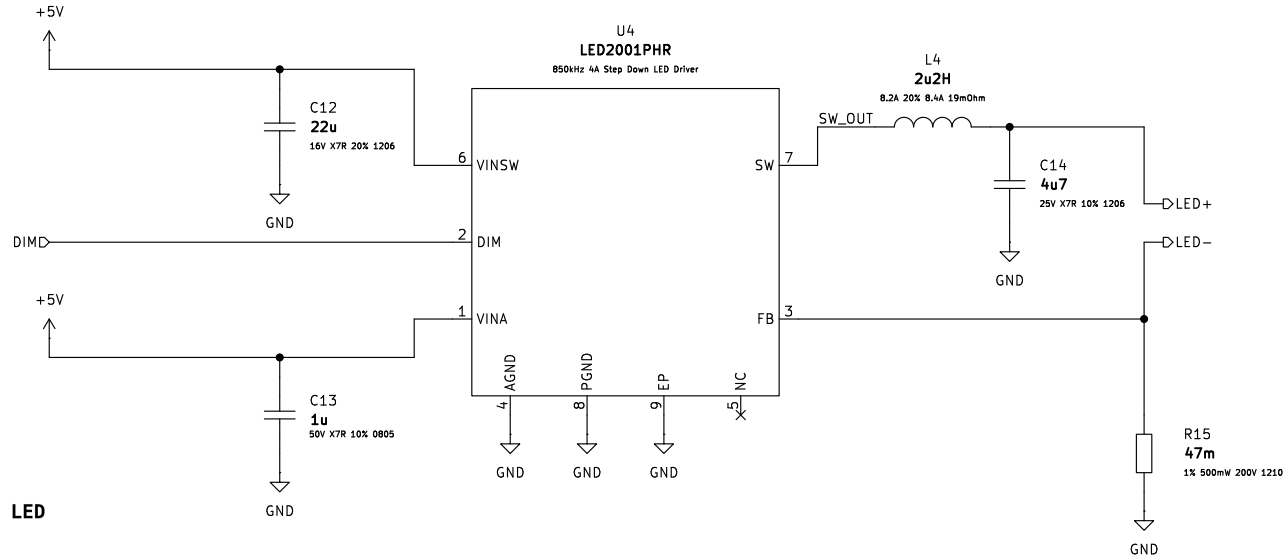
Board Name	Project Name	Company	Sheet Title	Sheet Path & File Name	Date	Revision	Size	Sheet
AstraDriver	AstraBeam	LiveAstra Technologies		/Block Diagram/Channel 3 Green 2.5A/ led_driver_green_2A5.kicad_sch	2024-08-26	A	A4	6 of 8

# Red

## Information

LED Current: 2.13A (2.5A Max)  
 LED Current Ripple: 4%  
 Inductor Current Ripple: 34%

INF6



VF: 2.55V, IR: 2.1A, Dynamic resistance: 285 mΩ

### Operating Conditions

@Vin - from 5 to 5V: 5V  
 @Iout - from 2.1 to 2.1A: 2.1A  
 @Ta - from -55 to 150°C: 25°C

### Actuals

fsw: 850 kHz  
 Ton: 651.75 ns  
 ILED: 2.13 A  
 bandwidth: 117.54 kHz  
 phase margin: 77.58°  
 IC TJ: 53.8°C  
 ΔTj: 28.8°C

## LED2001 For Red LED

### CURRENT RIPPLE DIMMING

LED Current

LED Current Ripple:  %  from 1% to 20%

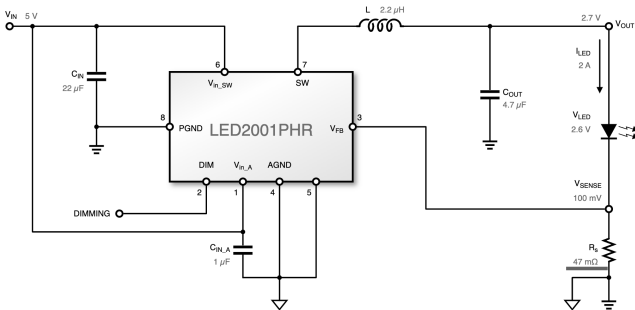
Dimming Setting

Use dimming

Inductor Current

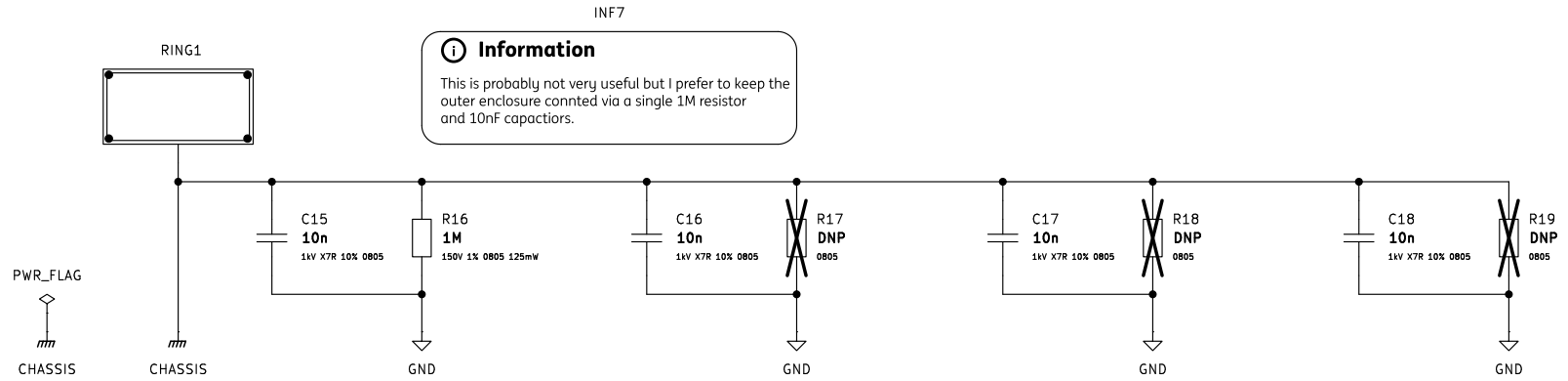
IL Ripple:  %  from 10% to 60%

### Circuit - Schematic



Board Name	Project Name	Company	Sheet Title	Sheet Path & File Name	Date	Revision	Size	Sheet
AstraDriver	AstraBeam	LiveAstra Technologies		/Block Diagram/Channel 4 Red 2A/ led_driver_red_2A.kicad_sch	2024-08-26	A	A4	7 of 8

# Misc



Board Name	Project Name	Company	Sheet Title	Sheet Path & File Name	Date	Revision	Size	Sheet
AstraDriver	AstraBeam	LiveAstra Technologies	AstraControl - Block Diagram	/Block Diagram/Misc/ misc.kicad_sch	2024-08-26	A	A4	8 of 8