LVHC (Low Voltage High Current) LED Driver

Product Offering

LED driver board capable of driving 36A at low voltages

Adjustment to set max current

Fast Driver Switching Frequency (420KHz)

Custom Pulse Shaping
- Opto-isolated Input terminals
- Fast Switching Response (Min. Pulse Width = 8µs)

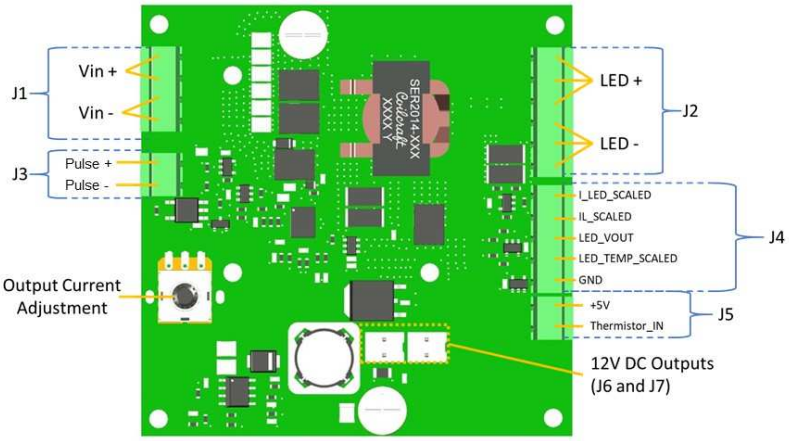
Monitor Driver and LED parameters through test points:
- Forward Voltage (V_f) and Forward Current (I_f)
- Forward Current (I_f) with Pulsed Input (Measured w/Duty Cycle)

Active thermal management
- Monitor LED Temperature
- Back off drive current to maintain safe working temperatures

Board size:
70 x 70 x 35mm
(including fan)

Input / Output Characteristics

Input Voltage	12 or 24Vdc
Output Power (Max.)	150W
Output Voltage	Up to 8Vdc (V_{in}=12V) Up to 18Vdc (V_{in}=24V)
Output Current Range (onboard dial)	1 – 30A (static current) 1 – 36A (pulse current)
Output Current Ripple	< 5% @ 420KHz
Efficiency (with 1.2W fan)	92% (typ.)
Driver Switching Frequency	420KHz



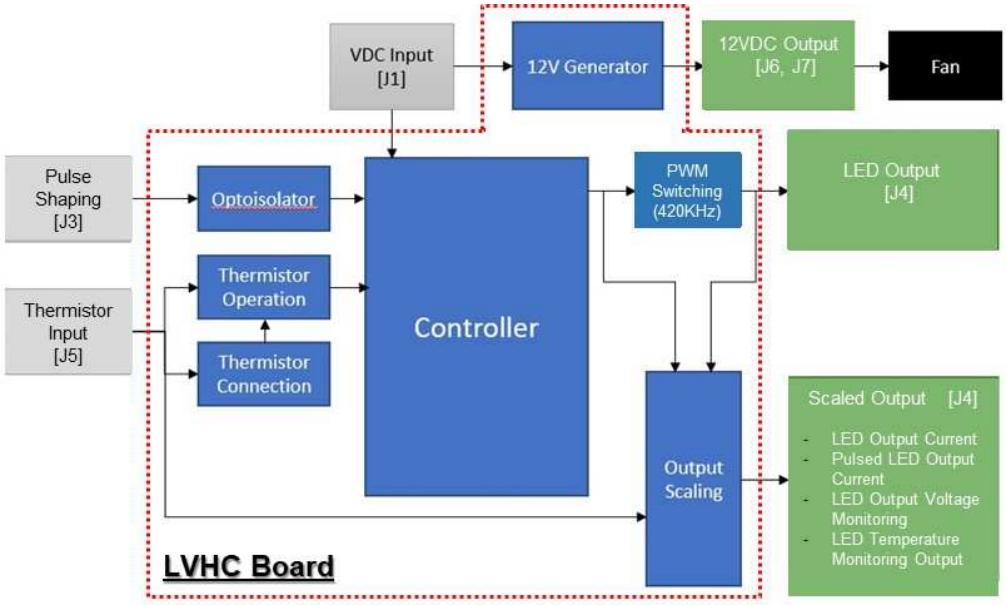
Custom Pulse Shaping (Pulse+ / Pulse-)

Pulse Input (Isolated Input)	Opto-isolator
Pulse Input Voltage (Pk-Pk)	5V (min) 8V (max)
Pulse Input: ACTIVE LOW	LED output ON when Pulse Input is LOW
Min. Pulse Width	8µs
Output Current Switching Response Time	Rise Time < 2µs Fall Time < 5.5µs
Pulsed Output Current Overshoot	< 35%

Monitoring Features

LED Temp. Monitoring Input	Thermistor_IN
LED Temp. Monitoring Output	LED_TEMP_SCALED
LED Output Voltage Monitoring	LED_VOUT
LED Output Current	IL_SCALED (Accuracy ± 5%)
Pulsed LED Output Current (Pulsed Duty Cycle Current)	I_LED_SCALED (Accuracy ± 5%)

Functional Block Diagram

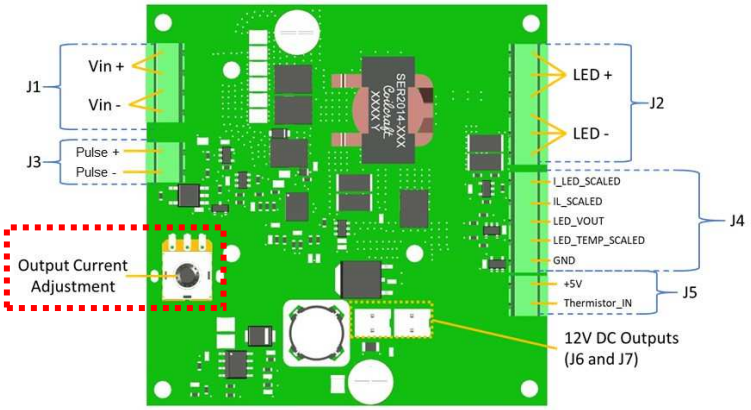


Input		Ports	
VDC Input	[J1]	**Vin+** **Vin-**	• V_{in}=12V (Support V_{out} up to 8Vdc) • V_{in}=24V (Support V_{out} up to 18Vdc)
Pulse Shaping	[J3]	**Pulse+** **Pulse-**	• Opto-isolated Input terminals • Pk-Pk 5V (min) / 8V (max) • LED output ON when Pulse Input is LOW • Fast Switching Response (Min. Pulse Width = 8µs)
Thermistor Input	[J5]	**+5V** **Thermistor_IN**	• 10KΩ thermistor input • Thermistor wiring is interchangeable (no polarity)

Output		Ports	
LED Output	[J2]	**LED+** **LED-**	• LED Output ports for LED connection
Scaled Output	[J4]		By measuring voltage across monitoring pins to calculate the required parameters
- LED Output Current		**IL_SCALED**	• LED Output Current (without Pulse Duty Cycle counted • Current (A) = 0.88 + [Voltage (V) x 20.7
- Pulsed LED Output Current		**I_LED_SCALED**	• LED Output Current (with Pulse Duty Cycle counted) i.e. 36A LED Output Current with 10% Duty-Cycle Pulse = 3.6A • Current (A) = 0.88 + [Voltage (V) x 20.7
- LED Output Voltage Monitoring		**LED_VOUT**	• Measure the LED voltage
- LED Temp. Monitoring Output		**LED_TEMP_SCALED**	• translates LED temperature into a voltage (tuned with Murata NCP18XH103J03RB) ➢ LED Temperature (°C) = 39*LN(LED_TEMP_SCALED) + 90
12VDC Output	[J6, J7]		2x 12V DC output connectors (J6 & J7) are provided
		+ / - [J6]	• Used – for driver on-board cooling fan
		+ / - [J7]	• Available for user – i.e. for LED cooling fan)

LED Output Current Setting [R12]

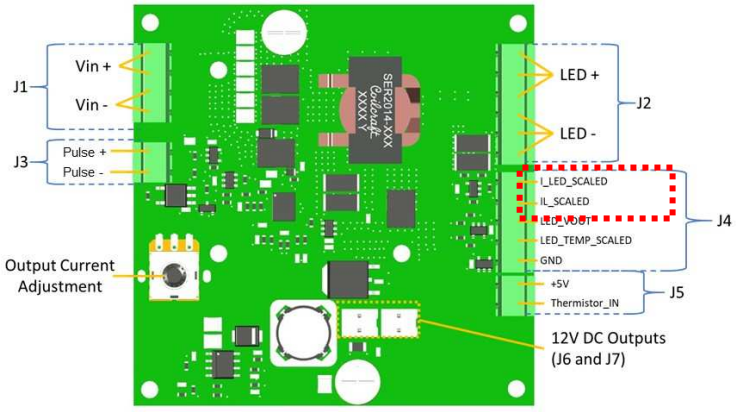
- LED output current is set by turning R12
  - clockwise to increase current
  - counterclockwise to decrease current



LED Output Current Monitoring [J4]

❖ **IL_SCALED**
- LED Output Current (without Pulse Duty Cycle counted
- Current (A) = 0.88 + [Voltage (V) x 20.7
- Current Accuracy ± 5%

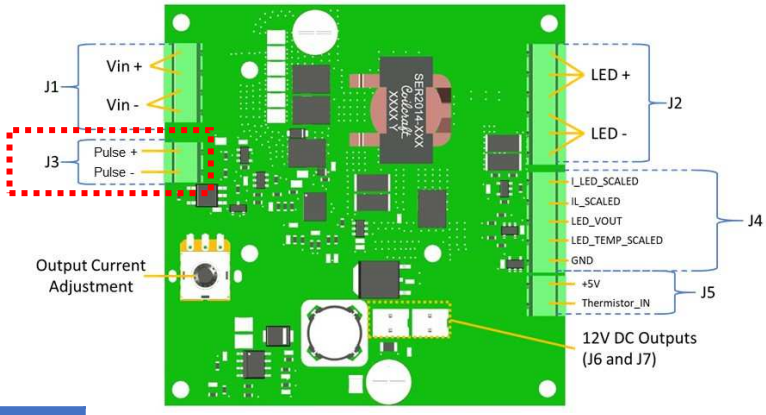
❖ **I_LED_SCALED**
- LED Output Current (with Pulse Duty Cycle counted)
- i.e. 36A LED Output Current with 10% Duty-Cycle Pulse = 3.6A
- Current (A) = 0.88 + [Voltage (V) x 20.7
- Current Accuracy ± 5%



Custom Pulse Shaping [J3]

- ❖ **Pulse +**
- ❖ **Pulse -**

- Input Signal (Pk-Pk): 5V (min) / 8V (max)
- Pulse Input: ACTIVE LOW
  - ➢ LED output ON when Pulse Input is LOW
- Fast Switching Response (Min. Pulse Width = 8µs)



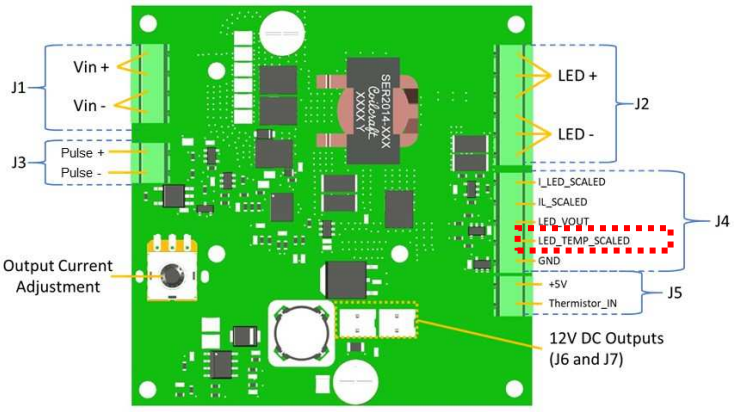
Output Current Pulse Switching Response

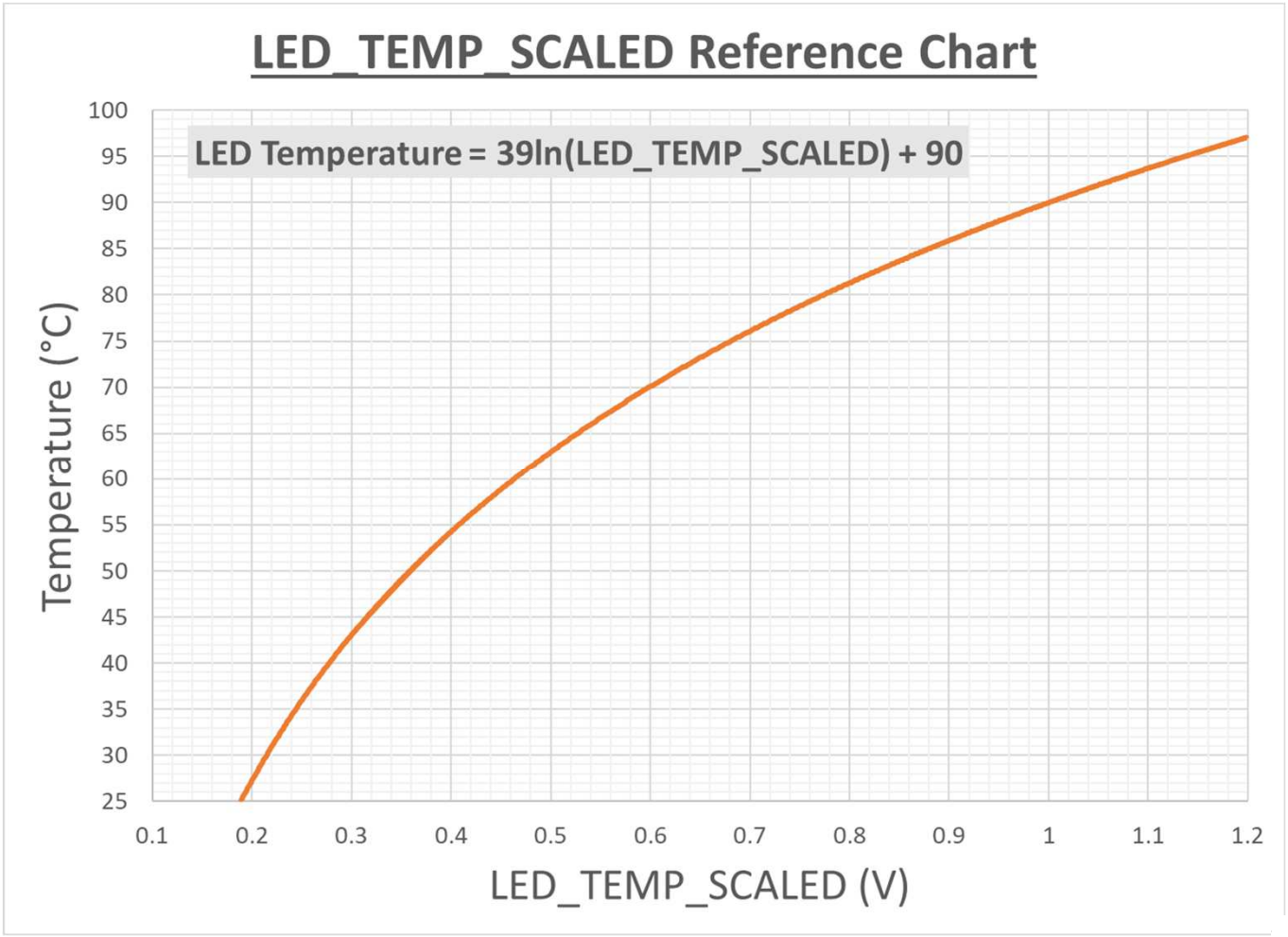
- Output Current / Voltage dependent

Output Voltage (V)	Output Current (A)	Rise Time (µs)	Fall Time (µs)
3	30	1.2	3.9
5	30	1.4	5.5
10	30	1.2	2.8
18	15	2	1

LED Temperature Monitoring [J4]

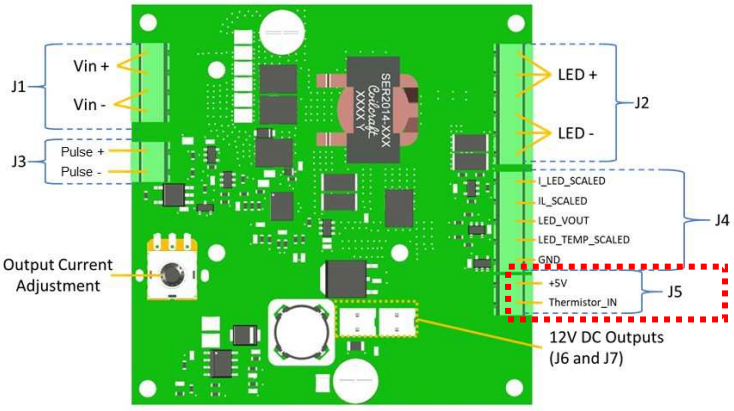
- **LED_TEMP_SCALED**
  - Translates LED temperature into a voltage (tuned with Murata NCP18XH103J03RB)
  - LED Temperature (°C) = 39*LN(LED_TEMP_SCALED) + 90

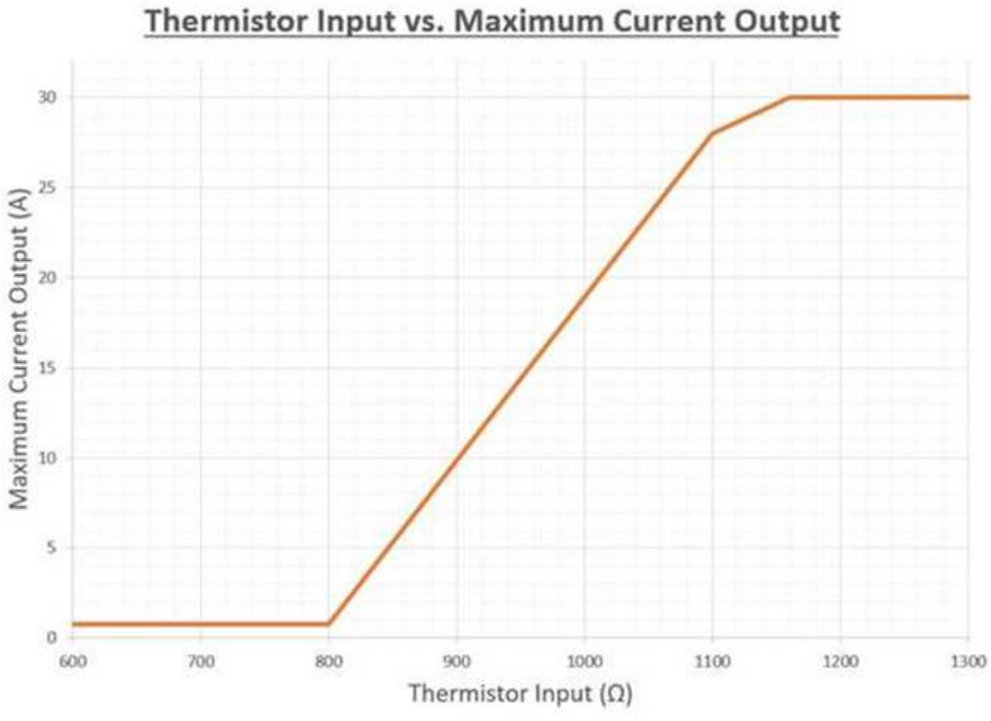




Active Thermal Management with Thermistor Input [J5]

- **THERMISTOR_IN / +5V**
  - 10KΩ thermistor input
  - Thermistor wiring is interchangeable (no polarity)
  - 90°C maximum LED temperature: If thermistor readings are over 90°C, driver will reduce current output to LED, reducing overall power to prevent the LED from overheating. The more the temperature is exceeded, the greater the reduction of output current.
  - Thermistor input is required for driver operation. Driver will limit maximum current output to less than 2A if no thermistor connection is detected.
    - *The LED thermal protection function can be bypassed by placing a 2KΩ-10KΩ resistor across J5. Note that in doing so, the LVHC driver will not be able to detect excessive high-temperature LED operation.*
  - *The below graph shows how the LVHC driver limits maximum current output to protect the LED. Note that using a different thermistor from the one specified will alter its behavior during high-temperature operation (per the above graph).*

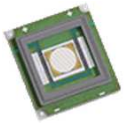
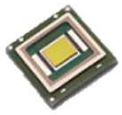




CUVÉE SYSTEMS

LVHC Compatibility Table With Luminus Specialty LEDs

LUMINUS

CBM-90 IR / IRD	**CBT-39** UV / W	**CFT-90** W / CG	**PT-26** B / CG / RA	**SBT-70** B / G
CBM-120 UV / FR	**CBT-90** W / B / G / R UV		**PT-39-TE** B / G / DR	**SBT-90** W / R
	**CBT-140** W		**PTM-40** B / CG / RA	
			**PT-50** B / CG / RA	
			**PT-54** B / G / RAX	
			PT-120/121 B / G / RAX