



**TEXAS
INSTRUMENTS**



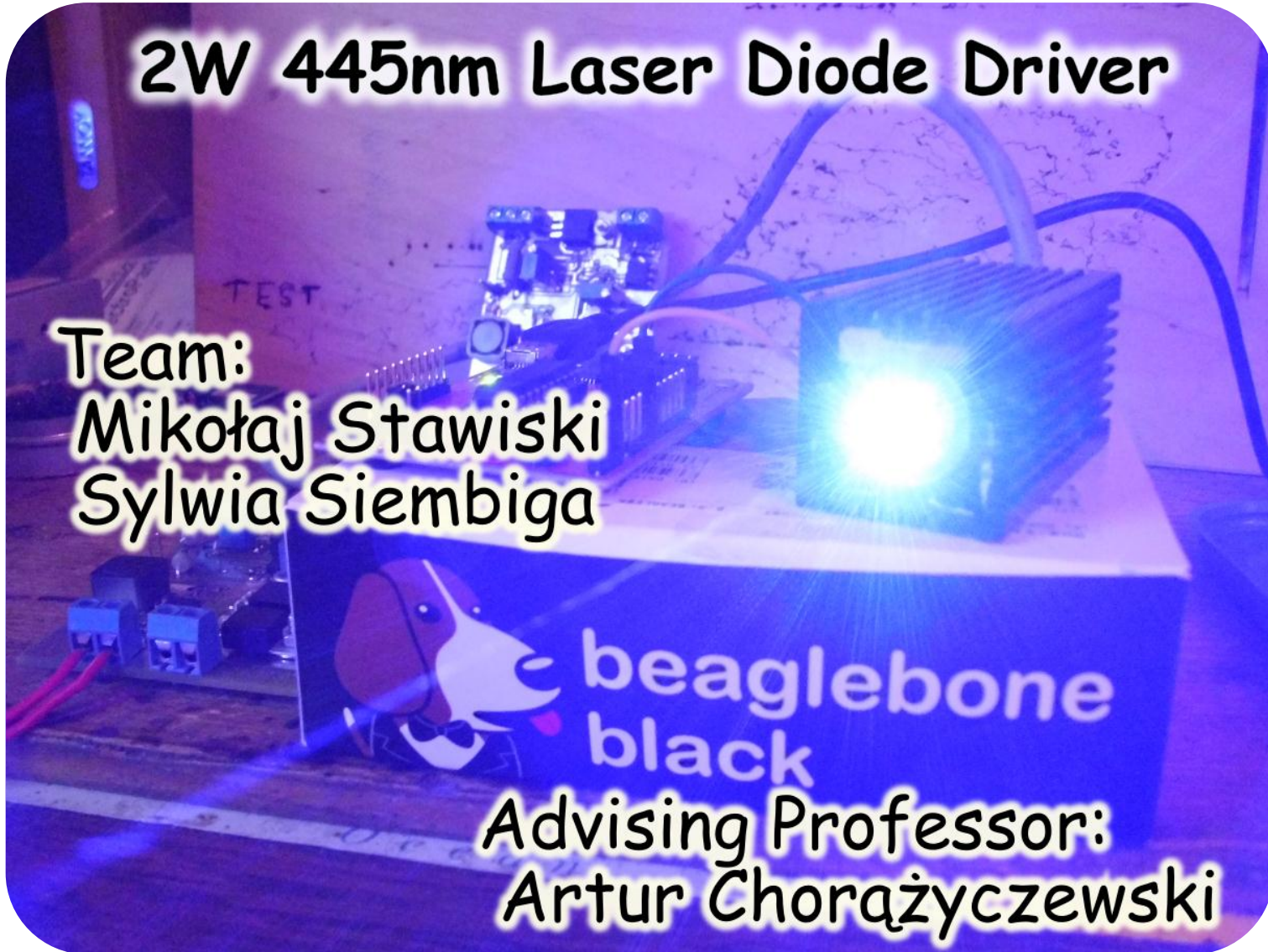
TI university program



2W 445nm Laser Diode Driver

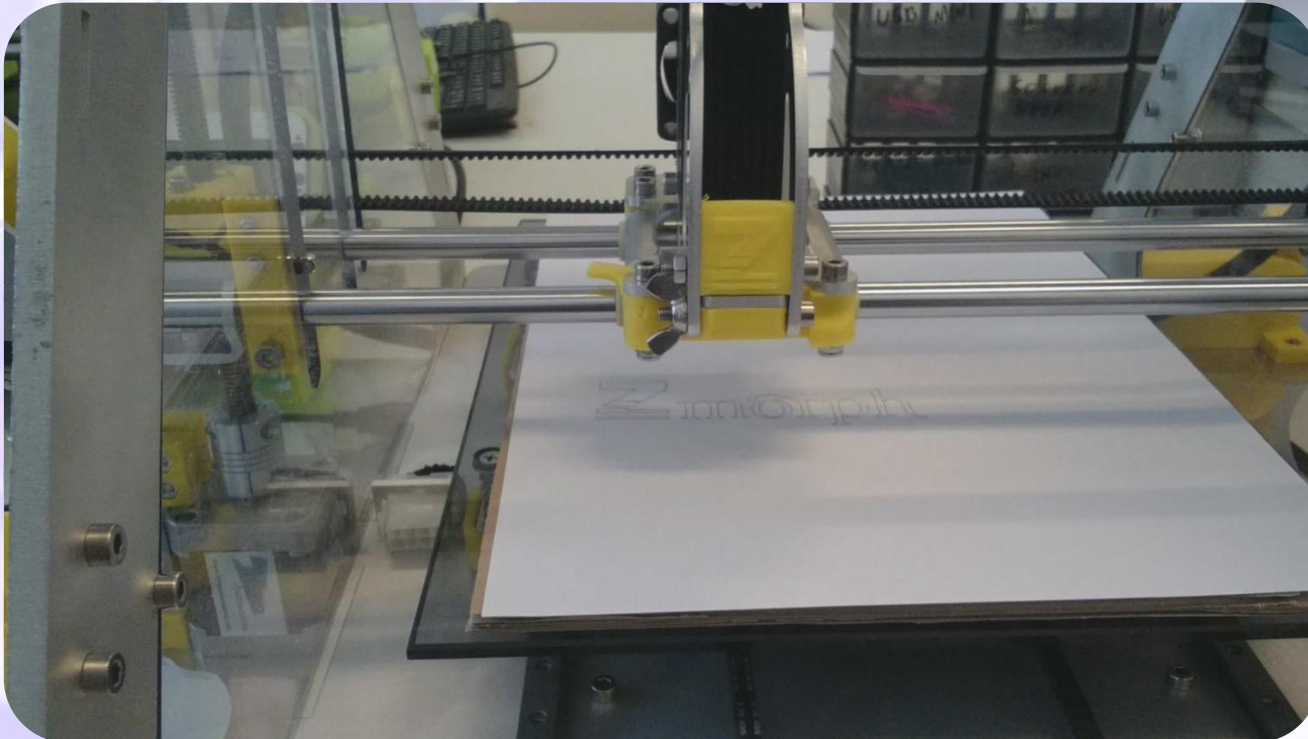
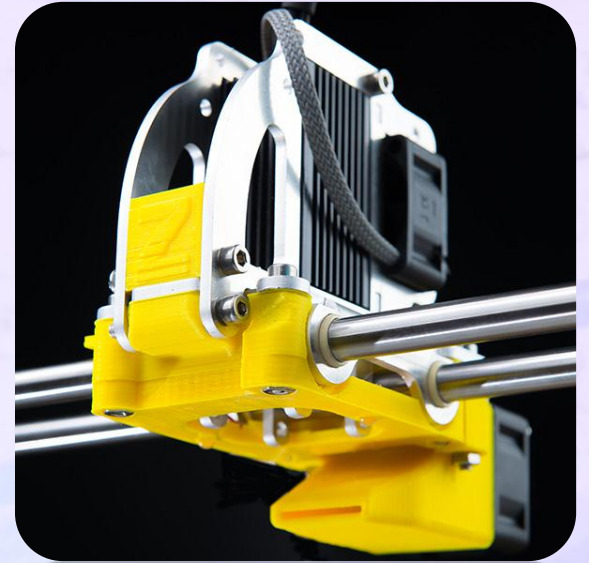
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Sylwia Siembiga

Advising Professor:
Artur Chorążyczewski

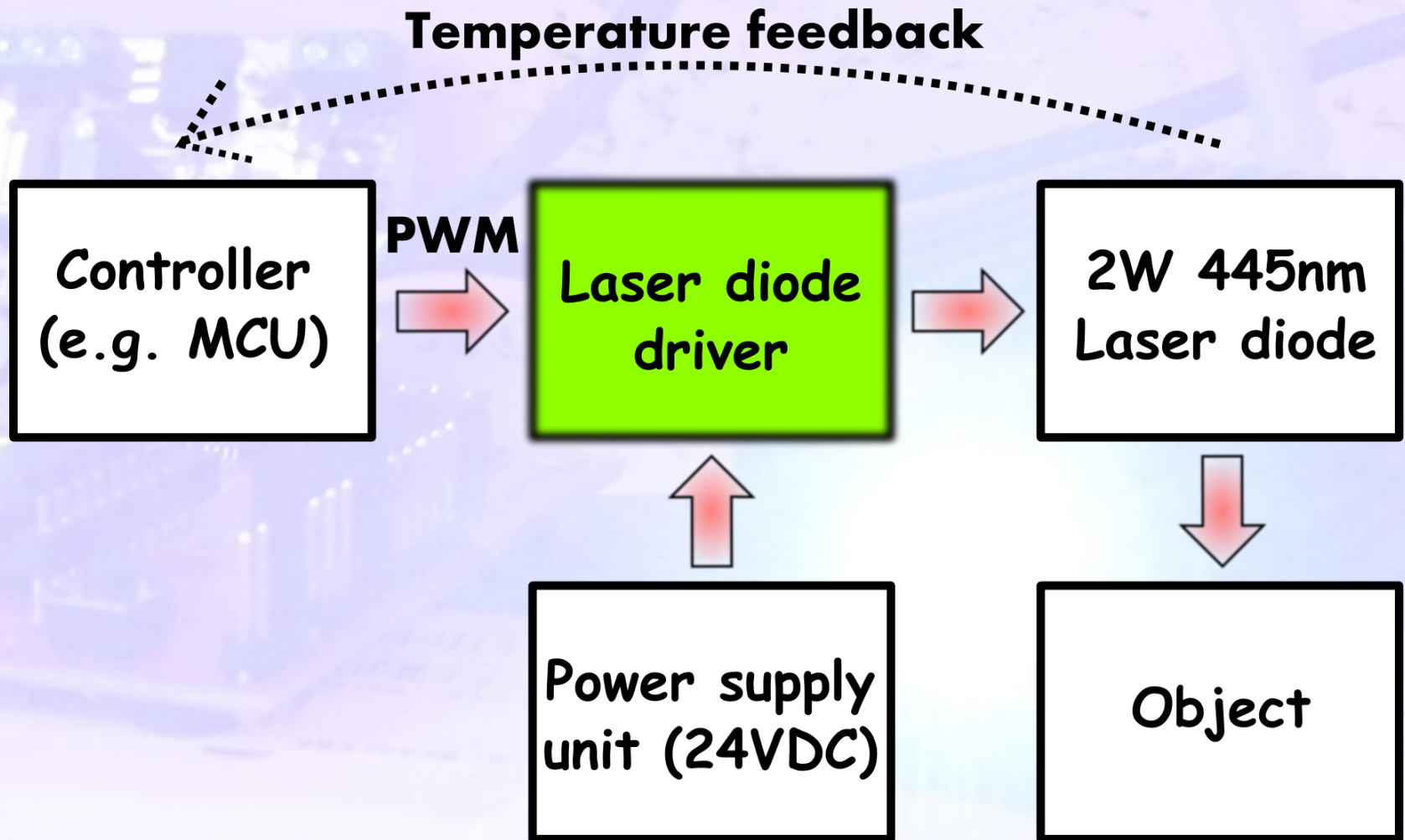


Motivation

- CNC Laser Head
- Extension to 3D Printer



Project overview



Project goals

- **Adjustable laser current up to 2A**
- **Laser current without overshoots**
- **Laser diode forward voltage drop up to 5V**
- **Supply voltage of 24VDC**
- **PWM input – up to 10kHz**
- **Isolated input – galvanic isolation of 1kV**

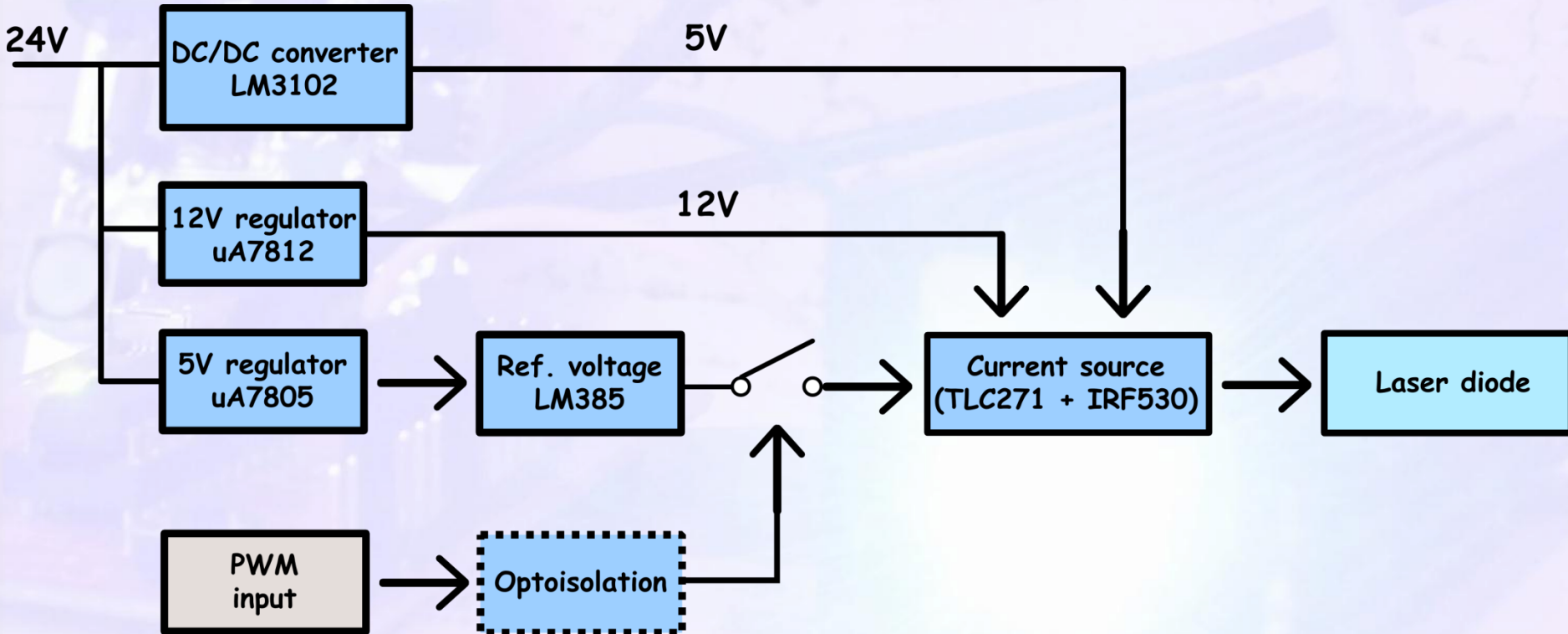
Tools & parts used

- WEBENCH (from ti.com)
- KiCAD (schematic & PCB)
- Test bench (Rigol DSO & Beagle Bone Black)
- DC/DC Converter – LM3102
- Current source (TLC271 & IRF530)
- Reference voltage (LM385 1.2V)
- Voltage regulators (uA7805 & uA7812)

Main design challenges

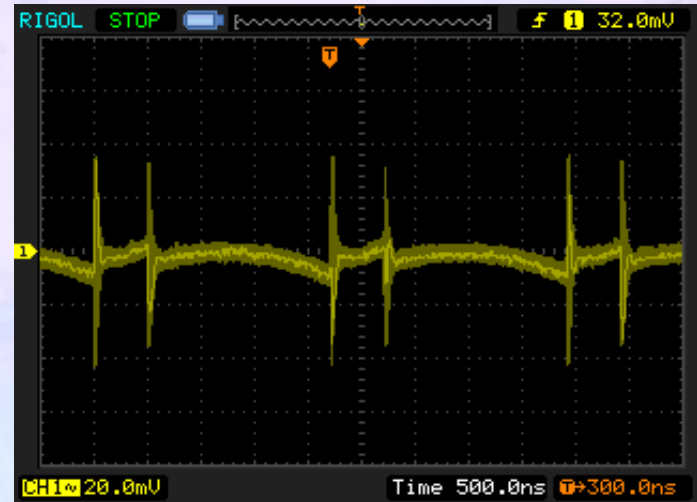
- DC/DC converter PCB layout
- Reference voltage switching noise
- Current source stability
- Testing (dummy load/laser diode)

Driver block diagram

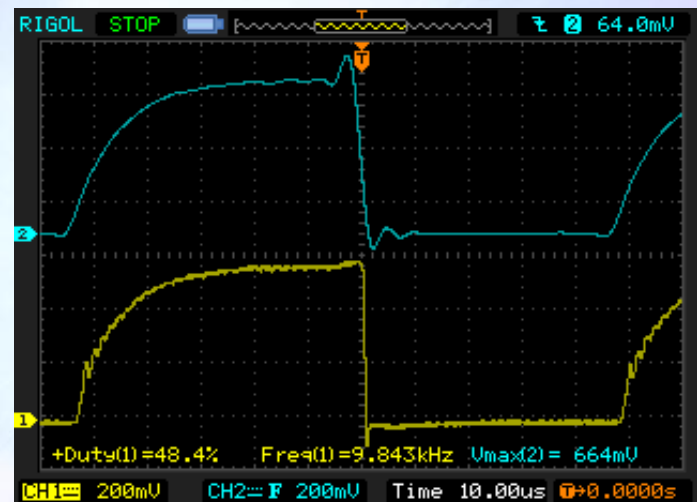


Results

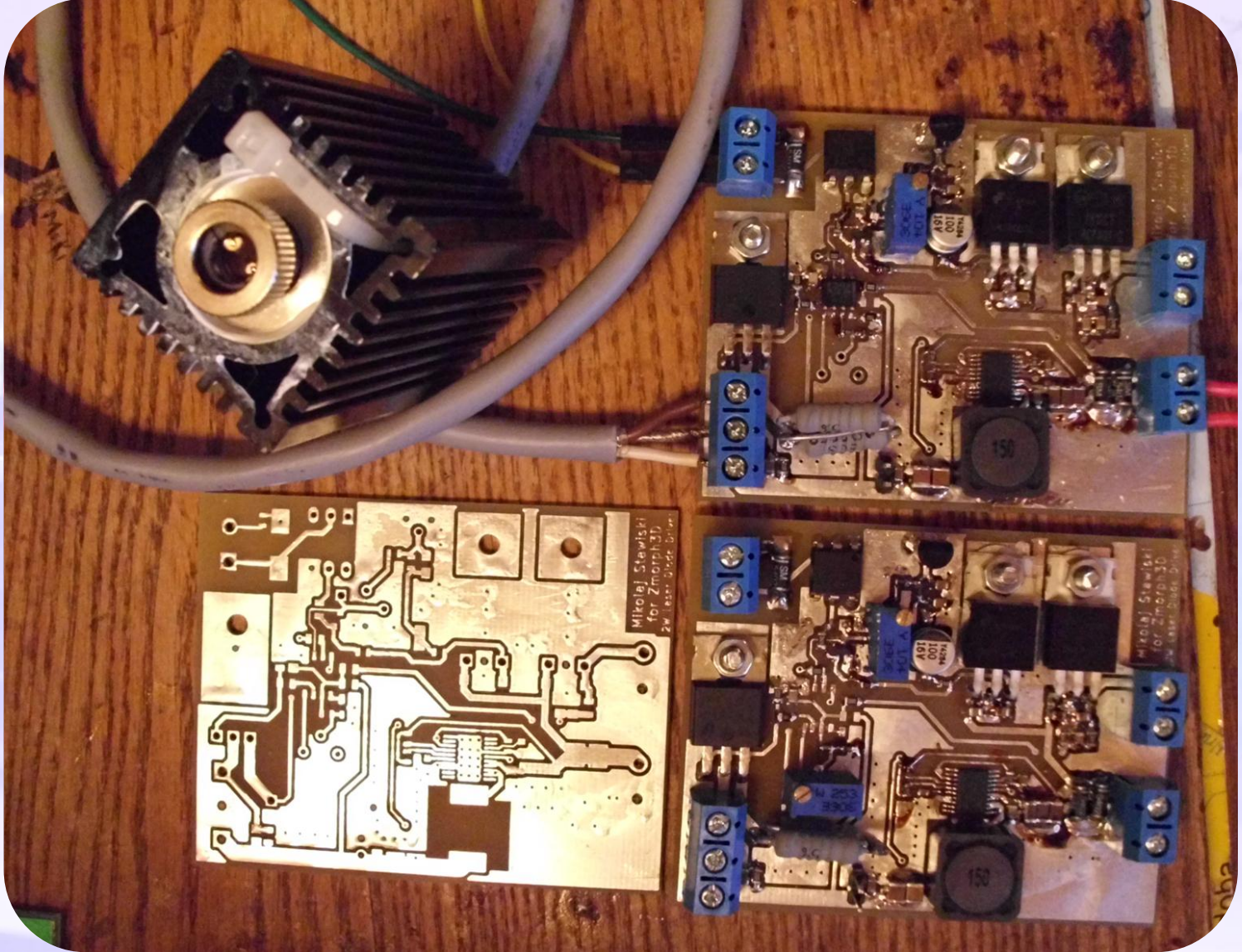
DC/DC Converter output voltage ripple
with laser on



Reference voltage (blue channel)
Sense resistor voltage (yellow channel)
PWM @ 50%, 10kHz



Results



Results



Results

A photograph of a wooden surface with the words "TEXAS" and "INSTRUMENTS" written in black ink. The text is arranged in two lines, with "TEXAS" on the top line and "INSTRUMENTS" on the bottom line. The wood grain is visible, and there are some dark smudges and scratches on the surface. The image is framed with rounded corners.

TEXAS
INSTRUMENTS



Thank you very much for your attention



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