



# All-Silicon Update

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# Thermal simulations

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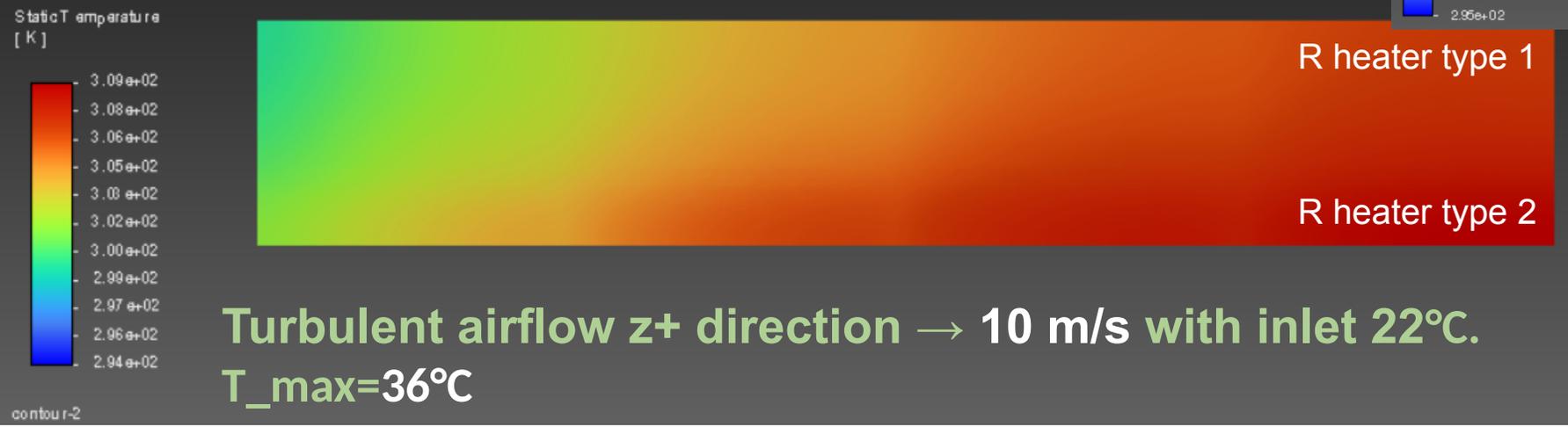
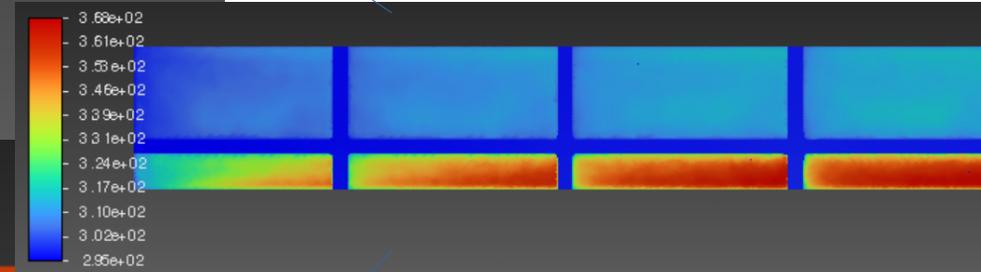
- Several models are presented today:
  - 1) Segmented, 1 layer, 300  $\mu\text{m}$ , no frame – to replicate the R heaters behavior.
  - 2) Full All-Si, 4+ layers, 40  $\mu\text{m}$ , with a frame – to reproduce full system.
- I recovered parts of the Full All-Si setup from August 2025 and was able to run it again without matrix/periphery segments.

# Simplified segmentation



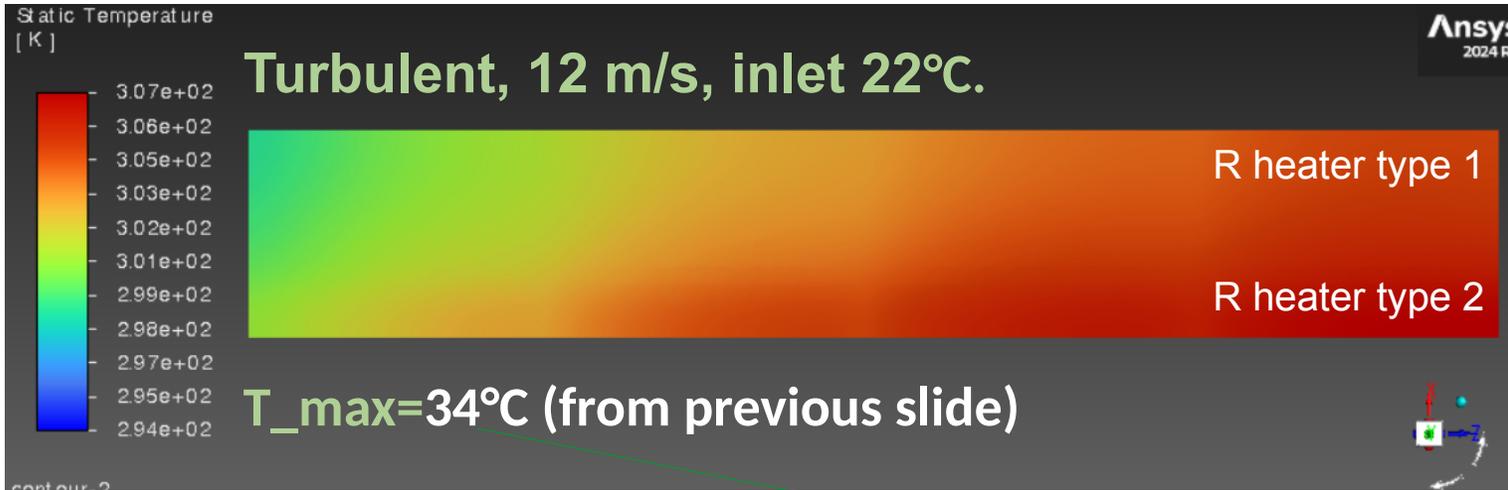
This setup doesn't account for the wafer thinning.

Segmented structure: 8 heaters



Splitting the ladder into zones helps to replicate realistic heat propagation scenario.

# Airflow measurements



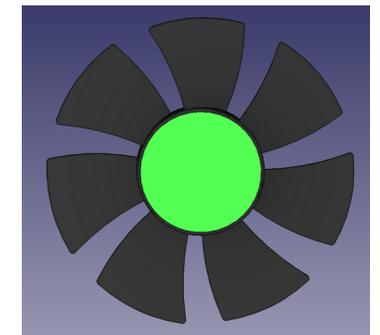
Simulated T<sub>max</sub> is in the same T range as the measured T<sub>max</sub>.

Power recovery was used.

Thicker module gives slightly higher temperatures.

Module	Total Power (W)	Temp No Fan (°C)	Fan V (V)	Temp With Fan (°C)
400 μm	6.527	<b>91.9</b>	11.8	<b>34.1</b>
400 μm	6.837	<b>90.1</b>	6.15	<b>42.5</b>
300 μm	6.558	<b>84.7</b>	11.81	<b>32.8</b>
300 μm	6.594	<b>86.0</b>	6.25	<b>38.3</b>

T<sub>max</sub> < 50°C even with minimally powered fan.

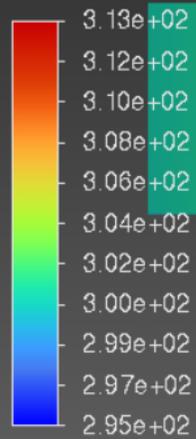


12 cm diameter fan

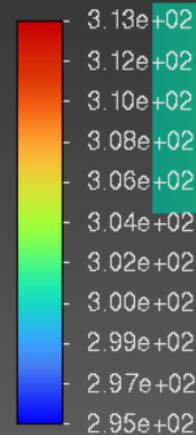
# Full All-Si Simulation (Turbulent)

- Consists of the layers: thinned framed ladder, polymer and RDL (copper).
- Both plots are from the same run.

Static Temperature [K]



Static Temperature [K]



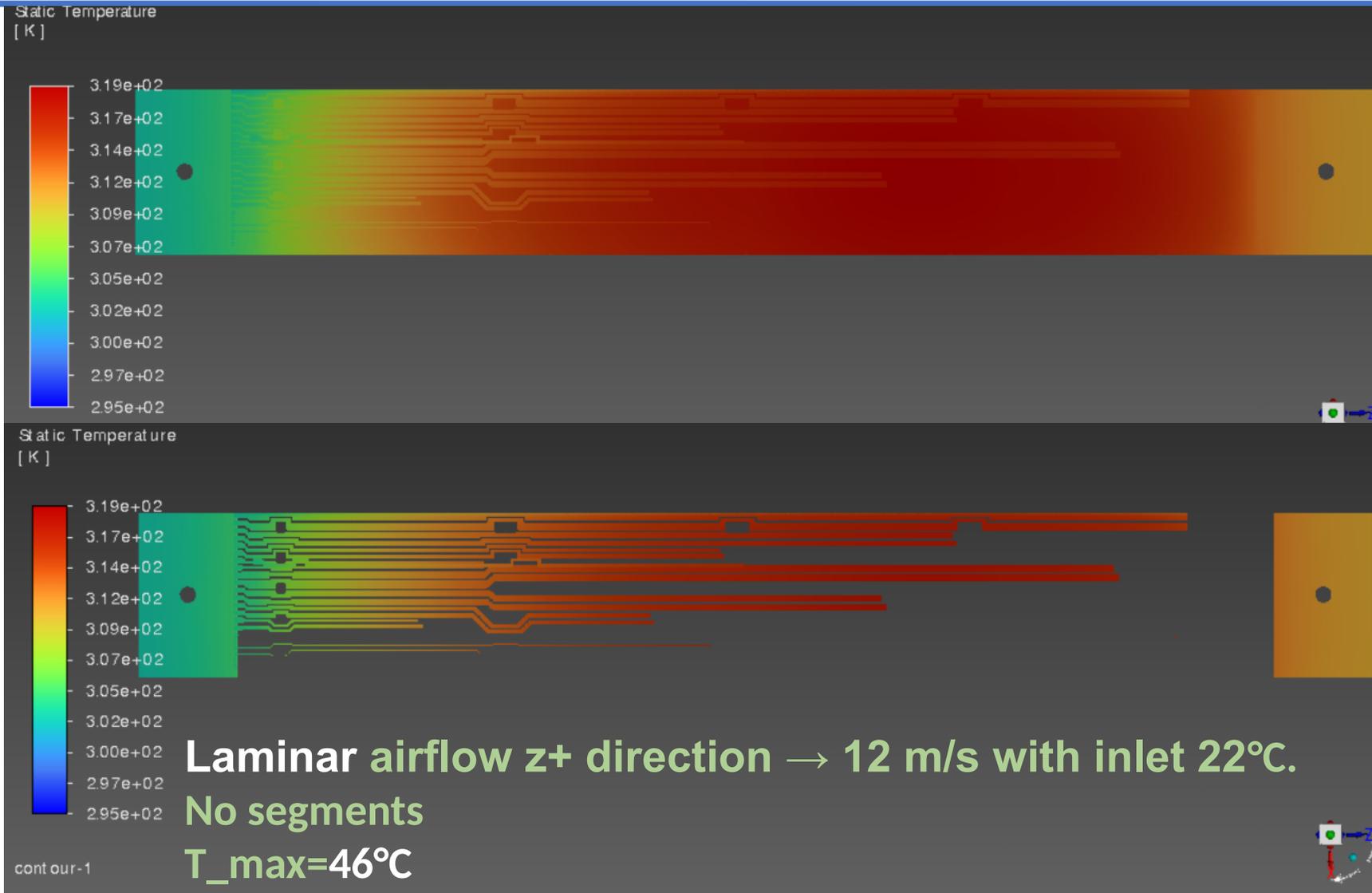
Turbulent airflow z+ direction → 12 m/s with inlet 22°C.

No segments

T\_max=40°C

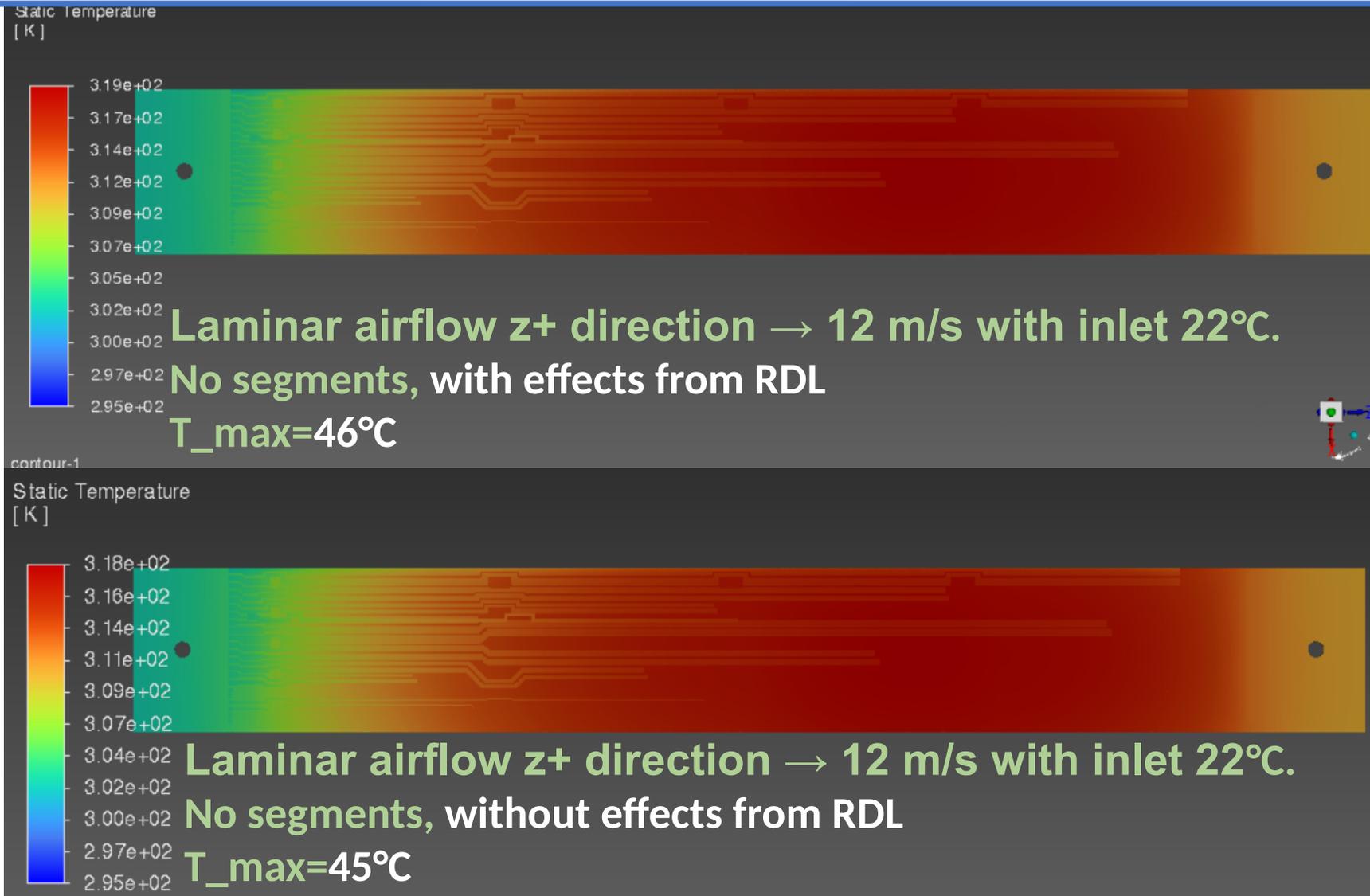
# Full All-Si Simulation (Laminar)

- Consists of the layers: thinned framed ladder, polymer and RDL (copper).
- Both plots are from the same run.
- Laminar flow cools down the demonstrator worse than turbulent.



# Impact of RDL

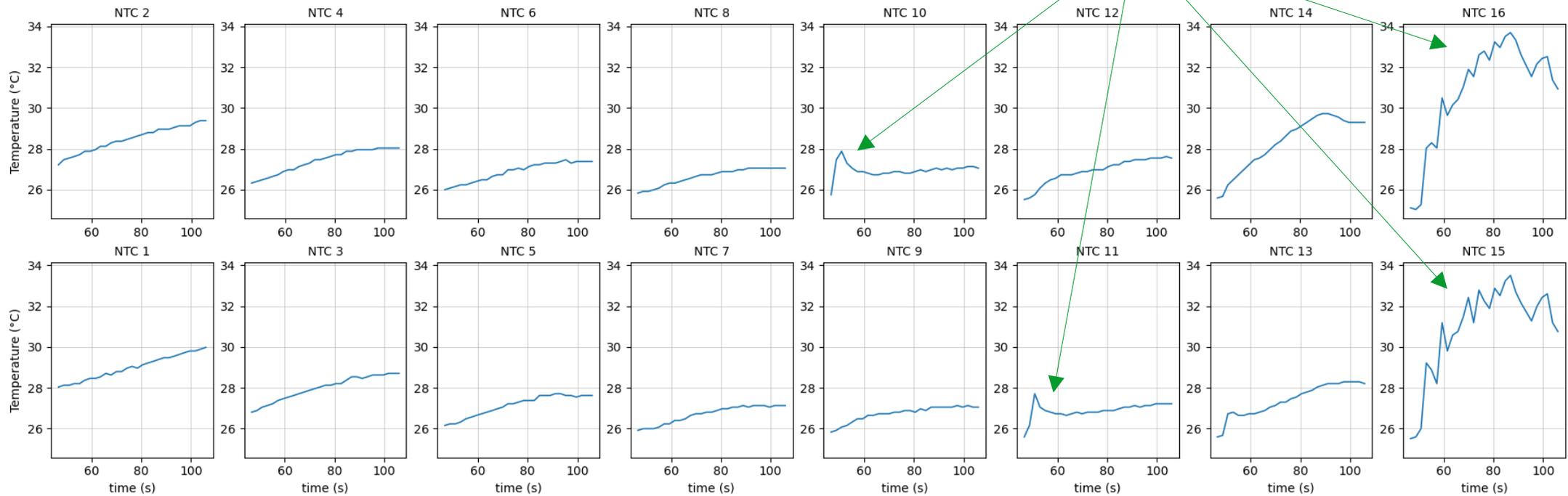
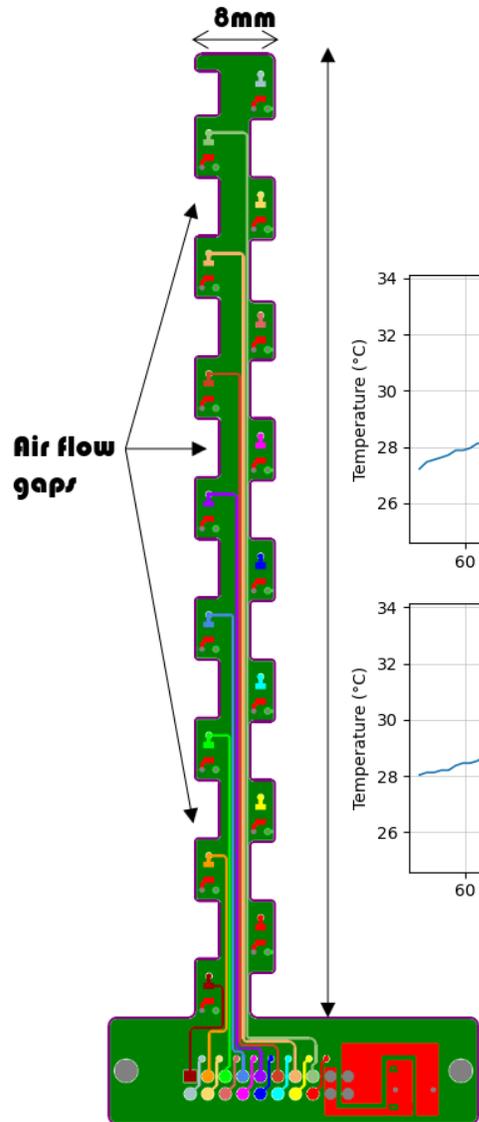
- Upper plot. Layers: thinned framed ladder, polymer and RDL (copper).
- Lower plot. Layers: thinned framed ladder, polymer and no effects of RDL.



# T measurements with a new board

← Populated one board.

First test measurements of touching sensors with a finger/removing a finger T were done (T-probe LT-101 touching sensors: 26.5°C).

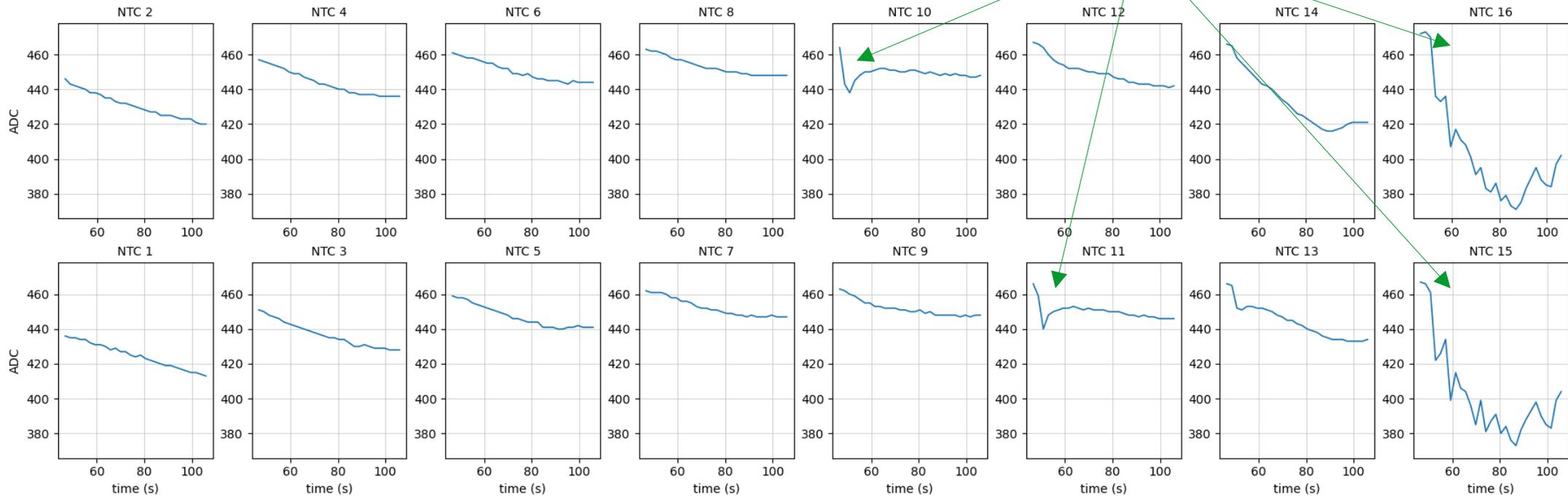
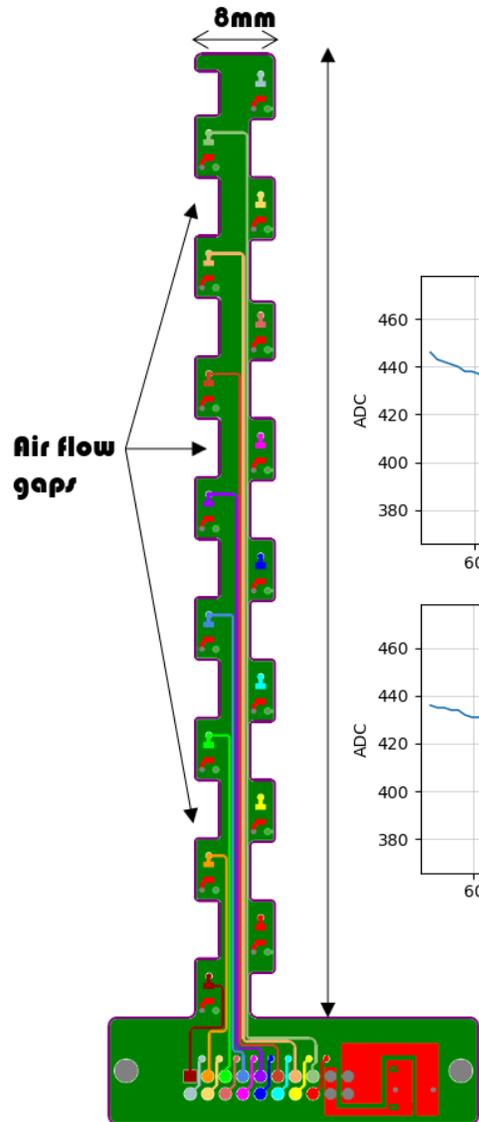


The 2d plot is attached in gif format.

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