AncASIC thermal model geometry and input

- 0.604W is applied to 5 SLDO area

- Silicon thermal conductivity: 124 W/m°C
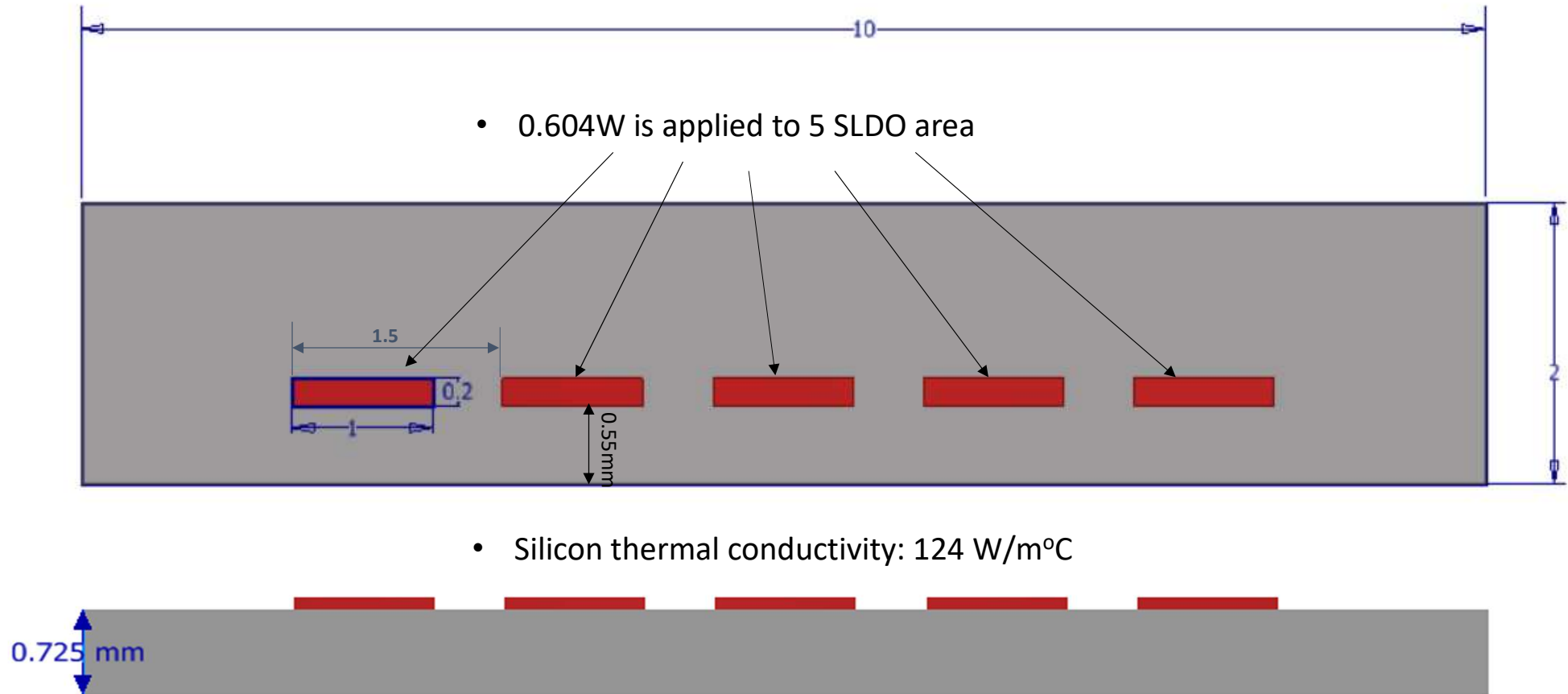
reference to the backup slides (page 6 and 7)

Temperature profile at different BCs -1

A: Steady-State Thermal fixed T =22C
Temperature
Type: Temperature
Unit: °C
Time: 1 s
08/09/2024 13:05

22.943 Max
22.838
22.734
22.629
22.524
22.419
22.314
22.21
22.105
22 Min

Bottom face fixed at 22°C

0.000   2.000   4.000 (mm)
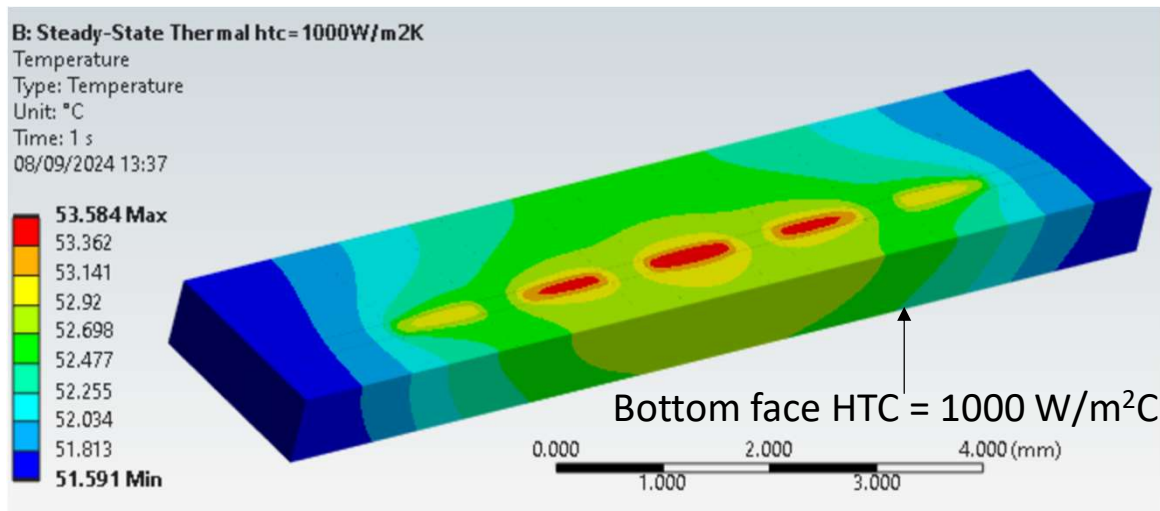   1.000   3.000
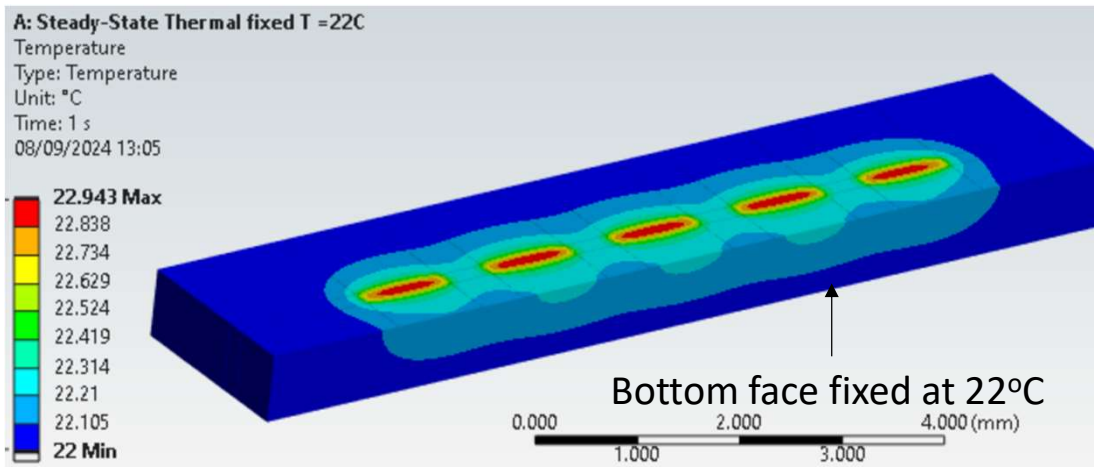
Initial temperature is 22 °C

Remarks-1:

By keeping the temperature at the bottom face to 22°C, and insulating the rest of the model except the 5 off SLDO areas, heat transfer by conduction through the bottom face causes local heat build-up around the SLDO areas.

The temperature difference of 0.94C is seen through out the whole model.

Temperature profile at different BCs -2

B: Steady-State Thermal htc=1000W/m2K
Temperature
Type: Temperature
Unit: °C
Time: 1 s
08/09/2024 13:37

53.584 Max
53.362
53.141
52.92
52.698
52.477
52.255
52.034
51.813
51.591 Min

Bottom face HTC = 1000 W/m²C

0.000   2.000   4.000 (mm)
   1.000   3.000

Initial temperature is 22 °C

Remarks -2:

When heat transfer coefficient of 1000W/m²K (typical value for Air) is applied to the bottom face of the model, keeping the rest area insulated, the max temperature reaches 53.6C. The average temperature to the rest of the model is 51.6C.

It seems without the conduction cooling at the bottom face of the model, there is a noticeable increase in overall temperature.

Temperature profile at different BCs -3
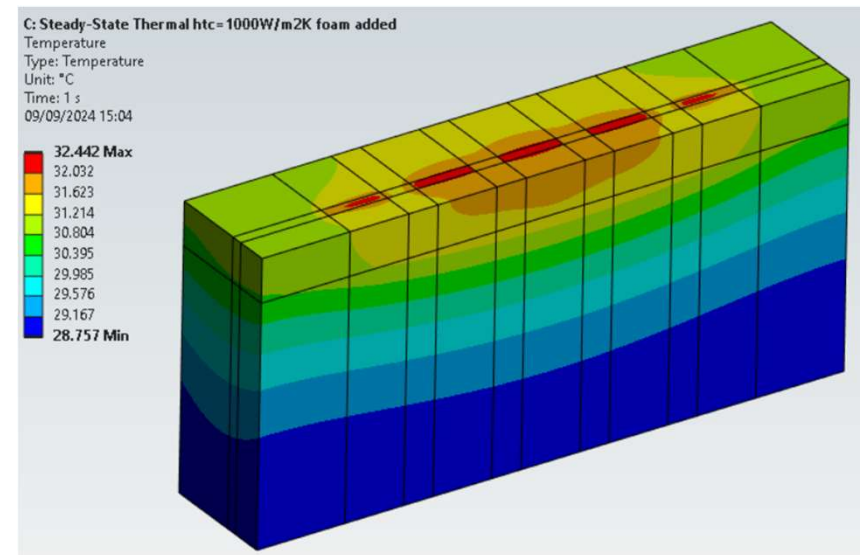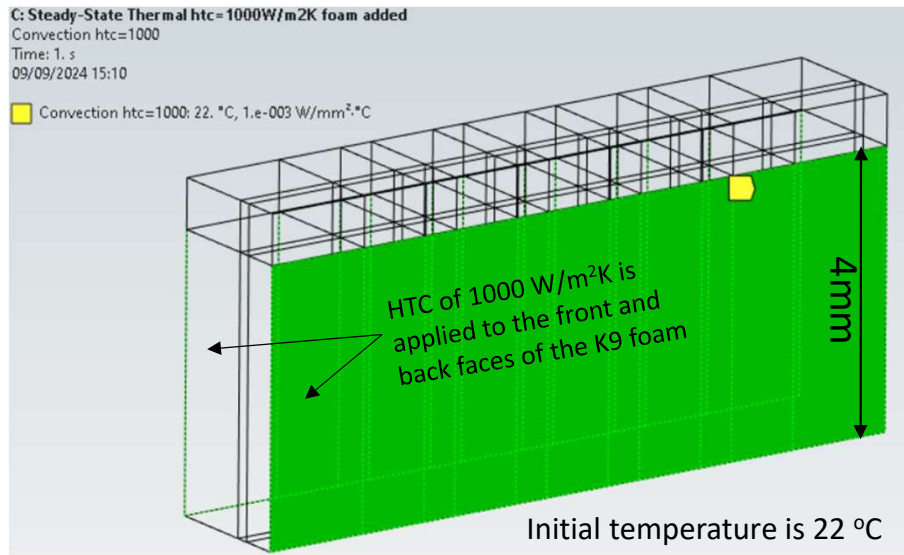
- With 4mm thick K9 foam added to the bottom face of the Silicon;
- K9 foam thermal conductivity: 25W/m-K;
- HTC of 1000 W/m^2K is applied to the front and back face of the K9 foam, and the rest faces are insulated.
- The max temperature is 32.4C. This is because the existence of K9 foam is acting as a much larger heat sink.

Backup: reference material

AncASIC Size
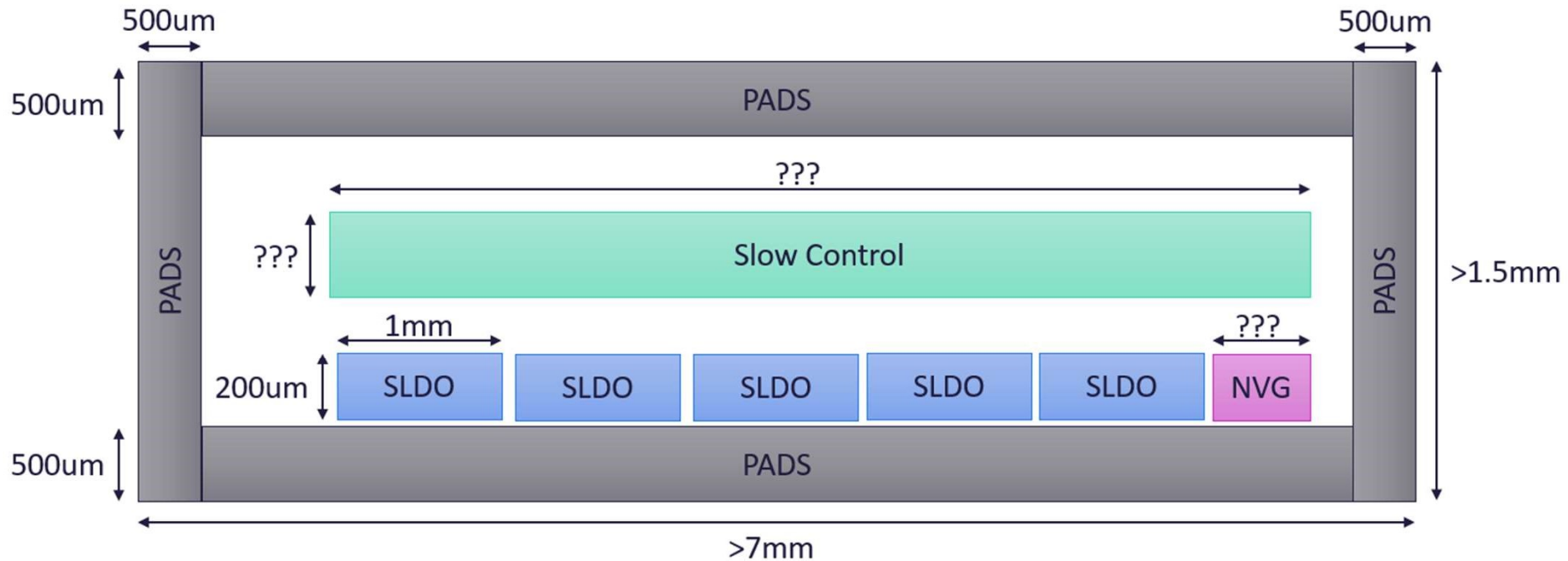
Iain Sedgwick: SLDO considerations v10, page 10.

Overall Power Consumption

	Unit	AncASIC		EIC-LAS	
		Expected 25	Max 45	Expected 25	Max 45
Global Analog	mW	80	105	235	378
Global Digital	mW	195	279	737	1144
Services	mW	22	32	56	84
Serialiser	mW	129	188	248	371
Total	mW	426 (33%)	604 (31%)	1276	1977
Chain Current	A	1.5	2.5	N/A	N/A

Iain Sedgwick: SLDO considerations v10, page 8.