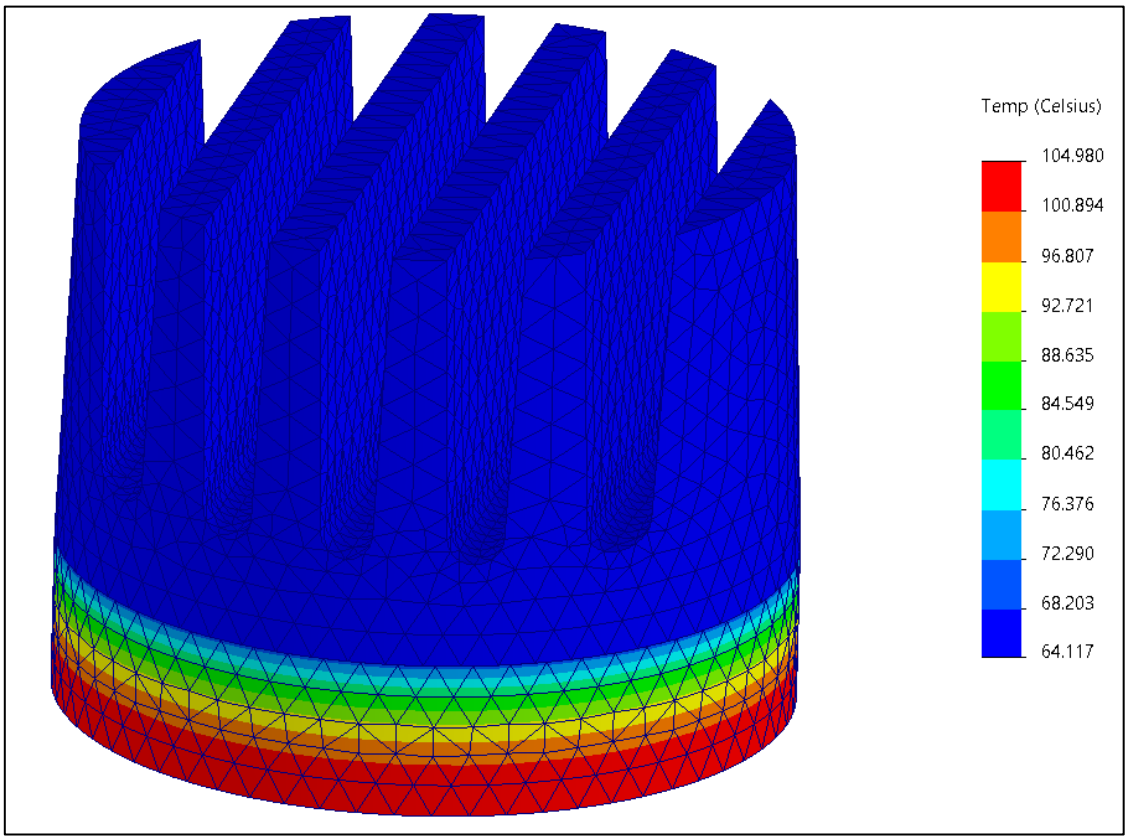
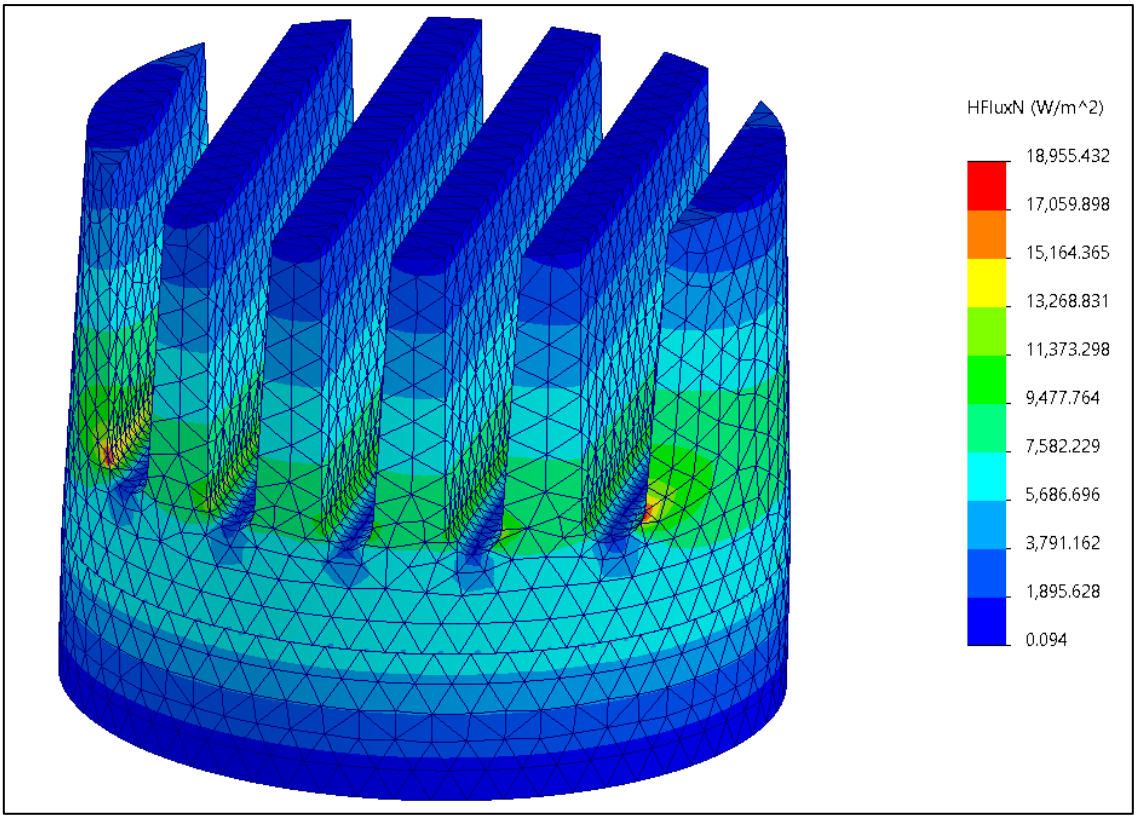
a. Steady-state thermal analysis:

Temperature contour plot at steady-state shown below:



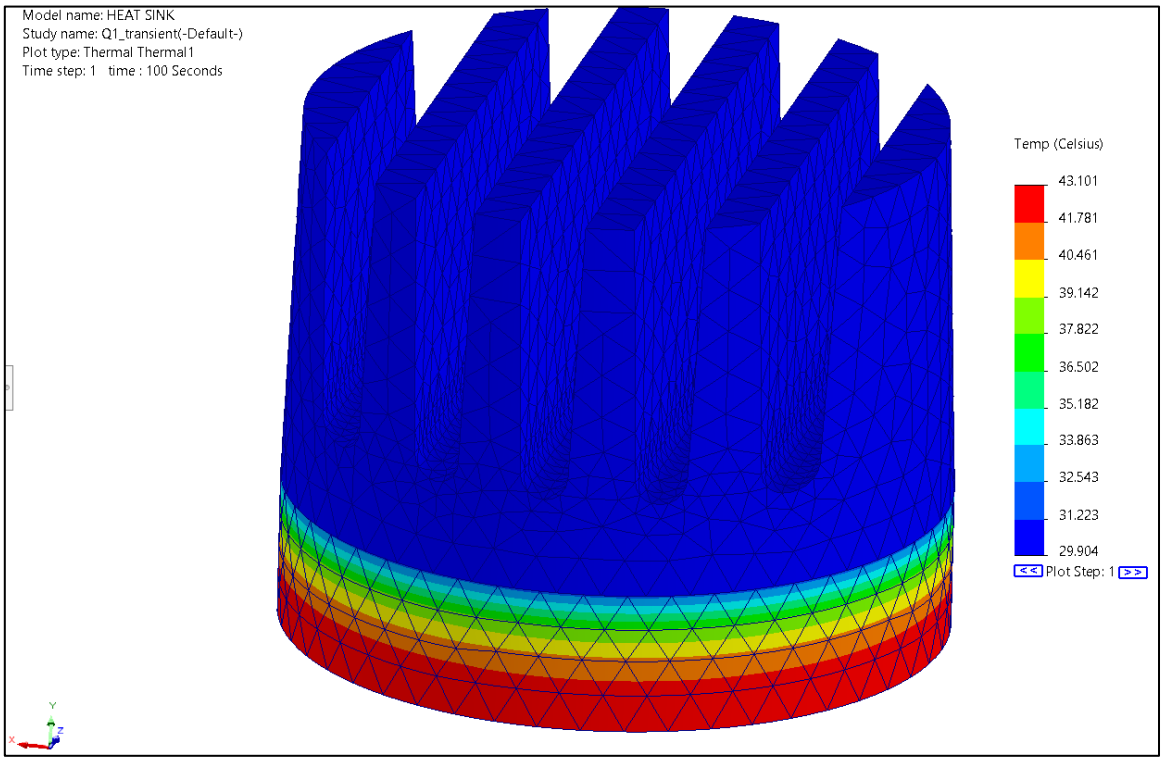
Heat flux contour plot at steady-state shown below:



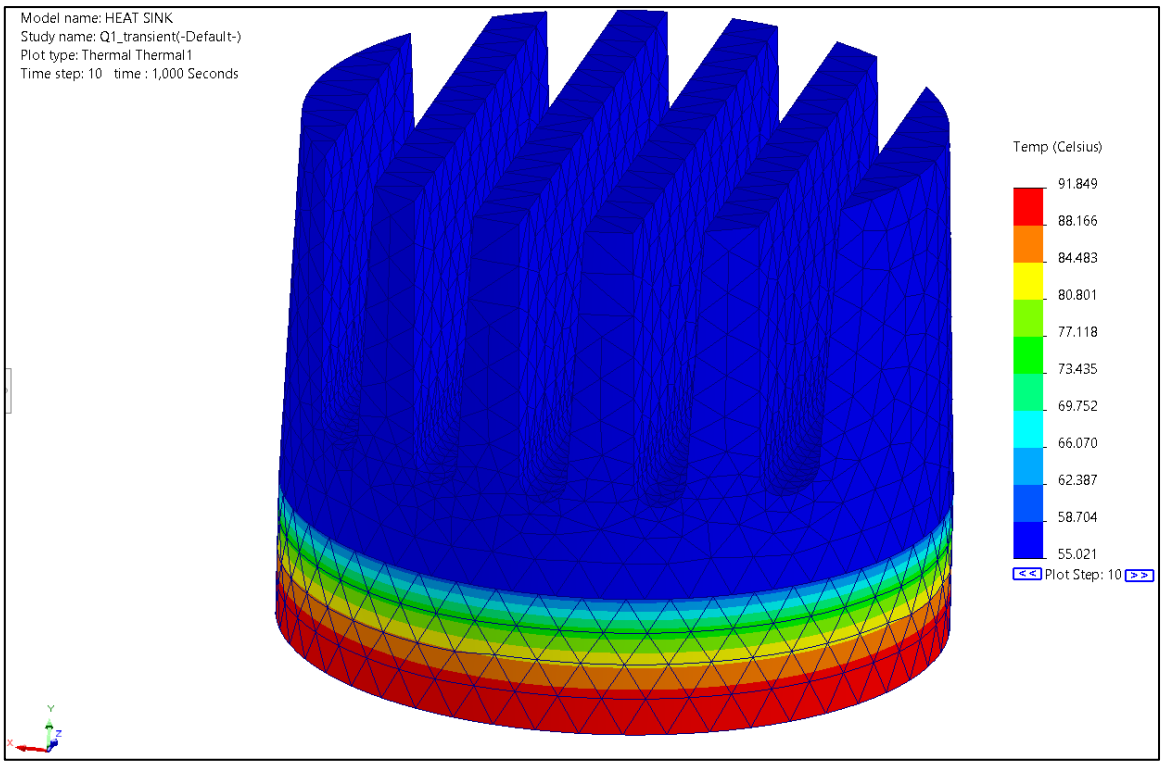
b. Transient thermal analysis:

Temperature contour plots for steps of 100s upto total 5000s shown below at specific intervals:

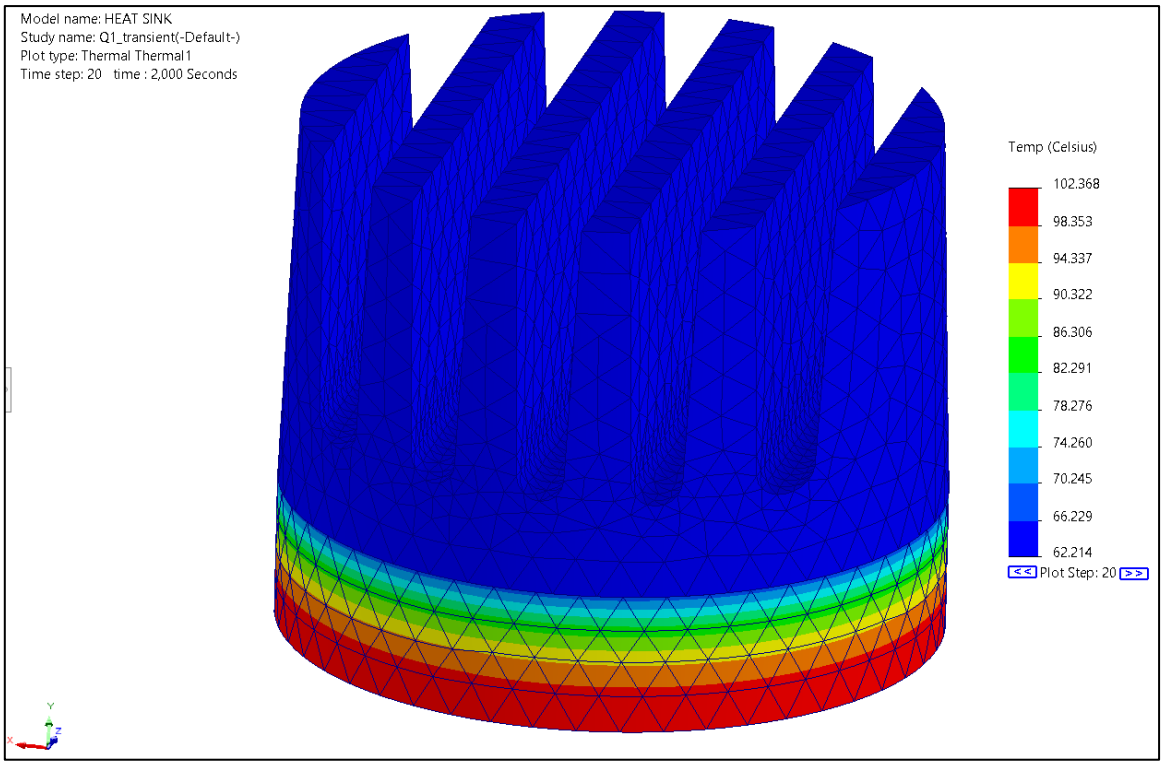
Step 1: At 100s,



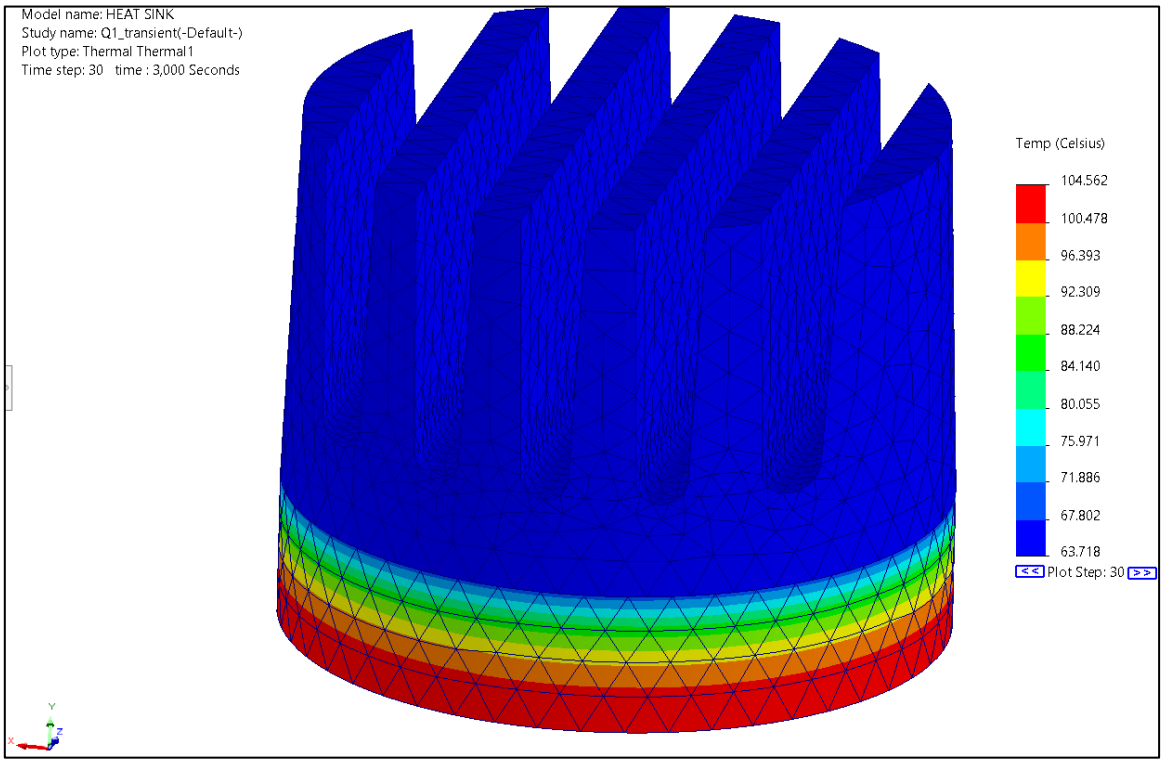
Step 10: At 1000s,



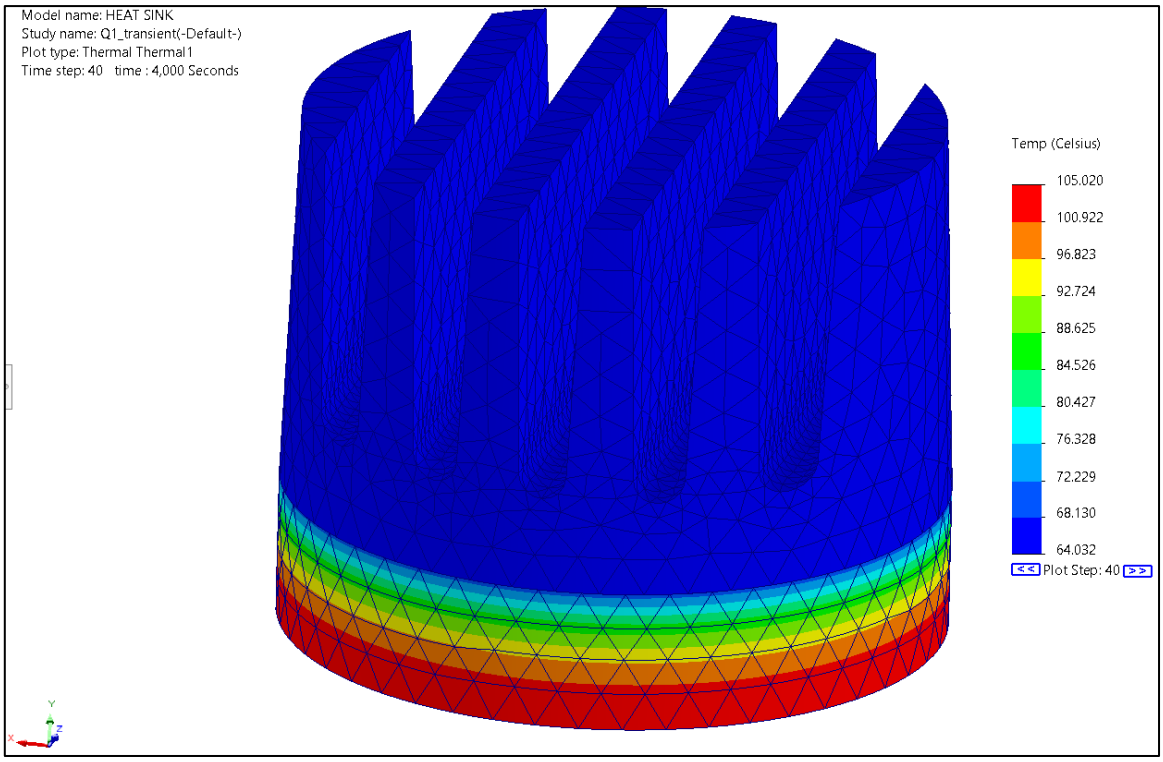
Step 20: At 2000s,



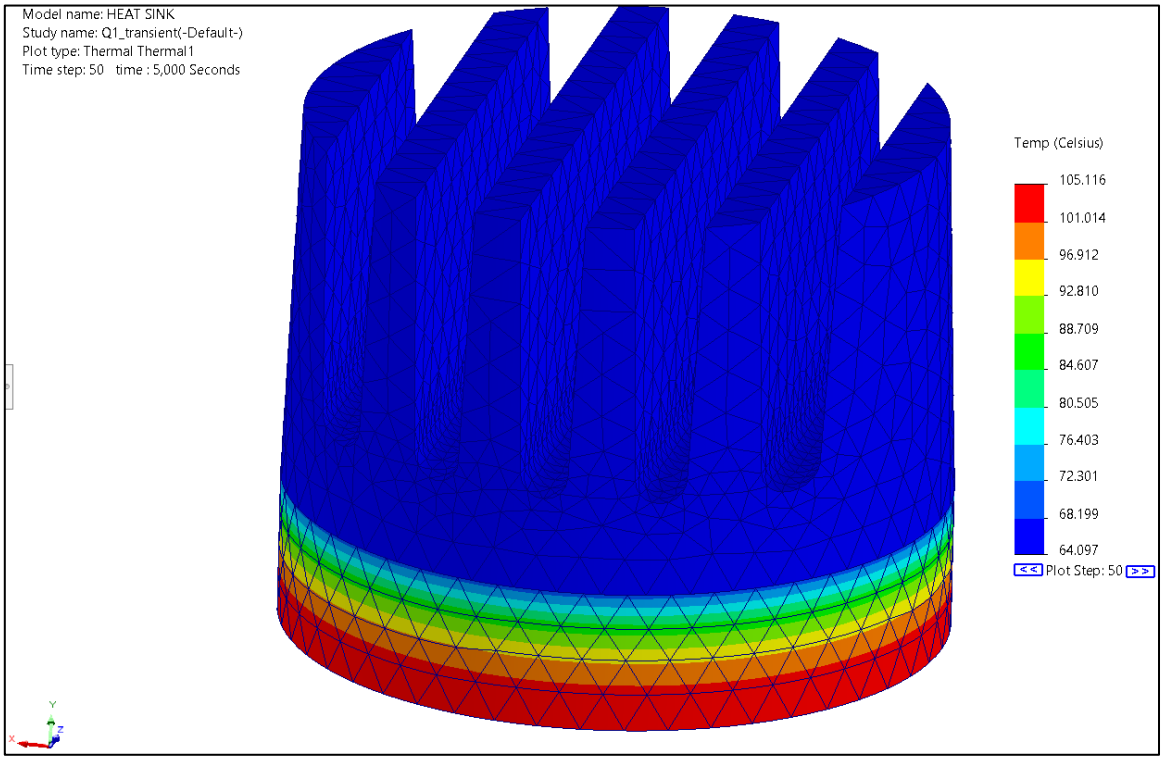
Step 30: At 3000s,



Step 40: At 4000s,

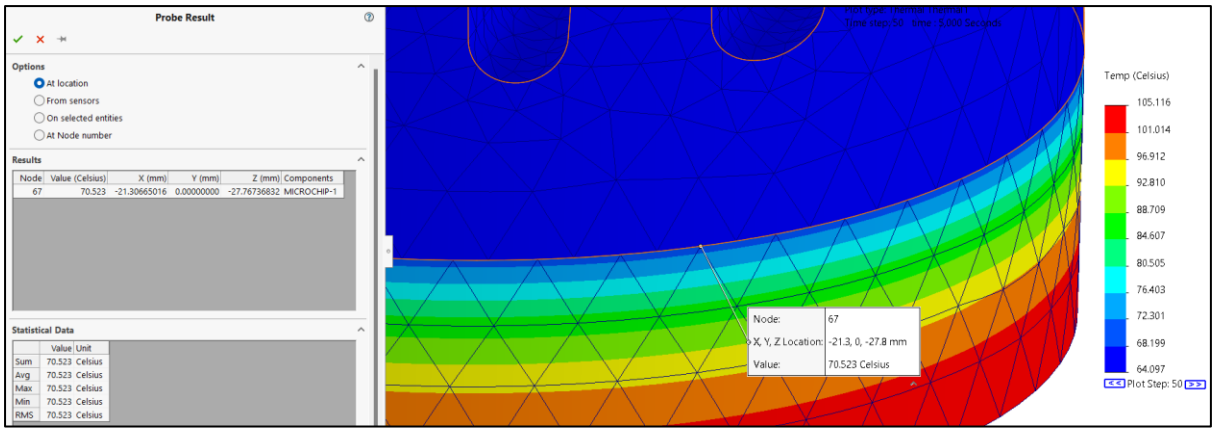


Step 50: At 5000s,

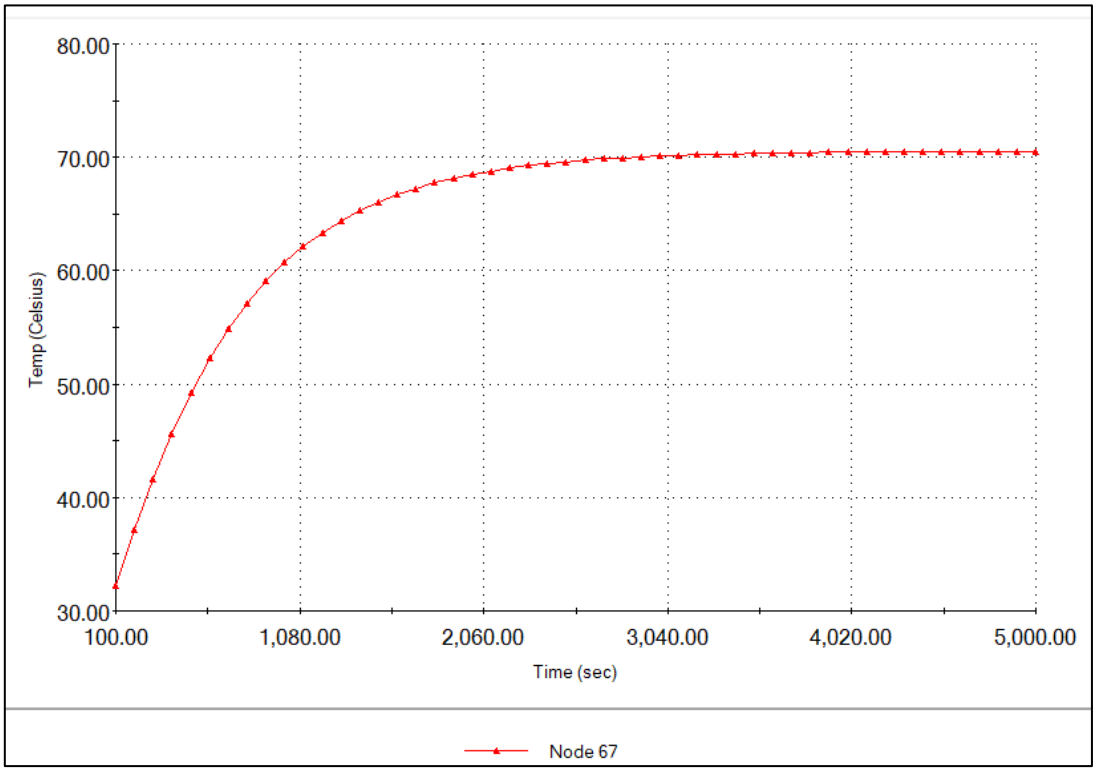


Temperature XY plots in Microchip at 2 locations:

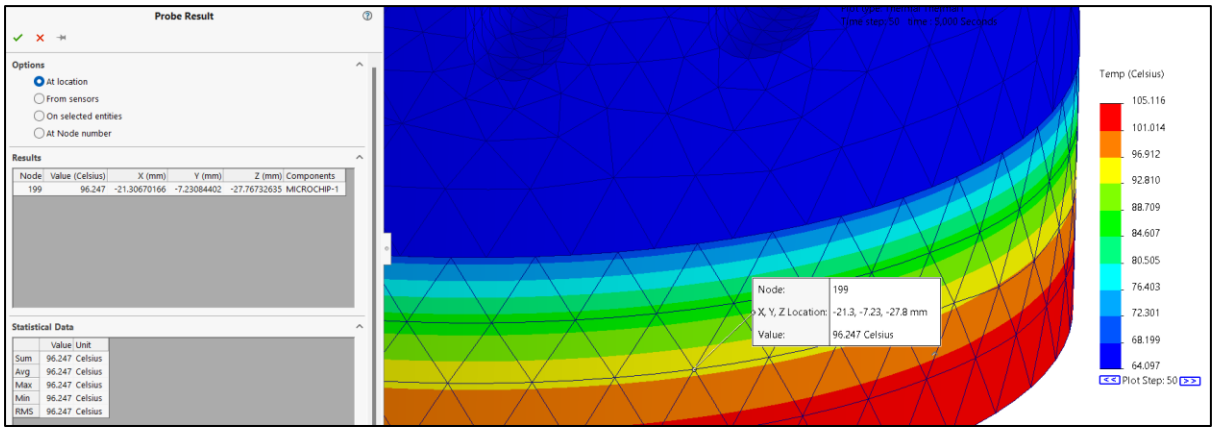
Microchip Location 1: Node 67 at interface boundary,



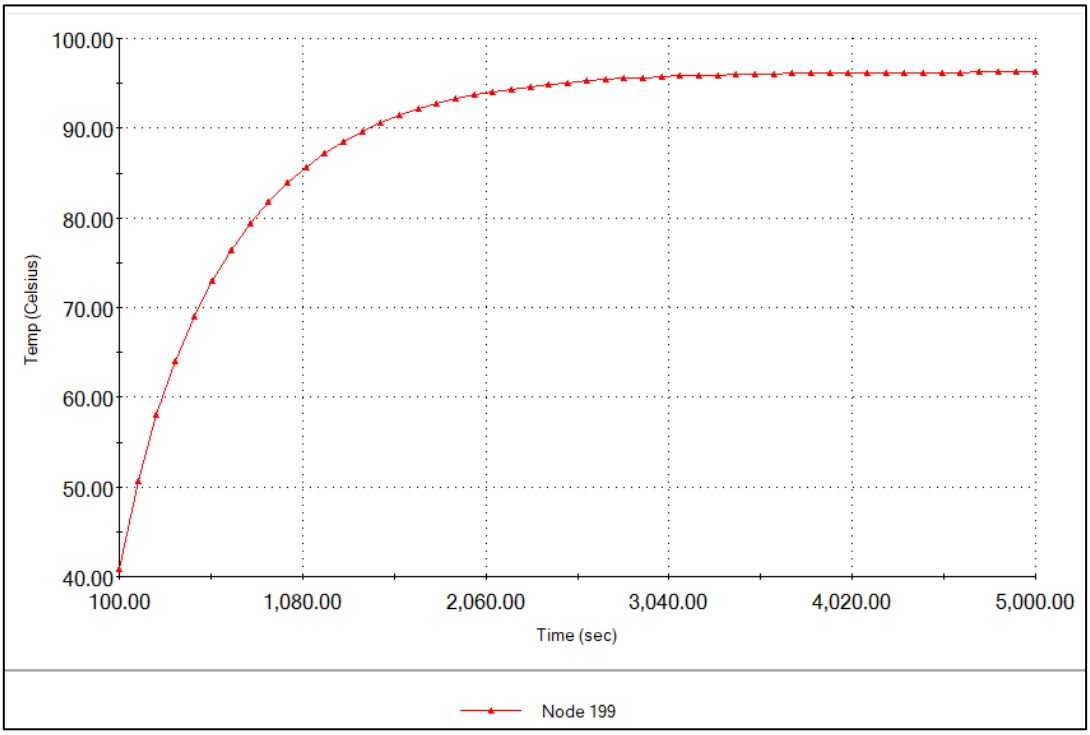
XY temperature plot in Microchip at node 67 shown below:



Microchip Location 2: Node 199 somewhere in middle away from interface boundary,

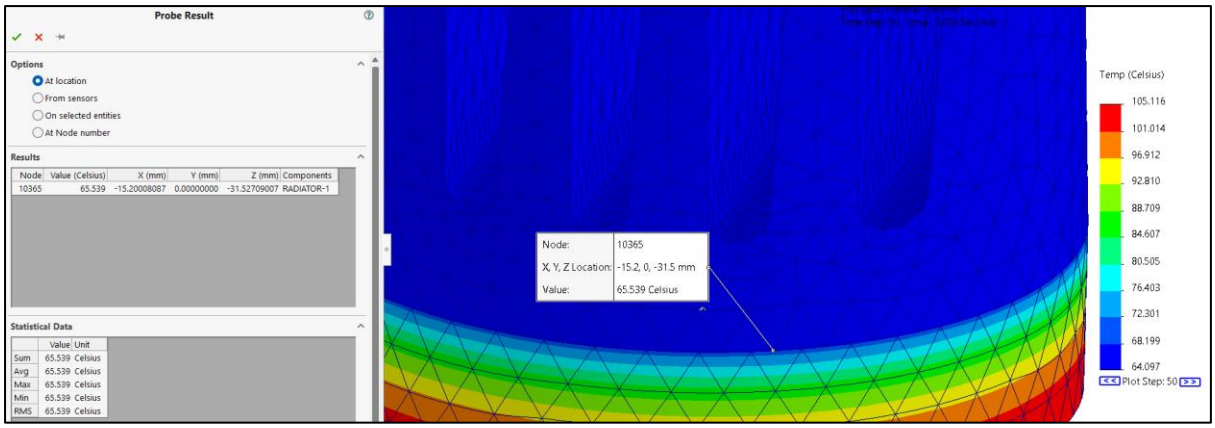


XY temperature plot in Microchip at node 199 shown below:

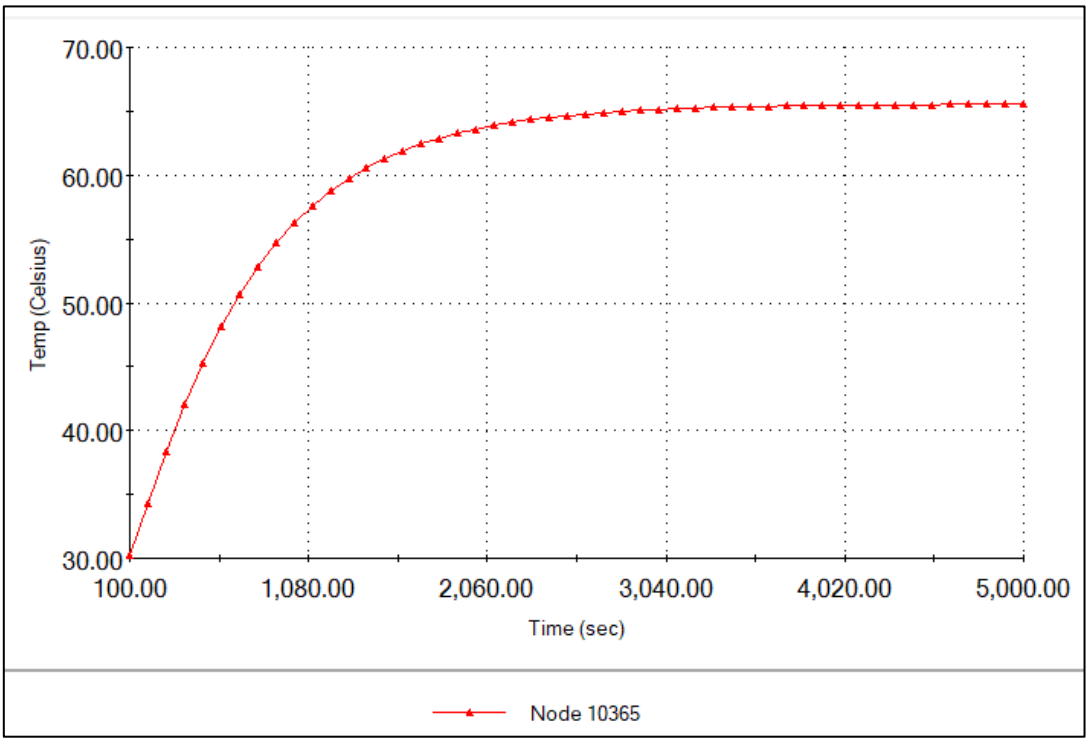


Temperature XY plots in Radiator at 2 locations:

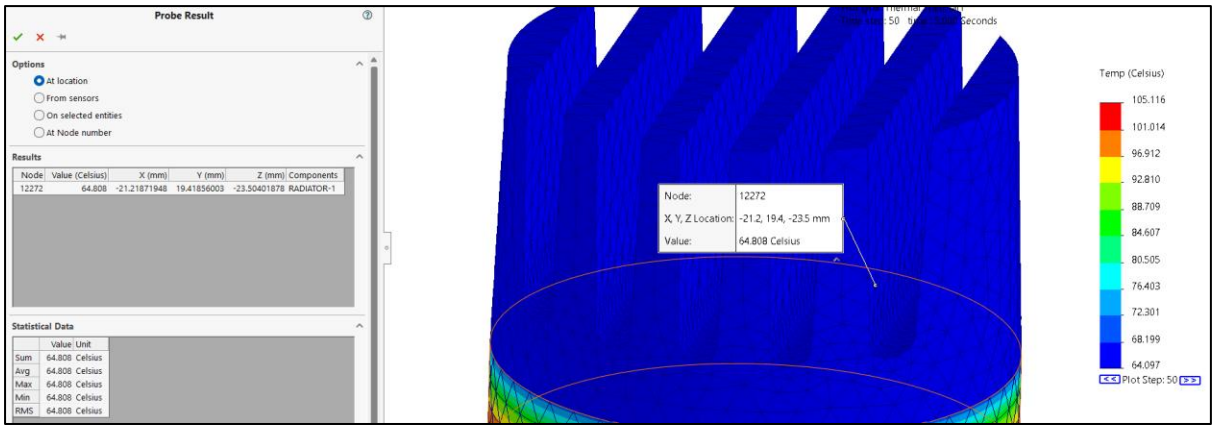
Radiator Location 1: Node 10365 at interface boundary,



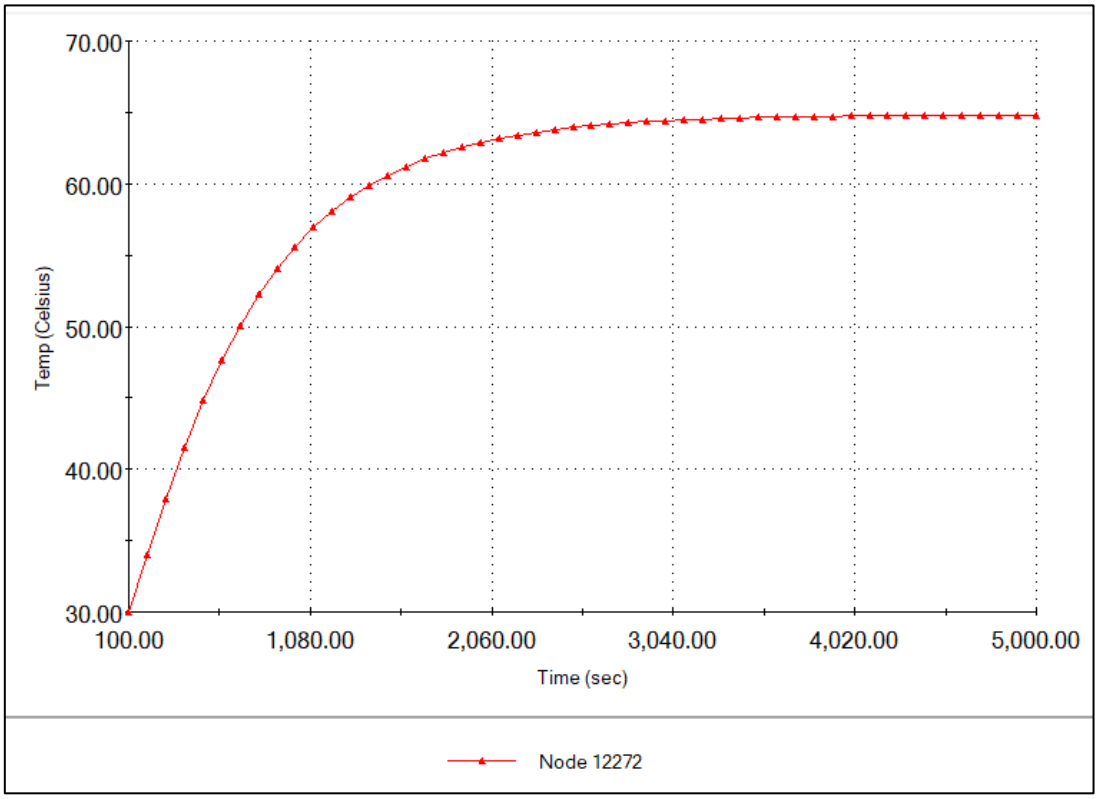
XY temperature plot in Radiator at node 10365 shown below:



Radiator Location 2: Node 12272 somewhere in middle away from interface boundary,

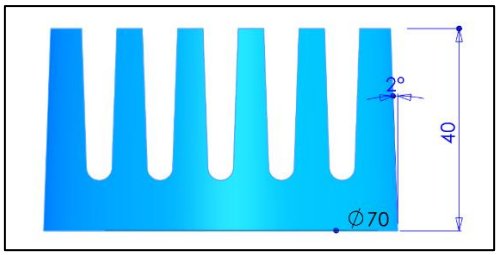


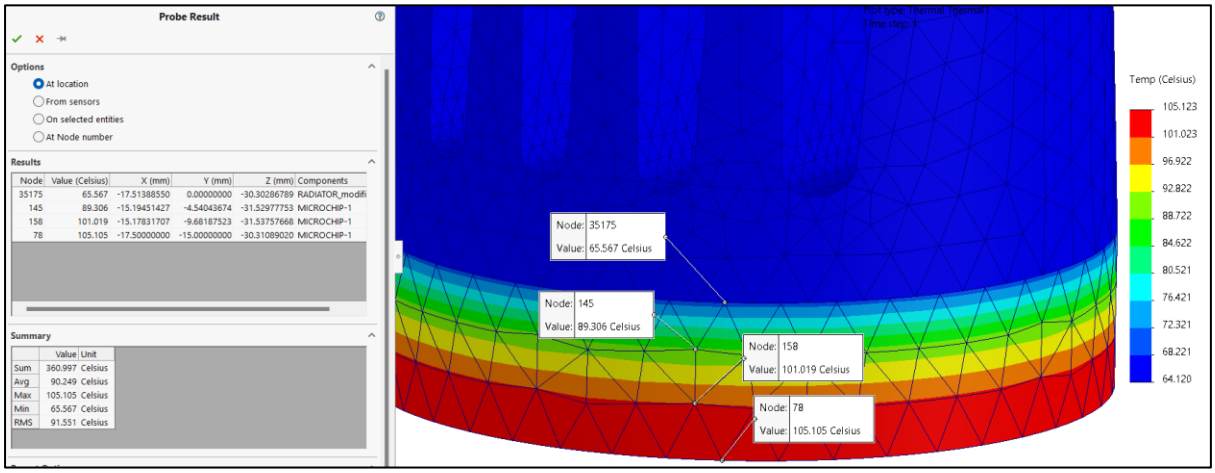
XY temperature plot in Radiator at node 12272 shown below:



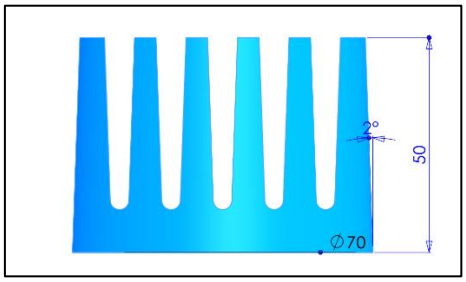
c. Change the height of the heatsink fins to decrease the temperature of the microchip:

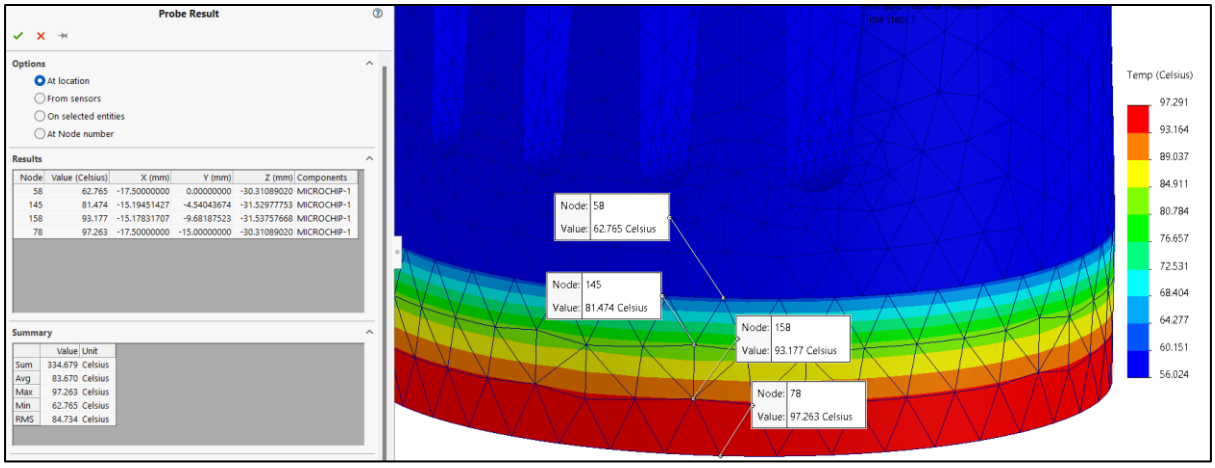
Case 1: Original fin height **40mm**,



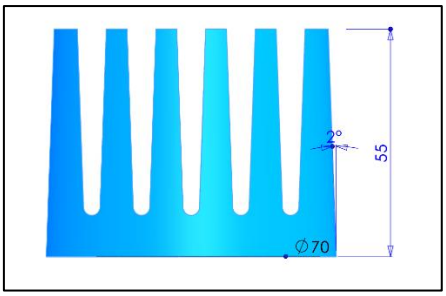


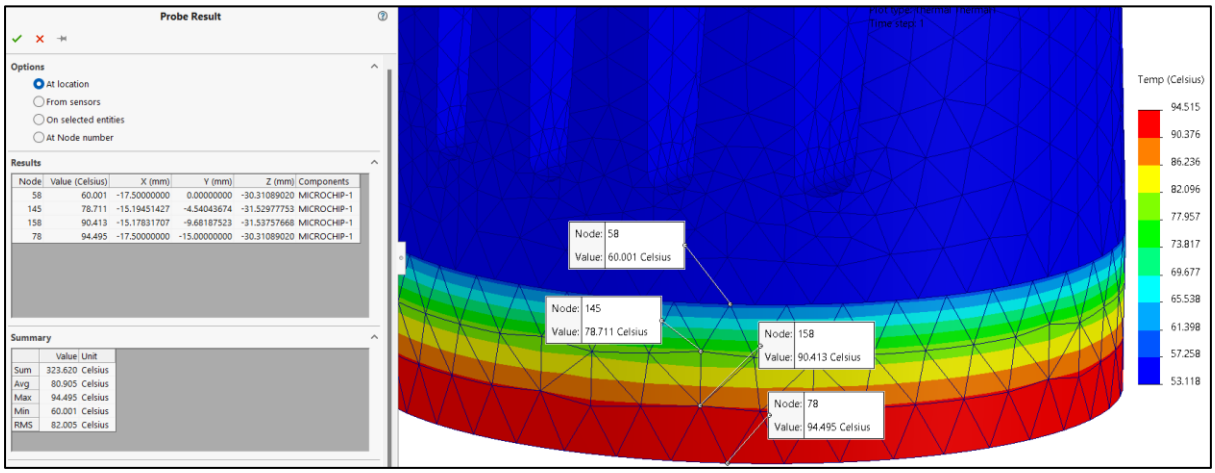
Case 2: Increased fin height **50mm**,





Case 3: Increased fin height **55mm**,





Comparison table between different cases shown below:

Case no.	Fin height (mm)	**% height increase** w.r.t. original	Average temperature of the probes (°C)	**% average temp decrease** w.r.t. original	Temperature at interface boundary (°C)	**% temp decrease at interface** boundary w.r.t. original
1	40	-	90.249	-	65.567	-
2	50	25.0%	83.670	7.3%	62.765	4.3%
3	55	37.5%	80.905	10.4%	60.001	8.5%

We get a 4.3% reduction in temperature in microchip at the interface boundary with the radiator when the heatsink fin height is increased by 25%.