Intel® Xeon® Processor 7500 Series Thermal Model Overview

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Summary

Objective: Provide heatsink thermal CFD models to customers to assist in their system and component thermal evaluations. Values based on CFD and compared to test results.

Heatsink Size and Boundary Conditions

Heatsink Form Factor Preliminary - subject to change	Overall HS Size (w x l x height) mm	TDP W	Tamb C	Airflow CFM	T rise C	Delta_P IN H2O
1U/blade proxy utilizing existing retention	90 x 90 x 26.5	95.0	35.0	12.6	7.0	0.34
2U utitilizing existing retention Cu base / Al fins	90 x 90 x 51.0	105.0	35.0	28.0	7.0	0.25
Enabled solution: 4U tower 100mm wide	100 x 70 x 102.5	130.0	35.0	36.0	10.0	0.20

Non-Uniform Correction Factors

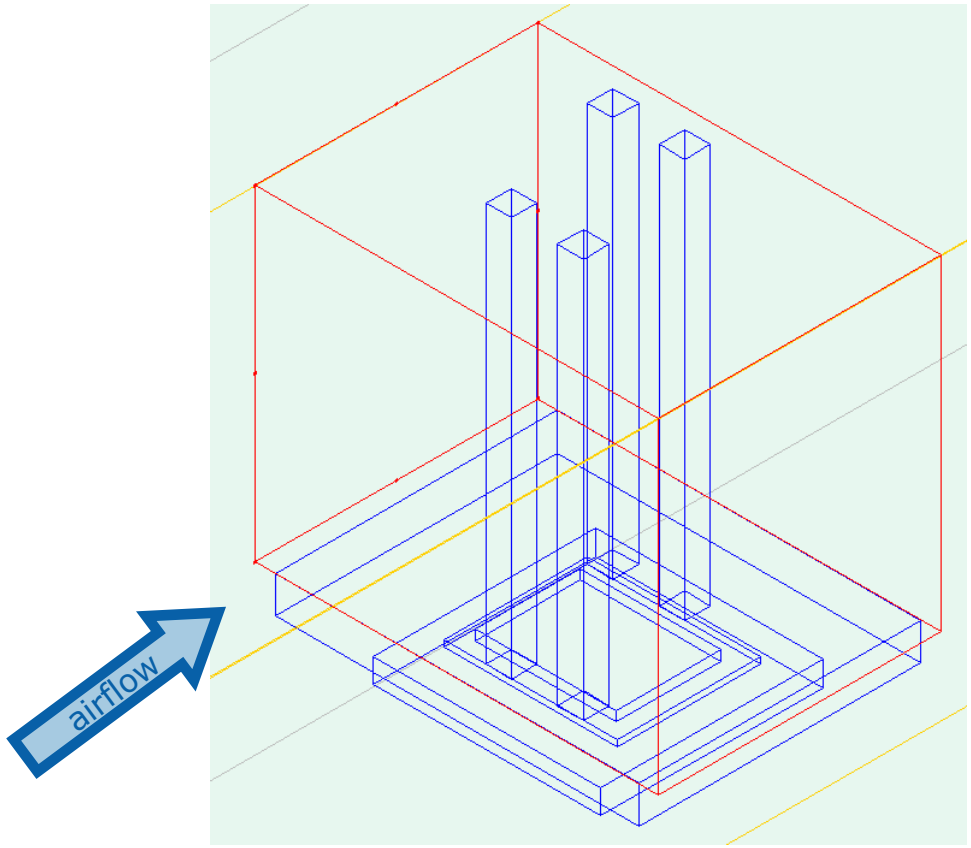
Correction Factor (CF) is added to the Thermal Test Vehicle (TTV) Ψ_{CA} heatsink to account for power non-uniformity and any difference in die size between TTV and product.

Processor Ψ_{CA} (non-uniform) = TTV Ψ_{CA} (uniform) + TTV CF

TDP(W)	TTV CF (˚C/W)
130	-0.018 °C/W
105	-0.017 °C/W
95	-0.017 °C/W

Thermal correction factor values are subject to change.

Tower Heatsink – Flotherm Compact Model



HS overall: 100 x 70 x 102.5 mm (max)
Fin volume: 100 x 70 x 80.8 mm
HS pedestal: 35.0 x 26.0 x 2.5 mm
4 L-shaped heatpipes
Represents: 64 fins @ 0.3mm thick, Al

Note: Cu pedestal required to clear ILM.

This compact model to be utilized in the system model to:

- obtain airflow through CPU fins to determine spec compliance utilizing the performance to airflow graph/equation
- represent the CPU stackup resistance and power dissipation in the system

Enabled Tower Heatsink Performance @ 36 CFM

	Enabled Heatsink w/ Xeon® 7500	Enabled Heatsink w/ Westmere-EX	Note
TTV Ψ_{CA} Mean EOLife	0.184	0.184	TTV and heatsink are assumed same for Intel Xeon processor 7500 series and Westmere-EX processor
3σ	0.018	0.018	
Ψ_{CA} TTV CF	-0.018	TBD	Based on silicon powermaps Westmere-EX processor TBD
Ψ_{CA} NU, EOLife + 3σ	0.184	TBD	Xeon 7500 Requirement: Psi_ca max = 0.185 C/W for 130W TDP, Tc-max = 69C, Tla = 45C
Pressure Drop (IN H2O)	0.19	0.19	Spec limit = 0.20

Performance vs. Airflow