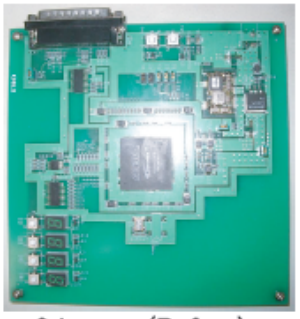
Heat Dissipation Design for Printed Circuit Board

by OKI Printed Circuits Co., Ltd.

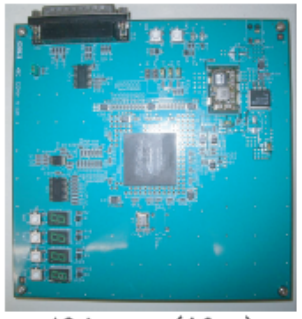
The number of prototypes has been reduced successfully by STREAM

Model

Dimension : 150 × 150 × 1.6t (mm)
Num. of Layers : FR-4 2 Layers
Circuits : Altera FPGA BGA package
Peripheral circuit
Operation : 66MHz Shift Register



2 Layers (Before)



10 Layers (After)

※ Both cases are identical in circuit schematic, parts placement and total thickness of PCB.

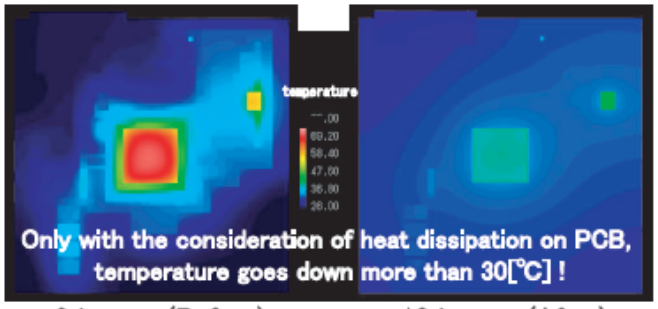
Design Points

- For increasing the thermal conductivity of PCB
  - * The number of layers; 2 layers => 10 layers
  - * Halogen-free insulation use
  - * Increase the residual copper area ratio
- For improving thermal conductivity of Board in PKG
  - * Ground connection of Chip NC pins
- For improving thermal heat transfer in PCB
  - * Additional aluminum fin at the back and at the edge of PCB
  - * Add the pin fin at the dead space of PCB

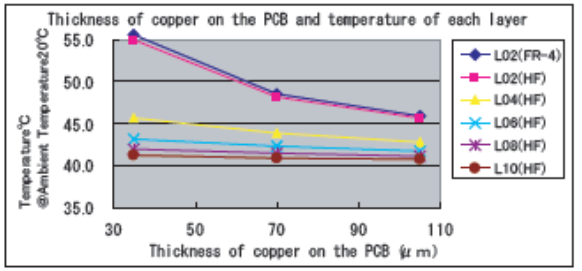
Analysis Results

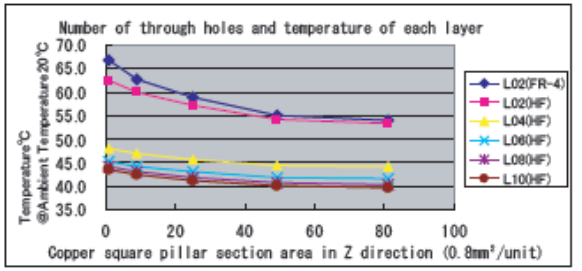
If the heat dissipation could be performed by natural convection instead of forced convection, you are able to;

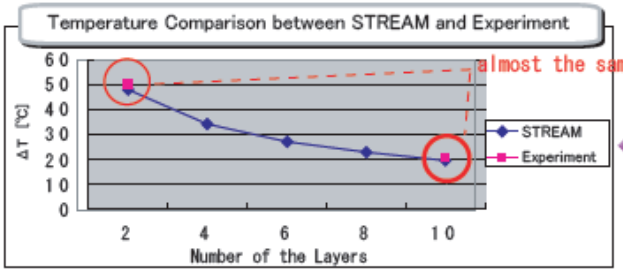
1) Reduce the space for cooling fan, wind path, etc.
2) Reduce noize level and improve the acoustic environment.
3) Improve quality and reliability
4) Reduce the cost



2 Layers (Before) 10 Layers (After)







We could predict the temperature for various cases with different number of layers.
Now, we can provide the adequate design according to the customer's need.

comment

This is the era that the Printed Circuit Board makers use the CFD software in order to improve their designs and make a better proposal.
For proposing the best solution, we can say that Cradle STREAM series is a dependable tool on thermal design and assesment.