Autonomous Thermal Connector

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SUMMARY

UCLA researchers have designed a novel replacement for traditional wedgelocks used to mount PCB boards to cold plates that eliminates the need for applying a mechanical force during installation, and improves heat transfer performance.

BACKGROUND

The traditional wedgelock used to mount PCB boards to cold plates requires a difficult and lengthy installation processes whereby a screw must be tightened to a specific torque. This process can result in poor PCB performance if the board is mounted with too little or too much torque. Development of an autonomous and reversible locking mechanism would improve installation performance and reduce time and costs associated with labor. Additionally, the heat transfer performance could be improved by increasing the connector's contact area.

INNOVATION

UCLA researchers from the Department of Mechanical and Aerospace Engineering have developed an innovative design for locking PCB boards to cold plates. An autonomous thermal connector was developed by utilizing springs fabricated from Nitinol. A change in the connector's temperature will provide the spring's reversible locking force due to Nitinol's shape memory characteristics. The novel connector design produces more favorable heat transfer properties by increasing the contact area of the clamping device. Furthermore, the simple design reduces the complexity and costs associated with manufacturing and installation labor.

APPLICATIONS

- Large scale servers and industrial electronics
- Missile defense systems
- Radar sensors and tracking units
- Jets, tanks, humvees, trains, ships
- Radio emitters
- Storage networks
- Medical systems

ADVANTAGES

• No mechanical force is supplied by a user to clamp the PCB board to the cold plates

• Nitinol spring's reversible mechanism experiences substantially less fatigue than current metal springs

• The thermal resistance is reduced by 45%.

• The temperature at the center of the board is 20% cooler.

• The design is simpler and thus reduces manufacturing complexity and costs.

STATE OF DEVELOPMENT

A working prototype has been developed and tested in experiments, showing better performance than the current state-of-the-art devices.

PATENT STATUS

Country	Type	Number	Dated	Case

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OTHER INFORMATION

KEYWORDS

Printed circuit board, PCB, COTS, Calmark, autonomous, reversible, thermal, thermally, connector, resistance, Nitinol, cold plate

CATEGORIZED AS

- **Computer**
  - Hardware
  - Other
- **Engineering**
  - Engineering
  - Other
- **Security and Defense**
  - Other
- **Sensors & Instrumentation**
  - Process Control

RELATED CASES

2012-778-0

United States Of America	Issued Patent	9,629,232	04/18/2017	2012-778

RELATED MATERIALS

- Reilly, S.; Stubblebine, M.; Supowit, J.; Catton, I., "A novel, autonomous thermal connector," Semiconductor Thermal Measurement and Management Symposium (SEMI-THERM), 2013 29th Annual IEEE , vol., no., pp.256,260, 17-21 March 2013

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