

## PASSIVE COOLING SYSTEM USING A DUAL-PHASE FLUID

Main Technological Area → Thermal control

Keywords → Electronic devices | Wick | Thermal dissipation | Bi-Phase fluid | Passive cooling

A new and more efficient technology for cooling and control of thermal transients, which increases the dissipation into the environment and limit the temperature excursions under the same conditions, without worsening dimensions, mass, energy consumption, safety and reliability characteristics.

### TECHNICAL SPECIFICATIONS

With reference to the case of the cooling of an avionics (exemplary, but not limiting), it is a matter of drowning a "fluid circuit" without components and with an optimized path, formed in the avionics plate itself. The fluid circuit comprises the following elements: a) A cylindrical evaporator arranged on the side of the plate that receives the heat; b) A cylindrical compensation chamber identical to the evaporator, but placed on the side of the plate that transfers the heat to the external environment; c) A thin porous wall called *Wick*, interposed between the evaporator and the compensation chamber, which generates the capillary flow of the fluid towards the Evaporator; d) A fluid circuit, as long and distributed as possible, on the two faces of the plate.

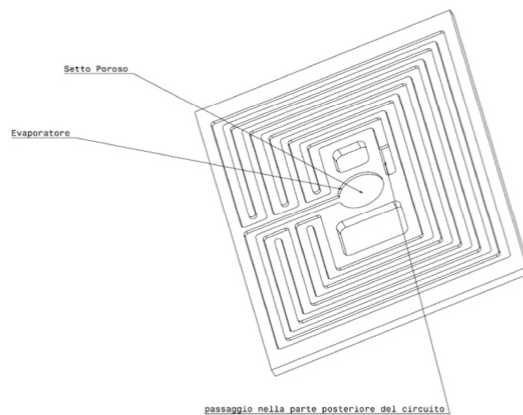


Figure 1 – Perspective view of the cooling system

### INNOVATION/ADVANTAGES

Main advantages of the patented solution over the known passive cooling systems using a dual-phase fluid:

- Constant temperature during "thermal transients" (e.g. : switching on / off / sudden changes of thermal load);
- Lower production costs, since the manufacturing of the device consists of machining a metal plate followed by filling with fluid and gluing of the films to both sides of the plate;
- Size and weight kept at minimum;
- Increased reliability, due to the absence of "active" components.

**FIELDS OF APPLICATION**

<b>Electronics</b>	Thermal control of electronic devices having high thermal dissipation, including PCs and Tablets.
<b>Automotive</b>	Thermal control of different kind of vehicle engines.

**PATENT INFORMATION**

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**Priority Code** – IT 102016000129385

**IPC Codes** - H05K 7/20

**CPC Codes** - H05K 7/20336, F28D15/0266

**Active worldwide applications**

ITA – 102016000129385 ; filing date: 2016/12/21; grant date: ---pending---

EPO - EP3339789; filing date: 2017/12/19; grant date: 2019/10/23

National Extensions: GERMANY – FRANCE – SPAIN – ITALY

USA - US10228193; filing date: 2017/12/20; grant date: 2019/03/12

HONG KONG - HK1256119; filing date: 2017/12/20; grant date: 2019/10/23

SPAIN - ES2761905T3; filing date: 2017/12/19; grant date: 2020/05/21

JAPAN - JP2018152550; filing date: 2017/12/19; grant date: ---pending---

RUSSIA - RU2017144903; filing date: 2017/12/20; grant date: 2021/05/17

CHINA - CN108235648A; filing date: 2017/12/20; grant date: ---pending---

**Leonardo internal code**

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