Physic - Engineering sciences / Aerospace & Defense - Industrial automation - Automative & Transport - Electronics & Safety - Energy & Electrical systems - Measurement & Instrumentation - Consumer goods

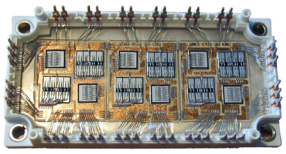
DISRUPTIVE METHOD FOR DIAGNOSING THE STATE OF HEALTH OF POWER ELECTRONICS DEVICES

Simple and economical method for diagnosing the state of health of discrete power devices or modules (IGBT, diode), in real time and in-situ, thanks to a new indicator which is independent of the temperature.

ERGANEO
L'AVENIR EST FAIT D'AUDACE

PRESENTATION

Current methods for monitoring the health status of power semiconductor components, in real time, in operating electronic equipment, are very complex and therefore expensive to implement. Thanks to the discovery of a new unique temperature-independent aging indicator it has now become very simple and economical to diagnose the state of health of these components. The result is a drastic reduction in the cost of maintenance that opens the way to new fields of application previously unthinkable.



Power module based on IGBT transistors and diodes

Degradations: detachment of connection wires

Aging indicator - State of health diagnostic
Temperature independent - IGBT, diode
Semiconductor Power Devices - Predictive maintenance

APPLICATIONS

- Predictive maintenance of power electronics equipment
- Electric vehicles (car, train, metro,...)
- Renewable energy converters
- Switching power supply
- Electric energy converters
- Variable speed drives

COMPETITIVE ADVANTAGES

- Unique and temperature-independent aging indicator
- Real time and in operation monitoring method.
- Robust, easy and low-cost implementation with only two electric sensors
- High precision, more sensitive than the «Vce indicator» method
- For discrete components and semiconductor modules (such as IGBT and power diodes)
- Detection of the most observed degradations related to chip interconnections such as bonding wires and die-attaches

DEVELOPMENT PHASE

☑ Process has been theoretically demonstrated using physical models. Tested and validated experimentally using accelerated aging tests in the laboratory.

INTELLECTUAL PROPERTY

Patent application filed in 2021
WO2023/094205

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PUBLICATIONS

Zoubir Khatir, Ali Ibrahim, Richard Lallemand, "New temperature-independent aging indicator for power semiconductor devices – Application to IGBTs", *Microelectronics Reliability* (2024)