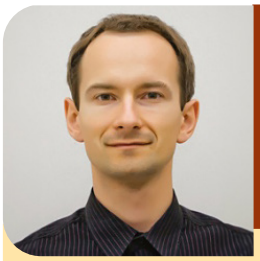

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ABSTRACT
PRESENTATION
PAPER

Robert Olbrycht has been working at the Institute of Electronics of the Łódź University of Technology since 2008. He graduated from the Faculty of Electrical Engineering, Electronics, Computer Science and Automation of the Łódź University of Technology, majoring in electronics and telecommunications and specializing in telecommunications & computer science. He defended his master's thesis entitled in 2008 and obtained a PhD in technical sciences with distinction in the discipline of electronics, specializing in thermal imaging in 2012. Currently, he conducts research on, among others, hyperspectral thermal imaging.

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REALTIME TEMPERATURE MEASUREMENT OF SEMICONDUCTOR JUNCTIONS IN OPERATION

Realtime temperature measurement of electronic components in operation can be very important in many types of research. It can be done both with contact and contactless sensors. Both approaches have the disadvantage of measuring the case temperature instead of the junction itself. In practice, it can be limiting factor when there are very fast junction temperature changes, e.g. during pulse switching. When using infrared thermal imaging, it should be also taken into consideration, that microbolometer time constant may be an additional limiting factor here. Hence for very fast junction temperature measurement it is preferred to use the approach basing on voltage drop over this junction, that is temperature dependent. Let us take an example of a semiconductor diode or bipolar transistor p-n junction, where under constant current, the voltage drops by -2,2 mV per each K temperature increase. In practical applications, however, the transistors are often driven by different values of current, making the above proposed approach difficult to use.

The proposed solution in this paper is to introduce additional small current of high frequency for measurement purposes. It should not affect the operation of a circuit with investigated transistor and it opens the possibility of live junction temperature monitoring.

To use the proposed approach, one needs to perform calibration, to find the relation between exact signal parameters and junction temperature. The authors propose to use thermal imaging for this calibration, together with precise apparatus for signal generation and analysis.