Low-cost and non-intrusive real power flux determination for any microelectronic device or system

CSIC have recently developed a local non-intrusive, low cost and quantitative method for the real power flux and its direction measurement in any high-frequency microelectronic device or system under operation for specific electrical and thermal working conditions.

Industrial partners from semiconductor industry addressed to telecommunication and radar application sectors, particularly focused on amplifiers and mixer systems development, as well as thermographic systems manufacturers and/or distributors, are being sought to exploit the existing know-how through a patent licence or service agreement.

Non-invasive method to quantitatively determine the real power flux characteristics

Monitoring specific local parameters, such as power flux from the input to the output of the microelectronic device or system, is difficult, as local access to its internal nodes is highly complicated or impossible. The characterization of power flux between input and output is of paramount importance to understand the behavior of any component of a Radio Frequency (RF) device or system, but they are not giving any feedback about the system components or device parts under working conditions.

A local non-intrusive, low cost and quantitative approach based on infrared lock-in thermography is used to capture thermal images which are post-processed to obtain temperature information pixel-by-pixel to finally determine how the temperature is distributed in all system components (actives and passives) or device parts under operating conditions (electrical and thermal). With this information, the direction of the power flux and its relative value can be derived.

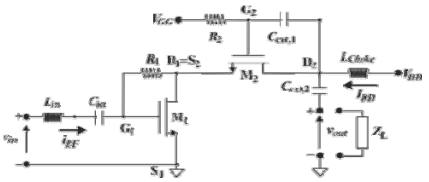

Fig.1) *Schema of a power amplifier*

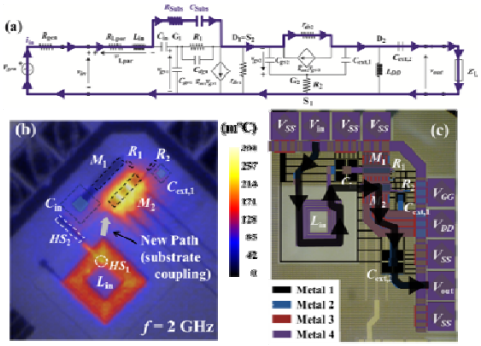

Fig 2) *Quantitative real power flux in an operating microelectronic power amplifier. The thermal image (Fig. Bottom Left) and amplifier layout (Fig. Bottom Right) show the path and direction of the current in the power amplifier.*

Main innovations and advantages

- Non-intrusive and low-cost electro-thermal spatial resolved technique (6 microns spatial resolution) up to 125°C.
- Very suitable as quality control system for diagnostics of systems of amplification, conditioning, transmission or reception signals.
- Of easy implementation in any other imaging temperature sensing system such as thermoreflectance, liquid-crystal thermography, among others.

Particularly addressed to telecommunication sectors, and extendable to other low-frequency electronic scenarios, e.g., in automotive electronics

Patent Status

Patent Application filed

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