

Ultra low-power high-speed IC and high-frequency packages for optical communication transceivers

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Abstract

The ultra-low power and high-speed IC developments and RF package activities at the Fraunhofer Heinrich-Hertz Institute (HHI) will be presented. The electrical impedance of the optical device is not conventional 50 Ω . For example, optical Mach-Zehnder modulator (MZM) requires very high-swing output voltage, e.g. around 3 V_{pp}, diff at 32 GBd for 2x 25 Ω load impedance. For electro-absorption modulated laser (EML), a 50 Ω matching shall be integrated either onto chip or interposer package. Depending on the optical device, the driver IC requirements are quite different.

For the low-power and good signal integrity of the transmitted optical signals, the particular design method, so called co-design, has been intensively investigated at the HHI and excellent performances have been obtained. Details about those ICs for each optical device will be explained and recent development examples will be discussed.

By having this talk, the author would like to emphasize on core competencies, research capabilities and research achievements with regards to high-speed IC and packages. Also, he wants to discuss with session attendees about potential applications, e.g. IoT, industry 4.0, artificial intelligence (AI), medical instruments, and feasible research collaborations.

Keywords: *low-power, IC, high-speed, optical communication*

References

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Biography

Since 2011 Dr. Jung Han Choi is working on high-speed IC design and electromagnetic-wave simulations at the Fraunhofer Heinrich-Hertz Institute. He holds permanent tenure position. His current research interest includes active/passive device design, their modeling, high-frequency circuit design, and metamaterials. He published more than 90 international papers, 3 books, 3 book chapters, and holds 21 and 20 registered and filed patents.