

SESSION 24 – TAPA I
Optical Communication Components

Saturday, June 19, 10:20 a.m.

Chairpersons: A. Amerasekera, Texas Instruments
M. Ugajin, NTT

24.1 — 10:20 a.m.

A Low Voltage 10Gbps SiGe Laser Diode Driver Using Adaptive RC Compensation and Common-Mode Feedback Based Current Generators, A. Maxim, Integrated Products, Austin, TX

A low voltage, high modulation current 10Gbps laser diode driver was realized in a 0.2 μ m SiGe BICMOS technology, by using multiple common-mode feedback loops to generate both the output modulation current and the output driver variable biasing currents. Adaptive RC compensation networks provide an optimal switching speed while controlling the overshoot and ringing over a wide range of modulation current. IC's specifications include: supply voltage 3-4.5V, rise/fall time <25ps, overshoot <10%, deterministic jitter <12ps, modulation current range 20-100mA, bias current range 1-100mA, and die area 1.5x1.5mm².

24.2 — 10:45 a.m.

A 10Gb/s SiGe Transimpedance Amplifier Using a Pseudo-Differential Input Stage and a Modified Cherry-Hooper Amplifier, A. Maxim, Integrated Products, Austin, TX

A 10Gbps inductor-free transimpedance amplifier was realized in a 60GHz fT_{0.2} μ m SiGe process, using a die on board mounting technique. The input stage uses a pseudo-differential cascoded common emitter architecture that achieves both low input noise and good supply and substrate rejection. The wide band operation is assured by using input bondwire inductive peaking in conjunction with feedback capacitive peaking. A low voltage operation was achieved by eliminating the inter-stage isolation emitter followers and minimizing the capacitive loading at the high impedance nodes through emitter degeneration and cross-coupled Miller capacitance neutralization.

24.3 — 11:10 a.m.

A 20mW 85dB- Ω 1.25Gb/s CMOS Transimpedance Amplifier with Photodiode Capacitance Cancellation, C.-M. Tsai, Industrial Technology Research Institute, Hsinchu, Taiwan, ROC

This paper presents a 1.25Gb/s transimpedance amplifier employing a novel photodiode capacitance cancellation technique in 0.35 μ m CMOS technology. The transimpedance amplifier exhibits 85dB-ohm differential transimpedance gain and wide dynamic range of -3 to -27.3dBm while dissipating 20mW from a 3V supply.

24.4 — 11:35 a.m.

CMOS Transceiver with Baud Rate Clock Recovery for Optical Interconnects, A. Emami-Neyestanak, S. Palermo, H.-C. Lee and M. Horowitz, Stanford University, Stanford, CA

An efficient baud rate clock and data recovery architecture is applied to a double sampling/integrating front-end receiver for optical interconnects. Receiver performance is analyzed and projected for future technologies. This front-end allows use of a 1:5 demux architecture to achieve 5Gb/s in a 0.25 μ m CMOS process. A 5:1 multiplexing transmitter is used to drive VCSELs for optical transmission. The transceiver chip consumes 145mW per link at 5Gb/s with a 2.5V supply.

24.5 — 12:00 p.m.

A 1.25Gbit/s CMOS Burst-Mode Optical Transceiver for Ethernet PON System, K. Nishimura, H. Kimura, M. Watanabe, T. Nagai*, K. Nojima*, K. Gomyo*, M. Takata**, M. Iwamoto** and H. Asano*, Matsushita Electric Industrial Co., Ltd., Osaka, Japan, *Panasonic Mobile Communications Co., Ltd., Yokohama, Japan, **Panasonic Mobile Communications Kanazawa R&D Lab, Kanazawa, Japan

A 1.25Gbit/s burst-mode optical transceiver for (EPON) system has been developed using a 0.25 μ m CMOS technology. With new automatic gain control technique and reference-voltage generator, the receiver achieved wide dynamic range of 26.3dB with sensitivity of -29.0dBm and overload of -2.7dBm. Moreover, coming up with a novel automatic power and extinction ratio control method, the transmitter suppressed their variations significantly. This is the first CMOS optical transceiver that meets the specifications of IEEE802.3ah standard.