**40GbE Serial and 40G VSR Compact Optical Transceiver**

**OBJECTIVES**
- 40G compact optical transceiver for ultra-fast optical NIC
- Applicable for 40GbE serial and 40G VSR

**TECHNICAL CHALLENGES**
- Low-power 40G MUX/DeMUX ICs using advanced CMOS technologies
- Compact E/O module with broadband FPC connection technique
- High-speed packaging technology

**Block-diagram of 40G Compact Optical Transceiver**

![Block-diagram](image)

**ACCOMPLISHMENT**
40GbE serial and 40G VSR Optical Transceiver
- 40G MUX/DeMUX ICs and Compact E/O module mounted on the board
- Achieved 40GbE serial and 40G VSR operation
- 1/3 size and 1/2 power consumption compared to conventional one
- Succeeded in developing the world’s first optical transceiver for 40GbE serial and contributed to the IEEE802.3bg standardization

**Optical Transceiver**
- 40G MUX/DeMUX IC: 91.5 x 41.8 mm
- Power: 5.6 W

**40G Optical Eye Diagram**
- Bit error rate: 10^-5 to 10^-12
- VSR Spec.

**40G Receiver Sensitivity**
- Input power [dBm]: -15 to 0
- 39.8/41.2/43 Gbps

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**Block-diagram of 40G Compact Optical Transceiver**

- 1:4 DEMUX
- Amp.
- Pin-PD
- Optical 40G
- Electrical 10G x 4
- 4:1 MUX
- Driver
- EML
- 40G MUX/DeMUX IC
- Compact E/O module

**40G CMOS MUX/DeMUX ICs for 40GbE serial and 40G VSR**
- 1:4 DeMUX
- 4:1 MUX
- VCO
- SFI-5.2 (VSR)/MLD (40GbE)