

High Performance Scalable RF-CMOS Integrated Circuit Design



Tokyo Institute of Technology, Solutions Research Lab., Masu Lab.

Scalable RF Circuit Design

RF front-end

Great demand for 1 chip RF LSI system 800MHz-6GHz

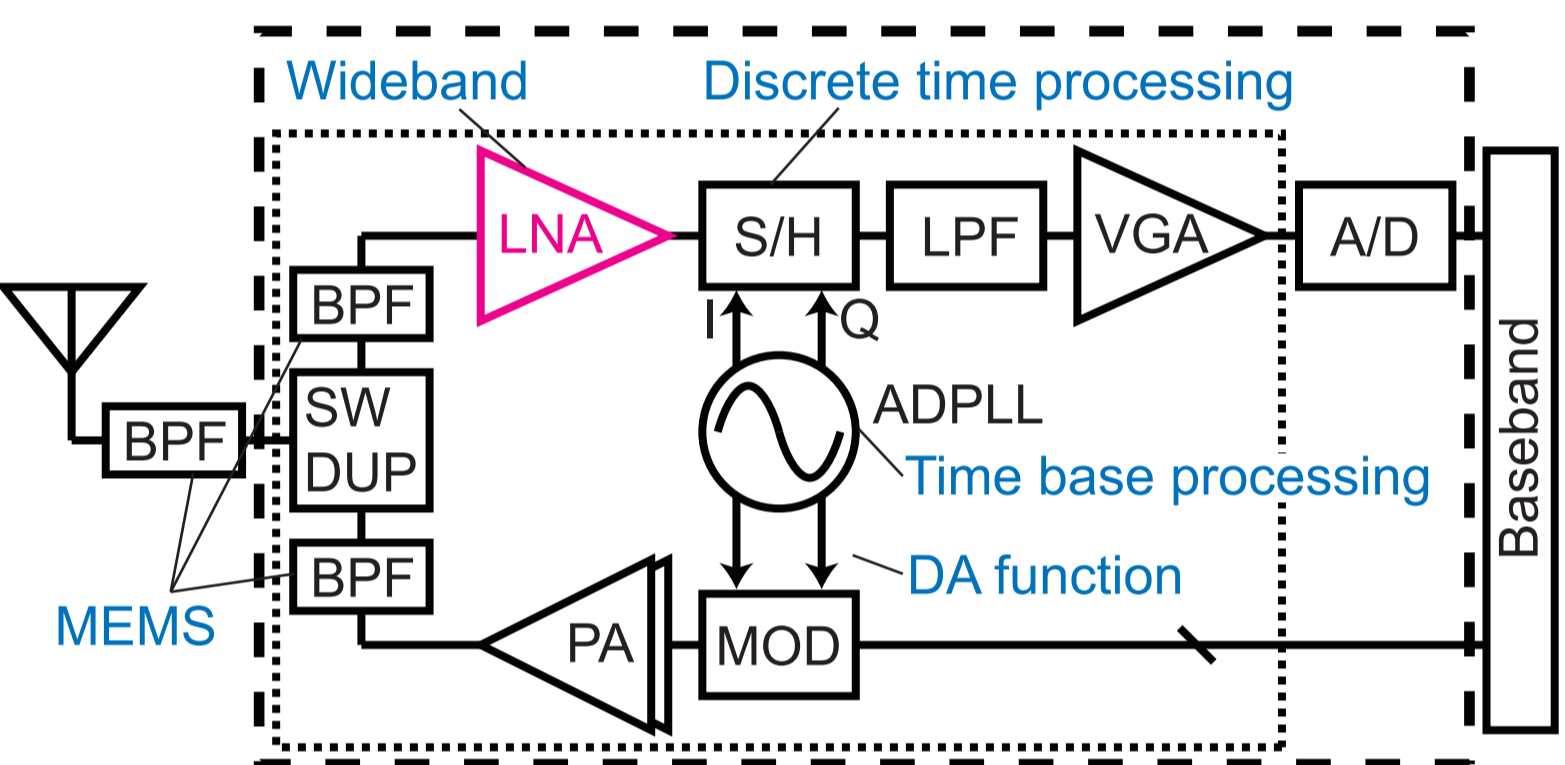
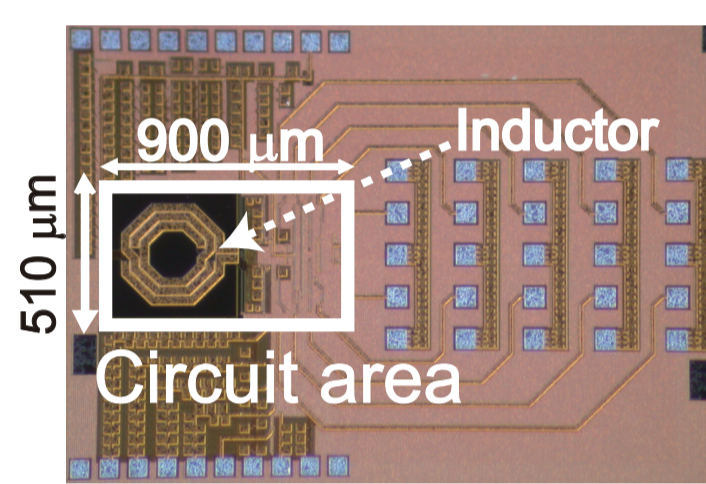
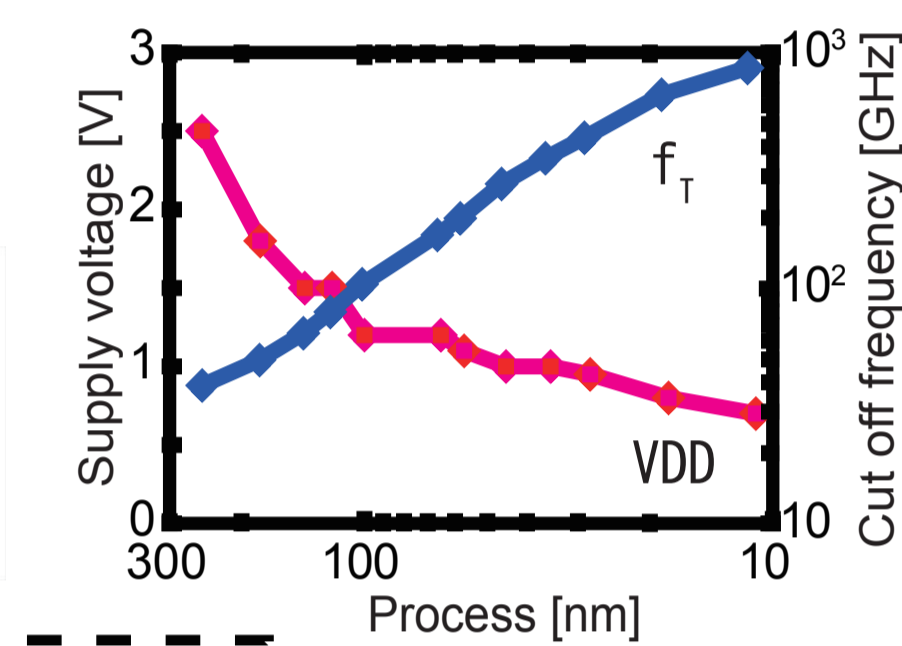
Mobile phone(WCDMA, GSM)
WLAN (802.11a/n/b/g, Bluetooth, Zigbee, WiMAX)
GPS, DTV, EDGE, etc.



Si CMOS process miniaturization

RF circuit become CMOS, digital assisted, SoC

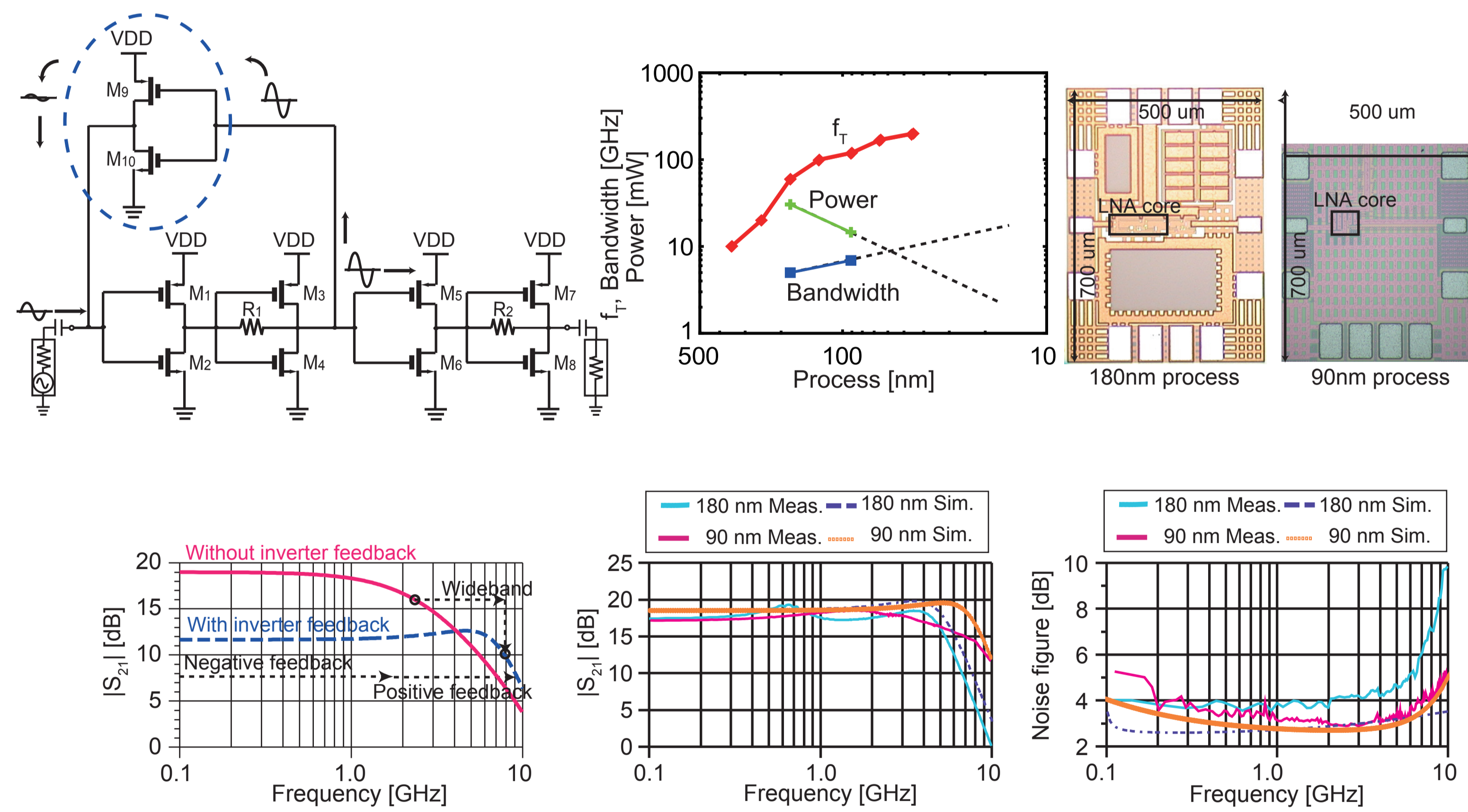
falling supply voltage difficult to small area



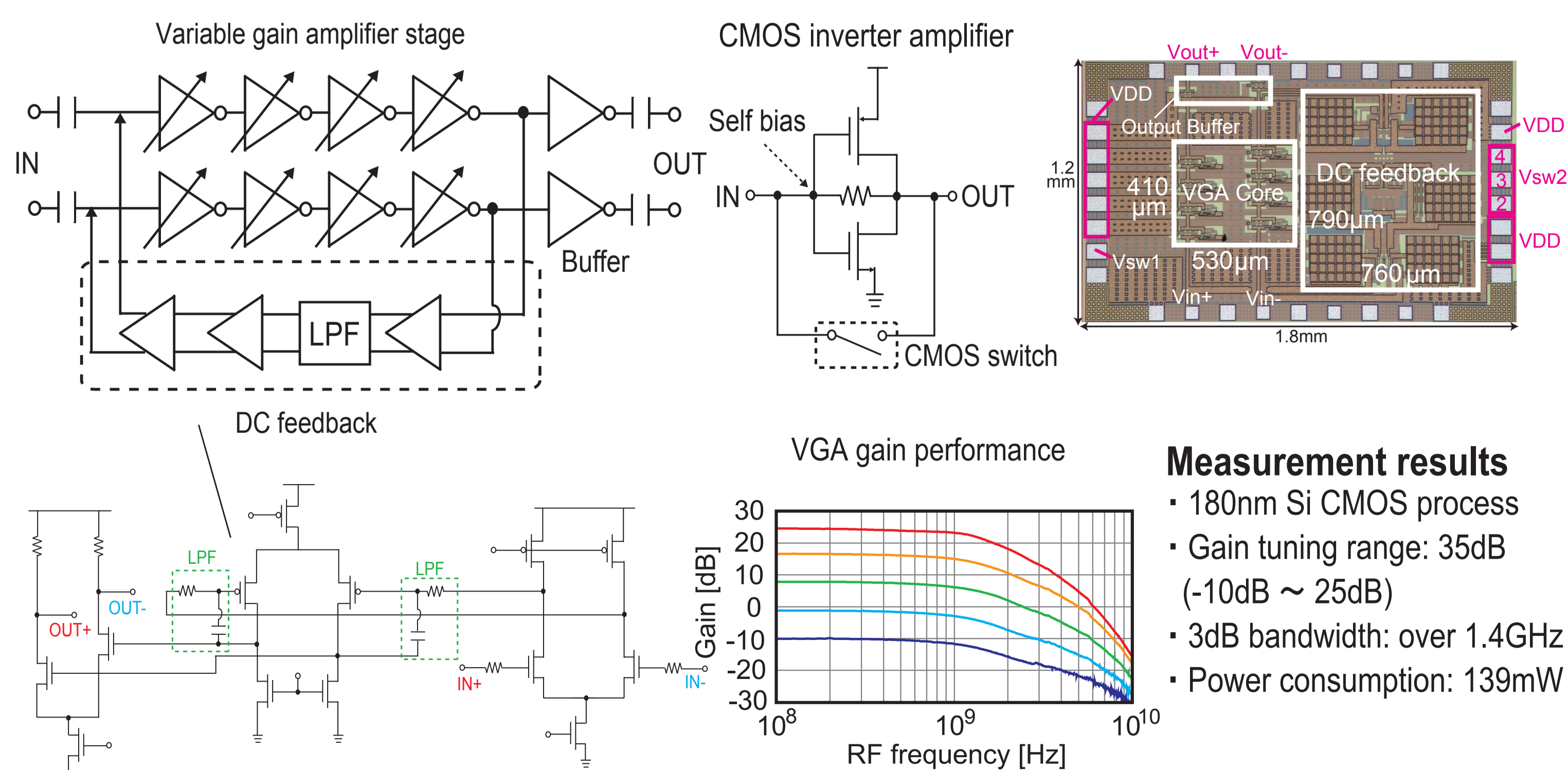
What's scalable make possible?

- small area, low cost
- move in low supply voltage
- high performance

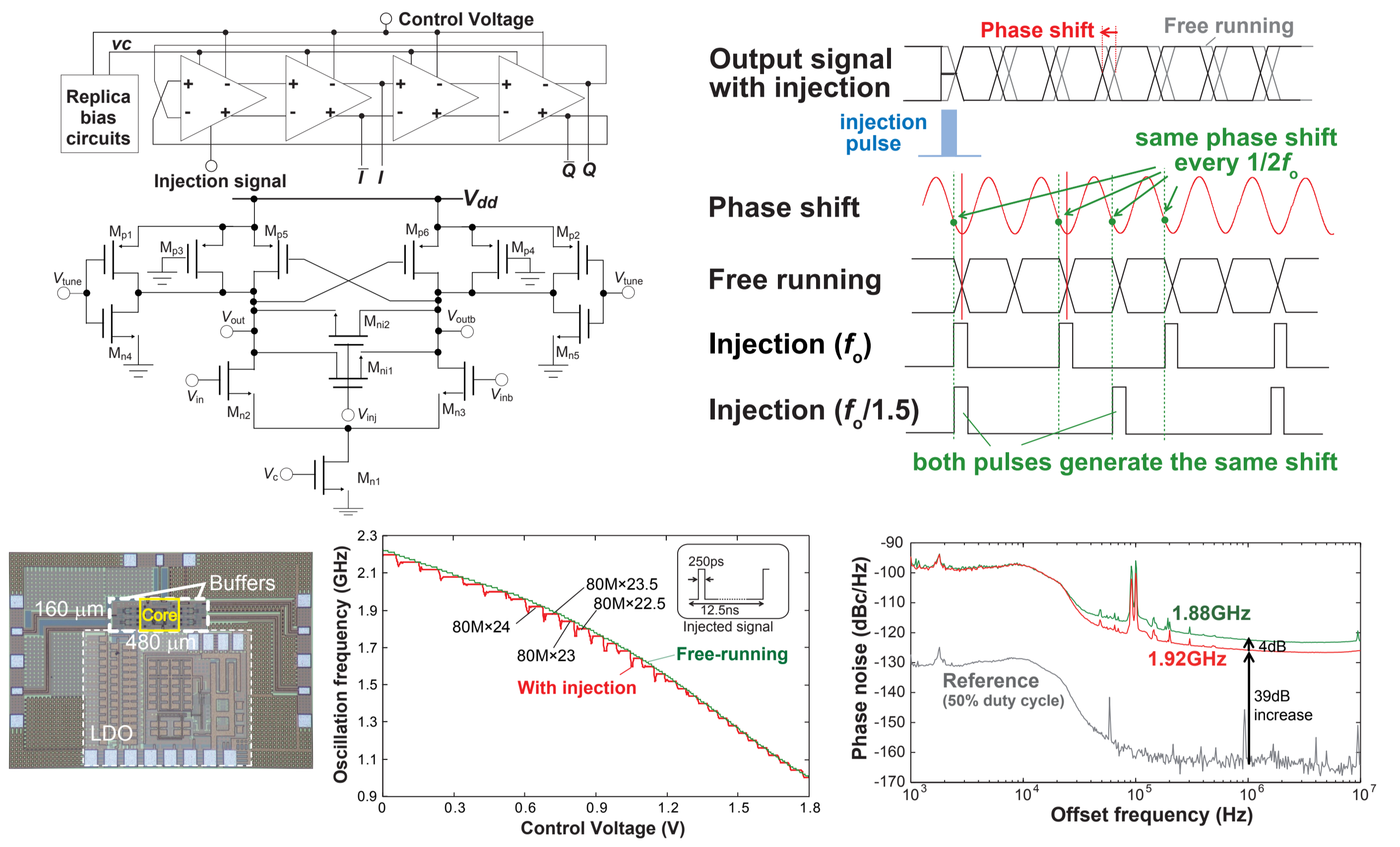
Scalable wideband inverter-based LNA



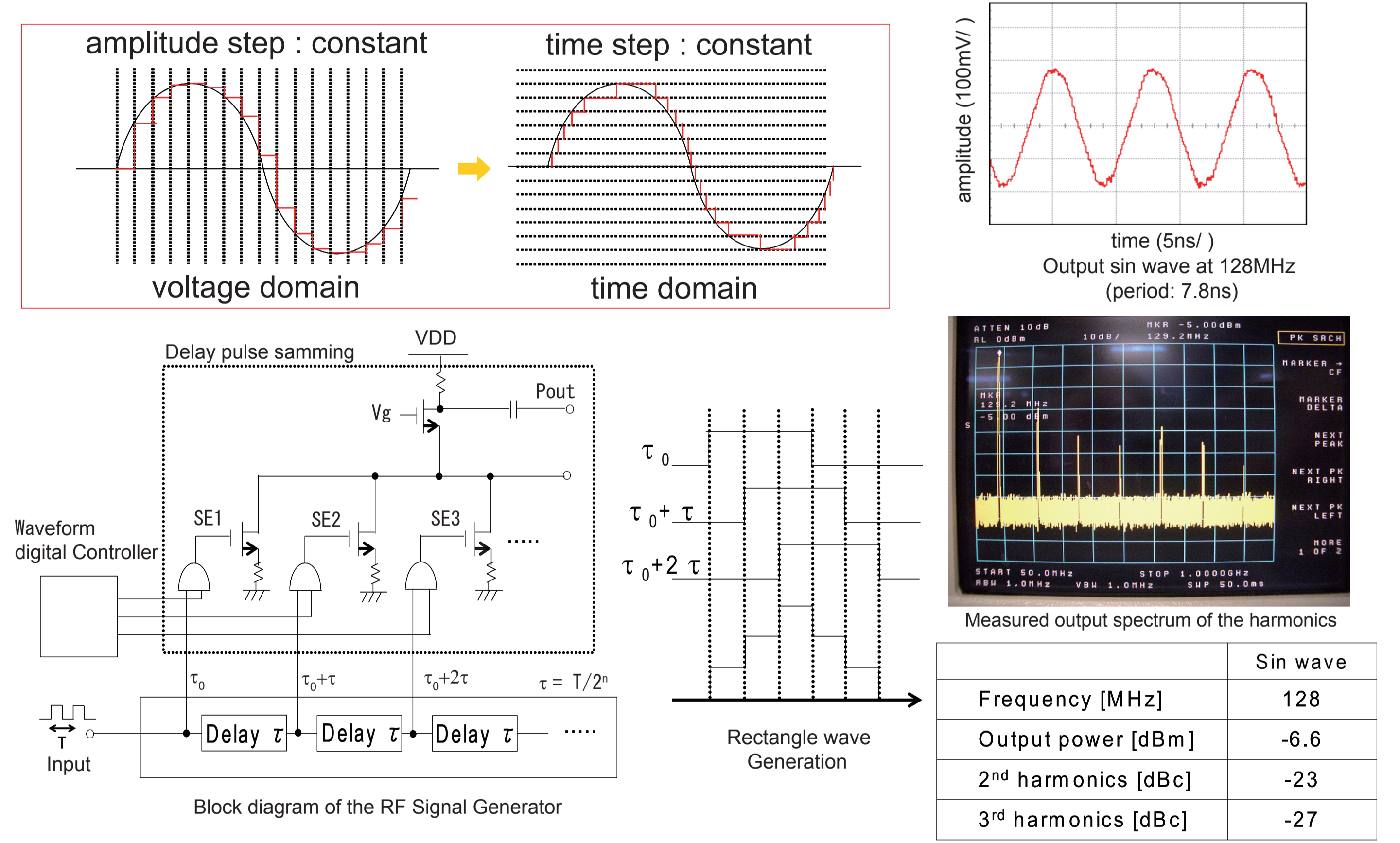
CMOS inverter-based variable gain amplifier



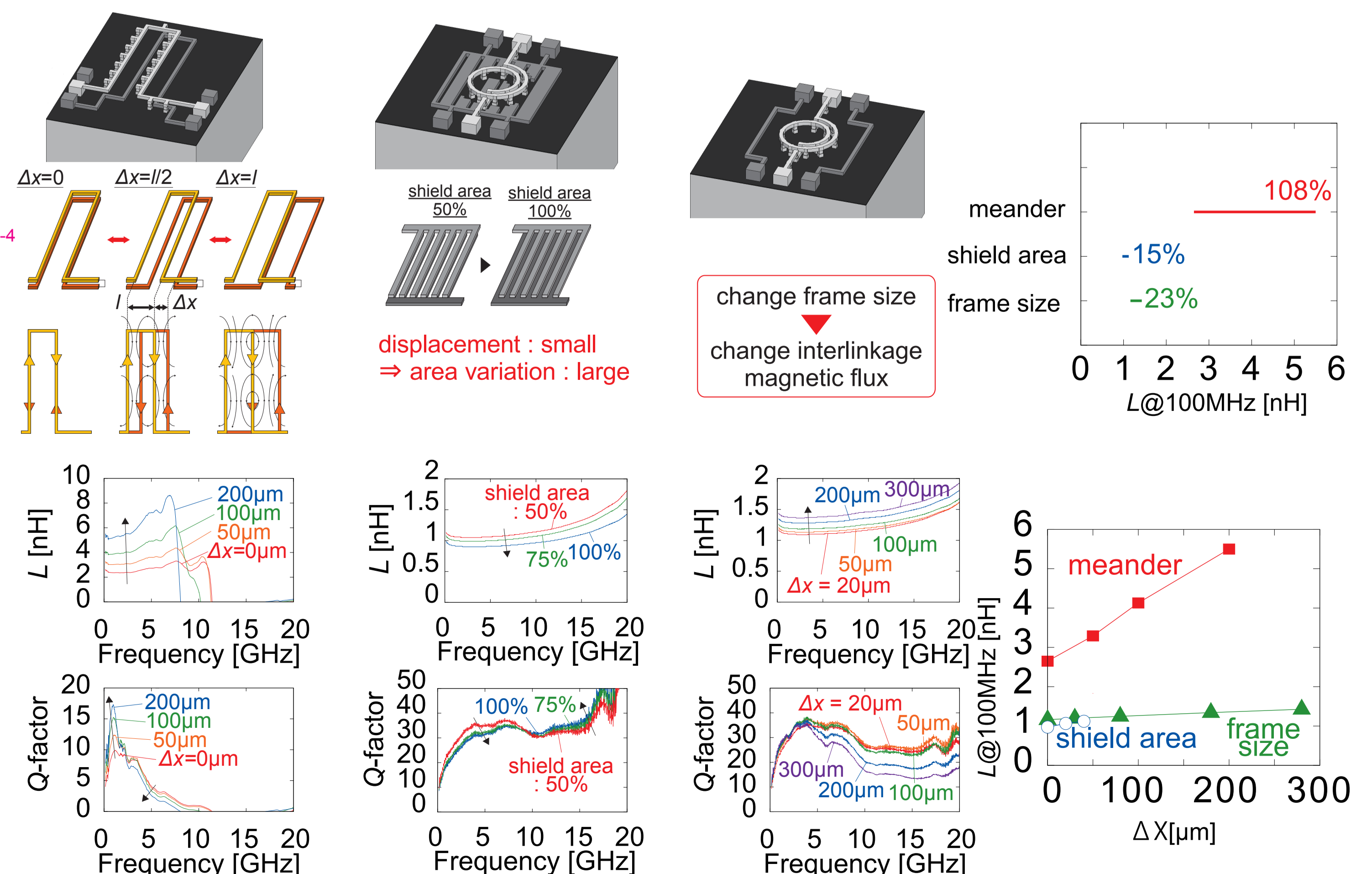
Scalable injection-locked ring-VCO



RF signal generator based on time-to-analog converter

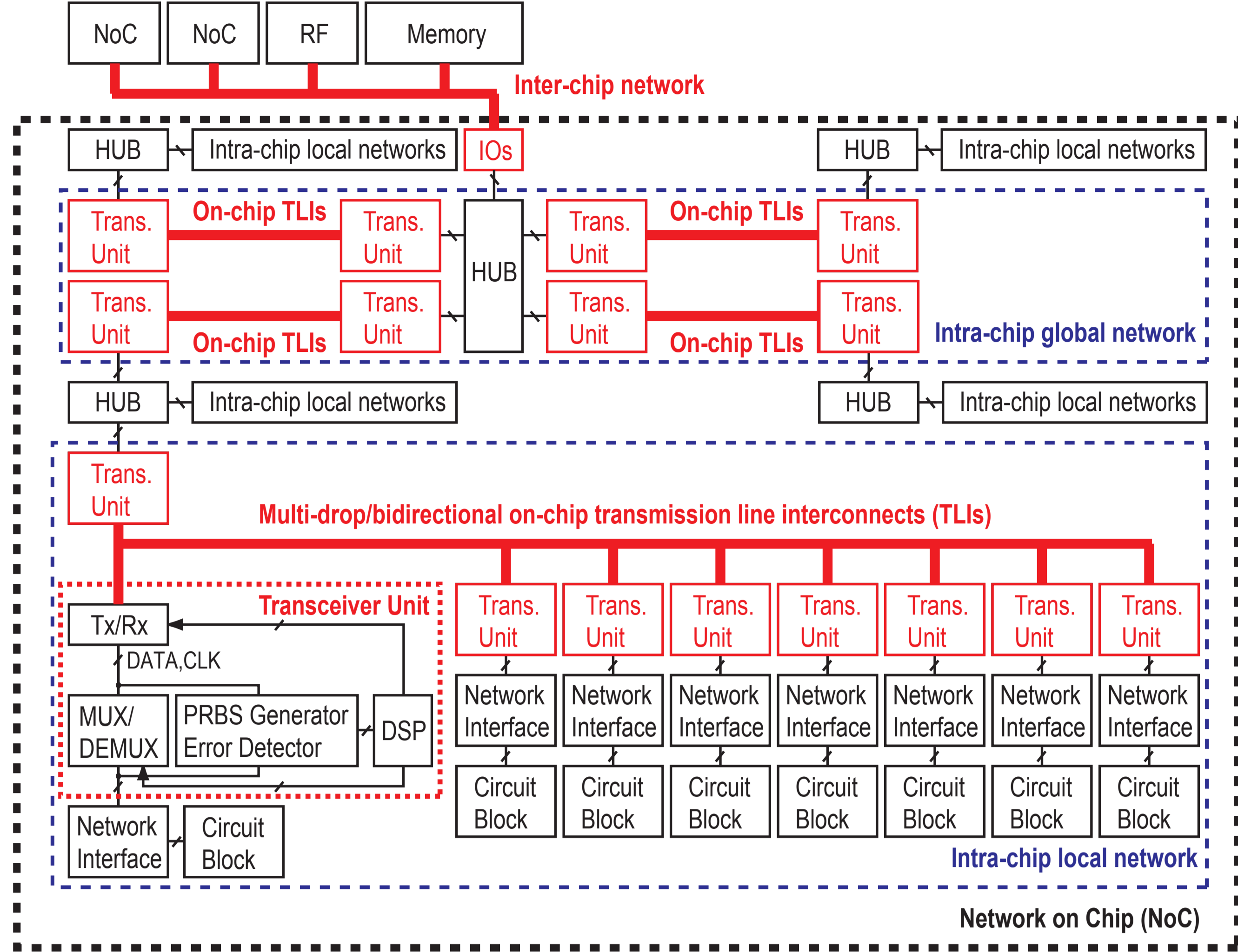


Tunable MEMS inductors

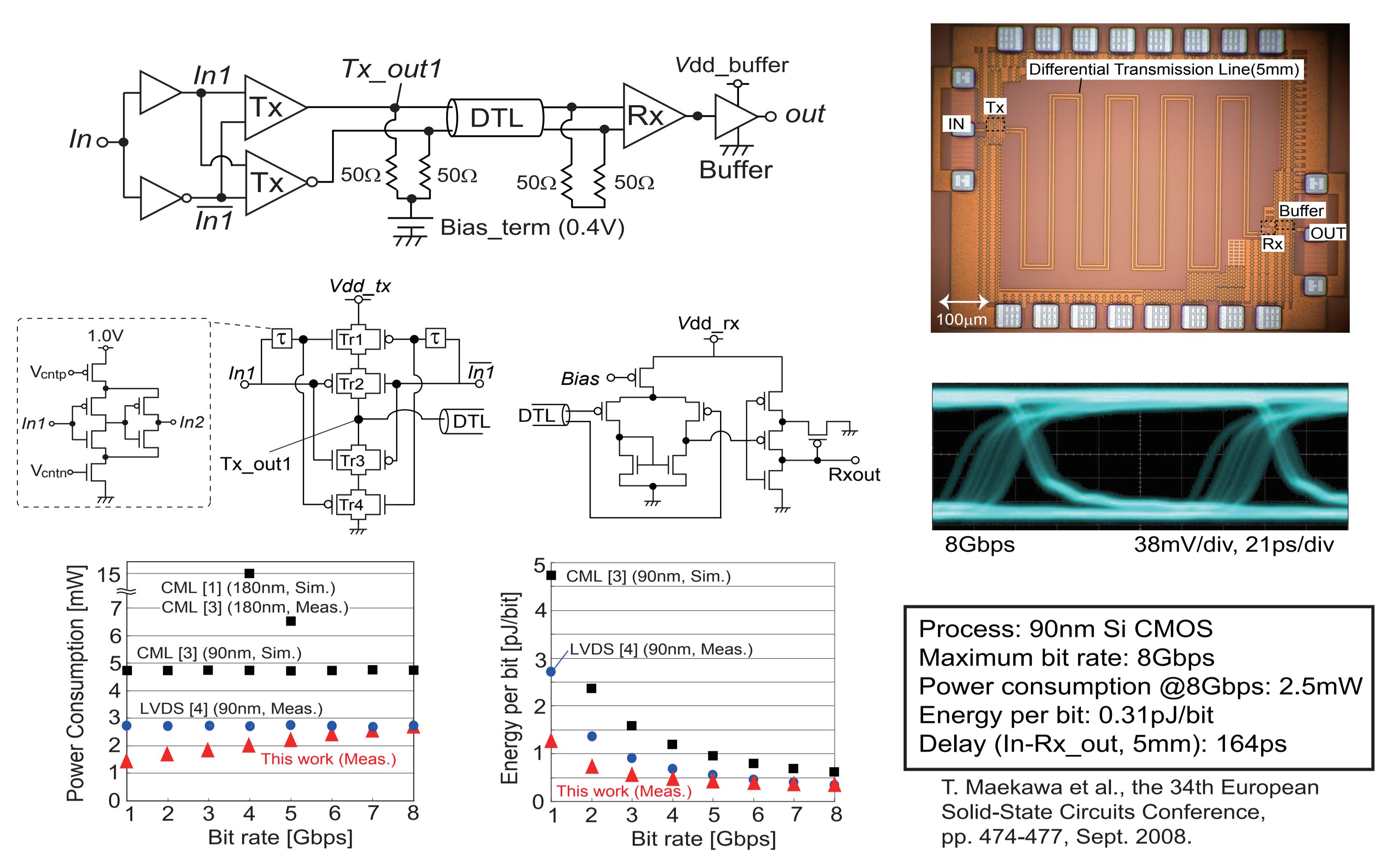


High-Speed Interconnect Technologies for Network on Chip

Intra-/inter-chip network structure example

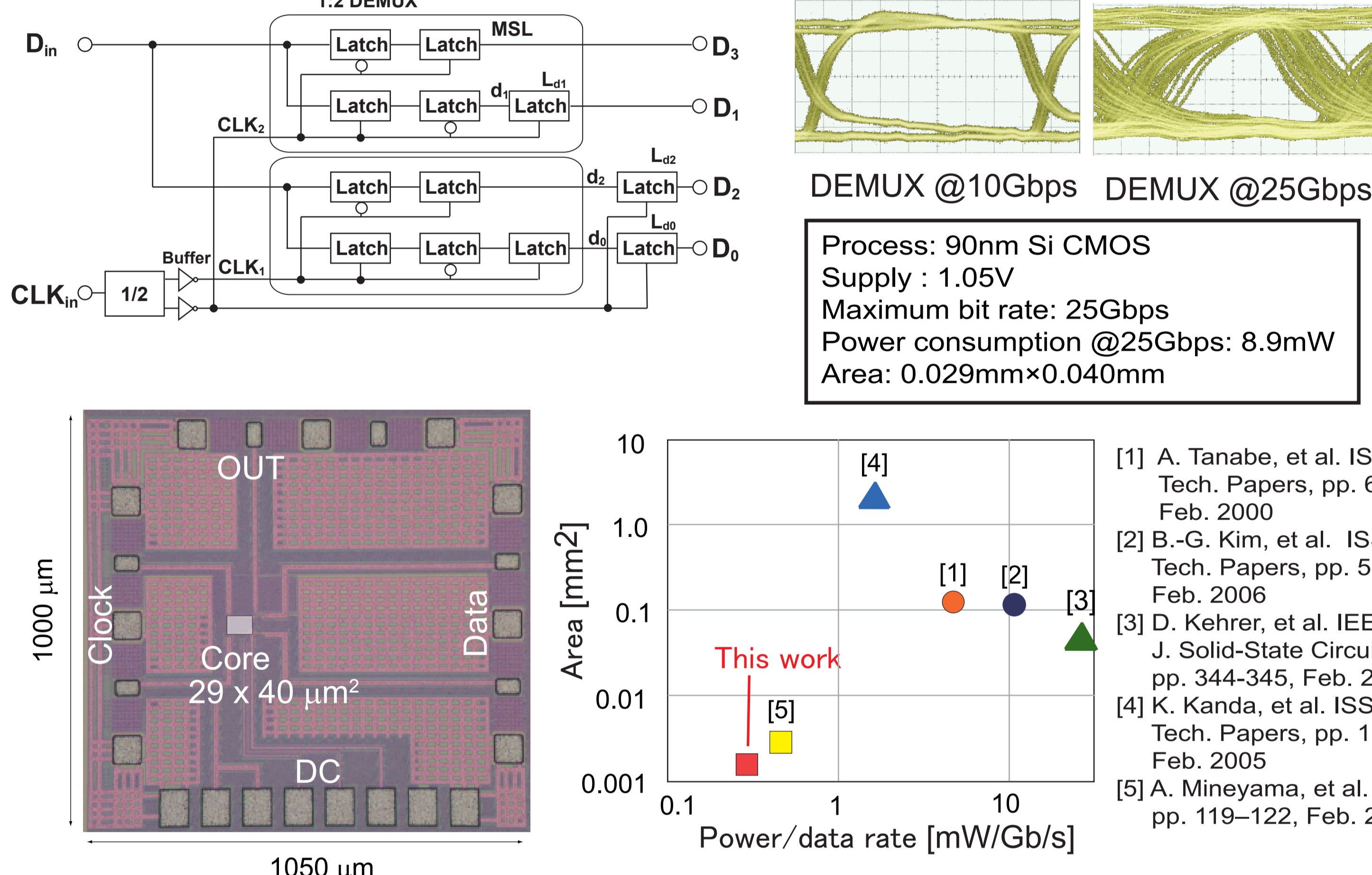


8Gbps 2.5mW pulsed-current-mode TLI

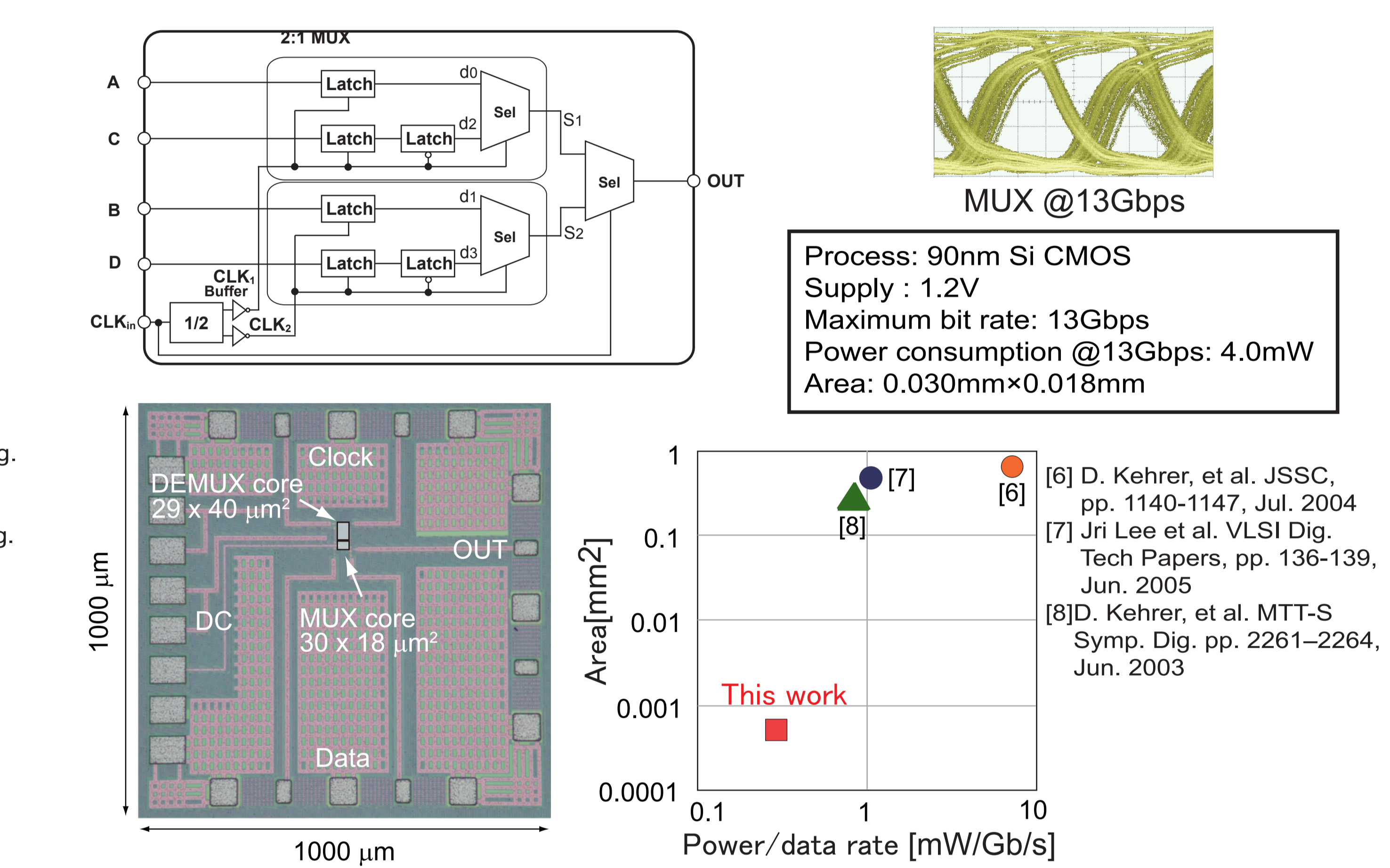


DEMUX/MUX using pseudo nMOS type D-latch

1:4 DEMUX

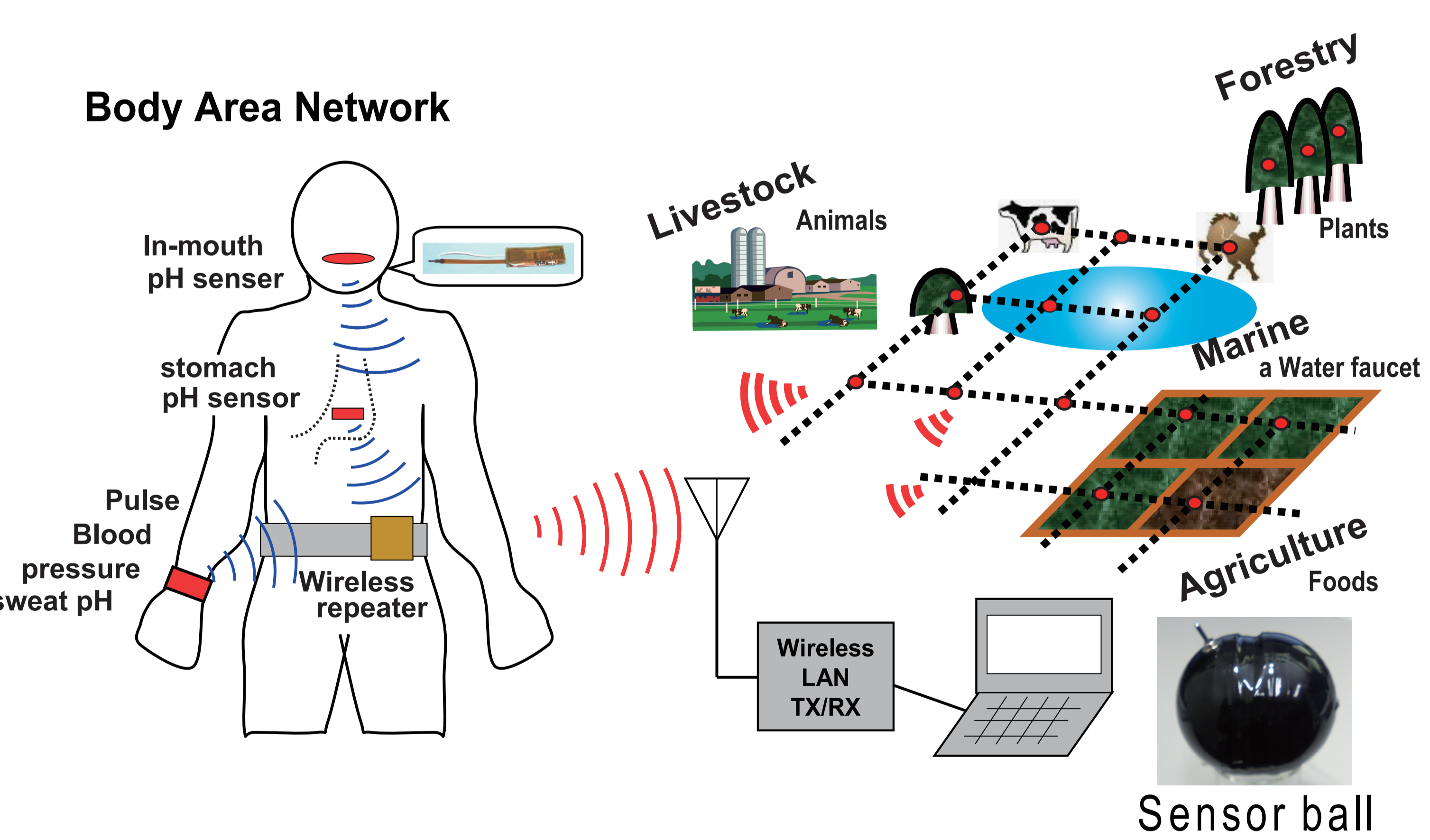


4:1 MUX

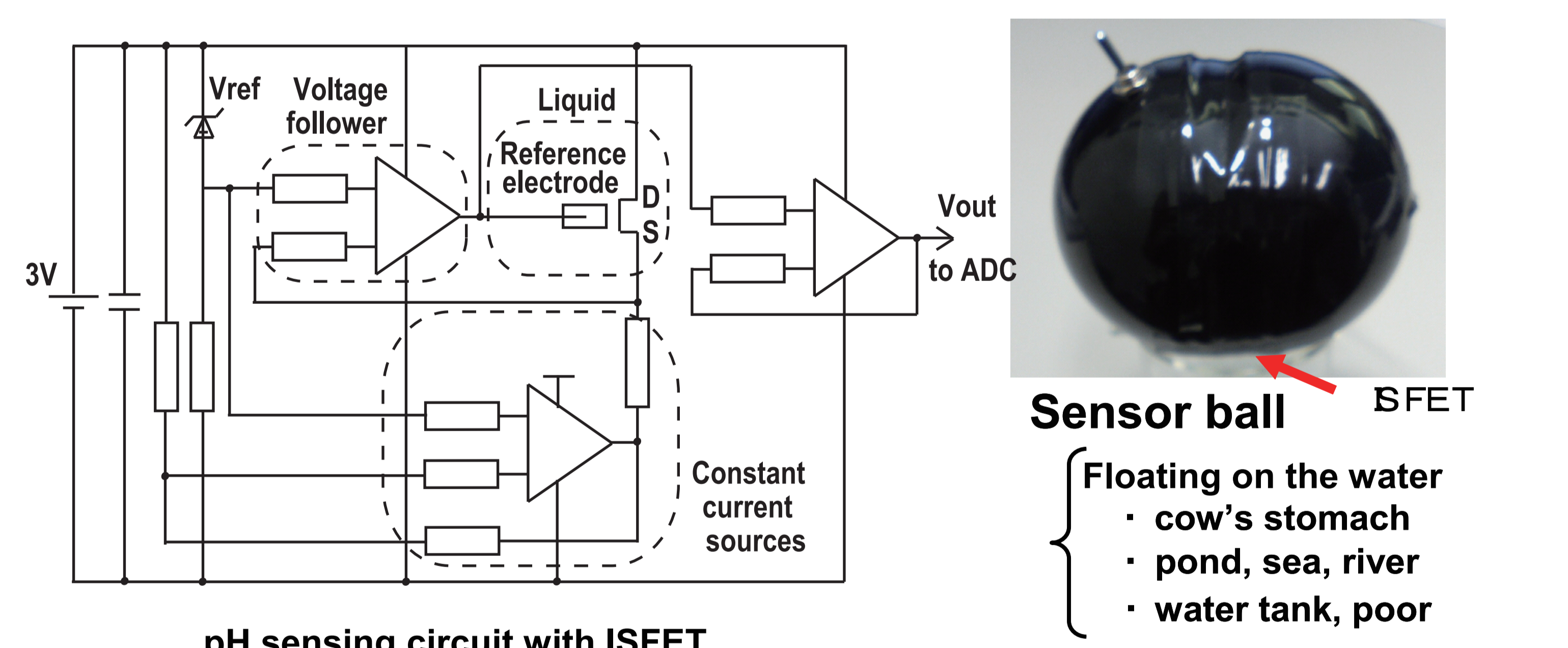


Wireless Communication module/IC for Sensor Network

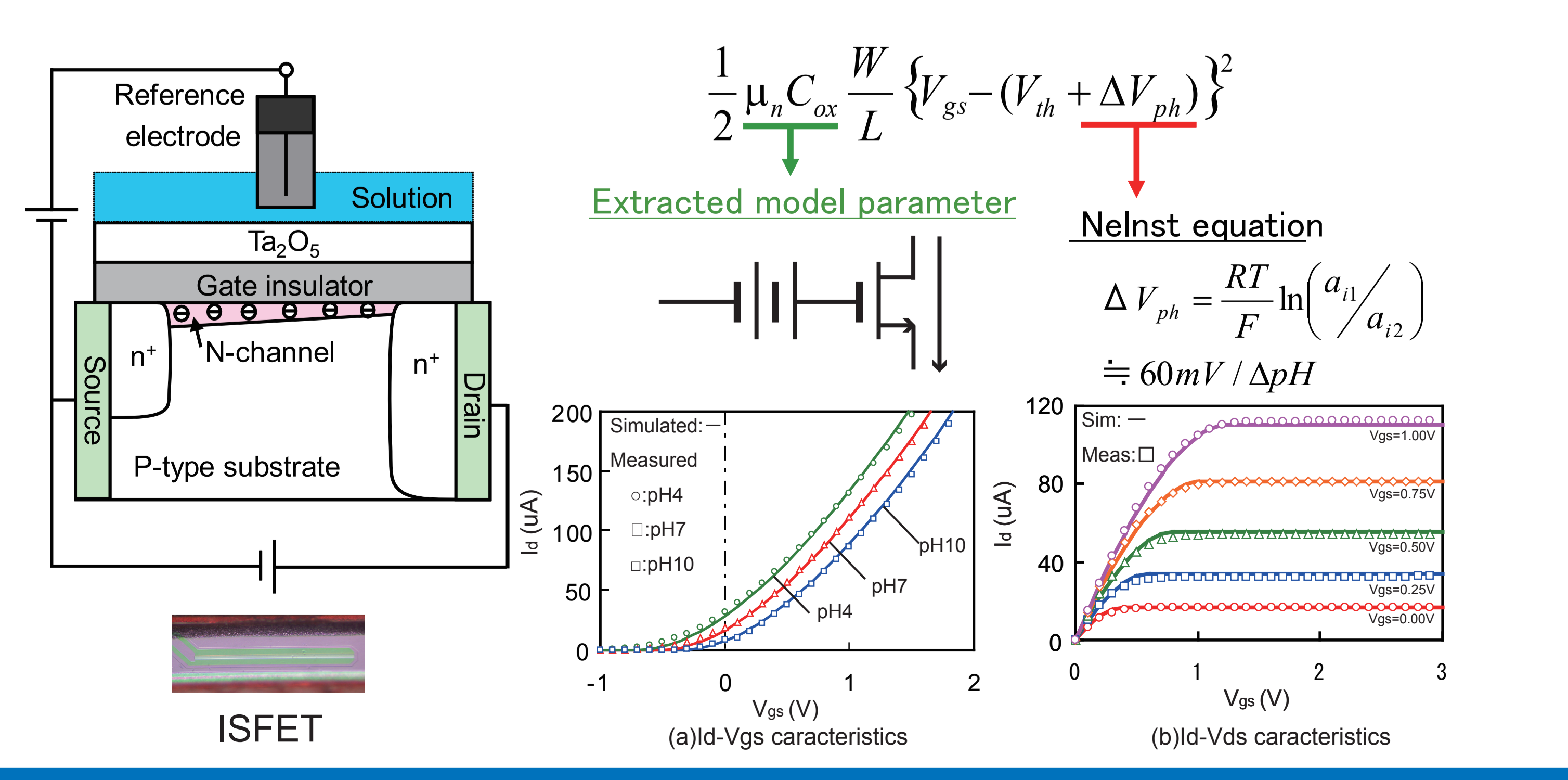
Wireless medical and biological communication system



Wireless environment monitoring module



Ion-sensitive FET (ISFET) modeling



Intermittent wireless pH data transmitter IC

