A Process-Scalable RF Transmitter Using 90nm and 65nm Si CMOS

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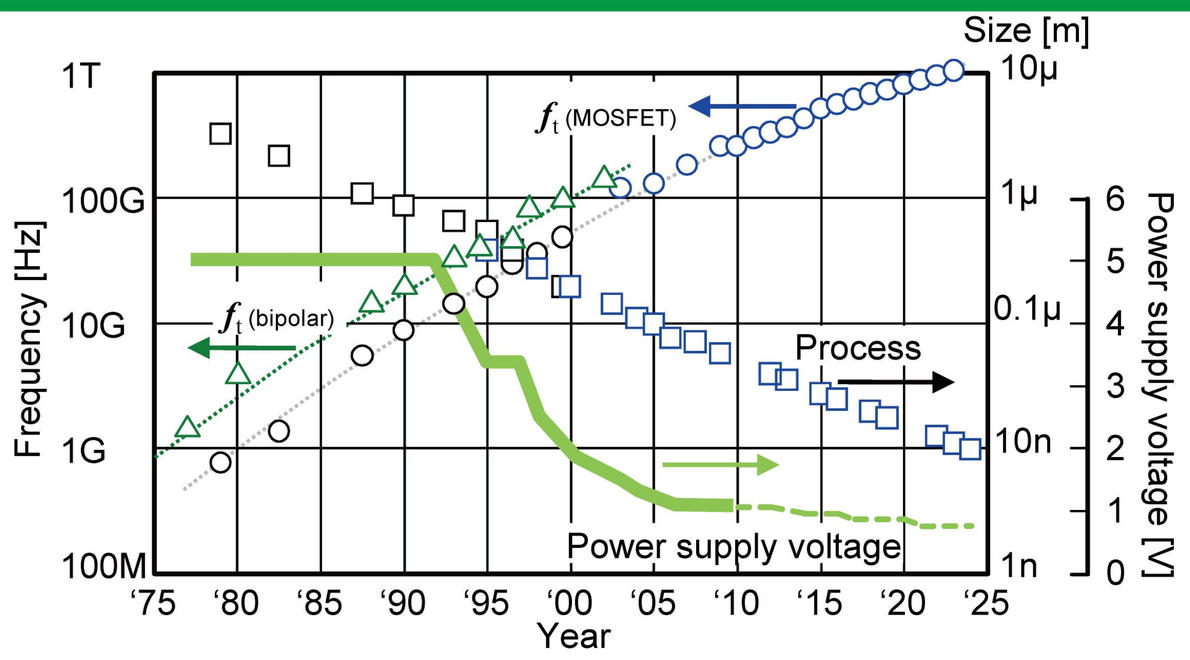
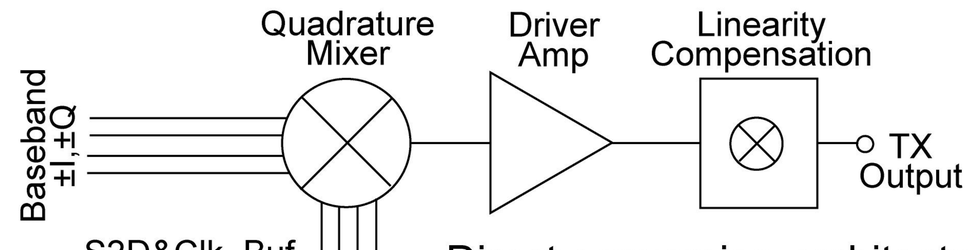
Background



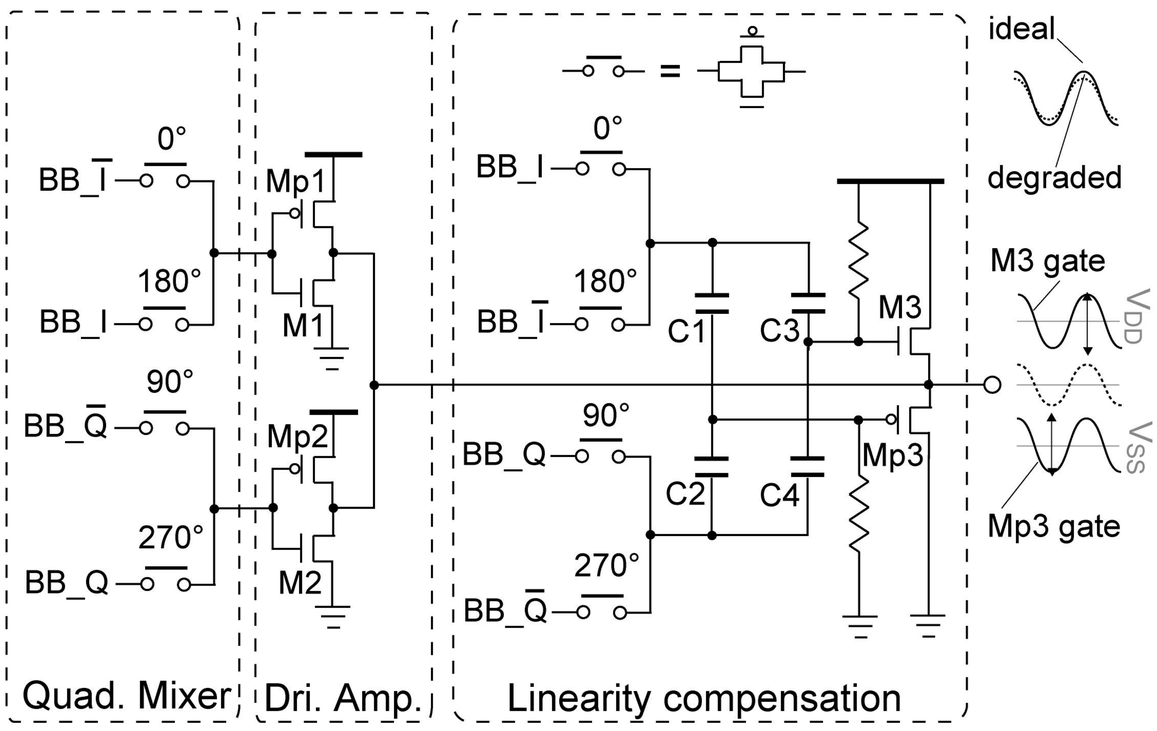
- Process-Scalable RF circuits are required for next generation systems
- Purpose is the development of the RF transmitter with the scalability

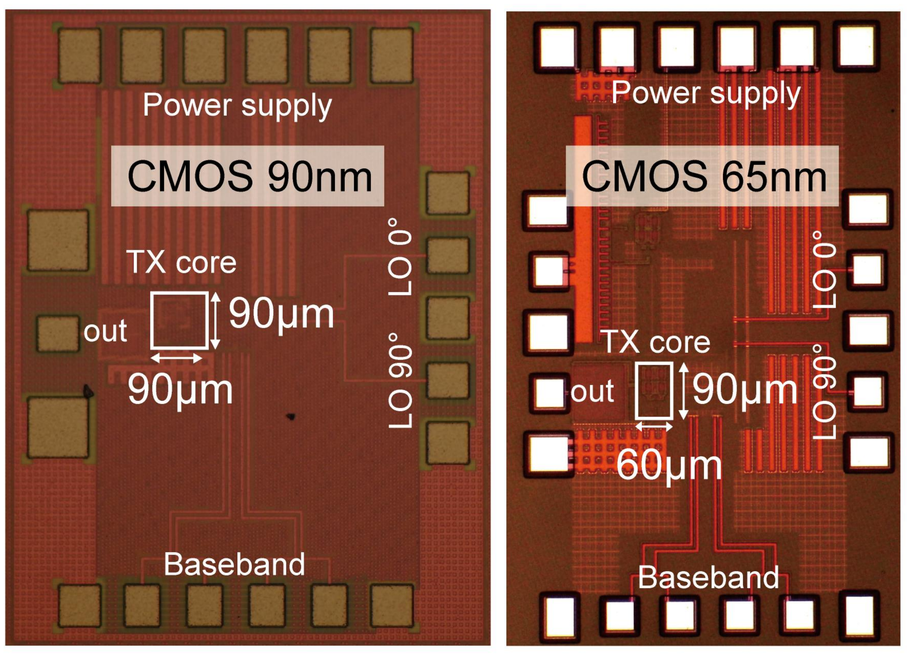
Design of TX

- The proposed RF transmitter is based on inverter topology
- The transmitter never includes un-scalable inductors



- Direct conversion architecture
- TX has linearity compensation

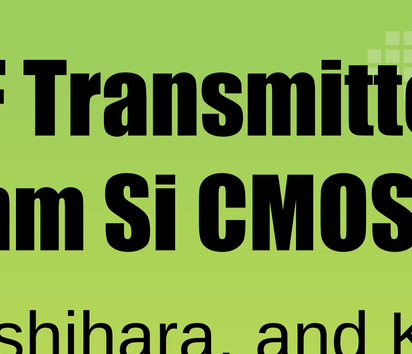




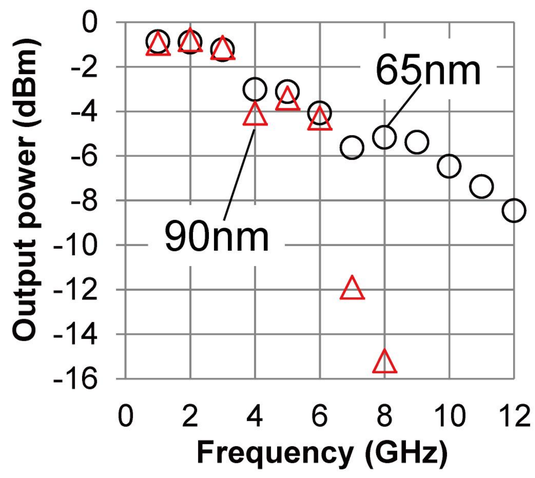
Proposed TX was fabricated by using Si CMOS 90nm and 65nm.

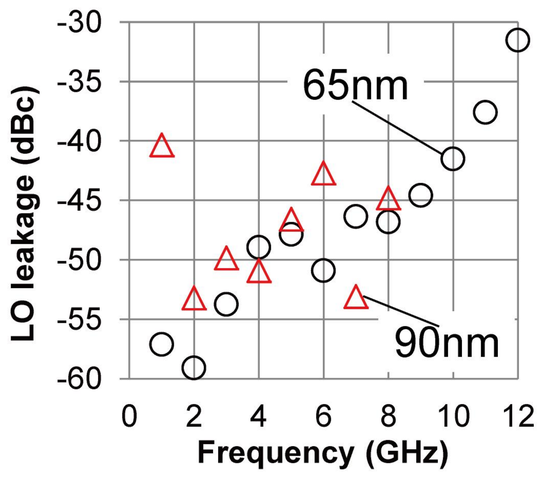
Measurement Results

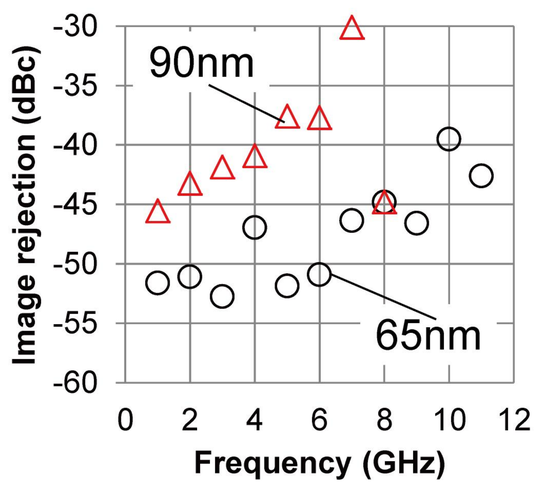
Spectrum of 1-tone tset →

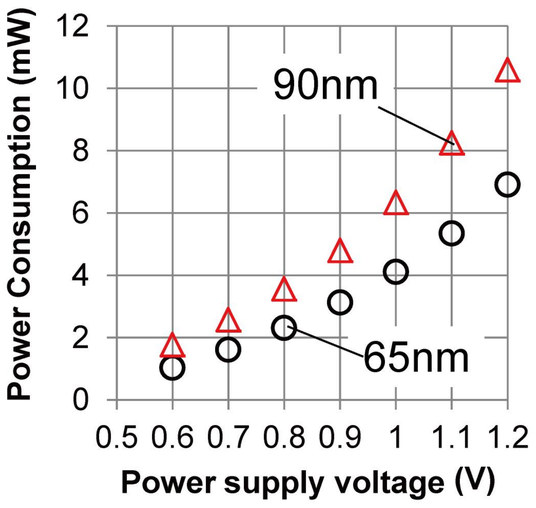


- Power supply voltage : 1.2V (both 90nm and 65nm)
- One-tone baseband signal : 24kHz, 640mVrms





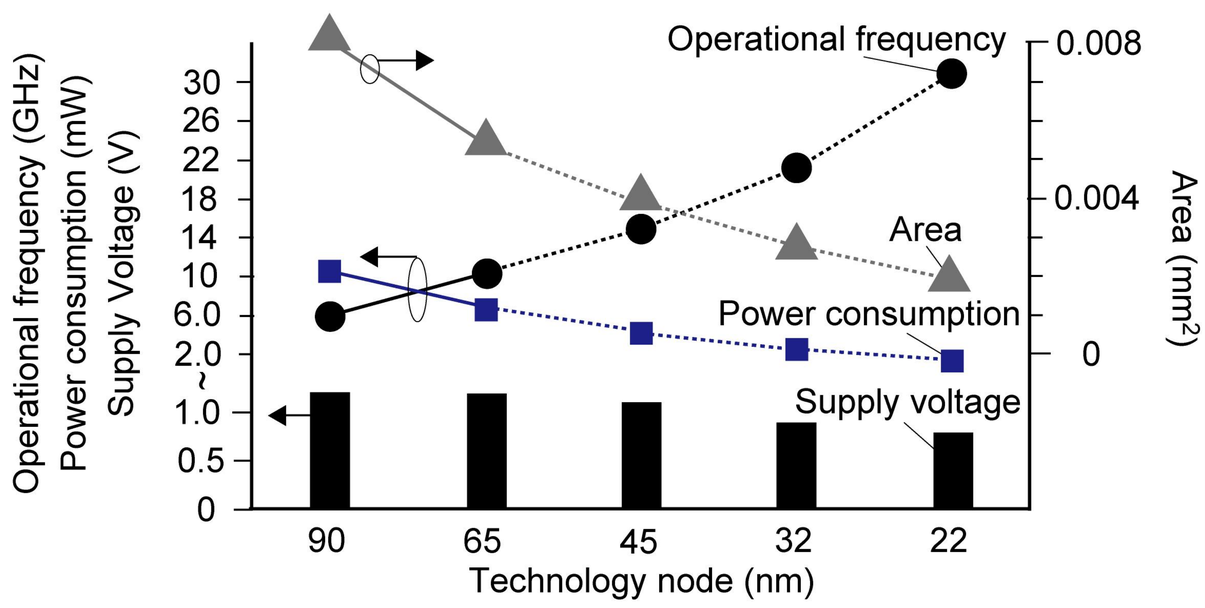




Comparison with 90nm and 65nm TX

Process	90nm	65nm
Supply voltage	1.2	1.2
Power consumption @1GHz	TX: 6.6mW	TX: 5.4mW
	LO: 4.0mW	LO: 1.6mW
Operational freq. range	1.0～6.0GHz	1.0～11GHz
Output power	-0.8dBm	-0.8dBm
Local leakage @worst freq.	-40dBc	-38dBc
Image rejection @worst freq.	-38dBc	-40dBc
OIP3 @1GHz	6.2dBm	6.1dBm
Core area	0.0081mm^2	0.0054mm^2

Conclusion



- The comparison between 90nm and 65nm demonstrates the improvements of the area by 33 %, bandwidth by 83% and power consumption by 34%.
- The proposed circuit has advantages in process-scalability similar to digital, thus it is expected to have higher performances along with the process scaling.