4A-11

A 300-μW Audio ΔΣ Modulator With 100.5-dB DR Using Dynamic Bias Inverter

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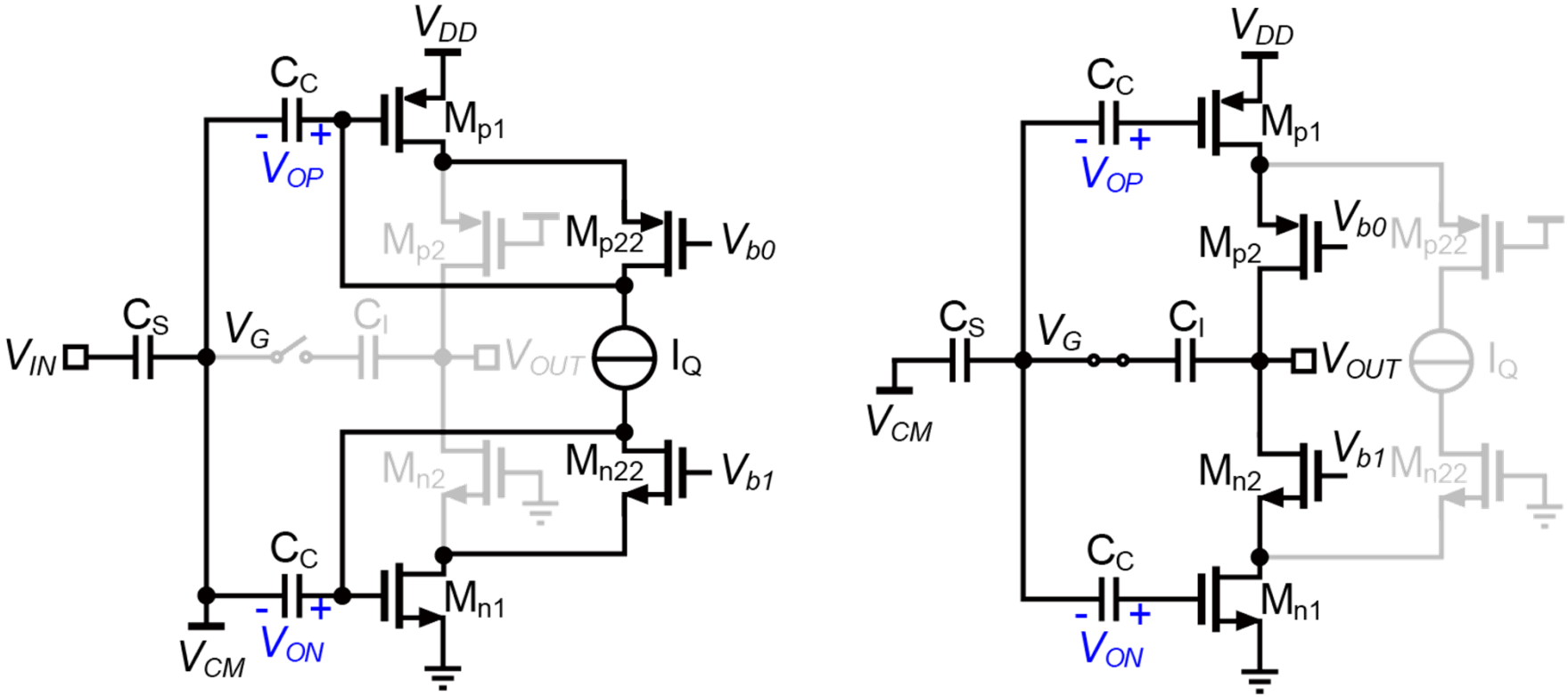
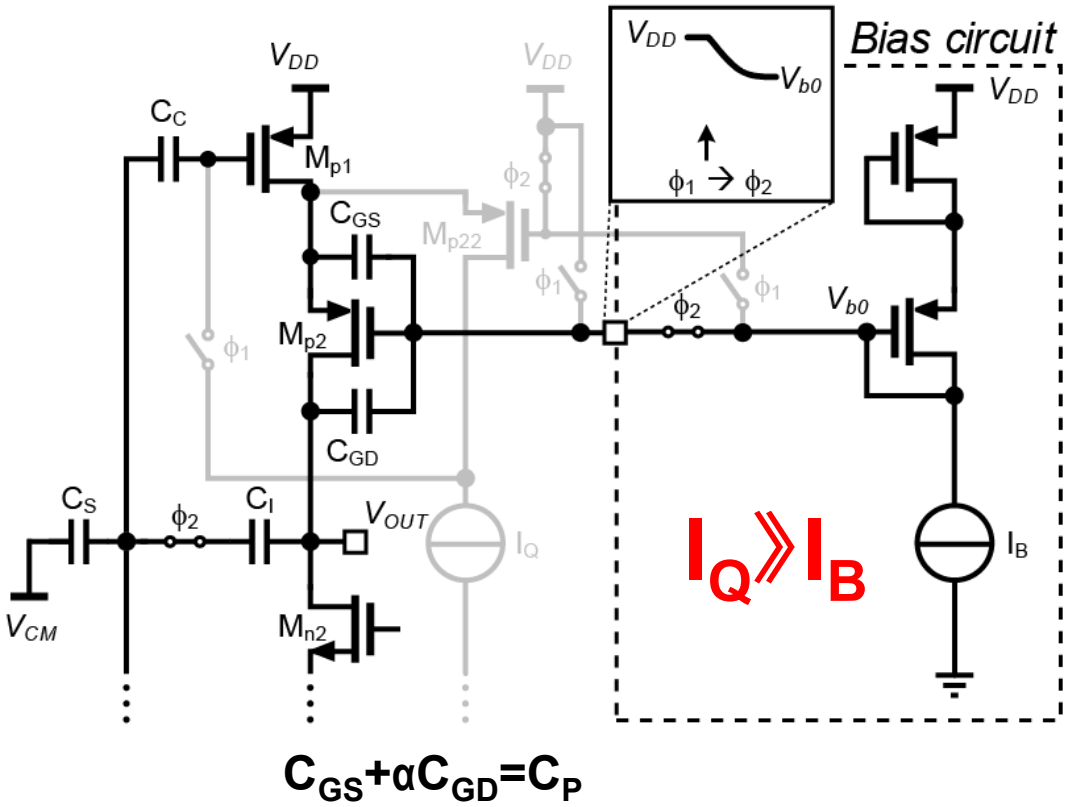
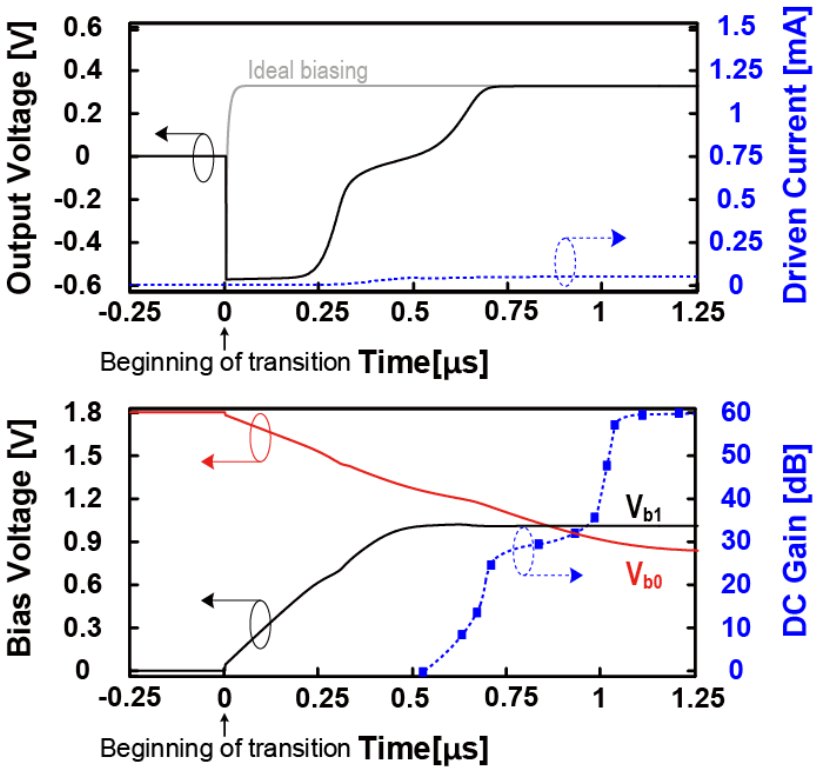
Dynamic Bias Inverter



- High g_m/I, Slew rate → Power efficient
- Floating Current Source → PVT Tolerance

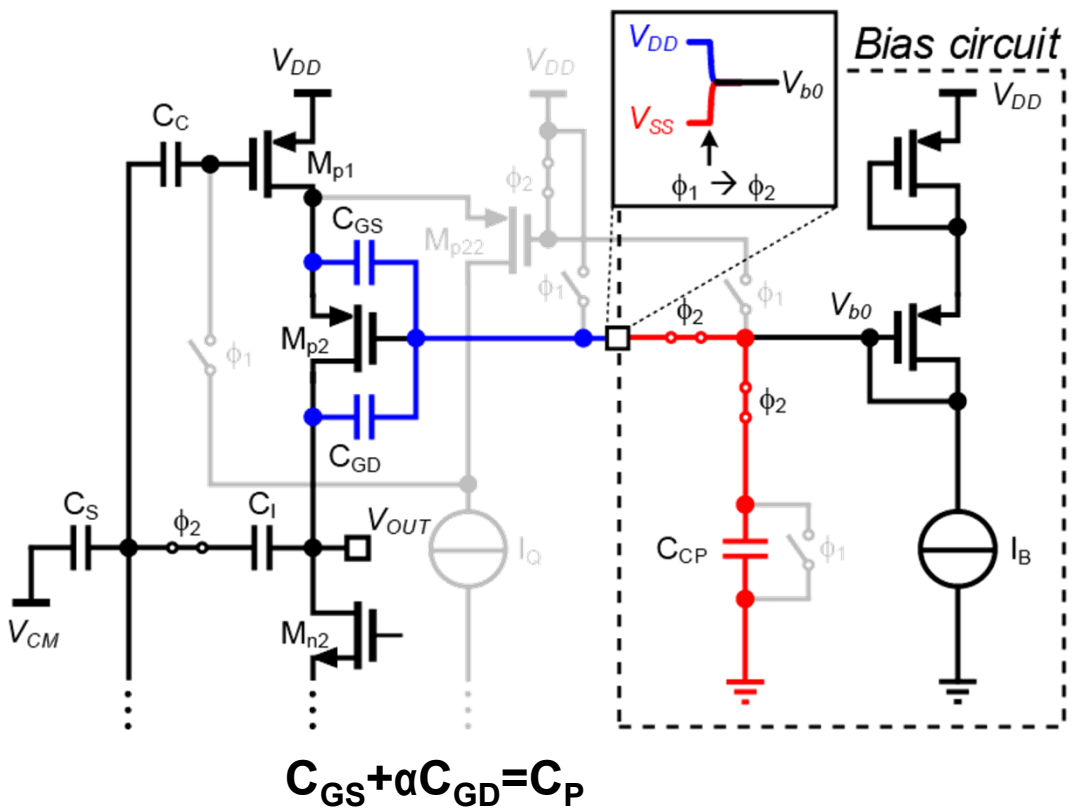
Conventional Dynamic Bias Scheme



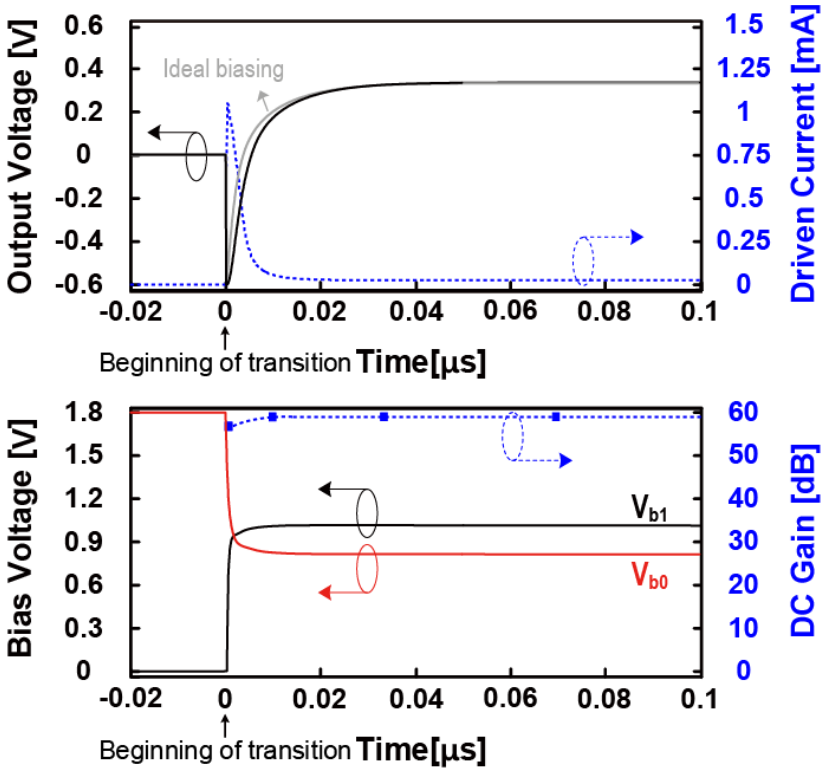


- **Settling time of dynamic bias voltage ($\tau = C_P/I_B$)**
- **Limiting operating frequency (<1MHz)**

Proposed Dynamic Bias Scheme

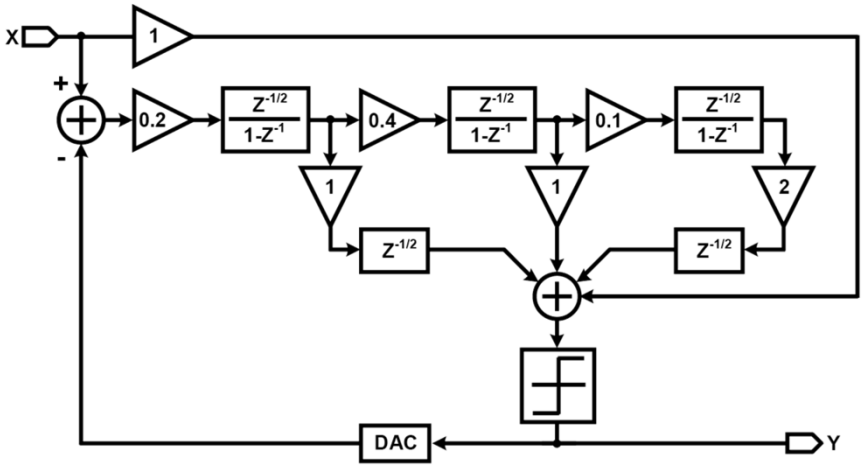


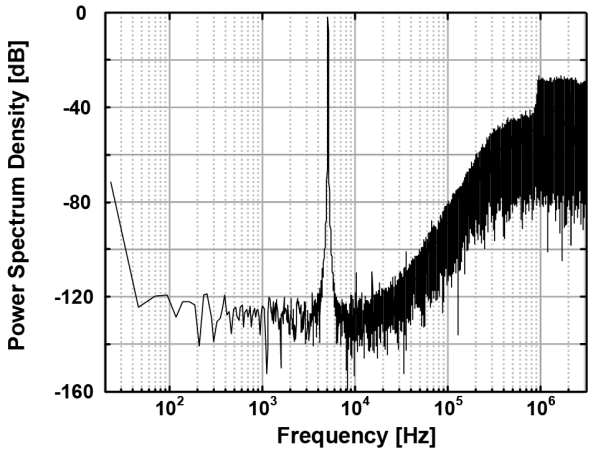
$C_{GS}+\alpha C_{GD}=C_P$



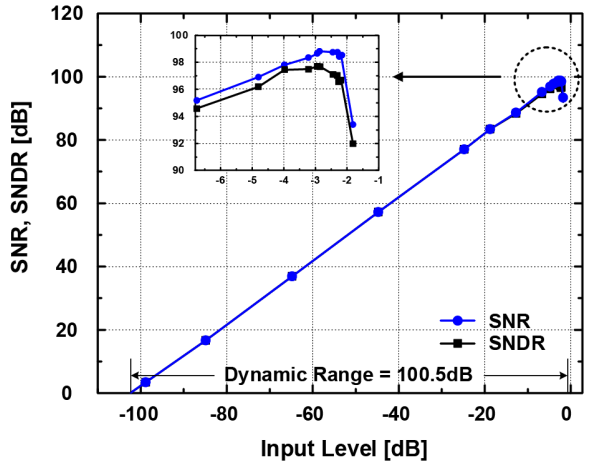
- Dynamic compensation between C_P and C_{CP}
- Increasing operating frequency up to x10

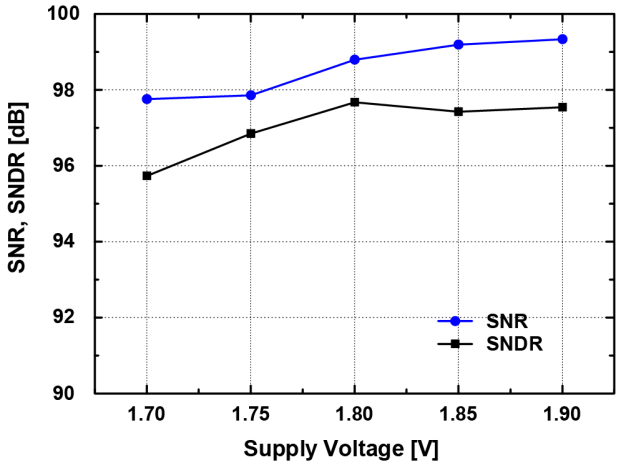
Measurement Result

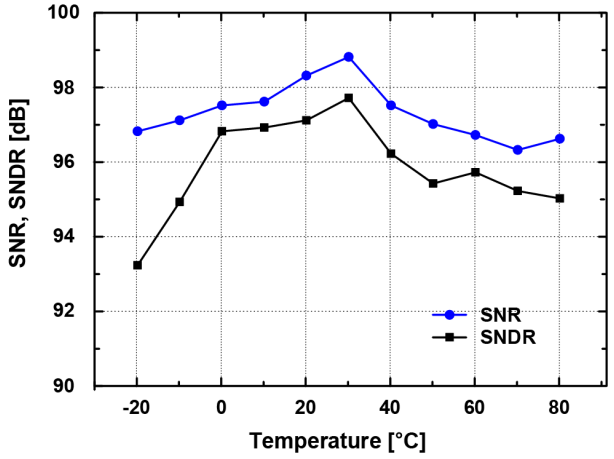




F_S=6.1MS/s
F_{in}=5.1kHz
SNDR : 97.7dB
SNR : 98.6dB
SFDR : 105.8dB







- 3rd order CIFF Audio-band DSM @ 6.1MS/s
- Achieves 178.7dB FoM_S with PVT tolerance

*FoM_S=DR+10log(BW/Power)