

EECS240 – Spring 2010

Lecture 17: Biasing and References



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Reference Circuits

- External bias current not always available
 - May need to generate reference internally
- Tons of “constant X” reference circuits in the literature
 - Important considerations include power, accuracy, PSRR, output impedance, etc.
- Most important question: what do you really want to be constant?

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Constant Current Bias?

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Constant Gain Example

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Supply “Independent” Biasing

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Improved V_{GS} Reference

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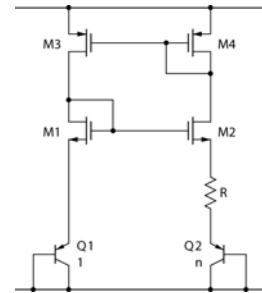
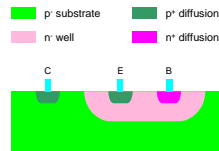
PTAT Reference

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CMOS PTAT Reference

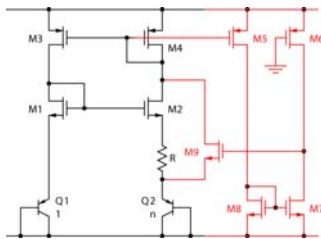


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Startup Circuit

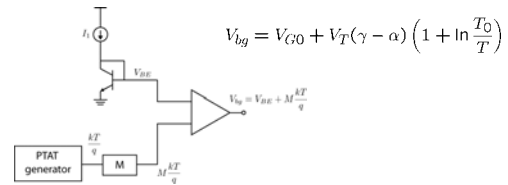


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Conceptual Band-Gap



- V_{BE} has a tempco of roughly $-2 \text{ mV}/^\circ\text{C}$
- Add V_{BE} to PTAT voltage (with right M) $\rightarrow V_{bg}$ independent of T
- Reference derived from band-gap of Si (1.205V)

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Constant g_m Reference

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