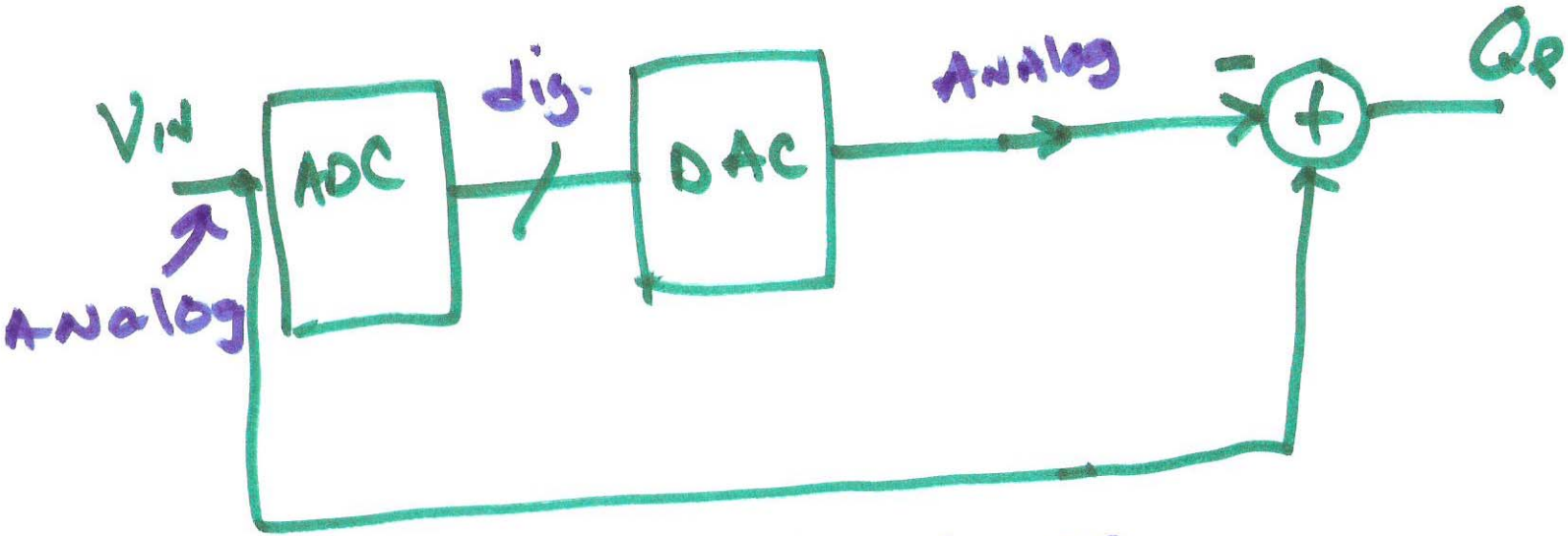
ECE 614 Advance Analog IC Design

BOISE STATE UNIVERSITY

Lecture 16

Oct. 13, 2011



Th. Ch. 29

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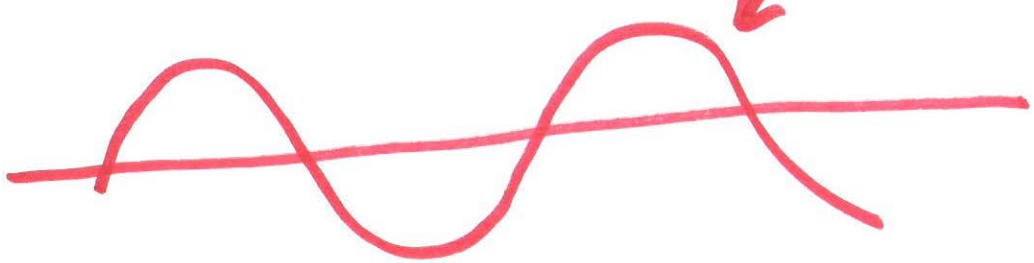
open book!

Ch. 8, 28, 31

28.11

$$1LSB = \frac{1}{2^N} = \frac{1}{2^3} = \frac{1}{8}V = 0.125V$$

Ch. 8 → page 215



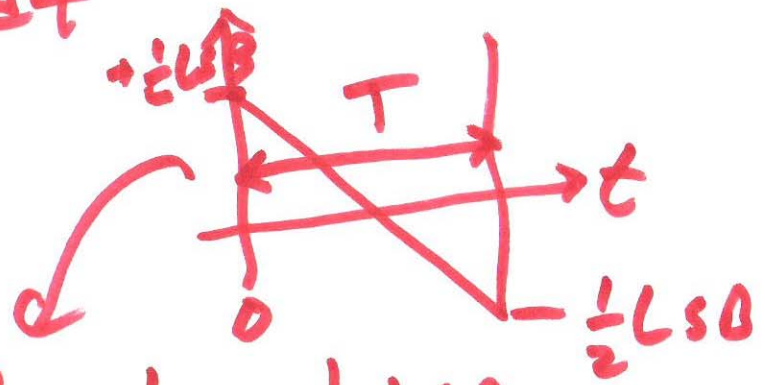
$$\frac{1}{T}\int_0^T V_p^2 \sin^2 2\pi f \cdot t \cdot dt$$

$$= \frac{V_p^2}{2}$$

$$Rms \rightarrow \frac{V_p}{\sqrt{2}}$$

2)

$$M.S. = \frac{1}{T}\int_0^T V_{QE}^2(t)\cdot dt$$



$$V_{QE}(t) = \frac{-1LSB}{T}\cdot t + \frac{1}{2}LSB$$

$y = mx + b$

$$M.S. = \frac{1}{T}\int_0^T \frac{1^2_{LSB}}{T^2}\cdot t^2\cdot dt$$

$$= \frac{1}{T^3}\cdot 1^2_{LSB}\cdot\frac{1}{3}t^3\Big|_0^T$$

3)

$$V_{QE}(t) = \frac{1}{2}LSB - \frac{1LSB}{T} \cdot t$$

$$M.S. = \frac{1}{T}\int_0^T V_{QE}^2(t) \cdot dt$$

$$1LSB = V_{LSB}$$

$$= \frac{1}{T}\int_0^T \left(\frac{1}{2}LSB - \frac{1LSB}{T} \cdot t\right)^2 \cdot dt$$

$$= \frac{1}{T}\int_0^T \left[\frac{V_{LSB}^2}{4} - 2\frac{V_{LSB}^2 \cdot t}{2T} + \frac{V_{LSB}^2 t^2}{T^2}\right] dt$$

$$\frac{V_{LSB}^2}{4T}\Big]_0^T - \frac{2V_{LSB}^2}{4T^2}t^2\Big]_0^T + \frac{V_{LSB}^2}{T^{3.3}}t^3\Big|_0^T$$

4)

$$\frac{V_{LSB}^2}{4} - \frac{V_{LSB}^2}{2} + \frac{V_{LSB}^2}{3}$$

$$\frac{3V_{LSB}^2}{12} - \frac{6V_{LSB}^2}{12} + \frac{4V_{LSB}^2}{12}$$

$$M.S. = \frac{V_{LSB}^2}{12}$$

$$Rms = \frac{V_{LSB}}{\sqrt{12}}$$

$V_{LSB} = 125\,mV$

$$Rms = \frac{125\,mV}{\sqrt{12}}$$

$$= 36\,mV$$

5)