

E157 Lecture 22 Day Plan

Clarification on quantization noise stdev – it's also OK to say $\sigma_q = LSB/\sqrt{12}$

Any questions before quiz

Quiz + Team Quiz + Talk through solution

What is the LSB size of an ADC with Nbits and Vfs? $LSB = Vfs / [2^{(Nbits)-1}]$, SQNR = 6.02dB/bit +1.76dB

Processing Gain – a FFT sets the noise bandwidth

Noise spreadsheet ... maybe for RX chain from last notes

- Carrier frequency is 2.4GHz
- Chain goes: T/R switch – amp – filter – amp
- Amplifiers: <https://www.minicircuits.com/pdfs/ZRL-3500+.pdf>
- Filter: <https://www.minicircuits.com/pdfs/VBF-2435+.pdf>
- T/R Switch: <https://www.minicircuits.com/pdfs/ZFSWA-2-46.pdf>
- Fill in spreadsheet below, sketch the spectrum at the output of this system, and pick how many ADC bits and what ADC sample rate you want.

Are oscilloscopes limited by quantization or thermal noise?

<https://www.keysight.com/en/pdx-x201837-pn-DSOX2024A?nid=-32542.1150190&cc=US&lc=eng>

8 bits, 200MHz front-end BW.

Check-in, office hours

Noise spreadsheet:

https://docs.google.com/spreadsheets/d/1a8tp4q8aZqqk_zcnzNJ1Xu8owhBuvWTrAU_nkpJs9Y8/edit?usp=sharing