Oversampling (3B)

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Please send corrections (or suggestions) to youngwlim@hotmail.com.

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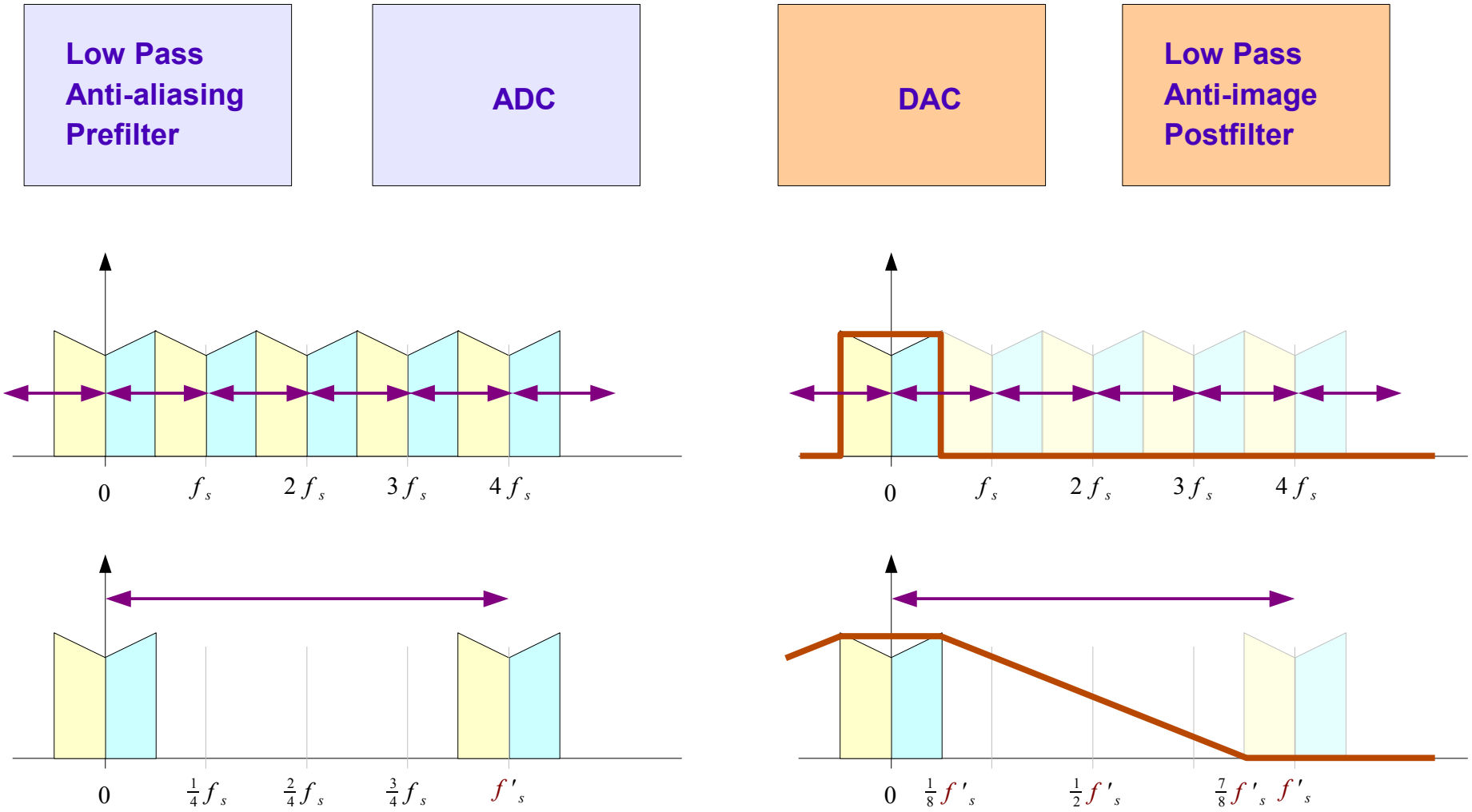
Band-limited Signal



Band-limited Signal

Low Pass
Anti-aliasing
Prefilter

ADC

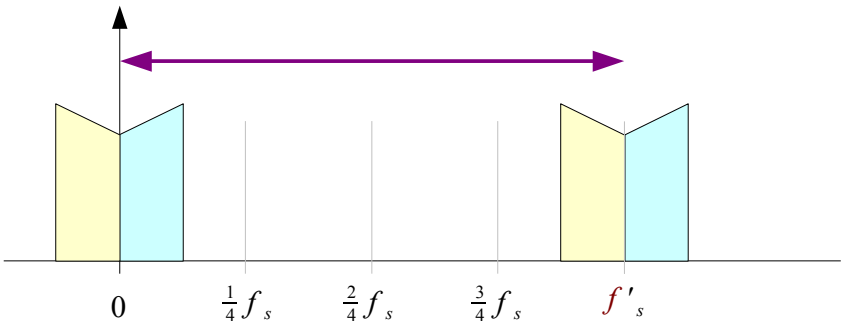
DAC

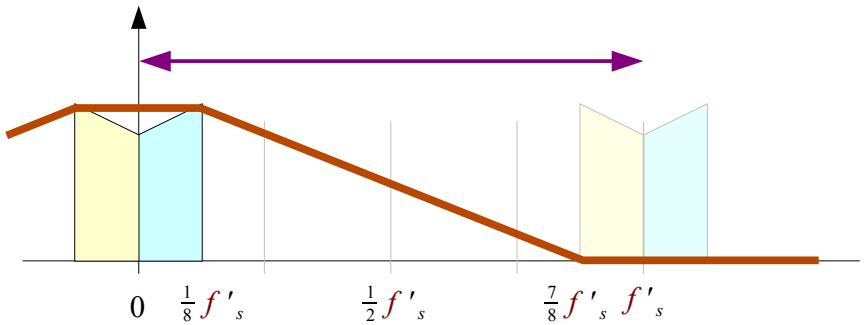
Low Pass
Anti-image
Postfilter

↑ 4

UpSampler

FIR
Interpolation
Filter





Band-limited Signal

Low Pass
Anti-aliasing
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ADC

DAC

Low Pass
Anti-image
Postfilter

$$f_s > 2 \cdot f_H$$

↑ 4

FIR
Interpolation
Filter

$$f_{oversampling} = 4^n \cdot f_s$$

UpSampler

Band-limited Signal

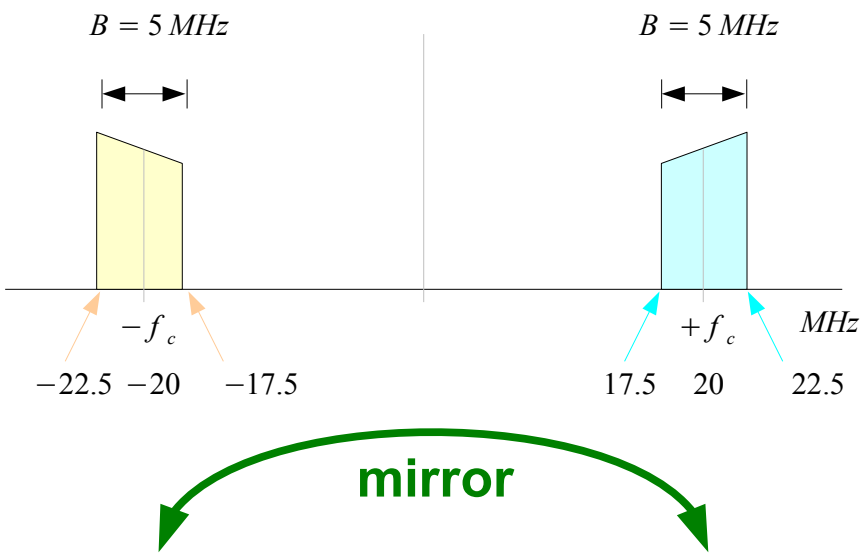
$$f_{oversampling} = 4^n \cdot f_s$$

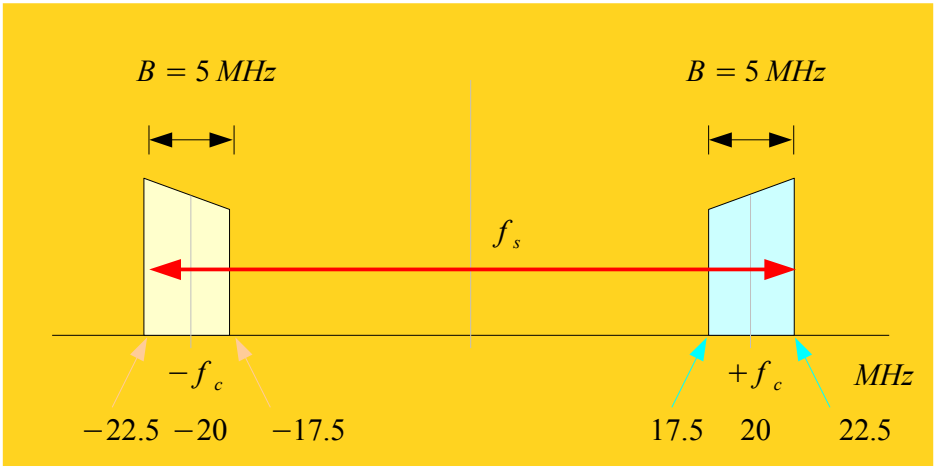
Oversampling and Decimation
Oversample and Lowpass Filter

- **Normal Averaging**
- **Decimation / Interpolation**

$$f_s > 2 \cdot f_H$$

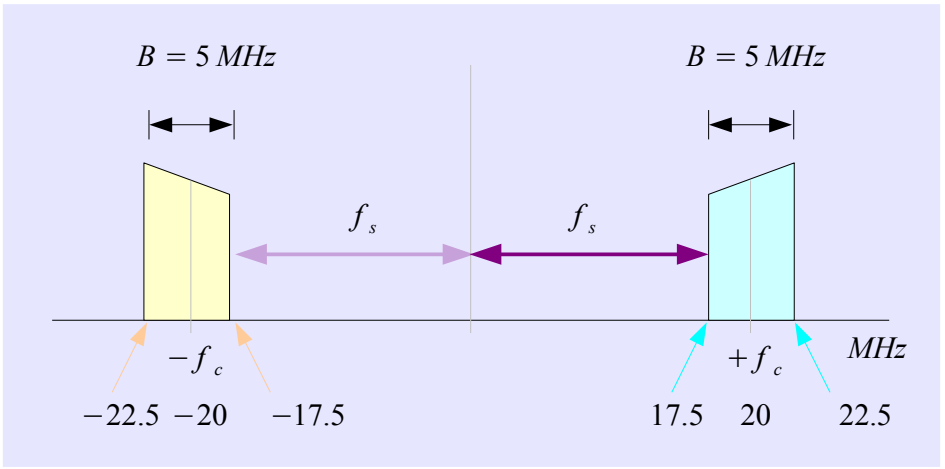
Band-limited Signal



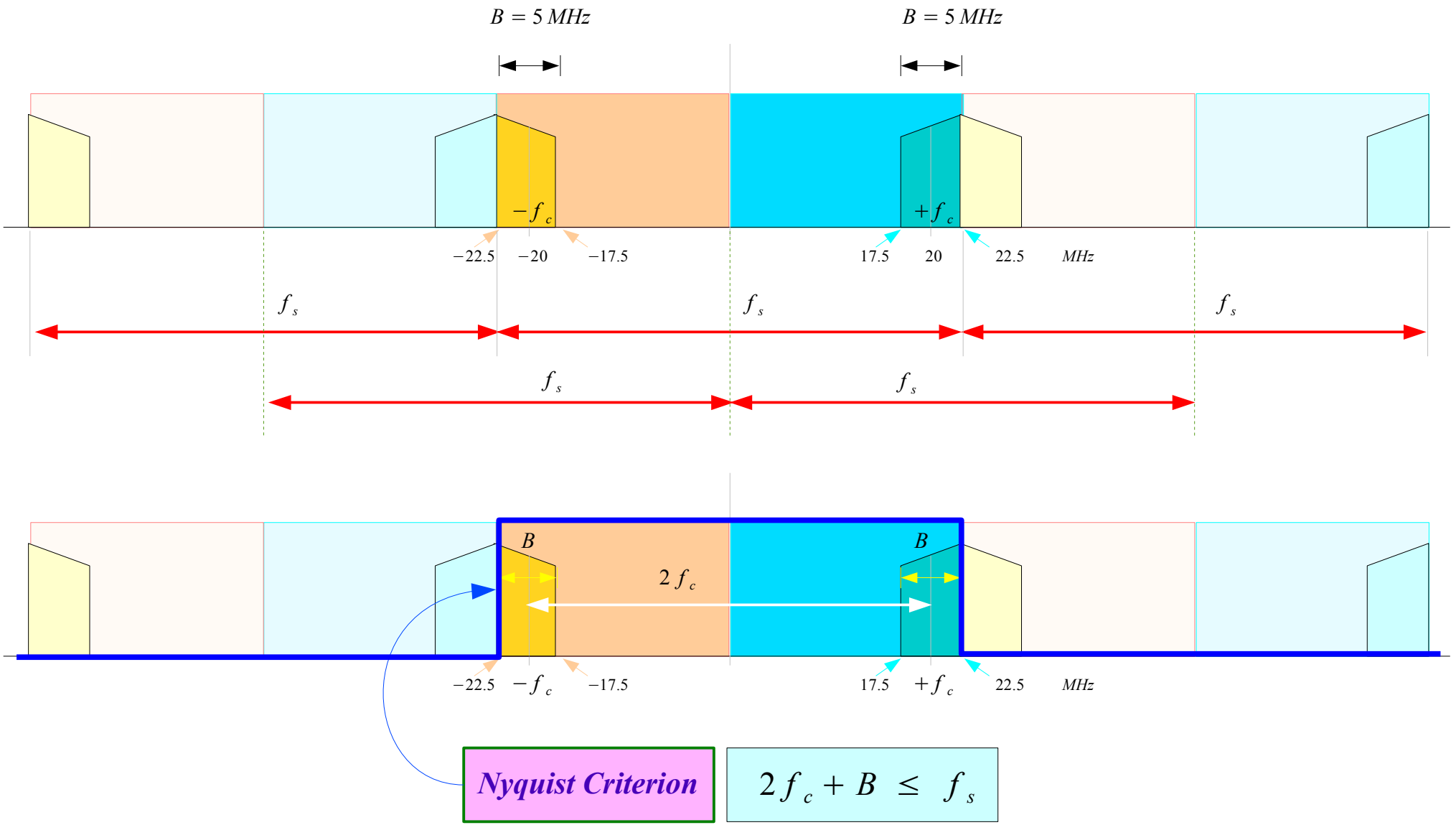


- **Lowpass Sampling**

- **Bandpass Sampling**
- **IF filtering**
- **Harmonic Sampling**
- **Sub-Nyquist Sampling**



Low-pass Signal Sampling



References

[1] http://en.wikipedia.org/
[2] J.H. McClellan, et al., Signal Processing First, Pearson Prentice Hall, 2003
[3] A "graphical interpretation" of the DFT and FFT, by Steve Mann
[4] R. G. Lyons, Understanding Digital Signal Processing, 1997
[5] AVR121: Enhancing ADC resolution by oversampling
[6] S.J. Orfanidis, Introduction to Signal Processing
www.ece.rutgers.edu/~orfanidi/intro2sp