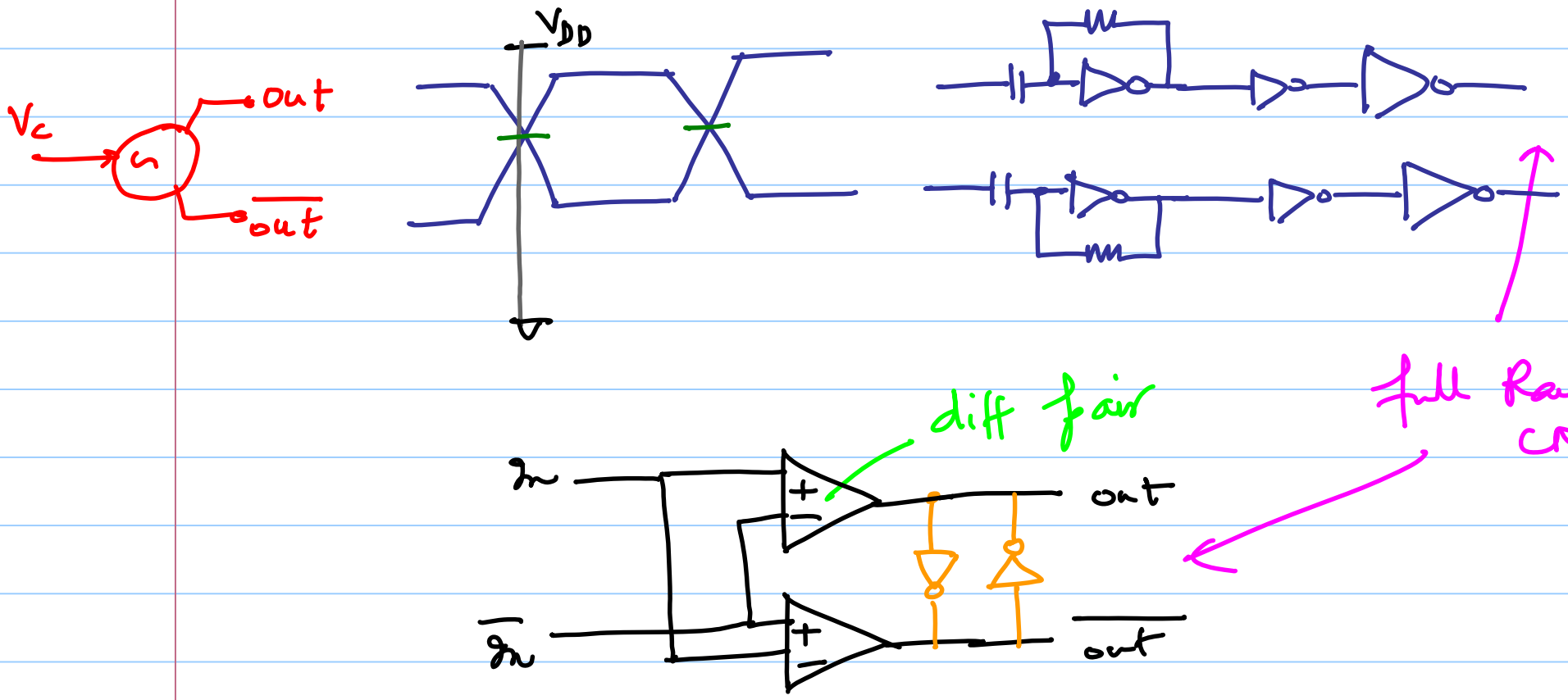
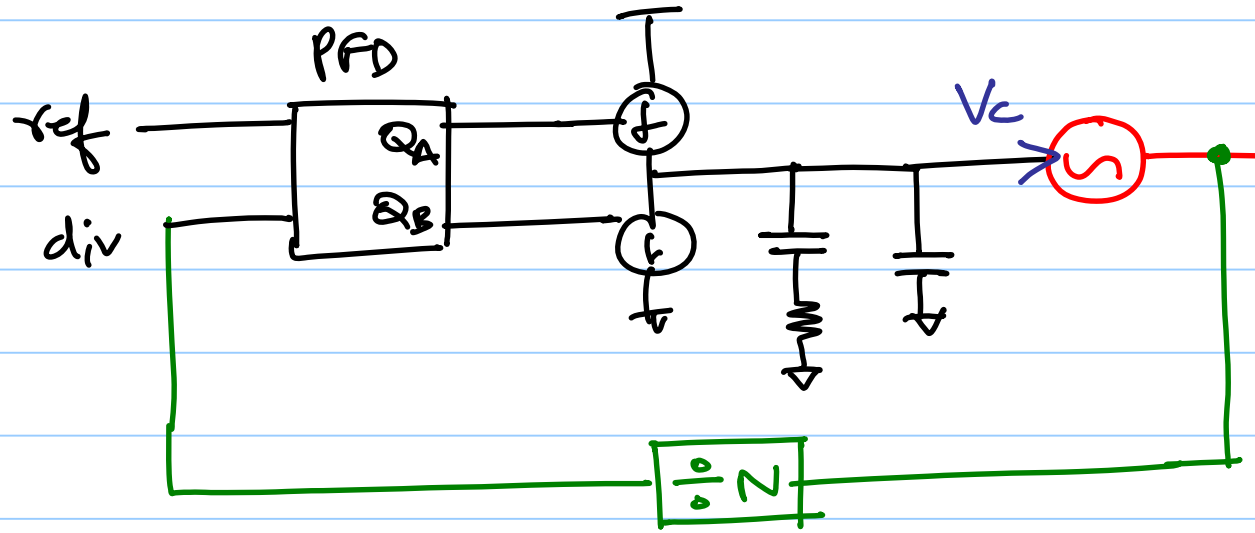
ECE 518 – Lecture 18

Note Title 3/17/2015

VCO Buffers :





f_{VCO}

↓

100 MHz

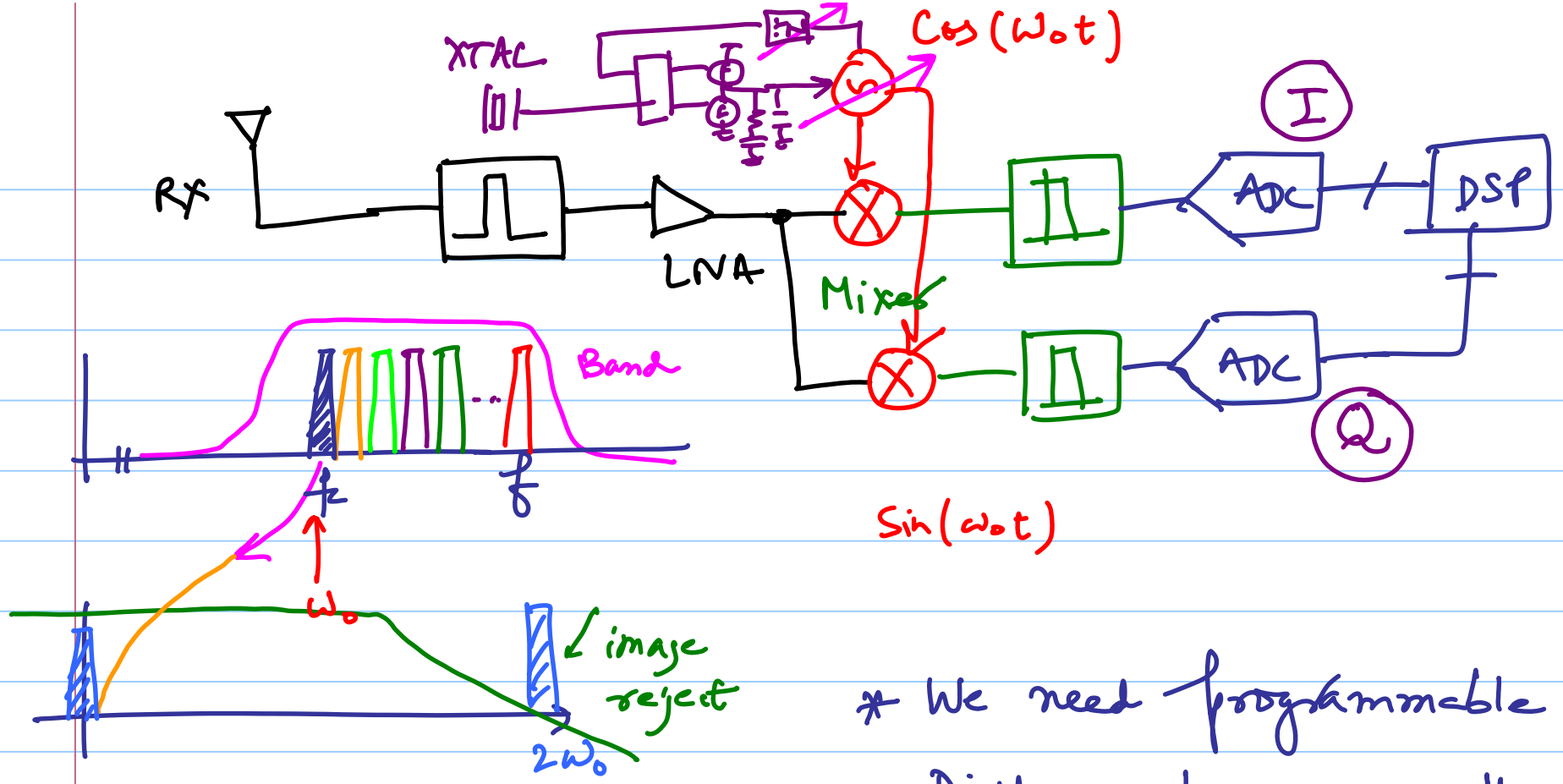
5 GHz

↳ 2^m, $m \in I$ } integers

↳ $n \in I$ }

↳ $\frac{p}{q}$ ← fractional

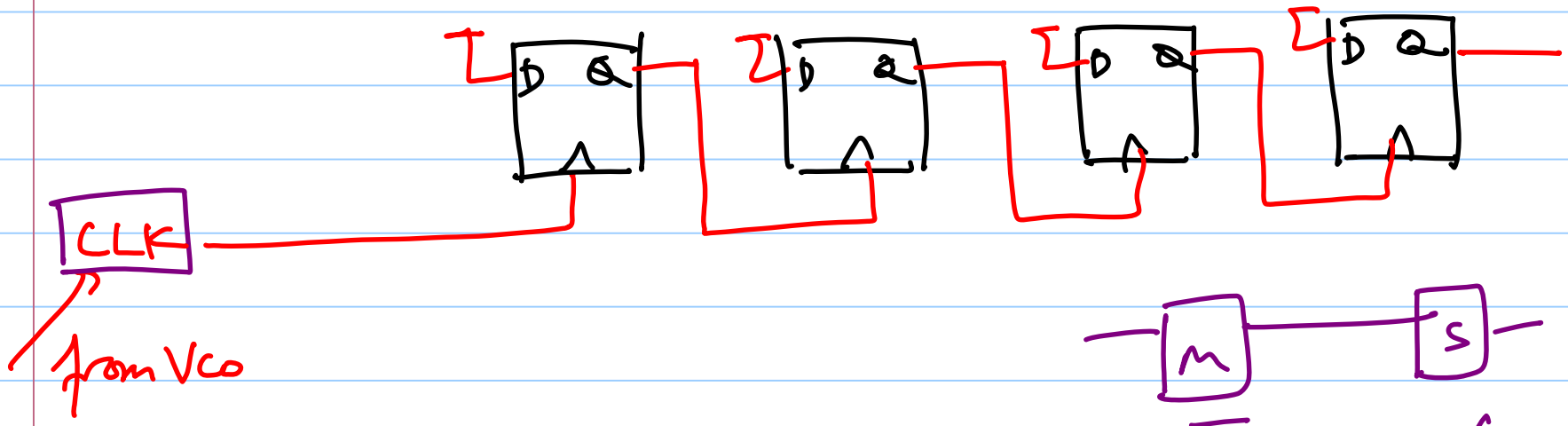
programmability for synthesizers



* We need programmable Dividers to cover all channels with a given frequency spacing & within specified switching time.

16

÷16



TSPC Latch

↳ True Single phase clock

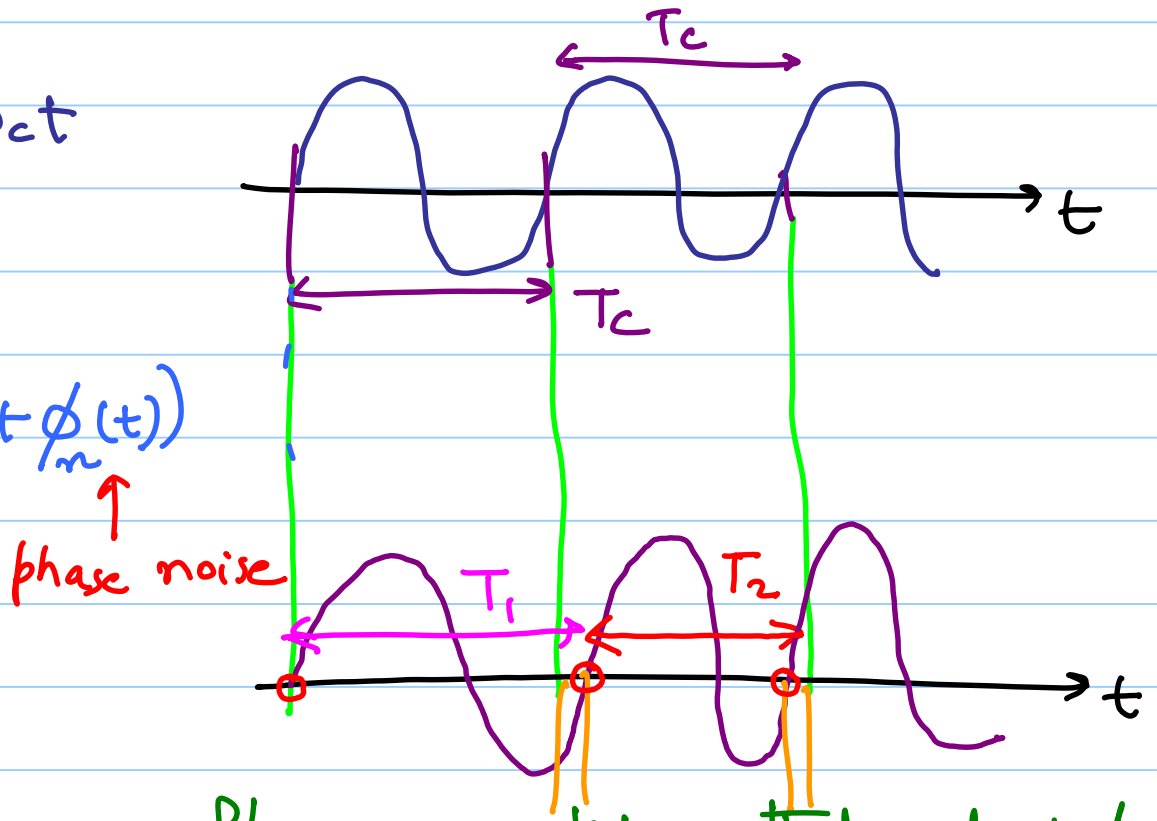
(Dynamic Logic)

Oscillator Phase Noise Overview

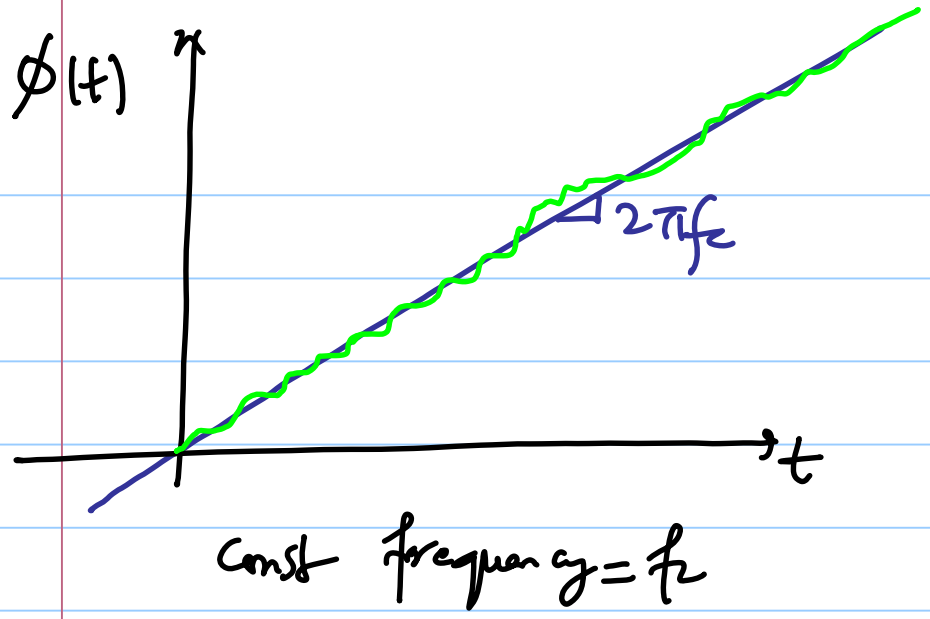
Ideal oscillator $A\cos\omega_c t$

Noisy Oscillator $A\cos(\omega_c t + \phi_n(t))$

↑ phase noise



* $\phi_n(t)$ is a random phase quantity that deviates zero crossings from multiples of T_c



$\phi_n(t) \rightarrow$ random noise
(random process)

zero mean

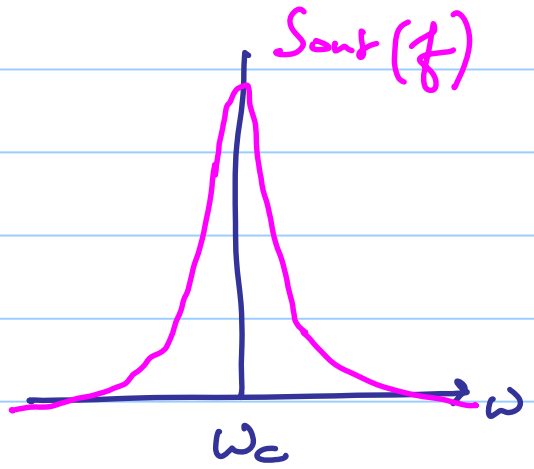
σ^2

$\Rightarrow$ Gaussian

power spectral density

PSD

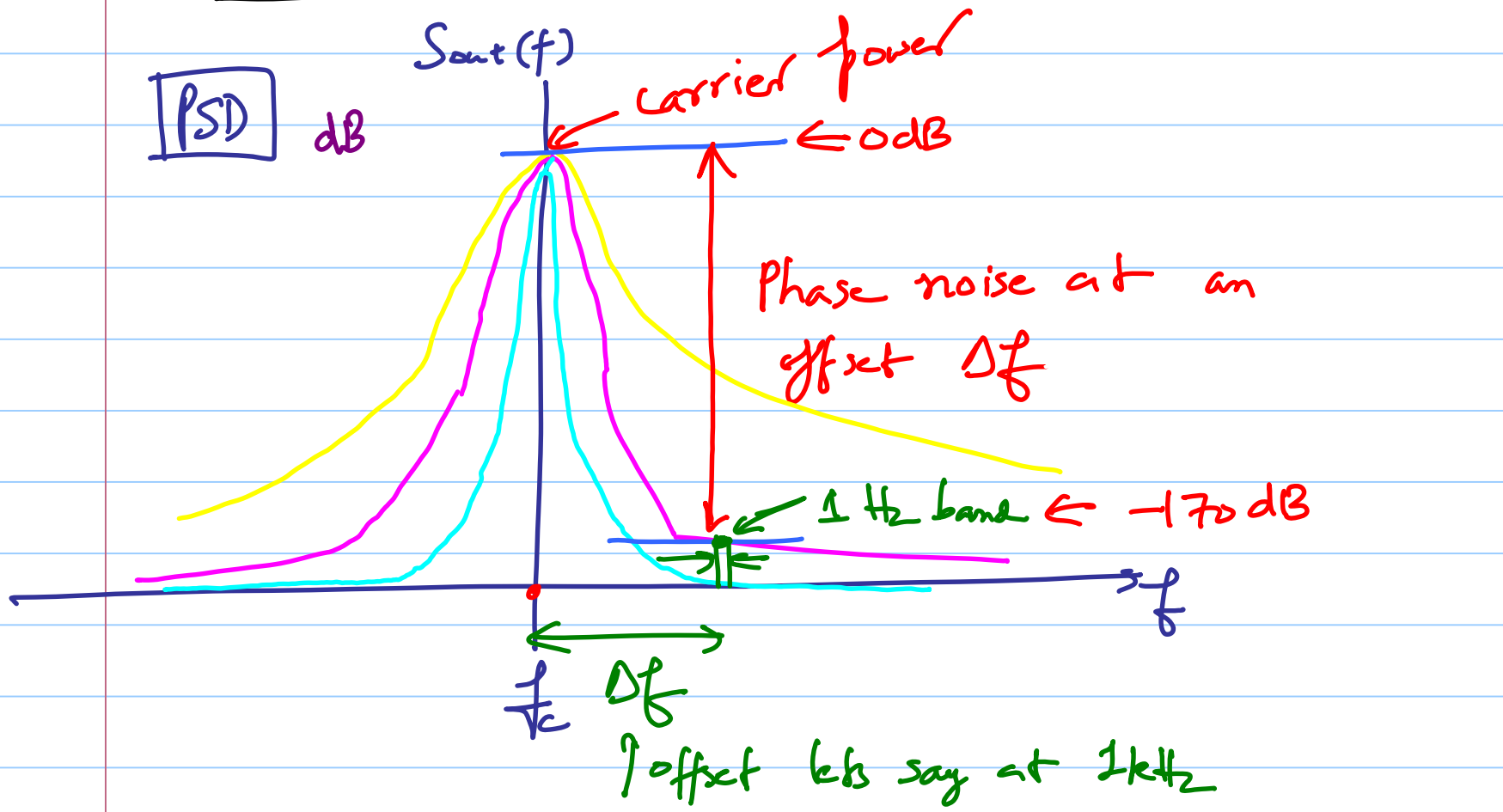
Ideal



Real

impulse is 'broadened' due to phase noise

specification of the oscillator phase noise



Normalize the power at $f_c + \Delta f$ in 1 Hz BW w.r.t. to the power of the carrier peak

Ex.

* -170 dBc/Hz at an offset of 2 kHz

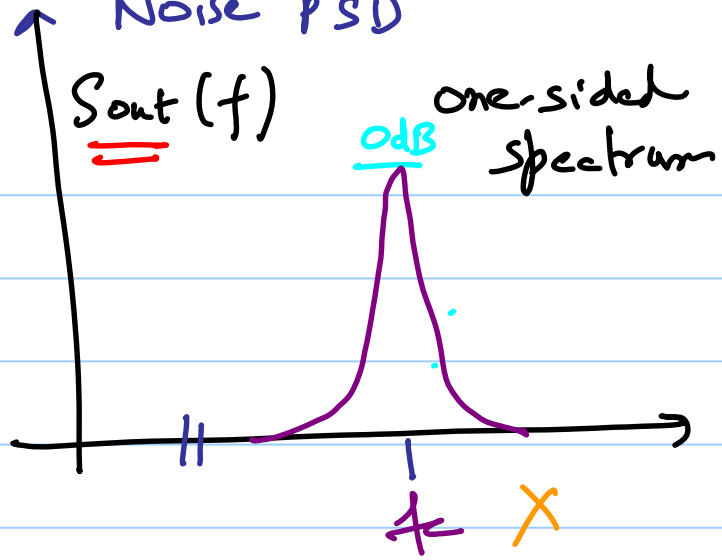
Ex GSM:

< -115 dBc/Hz at 600 kHz offset

spectrum analyzer measures power of

$A\cos(\omega_c t + \phi_n(t))$

Oscillator



VOLTAGE DOMAIN