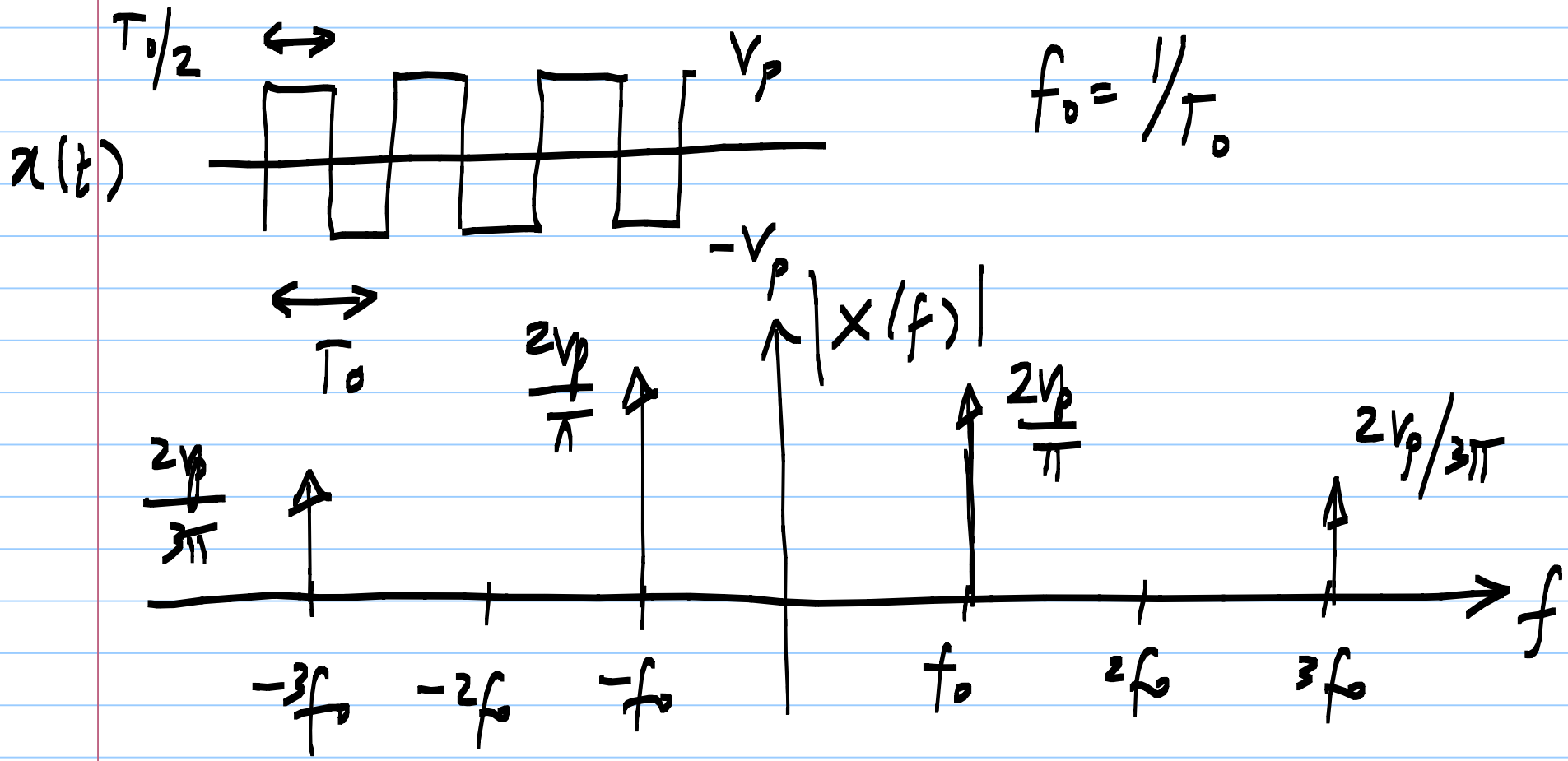
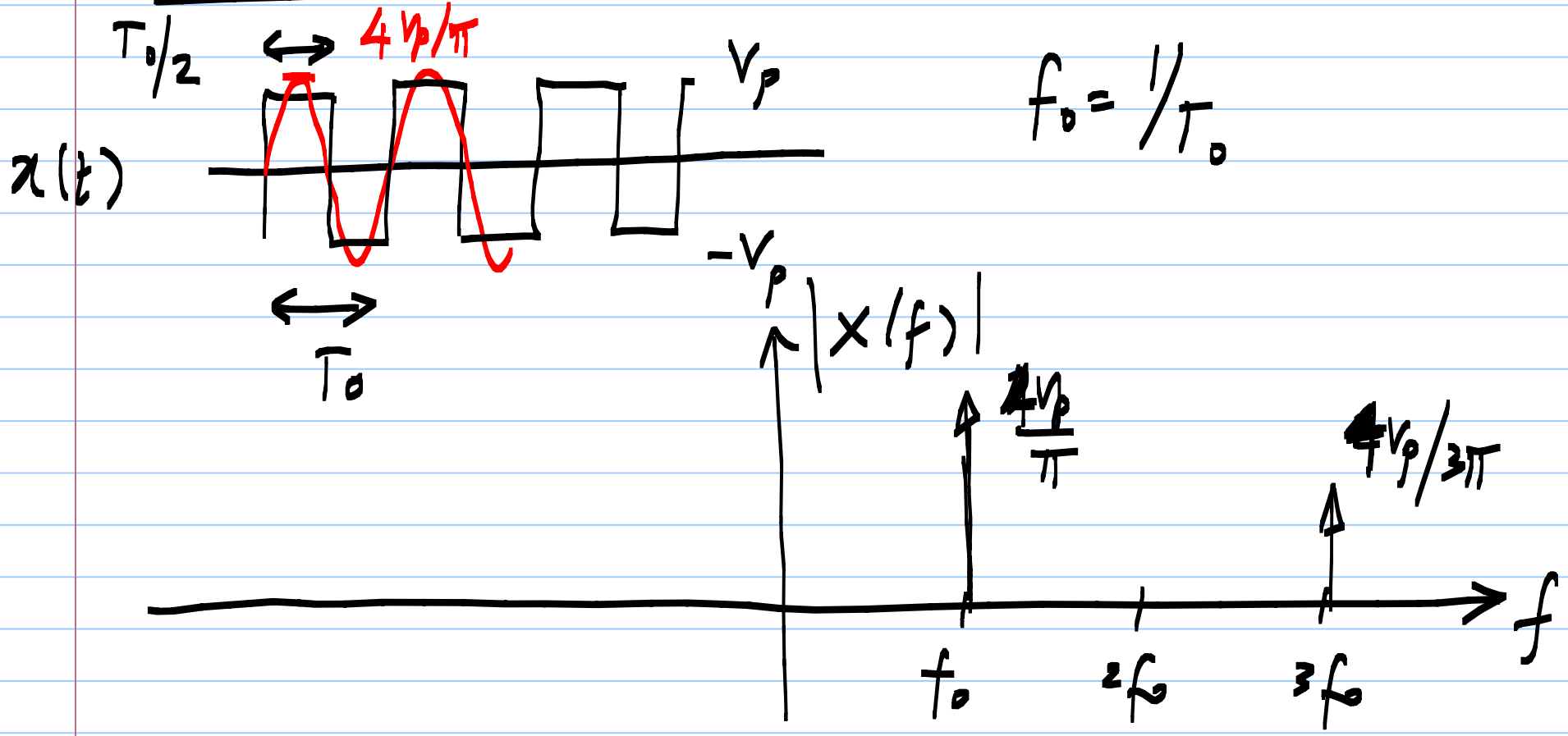
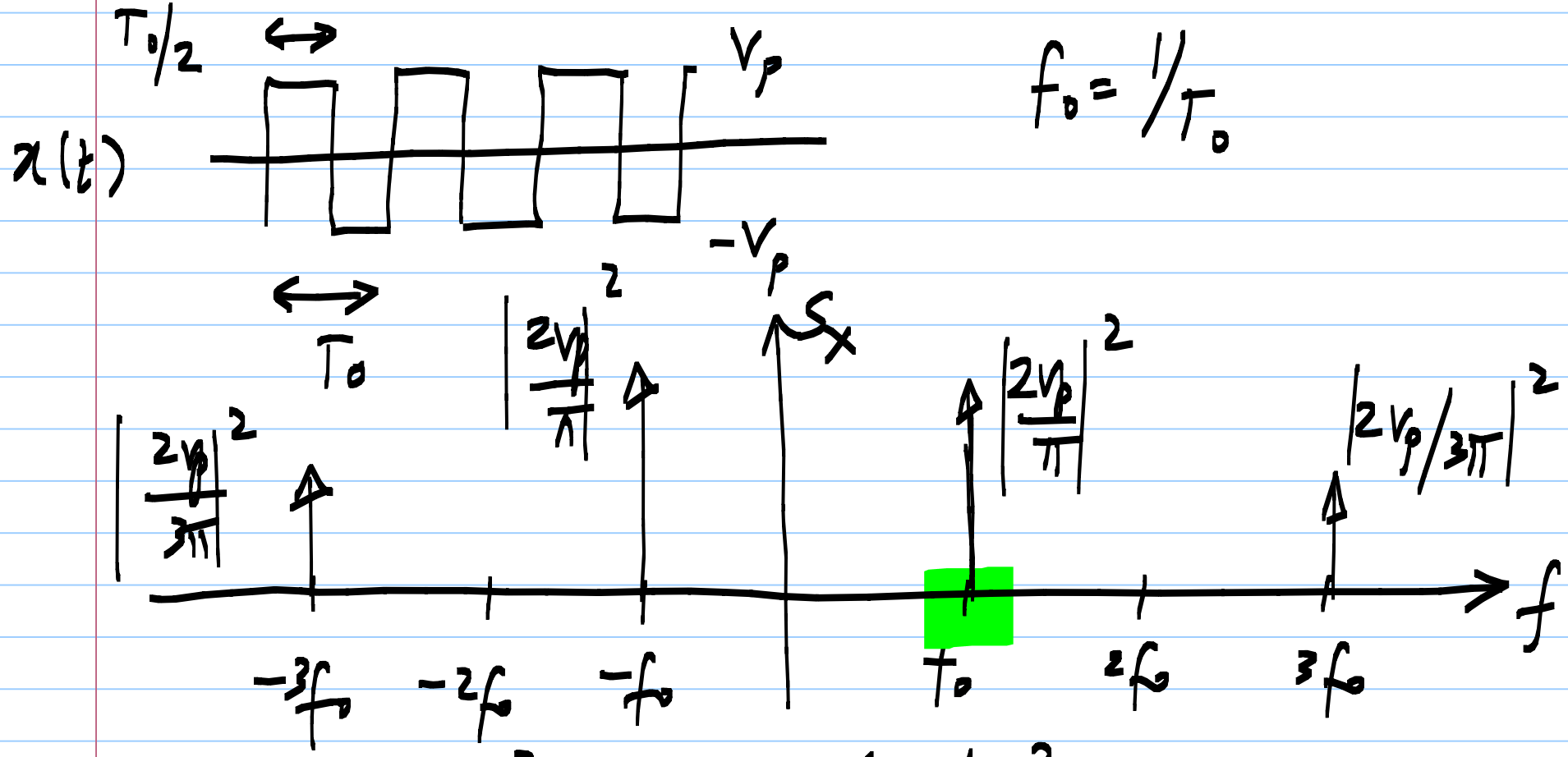
Jitter and phase noise spectra



Jitter and phase noise spectra

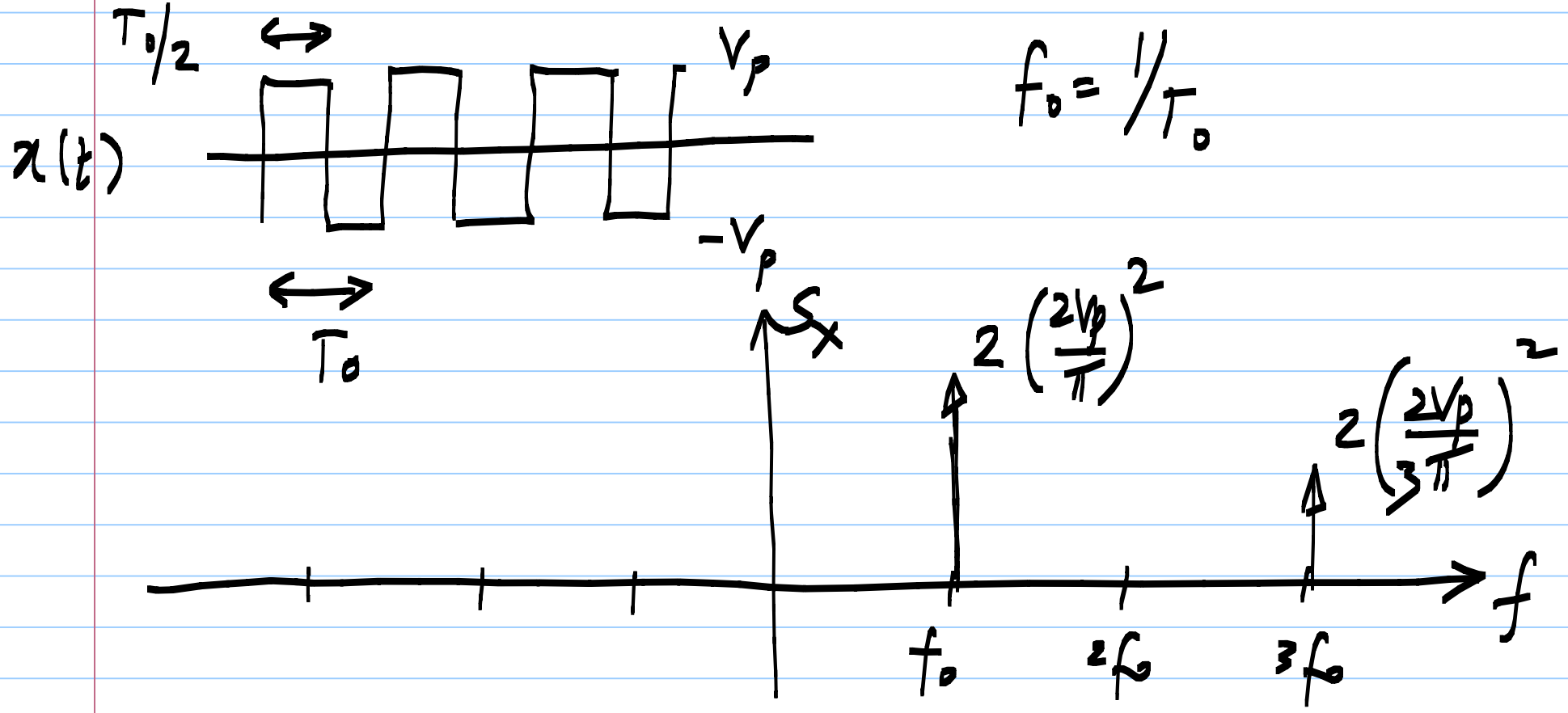


Jitter and phase noise spectra



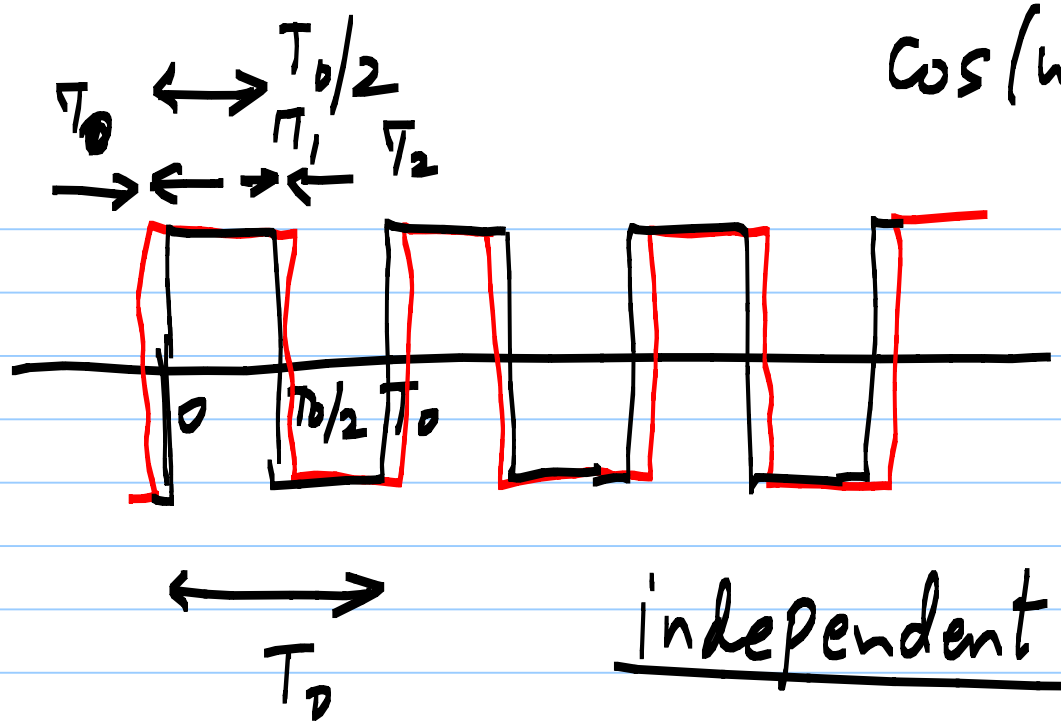
$$S_x(f) = \left(2V_p/\pi\right)^2 \delta(f - f_0) + \left(2V_p/\pi\right)^2 \delta(f + f_0)$$

Jitter and phase noise spectra



$f_0 = 1/T_0$

$$S_x(f) = \left(2V_p/\pi\right)^2 \delta(f - f_0) + \left(2V_p/\pi\right)^2 \delta(f + f_0)$$

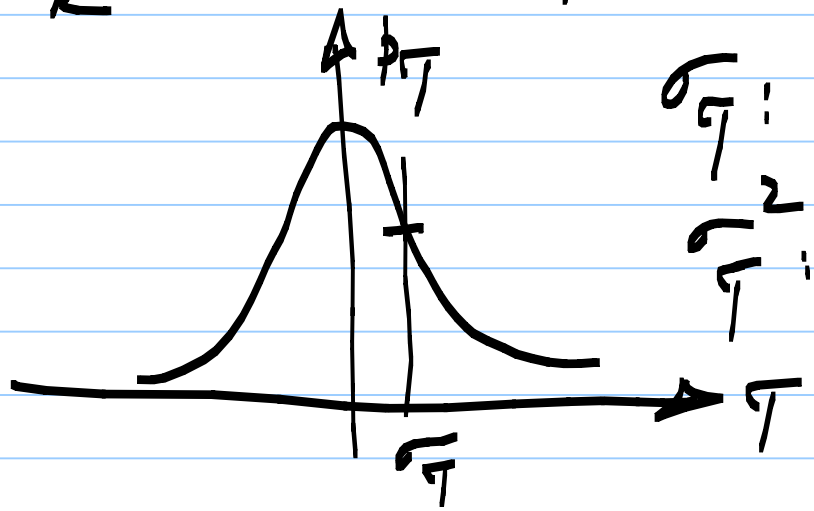


$\cos(\omega t + \underline{\underline{\Phi(t)}})$

Ideal periodic square wave (50%)

$\overline{\text{independent of time absolute jitter}}$

T_k : deviation from ideal edge position

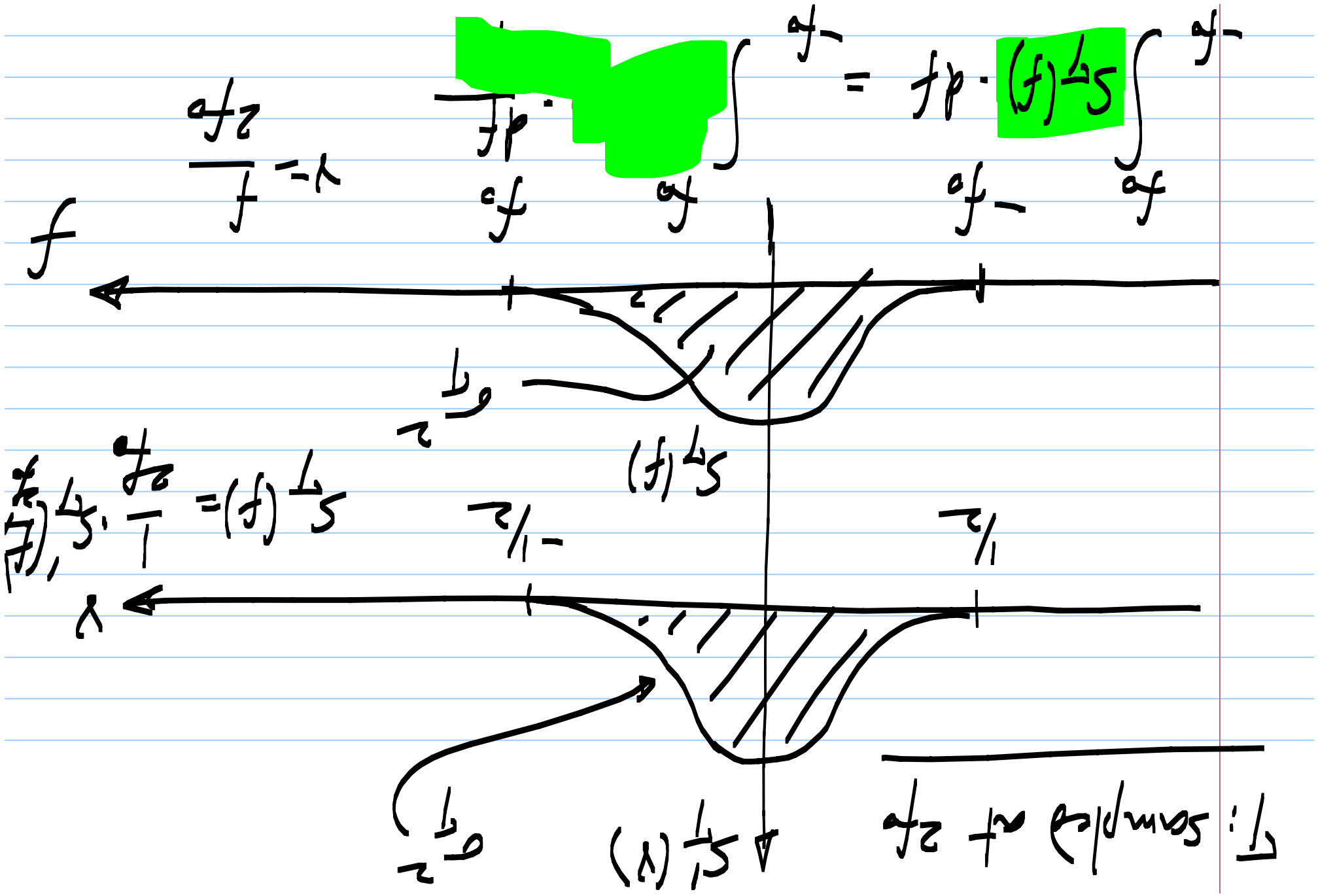


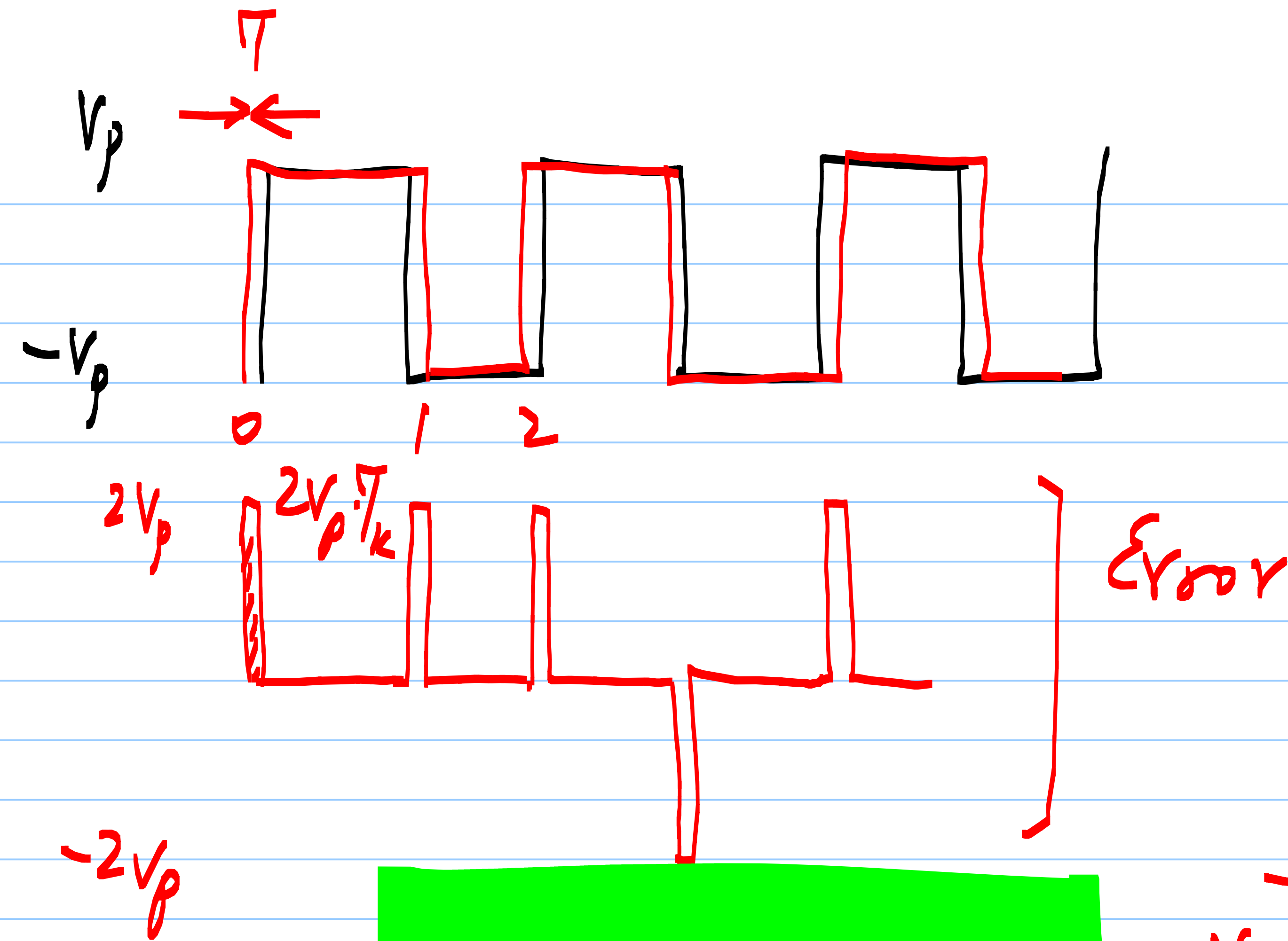
σ_T : rms jitter

σ_T^2 : mean squared jitter

[redacted] = [redacted]

[redacted] = slope

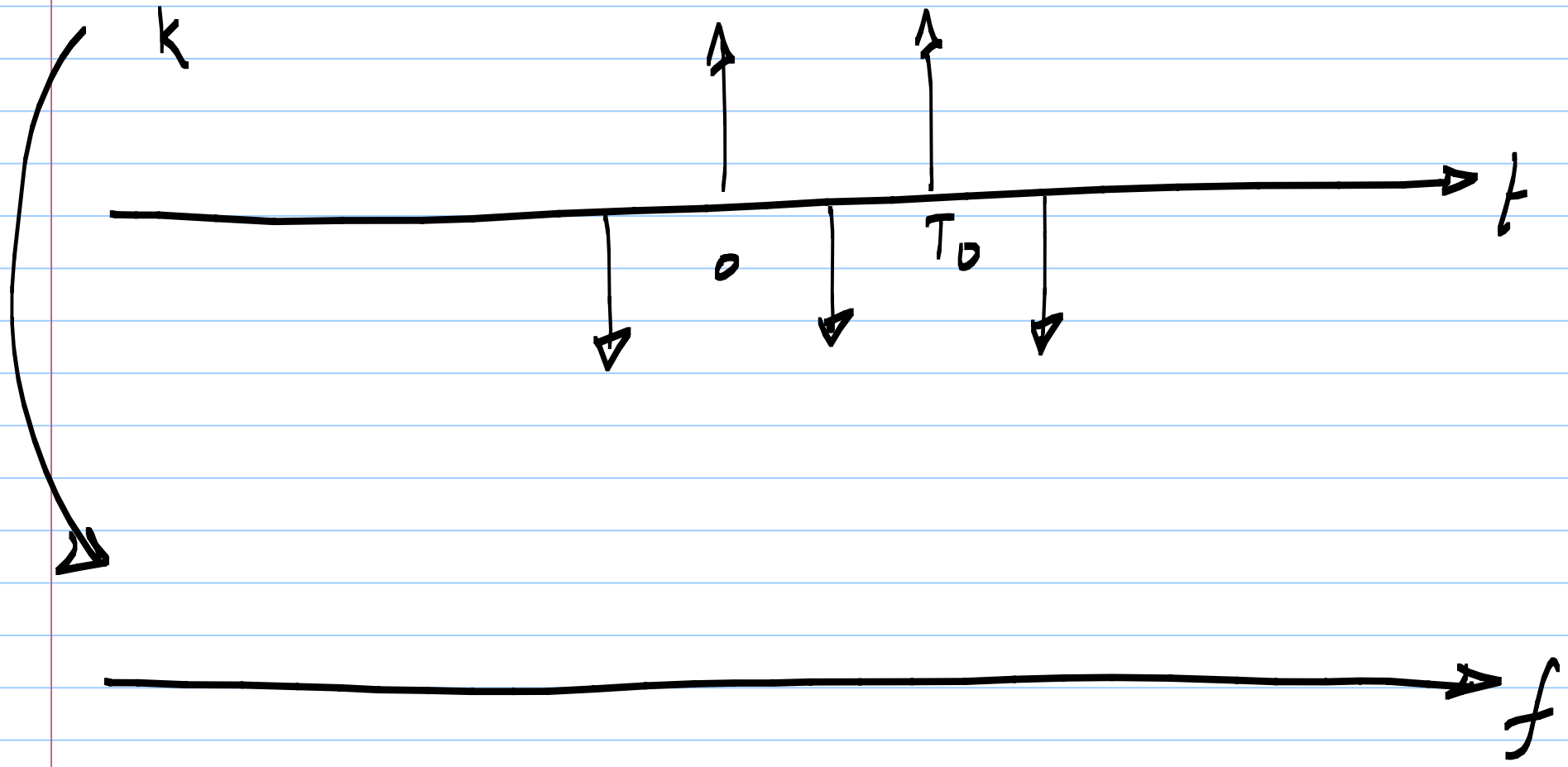




$$\sum T_k \times 2V_p \times (-1)^k \times \delta\left(t - k\frac{T_0}{2}\right)$$

Noise due to jitter

$$\sum_{k} (-1)^k \, \delta\left(t - \frac{kT_0}{2}\right)$$



$$\sum_{n=-\infty}^{\infty} \delta(t - nT_0) \quad \overset{\mathcal{F}}{\longleftrightarrow} \quad \frac{1}{T_0} \sum_{n=-\infty}^{\infty} \delta(f - nf_0)$$

$$\sum_{k=-\infty}^{\infty} (-1)^k \delta\left(t - \frac{kT_0}{2}\right)$$

$$= \sum_{n=-\infty}^{\infty} \delta(t - nT_0) - \sum_{n=-\infty}^{\infty} \delta\left(t - nT_0 - \frac{T_0}{2}\right)$$

delayed by $T_0/2$

$\mathcal{F}$

$$\left[f_0 \sum_{n=-\infty}^{\infty} \delta(f - nf_0)\right]\left[1 - \exp(-j\pi f T_0)\right]$$

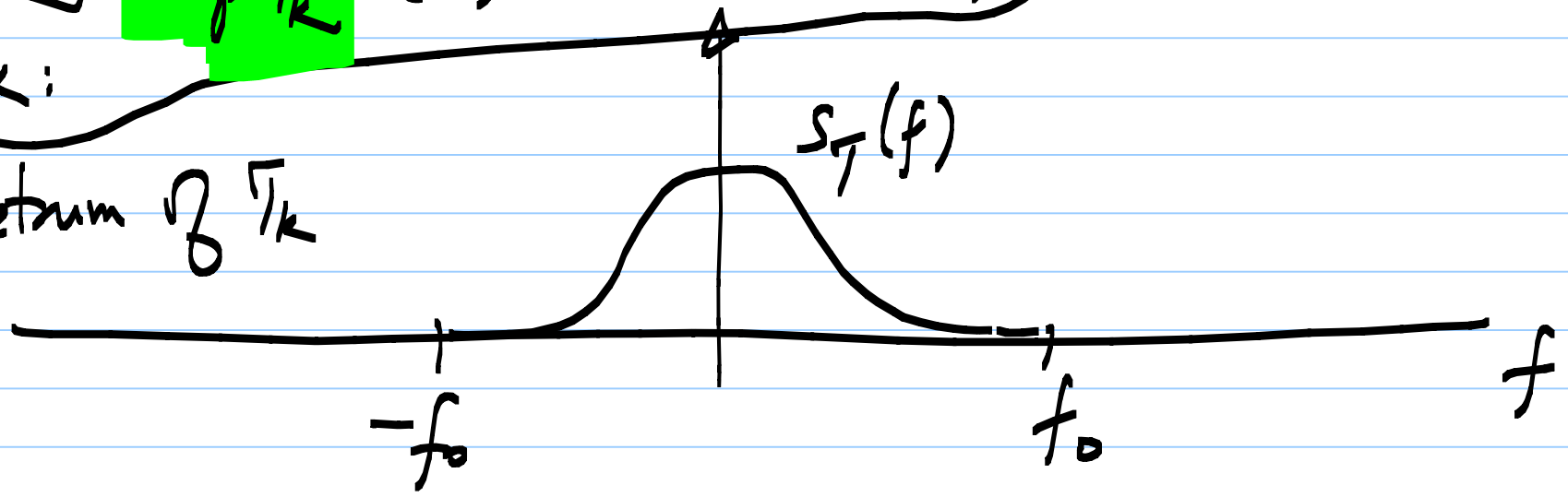
$$\left[f_0 \cdot \sum_{n=-\infty}^{\infty} \delta(f - n f_0) \right] \underbrace{\left[1 - \exp(-j\pi f T_0) \right]}$$

$$\exp(-j\pi n \cancel{f_0} \cdot \cancel{T_0}) \begin{cases} 1 : & n \text{ is even} \\ -1 : & n \text{ is odd} \end{cases}$$

$$2 f_0 \sum_{n:\text{odd}} \delta(f - n f_0)$$

$$\sum_k 2V_p T_k \cdot (-1)^k \delta(t - kT_0/2)$$

Spectrum of T_k



Spectrum of $\sum (-1)^k \cdot \delta(t - kT_0/2)$