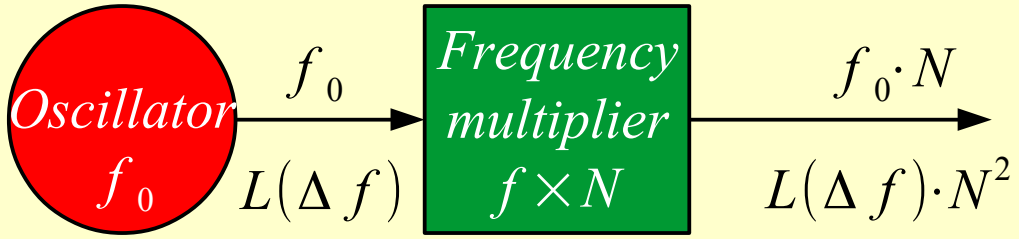
The loaded resonator quality Q_L defines the oscillator phase noise!

$$L(\Delta f)=\frac{1}{2}\cdot\left[1+\left(\frac{f_0}{2Q_L\Delta f}\right)^2\right]\cdot\frac{k_B T_0 F}{P_0}\cdot\left(1+\frac{f_C}{|\Delta f|}\right)$$

Variable-frequency oscillators	Q_L
RC VCO	~1
BWO tube	~1
Varactor-tuned LC VCO	10↔30
YIG ($Y_3Fe_5O_{12}$) oscillator	300↔1000



The phase noise multiplies with the square of the frequency multiplication factor!

Fixed-frequency oscillators	Q_L
RC multivibrator	~1
LC resonator	30↔100
Cavity resonator	1000↔3000
Ceramic dielectric resonator	1000↔3000
AT-cut quartz crystal (fundamental mode)	3000↔10000
AT-cut quartz crystal (third/fifth overtone)	10000↔30000
Electro-optical delay line ($)	~10^6 (noisy!)
Sapphire dielectric resonator ($$$)	~3.10^5
Red HeNe LASER	~10^8