O5METALS **Calculation of n and K for Copper using the Drude model.**

Calculation of real and imaginary part.
Expression for low and high frequencies depending on angular frequency.

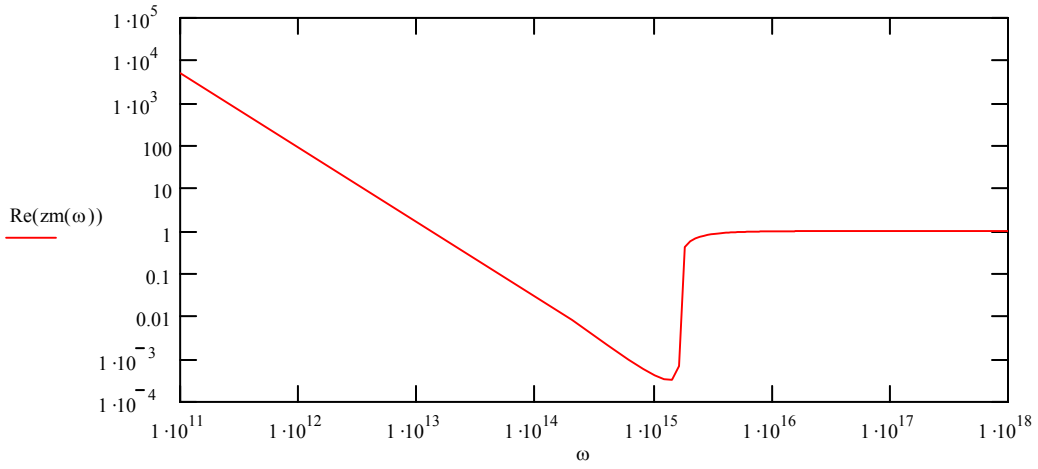
1. General Expression

$c := 3 \cdot 10^{8}$ m/s $\quad \sigma := 6 \cdot 10^{7}$ (OHM m)^-1 $\quad \varepsilon o := 8.85 \cdot 10^{-12}$ C^2/Nm

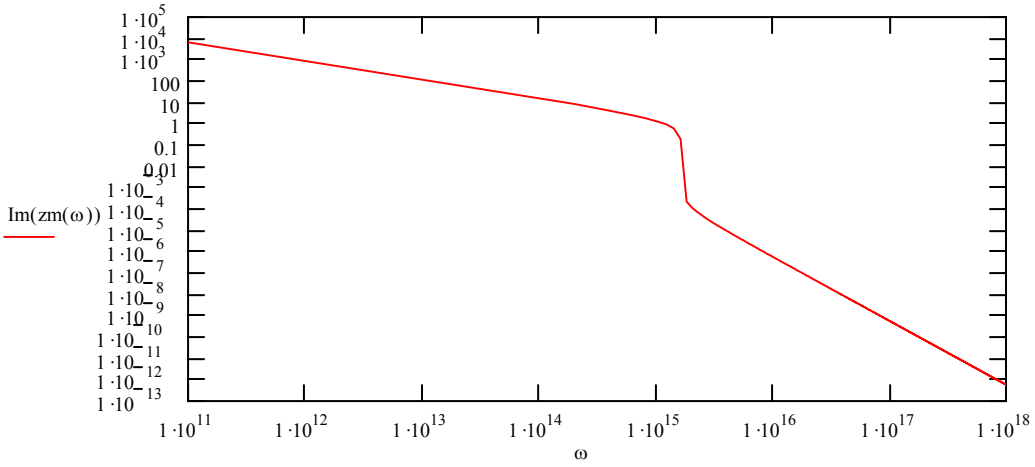
$\tau := \frac{1}{4.1 \cdot 10^{11}}$ sec $\qquad i := \sqrt{-1}$

Angular frequency for 1 mm wavelength is 2π*300* 10^9 see below $\quad \omega := 10^{11}, (2 \cdot 10)^{11} .. 10^{18}$

The general expression for n+iK=zm(ω) $\quad zm(\omega) := \sqrt{1 + \left(\frac{i \cdot \sigma}{\varepsilon o \cdot \omega}\right) \cdot \frac{1}{1 - i \cdot \omega \cdot \tau}}$



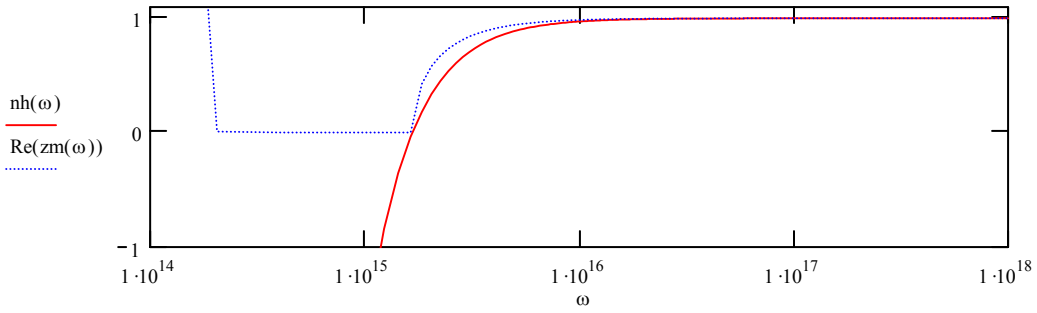
.5 mm 5 microns 500 A 5 A .5 A



.5 mm 5 microns 500 A 5 A .5 A

2. High frequency limit

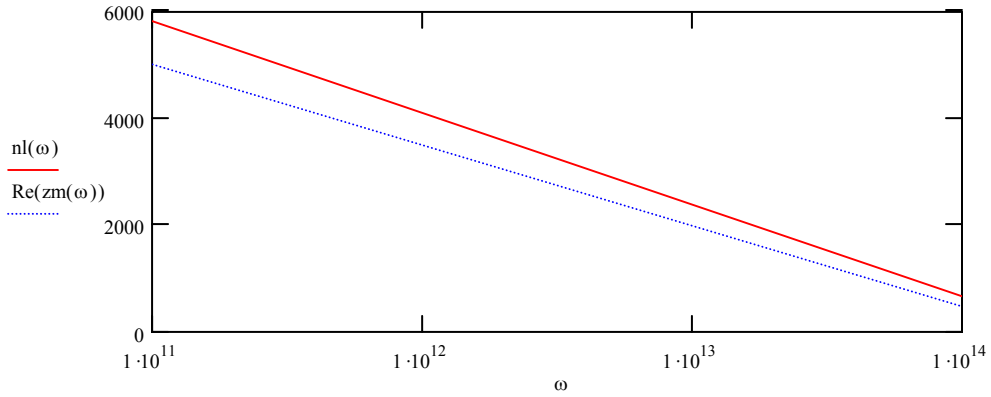
$$nh(\omega) := 1 - \frac{\sigma}{\varepsilon o \cdot \omega^2 \cdot \tau}$$



.5microns 50A 5A

3. Low frequency limit

$$nl(\omega) := \sqrt{\frac{\sigma}{2 \cdot \varepsilon o \cdot \omega}}$$



.5mm .05mm 5microns .5micron

frequency

$3 \cdot 10^{11}$ is 1mm

$3 \cdot 10^{14}$ is 1micron

$3 \cdot 10^{17}$ is 1nm is 10A

frequency

$1 \cdot 10^{11}$ is 3mm

$1 \cdot 10^{14}$ is 3micron

$1 \cdot 10^{17}$ is 3nm is 30A

angular frequency

$1 \cdot 10^{11}$ is $\frac{3}{2 \cdot \pi} = 0.477$ mm

$1 \cdot 10^{14}$ is 0.477 micron

$1 \cdot 10^{17}$ is 0.477nm is 47A