$3\delta_s \longleftrightarrow 1.2 km$ $\qquad \varepsilon_0 = 8.85 \times 10^{-12} \text{ F/m}$

$\varepsilon_r = 3 + j 0.01$

$\varepsilon = \varepsilon_0 \varepsilon_r = 3\left(8.85 \times 10^{-12}\right) + j\left(0.01\right)\left(8.85 \times 10^{-12}\right)$

$\varepsilon = 26.55 \times 10^{-12} + j\left(88.5 \times 10^{-15}\right)$

$\varepsilon' = 26.55 \times 10^{-12}$
$\varepsilon'' = 88.5 \times 10^{-15}$

$$\frac{\varepsilon''}{\varepsilon'} = \frac{88.5 \times 10^{-15}}{26.55 \times 10^{-12}} = 3.33 \times 10^{-3} = \frac{\sigma}{\omega \varepsilon}$$

$\downarrow$

Frequency
Dependent

$\varepsilon_r = \varepsilon_r' + j \frac{\sigma}{\omega \varepsilon_0}$
(3) (0.01)

This answer only
works for a
specific frequency
+ σ.