Determine ε', ε'', and the effective conductivity σ of rexolite at 3 GHz at 25°C. [Hint: Appendices E, F, & G.]

From Appendix G, $\varepsilon_r = 2.54$ and $\tan \delta = 0.00048$ for rexolite at 3 GHz.

Per notes,

$$\varepsilon' = \varepsilon_r \varepsilon_0 = 2.54(8.8541878 \times 10^{-12})$$

$$\underline{\underline{\varepsilon' = 2.24896 \times 10^{-11} \ \text{F/m}}}$$

$$\varepsilon'' = \varepsilon' \tan \delta = 2.24896 \times 10^{-11}(0.00048)$$

$$= \qquad \underline{\underline{\varepsilon'' = 1.0795 \times 10^{-14} \ \text{F/m}}}$$

$$\varepsilon'' = \sigma/\omega \implies \sigma = \varepsilon'' \omega$$

$$= 1.0795 \times 10^{-14}(2\pi)3 \times 10^{9}$$

$$\underline{\underline{\sigma = 0.00020348 \ \text{S/m}}}$$