1 | Patch antenna design

$$w = \frac{c}{2f} \cdot \sqrt{\frac{2}{e_r + 1}} \tag{1.1}$$

$$\epsilon_{eff} = \frac{\epsilon_r + 1}{2} + \frac{\epsilon_r - 1}{2} \cdot \left(1 + \frac{12h}{w}\right)^{-\frac{1}{2}} \tag{1.2}$$

$$\Delta L = h \cdot 0.412 \frac{(\epsilon_{eff} + 0.3)\left(\frac{w}{h} + 0.264\right)}{(\epsilon_{eff} - 0.258)\left(\frac{w}{h} + 0.8\right)} \cdot 10^{-3} \tag{1.3}$$

$$L = \frac{c}{2 \cdot f \cdot \sqrt{\epsilon_{eff}}} \tag{1.4}$$

$$L_{eff} = L - 2 \cdot \Delta L \tag{1.5}$$

$$y_0 = \frac{\arccos\left(\sqrt{\frac{R_{in}(y=0)}{R_{in}(y=y_0)}}\right) \cdot L}{\pi} \tag{1.6}$$

2 | Monopole design

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