$$\omega_{\mathrm{Cav}} = 2\pi \times 5.42\,\mathrm{GHz} \tag{1}$$

$$\omega_{\mathrm{atom}} = 2\pi \times 5.21\,\mathrm{GHz} \tag{2}$$

$$\Delta = \omega_{\mathrm{Cav}} - \omega_{\mathrm{atom}} = 2\pi \times 210\,\mathrm{MHz} \tag{3}$$

$$\frac{1}{2} C_{\mathrm{equiv}} < V >^2 = \frac{\hbar \omega_{\mathrm{Cav}}}{4} \tag{4}$$

$$C_{\mathrm{equiv}} = \frac{\pi}{4 \omega_{\mathrm{Cav}} Z_0} = 4.6 \times 10^{-13} \tag{5}$$

$$< V > = \sqrt{\frac{\hbar \omega_{\mathrm{Cav}}}{2 C_{\mathrm{equiv}}}} = 9.8 \times 10^{-7}\,\mathrm{V} \tag{6}$$

$$\Delta x = 30\ \mu\mathrm{m} \tag{7}$$

$$|\vec{E}| = \frac{< V >}{\Delta x} = 0.033\ \mathrm{V/m} \tag{8}$$

$$|\vec{d}| = 8360\sqrt{2/9}\ e a_0 \tag{9}$$

$$g = \frac{\vec{E} \cdot \vec{d}}{\hbar} = 2\pi \times 3.3\,\mathrm{MHz} \tag{10}$$

$$Q_i = 10480 \tag{11}$$

$$Q_c = 30000 \tag{12}$$

$$Q_T = (1/Q_c + 1/Q_i)^{-1} = 7500 \tag{13}$$

$$\chi = \frac{g^2}{\Delta} = 52\ \mathrm{kHz} \tag{14}$$

$$\kappa = \frac{\omega_{\mathrm{Cav}}}{Q_T} = 2\pi \times 4.52\,\mathrm{MHz} \tag{15}$$

$$\bar{n}_{\mathrm{crit}} = \frac{\Delta^2}{4g^2} = 1012 \tag{16}$$

$$P_{\mathrm{crit}} = \bar{n}_{\mathrm{crit}} \times \left(\frac{Q_c \hbar \omega_{\mathrm{Cav}}^2}{Q_T^2} \right) = 65 \times 10^{-14}\,\mathrm{W}\ (\text{-}102\ \mathrm{dBm}) \tag{17}$$