$$K_{128}^2 = \begin{bmatrix} \frac{-9\,U}{2\,t} & \frac{U^2}{2\,t^2} & 0 & \frac{-3\,U}{2\,t} & -\left(\frac{U}{t}\right) & 0 & \frac{\sqrt{3}\,U}{2\,t} & 4-\frac{U^2}{2\,t^2} \\ \frac{U^2}{2\,t^2} & \frac{-3\,U}{2\,t} & \frac{\sqrt{3}\,U}{2\,t} & -2 & 0 & \frac{-2\,U}{t} & 2\,\sqrt{3} & \frac{-U}{2\,t} \\ 0 & \frac{\sqrt{3}\,U}{2\,t} & \frac{-3\,U}{2\,t} & \frac{-\left(\sqrt{3}\left(4\,t^2+U^2\right)\right)}{2\,t^2} & 0 & -\left(\frac{\sqrt{3}\,U}{t}\right) & -2+\frac{U^2}{2\,t^2} & \frac{3\,\sqrt{3}\,U}{2\,t} \\ \frac{-3\,U}{2\,t} & -2 & \frac{-\left(\sqrt{3}\left(4\,t^2+U^2\right)\right)}{2\,t^2} & 0 & 0 & 0 & \frac{-2\,\sqrt{3}\,U}{t} & 0 \\ -\left(\frac{U}{t}\right) & 0 & 0 & 0 & \frac{-2\,U}{t} & 4 & 0 & 0 \\ 0 & \frac{-2\,U}{t} & -\left(\frac{\sqrt{3}\,U}{t}\right) & 0 & 4 & \frac{-5\,U}{t} & 0 & \frac{-2\,U}{t} \\ \frac{\sqrt{3}\,U}{2\,t} & 2\,\sqrt{3} & -2+\frac{U^2}{2\,t^2} & \frac{-2\,\sqrt{3}\,U}{t} & 0 & 0 & \frac{-6\,U}{t} & 0 \\ 4-\frac{U^2}{2\,t^2} & \frac{-U}{2\,t} & \frac{3\,\sqrt{3}\,U}{2\,t} & 0 & 0 & \frac{-2\,U}{t} & 0 & \frac{-7\,U}{2\,t} \end{bmatrix}$$