

$$\rho_t = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}; \quad \rho_y = \begin{pmatrix} 0 & 0 \\ -\epsilon & 0 \end{pmatrix};$$

$$\rho_a = \begin{pmatrix} (1 + 1/\epsilon) / 2 & 0 \\ 0 & -(1 - 1/\epsilon) / 2 \end{pmatrix}; \quad \rho_x = \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix};$$

Simplify@{ $\rho_a \cdot \rho_x - \rho_x \cdot \rho_a == \rho_x$, $\rho_a \cdot \rho_y - \rho_y \cdot \rho_a == -\rho_y$,
 $\rho_x \cdot \rho_y - \rho_y \cdot \rho_x == \rho_t - 2 \epsilon \rho_a$ }

{True, True, True}