$$
\begin{array}{ccc}
X \otimes^{\mathbf{L}} (Y \otimes^{\mathbf{L}} Z) & \xrightarrow{\ \star\ } & \rho X \otimes (Y \otimes^{\mathbf{L}} Z) == \rho X \otimes (Y \otimes \rho Z) \\
\Big\downarrow{\alpha^D} & & \quad\quad\quad\quad\simeq \Big\downarrow{\alpha} \\
(X \otimes^{\mathbf{L}} Y) \otimes^{\mathbf{L}} Z == (X \otimes^{\mathbf{L}} Y) \otimes \rho Z \xleftarrow{\star^{-1} \otimes \rho Z} (\rho X \otimes Y) \otimes \rho Z
\end{array}
$$