$$
\begin{aligned}
\Psi_{123} &= C_1\left(|02du\rangle + |02ud\rangle + i\,|0du2\rangle + i\,|0ud2\rangle + |20du\rangle + |20ud\rangle + i\,|2du0\rangle + i\,|2ud0\rangle + i\,|d02u\rangle + i\,|d20u\rangle - |du02\rangle - |du20\rangle + i\,|u02d\rangle + i\,|u20d\rangle - |ud02\rangle - |ud20\rangle\right) \\
&\quad + C_2\left(-|dduu\rangle + i\,|duud\rangle - i\,|uddu\rangle + |uudd\rangle\right)
\end{aligned}
$$

$$
C_1 = \frac{\frac{i}{16}\left(-U + \sqrt{16\,t^2 + U^2}\right)}{t}
$$

$$
C_2 = -\left(\frac{1}{2}\right)
$$