$$
\begin{aligned}
\Psi_{52} &= C_1\left(i\left|0duu\right\rangle+\left|duu0\right\rangle-\left|u0du\right\rangle-i\left|uu0d\right\rangle\right)\\
&\quad +C_2\left(-i\left|d0uu\right\rangle+\left|ud0u\right\rangle\right)\\
&\quad +C_3\left(i\left|0uud\right\rangle+\left|uud0\right\rangle\right)\\
&\quad +C_4\left(i\left|0udu\right\rangle+\left|udu0\right\rangle\right)\\
&\quad +C_5\left(\left|du0u\right\rangle-i\left|u0ud\right\rangle\right)\\
&\quad +C_6\left(-i\left|002u\right\rangle-\left|02u0\right\rangle+i\left|2u00\right\rangle+\left|u002\right\rangle\right)\\
&\quad +C_7\left(-i\left|020u\right\rangle+i\left|0u02\right\rangle-\left|20u0\right\rangle+\left|u020\right\rangle\right)\\
&\quad +C_8\left(\left|00u2\right\rangle-i\left|0u20\right\rangle+i\left|200u\right\rangle-\left|u200\right\rangle\right)
\end{aligned}
$$

$$
C_1 = \frac{\frac{i}{3}\left(2\,t^2\left(-2\,U+\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)+\sqrt{64\,t^4+3\,t^2\,U^2}\left(U+\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)\right)}{\sqrt{2}\,t\left(8\,t^2-\sqrt{64\,t^4+3\,t^2\,U^2}+i\,t\left(-U+2\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)\right)}
$$

$$
C_2 = \frac{-48\,i\,t^3+\sqrt{64\,t^4+3\,t^2\,U^2}\left(U+\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)+2\,t^2\left(U+4\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)+3\,i\,t\left(-U^2+2\,\sqrt{64\,t^4+3\,t^2\,U^2}-U\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)}{6\,\sqrt{2}\,t\left(8\,t^2-\sqrt{64\,t^4+3\,t^2\,U^2}+i\,t\left(-U+2\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)\right)}
$$

$$
C_3 = \frac{-48\,t^3-i\,\sqrt{64\,t^4+3\,t^2\,U^2}\left(U+\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)-2\,i\,t^2\left(U+4\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)+t\left(-3\,U^2+6\,\sqrt{64\,t^4+3\,t^2\,U^2}-3\,U\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)}{6\,\sqrt{2}\,t\left(8\,t^2-\sqrt{64\,t^4+3\,t^2\,U^2}+i\,t\left(-U+2\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)\right)}
$$

$$
C_4 = \frac{48\,t^3-i\,\sqrt{64\,t^4+3\,t^2\,U^2}\left(U+\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)+2\,i\,t^2\left(5\,U+2\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)+3\,t\left(U^2-2\,\sqrt{64\,t^4+3\,t^2\,U^2}+U\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)}{6\,\sqrt{2}\,t\left(8\,t^2-\sqrt{64\,t^4+3\,t^2\,U^2}+i\,t\left(-U+2\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)\right)}
$$

$$
C_5 = \frac{48\,i\,t^3+\sqrt{64\,t^4+3\,t^2\,U^2}\left(U+\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)-2\,t^2\left(5\,U+2\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)-3\,i\,t\left(-U^2+2\,\sqrt{64\,t^4+3\,t^2\,U^2}-U\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)}{6\,\sqrt{2}\,t\left(8\,t^2-\sqrt{64\,t^4+3\,t^2\,U^2}+i\,t\left(-U+2\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)\right)}
$$

$$
C_6 = \frac{i\left(-8\,t^2+i\,t\,U+\sqrt{64\,t^4+3\,t^2\,U^2}\right)}{\sqrt{2}\left(-8\,t^2+i\,t\,U+\sqrt{64\,t^4+3\,t^2\,U^2}-2\,i\,t\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)}
$$

$$
C_7 = \frac{i\left(-8\,t^2+\sqrt{64\,t^4+3\,t^2\,U^2}+i\,t\left(U+2\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)\right)}{\sqrt{2}\left(-8\,t^2+i\,t\,U+\sqrt{64\,t^4+3\,t^2\,U^2}-2\,i\,t\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)}
$$

$$
C_8 = \frac{\sqrt{2}\,t\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}}{\left(8\,t^2-\sqrt{64\,t^4+3\,t^2\,U^2}+i\,t\left(-U+2\,\sqrt{32\,t^2+U^2-4\,\sqrt{64\,t^4+3\,t^2\,U^2}}\right)\right)}
$$