$$
\begin{aligned}
\Psi_{111} &= C_1\left(|0022\rangle - |0220\rangle - |2002\rangle + |2200\rangle\right) \\
&\quad + C_2\left(-|02du\rangle + |02ud\rangle + |0du2\rangle - |0ud2\rangle - |20du\rangle + |20ud\rangle + |2du0\rangle - |2ud0\rangle + |d02u\rangle + |d20u\rangle - |du02\rangle - |du20\rangle - |u02d\rangle - |u20d\rangle + |ud02\rangle + |ud20\rangle\right) \\
&\quad + C_3\left(|dudu\rangle + |udud\rangle\right) \\
&\quad + C_4\left(|dduu\rangle + |duud\rangle + |uddu\rangle + |uudd\rangle\right)
\end{aligned}
$$

$$
C_1 = \frac{48\,\left(1+i\,\sqrt{3}\right)\,t^2+\left(3+3\,i\,\sqrt{3}\right)\,U^2-6\,3^{\frac{1}{3}}\,U\,\left(-36\,t^2\,U+\sqrt{3}\,\sqrt{-4096\,t^6-336\,t^4\,U^2-48\,t^2\,U^4-U^6}\right)^{\frac{1}{3}}+3^{\frac{1}{6}}\,\left(-3\,i+\sqrt{3}\right)\,\left(-36\,t^2\,U+\sqrt{3}\,\sqrt{-4096\,t^6-336\,t^4\,U^2-48\,t^2\,U^4-U^6}\right)^{\frac{2}{3}}}{6\,\left(16\,\left(3\,i+\sqrt{3}\right)\,t^2+\left(3\,i+\sqrt{3}\right)\,U^2+2\,3^{\frac{5}{6}}\,U\,\left(-36\,t^2\,U+\sqrt{3}\,\sqrt{-4096\,t^6-336\,t^4\,U^2-48\,t^2\,U^4-U^6}\right)^{\frac{1}{3}}+3^{\frac{1}{6}}\,\left(1-i\,\sqrt{3}\right)\,\left(-36\,t^2\,U+\sqrt{3}\,\sqrt{-4096\,t^6-336\,t^4\,U^2-48\,t^2\,U^4-U^6}\right)^{\frac{2}{3}}\right)}
$$

$$
C_2 = \frac{96\,2^{\frac{1}{3}}\,\left(1+i\,\sqrt{3}\right)\,t^2+6\,2^{\frac{1}{3}}\,\left(1+i\,\sqrt{3}\right)\,U^2-6\,i\,2^{\frac{1}{3}}\,3^{\frac{1}{6}}\,\left(-36\,t^2\,U+\sqrt{3}\,\sqrt{-4096\,t^6-336\,t^4\,U^2-48\,t^2\,U^4-U^6}\right)^{\frac{2}{3}}-12\,U\,\left(-216\,t^2\,U+6\,\sqrt{3}\,\sqrt{-4096\,t^6-336\,t^4\,U^2-48\,t^2\,U^4-U^6}\right)^{\frac{1}{3}}+2^{\frac{2}{3}}\,\left(-216\,t^2\,U+6\,\sqrt{3}\,\sqrt{-4096\,t^6-336\,t^4\,U^2-48\,t^2\,U^4-U^6}\right)^{\frac{2}{3}}}{96\,\sqrt{3}\,t\,\left(-216\,t^2\,U+6\,\sqrt{3}\,\sqrt{-4096\,t^6-336\,t^4\,U^2-48\,t^2\,U^4-U^6}\right)^{\frac{1}{3}}}
$$

$$
C_3 = -\left(\frac{1}{\sqrt{3}}\right)
$$

$$
C_4 = \frac{1}{2\,\sqrt{3}}
$$