$$C_{ud}^{(1)\,i1\_i2\_i3\_i4\_} \to$$

$$\hbar \left( \frac{1}{324} \frac{1}{m_{\tilde{u}}^2} \left( \overline{y_d}^{pi3} \left( 27\, \overline{y_u}^{ri1} \left( -y_d{}^{ri4}\, y_u{}^{pi2} + 6\, s_\gamma{}^2\, c_\gamma{}^2\, y_d{}^{pi4}\, y_u{}^{ri2} \right) - 2\, g_1{}^2\, s_\gamma{}^2\, y_d{}^{pi4}\, \delta_{i1i2} \right) + 7\, g_1{}^2\, c_\gamma{}^2\, \overline{y_u}^{pi1}\, y_u{}^{pi2}\, \delta_{i3i4} \right) - \frac{8}{243} \sum_p g_1{}^4\, LF_{3,0}\left[ m_{\tilde{d}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} + \right.$$

$$\frac{5}{81} \sum_p g_1{}^4\, LF_{4,-1}\left[ m_{\tilde{d}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{32}{1215} \sum_p g_1{}^4\, LF_{5,-2}\left[ m_{\tilde{d}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} -$$

$$\frac{8}{81} \sum_p g_1{}^4\, LF_{3,0}\left[ m_{\tilde{e}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} + \frac{5}{27} \sum_p g_1{}^4\, LF_{4,-1}\left[ m_{\tilde{e}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} -$$

$$\frac{32}{405} \sum_p g_1{}^4\, LF_{5,-2}\left[ m_{\tilde{e}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{4}{81} \sum_p g_1{}^4\, LF_{3,0}\left[ m_{\tilde{l}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{5}{54} \sum_p g_1{}^4\, LF_{4,-1}\left[ m_{\tilde{l}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{16}{405} \sum_p g_1{}^4\, LF_{5,-2}\left[ m_{\tilde{l}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} -$$

$$\frac{4}{243} \sum_p g_1{}^4\, LF_{3,0}\left[ m_{\tilde{q}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} + \frac{5}{162} \sum_p g_1{}^4\, LF_{4,-1}\left[ m_{\tilde{q}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} -$$

$$\frac{16}{1215} \sum_p g_1{}^4\, LF_{5,-2}\left[ m_{\tilde{q}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{32}{243} \sum_p g_1{}^4\, LF_{3,0}\left[ m_{\tilde{u}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{20}{81} \sum_p g_1{}^4\, LF_{4,-1}\left[ m_{\tilde{u}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{128}{1215} \sum_p g_1{}^4\, LF_{5,-2}\left[ m_{\tilde{u}}{}^p \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{1}{54} \left( \overline{y_d}^{pi3} \left( 9\, \overline{y_u}^{ri1} \left( y_d{}^{ri4}\, y_u{}^{pi2} \left( c_\gamma{}^2 - s_\gamma{}^2 \right)^2 + 6\, s_\gamma{}^2\, c_\gamma{}^2\, y_d{}^{pi4}\, y_u{}^{ri2} \right) - 4\, g_1{}^2\, s_\gamma{}^2\, y_d{}^{pi4}\, \delta_{i1i2} \right) + 2\, g_1{}^2\, c_\gamma{}^2\, \overline{y_u}^{pi1}\, y_u{}^{pi2}\, \delta_{i3i4} \right) LF_{1,2}[m_\oplus] +$$

$$\frac{1}{18} \left( s_\gamma{}^2\, \overline{y_d}^{pi3} \left( 3\, c_\gamma{}^2\, \overline{y_u}^{ri1} \left( 2\, y_d{}^{ri4}\, y_u{}^{pi2} - 3\, y_d{}^{pi4}\, y_u{}^{ri2} \right) + 2\, g_1{}^2\, y_d{}^{pi4}\, \delta_{i1i2} \right) + g_1{}^2\, c_\gamma{}^2\, \overline{y_u}^{pi1}\, y_u{}^{pi2}\, \delta_{i3i4} \right) LF_{2,1}[m_\oplus] -$$

$$\frac{1}{162} g_1{}^2 \left( 18\, s_\gamma{}^2\, \overline{y_d}^{pi3}\, y_d{}^{pi4}\, \delta_{i1i2} + \left( 9\, c_\gamma{}^2\, \overline{y_u}^{pi1}\, y_u{}^{pi2} + 8\, g_1{}^2\, \delta_{i1i2} \right) \delta_{i3i4} \right) LF_{3,0}[m_\oplus] +$$

$$\frac{5}{54} g_1{}^4\, LF_{4,-1}[m_\oplus]\, \delta_{i1i2}\, \delta_{i3i4} - \frac{16}{405} g_1{}^4\, LF_{5,-2}[m_\oplus]\, \delta_{i1i2}\, \delta_{i3i4} -$$

$$\frac{4}{81} g_1{}^4\, LF_{3,0}[\tilde{\mu}]\, \delta_{i1i2}\, \delta_{i3i4} - \frac{2}{27} g_1{}^4\, LF_{4,-1}[\tilde{\mu}]\, \delta_{i1i2}\, \delta_{i3i4} + \frac{32}{405} g_1{}^4\, LF_{5,-2}[\tilde{\mu}]\, \delta_{i1i2}\, \delta_{i3i4} -$$

$$\frac{2}{243} g_1{}^4\, LF_{2,1,0}\left[ m_1, m_{\tilde{d}}{}^{i4} \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{2}{243} g_1{}^4\, LF_{2,2,-1}\left[ m_1, m_{\tilde{d}}{}^{i4} \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{4}{243} g_1{}^4\, LF_{3,1,-1}\left[ m_1, m_{\tilde{d}}{}^{i4} \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{2}{243} g_1{}^4\, LF_{4,1,-2}\left[ m_1, m_{\tilde{d}}{}^{i4} \right] \delta_{i1i2}\, \delta_{i3i4} -$$

$$\frac{8}{243} g_1{}^4\, LF_{2,1,0}\left[ m_1, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{8}{243} g_1{}^4\, LF_{2,2,-1}\left[ m_1, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{16}{243} g_1{}^4\, LF_{3,1,-1}\left[ m_1, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{8}{243} g_1{}^4\, LF_{4,1,-2}\left[ m_1, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} -$$

$$\frac{8}{81} g_1{}^2\, g_3{}^2\, LF_{2,1,0}\left[ m_3, m_{\tilde{d}}{}^{i4} \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{8}{81} g_1{}^2\, g_3{}^2\, LF_{2,2,-1}\left[ m_3, m_{\tilde{d}}{}^{i4} \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{16}{81} g_1{}^2\, g_3{}^2\, LF_{3,1,-1}\left[ m_3, m_{\tilde{d}}{}^{i4} \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{8}{81} g_1{}^2\, g_3{}^2\, LF_{4,1,-2}\left[ m_3, m_{\tilde{d}}{}^{i4} \right] \delta_{i1i2}\, \delta_{i3i4} -$$

$$\frac{8}{81} g_1{}^2\, g_3{}^2\, LF_{2,1,0}\left[ m_3, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{8}{81} g_1{}^2\, g_3{}^2\, LF_{2,2,-1}\left[ m_3, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{16}{81} g_1{}^2\, g_3{}^2\, LF_{3,1,-1}\left[ m_3, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{8}{81} g_1{}^2\, g_3{}^2\, LF_{4,1,-2}\left[ m_3, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{4}{243} g_1{}^4\, LF_{2,1,0}\left[ m_{\tilde{d}}{}^{i4}, m_1 \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{2}{243} g_1{}^4\, LF_{3,1,-1}\left[ m_{\tilde{d}}{}^{i4}, m_1 \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{16}{81} g_1{}^2\, g_3{}^2\, LF_{2,1,0}\left[ m_{\tilde{d}}{}^{i4}, m_3 \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{8}{81} g_1{}^2\, g_3{}^2\, LF_{3,1,-1}\left[ m_{\tilde{d}}{}^{i4}, m_3 \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{1}{27} g_1{}^2 \left( -2\, \overline{y_d}^{pi3}\, y_d{}^{pi4}\, \delta_{i1i2} + \overline{y_u}^{pi1}\, y_u{}^{pi2}\, \delta_{i3i4} \right) LF_{2,1,0}\left[ m_{\tilde{q}}{}^p, \tilde{\mu} \right] +$$

$$\frac{1}{54} g_1{}^2 \left( 2\, \overline{y_d}^{pi3}\, y_d{}^{pi4}\, \delta_{i1i2} - \overline{y_u}^{pi1}\, y_u{}^{pi2}\, \delta_{i3i4} \right) LF_{2,2,-1}\left[ m_{\tilde{q}}{}^p, \tilde{\mu} \right] +$$

$$\frac{1}{54} g_1{}^2 \left( 2\, \overline{y_d}^{pi3}\, y_d{}^{pi4}\, \delta_{i1i2} - \overline{y_u}^{pi1}\, y_u{}^{pi2}\, \delta_{i3i4} \right) LF_{3,1,-1}\left[ m_{\tilde{q}}{}^p, \tilde{\mu} \right] +$$

$$\frac{16}{243} g_1{}^4\, LF_{2,1,0}\left[ m_{\tilde{u}}{}^{i2}, m_1 \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{8}{243} g_1{}^4\, LF_{3,1,-1}\left[ m_{\tilde{u}}{}^{i2}, m_1 \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{16}{81} g_1{}^2\, g_3{}^2\, LF_{2,1,0}\left[ m_{\tilde{u}}{}^{i2}, m_3 \right] \delta_{i1i2}\, \delta_{i3i4} - \frac{8}{81} g_1{}^2\, g_3{}^2\, LF_{3,1,-1}\left[ m_{\tilde{u}}{}^{i2}, m_3 \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{1}{54} g_1{}^2 \left( 2\, \overline{y_d}^{pi3}\, y_d{}^{pi4}\, \delta_{i1i2} - \overline{y_u}^{pi1}\, y_u{}^{pi2}\, \delta_{i3i4} \right) LF_{2,1,0}\left[ \tilde{\mu}, m_{\tilde{q}}{}^p \right] +$$

$$\frac{1}{54} g_1{}^2 \left( 14\, \overline{y_d}^{pi3}\, y_d{}^{pi4}\, \delta_{i1i2} + 11\, \overline{y_u}^{pi1}\, y_u{}^{pi2}\, \delta_{i3i4} \right) LF_{3,1,-1}\left[ \tilde{\mu}, m_{\tilde{q}}{}^p \right] -$$

$$\frac{2}{27} g_1{}^2 \left( \overline{y_d}^{pi3}\, y_d{}^{pi4}\, \delta_{i1i2} + \overline{y_u}^{pi1}\, y_u{}^{pi2}\, \delta_{i3i4} \right) LF_{4,1,-2}\left[ \tilde{\mu}, m_{\tilde{q}}{}^p \right] +$$

$$\frac{4}{81} g_1{}^4\, LF_{2,1,1,-1}\left[ m_1, m_{\tilde{d}}{}^{i4}, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} + \frac{8}{81} g_1{}^4\, m_1{}^2\, LF_{2,1,1,0}\left[ m_1, m_{\tilde{d}}{}^{i4}, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{2}{9} g_3{}^4\, LF_{2,1,1,-1}\left[ m_3, m_{\tilde{d}}{}^{i4}, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} + \frac{4}{9} g_3{}^4\, m_3{}^2\, LF_{2,1,1,0}\left[ m_3, m_{\tilde{d}}{}^{i4}, m_{\tilde{u}}{}^{i2} \right] \delta_{i1i2}\, \delta_{i3i4} +$$

$$\frac{1}{6} \overline{y_d}^{pi3}\, y_d{}^{ri4}\, \overline{y_u}^{ri1}\, y_u{}^{pi2}\, LF_{2,1,1,-1}\left[ \tilde{\mu}, m_{\tilde{q}}{}^p, m_{\tilde{q}}{}^r \right] -$$

$$\left. \frac{1}{3} \tilde{\mu}^2\, \overline{y_d}^{pi3}\, \overline{y_u}^{ri1} \left( y_d{}^{ri4}\, y_u{}^{pi2} - 3\, y_d{}^{pi4}\, y_u{}^{ri2} \right) LF_{2,1,1,0}\left[ \tilde{\mu}, m_{\tilde{q}}{}^p, m_{\tilde{q}}{}^r \right] \right)$$