$$C_{HG} \to \frac{1}{16\,\pi^2}$$

$$\Big(\tfrac{1}{24}\sum_p c_{2\gamma}\,g_1{}^2\,g_3{}^2\,LF_{3,0}\big[m_{\tilde{d}}{}^p\big] - \tfrac{1}{24}\sum_p c_{2\gamma}\,g_1{}^2\,g_3{}^2\,LF_{4,-1}\big[m_{\tilde{d}}{}^p\big] - \tfrac{1}{4}\,g_3{}^2\,c_\gamma{}^2\,\overline{y_d}{}^{pr}\,y_d{}^{pr}\,LF_{3,0}\big[m_{\tilde{d}}{}^r\big] + \tfrac{1}{4}\,g_3{}^2\,c_\gamma{}^2\,\overline{y_d}{}^{pr}\,y_d{}^{pr}\,LF_{4,-1}\big[m_{\tilde{d}}{}^r\big] + \tfrac{1}{24}\,g_3{}^2\,\big(-6\,c_\gamma{}^2\,\overline{y_d}{}^{pr}\,y_d{}^{pr} - 6\,s_\gamma{}^2\,\overline{y_u}{}^{pr}\,y_u{}^{pr} + \sum_p c_{2\gamma}\,g_1{}^2\big)\,LF_{3,0}\big[m_{\tilde{q}}{}^p\big] + \tfrac{1}{24}\,g_3{}^2\,\big(6\,c_\gamma{}^2\,\overline{y_d}{}^{pr}\,y_d{}^{pr} + 6\,s_\gamma{}^2\,\overline{y_u}{}^{pr}\,y_u{}^{pr} - \sum_p c_{2\gamma}\,g_1{}^2\big)\,LF_{4,-1}\big[m_{\tilde{q}}{}^p\big] - \tfrac{1}{12}\sum_p c_{2\gamma}\,g_1{}^2\,g_3{}^2\,LF_{3,0}\big[m_{\tilde{u}}{}^p\big] + \tfrac{1}{12}\sum_p c_{2\gamma}\,g_1{}^2\,g_3{}^2\,LF_{4,-1}\big[m_{\tilde{u}}{}^p\big] - \tfrac{1}{4}\,g_3{}^2\,s_\gamma{}^2\,\overline{y_u}{}^{pr}\,y_u{}^{pr}\,LF_{3,0}\big[m_{\tilde{u}}{}^r\big] + \tfrac{1}{4}\,g_3{}^2\,s_\gamma{}^2\,\overline{y_u}{}^{pr}\,y_u{}^{pr}\,LF_{4,-1}\big[m_{\tilde{u}}{}^r\big] - \tfrac{1}{4}\,g_3{}^2\,\big(c_\gamma\,\overline{a_d}{}^{pr} - s_\gamma\,\tilde{\mu}\,\overline{y_d}{}^{pr}\big)\,\big(c_\gamma\,a_d{}^{pr} - s_\gamma\,\tilde{\mu}\,y_d{}^{pr}\big)\,LF_{2,2,0}\big[m_{\tilde{d}}{}^r,\,m_{\tilde{q}}{}^p\big] - \tfrac{1}{4}\,g_3{}^2\,\big(c_\gamma\,\overline{a_d}{}^{pr} - s_\gamma\,\tilde{\mu}\,\overline{y_d}{}^{pr}\big)\,\big(c_\gamma\,a_d{}^{pr} - s_\gamma\,\tilde{\mu}\,y_d{}^{pr}\big)\,LF_{3,1,0}\big[m_{\tilde{d}}{}^r,\,m_{\tilde{q}}{}^p\big] + \tfrac{1}{4}\,g_3{}^2\,\big(c_\gamma\,\overline{a_d}{}^{pr} - s_\gamma\,\tilde{\mu}\,\overline{y_d}{}^{pr}\big)\,\big(c_\gamma\,a_d{}^{pr} - s_\gamma\,\tilde{\mu}\,y_d{}^{pr}\big)\,LF_{3,2,-1}\big[m_{\tilde{d}}{}^r,\,m_{\tilde{q}}{}^p\big] + \tfrac{1}{4}\,g_3{}^2\,\big(c_\gamma\,\overline{a_d}{}^{pr} - s_\gamma\,\tilde{\mu}\,\overline{y_d}{}^{pr}\big)\,\big(c_\gamma\,a_d{}^{pr} - s_\gamma\,\tilde{\mu}\,y_d{}^{pr}\big)\,LF_{4,1,-1}\big[m_{\tilde{d}}{}^r,\,m_{\tilde{q}}{}^p\big] - \tfrac{1}{4}\,g_3{}^2\,\big(c_\gamma\,\overline{a_d}{}^{pr} - s_\gamma\,\tilde{\mu}\,\overline{y_d}{}^{pr}\big)\,\big(c_\gamma\,a_d{}^{pr} - s_\gamma\,\tilde{\mu}\,y_d{}^{pr}\big)\,LF_{3,1,0}\big[m_{\tilde{q}}{}^p,\,m_{\tilde{d}}{}^r\big] + \tfrac{1}{4}\,g_3{}^2\,\big(c_\gamma\,\overline{a_d}{}^{pr} - s_\gamma\,\tilde{\mu}\,\overline{y_d}{}^{pr}\big)\,\big(c_\gamma\,a_d{}^{pr} - s_\gamma\,\tilde{\mu}\,y_d{}^{pr}\big)\,LF_{3,2,-1}\big[m_{\tilde{q}}{}^p,\,m_{\tilde{d}}{}^r\big] + \tfrac{1}{4}\,g_3{}^2\,\big(c_\gamma\,\overline{a_d}{}^{pr} - s_\gamma\,\tilde{\mu}\,\overline{y_d}{}^{pr}\big)\,\big(c_\gamma\,a_d{}^{pr} - s_\gamma\,\tilde{\mu}\,y_d{}^{pr}\big)\,LF_{4,1,-1}\big[m_{\tilde{q}}{}^p,\,m_{\tilde{d}}{}^r\big] - \tfrac{1}{4}\,g_3{}^2\,\big(s_\gamma\,\overline{a_u}{}^{pr} - \tilde{\mu}\,c_\gamma\,\overline{y_u}{}^{pr}\big)\,\big(s_\gamma\,a_u{}^{pr} - \tilde{\mu}\,c_\gamma\,y_u{}^{pr}\big)\,LF_{2,2,0}\big[m_{\tilde{q}}{}^p,\,m_{\tilde{u}}{}^r\big] - \tfrac{1}{4}\,g_3{}^2\,\big(s_\gamma\,\overline{a_u}{}^{pr} - \tilde{\mu}\,c_\gamma\,\overline{y_u}{}^{pr}\big)\,\big(s_\gamma\,a_u{}^{pr} - \tilde{\mu}\,c_\gamma\,y_u{}^{pr}\big)\,LF_{3,1,0}\big[m_{\tilde{q}}{}^p,\,m_{\tilde{u}}{}^r\big] + \tfrac{1}{4}\,g_3{}^2\,\big(s_\gamma\,\overline{a_u}{}^{pr} - \tilde{\mu}\,c_\gamma\,\overline{y_u}{}^{pr}\big)\,\big(s_\gamma\,a_u{}^{pr} - \tilde{\mu}\,c_\gamma\,y_u{}^{pr}\big)\,LF_{3,2,-1}\big[m_{\tilde{q}}{}^p,\,m_{\tilde{u}}{}^r\big] + \tfrac{1}{4}\,g_3{}^2\,\big(s_\gamma\,\overline{a_u}{}^{pr} - \tilde{\mu}\,c_\gamma\,\overline{y_u}{}^{pr}\big)\,\big(s_\gamma\,a_u{}^{pr} - \tilde{\mu}\,c_\gamma\,y_u{}^{pr}\big)\,LF_{4,1,-1}\big[m_{\tilde{q}}{}^p,\,m_{\tilde{u}}{}^r\big] - \tfrac{1}{4}\,g_3{}^2\,\big(s_\gamma\,\overline{a_u}{}^{pr} - \tilde{\mu}\,c_\gamma\,\overline{y_u}{}^{pr}\big)\,\big(s_\gamma\,a_u{}^{pr} - \tilde{\mu}\,c_\gamma\,y_u{}^{pr}\big)\,LF_{3,1,0}\big[m_{\tilde{u}}{}^r,\,m_{\tilde{q}}{}^p\big] + \tfrac{1}{4}\,g_3{}^2\,\big(s_\gamma\,\overline{a_u}{}^{pr} - \tilde{\mu}\,c_\gamma\,\overline{y_u}{}^{pr}\big)\,\big(s_\gamma\,a_u{}^{pr} - \tilde{\mu}\,c_\gamma\,y_u{}^{pr}\big)\,LF_{3,2,-1}\big[m_{\tilde{u}}{}^r,\,m_{\tilde{q}}{}^p\big] + \tfrac{1}{4}\,g_3{}^2\,\big(s_\gamma\,\overline{a_u}{}^{pr} - \tilde{\mu}\,c_\gamma\,\overline{y_u}{}^{pr}\big)\,\big(s_\gamma\,a_u{}^{pr} - \tilde{\mu}\,c_\gamma\,y_u{}^{pr}\big)\,LF_{4,1,-1}\big[m_{\tilde{u}}{}^r,\,m_{\tilde{q}}{}^p\big]\Big)$$