

$$\text{ASK Non-coherent: } P_e = \frac{1}{2} e^{\frac{-E_b}{2N_0}}$$

$$\text{ASK Coherent: } P_e = Q\left(\sqrt{\frac{E_b}{N_0}}\right)$$

$$\text{BPSK: } P_e = Q\left(\sqrt{\frac{2E_b}{N_0}}\right)$$

$$\text{QPSK: } P_e = Q\left(\sqrt{\frac{2E_b}{N_0}}\right)$$

$$\text{M-QAM: } P_e = \frac{4}{\gamma} \left(1 - \sqrt{\frac{1}{M}}\right) Q\left(\sqrt{\left(\frac{3\gamma}{(M-1)}\right) \frac{2E_b}{N_0}}\right)$$