

1. An FSK system transmits binary data at a rate of 10^6 bits per second. Assuming channel AWGN with zero mean and power spectral density of 2×10^{-30} W/Hz. Determine the probability of error. Assume coherent detection and amplitude of received sinusoidal signal for both symbol 1 and 0 to be 1.2 microvolt.

2. A binary data are transmitted at a rate of 10^6 bits per second over the microwave link. Assuming channel AWGN with zero mean and power spectral density of 1×10^{-10} W/Hz. Determine the average carrier power required to maintain an average probability of error $P_e < 10^{-6}$ for coherent binary FSK.

3. A binary data are transmitted at a rate of 10^6 bits per second over the microwave link. Assume channel AWGN with zero mean and power spectral density of 1×10^{-10} W/Hz. For each of the following, determine which one requires more power than other. Determine the average carrier power required to maintain an average probability of error $P_e < 10^{-4}$.

(a) BPSK

(b) QPSK

(c) FSK