RF Design - IP3

Exercise 1: If the two input frequencies are 150 and 155 MHZ, what are the frequencies of the third-order products? If these two frequencies represent the lower and upper frequencies of a channel, what is the channel bandwidth? Where would the third-order products fall relative to the adjacent channel?

third-order products

(sin(x)+sin(y))^3

$$= 3\sin(2y-x)$$

$$\frac{1}{4}\left(-3\sin(x-2y) + 3\sin(2x-y) - 3\sin(2x+y) - 3\sin(x+2y) + 9\sin(x) - \sin(3x) + 9\sin(y) - \sin(3y)\right)$$

components near 150 & 155 MHz

145   150   155   160   → f

X   y

Exercise 2: An amplifier has an OIP3 of 30dBm. If it is required that the adjacent channel power be 30dB below the in-channel power, what is the maximum output power we should try to get from this amplifier?

30 dBm

∴ should not output > 15 dBm.

30 dBm
15 dB = Δ
15 dBm —
30 dB = 2Δ
− 15 dBm