

ELT-45106 RF equipment for wireless networks
 Final examination (Ari Asp)
 6.2.2017 (calculator allowed)

You have to answer to all five (5) questions.

1. Explain shortly the following terms:
 - a) XPI and XPD ?
 - b) kTB
 - c) Y-factor method
 - d) Tapper
 - e) MDT and EDT
 - f) splitter

2. Why in diversity –methods it is always supposed that a channel is Rayleigh distributed case?

3. Explain IP3. Where will be 3. order intermodulation products, how fast they are increasing, what will be bandwidth of them and how you can avoid them?

3. Explain next one formula. What are terms? Sketch a figure from this formula.

$$SSL_{dB} = 20 \log_{10} \frac{|F(SSL)|}{|F(max)|}$$

3. Using the values given in following figure, calculate the noise figure, noise factor and total equivalent temperature of the system at the receiver output, after the 2. amplifier. If the gains of amplifiers are switched (LNA Gain -> 15 dB and 2. Amp gain -> 20 dB), what will happen to the noise figure?

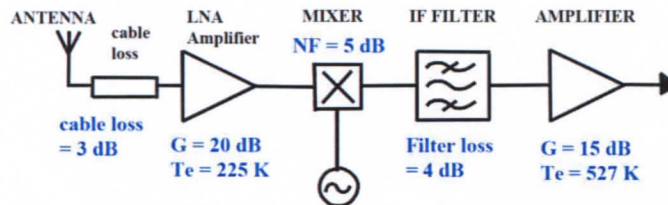


Figure 1. Receiver structure

Note all the calculations.

Hint:

$$F_{cas} = F_1 + \frac{F_2 - 1}{G_1} + \frac{F_3 - 1}{G_1 G_2} + \dots + \frac{F_n - 1}{G_1 G_2 \dots G_{n-1}}$$

$$T_{cas} = T_{e1} + \frac{T_{e2}}{G_1} + \frac{T_{e3}}{G_1 G_2} + \dots + \frac{T_{en}}{G_1 G_2 \dots G_{n-1}}$$