$$P_{del} = P_{av} \cdot \frac{(1-|\Gamma_1|^2).(1-|\Gamma_2|^2)}{|1-\Gamma_1.\Gamma_2|^2}$$

$$\text{Tuner Loss} = \frac{1-|S_{11}|^2}{|S_{21}|^2}$$

Loss of Test Fixture

$$\text{Loss} = \frac{|1-\Gamma_T.S_{22}|^2.(1-|\Gamma_1|^2)}{|S_{21}|^2.(1-|\Gamma_T|^2)}$$

Where

$$\Gamma_1 = S_{11} + \frac{S_{12}.S_{21}.\Gamma_T}{1-\Gamma_T.S_{22}}$$

S_{ij} are "S" parameters of fixture and Γ_T the reflection factor presented by the tuner

$$\text{Power Gain} = \frac{P_{out}.del}{P_{in}.del}$$

$$= |S_{21}|^2 \cdot \frac{1-|\Gamma_L|^2}{|1-\Gamma_L.S_{22}|^2.(1-|\Gamma_1|^2)}$$

Where

$$\Gamma_1 = S_{11} + \frac{S_{12}.S_{21}.\Gamma_L}{1-S_{22}.\Gamma_L}$$

$$\text{Transducer Gain} = \frac{P_{out}.del}{P_{in}.av}$$

$$= |S_{21}|^2 \cdot \frac{(1-|\Gamma_S|^2).(1-|\Gamma_L|^2)}{|1-\Gamma_S.S_{11}|^2.|1-\Gamma_L.\Gamma_2|^2}$$

Where

$$\Gamma_2 = S_{22} + \frac{S_{12}.S_{21}.\Gamma_S}{1-\Gamma_S.S_{11}}$$

$$\text{Available Gain} = \frac{P_{out}.av}{P_{in}.av}$$

$$= |S_{21}|^2 \cdot \frac{1-|\Gamma_S|^2}{|1-\Gamma_s.S_{11}|^2.(1-|\Gamma_2|^2)}$$

Γ_2 as above

Power Added Efficiency PAE

$$\text{PAE} = \frac{Pout.del - Pin.del}{P_{DC}}$$

$$PAE = \frac{P_{out}.del - \frac{P_{in}.av.(1-|\Gamma_{DUT}|^2).(1-|\Gamma_2|^2)}{|1-\Gamma_{DUT}.\Gamma_2|^2}}{P_{DC}}$$

Γ_2 as above

Double Sideband and Two Tone Error in phase of Γ_{Load} & Γ_{Source}

$$\Delta\Phi(\text{deg}) = 0.024.L_{el}(cm).\Delta F(MHz)$$

Where L_{el} = Electrical length between DUT and Tuner Probe

Where ΔF = Frequency difference between the two tones or the two sidebands