# Transimpedence Calculation using NF 1611 as Reference PD:

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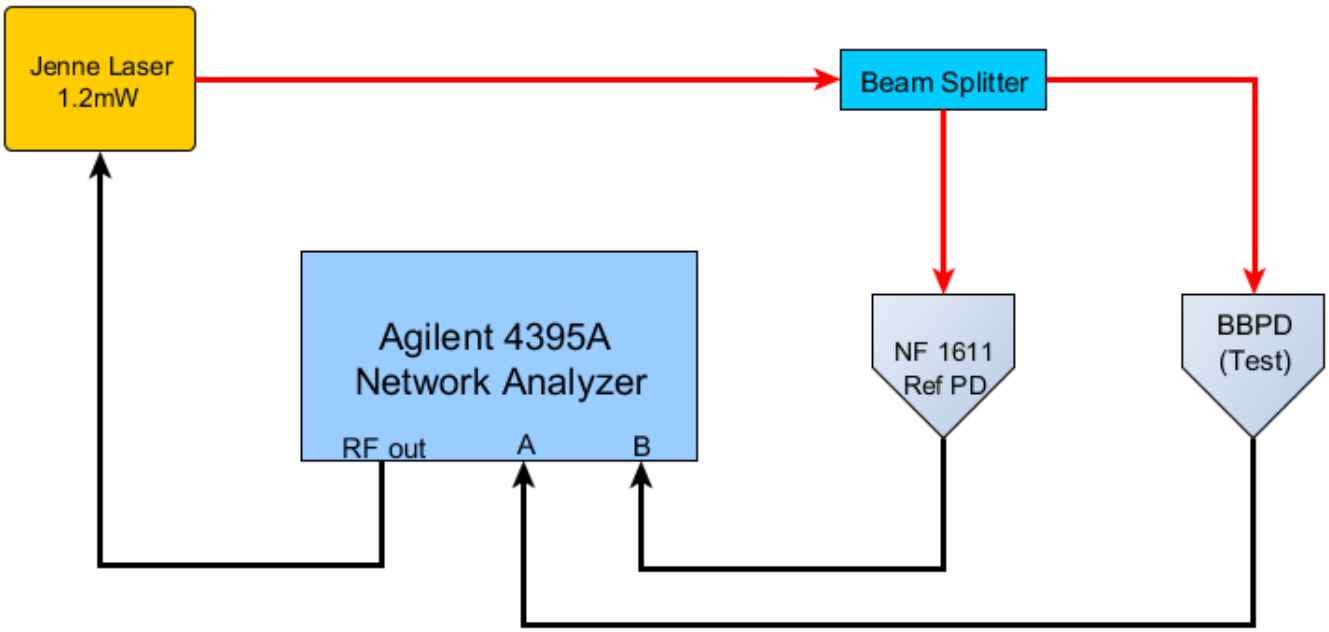


$$DC\ output\ voltage\ =\ Photocurrent\ *\ DC\ transimpedence$$

$$V_{DC,Ref} = I_{DC,Ref} *\ T_{DC,Ref} \qquad [1]$$

$$V_{DC,Test} = I_{DC,Test} *\ T_{DC,Test} \qquad [2]$$

$$RF\ output\ voltage$$
$$= Modulation\ depth *\ Photocurrent\ *\ RF\ transimpedence$$

$$V_{RF,Ref} = \epsilon(f) * I_{DC,Ref} *\ T_{RF,Ref} \qquad [3]$$

$$V_{RF,Test} = \epsilon(f) * I_{DC,Test} *\ T_{RF,Test} \qquad [4]$$

- $T_{DC,Ref}$ and $T_{DC,Test}$ values from the datasheet are assumed to be accurate
- $T_{RF,Ref}$value from the datasheet is also assumed to be accurate as the Ref PD is designed to be operated over a very large frequency range, in this case 30kHz to 1GHz, and we sweep frequencies which are well within this range (1MHz to 300MHz or so).
- Dividing equation [4] by equation [3]

$$\frac{V_{RF,Test}}{V_{RF,Ref}} = \frac{I_{DC,Test}}{I_{DC,Ref}} * \frac{T_{RF,Test}}{T_{RF,Ref}}$$

- From equations [1] and [2]

$$\frac{V_{RF,Test}}{V_{RF,Ref}} = \frac{V_{DC,Test}}{V_{DC,Ref}} * \frac{T_{DC,Ref}}{T_{DC,Test}} * \frac{T_{RF,Test}}{T_{RF,Ref}}$$

$$T_{RF,Test} = \frac{V_{RF,Test}}{V_{RF,Ref}} * \frac{V_{DC,Ref}}{V_{DC,Test}} * \frac{T_{DC,Test}}{T_{DC,Ref}} * T_{RF,Ref}$$

- $\frac{V_{RF,Test}}{V_{RF,Ref}}$ is the value measured from the network analyzer.
- $V_{DC,Ref}$ and $V_{DC,Test}$values are measured with a multimeter.

The values are plugged in and the RF transimpedence for the test PD is calculated at different frequencies.