

# Help

Thermal Noise Calculator (TNC Calc) is a program that aids in the analysis of thermal noise found in resistors and other noise sources. TNC finds the noise voltage generated by any device if its white noise spectral density and 1/f corner frequency are known. Each parameter can be entered or found.

## Parameters

1. Noise Voltage, **Vn**, in  $\mu\text{Vpp}$  or  $\mu\text{Vrms}$
2. White Noise Spectral Density, **ND**, in  $\text{nV}/\sqrt{\text{Hz}}$
3. Johnson Resistance, **R**, in  $\Omega$
4. Temperature, **T**, in  $^{\circ}\text{C}$
5. Upper Frequency, **Fh**, in Hz
6. Lower frequency, **Fl**, in Hz
7. 1/f Corner Frequency, **Fc**, in Hz

## Calculator Window

Description	Name	Value	Unit
Noise Voltage	Vn	66.00	$\mu\text{Vpp}$
Noise Voltage	Vn	10.00	$\mu\text{Vrms}$
White Noise Spectral Density	ND	31.48	$\text{nV}/\sqrt{\text{Hz}}$
Johnson Resistance	R	60184	$\Omega$
Temperature	Temp	25.0	C
Upper Frequency	Fh	100000.0	Hz
Lower Frequency	Fl	10.0	Hz
1/f Corner Frequency	Fc	100.0	Hz

Consistent

Buttons: Defaults, Import, Find, Help, Export, Graph, Close

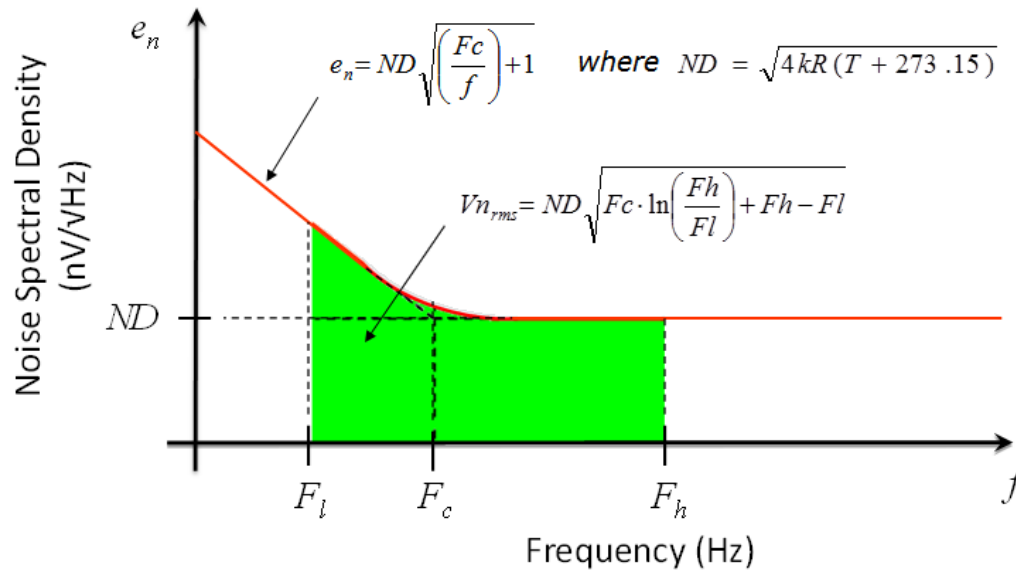
Annotations: Parameters (bracketed), Message Line (arrow), Command Buttons (bracketed), Consistent Indicator (arrow)

## Commands

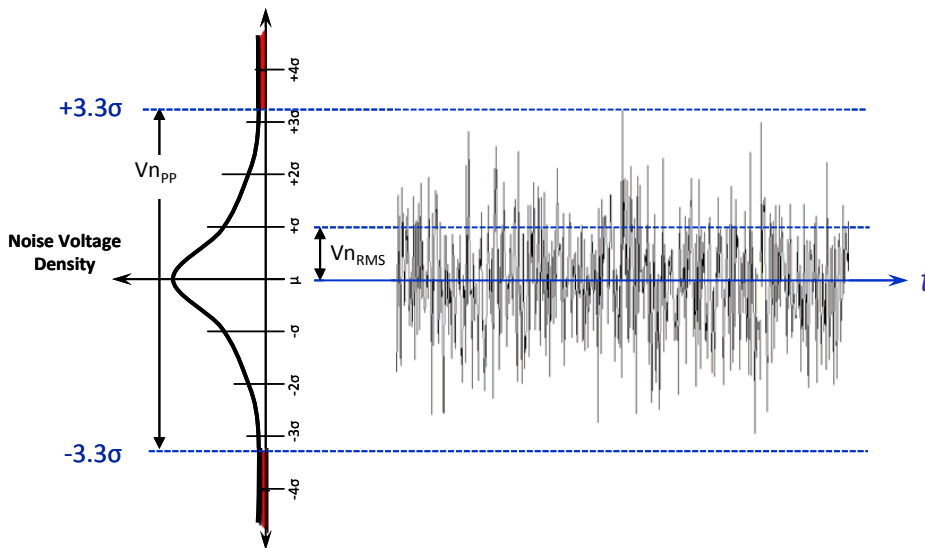
<b>F</b> ind	Alt + F	Find the selected parameter
<b>G</b> raph	Alt + G	Graph the noise spectral density curve specified by the parameters
<b>E</b> xport	Alt + E	Export all parameters to a .cvs file
<b>I</b> mport	Alt + I	Import all parameters from a .cvs file
<b>D</b> efaults	Alt + D	Load the default startup parameter values
<b>H</b> elp	Alt + H	Display the help page
<b>C</b> lose	Alt + C	Close the calculator

“Consistent” indicates that all parameters are consistent. It appears following a Find (Alt + F) command. “Inconsistent” indicates that all parameters may not be consistent. It appears following an entry or import command.

## Noise Density Curve with Parameters



## Gaussian Noise Distribution



$$Vn_{pp} = 6.6 \cdot Vn_{rms}$$

The probability of exceeding  $\pm 3.3\sigma$  is 0.001, thus  $6.6 \cdot V_{rms}$  is the peak to peak amplitude that will occur 0.1 % of the time.

## About

Version 1.1.0  
 March 1, 2015  
 Author: Steve Edwards  
 Ported to Python by Matthew Fortin