

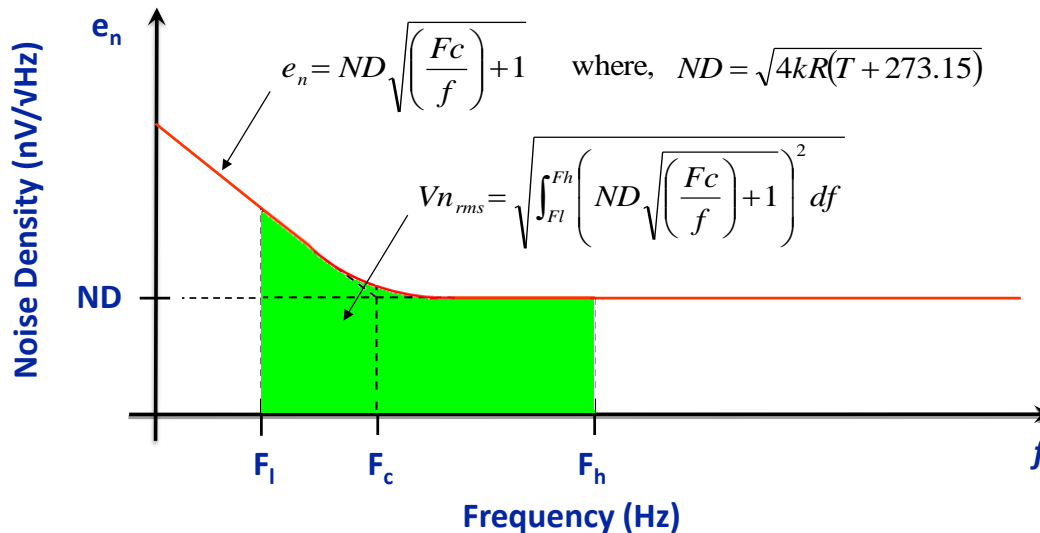
TNC Quick Reference Guide

Thermal Noise Calculator (TNC) is a program written for the HP50g calculator 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.

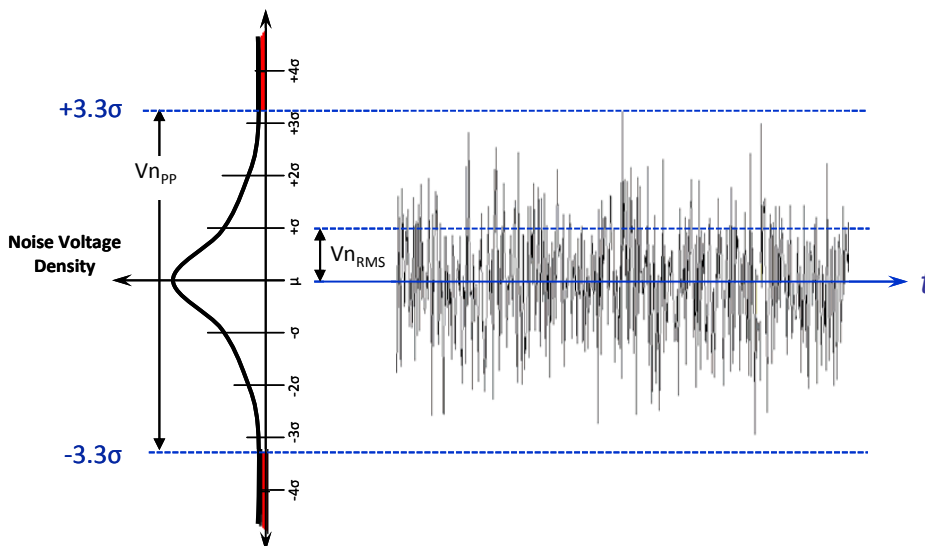
Parameters

1. Noise Voltage, **V_n**, in μV_{pp} or μV_{rms}
2. White Noise Spectral Density, **ND**, in $\text{nV}/\sqrt{\text{Hz}}$
3. Johnson Resistance, **R**, in Ω
4. Temperature, **T**, in $^{\circ}\text{C}$
5. Upper Frequency, **F_h**, in Hz
6. Lower frequency, **F_l**, in Hz
7. 1/f Corner Frequency, **F_c**, in Hz

Noise Density Curve with Parameters



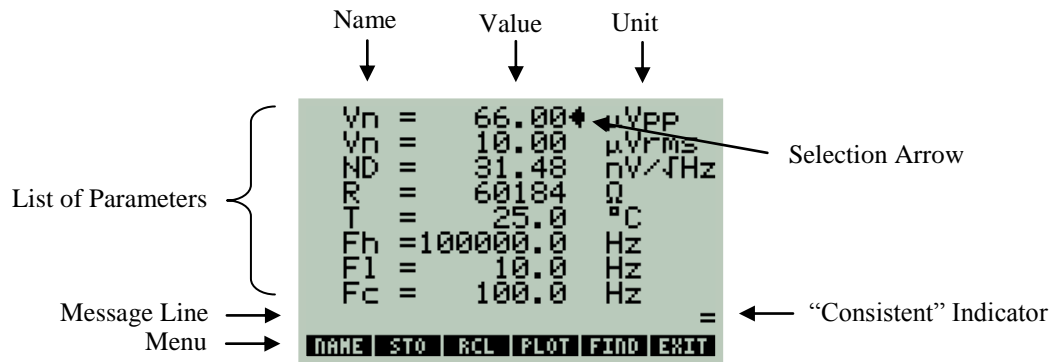
Gaussian Noise Distribution



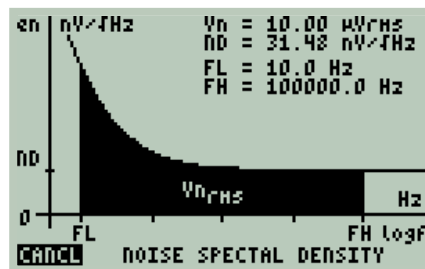
$$V_{n_{pp}} = 6.6 \cdot V_{n_{rms}}$$

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.

Parameter Display



Plot Display



Commands

- or select a parameter, as indicated by the selection arrow.
- (insert) insert a parameter value. Press **ENTER** when finished.
- (delete) delete a parameter value. Press **ENTER** when finished.
- F1** () display a description of the selected parameter in the message line
- F1** () display the full precision of the selected parameter in the message line
- F2** () store all parameters
- F3** () recall all stored parameters
- F4** () plot the noise density spectrum specified by the parameters
- F5** () find the selected parameter
- F6** () or **ON** (Cancel) exit the program
- F6** () launch previous run calculator (for physical calculators only - requires CALC)
- ON** turn off the calculator
- NXT** **F1** () display the equations used by TNC
- NXT** **F2** () export the selected parameter to the stack upon exiting
- NXT** **F3** () import a number present in level 1 of the stack when TNC was launched, to the selected parameter. The import value is automatically displayed on the message line.
- NXT** **F4** () enter all default parameter values. Parameters are not stored until is executed.

The equal sign (=) indicates all the parameters are consistent with each other and will appear following a **F5** () command. The not equal sign (\neq) appears following an entry, indicating that the parameters may not be consistent.