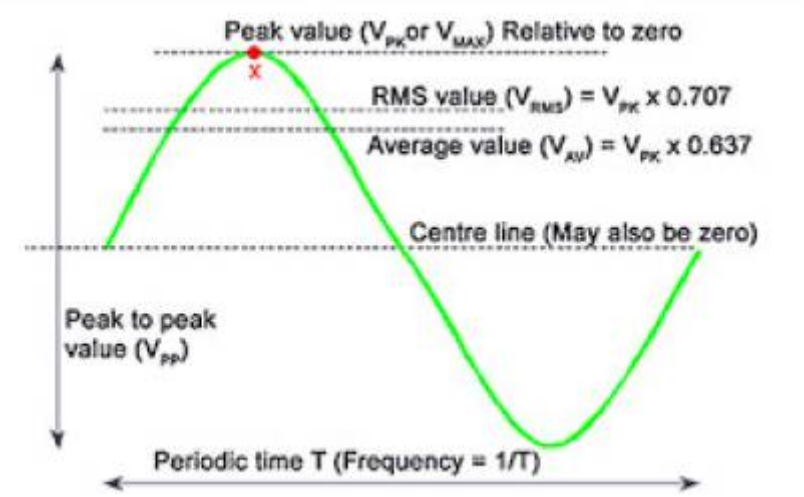
Voltage Equations

Vpp,Vrms

The following different terminologies and units are used for the calculations around alternating voltages:

- ***VPeak* (V*p* or V*max*)**: The maximum instantaneous value of a function as measured from the zero-volt level. For the waveform shown above, the peak amplitude and peak value are the same, since the average value of the function is zero volts.
- ***VPeak−Peak* (V*pp*)**:The full voltage between positive and negative peaks of the waveform; that is, the sum of the magnitude of the positive and negative peaks.
- ***Vrms*** : The root-mean-square or effective value of a waveform.
- ***Vavg* or *VDC*** : The level of a waveform defined by the condition that the area enclosed by the curve above this level is exactly equal to the area enclosed by the curve below this level.



These values can be easily converted to each other. The way formulas for these conversions differ upon the the waveform that applies (sinus, triangle, square). The relevant basic conversions are:

Sinus

- ** V*p* = V*pp* / 2 **
- ** V*dc* = V*avg* = (2 * V*p*) / π **
- ** V*rms* = V*p* / √(2) **
- ** V*rms* = V*pp* / (2 * √(2)) **
- ** V*pp* = 2*√(2) * V*rms* **

Triangle

- ** V*dc* = V*avg* = V*p* / 2 **

- ** $V_{rms} = V_p / \sqrt{3}$ **

Square

- ** $V_p = V_{pp} / 2$ **
- ** $V_{dc} = V_{avg} = V_p$ **
- ** $V_{rms} = V_p$ **

Slew Rate vs Frequency

When SR is the SlewRate in V/s, F is the operating frequency, and Vpk is the peak amplitude of the waveform, i.e. half the peak-to-peak swing of a sinusoid.

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SR >= 2*Pi*F*Vpk
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Fmax = SR / (2*Pi*Vpk)
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