ROOT_MEAN-SQUARE value (rms)

→ The RMS value of a set of values (or a continuous wave form) is the square root of the arithmetic mean of the squares of the original values (or function).

The RMS value of a set of n values $\{x_1, x_2, \ldots, x_n\}$ is given by

$$x_{rms} = \sqrt{\frac{x_1^2 + x_2^2 + \ldots + x_n^2}{n}}$$

The RMS value of a continuous function $f(x)$ defined over the interval $a \le x \le b$ is given by

$$f_{rms} = \sqrt{\frac{1}{b-a}\int_a^b [f(x)]^2 dx}$$

The RMS value of a continuous function $f(x)$ over all time is given by

$$f_{rms} = \lim_{T \to \infty} \sqrt{\frac{1}{2T}\int_{-T}^{T} [f(x)]^2 dx}$$

NOTE: 1) The RMS over all time of a periodic function is equal to the RMS of one period of the function.

2) The RMS value of $f(x)$ is also known as the effective value of the function [effective voltage or current, etc]

3) The RMS value of a periodic function is frequently made in the theory of mechanical vibrations and in electric