AC Circuits

RMS values, and why they are what meters read.

Physics

The root mean square value delivers the same average power as a steady DC value.

$$V_{rms} = V_{peak} \div \sqrt{2} \cdot I_{rms} = I_{peak} \div \sqrt{2}$$

230 V mains 230 × √2.	**Peak is about 325 V**
Average power	**$P = V_{rms} \times I_{rms}$**
Peak-to-peak	**Twice the peak**

THE COMMON MISTAKE

× Using peak values to calculate power

✓ Using RMS

Peak values overstate power by a factor of two, since the waveform spends most of its time below peak.

The mean value of a full sine wave is zero. RMS exists precisely because the simple average is useless here.