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Expression for voltage amplitude in resistor in ac

$$V_R = IR$$

Derivation of instantaneous voltage in resistor in ac

$$i = I \cos(\omega t)$$

$$v_R = iR$$

$$v_R = I \cos(\omega t)R$$

$$v_R = V_R \cos(\omega t)$$

Expression of instantaneous voltage in resistor in ac

$$v_R = v_R \cos \omega t$$

Relation of voltage and current in resistor in ac

Voltage and current are in phase

Graphical representation of voltage and current in resistor in ac

[Illustration Missing]

Same position of crest and trough in x axis of voltage and current

Phasor diagram of voltage and current in resistor in ac

[Illustration Missing]

Voltage and current overlap