# RMS, Average, Form Factor and Crest Factor of Waveforms

RMS value, average (rectified) value, form factor and crest factor of sine, half-wave and full-wave rectified, square and triangular waveforms from the peak.

**Method:** Definitions of RMS and mean values (integrals over one period)

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Waveform | Sine wave | |
| Peak value (volts or amperes) | 325.27 | |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| RMS value | 230.00 | |
| Average value (of the rectified wave) | 207.07 | |
| Form factor (RMS / average) | 1.1107 | |
| Crest factor (peak / RMS) | 1.4142 | |

## Formula and method

$$V_{rms} = \sqrt{\frac{1}{T}\int_0^T v^2\,dt}, \quad V_{avg} = \frac{1}{T}\int_0^T |v|\,dt$$

$$k_f = \frac{V_{rms}}{V_{avg}}, \quad k_c = \frac{V_p}{V_{rms}}$$

### Variables

| | | |
|---|---|---|
| $\mathrm{wave}$ | Waveform | - |
| $V_p$ | Peak value (volts or amperes) | - |
| $V_{rms}$ | RMS value | - |
| $V_{avg}$ | Average value (of the rectified wave) | - |
| $k_f$ | Form factor (RMS / average) | - |
| $k_c$ | Crest factor (peak / RMS) | - |

### Method and standards

Closed-form integrals of each waveform over one period.

### Assumptions and limits

- Ideal waveforms, no DC offset.

### References

- Definitions of RMS and mean values (integrals over one period)

## Report details

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|---|---|
| Report reference | FCC-QSY2-EJZC (the same inputs always give the same reference) |
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| Calculator | RMS, Average, Form Factor and Crest Factor of Waveforms |
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| Release checks | 5 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/electrical/circuits/waveform-rms-average

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.