# 信导作业topic8

*For electronic noise arising from outside sources, see* [*electromagnetic compatibility*](https://en.wikipedia.org/wiki/Electromagnetic_compatibility) *and* [*electromagnetic interference*](https://en.wikipedia.org/wiki/Electromagnetic_interference)*. For acoustic noise due to electromagnetic fields, see* [*electromagnetically-excited acoustic noise and vibration*](https://en.wikipedia.org/wiki/Electromagnetically-excited_acoustic_noise_and_vibration)*. For other uses, see* [*Noise (disambiguation)*](https://en.wikipedia.org/wiki/Noise_(disambiguation))*.*

In electronics, **noise** is an unwanted disturbance in an electrical signal.[[1]](https://en.wikipedia.org/wiki/Noise_%28electronics%29#cite_note-noise-1):5 Noise generated by electronic devices varies greatly as it is produced by several different effects.

In [communication systems](https://en.wikipedia.org/wiki/Communication_system), noise is an error or undesired random disturbance of a useful information [signal](https://en.wikipedia.org/wiki/Signal). The noise is a summation of unwanted or disturbing energy from natural and sometimes man-made sources. Noise is, however, typically distinguished from [interference](https://en.wikipedia.org/wiki/Interference_(communication)),[[a]](https://en.wikipedia.org/wiki/Noise_%28electronics%29#cite_note-2) for example in the [signal-to-noise ratio](https://en.wikipedia.org/wiki/Signal-to-noise_ratio) (SNR), [signal-to-interference ratio](https://en.wikipedia.org/wiki/Signal-to-interference_ratio) (SIR) and [signal-to-noise plus interference ratio](https://en.wikipedia.org/wiki/Signal_to_noise_plus_interference) (SNIR) measures. Noise is also typically distinguished from [distortion](https://en.wikipedia.org/wiki/Distortion), which is an unwanted systematic alteration of the signal waveform by the communication equipment, for example in [signal-to-noise and distortion ratio](https://en.wikipedia.org/wiki/Signal-to-noise_and_distortion_ratio) (SINAD) and [total harmonic distortion plus noise](https://en.wikipedia.org/wiki/Total_harmonic_distortion_plus_noise) (THD+N) measures.

While noise is generally unwanted, it can serve a useful purpose in some applications, such as [random number generation](https://en.wikipedia.org/wiki/Random_number_generation) or [dither](https://en.wikipedia.org/wiki/Dither).

Different types of noise are generated by different devices and different processes. [Thermal noise](https://en.wikipedia.org/wiki/Thermal_noise) is unavoidable at non-zero temperature (see [fluctuation-dissipation theorem](https://en.wikipedia.org/wiki/Fluctuation-dissipation_theorem)), while other types depend mostly on device type (such as [shot noise](https://en.wikipedia.org/wiki/Shot_noise),[[1]](https://en.wikipedia.org/wiki/Noise_%28electronics%29#cite_note-noise-1)[[2]](https://en.wikipedia.org/wiki/Noise_%28electronics%29#cite_note-shot-3) which needs a steep potential barrier) or manufacturing quality and [semiconductor](https://en.wikipedia.org/wiki/Semiconductor) defects, such as conductance fluctuations, including [1/f noise](https://en.wikipedia.org/wiki/1/f_noise).

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