Glossary

Introduction to the Operational Amplifier

Buffer: See voltage follower.

Closed-loop gain: The gain of an op amp circuit when there is a signal path connecting the op amp's output terminal to the op amp's inverting input.

Gain: The ratio of the signal at one node to the signal at another node. The signal can be a voltage or a current.

Input resistance: The Thévenin equivalent resistance seen at an input terminal.

Inverting input: The input terminal of an op amp, that is out of phase with the op amp's output.

Loading: The change in voltage at a device's terminal, due to the flow of current.

Non-inverting input: The input terminal of an op amp that is in phase with the op amp's output.

Op amp: See operational amplifier.

Operational amplifier: A direct-coupled stable high-gain amplifier.

Output resistance: The Thévenin equivalent resistance seen at an output terminal.

Virtual short: A condition in a circuit where two nodes are forced to have the same potential, but no current flows directly between the two nodes.

Voltage follower: An amplifier with a voltage gain of unity or almost unity. Voltage followers are typically characterized by a high input resistance and low output resistance.

Introduction to the Capacitor and Inductor

Capacitance: The property of two conductors, separated by an insulating layer to store electric charge. The units are farads (F).

Capacitor: A circuit element that displays the property of capacitance.

Equivalent: Two circuits or sub-circuits are said to be equivalent when they display the same terminal characteristics.

Inductance: The property of a conductor that gives rise to a potential difference due to the time rate of change of the current flowing through the conductor. The units are henrys (H).

Inductor: A circuit element that displays the property of inductance.

The Natural and Step Response of First Order Circuits

Final conditions: The voltages and currents in a circuit after all the initial stored energy has been dissipated.

First order circuit: A circuit that can be reduced to an equivalent circuit with one energy storage element.

Forced response: A system's response to an applied stimulus.

Initial conditions: The voltages and currents in a circuit at time zero plus.

Natural response: A system's response to stored energy.

Step response: A system's forced response when the applied stimulus is a step.

Time constant: A characteristic of a circuit that expresses how fast the circuit responds to changes.

Zero minus: The time just before a switching event.

Zero plus: The time just after a switching event.

Analysis of Sinusoidally Driven Circuits

Admittance: The ratio of the phasor current through an element to the phasor voltage across the element.

Amplitude: The peak value of a sine or cosine signal.

Frequency: The cycles per second of a periodic waveform. Units are usually hertz (Hz).

Impedance: The ratio of the phasor voltage across an element to the phasor current through the element.

Magnitude: See amplitude.

Phase: The time difference between two periodic signals with the same period. Phase is usually expressed in degrees.

Phasor: A representation of a sinusoidal waveform containing only the magnitude and phase. The frequency is assumed to be known.

Phasor Diagram: A plot of the phasor voltages and/or currents in a circuit on the complex plane.

Radian frequency: The frequency of a periodic waveform in radians per second (RAD/s).

Reactance: The imaginary part of the impedance.

Susceptance: The imaginary part of the admittance.

Glossary for: Power Calculations of Sinusoidally Driven Circuits

Apparent power: The product of the effective voltage and effective current. Units are volt-amperes (VA).

Complex power: The vector sum of the real power and the reactive power, where the reactive power is taken to be purely imaginary and the real power is taken to be purely real. Units are volt-amperes (VA)

Effective value: The value of a dc source, of the same type, that delivers the same average power.

Lagging: The power factor angle is positive (*i.e.* the voltage precedes the current).

Leading: The power factor angle is negative (*i.e.* the current precedes the voltage).

Power factor: The ratio of the real power to the apparent power.

Power factor angle: The phase difference between the voltage and current.

Reactive power: For sinusoidally driven circuits, the product of the effective voltage and effective current multiplied by the power factor angle. Units are volt-amperes reactive (VAR).

Real (average) power: The average value of the time integral of the product of instantaneous voltage and instantaneous current. For sinusoidally driven circuits, the product of the effective voltage and effective current multiplied by the cosine of the power factor angle. Units are watts (W).

Root-mean-square: See effective value.

RMS: See root-mean-square.