

ADSL: Asymmetrical Digital Subscriber Line. Technology used to transmit/receive data and audio using the pair copper telephone lines with speed up to 8 Mbps.

AMBIENT TEMPERATURE: The temperature surrounding a component or circuit. Temperature is measured at 0.5 inch away from the specimen.

ATTENUATION: Ratio of output parameter (voltage, current or power) to input parameter. It is measured in decibels (dB). For power ratio, $1\text{dB}=10 \text{Log} (P_{\text{out}}/P_{\text{in}})$. A dB is equal to $20\text{Log}(I_{\text{out}}/I_{\text{in}})$ for current and $20 \text{Log} (V_{\text{out}}/V_{\text{in}})$ for voltage ratios.

BOOST REGULATOR: Topology for a DC-DC converter where input voltage unregulated is converted to a higher output regulated voltage.

BUCK REGULATOR: Topology for a DC-DC converter where input voltage unregulated is converted to a lower output regulated voltage.

BUCK-BOOST REGULATOR: Topology for a DC-DC converter where output voltage unregulated is converted to a higher or lower output regulated voltage with reversed polarity.

CAPACITANCE: See Distributed Capacitance.

CREEPAGE: Is the shortest distance between two conducting parts measured along the surface of the insulation.

CLEARANCE: Is the shortest distance between two conductive parts as measured through the air.

CURIE TEMPERATURE, T_c : The transition temperature above which a core loses its ferromagnetic properties. Usually defined as the temperature at which initial permeability of a core falls 10% of its room temperature value.

DC-DC CONVERTER: A device or circuit that converts dc input voltage/current to a regulated output voltage/current for delivering to a load. Buck, boost and buck-boost are typical topologies for DC-DC converters.

Usually employs inductors and transformers to maintain the required load regulation.

DCR: It is the opposition of a material or device to the direct current flow. Its measured in Ohms and represented by the letter Ω .

CHOKER: Another term given to the inductors which is intended to filter or choke out signals.

COIL: A winding of wire made around a magnetic core or air, also inductors are called coils.

COMMON MODE CHOKE OR INDUCTOR: Double inductor wound on same core useful for filtering applications and EMI prevent mainly in SMPS. Also called Dual Inductor.

COMMON MODE NOISE: Electrical interference that is common to both lines in relation to earth ground.

COPPER LOSS: The power loss or heat generated by a current flowing into a winding with a DC resistance value. It is measured in Watts (W).

CORE: A material with ferromagnetic properties and geometry to conduct the magnetic flux lines into a inductor or transformer. Typical mixes and alloys are manganese, zinc, magnesium, iron, nickel, carbon and silicon are employed for magnetic cores.

CORE LOSS: Power loss or heat generated by a magnetic material subjected to an alternating magnetic field. Core loss is composed of eddy current losses, hysteresis losses and residual losses. Measured in Watts (W) and sometimes expressed as W/cm³ for specific materials.

CROSS-TALK: The ratio of noise due to the interference when signals are traveling too close each other. When two or more ports are built into a magnetic module they may cause interference themselves. It is measured in dB.

DIELECTRIC STRENGTH: See Hi-pot.

DIFFERENTIAL MODE-NOISE: Electrical interference that is not common to both lines but is present between both lines. It is also known as Normal Mode Noise.

DISTIBUTED CAPACITANCE: Into a coil or winding the adjacent turns of wires acts like small capacitors. The total effects of these small capacitors and winding layers can be seen like a distributed capacitance along the entire winding and in parallel with the inductance. Capacitance in parallel with inductance causes the inductor to resonated at certain frequency. The smaller the distributed capacitance of an inductor, the higher the self-resonance frequency.

EFFICIENCY: A figure to define how effective is a transformer or inductor. It is defined as the ratio of output power/ input power x 100%.

EDDY CURRENT: When an alternating magnetic field passes through the conducting material , current which opposes the change of field is induced in it. This current is called eddy current. Due conducting material has electrical resistance, the eddy current results in heat losses.

EMC: Electromagnetic Compatibility.

EMI: Electromagnetic Interference. Refers to the amount of magnetic field radiated away from the inductor volume. This field may cause interference with another magnetically sensitive components into a board or circuit.

ETHERNET: The first protocol developed for local area networks (LAN) with transmit/receive speeds of up to 10 Mbps.

FAST ETHERNET: Improved protocol from Ethernet for local area networks (LAN) with transmit/receive speeds of up to 100 Mbps.

FILTER: A network of passive and active devices such like resistors, capacitors and inductors to provide low, high and band-pass signal frequency functions.

FLUX DENSITY: The number of magnetic flux lines per unit of cross sectional area generated by an alternating magnetic field. In general, in the CGS system:

$$B = \frac{V_{avg} X 10^8}{4NAf}$$

B = Gauss (1 Tesla in SI = 10000 Gauss)

V_{avg} = Average voltage in Volts

A = cross sectional area of core (squared cm)

f = frequency in Hz

HSDL: High Speed Rate Digital Subscriber Line. Technology used for transmission of voice and data using the pair copper telephone lines with speed up to 2 Mbps.

HIPOT: High Potential test applied between two points to verify insulation strength. Usually it is specified by IEC in volts peak or rms for a unit base time, 1 or 60 seconds. Also known as dielectric strength test.

IEEE: International Electrical and Electronic Engineering Association.

IMPEDANCE: In terms of an inductor is the resistance to the AC (reactance) and DC (pure resistance) current flow. DC resistance is due to the wire resistance and AC is due to the inductor reactance X_L , direct consequence of the inductance. It's measured in Ohms and represented by the letter Z.

$$Z = \sqrt{(R_{DC}^2 + X^2_L)}$$

INDUCTANCE: Classical definition for inductance is a constant that relates the magnetic flux to the current flowing in the circuit. It represented by the letter L. Other definition for inductance is that property of an inductor which tends to oppose any change in the current flowing through the inductor. The current flowing through the inductor will produce a magnetic field, changing the magnetic field induces a voltage which opposes the field-producing current, this effect is known as inductance. The induced voltage across an inductor is given by:

$$V = L di/dt$$

"The induced voltage is proportional to the inductance value and the rate of current change". The inductance for a given inductor depends of the core material, core geometry, size and turns of the coil. Inductance is measured in Henries (H) or Ohms - sec.

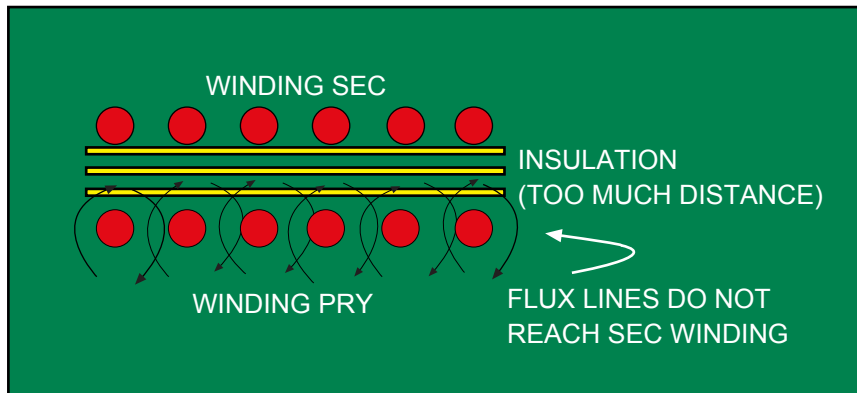
INDUCTOR: A passive device ability to produce a change on current. Magnetic flux is induced in the inductor when current flows through it, and the induced voltage by magnetic flux prevents the change of current. The inductor is called sometimes AC resistor.

INSERTION LOSS: Is the power loss due to inserting a device into a line or circuit.

ISDN: Integrated Services Digital Network. A technology supplied by a telephone company that provides digital service in increments of 64 Kbps channels.

LAN: Local area network developed to link two or more computers into a confined area like schools, buildings, etc.

LEAKAGE INDUCTANCE: Inductance due to magnetic flux lines into a winding arrangement that do not links or “reach” the secondary winding. A low leakage inductance is always desirable. High leakage inductance means primary and secondary windings are not properly coupled. Leakage inductance is measured in transformers on one winding with the others winding short-circuit.



MAGNETIZING FORCE: The magnetic field strength produced into an inductor or coil due to a magnetizing current, it's calculated:

In CGS unit system

$$H = \frac{0.4\pi NI}{\lambda}$$

where,

H = Oersted

N = turns of coil

I = current flowing in the coil in amperes

λ = magnetic path length in cm

In SI unit system

$$H = \frac{NI}{\lambda}$$

where,

H = amperes-turns/meter

λ = magnetic path length in meters

MAGNETIC PATH LENGTH: The effective path that follows the magnetic flux lines into the magnetic core.

MODEM: A modem is a device that transforms digital signals to audio signals for transmission over the standard telephone line.

NOISE: Electrical energy unwanted into a circuit that is not related to the main signal. Noise is often generated by switching or sparks circuits.

OPERATING TEMPERATURE RANGE: Range of ambient temperatures over which an inductor or transformer can operate safely without degradation in materials and electrical properties.

$$\text{Maximum Operating Temperature} = \text{Storage Temperature} - \text{Temperature Rise}$$

PERMEABILITY: Permeability of a magnetic core is the ability to conduct the magnetic flux lines. Permeability is dependent of the core mix material. It is defined as the ratio of B/H. The air absolute permeability is $\mu_0 = 4\pi \times 10^{-7}$. H m⁻¹ in the SI unit system.

PERMEABILITY, RELATIVE μ_r : Relative permeability. The permeability of a core referenced to the air or vacuum permeability μ/μ_0 .

POTS: Plain Old Telephone System.

QUALITY FACTOR: In single reactive components the quality factor (Q) is usually the ratio of the reactance and resistance.

$$Q = \frac{\omega L}{R_{DC} + R_{ac}} \text{ where } \omega = 2\pi f$$

RATED CURRENT: The continuous DC or RMS current that can handle an inductor to produce a given temperature rise. Rated current is limited by the DC resistance most of the times on inductors and core and copper loss in transformers.

REACTANCE: It's a electrical resistance showed by passive device like an inductor or a capacitor to the AC current only. Its measured in ohms and represented by the letter X. The reactance due to the inductance is called inductive reactance, and to the capacitor is called capacitive reactance.

REGULATION: Voltage Regulation. The percentage change on voltage for a transformer output without load against full load operation. Is represented with a and defined as:

$$\alpha = \frac{V(\text{NoLoad}) - V(\text{FullLoad})}{V(\text{FullLoad})} \times 100\%$$

RETURN LOSS: Power loss due to mismatch impedance between two lines and sent back to the source voltage like a reflection effect.

RFI: Radio Frequency Interference.

SATURATION: Saturation of an inductor occurs when a core could not longer store magnetic energy. Energy storage depends of inductance L and current applied I as LI² Joules. Saturation is defined as the point at which initial inductance without DC bias decreases a percentage, typically 10%, at a specific DC current value.

SELF- RESONANCE FREQUENCY: Occurs when the impedance of the inductor is purely resistive. At this frequency the capacitive effect of the wire and the inductance cancel and relative signal phase across the inductor is zero.

SHIELDING: Shielding in inductors refers to the fact they do not generate EMI since the magnetic field is confined to the core volume and coil. Pot and toroids are self-shielding cores. Slugs, bobbin and drum cores requires of a extra shielding sleeve to reduce the EMI.

SKIN EFFECT: As the frequency increases, current flow is confined to the wire surface because the magnetic field in the center of wire increases. The depth from the wire surface at which the current density decreases by 1/e (37%) is called "skin depth". As the frequency is higher, skin depth decreases and reactance of wire increases hence current flow is interfered. Litz wire may be used in order to decrease skin depth effects.

SMPS: Switching Mode Power Supplies.

STORAGE TEMPERATURE: Range of ambient temperatures over which a component can be stored safely.

SUSCRIBER LINE: The line connecting the individual subscriber (e.g. a household) to the local exchange.

T1/E1. A service for transmission of voice and data using the 4 pair copper telephone lines with speed up to 1.54 Mbps.

TEMPERATURE RISE: The increased temperature of inductor or transformer due to copper and core losses in reference to ambient temperature. Temperature rise is typically specified like 40°C over ambient temperature of 25°C for inductors and transformers.

TRANSCEIVER: It is a device or module that serves to receive and transmit information.

TRANSFORMER: An electrical device that transforms voltage or current at the input (primary side) to a lower or higher value at the output (secondary side).

TURNS RATIO: The relationship of the number of turns from one winding to another.

xDSL: Digital Subscriber Line technology for transmission of voice and data at higher speed using the existing copper telephone lines. ADSL, HDSL, SDSL, VDSL and RDSL are the most known technologies.