

**An Understanding**

**EMC - Electro-Magnetic Compatibility.**

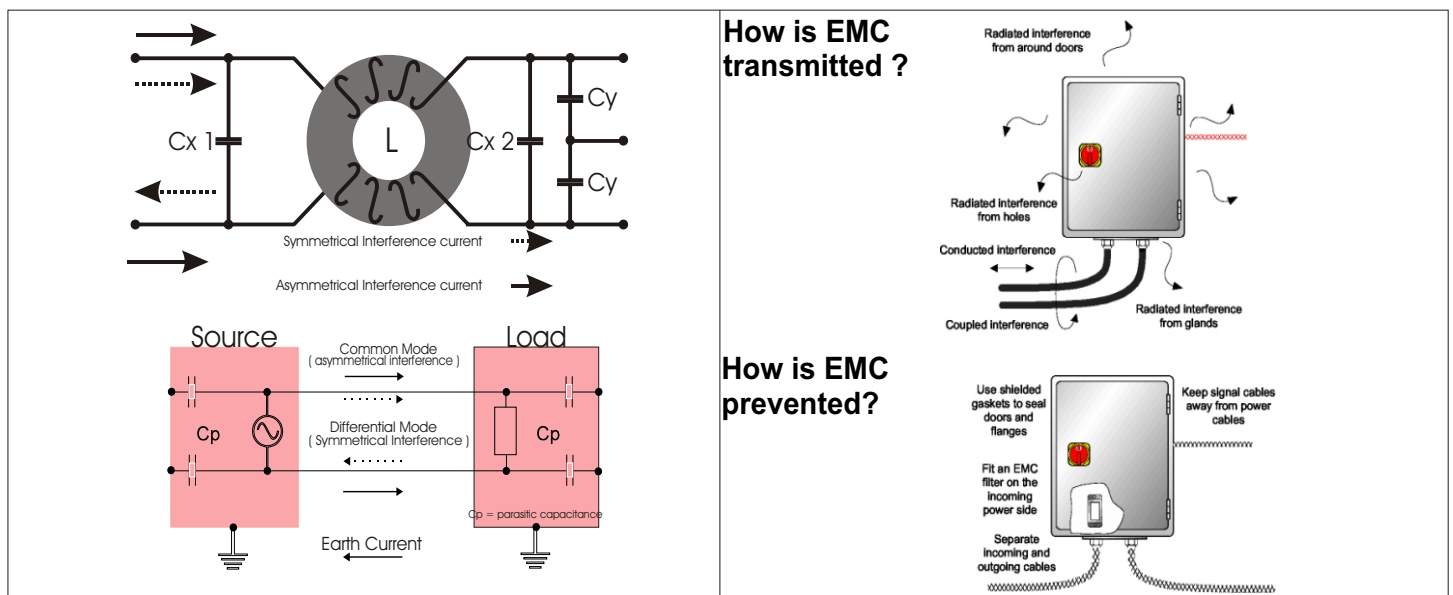
The ability for two electrical or electronic systems to co-exist without either disturbing the correct operation of the other. The electrical or electronic disturbance can be man-made or naturally produced, which causes a malfunction in the performance of electrical equipment. Switching power supplies, power supply voltage dips, brownouts, voltage surges, X rays, ultraviolet and visible lights, microwaves, radio waves RFI (Radio Frequency Interference), AC motors, and inverters are all typical sources of conducted interferences; however, vertically every electrical and electronics device has the potential to generate conducted and radiated interferences. Electromagnetic Interference (EMI) can travel over the electrical power cord of the electronic device itself, unshielded cable acting as an antenna, over signal and power lines, and through free space.

**Functionality**

An EMC filter is a passive electronic device used to suppress conducted interference present on any power or signal line. The filter works by providing an impedance mismatch between the power line and the equipment, which reflects the generated noise back to its source. EMC filters components include chokes, capacitors and resistors. The chokes fall into two groups: current compensates, common mode and series, or differential mode types. The current compensated choke has two or three windings on a toroidal core. The direction of each winding is chosen to give an opposing current flow, thus balancing the flux. The common mode currents, which are in phase with two or three conductors, has an additive effect, thus presenting higher impedance against the common mode noise. Capacitors also fall into two groups: X Class and Y Class. The X Class capacitors are connected between live and neutral (between phase), to reduce differential noise. The Y Class capacitors are connected between live, neutral, and earth to reduce common mode noise.

**Types of noise**

Common mode noise, also known as asymmetrical interference, is a noise signal which is found in phase on both the line and neutral conductors with respect to ground. Differential mode noise, also known as symmetrical interference, is a noise signal which exists between the line and neutral conductors. The filter has a high reactive component to its impedance. The high impedances attenuates or reduces the strength of these signals so they will have less of an effect on other devices. For higher levels of attenuation, several stages of chokes and capacitors can be added. This is known as a multi-stage filter.



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