The effect of Non Ideal Inductors

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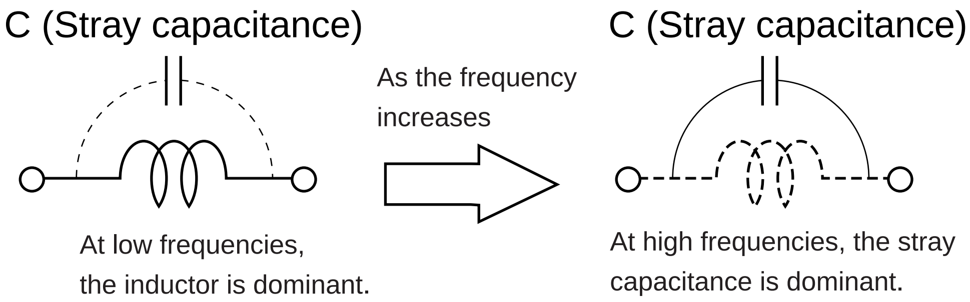
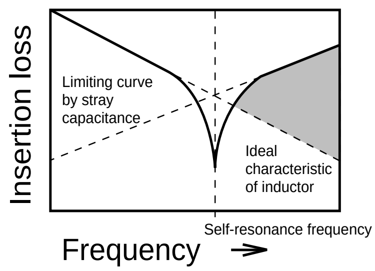
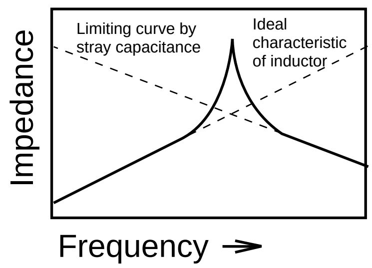
(a) Inductor's equivalent circuit



(b) Effect of stray capacitance



(c) Impedance characteristic



The previous sections have described why the insertion loss of capacitors is not ideal due to the residual inductance and equivalent series resistance. The insertion loss of inductors is also not ideal. The impedance of inductors begins to decrease when the frequency exceeds the self-resonance frequency because as frequency increases, the impedance of the stray capacitance decreases. Hence noise bypasses the inductor.

[Notes]

3. Noise Suppression by Low-pass Filters

3.10. Ferrite bead Inductors

Ferrite Beads Inducters

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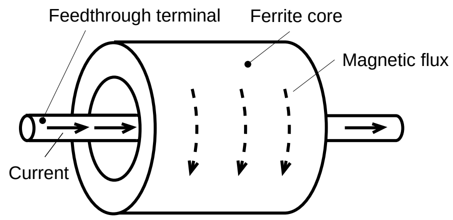
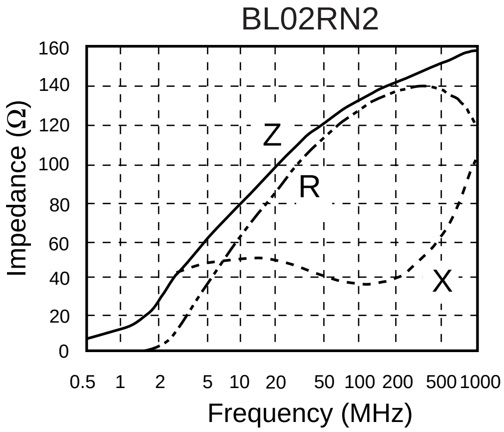
(a) Structure



(b) Example of impedance characteristic



$Z = R + jX$

$(Z^2 = R^2 + X^2)$

Leaded ferrite bead inductors, which are typical inductor-type EMI filters, have a simple structure in which a feedthrough terminal goes through the ferrite core, allowing reduction of stray capacitance. The above graph (b) shows an example of the impedance characteristic. This graph demonstrates that this type of inductor has an excellent characteristic with a self-resonance frequency of 1 GHz or higher because of small stray capacitance.

[Notes]