

전원부 잡음제거용 광대역 EMI filter의 설계

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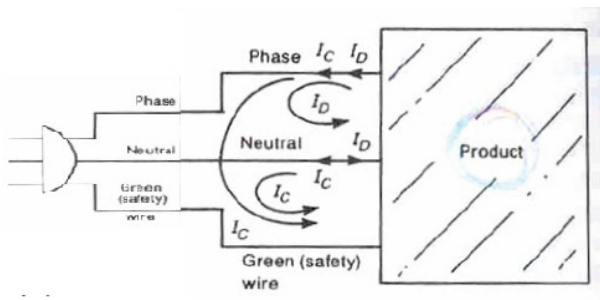
Design of a Broadband EMI filter to Suppress the Noise from the Power Supply

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Abstract - We present the design of an EMI filter to mitigate the electrical noise from the power supply over a broadband of a few tens of KHz to 18GHz. Admitting that our approach is not apart from the standard technology of EMI filter, it is worth checking out how we can implement the filter that meets the challenging spec. on band of operation. The function of the EMI filter is well-depicted by its performance on the CE(Conducted Emission) and RE(Radiated Emission) suppression through tests which convince us of its application to power supplies of land, water and flying vehicles.

1. Introduction

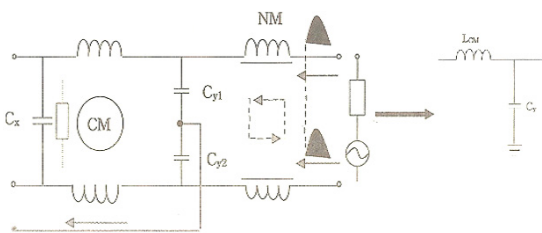
The power supply is essential to any electrical or electronic equipment. Ideally, since the power supply is the source of energy shared by all the components of an electrical product, it should have nothing that causes any degradation in the total quality[1].



<Fig. 1> Power supplied through the connector to a product
 However, a power supply itself is composed of wires, non-linear materials, circuit elements and so on which makes electrical noise due to the parasitics invisible but occurring between and inside the components with the changing frequency. When the power supply is required to work over a very wide frequency band, a reliable design methodology should be taken along with the choice of sturdy material-based L and C elements.

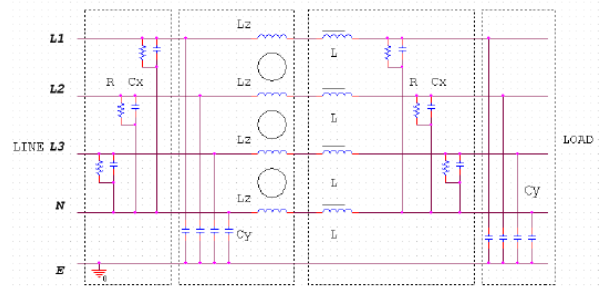
2. Design and its results

The power supply is known to send the normal mode(NM) and common mode(CM) noise. The following is the NM and CM chokes preventing NM and CM noise currents.

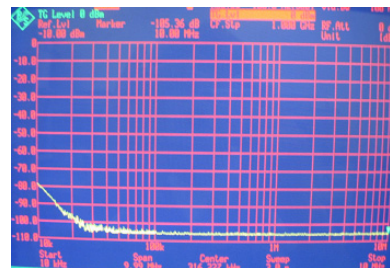


<Fig. 2> Normal and common mode noise currents and their chokes
 Seeing the figure, since the normal mode noise occurs along the normal differential circuit, the choke is an inductor that blocks NM noise. Simultaneously, the common mode noise is transferred through

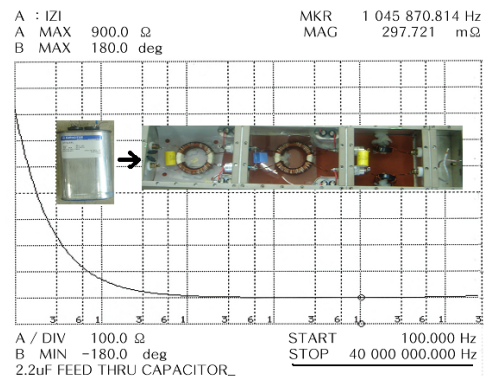
the trespassing path from the positive the negative polarity lines. On the basis of the sketch of the chokes, we can draw a schematic that agrees on the objective of Fig. 2.



<Fig. 3> Schematic of normal and common mode noise chokes
 To realize the function of the derived circuit above particularly including quasi-constant L and C elements, coils and feed-thru capacitors are carefully surveyed on the market and chosen.



<Fig. 4> CE level under -70 dB(Passing the test)



<Fig. 5> C over a broadband with realized EMI filter
 The CE requirement was met with the level under -70 dB .

3. Conclusion

We implement an broadband EMI filter working well.

[References]

[1] C. R . Paul, Eelctromagnetic Compatibility, Wiley& Sons, 1992