EMC problems:
Discontinuities: Ground Apertures, Transfer impedance of transmission line, Filtering & filter assembling, Crosstalk

1. Objectives

Getting acquainted with the operation of the SA (Spectrum Analyser);
Understanding chosen EMS problems - Discontinuities: Ground Apertures, Transfer impedance of transmission line, Filtering & filter assembling, Crosstalk;

2. Components and instrumentation.

Spectrum Analyzer by R&S is used with dedicated software.

3. Preparation.

Estimated preparation time for classes is 2 to 6 hours.

3.1. Readings

[1] Understanding Electromagnetic Effects using PCB demos.pdf, chapters 4, 6, 10 and 12
[2] Practical Papers-Transfer _impedance.pdf.
[3] Spectrum_Analysis_Basics_Agilenet_Technologies_HP.pdf
[4] FSC_SpectrumAnalyzer_QuickStartGuide.pdf

3.2. Problems

1. What is the general idea of SA (Spectrun Analyzer) operation principle ? ?
2. What is the transfer impedance of coaxial cabel ?
3. What is the input impedance of transmission line (open, shorted, matched) ?
4. How to understand the notion of crosstalk ?

4. Contest of rapport

4.1. Grounding of Filters - Board & chapter 10 of [1]

- Make plots (full A4 page) of attenuation of filters vs. frequency (log scale);
- Answer question: How to assemble the filter so that its properties are fully used ?

4.2. Discontinuities: Ground Apertures – Board & chapter 12 of [1]

- Make plots (full A4 page) of attenuation of connections between pair of ports vs. frequency (log scale);
- Answer question: How to design a PCB to minimize attenuation between two separate ports ?

4.3. Transfer Impedance - Board & chapter 4 of [1]

- Make plots (full A4 page) of transfer impedance (induced voltage on “inner wire” – draw the equivalent circuit diagram ?) vs. frequency (log scale) taking into account length of measured cable;
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Cable description	Length [m]	Length correction [dB]

- Answer the questions: Which of measured cables is the best and which is the worst ?

4.4. Crosstalk Board & chapter 6 of [1]

- Make plots (full A4 page) of coupled voltage for cases described in “Understanding Electromagnetic Effects using PCB demos.pdf”;
- Answer the question: Haw to design PCB to avoid unwonted coupling between different circuits ?