

Student Research Project: RF Contact Harmonic Evaluation System

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Motivation

Portable wireless connected devices cannot avoid electrical contacts due to serviceability and assembly requirements. The antenna designers are forced to minimize the antenna volume. One path for achieving this is to use the structure of the device as part of the antenna. For example, the inverted F antenna follows this concept. This leads to the problem which the RF current that flows through the system will pass through contact points. The contact point creates intermodulation and harmonics. The harmonic creation of contacts is highly variable such that statistical descriptions maybe needed for a wide range of imperfect contacts.

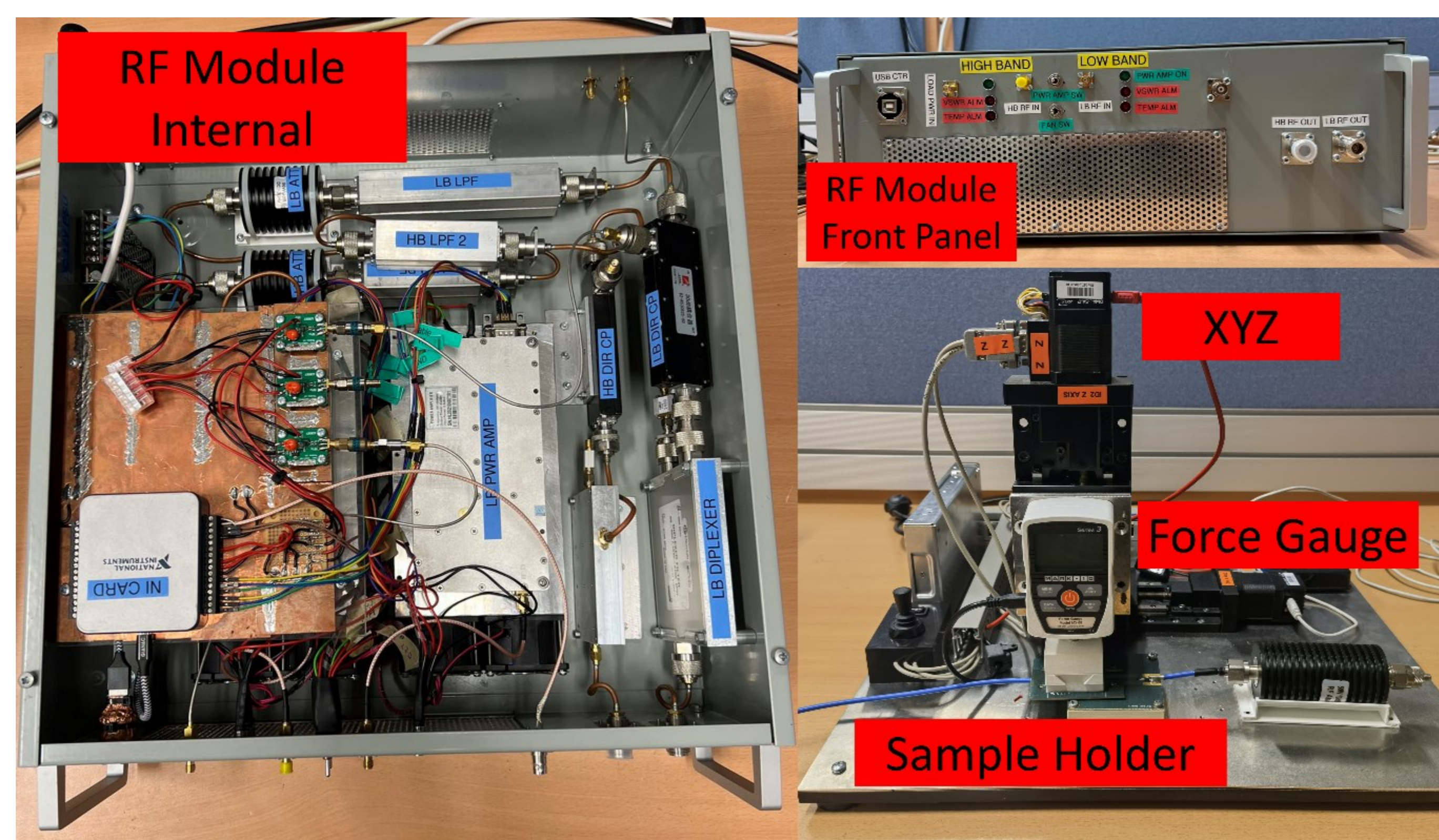


Fig. 1. Contact Harmonic Evaluation System

Task

The objective is to use our existing test platform to evaluate the harmonic distortion in order to investigate a broad range of material combinations as a function of pressure, DC bias, and other potentially influencing factors. The contact harmonic evaluation system is built specifically for this purpose.

Project participants will be involved in the following:

1. Learn the use of basic RF related instruments such as spectrum analyzer, vector network analyzer, oscilloscope, etc.
2. Assist in sample testing. During the project, we will repeatedly test the harmonics of the samples under different constraints.
3. Process and analyze the data obtained from the tests.
4. Optimization and adjustment of the test procedure. The existing test procedures are still in the development stage and need to be adjusted in order to improve the test efficiency.

Requirement.

Based on the system that has been built, we will conduct a systematic study of the mechanism of contact surface harmonics generation.

For this purpose, we need the following skills of the applicant:

- **Knowledge and interest in electronics and EMC are essential**
- **Programming and simulation software skills are preferred**
- **High motivation to work independently**
- **Student enrolled in electrical, computer, audio, or biomedical engineering**

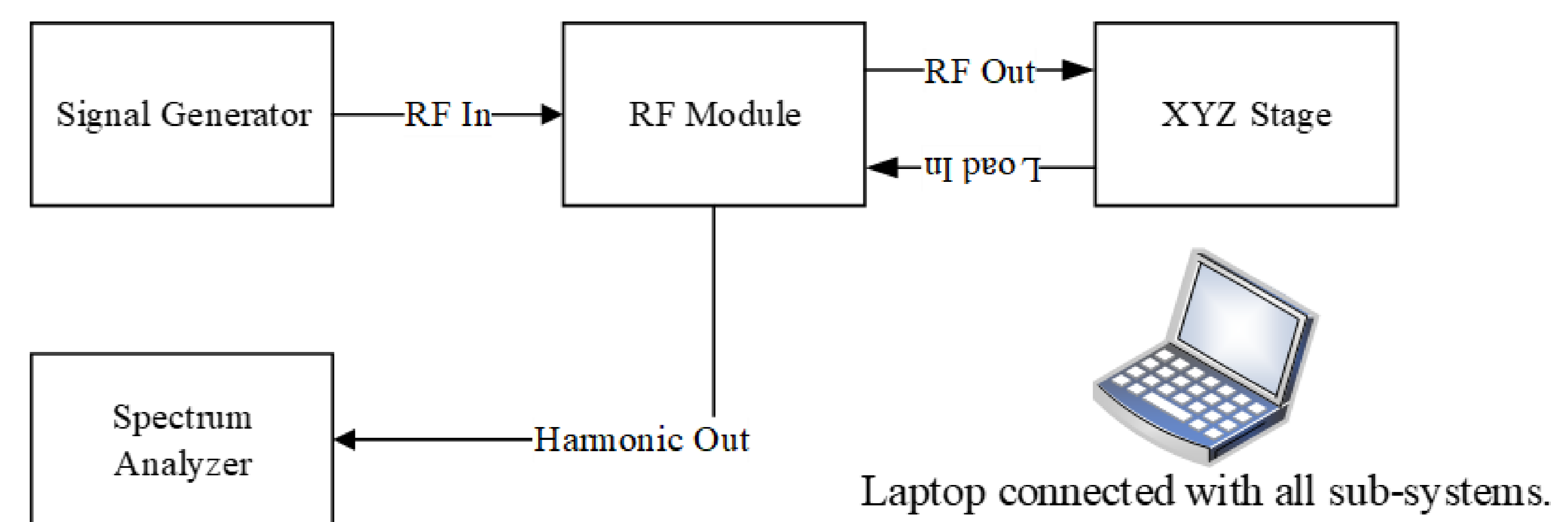


Fig. 2. Contact Harmonic Evaluation System Overview

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