

Nonlinear Microwave Device LabVIEW Automatic Test Bench: Double-Frequency IMD3 Characterization

Xin Cheng,

Fayu Wan,

Mordachev V.¹,

Sinkevich E.¹,

Xiaohe Chen,

Ravelo B.

2024

¹Belarusian State University of Informatics and Radioelectronics, 6 P. Brovki Street, Minsk 220013 Belarus

Keywords: nonlinear effect, microwave, electromagnetic interference, signal distortion, double-frequency method, intermodulation.

Abstract: The active component nonlinear (NL) effect causes undesirable RF and microwave system electromagnetic interference (EMI) problems which penalizes the communication system performance by signal distortion. Therefore, a relevant NL component measurement method is needed to predict the transceiver system EMI effect. However, the NL measurement characterization of RF and microwave active devices remains a fastidious and time cost task. An innovative NL test bench automatized by LabVIEW®control interface is featured in this research work. The design technique of the NL test methodology is described. The developed automatic test bench is tested with a microwave power amplifier (PA) operating at 2.4 GHz based on

double-frequency (DF) method. The experimental test setup including the LabVIEW® test control parametrization and data acquisition is described. The test bench effectiveness was assessed by the third-order intermodulation (IMD3) PA measurement with DF method. The theoretically calculated and measured IMD3 amplitudes based on DF input signal are in very good correlation. Thanks to its advantages in terms of simplicity, flexibility, and time cost, the innovative NL automatic test bench is very useful for transceiver system EMI analyses.

Publication source: Nonlinear Microwave Device LabVIEW Automatic Test Bench: Double-Frequency IMD3 Characterization / Xin Cheng, Fayu Wan, VyMordachev, E. Sinkevich [et al.] // Progress In Electromagnetics Research B. –2024. – Vol. 108. – P. 47–59.