Practical Papers, Articles and Application Notes

Kye Yak See, Technical Editor

Laboratory-based electromagnetic immunity tests are conducted with coupling-decoupling networks (CDNs) but these may not be always feasible for heavy industrial equipment due to its size and high current rating. To overcome this limitation, Mingxing Du, Xing Zhang and Kexin Wei from Tianjin University of Technology, China, and Hurley William Gerard from National University of Ireland, propose an alternative method in the first paper, "An Alternative Method for Conducting Immunity Tests in the Industrial Environment". They propose a method for equipment in an industrial environment using current probes instead of CDNs. The analysis of the loop impedances in the laboratory and the industrial environments lead to an equalization between the two methods.

Inter-laboratory comparison (ILC) is an integral part of quality assurance of a certified electromagnetic compatibility (EMC) test laboratory. Deepak Kumar and P. Sudhakar from Society for Applied Microwave Electronics and Engineering Research, Center for Electromagnetics, Chennai, India, share their ILC experiences in the second paper, "Inter Laboratory Comparison (ILC) of Conducted Emission Measurements". A comparative analysis of measured data collected from five participating laboratories is presented based on both the classical and robust methods. Significant deviation is observed at higher frequencies of conducted emission measurements, which could be due to several factors, such as improper earth connections and bonding the line impedance stabilization network (LISN) to the ground reference plane, non-calibration of LISN and performance of the test receiver.

Wireless medical devices use technologies that operate in the unlicensed 2.4 GHz and 5 GHz bands. Therefore, it is important to ensure a new medical device can co-exist with other wireless devices operating in these frequency bands for safety reasons. Mohamad Omar Al Kalaa, Joshua W. Guag and Seth J. Seidman from the U.S. Food and Drug Administration (FDA) look into this matter in the third paper, "An Outlook on Wireless Coexistence with Focus on Medical Devices". They provide an overview of recent developments of established technologies in unlicensed bands such as Wi-Fi and Bluetooth, and the emerging use of unlicensed spectrum by cellular systems. This paper highlights the lack of unified methodology to assess wireless coexistence of emerging technologies and shares the work done by the ANSI C63.27 working group to develop a test standard addressing this issue.

This column can only be successful with active participation of potential contributors. I appeal for more technical papers that address practical EMC design issues. I am happy to communicate with you through email at ekysee@ntu.edu.sg for penning a paper for this column.

An Alternative Method for Conducting Immunity Tests in the Industrial Environment

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Abstract— For studying the electromagnetic compatibility (EMC) of any device, measuring the devices' immunity is very important. At present, most of the standards relating to immunity are designed for laboratories, and the immunity tests are always conducted by using coupling-decoupling networks (CDN) in laboratories, in accordance with the standard EN61000-4-6. However, these methods are not always feasible because of some limitations. If the equipment under test (EUT) has large dimensions or high currents, as in the case of most of the industrial equipment, it is not possible to send it to the EMC laboratory or to use CDNs for testing. To overcome this problem, an alternative method is proposed for conducting immunity tests in the industrial environment. In this paper, the test methods for the laboratory and for the industrial environment, the former with CDNs and the latter with current probes, are described first. From these tests, correction factors (CF) are extracted, based on the analysis of the loop impedances in the laboratory and the injected loop currents in the industrial environment. Finally, a link is established between the laboratory and the industrial environment, and then, the equalization between the two is realized by using these correction factors.