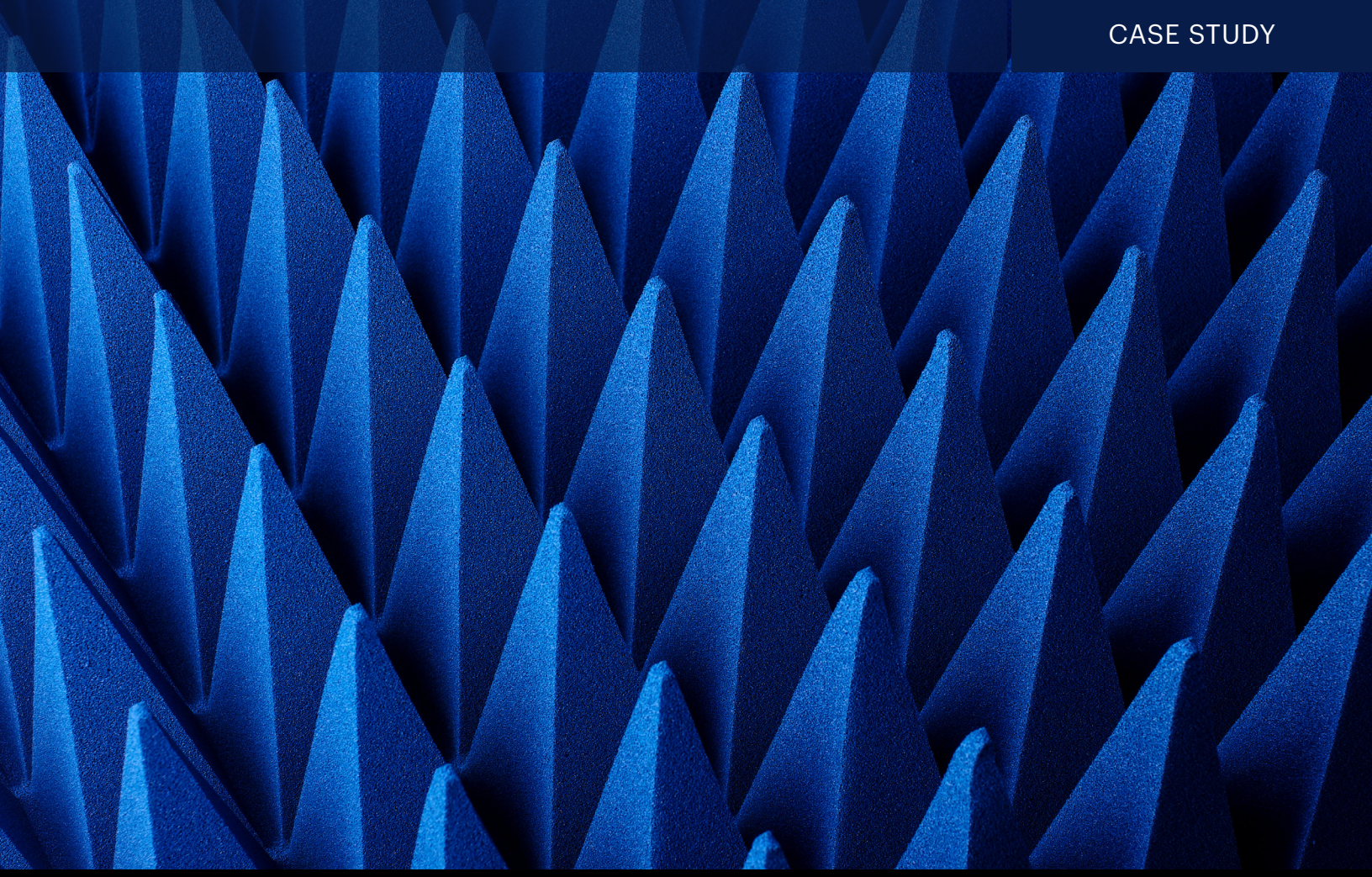
CASE STUDY



Hewlett Packard Enterprise Improves EMI Measurement Efficiency

KEYSIGHT

Organization

- Hewlett Packard Enterprise, Roseville, California

Challenges

- Considerable lengthy EMI test time due to product and test complexity
- Extensive troubleshooting time for staff to check intermittent issues
- Maximum use of the test chamber

Solutions

- Keysight PXE N9048B EMI receiver
- TOYO EPX / RE EMC software

Results

- Measures 10 times faster with 350 MHz fast Fourier transform (FFT) bandwidth
- Monitor noise amplitudes continuously over time domain with RTSC gapless measurement
- Reduces the total EMI troubleshooting time from > 2 hours to 10 minutes

Introduction

As connected devices, whether wearables, home appliances, entertainment, or healthcare devices, evolve to become smarter and more interconnected, electromagnetic interference and exposure to harmful radiation increase. The radiation emitted by these devices can have harmful effects on both device performance and human health.

Regulatory bodies, such as Federal Communications Commission (FCC) and European Telecommunications Standards Institute (ETSI), continue tightening regulations, especially for mission-critical applications, such as medical devices and autonomous driving. Electromagnetic compatibility (EMC) testing has become more challenging today than ever before.

Hewlett Packard Enterprise (HPE) is a leading manufacturer of network switches for servers, networking, and data storage applications. The HPE site in Roseville, California, is one of the company's main EMC test sites supporting EMC compliance and pre-compliance testing for HPE business units in California. They currently have 3-meter and 10-meter chambers serving internal and external customers.

With the Ethernet switch market growing at high speed, driven by data center and enterprise network capacity expansion, HPE wanted to ensure their EMC chamber capacity could meet demand related to an increasing number of new product introductions and increasing test times due to product complexity.

Figure 1. HPE network switches

Challenges: Troubleshooting Intermittent Emissions

David Bernal, HPE laboratory manager for hardware test and compliance, looks for ways to improve EMI measurement efficiency. He knew he needed to investigate the current EMC workflow to identify bottlenecks and enable faster and more accurate measurements. Bernal has a team of experienced EMC engineers and technicians who can efficiently perform most of their compliance testing and failure debugging.

However, as the new product gets more complex, even the most experienced technician is taking longer to duplicate the EMI failures, especially the transient and intermittent electromagnetic disturbances that appear momentarily under certain device under test (DUT) conditions. When an intermittent emission is detected, his team spends two to three hours, sometimes more, to duplicate and capture the intermittent signal.

There is no compromise when it comes to EMI measurements. The objective is to capture all electromagnetic disturbances so that HPE products can function satisfactorily in their electromagnetic environment without introducing intolerable disturbances to surrounding equipment. He also needs to ensure his customers' operations run smoothly with no interruptions, 24/7.

Solutions: Keysight / TOYO PXE EMI Test

To improve EMC measurement efficiency, Bernal contacted the Keysight Technologies sales team for recommendations. Keysight, together with TOYOTech LLC, a US subsidiary of TOYO Corporation, a leader in the EMC and compliance testing field, recommended upgrading the existing EMI receiver test system to the Keysight N9048B PXE EMI test receiver with TOYO EPX / RE software. The PXE N9048B EMI receiver hardware and TOYO's EPX / RE EMC software work seamlessly to enable users to capture any transient, intermittent, narrowband, or broadband disturbances.

Figure 2. Keysight PXE EMI receiver test solution with TOYO EXP / RE software

The PXE's accelerated time domain scan (A-TDS) and real-time scan (RTSC) have two innovative capabilities:

- Measures 10 times faster with 350 MHz fast Fourier transform (FFT) bandwidth.
- Eliminates noise oversight, streamlined troubleshooting, and provides signal insights with advanced RTSC gapless measurements.

The PXE N9048B with RTSC has a unique feature that enables gapless signal capture and analysis with very wide FFT bandwidth up to 350 MHz. It enables simultaneous measurements and display of frequency domain, time domain and spectrogram results, with up to three EMC detectors. Hardware design engineers can perform gapless measurement and analysis of intermittent disturbance signals emanating from the equipment under test faster than the traditional step and sweep methods. Test labs can improve throughput of EMC test to assess more products and certify them in a shorter amount of time.

The EPX / RE software fully enhances the advantages of the N9048B PXE EMI test receiver's unique A-TDS feature, which enables reliable EMI measurements without missing any noise. The EPX / RE software also embeds automated measurement sequences, which helps users improve the measurement speed.

Ultimately, Bernal selected the Keysight N9048B PXE and TOYO EPX / RE software for compliance and pre-compliance testing. The combination of these two solutions reduced the total EMI measurement and debugging person hours up to 90%.

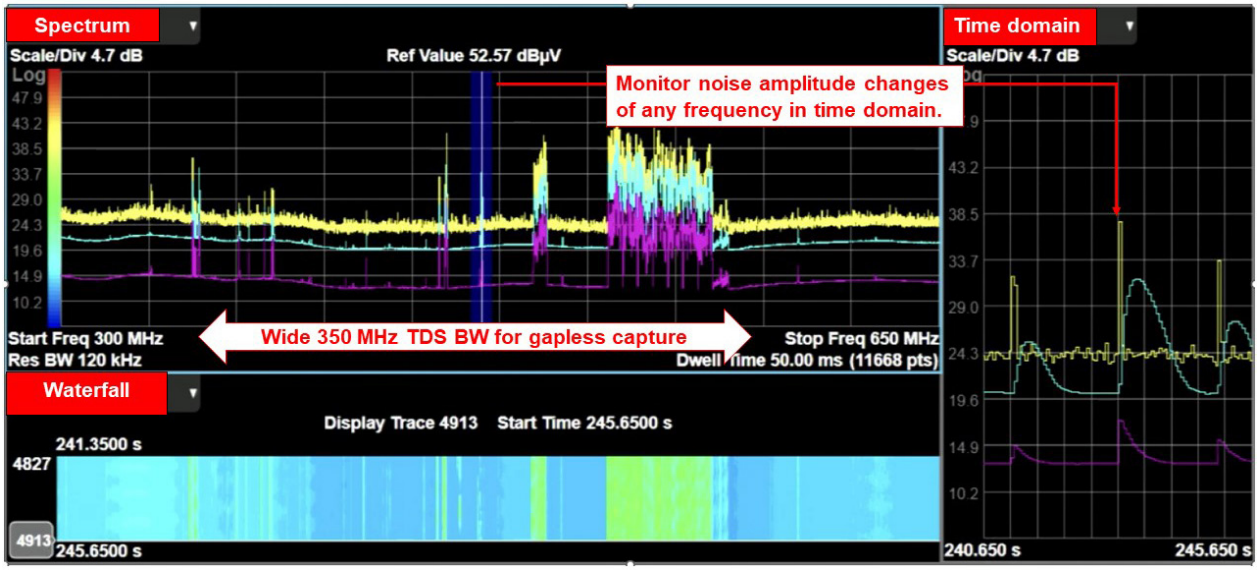


Figure 3. Simultaneous and real-time gapless capture of 350 MHz spectrum, together with the ability to monitor the noise amplitudes continuously over time domain, enable HPE to mitigate EMI issues more effectively

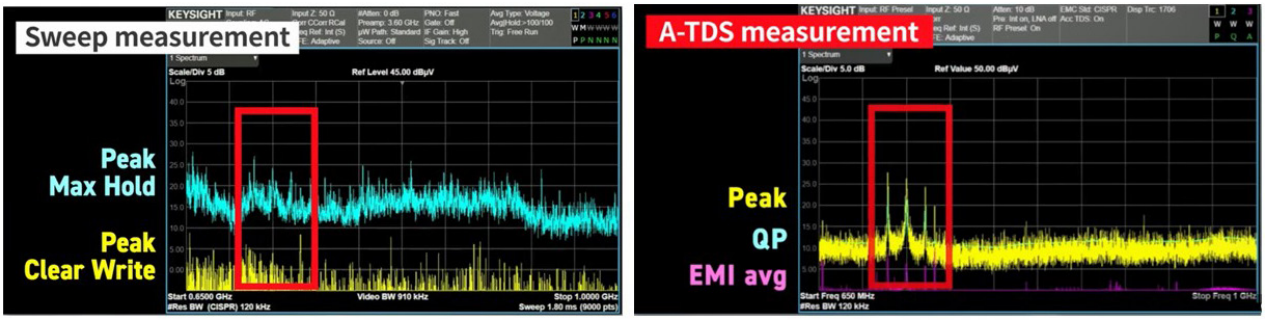


Figure 4. With PXE's A-TDS, HPE can capture and resolve broadband and narrowband disturbances with simultaneous display of peak, quasi-peak, and EMI average detectors measurements, which is not possible using a conventional sweep analyzer

Results

Implementing the N9048B PXE and TOYO EPX / RE software in their current EMC test system, HPE managed to save the EMI troubleshooting time by almost ten times. Any hard-to-troubleshoot intermittent disturbances that used to take more than two hours for an experienced EMC technician to duplicate and debug now only take 10 minutes. The technician can capture the noise and identify the root cause easily.

> "Speed and reliability in testing don't have to be a trade-off. Keysight and Toyo have helped Roseville Hardware Test and Compliance Department to achieve both." –
>
> **David Bernal,**
> HPE laboratory manager

Other related software

The Keysight N6141EM0E EMI application software enables your Keysight X-Series signal analyzers to perform a one-button pre-compliance measurements and diagnostic of your design according to EMC standards. The N6141EM0E provides built-in CISPR and MIL-STD compliant bandwidths, detectors, band presets and automated testing to regulatory limit lines. The application also supports amplitude correction for antennas, line impedance stabilization networks (LISNs), cables, and preamplifiers. You can now perform pre-compliance radiated and conducted emissions measurements and diagnose non-compliant emissions with extensive spectrum analysis capabilities.

The Keysight N6141EM0E EMI application software is available as standard and pre-installed in the factory for the PXE EMI receiver. The N6141EM0E is also available as software option for other Keysight signal analyzers to enable EMI pre-compliance testing or troubleshooting.

Resources

Visit keysight.com/find/PXE for more about this solution.