



CASE STUDY

Yamaha Fine Technologies Achieves 100% High-Frequency PCB Characterization

The Company

Yamaha Fine Technologies Co., Ltd., is a leading developer of test solutions for the printed circuit board (PCB) industry. Modern PCBs constructed from flexible liquid crystal polymer (LCP) and polyimide (MPI) substrates present unique test challenges for PCB manufacturers.

The PCBs require precise high-frequency measurements of high-speed transmission lines on the circuit boards. Yamaha needed a process to combine high-frequency measurements with an automated PCB test to support 5G equipment reliability.

Traditional RF characterization for circuit boards involves removing and measuring test coupons. Coupons are pieces of the board designed for removal and testing without impacting the main PCB. The results vary when you manually test coupons depending on the operator's skill and the contact of probes on the boards.

Inconsistent results cause unacceptable uncertainty with the small margin of error associated with high frequencies. Testing only coupons does not guarantee the integrity of the entire board. Manufacturers of next-generation high-frequency circuit boards require 100% traceable measurements of every PCB component.



Company:

- Yamaha Fine Technologies, Co., Ltd.

Key Issues:

- measuring the actual devices on the PCB
- providing consistent probing for sensitive RF measurements
- measuring various types of RF devices

Solutions:

- Keysight M980xA PXI VNA
- Yamaha micro prober

Results:

- industry's first high-frequency PCB solution for testing 100% of the components
- flexibility to configure measurement set up to meet testing requirements
- accelerated testing process





The Key Issues

Measuring a test coupon separate from the primary circuits will not give you the S-parameter characteristics of the actual circuits. You need to measure the circuits on the PCB to ensure their RF performance.

Testing the PCB causes the following challenges:

- Simultaneously contacting the board at multiple points — two points for single-end lines and four points for differential lines.
- Specialized fixtures require stable connections for the small contact points and unique circuit designs.
- High-frequency board materials such as LCP and MPI can warp, requiring stabilization for accurate measurements.
- Quickly characterizing a wide variety of boards and components requires a flexible multiport network analyzer that can easily remove fixtures.

PCB probing systems give you access to board components quickly and consistently. Adding high-frequency measurements to probing systems is the next logical step for testing modern PCBs.

The Solutions

The Yamaha Series MP502 / MP502-A micro prober provides accurate probing on a wide variety of substrates. The micro prober clamps and applies tension to the corners of the substrate, enabling precise measurements even on modern, flexible boards like LCP and MPI.

Yamaha, by including the Keysight M980xA PXI vector network analyzer with the micro prober, provides a complete high-frequency characterization solution (Figure 1).

The M980xA PXI vector network analyzer measures essential frequency characteristics such as insertion loss and return loss with options for advanced measurements like time domain reflectometry (TDR).

The Keysight multiport network analyzer measures multiple devices simultaneously as the Yamaha micro prober accurately places the probes on the board. The system restricts probe movement on the Z-axis to μm , minimizing measurement uncertainty from any cable movement.



Figure 1. Yamaha micro prober system with the M980xA PXI VNA

The Results

The micro prober supports many different types of fixtures for a wide range of PCB devices. With the M980xA's automatic fixture removal, you can quickly de-embed fixtures from your measurements as you exchange them for different components. Easily perform your measurements automatically to accelerate the testing process and reduce operator error. You can store the measurement results with the PCB's ID for full traceability.

The modular PXI network analyzer gives you the flexibility to configure your measurement set up to meet your test requirements. Avoid test system downtime by easily exchanging individual PXI modules that require servicing. Buy only as many PXI modules as necessary and upgrade at any time.

Yamaha has the industry's first high-frequency PCB solution for testing 100% of the components.

Learn more at: www.keysight.com

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