

MAGNALYTIX®



Process Assessment Investigation

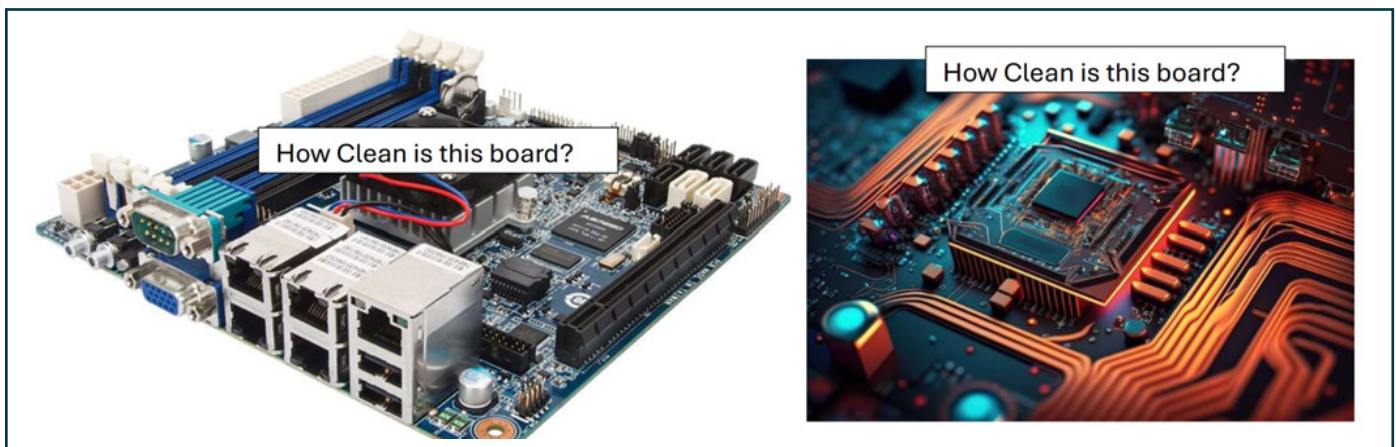


Assess Your Assembly Process

The Umpire 41® Functional-SIR Test Board is designed to perform a process assessment investigation of your assembly process to ensure acceptable levels of flux residues and process contamination. The test instrumentation, in combination with the Umpire 41®, allows for electrical testing in temperature, humidity, and bias conditions using electrical active and SIR components.

Understanding Why Cleanliness of Electric Systems is Important to Reliability

Electric systems, hardware, harnesses, and individual circuit board cleanliness have become critical aspects of electronic hardware reliability. Cleanliness of electronic hardware has historically been identified by general visual conditions, particles and debris, and the general conductivity average of a solvent after exposure of the entire circuitboard. Still, these general tests have not proven to correlate to predictive hardware.

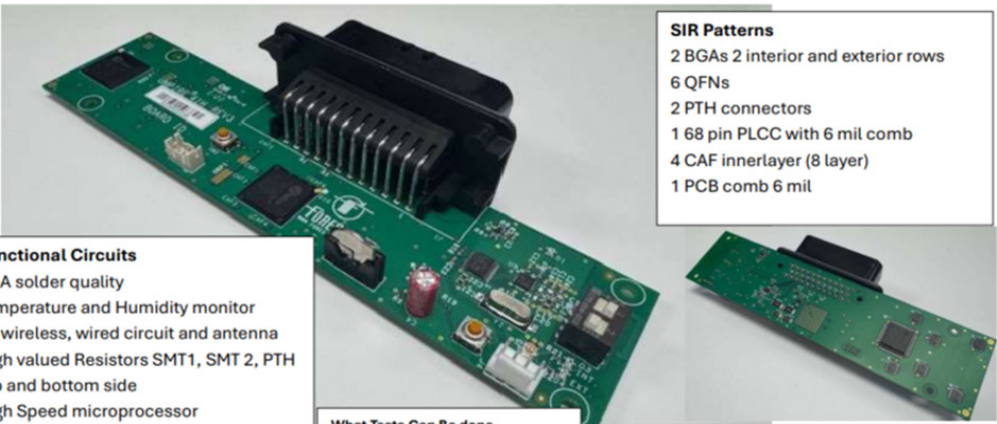


How should a process be qualified to assess acceptable levels of flux and process residues? Using actual products is critical to understanding the collective residues, which allows for electrical assessment of the residues, solder quality inspection, and SIR/Functional circuit performance using the Umpire 41 test system.

The Umpire 41® test board assessment, offered in collaboration with testing from Foresite and Magnalytix reliability test labs, addresses the cumulative and interactive effects of the electronic assembly process.

- Tests sensitive circuits
- Tests circuits pad to pad, via to hole, and lead to lead
- Tests for what residues are present and their impact on circuit performance
- Tests multiple processes (SMT- Selective – Manual)
- Tests for collective residues across the assembly
- Tests for the collective impact of residues both applied and removed

Functional – SIR Umpire Test System addresses the cumulative and interactive effects of the assembly process.



Functional Circuits

- BGA solder quality
- Temperature and Humidity monitor
- RF wireless, wired circuit and antenna
- High valued Resistors SMT1, SMT 2, PTH top and bottom side
- High Speed microprocessor
- LED circuits
- Clock Circuits
- Capacitor (electrolytic)
- Battery (3.3v) active to LED circuits

What Tests Can Be done

- IPC 610 Inspection
- SIR and Functional assessment
- Thermal Imaging
- C3/CI cleanliness assessment
- Ion Chromatography and IC MS
- Solder Quality Cross Section / Shear

SIR Patterns

- 2 BGAs 2 interior and exterior rows
- 6 QFNs
- 2 PTH connectors
- 1 68 pin PLCC with 6 mil comb
- 4 CAF innerlayer (8 layer)
- 1 PCB comb 6 mil

Assessment of No Clean (cumulative Processes)

- PCB innerlayer (8 layers) CAF
- SMT 1 and SMT 2 processes
- PTH – Selective pallet / robotic
- Rework and Repair (brush cleaning)

Assessment of a Cleaning Process

- PCB innerlayer (8 layers) CAF
- SMT 1 and SMT 2 processes + Cleaning
- PTH – Selective pallet / robotic + Cleaning
- Rework and Repair + (brush cleaning)

What does this system do beyond SIR and some functional test. It allows the documentation from an electrical perspective on SIR and sensitive circuits of the interactive effects of the fabrication, assembly reflow and wave soldering processes and the effect of cleaning or repair. Now the process can be qualified beyond the simple material qualification that historically has been done. Using this 4 up array with 3 arrays built to assess the interaction of the process and meet the qualification number of boards that allow for a statistical valid assessment of the process and materials.

1. In-Circuit Testing – Electrical performance when exposed to Harsh Climatic Conditions
2. SIR Testing – Effects of process residues pad to pad, hole to hole, via to pad
3. Visual Examination—Before testing, visually inspect the test boards to ensure they represent manufactured hardware.
4. Ionic Analysis Tests – Localized Extraction (C3) in combination with IC Ion Chromatography analysis tests are performed per IPC TM-650, Method 2.3.28.
5. Visual Inspection: IPC 610 inspection
6. X-Ray Inspection: 2D
7. Cross Section
8. Reporting – 3rd party report that includes
 - a. Test Objective
 - b. Test Board
 - c. Materials and Process Parameters
 - d. SIR Test Parameters, including hardware validation and environmental conditions.
 - e. SIR data for each component with visual images
 - f. Detailed analysis of the data findings
 - g. Inferences from the Data Findings
 - h. Conclusions and Recommendations