



Pushing Performance

## FAQ

### 8 Questions You Must Ask Your Backplane Manufacturer

People | Power | Partnership

The backplane is the backbone of your embedded computing system. It interconnects the different modules and allows them to communicate to one another. You require a partner who delivers a high quality and cost competitive backplane solution. Everyone wants to minimize and cut costs in order to maximize profits. However, this cost cutting approach may result in unexpected problems such as downtime, errors, and defects, which leads to unhappy customers. This is a unique challenge.

This FAQ will show you how to navigate through the standards, methods, and terminology in backplane technologies providing you a guideline for what you need and what questions to ask.

#### 1. What do I need to look for when selecting a backplane manufacturer?

There are two questions that you should ask a manufacturer when considering them for a project:

- What standards are they certified to?
- What testing methods do they use?

#### 2. Why are standards important? What are common standards in the backplane industry?

Standards exist to ensure quality and conformance. A company who is certified to standard must undergo a lengthy process to receive the certification. This provides you assurance that a company is capable of doing what they say they can do.

Common certifications in the backplane industry:

- **ISO 9001:2008** is a quality management certification. In order to achieve this a company must demonstrate the ability to consistently meet customers' requirements as well as prove that they have developed a system of continuous improvement.
- **IPC** is an assembly standard that dictates what workers can assemble. Things like materials, termination styles, etc., they can use are determined by their IPC certification. Individual workers must earn this certification, which is divided into 3 groups: Class I, Class II, Class III. The higher the class the more exact specifications and higher quality standards that can be performed.
- **ITAR (International Traffic in Arms Regulations)** regulates the use of defense-related technical information to safeguard US national interests.
- **AS9100** is a quality management standard designed to meet the stringent, complex and unique demands encountered in the aerospace and defense industries. The AS9100C standard incorporates all requirements of ISO 9001:2008 and goes further, with 100 additional requirements to satisfy aerospace and defense customers.



*Backplane being assembled with a Press-fit machine*

There are, of course, many other certifications that may apply to your unique application. Don't be afraid to ask your manufacturer about their certifications and what they mean.

#### 3. Can having different certifications affect costs?

It depends on the manufacturer. Often manufacturers have different laborers certified to different IPC certifications. One manufacturer may charge a premium for work done by their Class III certified laborers, while another might charge same for all laborers. Talk to your manufacturer to understand their labor rate structure. If they do charge premiums for higher certified laborers, ask if your application requires that skill level so you're only paying for the work you need.



*AS9100 is a quality management certification for customer satisfaction and continuous improvement.*

**4. What are some examples of tests performed to ensure backplane quality?**

- **Visual Inspection:** Checks individual components on a backplane to ensure that they are placed correctly, including checking solder joints and component orientation. This can be done manually or automatically (called Automated Optical Inspection or AOI test).
- **Electrical Test:** This test send an electrical current through the pins and traces on the board to test connections:
  - **Continuity** (AKA “opens”) tests the signal between two pins through a trace on the board in order to show that there is a connection there.
  - **Isolation** (AKA “shorts”) tests the space between pins to ensure a connection doesn’t exist where it shouldn’t. An unintended connection can cause interference on a board and lead to malfunctions.
- **Functional Test:** Simulates how the board would work in the real-life application. This test is primarily used to check how the circuitry of the board will function with equipment when integrated into the final application.
- **Signal Integrity Analysis and Simulation:** As higher speed signals are incorporated within backplanes, the need for further testing arises. This is done with specialized equipment such as network analyzers. Time domain and frequency domain measurements can be performed to ensure the signal integrity.

**5. What are the latest trends for testing continuity and isolation?**

There are multiple ways to check continuity and isolation, and the test that is right for you varies. Below are some common tests:

- **In circuit test (ICT):** This test uses a series of pins called pogo pins set in the pattern of the connector pins on a board. A board will be placed on the pogo pins and mate with the connector pins.
- **Flying probe test:** Two metal probes with an electrical current running through that tap two pins at a time to see if there is a connection.
- **Continuity tester (RoBAT, LINX, Multi-meter):** The mating half of each connector on the board is pressed together or manual probes are used to check continuity.

**6. What are the benefits and disadvantages of each method for testing continuity and isolation?**

TEST	BENEFITS	DISADVANTAGES
<b>In Circuit Test (ICT)</b>	<ul style="list-style-type: none"> <li>■ Once set up, test time is approximately 1 minute</li> <li>■ Ideal for large volume orders</li> </ul>	<ul style="list-style-type: none"> <li>■ High set up charges to build initial test fixture</li> </ul>
<b>Flying Probe</b>	<ul style="list-style-type: none"> <li>■ No unique test fixtures</li> <li>■ Ideal for small volume order</li> </ul>	<ul style="list-style-type: none"> <li>■ New boards need to be programmed</li> <li>■ Slower than ICT test</li> </ul>
<b>Automated Continuity Tester (RoBAT)</b>	<ul style="list-style-type: none"> <li>■ No unique test fixtures</li> <li>■ Test is quicker than flying probe for high pin count backplanes</li> </ul>	<ul style="list-style-type: none"> <li>■ New boards need to be programmed</li> </ul>



*RoBAT tester performs AOI, continuity, and isolation testing*

**7. What kind of equipment is used for testing?**

There are various brands and types of equipment. More and more companies have adopted the use of RoBat technologies for custom and custom backplane system. A very reliable piece of equipment is the fully automated RoBAT machine which performs AOI, continuity, and isolation tests. By performing multiple tests at once, the manufacturer is able to shorten testing time to about 15 minutes per board, saving customers time and labor. The RoBAT also does not require unique testing fixtures and is able to test larger boards than many other pieces of equipment. There are also other options for testing, such as the LINX tester which is a lower cost option ideal for customers who want to balance cost and quality.

Each manufacturer has different equipment. Be sure to ask what options they have and which one is the best for your application.

**8. Is there a limit to the types of connectors that can be tested?**

No. All types of connectors can undergo electrical testing and visual inspection; this includes everything from fine pitch to heavy duty connectors. There are no pin pitch or pin quantity limits. All mounting and termination methods can be tested including press-fit, through-hole, and surface mount.



**About the Author:** John Hamilton is the Business Development Associate for HARTING Integrated Solutions. John has a Bachelor of Science in Electrical Engineering as well as several software related certificates, including AutoCAD, Macola, LabVIEW, MATLAB, OrCAD PCB design, PSpice and Multisim circuit simulators.

**Contact:** John.Hamilton@HARTING.com | +1 (847) 717-9219

**About HARTING Integrated Solutions:** HARTING Integrated Solutions is the backplane design and manufacturing division of world-renowned connector and interconnect manufacturer HARTING. With manufacturing and design facilities in the US, England, and China, HARTING Integrated Solutions is suited to providing solutions to customers worldwide.

All backplanes produced by HARTING undergo comprehensive testing for quality assurance. HARTING is one of the few manufacturers in the world with a RoBAT testing machine which performs AOI and electrical testing in one machine reducing time spent testing each board while maintaining the high quality results customers’ worldwide expect from HARTING.

