MCT Position Paper on

Is Panel Testing the Next Advance for Semiconductor Test?

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The purpose of final test is to verify that the units shipped to the end customer work as planned. Until recently, there were two basic technologies available for presenting package devices to testers for test:

- Gravity Feed Handlers, and
- Pick and Place Handlers

Gravity handlers have worked quite well for cost sensitive devices but have not been well suited for multi-site test. Pick and Place handlers have worked well for larger devices and offer good solutions for multi-site testing, but they are more expensive and slower than gravity handling systems. In the beginning, the industry presented parts to testers manually, and as volumes grew, gravity handlers became the presentation method of choice. As packaging technology advanced and certain new packages became popular, such as the Quad Flat Pack (QFP) with leads on all sides of the package, it was no longer practical or desirable to handle these devices in gravity feed systems. The Pick and Place handler evolved as the handling method of choice for large complex devices primarily as a result of a package technology change.

Today, the semiconductor industry is trying to deal with the latest advances in packaging technology. New chip scale packages have become so small that they cannot be routinely or reliably handled in either gravity feed or pick and place handlers. Additionally, due to alignment and fine pitch requirements, they are not good multi-site candidates either. The combination of both handling and contacting difficulty only adds to the problem of escalating complexity and costs for the back end. In short, new packaging technologies require appropriate new handling technologies. Where did we ever get the notion that we could go on forever with a 30 year-old handling technology for our next generation devices and packages?

Panel test is an excellent solution to the current difficulties in handling modern devices in a multi-site environment:

- Most devices are already being manufactured in strip format today
- Devices are very accurately positioned with respect to each other within the strip and are already organized to be multi-site friendly
- Multi-site test strategy decisions can be made based on customer needs, economics, and tester resources, and not tied to a specific handler types
- Strips do not require precision handling mechanisms
- Panel test can use existing testers
- Many packages types can be handled in a single strip format (Amkor has recently announced that up to 585 different package types can be manufactured in a single common format)
- Small packages are not any more difficult to handle in strip format than large packages
- Device yields are higher in strip format than in singulated formats
- Lead/ball damage is dramatically reduced
- Index times are reduced compared to traditional handling systems-testers are kept very busy
- Jam rates are dramatically reduced
- Outgoing shipment quality is improved as a result of minimal handling of individual units
- The cost of test is dramatically improved (Amkor has stated that they can reduce the cost of test by 50%-90%)

Of all the methods available to reduce the cost of test and reduce cycle times, panel test offers the most promise, as this is the key enabling technology that allows a whole new manufacturing and test strategy to be implemented. Strip test processing allows manufactures to redesign and simplify their manufacturing processes, improve capital utilization, increase throughput, and dramatically lower their overall cost of test.

Panel Test is indeed the Next Major Advance for Semiconductor Test.