



# ADVANCED CONNECTIONS

Advanced Interconnect Technologies

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Summer 2002

## AIT 2002 News

### AIT Named by Motorola as "Supplier of the Year" for 2001

On June 5, 2002, AIT was honored by Motorola, Inc.'s Semiconductor Products Sector as a "Supplier of the Year" at the company's Supplier Performance Awards Ceremony in Austin, Tex. As a valued supplier and critical business partner of Motorola, AIT was recognized for its continuous quest for performance excellence while working with Motorola to provide excellent customer service while meeting market demands.



Motorola SPS 2001 Supplier Performance Award Ceremony - June 5, 2002

AIT's strong commitment to customer service has helped the company distinguish itself in the subcontract assembly and test market, and has given it a unique competitive edge. The company services both stable and emerging markets within the semiconductor industry, including communications, consumer electronics, automotive, industrial, computer applications and data processing.

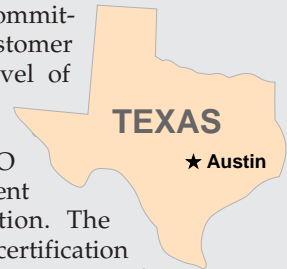
"AIT is honored that the manufacturing, assembly and test services we provide to Motorola were selected for such a prestigious award," stated Ralph Duceour, CEO and president of AIT. "Receiving this award is a true testament of our dedication and commitment to excellent customer service. At AIT, we value the partnerships we have with our customers, and continually strive to meet their demands while exceeding their service expectations."

Motorola created its annual Supplier Performance Awards to reward key suppliers for consistently providing excellent service. AIT is one of three companies that received Motorola's top honor of Supplier of the Year. Other Supplier Performance Awards presented were Motorola's Gold and Silver Performance Excellence Awards, as well as an award for consistent and marked improvement.



### AIT's Austin Test Facility Earns ISO 9002 Certification

Due to AIT's ongoing commitment to meet growing customer demands for the highest level of quality, AIT announced in March 2002 that its Austin, Tex. test facility earned the ISO 9002:1994 Quality Management Systems Standard certification. The facility was awarded this certification from Bureau Veritas Quality International Inc. (BVQI), a third party certification bureau that has assisted more than 30,000 companies worldwide in achieving certification to ISO 9000 or other equivalent standards.



According to Ritchie Armbruster, quality manager for AIT's Austin facility, "The involvement of our employees and management team in our statistical process control system has enabled us to achieve error-free performance and join an elite group of companies who have achieved world class quality within their organization by meeting the requirements of ISO 9002:1994."

AIT's Austin facility provides a full-range of semiconductor testing services that include wafer probing and final testing, as well as additional test related services such as burn-in process support, dry pack and tape and reel for analog, digital and mixed signal devices.

"The validation of our Austin test facility by the ISO organization further distinguishes AIT from our competition by showcasing our commitment to provide exceptional customer service and excellent quality management in order to promote the future success of AIT and our customers," continued Armbruster.

The Austin test facility joins the ranks of AIT's other assembly and test operations located throughout the United States and Southeast Asia in achieving ISO certification.

# TECHNOLOGY

## AIT Enhances Package Characterization Services

### New Software Significantly Enhances Electrical Characterization, Is Part of Complete Expanded Package Characterization Suite

A variety of methods have been developed to solve the challenging electrical, thermal and mechanical demands imposed by today's higher-density integrated circuits and smaller package sizes. Electrical characterization, in particular, requires a variety of capabilities ranging from electromagnetic field simulation to signal integrity analysis.

AIT recently upgraded its suite of electrical characterization services, and as a part of its package characterization program, AIT provides Ansoft Maxwell Spicelink electrical modeling software, which includes three-dimensional (3D) finite element electromagnetic (EM) field simulation, RLGC extraction and cross-talk analysis of neighbor traces. Additionally Ansoft HFSS software supports full-wave 3D finite element EM field simulation, as well as RLGC and S parameter extraction, resonance analysis, and Spice modeling. Finally, Ansoft Siwave software encompasses a full-wave EM simulator with SI features, a complete-package SI analysis capability, and the full range of resonance, SSN, power/ground bounce, and delay simulation. Also supported are noise coupling, and a frequency domain resonance model and S parameters. The modeling software directly interfaces to the design software to enable the quick SI analysis in the design stage.

In addition to enhancing its packaging characterization software offering, AIT also has developed a program for controlling electrical measurement equipment. This program controls the Network Analyzer and acquires the S-parameter reading from the analyzer to a computer.

AIT's expanded electrical characterization capabilities have already proven important in a variety of applications. For example, AIT's engineers have implemented the newly installed 3D electrical software to model and analyze the electrical performance of the company's QFP and MQAD packages. During the evaluation, the electrical and thermal performances of several thermally enhanced QFPs, including the drop-in heat spreader, and exposed and PCB-attached heat dissipators were studied in order to provide the customer with the best replacement for the MQAD package. In addition, the effect of the grounded drop-in heat spreader on electrical performance of the HSPBGA package has been evaluated using the new electrical software. AIT engineers are now beginning the modeling and signal integrity analysis of high-performance flip chip packages.

### Thermal and Mechanical Characterization Also Enhanced

AIT has also enhanced its comprehensive offering of both thermal and mechanical characterization capabilities.

Thermal characterization has become increasingly important. As designers adopt new thermal designs and

package types, they first must study thermal enhancement effects by conducting various thermal simulations and analysis. AIT's expanded thermal modeling capabilities can dramatically improve available options for optimizing thermal performance.

AIT's thermal modeling software uses the most updated version of ANSYS Multiphysics 6.1. AIT engineers can model the 3D geometry model with complex geometric configuration (both multilayer and internal structure) and small-scale features including very thin copper trace, thermal and signal vias, power and ground layer, etc. The thermal modeling is fully compliant with JEDEC standards, and detailed features are explicitly included in all thermal models. Customers have the capability to quantify substrate design effects, substrate copper layer thickness, and the number of copper layers of the substrate.

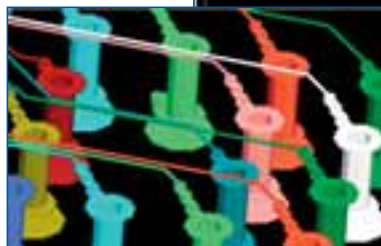
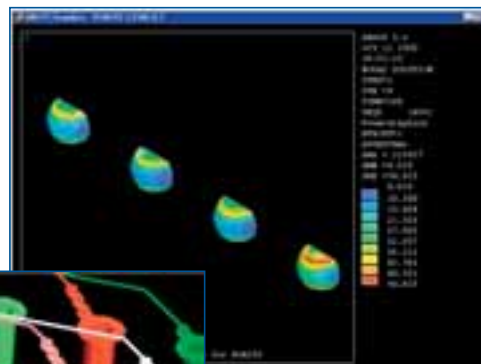
To demonstrate the power of AIT's enhanced thermal modeling capabilities, AIT recently conducted a study of an internally developed fine-pitch ball grid array (FBGA) package manufactured with standard technology. Two different substrate designs were explored – one with less copper and no thermal via, and another with more copper and 16 thermal vias for thermal enhancement. All of the small-scale features of the package and substrate – including copper trace, electrical and thermal via, solder ball, solder mask, and die attach – were modeled explicitly so that the thermal effects of each component could be quantified and investigated.

As a result of the thermal modeling study, it was determined that the PCB has significant effect on thermal performance, and that significant improvements could be realized with different PCB composition, the addition of more copper and thermal vias, and thicker copper.

This level of thermal analysis would not be possible without advanced simulation capabilities. AIT's goal is to provide customers with the most accurate and reliable package thermal – as well as electrical and mechanical – data using well-defined methodologies for package characterization. This enables customers to study the full range of critical effects during the development and design stages.

(PACKAGE CHARACTERIZATION CONTINUED ON BACK COVER)

*Mechanical Characterization – Modeling*



*Electrical Characterization – Modeling*

# B A T A M

## A History of Advanced Interconnect Technologies, Inc. in Batam

### The Development of Batam Island

Up until the 1980's, Batam Island, situated in the heart of the Asia Pacific region, was an undeveloped island. The development of industry in Batam was a result of the combined efforts of the governments of Singapore, Indonesia and Malaysia. In the 1980's Malaysia and Singapore, in particular, were highly focused on the development of production facilities for the manufacture of electronics goods and services, and as a result, were beginning to run out of land on which to build these facilities. This shortage of land, coupled with the rising cost of labor and high employee-turnover, lead Indonesia to take the lead with Singapore in developing a duty-free business model on Batam, enabling Singapore and Malaysia to continue expanding the electronics industry in the region. Batam was the first industrial area of its kind located in the archipelago of Indonesia.

Although dubbed an industrial area, Batam was developed to serve four main functions – industry, trade, tourism, and transshipment. The entire island of Batam is bonded, and as a result, all imported goods for production purposes, including capital goods and raw material, are exempt from import taxes. The government of Indonesia also has demonstrated its commitment to the development of the island with the additional exemption of Value Added Tax (VAT) throughout the island, making Batam an attractive choice of residency for both foreign nationals and Batam citizens. The Batam Industrial Development Authority (BIDA), that reports directly to the president of Indonesia, is responsible for maintaining the Island's rules and regulations so that businesses located in Batam are offered broader incentives for doing business here.

Industrial facilities are abundantly available in Batam, and skilled and semi-skilled labor is plentiful. With a population of 520,000, Batam enjoys a high ratio of workforce to population with 160,000 working in the formal sector and 70,000 more in the informal sector. Companies are allowed to have 100 percent foreign ownership, and more than 34 countries have taken advantage of the facilities of Batam. In addition, Foreign nationals are allowed to buy and own houses, whether or not they work in Batam. Residency permits for foreign workers employed in Batam at registered companies are simple to obtain. Today, the geographic position of Batam continues to be viewed as a stable and cost-effective location for doing business.

### AIT in Batam

When AIT first opened its IC packaging and test facility in Batam, as Astra Microtronics Technology (AMT), there were three electronics companies operating on the Island – Sumitomo, Thomson and Telefunken. Today, Batam Island is still focused on the manufacture of electronics goods, with factories whose primary purpose is to assemble products ranging from semiconductors and ICs to consumer goods such as televisions and radios.

AMT was attracted to Batam due to its low cost of labor, stable and well-educated workforce, and a currency that had an historical trend of devaluating to the U.S. dollar. The geographical location of Batam provided AMT with a cost-effective location because it enabled the company to be closer to its customers and materials/equipment suppliers which were primarily located in Southeast Asia at the time. In 1991, AMT bought land in the Batamindo industrial park and built its factory from the ground up. AMT's first building on Batam was 95,000 square feet with roughly 400 to 500 employees. Today, AIT's Batam facility is more than 350,000 square feet with 3900 employees.



Batam Island

To recruit employees to its facility in Batam, AMT leveraged its ties with its parent company, ASTRA International, the largest conglomerate in Indonesia at the time. ASTRA, with its hundreds of thousands of employees had a large human resources department, experienced in recruiting the best and brightest employees. ASTRA was the company in Southeast Asia that people wanted to work for, so AMT took advantage of ASTRA's recruiting capabilities and brand recognition, hiring educated, yet inexperienced employees to perform the packaging and test of ICs. AMT also developed an extensive internal screening program, putting applicants through rigorous aptitude and physical tests. Once the employees were hired, AMT trained them in an internal "university" set-up by the company to provide ongoing training to its employees.

In March of 1999, Newbridge Capital acquired AMT from ASTRA International and changed its name to Advanced Microtronics Technology (AMT). During that same year, production at the Batam facility reached 1.4 billion units. In 2000, AMT merged with Hana Technologies Hong Kong and became Advanced Interconnect Technologies, Inc. (AIT).

AIT's Batam facility continues to provide its customers with a one-stop shop. The company's services include wafer probing, backgrinding and map capabilities as well as package assembly, final test, tape and reel, and drop-shipment. Operating 24 hours, seven days a week, the Batam facility is continuously striving toward meeting and exceeding customer requirements, delivering products on-time and within budget, and improving safety and promoting high morale among its workforce.

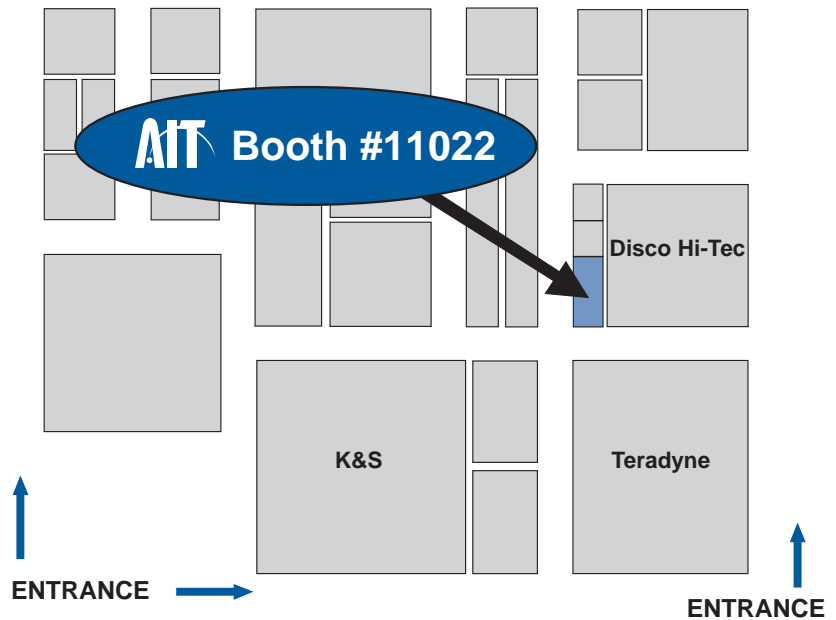
Today, the Batam facility manufactures a broad range of leaded packages in both wire-bond and flip-chip configurations. These packages range from TSSOP to QFP to PLCC to SIP. AIT Batam will continue to grow and expand its line-up of products and services with the introduction of more efficient processes and equipment. The facility has recently installed two new technologies, pillar bumping licensed from Advanpack Solutions, Pte. LTD of Singapore; and QFN-type packaging developed internally by AIT.

As the physical size of the assembly and test equipment decreases, additional space for more equipment will become available, increasing the output of the facility. When this happens, AIT will be able to expand its revenue generating capabilities without the need for more construction. The company predicts that it will double its revenue by 2004.



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(PACKAGE CHARACTERIZATION CONTINUED FROM PAGE 2)

Finally, for mechanical characterization, AIT has added the full complement of thermal stress modeling (including die stress and die crack), board-level reliability modeling, and warpage analysis. The company's goal is to provide customers with the most accurate and reliable characterization capabilities across the full range of package parameters, using well-defined methodologies.

### Raising the Bar for Package Characterization

AIT plans to continue improving its package characterization capabilities with the addition of compact thermal model development, system-level thermal simulation capability, and high-frequency electrical performance measurement up to 50 Ghz. AIT is well positioned to continue optimizing cost and yield across a wide variety of customer package designs, using advanced design and characterization capabilities that assure the highest quality and reliability available today.

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