ATP's New Wide Temperature DRAM Modules

Via new advanced IC level and module level Test During Burn In (TDBI) with Automatic Testing Equipment (ATE), ATP is able to provide a new class of reliable DRAM modules for wide temperature industrial applications.

1.0 Introduction

In several industrial applications, the industrial equipment is installed in a working environment with extreme working temperatures. For example, a telecom base station in North America may be situated in a climate with a temperature of -30°C in winter and 30°C in summer. The regular commercial grade DRAMs, rated from 0°C to 85°C can cause problems for a base station to work properly, even during a cold night in spring. Technicians usually have to spend precious working hours to travel to the remote equipment site to replace the DRAM modules. To face the challenge of satisfying wide temperature (WT) working requirements, ATP utilizes its unique technologies in both the IC screening process to weed out weak DRAM ICs, and the system level Test During Burn-In (TDBI) to ensure the modules meet and exceed extreme WT operating conditions, which ranges from -40°C to 85°C . In addition, specific test patterns can be designed and run on the Automatic Testing Equipment (ATE) for each customer's desired operating conditions. This new solution targets industrial applications such as telecom, networking, IPC, automation and ruggedized systems, and achieves the best total cost ownership (TCO) with long term system reliability.

2.0 The ATP Testing Technologies for the Wide Temperature DRAM Solutions

To offer a cost-effective WT DRAM solution and to maintain the quality and reliability ATP promises to its customers, ATP has offered two level of testing: the advanced IC level testing and the enhanced module level TDBI and ATE.

2.1 Advanced IC Level Testing

Not all DRAM ICs are created equal. The complicated wafer process makes ICs with a wide range of different quality. Some DRAM ICs have stronger reliability characteristics, such as higher data retention time than other ICs under extreme working temperatures. To find the most suitable DRAM ICs for WT DRAM modules, ATP first selects premium DRAM ICs to undergo strict IC level testing. ATP puts these DRAM ICs into two stages of tests: low temperature and high temperature tests, to screen for the ICs with the best reliability and quality characteristics that are suitable for the WT applications (Figure 1). Many competitors do not invest this much energy and time for this level of testing, which makes ATP advanced IC level testing stand out among other competitors. Nevertheless, it allows ATP to ensure that these WT ICs not only have the quality and reliability for each DRAM ICs, but also perform well in a WT working environment under IC level scrutiny.

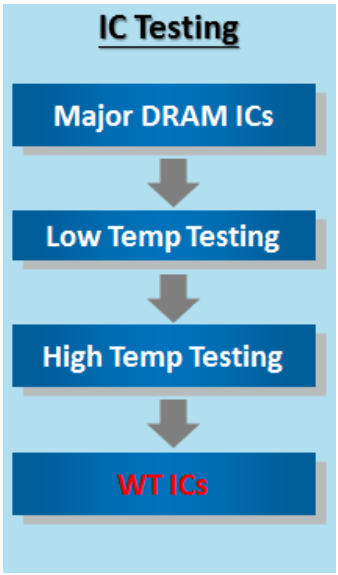

Figure.1: The Advanced IC Level Testing

2.2 The Enhanced Module Level TDBI and ATE Testing

ATP's new ATE and TDBI tests both play a vital role for providing ATP WT DRAM solutions (Figure 2). The new ATE test provides electrical testing patterns with various parameter settings, such as marginal voltage, signal frequency, clock, command timing and data timing under continuous thermal cycles. For specific weaknesses of some ICs, ATE can provide precise testing patterns to stress the screening of the particular defects during the testing. In addition, based on customers' requests, customized electrical testing patterns can be programmed and implemented into the ATE testing process. The ATE testing system is also able to pinpoint individual defective ICs, or defective DRAM PCB boards, which provides a much more efficient failure analysis method for both product development and mass production stages. Moreover, this new ATE system can automatically download the SPD specifications into the testing machines and run the test, while post analysis data of can be uploaded into the production DPM collection.

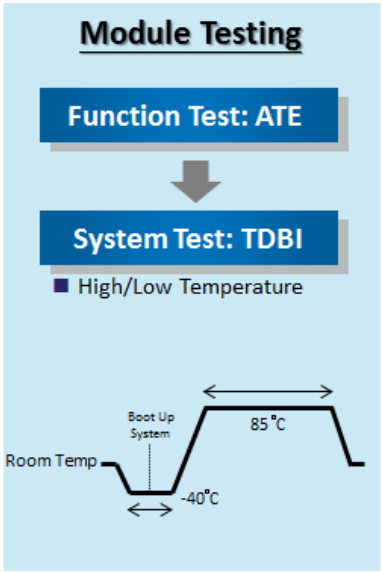

Figure.2: The Enhanced Module Level Testing

The new version of the ATP patented TDBI system consists of: a.) the miniature chamber, which isolates temperature cycling to targeted area, b.) module riser adapters from the motherboard,

which allow for simple production volume module insertions and c.) multiple temperature sensors, which regulate target temperature profiles (Figure 3). With the new addition of a wide temperature control enclosure, the system operates on a wide testing temperature of -40°C to 85°C, a range that other TDBI systems find extremely difficult to achieve. The new testing also includes a cold boot up test at -40°C to assure that the host system, equipped with ATP WT DRAM modules, is able to boot up in a deep freeze environment.

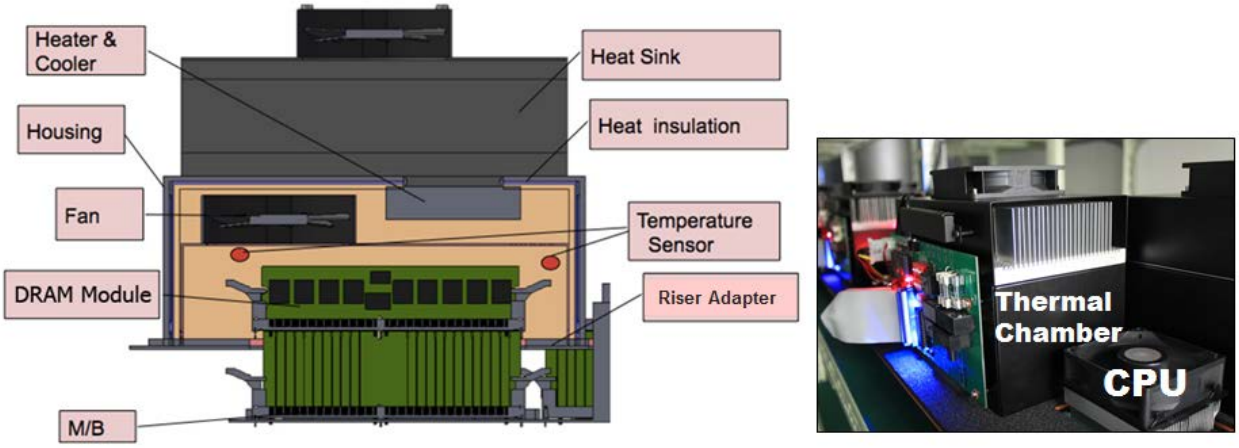

Figure.3: The New Version of the ATP TDBI System

By combining the two tests, the elevated temperature and critical testing signal patterns accelerate the detection of IC infant mortality and enable IC batch screening, which improves incoming IC quality control. This elevates overall ATP WT DRAM module quality and reliability to a new level. Since these systems offer both application and system specific testing, they also perform as powerful tools for product failure mode analysis. Both systems have the capability for swift scalability and ramp up during mass production.

3.0 Conclusion

With strong demands from ATP's industrial customers for a cost-effective WT DRAM solution that can function within the temperature range of -40°C to 85°C, ATP utilizes its advanced testing technologies in both the IC screening process to weed out weak DRAM ICs, and the system level TDBI to guarantee the modules meet or exceed mission critical WT operating conditions. Moreover, application-specific test patterns can be programmed and run on the ATE for each customer's exclusive operating criteria. These testing steps allow ATP to offer WT products without incurring heavy BOM costs.

Compared to other competitors' WT DRAM solutions, the ATP-exclusive IC level and system level testing on quality major DRAM ICs has given ATP WT DRAM modules more reliability in the long run, based on user data in the field. ATP WT DRAM solution has also provided a superior overall system-wide stability over typical commercial temperature DRAM modules. This new solution targets industrial applications such as telecom, networking, IPC, automation and ruggedized systems, and achieves the best total cost ownership (TCO) while ensuring long term system reliability. The solutions are available immediately in DDR3 RDIMM, UDIMM, SO-RDIMM, SO-DIMM, mini-DIMM, and VLP DIMM, with densities from 4GB to 8GB. As with all ATP product offerings, the new WT

DRAM solution follows ATP's controlled BOM policy to address the continuous supply chain requirements of mission-critical applications.

About ATP

ATP is a leading manufacturer of high performance, high quality and durable NAND flash memory solutions as well as DRAM memory modules. With over twenty years of experience in the design, manufacturing and support of memory products, ATP continues to focus on mission critical applications such as industrial automation, telecom, medical and enterprise computing where high levels of technical support, performance consistency and wide operating temperature ranges are required. As a true manufacturer, ATP offers in house design, testing and product tuning. ATP also offers extensive supply chain support with controlled/fixed BOM's and long product life cycles. For more information on ATP products please visit www.atpinc.com, or contact us at Info@atpinc.com