

***Soft Error Rate Improvement –
What the foundry can do***

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TSMC/Technology Reliability

Outline

- **SER service by foundry**
- **Process improvement for SER**
- **Conclusion**

SER Service

- **A silicon foundry provides IC processing service to customers**
- **Memory cell IPs, such as SRAM cell, are also offered to help customer's design**
- **Accelerated alpha test data of memory cells is available upon customer's request**
- **No cosmic ray test due to lack of neutron beam source**
- **No vehicle for measuring SER of logic gates**

Process Improvement

- **Process improvement activities in TSMC focus on reducing alpha's penetration and minimizing carrier collection at sensitive nodes**
- **Process material that can cause Boron fission is not used at TSMC's 130nm generation and below**
- **Alpha emission rate of fully processed wafer is provided to customers upon request**
- **TSMC plans to go for no-lead Bumping process in the future**
- **Package material does matter !**

Conclusion

- **Process options for SER reduction is very limited. TSMC welcomes process ideas and suggestions from customers.**
- **Process improvement can help reduce alphas. But nothing can be done to stop high-energy neutrons.**
- **Extra design efforts, such as ECC at chip or system level, is needed for further SER reduction**