

## Failure Analysis Method of Using Laser Nano Electrostaticfield Probe Sensor(L-NEPS)

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### Abstract

We propose in this paper to introduce the L-NEPS (Laser Nano Electro-static field Probe Sensor), which can detect the slight quasi-electrostatic field generated by optical excitation and thermal excitation occurred when laser beam irradiates on the surface and back of the Die of LSI under non-bias and non-contact conditions, as well as the method to locate the failure point with this device. This report explains the principle of quasi-electrostatic field sensing by L-NEPS and the detection mechanism, and also illustrates the effectiveness of this detection method on the basis of analysis data of two examples of LSI failures (ESD breakdown).

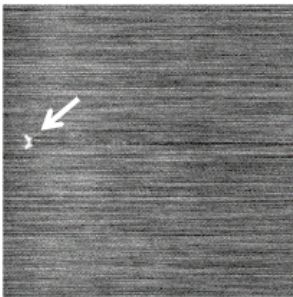


Figure 17: NEPS Image Without wire connection (750x750um area)

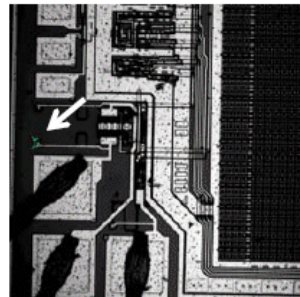


Figure 18: Overlay Image (750x750um area)

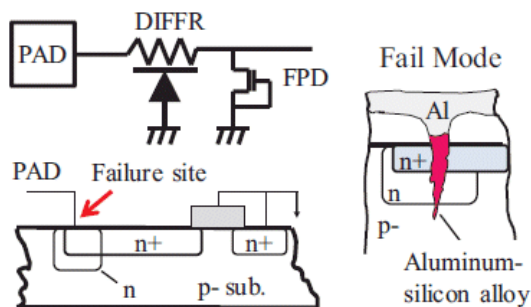


Figure 19: Input Protection Circuit and Cross-section Diagram of the Location of ESD damage