National Nuclear Security Administration

Sandia National Laboratories

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256k SRAM Interlevel Shorts

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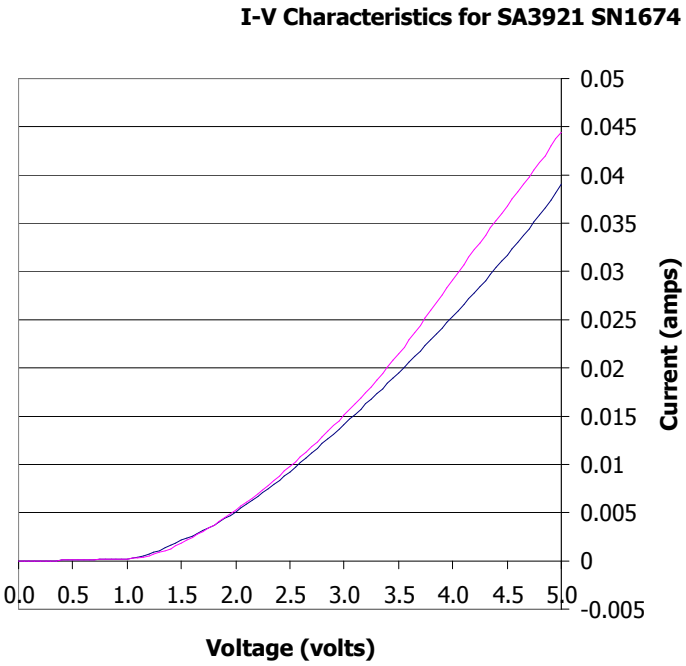
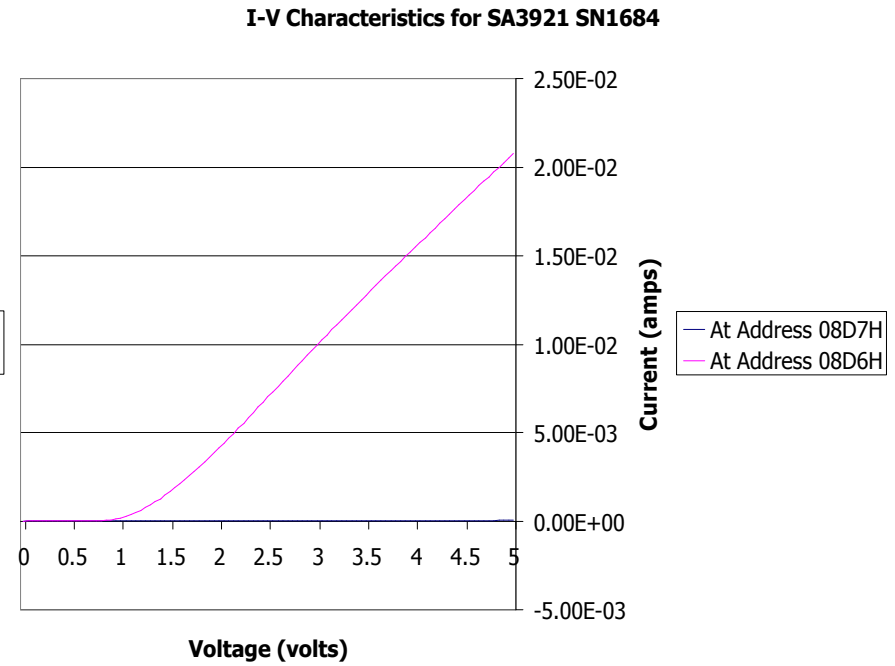
Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Background Information

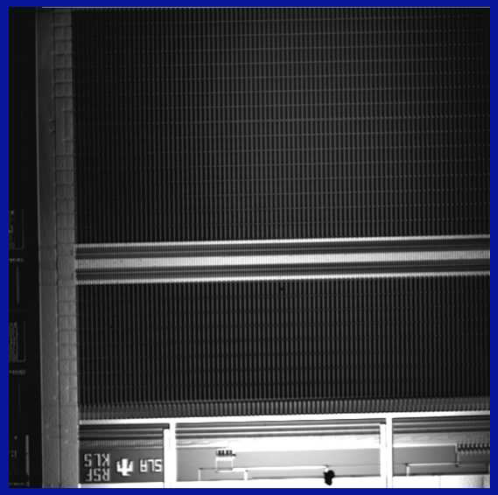
- ICs failed electrical test after packaging
  - ~ 10% fallout (9 of 89)
  - Extract same vectors sets used before and after packaging
- Indication of column failures from the test data
- ICs packaged in 28 pin CERDIPs with metal lids

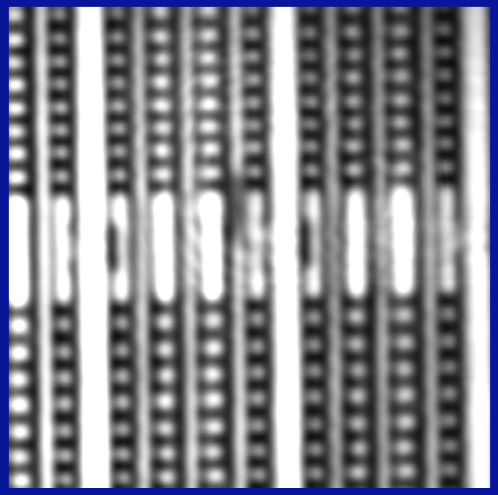
I-V Characterization

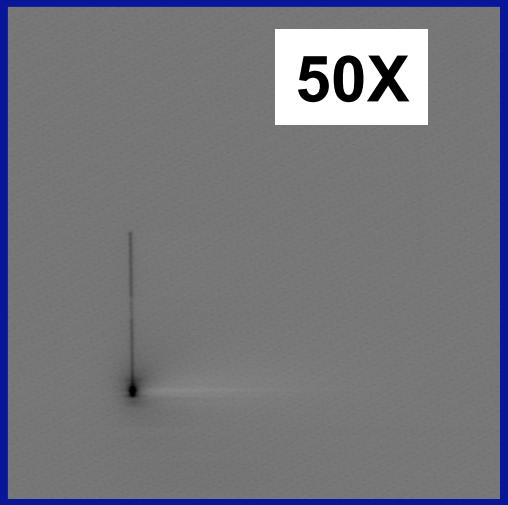


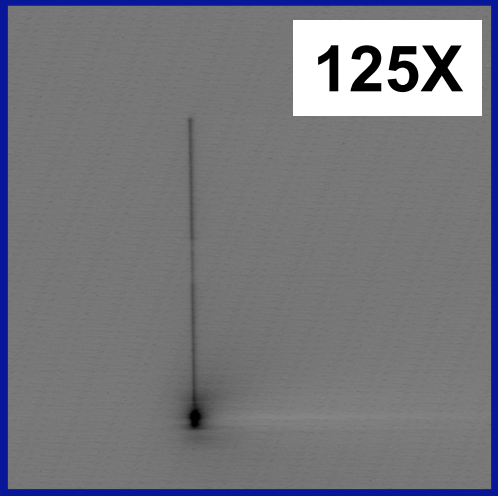


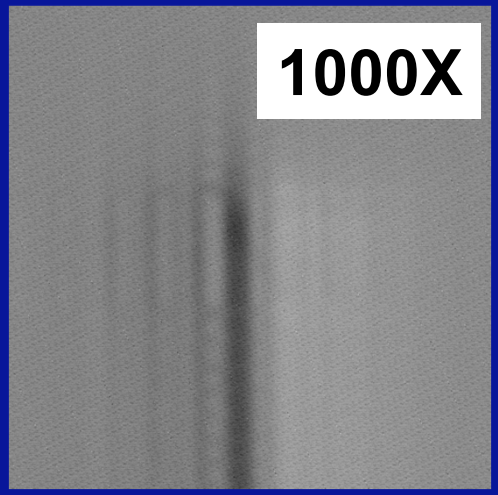
IR Optical & TIVA Images of SN 1669



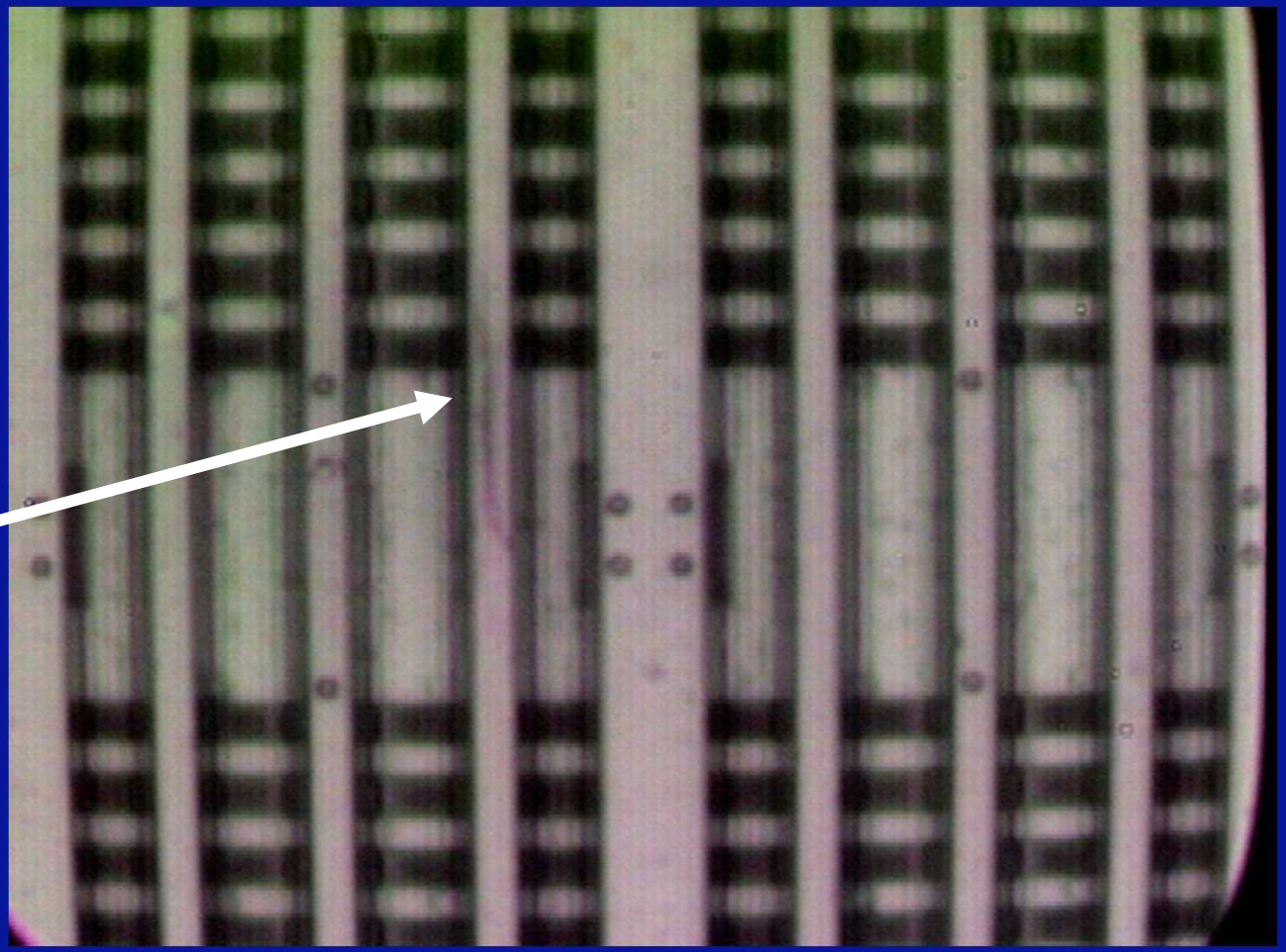




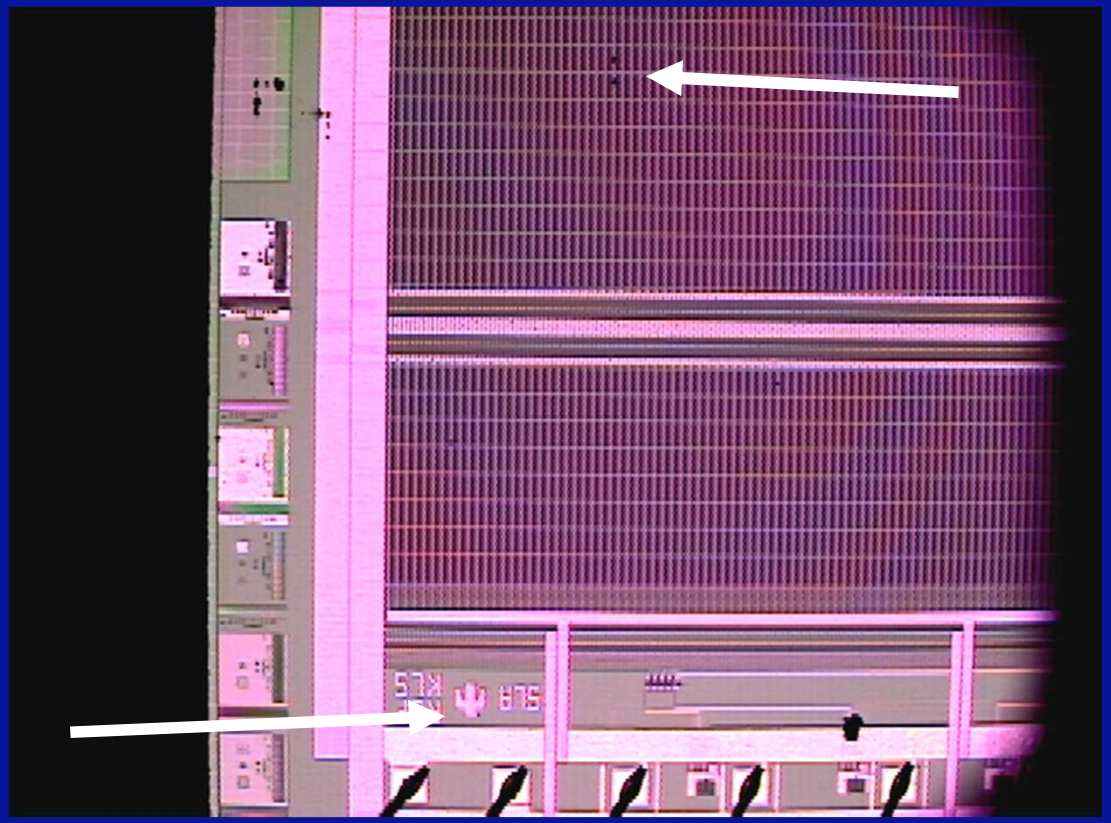




Optical Image of Suspect Defect Location (2500X)



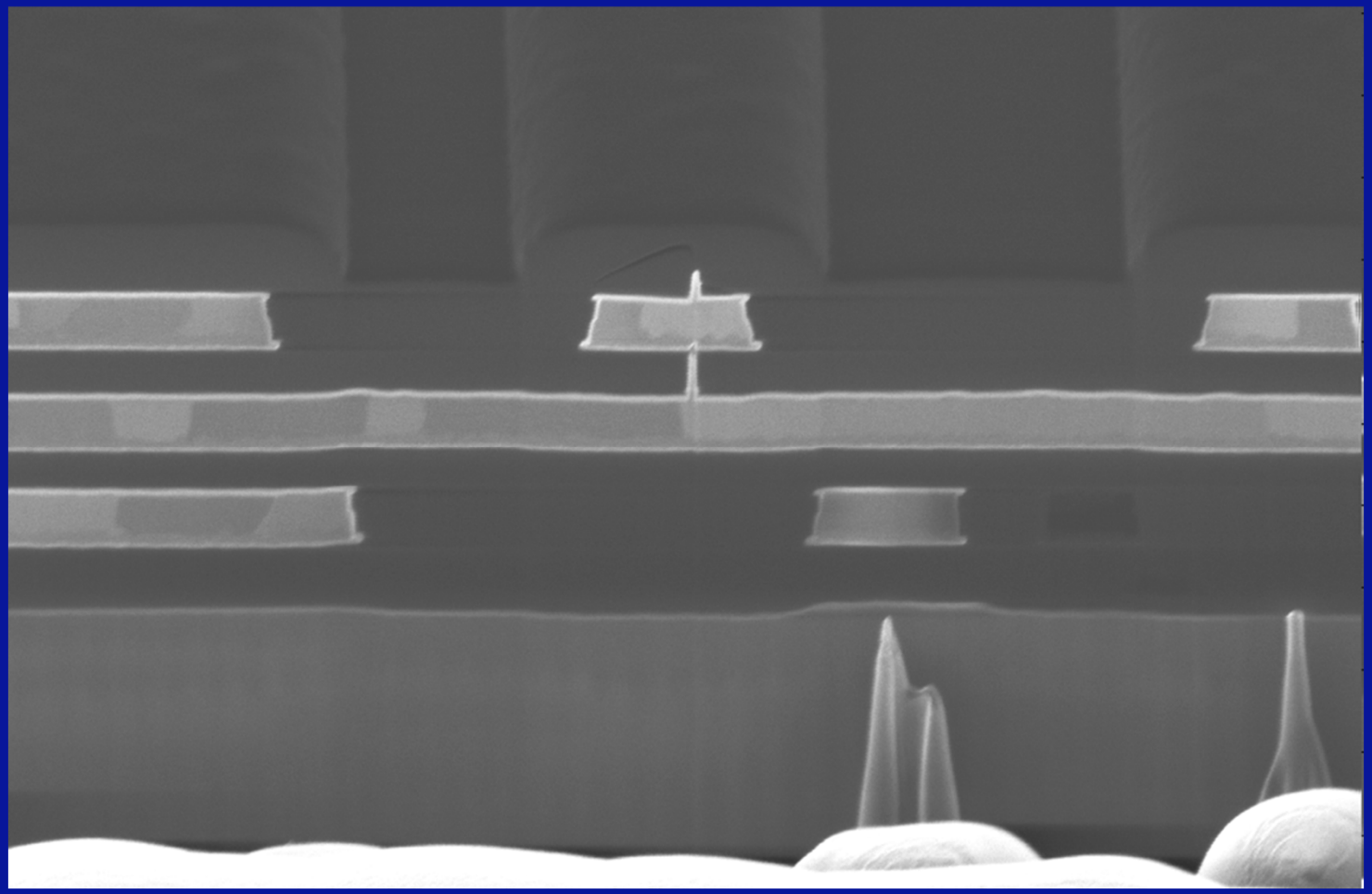
Optical Image showing laser marks relative to die orientation



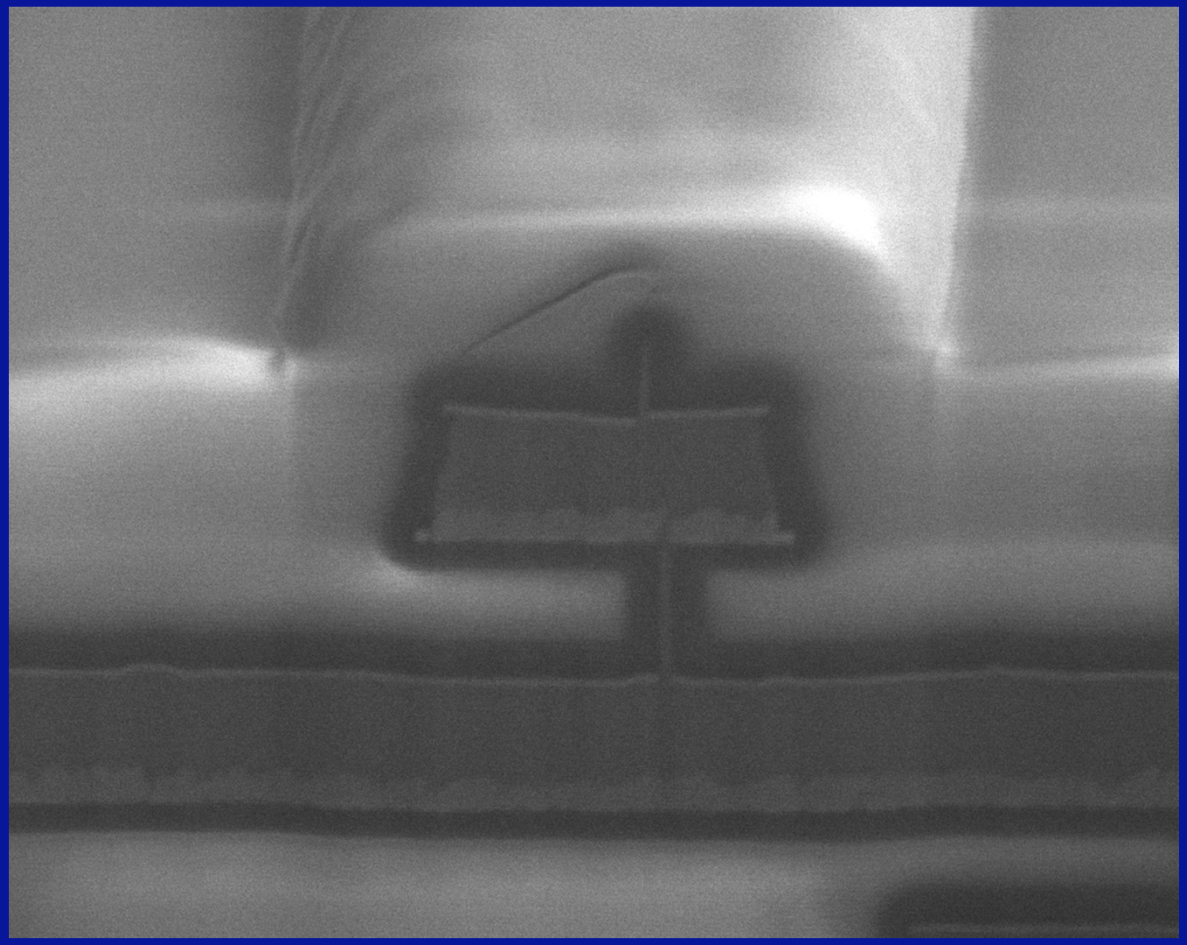
Laser Marks

SNL Logo

FIB Image of Short on SN 1669



Field Emission SEM Image of Short on SN1669



Discussion

- Cracking believed to have occurred during packaging
- 9-day delay between metal-3 patterning and phosphosilicate glass deposition
- Moisture uptake in the dielectric layers believed to have put metal layers in compression, resulting in the extrusion
- Moisture believed to be responsible for cracking