

■ ■ LABORATORY TECHNIQUES ■ ■

THE CRITICAL ANALYTIC STEPS FOR A BIT LOSS FAILURE

A recent case involved a series of failures of an EEPROM due to random bit loss. Within hours to days after programming one or more bits would be lost. There appeared to be some relation to the packaging date code. The chart below was developed to provide an organized approach to solving the problem.

As shown, the primary causes were assumed to be:

- Iddq leakage
- Surface contamination
- Moisture on the surface
- Package delamination

Sufficient samples of good and failed devices were available to perform parallel tests and to obtain a distribution of the key parameters.

The Iddq tests showed a strong relation between high values and failed devices. The fact that the levels dropped with an unbiased bake indicated a possible moisture related cause.

Separate EDS tests showed evidence of human contamination on the surface a few devices.

CSAM evaluations were the most conclusive. On devices prior to board assembly the failed units had significantly higher levels of delamination.

These tests showed that the root cause was package delamination due to poor molding procedures. The second cause was human contamination in the assembly operation. These factors allowed moisture to create localized leakage and bit loss.

ANALYSIS STEPS

