proteanTecs

Automotive Chipmaker Slashes DPPM With ML-Powered Outlier Detection

Discover how the fabless chipmaker boosted quality with proteanTecs analytics, employing telemetry-based machine learning in IDDQ testing

Case Study

NEAR-ZERO DPPM
Defective Parts per Million

SAVED >$250K
Cost of assembly & test of affected dies

SAVED >$1M
Cost of recall & RMA investigation

The Customer

A fabless automotive chipmaker making 16nm radar chips

The customer develops groundbreaking Radar-on-Chip technology for autonomous vehicles.

The chips can operate as standalone or complement Lidar for cost-effective 360° perception across all light and weather conditions.

The Challenge

Widespread latent defects in a safety-first market demanding impeccable quality

The customer had to reduce DPPM, a key quality metric, to meet the strict requirements of the automotive industry. Additionally, there was a need to "shift left" fault detection to reduce costs. The customer wanted to find faults as early as Wafer Sort to prevent expenses related to packaging and further testing of defective dies.

A key concern was IDDQ testing, which can detect anomalous behavior, indicating random or latent defects - a safety risk in automotive applications. The customer sought a method to identify those defects without affecting yield, as none of the conventional techniques proved successful.

→ Part-average testing (PAT) techniques deployed today compromise yield and fail to detect all defects.

→ The road to zero failures lies in personalized, parametric, and predictive ML-driven outlier detection.

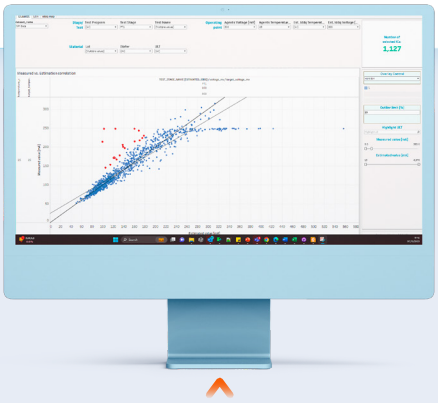
The Solution

Estimator-based defect detection with a deep data analytics tool

The customer embedded proteanTecs on-chip monitoring solution to improve quality while cutting costs. The solution creates a machine-learning model that encapsulates the relation between process profiling data retrieved from the chips and the IDDQ measurement. The model trained in the analytics platform is loaded to the ATE application, allowing it to compare the measured IDDQ with the predicted one in real-time.

With this new tester capability, outliers were found for the first time, catching latent defects that were previously undetectable. The customer discarded such units, which were likely to fail in the field after some usage.

This granularity has enabled a dependable in-line defect detection process that the customer was unable to achieve with conventional methods.



The proteanTecs platform showed multiple outliers in red when comparing measured IDDQ (Y-axis) with predicted IDDQ (X-axis)

The Results

Substantial reliability improvement: Thanks to the proteanTecs solution, the customer reduced **DPPM** from a competitive level to nearly zero, gaining trust with potential automotive customers. To cross-check the process, the customer tested 10 sample outliers in HTOL ovens, 7 of which failed.

Considerable cost saving: Early detection led to direct savings of over **$250,000** by preventing assembly, packaging and further testing (packaged device tests) of affected dies. The customer also saved over **$1,000,000** by avoiding RMA costs and prolonged investigations at a much later stage.

CONTACT US TODAY
to discover how proteanTecs can help your business achieve similar results

→ Schedule a Demo

VISIT US > proteanTecs.com