SPTS
A KLA Company

CASE STUDY

Improving MTBC for SiN Etch

Image: Courtesy of Skyworks Solutions, Inc.

Customer

Skyworks Solutions, Inc.(NASDAQ: SWKS) manufactures innovative analog semiconductors for the automotive, broadband, cellular infrastructure, connected home, industrial, medical, military, smartphone, tablet and wearable markets.

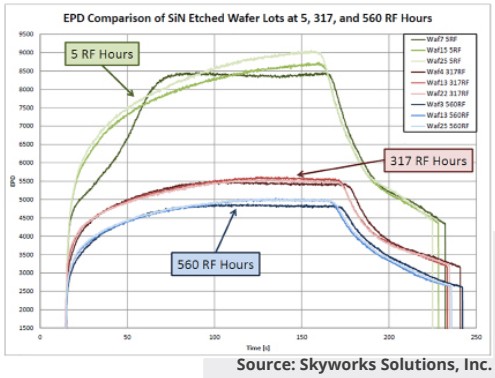
www.skyworksinc.com

Application

Frontside fabrication for advanced GaAs based RF applications often involves inductively coupled plasma (ICP) etching of thin layers of SiN to define critical features.

Background

Many RF devices rely on the precise and repeatable processing of GaAs substrates containing various films. One such process is the patterning of thin (<2µm) of SiN on GaAs using a photoresist mask. The CF_4- based chemistry employed to etch SiN generates by-products that accumulate within the ICP chamber in several locations including the window to the optical end-point spectroscopy (OES) system. Over time, this leads to reduced etch rates, high particle counts, and missed end-points due to signal loss. Regular chamber cleans are required to maintain process integrity and end-point measurements, and a short Mean Time Between Cleans (MTBC) leads to low productivity. The aim of this project was to triple the initial MTBC by proactively tackling each potential root cause of poor performance.



Source: Skyworks Solutions, Inc.

OES signal degradation over time

OBJECTIVE

- Improve productivity of a SiN etch process (on RF-IC GaAs substrate) by increasing Mean Time Between Clean (MTBC)
- Identify and address different issues causing premature faults which reduced MTBC

SOLUTION

- Improved cleaning and preventative maintenance (PM) procedures to reduce variability of wafer clamping/ cooling and premature fault conditions
- Re-design OES system to reduce etch by-products accumulation, aid correct positioning for data capture, and enable easier maintenance
- Production data analysis to optimize end-point recipe over kit lifetime

RESULTS

- MTBC was successfully increased from 200 RF hours to between 550-600 RF hours
- Productivity increased by 75%
- Multiple ICP process chambers are replicating this improvement

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SPTS Technologies, a KLA company, designs, manufactures, sells, and supports etch, PVD, CVD and MVD® wafer processing solutions for the MEMS and sensors, advanced packaging, photonics, high speed RF, and power device markets. For more information, email enquiries@spts.com or visit www.spts.com