

Recommendations for Grade BN-1250 Processing at 1150°C

PDS® Products grade BN-1250 planar diffusion sources were introduced thirty-five years ago for high temperature depositions. The original use instructions included:

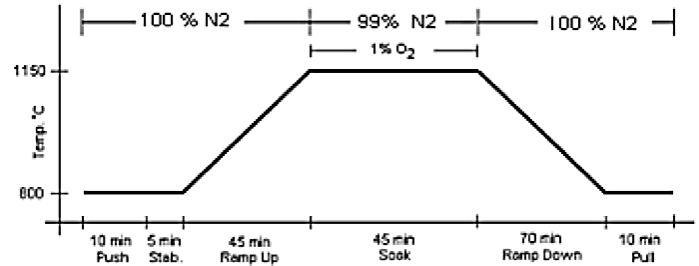
- Periodic reoxidation to replenish the reservoir of B_2O_3 .
- Periodic re-etching to expose fresh boron nitride.
- Use 100% nitrogen during the deposition process to avoid excessive oxidation of the source.

Recently, we reexamined these recommendations, using the PDS Products Class 100 Cleanroom. As a result we have developed new instructions for use of BN-1250. Diffusion processing now includes the use of 1% oxygen during the soak step.

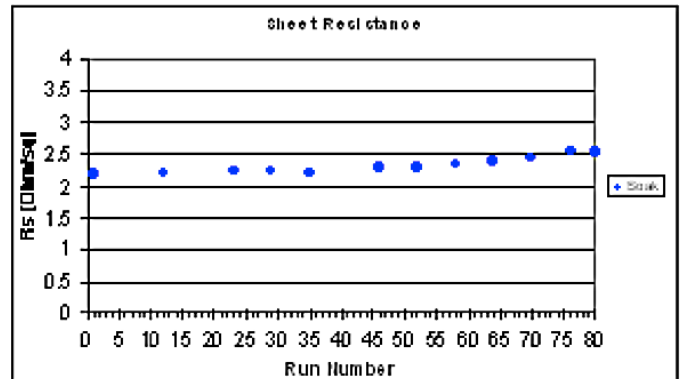
The benefits are:

- Eliminate periodic reoxidation and re-etching.
- A more uniform and stable Sheet Resistance.

Typical BN-1250 Diffusion Process outline at 1150°C with Oxygen:



BN-1250 processing using 1% O_2 during the soak interval resulted in 80 cycles with only 1/4 ohm/sq increase in sheet resistance. This is shown below:



P-Type Planar Diffusion Sources

BORON GLASS THICKNESS

Measuring the thickness of the deposited boron glass layer (Tgf) on the silicon wafer is a key aspect to optimum PDS Products performance. The information gained can be used to determine the condition of the PDS Products solid source wafer.

Refer to the guidelines in the next page for processing BN-1250 with oxygen:

Silicon Tgf	Risk	Symptom	Corrective Action
> 1200Å	Excess Boron Glass / Dopant Source Over Oxidation	Source Wafers Warping & Sticking to Carrier Rapid Tgf increase over source lifetime	Continue to monitor Tgf Decrease O ₂ %
400Å - 1200Å	None - Optimum Performance Range	Good Rs uniformity Slight Tgf increase over source lifetime	Continue to monitor Tgf
< 400Å	Not enough dopant to support diffusion	Unable to reach target Rs Poor Rs Uniformity	Continue to monitor Tgf Increase O ₂ % Incorporate an additional 1% O ₂ during the ramp interval

SUMMARY

New recommendations for BN-1250 diffusion processing are to include 1% O₂ during the soak step. This will continue to develop B₂O₃ supporting uniform and consistent diffusion while minimizing silicon damage and the need for frequent reoxidation.

This document is part of a continuing effort to provide current processing information. New data will be added as it is developed.

For further information, or specific processing recommendations, please visit us at www.bn.saint-gobain.com, or contact your PDS Products specialist at bnsales@saint-gobain.com



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