

Expanding The Lithography Process Window (PW) With CDC Technology

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ABSTRACT

The continuous shrinking of the semiconductor device nodes requires tough specs of CD uniformity which result in narrowing of the lithography process window. Finding methods for expanding the process window will enable to continue manufacturing at least one more generation using the existing litho equipment.

In this paper we will demonstrate a way to expand the lithograph process window by using the Carl Zeiss CD control (CDC) Technology.

A production memory product in PSC fab P1/2 showed reduced yield due to reduced process window in Poly layer. A close investigation in the fab showed CD non uniformity of 3.95nm 3S and 6.5nm Range in this layer.

A CDC process to improve the CDU was applied by the Carl Zeiss CDC200 tool.

Post CDC results show that CDU 3S has reduced to 1.94nm (53% improvement) and 3.7 nm Range (43% improvement)

Further assessment of this layer process window showed an increase of DOF from 0.15 um pre CDC to 0.3 um post CDC and exposure latitude increase from 18.7% pre to 26.7% post CDC.

To summarize our findings, applying the CDC process to the problematic layers allowed to increase the PW in both DOF and exposure latitude by improving the CDU of the layer. This resulted in better yield of this product.

Key words: CDC, Process Window, CDU, DOF, Exposure Latitude