**ABSTRACT**

A plurality of contact trenches are formed in a semiconductor structure. The plurality of contact trenches are formed with a contact opening width selected to result in an improper contact trench formation in a random number of the plurality of contact trenches. Devices are formed from the semiconductor structure using the plurality of contact trenches, wherein devices formed with improperly formed contact trenches are defective and devices formed with properly formed contact trenches are not defective. One or more measurements are performed to determine which devices are defective and which devices are not defective. The results of the measuring step represent a unique authentication code for an integrated circuit in which the devices are formed. Advantageously, the unique authentication code represents a physically unclonable function.

20 Claims, 5 Drawing Sheets