

Application Note

DSA20060715: Scratch Analyzer

FEATURES

Pre-process KLARF data

Detect Scratches

Output



Introduction

DSA Release 8.2 use one scratch analyzer function: **Thin Scratch Analyzer/Filter**. This function allows users to analyze either straight or thin arc scratches (sparse or adjacent, isolated or intersecting, etc.) on wafer surface. Thin Scratch Analyzing/Filtering is comprised of three steps:

1. Pre-process KLARF data, which is filtering by classification attributes;
2. Detect Scratches.
3. Output.

Pre-process KLARF data

The input data to the **Thin Scratch Analyzer/Filter** may be **filtered by classification attributes** (e.g., ClassNum).

- Check Filter by Classification Attributes before processing to filter data by the defect's classification type before performing the object analysis.
- Press the Settings button to view the dialog box below:

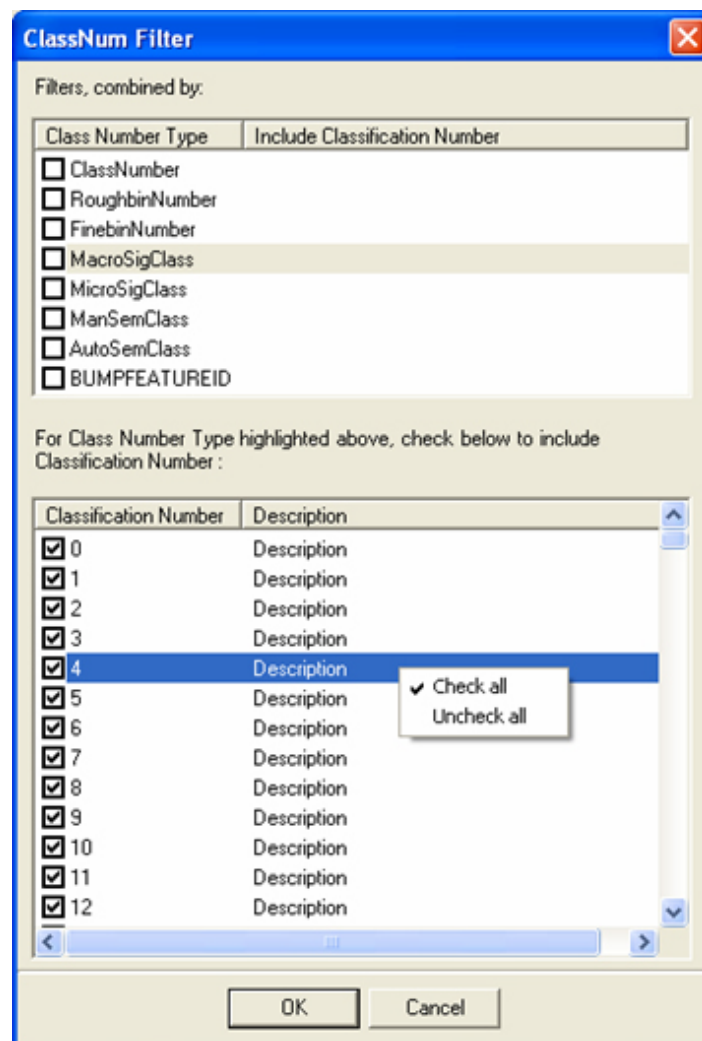


Figure Error! No text of specified style in document. 1 ClassNum filter

- Select *Class Number Type* by checking a field from its list.

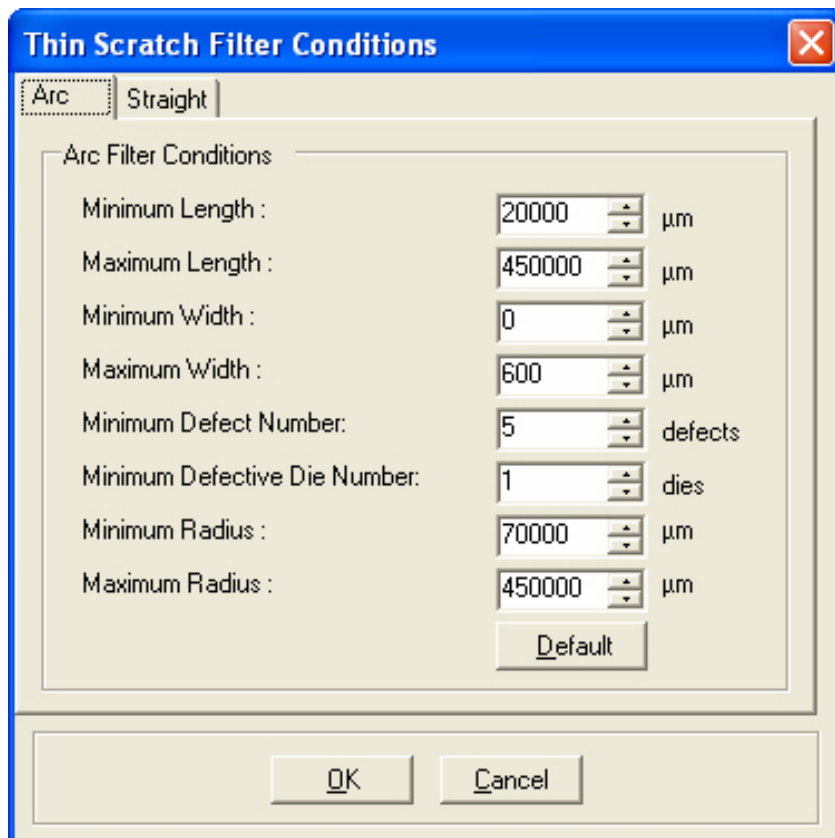
Refer to [Filter by ClassNum](#) for the usage of the check box “*Filter by Classification Attributes before processing*”.

Detect Scratches

This function can find and analyze three types of thin scratch:

1. **Straight Scratches**: Check this option to detect and view only straight thin scratches on the result file.
2. **Short Scratches**: Check this option to detect and view only isolated short and thin scratches of which length is less than approximately 30,000 μm and thickness is less than approximately 400 μm .
3. **Arc Scratches**: Check this option to detect and view only arc thin scratches on the result file.
 - Check *Sparse Arc Scratches* to also detect and view the thin scratches with low density on the result file.
 - Press the **Filter Conditions** button to filter and keep only the arc scratches that satisfy the parameters user sets in the dialog box below:

- [The Arc tab:](#)



The image shows a dialog box titled "Thin Scratch Filter Conditions" with a blue header bar and a close button (X) in the top right corner. The dialog has two tabs: "Arc" (selected) and "Straight". The "Arc Filter Conditions" section contains the following settings:

Parameter	Value	Unit
Minimum Length :	20000	μm
Maximum Length :	450000	μm
Minimum Width :	0	μm
Maximum Width :	600	μm
Minimum Defect Number:	5	defects
Minimum Defective Die Number:	1	dies
Minimum Radius :	70000	μm
Maximum Radius :	450000	μm

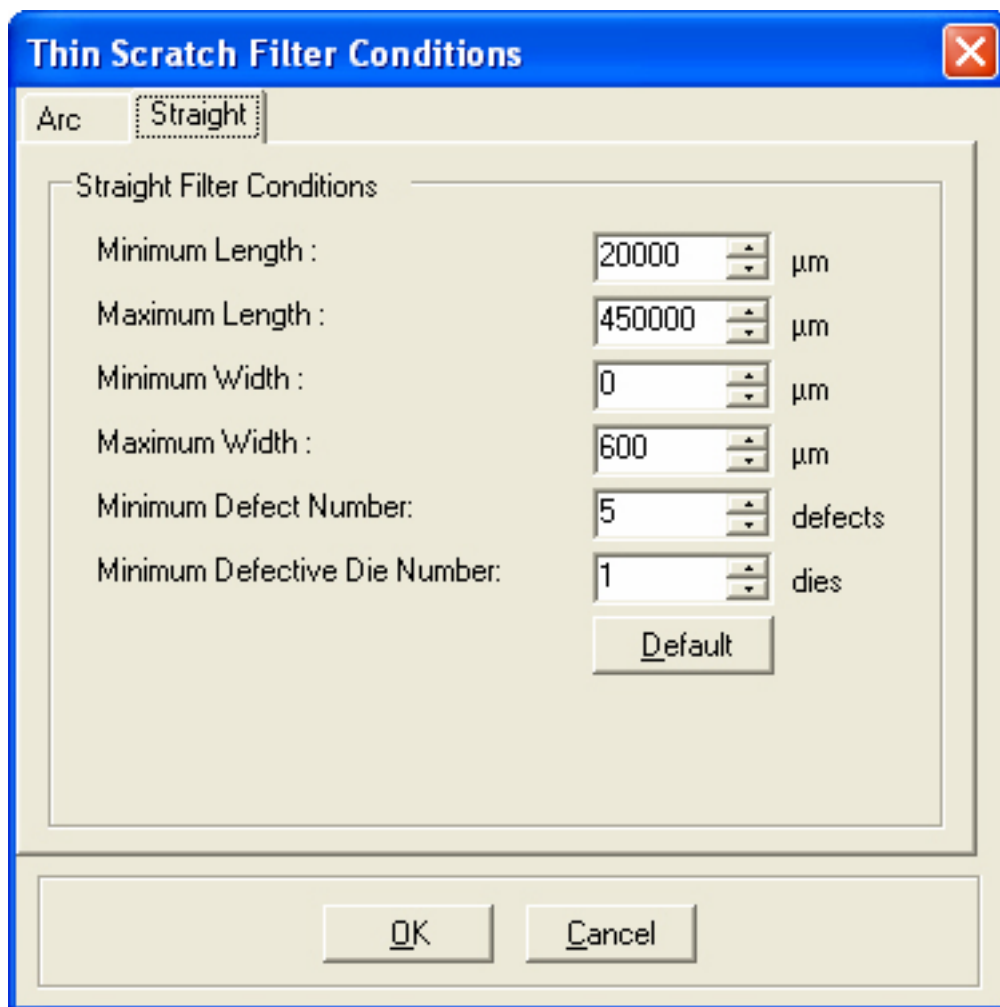
At the bottom of the "Arc Filter Conditions" section is a "Default" button. At the bottom of the dialog box are "OK" and "Cancel" buttons.

Figure Error! No text of specified style in document. 2 Thin Scratch Filter conditions - Arc

- *Minimum/Maximum Length*: the acceptable minimum/maximum length of the thin arc scratch to be filtered.
- *Minimum/Maximum Width*: the acceptable minimum/maximum width of the thin arc scratch to be filtered.
- *Minimum Defect Number*: the acceptable minimum number of defects in the thin arc scratch to be filtered.
- *Minimum Defective die Number*: the acceptable minimum number of defective dies in the thin arc scratch to be filtered.
- *Minimum/Maximum Radius*: the acceptable minimum/maximum radius of the thin arc scratch to be filtered.

The **Default** button allows user to reset all parameters to default values.

- [The Straight tab:](#)



The screenshot shows a dialog box titled "Thin Scratch Filter Conditions" with a blue header bar and a red close button. It has two tabs: "Arc" and "Straight", with "Straight" being the active tab. The "Straight Filter Conditions" section contains six parameters, each with a numeric input field and a unit label: "Minimum Length" (20000, μm), "Maximum Length" (450000, μm), "Minimum Width" (0, μm), "Maximum Width" (600, μm), "Minimum Defect Number" (5, defects), and "Minimum Defective Die Number" (1, dies). Each input field has up and down arrow buttons. A "Default" button is located below the "Minimum Defective Die Number" field. At the bottom of the dialog are "OK" and "Cancel" buttons.

Parameter	Value	Unit
Minimum Length	20000	μm
Maximum Length	450000	μm
Minimum Width	0	μm
Maximum Width	600	μm
Minimum Defect Number	5	defects
Minimum Defective Die Number	1	dies

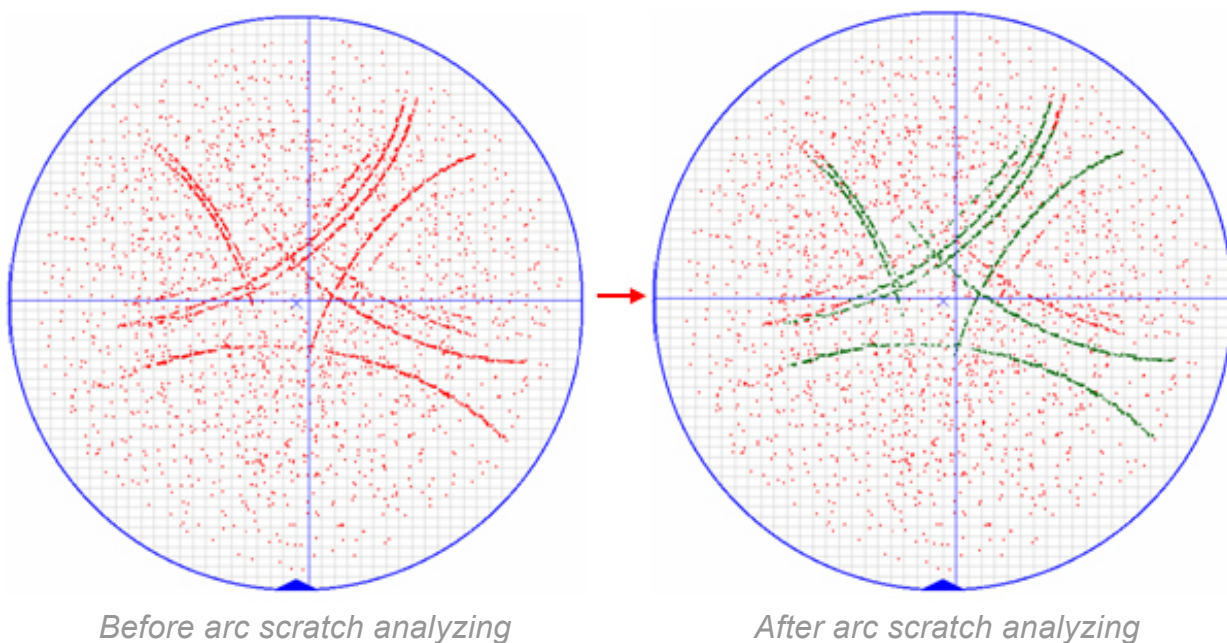
Figure 3 Thin Scratch Filter conditions - Straight

- *Minimum/Maximum Length*: the acceptable minimum/maximum length of the thin straight scratch to be filtered.
- *Minimum/Maximum Width*: the acceptable minimum/maximum width of the thin straight scratch to be filtered.
- *Minimum Defect Number*: the acceptable minimum number of defects in the thin straight scratch to be filtered.
- *Minimum Defective die Number*: the acceptable minimum number of defective dies in the thin straight scratch to be filtered.

- Press **OK** to accept the settings.

Example:

The figure below illustrates a KLARF file before and after being processed with Thin Scratch Analyzer.



The **green** scratches shown above are thin arcs.

- To view and keep only these scratches on wafer, click the **Show Analyzed Data** button from the wafer toolbar.
- To select an arc, left click on any point belonging to the arc, the whole arc will be highlighted in **light green**.
- To view an arc's information as shown below, select and right click on it.

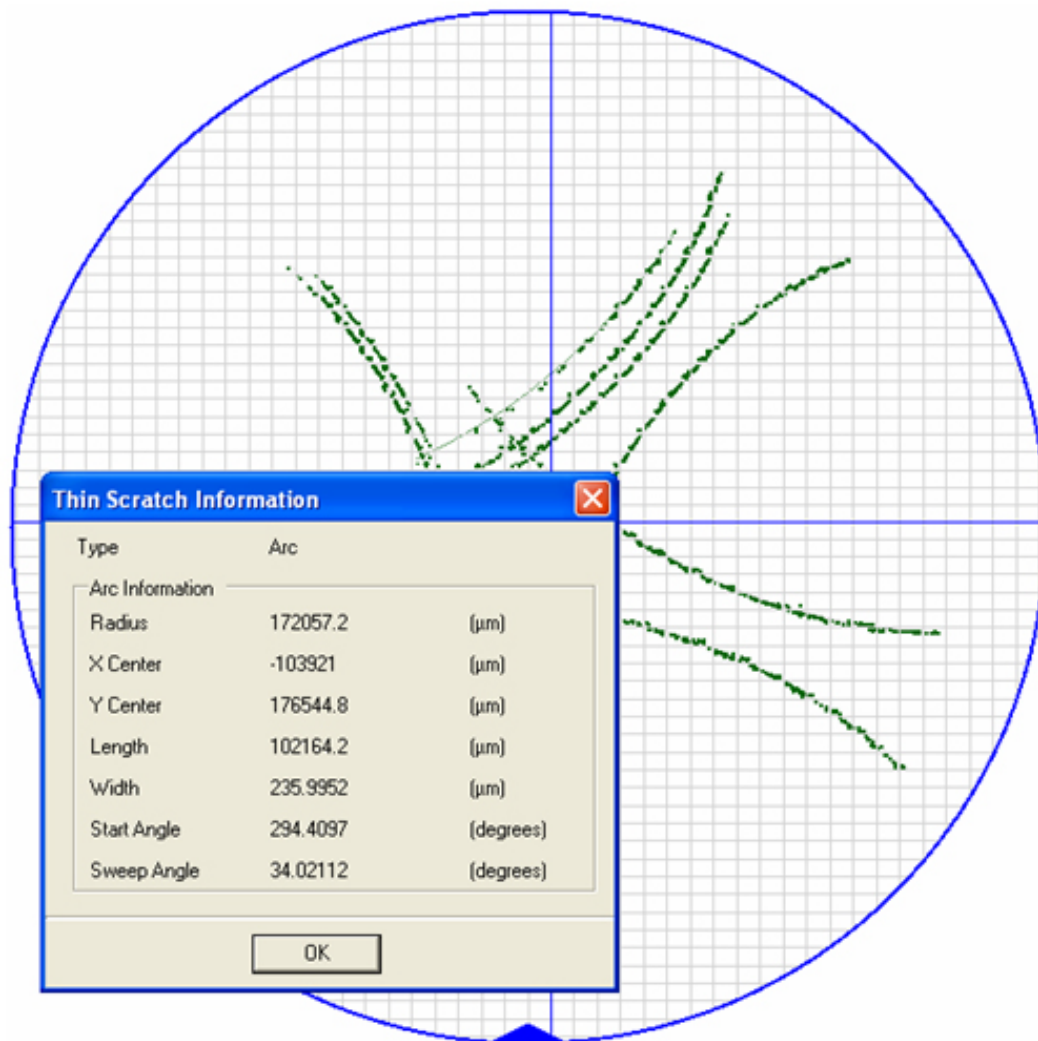


Figure *Error! No text of specified style in document.* 4 Thin Scratch information

Output

The output options are only applied to Thin Scratch Filter function.

- Select one of the Output Options:

- Keep Scratch defects only: Analyze defects and keep in the current results file only the scratches that meet the criteria set above.
- Clear Scratch defects from defect list: Analyze defects and filter out from the defect list all the scratches that meet the criteria set above.
- Classify Scratches: Assign classification attributes (e.g. ClassNum Type) to all scratches that meet the criteria above. Press the Arc Scratch Classification button to specify three types of classification as follows:

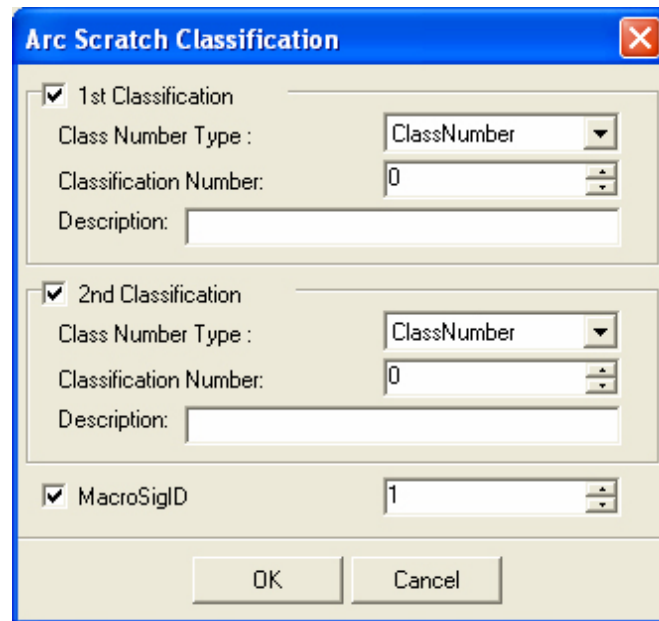
The image shows a software dialog box titled "Arc Scratch Classification". It has a blue title bar with a close button (X) in the top right corner. The dialog is divided into three sections, each with a checked checkbox: "1st Classification", "2nd Classification", and "MacroSigID". Each section contains a "Class Number Type" dropdown menu (all set to "ClassNumber"), a "Classification Number" spinner box (all set to "0"), and a "Description" text field. At the bottom, there are "OK" and "Cancel" buttons. The "MacroSigID" section has a spinner box set to "1".

Figure Error! No text of specified style in document. 5 Arc Scratch Classification

Classify defects by checking *1st Classification*, *2nd Classification* and/or *MacroSigID*. Enter the Classification Number and Description of the scratch signature.

Press **OK** to accept the defined type of classification into output result.

- *Update Cluster ID*: After analysis, the Cluster ID of original KLARF file will change according to the analyzing results. This option is used to update new Cluster ID into the output file.
- Press **OK** to finish the task and view the result wafer map.

Example:

The image below illustrates a KLARF file before and after being processed with Thin Scratch Filter.

