George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

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ORGANIZATIONAL WORK INSTRUCTION

EM50

Image Analysis of Silicon Wafer Optical Witness Samples

APPROVING AUTHORITY	NAME	TITLE	ORG	DATE
Group Leader	DeWitt Burns	Environmental Effects Branch	EM50	4/27/2005

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		10-2-97	Initial Release
Revision	A	6/2/99	Revision to incorporate re-organizational changes
Revision	B	8/3/99	Revision to setting verifications in sections 4.13 and 4.16
Revision	C	6/28/02	Revision made to incorporate applicable OWI changes and correct errors
Revision	D	9/3/04	Revision to accommodate NASA HQ actions for document standardization
Revision	E	4/27/05	Changes made due to reorganization

Image Analysis of Silicon Wafer Optical Witness Samples

1. SCOPE

1.1 Scope

This document establishes the standard operating procedure for the Image Analyzer. This instrument setup does not require periodic calibration.

1.2 Purpose

The purpose of this document is to outline the steps necessary for image analysis of particulate contamination on silicon wafer optical witness samples.

1.3 Applicability

This document only applies to the Image Analyzer, located in 4711, room E111B. This operating procedure is not a substitute for formal training in instrument operation. Untrained personnel shall not attempt to use this document to operate this instrument unless supervised by trained, experienced personnel.

2. APPLICABLE DOCUMENTS

EM50-OWI-002 - Work Request Process

EM50-OWI-003 - Control of Records

3. DEFINITIONS

3.1 OWS - Optical witness sample - 2" diameter silicon wafer.

3.2 Particulate Contamination - Foreign matter found on the surface of the Silicon Wafer which can be quantified.

3.3 OWS Holder - Specialized fixture that allows for the storage and handling of the silicon wafer OWS. Fixture is three main parts; cover, base plate, and wafer ring. Four fastening screws, Teflon spacer, and viton o-ring are also included. Holder is black and is serialized.

4. INSTRUCTIONS

4.1 Turn on light source power supply. Verify that light intensity setting is set to **3**. If it is not set to **3**, turn knob till the knob's pointer is pointed and centered on **3**.

4.2 Turn on monitor via power button.

4.3 Using joystick, move microscope stage towards you and your right, till it stops.

4.4 Verify that the objective in line with the optics is the 10x objective. If it is not the 10x objective, rotate the objective carousel till the 10x objective is in line with the optics.

4.5 Put on a fresh pair of clean room compatible gloves.

4.6 Remove the OWS holder from the bagging material. Inspect the outside of the OWS holder for contamination. Note in log, any particulate contamination found.

4.7 Using hex screwdriver found in flow bench, remove the two screws holding the cover onto the OWS holder. Place screws in the used screw container for future cleaning.

4.8 Place OWS holder on stage with serial # such that you can read it from the front. Place OWS holder onto the indexing pins on stage.

4.9 Remove the OWS holder cover and place cover within flow bench, in area where it will not be contaminated.

4.10 Using joystick, move stage so the silicon wafer is somewhat centered under objective.

4.11 Using joystick, move stage around while watching monitor, till a particle is found. Try to find a particle near the center of the wafer. Once particle is found, use focus knobs on stage and focus microscope till particle is in focus on monitor.

4.12 On the computer (Sun workstation) with the mouse, right click with the cursor on the desktop. Select Image Analysis then the icon labeled **Feature Analysis**.

4.13 Verify settings as follows:

> **No** overwrite confirmer; State File: **Auto_2_inch_OWS**; Action: **Geometric Analysis**; Category**: Multiple Fields Analysis**; Region: **Full image**; Feature region: **Dark**; Destination: **New analysis**; Display number: **1**; Image number: **1**; **Analysis name: see step 4.14;** Measurement file: **NASA_Buckets**; Feature selection formula: **"area fraction"**; Report category: **Feature measurements**; Report unit: **microns**; Labels: **center**.

4.14 Enter file name for analysis next to **Analysis name** and click on the **Store** icon.

4.15 Right click on desktop, move cursor to Utilities icon, then Automation/Systems Controls, then List of user sequences, then right click on **Collect_Images.**

4.16 Verify Settings to match the following:

> Sample positioning: **Automatic**; Stage: **Prior_Sci_XY**; Points File: **60_Point_Scan** (56 points); Image binarization: **Color**; Table: **Test 147**; Image analysis: **Feature analysis** selected; Feature state: **Auto_2_inch_OWS**.

4.17 Click the **Run** Button.

4.18 After the first image has been displayed on screen, verify that it is accurate to what is on the monitor. If it is okay, click the **Done** button to continue. If it is not okay, click on the **Image Collect** icon and then click on the **Run** button. Go. If okay, continue with 4.19 otherwise repeat.

4.19 After the image is enhanced and analyzed, verify that the analysis is complete and click on **Done** button to continue.

4.20 When Analysis is complete for all 56 images, generate report by the following procedure:

a) Switch to **Feature Analysis** screen
b) Click once on **Report category** so it reads **Field measurements**
c) Click on **Analysis Summary** then click on **Summary**
d) Click once on **Report category** so it reads **Feature measurements**
e) Right click (with mouse) on **Histogram** and select with right mouse button, **Data to Window**
f) Click on **List**
g) Switch to **Data Window** screen
h) Click on **Print** button

4.21 Switch to **Feature Analysis** screen. Click on **Store** button to store Analysis.

4.22 Record required data in log folder.

4.23 Using joystick, move microscope stage towards you and your right, till it stops.

4.24 Remove OWS holder from stage and place near cover.

4.25 Turn off light source power supply.

4.26 Turn off monitor.

5. NOTES

None

6. SAFETY PRECAUTIONS AND WARNING NOTES

None

7. APPENDICES, DATA, REPORTS, AND FORMS

None

8. RECORDS

Electronic database, log folder, and printed Analysis Report, all per EM50-OWI-003, EM50 Control Of Records

9. TOOLS, EQUIPMENT, AND MATERIALS

OWS holder (with 4 screws, viton o-ring and Teflon spacer), silicon wafer, hex driver tool, clean room compatible gloves, scissors (to remove bagging material), microscope stage and optics, light source and power supply, computer system (including printer), and monitor.

10. PERSONNEL TRAINING

Image Analysis operators must be trained by a qualified user in all aspects of this instrument. They shall be approved by the Group Lead before using equipment.