1. Scope: This document describes the operation of the 6100/6200 Scanning Electron Microscope for review of KLA2131/MAX880 inspected wafers.

2. Reference Documents:

2.1 Refer to binder #212-PQC

3. Contents

4. Safety Precaution: N/A

5. Equipment

5.1 SEM 6100
5.2 SEM 6200

6. Operating Instruction:

6.1 After inspecting and reviewing a wafer, you must obtain the defect coordinates from the database.

6.1.1 After reviewing a wafer on either the KLA2131 or Leica review stations, load the data into the 2551 database.

6.1.1.1 If only certain defects are desired for SEM review, bring up the pareto chart for the inspected wafer and choose the defects. Click on "Data Summ" button. In the "Data Summ" window, choose "Use Graphical Selectors" and click on "OK" button. The Wafer Orientation must be "Down" for these coordinates to be valid.

6.1.1.2 If 100% review is desired click directly on "Data Summ" and click on "OK".

6.1.1.3 Use "Output" function to create a printout of the defect list.

6.1.2 After reviewing a wafer on the MAX880, use the Transfer option to store the data in the WIPAS.

6.1.2.1 On the WIPAS, find the inspection in the MAX880 window and click on it.

6.1.2.2 Choose "Plot". When the plot screen appears, click on "Cook mode" in the lower right corner.

6.1.2.3 When the text screen appears, click on "Data" in the upper right with the third mouse button. Choose "Coordinate Units".

6.1.2.4 Find the defects you wish to review and note the Row numbers and the defect coordinates.

6.2 On the 6100/6200 SEM, ensure there is no wafer loaded by checking that the red LOAD light is dark and that the stage is visible through the glass porthole on the load lock.

6.2.1 Load the cassette into the SEM by placing it in the correct position on the holder.

6.2.2 Press the ESC key. This will deliver the asterisk prompt on the monitor.

6.2.3 If the SEM does not perform properly during the following steps, press ESC. At the asterisk prompt, type "LOAD" and press return. When asked for "DRIVE:", type "1" and press return. When asked for "FILE:", type "HMU256P" and press return. When asked for "TYPE:", type "CP" and press return.The asterisk will reappear.

6.3 This step applies to the 6100 only.

6.3.1 Type "WNO" and press return.

6.3.2 When asked for "NO:", type number of slot containing desired wafer and press return. When prompted to save to disk type "N" and press return.

6.3.3 Press the F2 key or type "RUN". When prompt "EXECUTE OK? Y/N" appears, type "Y" and press return.

6.3.4 All the data entry prompts except for "FILE NAME:" are irrelevant to the purposes of this specification. Press the return key until you have arrived at the "FILE NAME" prompt.

6.3.5 When asked for "FILE NAME:" type the desired recipe name from Appendix I and press return.

6.3.6 Press return through the rest of the data prompts until monitor prompts "DATA ENTRY O.K. : Y/N?". Type "Y" and press return.

6.4 This step is for 6200 users only.

6.4.1 Type "WNO" and press return.

6.4.2 A graphic representation of the wafer cassette will be displayed on the right side of the screen. Using the cursor keys, move the purple bar to the desired slot and press the "E" key. The slot will turn yellow to confirm its selection. Press return.

6.4.3 When monitor prompts "SAVE TO DISK OK Y/N:" type "N" and press return.

6.4.4 Press the F2 key or type "RUN". When monitor prompts "EXECUTE OK? Y/N" type "Y" and press return.

6.4.5 The following data entry prompts are irrelevant to the purpose of this specification. Press return, and enter "Y" at the "DATA ENTRY OK? (Y/N) . Press return until the monitor displays the following:

4:LOAD
Drive No.:1
File Type :IDP
File Name:

For File Name type the desired recipe name from Appendix I.

6.5 The wafer stage will now automatically load the wafer and move to the first prealign position.

6.5.1. Align the crosshair to the lower left corner of the die for MAX880 inspected wafers and all SRAM wafers. For KLA inspected DRAM wafers, the alignment point is the lower left inside corner of the small cross at the lower left corner of the die. Press "REG" switch to enter position. The stage will move to the second prealignment position. Repeat the process.

6.6 The stage will now move to the center die. When you are asked to press the "CONTINUE" switch, press ESC and the asterisk prompt will appear.

6.7 Type "WMS" for the wafer map, or "WMC" for wafer and die map.

6.8. Although the defect coordinates may be used as they are, the KLA/MAX die coordinates must be modified to be used on the SEM. Perform the applicable operation from the list in Appendix I.

6.9 To begin reviewing defects, type "MVC" and press return. When asked for die coordinates, enter the modified die coordinates. When asked for the X and Y coordinates, enter the KLA/MAX defect coordinates rounded to the nearest whole number. Press return.

6.10 The defect will usually be fairly easy to distinguish. If it does not stand out, select 128 frame scan from the subpanel above the keyboard. Select single scan, then press start.

6.11 When defects are located, position crosshair on defect and press MOVE switch to move defect into center of screen.

6.12 To photograph defect, achieve best focus possible, then switch to 128 frame scan and SINGLE mode. Press the SCAN START key. Press crosshair switch to remove crosshair from screen.

- **6.12.1** Insert film into camera with the arrows on top. When film is fully seated, withdraw slowly until it stops.
- **6.12.2** Toggle shutter switch and hold until shutter closes automatically, then release.
- **6.12.3** Push film back into camera body, then move the roller lever on the top of the camera to the left. Pull film out again. (There will be some resistance.) When film stops, move the lever to the right and remove film. Wait one minute, then remove outer paper and lay the print on a flat surface. After it has dried, write the lot number-wafer number, the die and defect coordinates and your initials on the bottom white border.
- **6.12.4** If you are using the thermal printer atop the 6200, press the PRINT button and tear off picture after printing has completed.
- **6.12.5** Press crosshair switch again to reinstate crosshair. Switch scan mode to "REPEAT". Return to 8- or 16-frame scan.

6.13 When all the desired defects have been reviewed, press UNLOAD switch. When the wafer is back in the cassette, type "LEV" at the asterisk prompt to close the loader door and evacuate the load lock. Return the cassette to its box.

6.14 If an error occurs and the monitor displays an "E>" prompt, type the following to restart the SEM software:

- **6.14.1** For the 6100, type "SM6100"
- **6.14.2** For the 6200, type "SM6200"
- **6.14.3** Press "UNLOAD" switch to unload the wafer, if needed.

6.15 If the beam current drops below a preset level (usually 7.5), the SEM will automatically reset it to normal. Do not press "HV ON/EMISSION ADJUST" to bring the beam current up. The SEM will function normally with a low beam current. If the picture is extremely indistinct, and the focusing and stigmator controls seem to have little or no effect, the SEM needs flashing. Check with the Photo lead to flash the SEM. The 6200 flashes automatically every ten hours, and it will take 1.5 to 2 hours to completely stabilize.

6.16 If an "X-Y Exchange error" occurs, or if the picture appears to be turned 90 degrees, press the X-Y EXCHANGE switch.

6.17 If an error occurs at any time during the data entry, the process may be begun again without unloading the wafer. Press “ESC” , if necessary to obtain the asterisk prompt. Then press F2, and at the “EXECUTE OK? Y/N” prompt, type “N”. The wafer will not be unloaded and you may continue entering the data.

Appendix I
6000 series SEM recipes and offsets

Device	Recipe	KLA offset	MAX880 offset
256KB	KLA256B-1	(X+15)(Y-13)	
4MDC	KLA4MEGC-1	(X+13)(Y+15)	(X-2)(Y-1)
4MDX16C	KLAX16C-1	(X+14)(Y+5)	(X-1)(Y-1)
1MSB	KLA128B-1	(X+14)(Y+5)	(X-1)(Y-1)
H8-3001	KLA3001-1	(X+12)(Y+9)	
H8-3048S	KLA3048S-1	(X+12)(Y+9)	
H8-3399	KLA3399-1	(X+11)(Y+12)	