Surface Mount PCB Assembly

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10-25-12 SurfaceMount.ppt
OVERVIEW

- Step 1- Introduction to the Center for Electronics Manufacturing and Assembly
- Step 2- Sign In / Let lab manager (Jeff) know what you plan to do
- Step 3- Get solder paste from refrigerator / warm up paste
- Step 4- Familiarize yourself with surface mount rework station
- Step 5- Using the EFD 1000 XL Solder Dispenser
- Step 6- Using the METCAL Solder Reflow Heat Gun
- Step 7- Inspection of solder joints
- Step 8- Clean up and Sign Out
CEMA – Center for Electronics Manufacturing and Assembly

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Jeff Lonneville, Lab Manager
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CIMS Building

78-1580 Laboratory
Step 2- Sign In

- As you first enter the room there will be a sign in sheet on the right wall
  - Sign in by giving the date, your name, major, time in, etc.

If the Sign in sheet is full, just sign your name on the back.

SIGN IN Sheet!!
Step 2- Ask for Help if you don’t know what to do

- If at any time you do not know what to do ASK for HELP.
- Jeff Lonneville is usually in the room and is always willing to help.
- Otherwise ask someone who has already used the tools and facilities
Step 3- Get Solder Paste from Refrigerator

- The solder paste is in the refrigerator, which is located on the far side of the room.
Step 3- Get Solder Paste from Refrigerator

- Inside the refrigerator there will be a box of solder paste tubes and other chemicals used for surface mounting.
- The correct paste has a PN# AL-CL78 10cc
  - The opposite side will have a label that reads Alpha CL78
**Step 3 - Warming up the solder paste**

- Warm up the solder paste by holding it in your hand before attaching it to the EFD 1000 XL Solder Dispenser.
- Once warm, attach the solder paste tube to the end of the EFD 1000 and rotate 90 degrees to lock.
Step 4- Familiarizing with surface Mounting Station

- Compressed Air
- Turn on Valve
- EFD 1000 XL or 1500D Solder Dispenser
- Microscope
- Display for Microscope
Step 5 - Turning on EFD 1000 XL Solder Dispenser

- Turn on the Compressed Air
- Turn on EFD 1000 XL Solder Paste Dispenser
- Settings for 1000 XL and 1500D
  - 1000XL Pressure = 90 psi, Dispense Time = 0.5 seconds
  - 1500D Pressure = 50 psi, Dispense Time = 0.25 seconds (Red Tip)
- Turn on Microscope and Display
- Make sure you have the correct tip on solder paste tube. There are many different diameters depending on how much you want to dispense
- Smaller is usually better (they are color coded… red is the smallest)
Step 5- Operating The EFD 1000 XL Solder Dispenser

- To operate the EFD 1000 XL Solder dispenser, use the foot pedal to dispense solder paste.
- If you changed tips hold the pedal down until solder paste begins to flow.
- There are two modes of the EFD 1000; Manual and Automatic.
  - **Manual**
    - Use the foot pedal to control the dispense time.
  - **Automatic**
    - Turn on Timing (orange switch).
    - Set time with dial.
    - Press foot pedal once to dispense solder paste for x-seconds.
Step 5- Operating The EFD 1000 XL Solder Dispenser

- Apply solder paste where needed for components, less is better.
- Place components using tweezers
- See movie at end of this document
Step 6 - Using the METCAL Rework Station

- After all components are placed on the PCB take the board over to the METCAL Rework Station “heat gun” to reflow the solder
- The METCAL is on the opposite side of the EDX 1000

- Knob to adjust head height
- Interchangeable Nozzles
- Clamp Dial
- Controls
**Step 6-Using the METCAL Rework Station**

- The switch to turn on the METCAL Rework Station is located on the back of the machine
- Place a bigger PCB in the Clamp of the METCAL
- Make Sure the head is all the way up, so you do not crash the head into the PCB when lowering the arm
- Bring the arm all the way down and center the PCB under the head
- Adjust the head so it is ½” away from the PCB
- See movie at the end of this document
Step 6-Controlling the METCAL

- Use the +/- buttons to add time
- The large dial changes the heat from top to bottom
  - Use top if all components are on one side
  - If components are on both sides of PCB put dial in the middle
- The smaller dial controls the amount of heat

- Set time to 2:30
- Set Heat to the second level
- Push button in the middle to start
Step 7- Check Solders

- After the METCAL is finished, check the solder joints under the microscope to make sure they are solid. This can be done by probing the components with tweezers.
- See movie at the end of this document.
Copper Traces with Solder Paste

Image of bottom of ADXL325 Superimposed on Copper Traces

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Copper Traces with Solder Paste

Image of bottom of BMA140 Superimposed on Copper Traces
TEMPERATURE RAMP DURING SOLDERING
COMPLETED BOARD WITH SOLDERED COMPONENTS
XRAY IMAGE OF ADXL325 SOLDER JOINTS

Glenbrook X-Ray Inspection
XRAY IMAGE OF BMA140 SOLDER JOINTS

Shows Possible Problem with Y and Z outputs shorted together
§ Don’t forget to sign out!!