

# Liquid Metal Removal & Application processes for

**Legion Pro 7 16IRX8H (82WQ)**

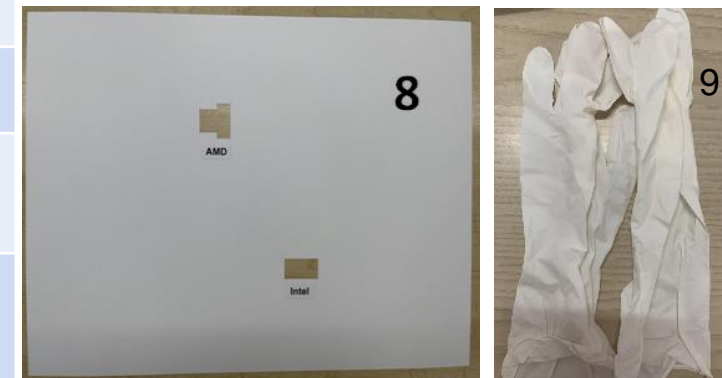
**Legion Pro 7 16IRX8 (82WR)**

Service | February 2023



# Liquid Metal FRU Kit - One FRU PN Includes:

| No | Name                               | Qty | spec                              | Remarks  |
|----|------------------------------------|-----|-----------------------------------|--|
| 1  | Liquid metal                       | 1   | 1g<br>in syringe package          | Only apply a thin layer on CPU(~0.2g), 1g LM could be used for several times<br>Reusable   |
| 2  | Needle                             | 1   |                                   | Used with syringe to drop LM on CPU die area, the needle will help to control the amount<br>Reusable                                       |
| 3  | Brush                              | 2   |                                   | For cleaning and the other one for re-apply LM<br>Reusable but do not mix use to avoid dirt/cleanser residue                               |
| 4  | Cleaning solution/cleaning agent   | 1   | 10ml<br>20-30% sodium bicarbonate | For cleaning process, help to gather LM into a ball.<br>Reusable   |
| 5  | Cleaning wipes                     | 3   |                                   | For cleaning process, used together with solution.<br>Not reusable, can be substituted by non-woven cloth, cleaning wipes, glass wipe pads |
| 6  | Sponge                             | 2+2 | 2 pcs for Intel<br>2 pcs for AMD  | May reuse if no motherboard replacement and no damage, no stain on the sponge  |
| 7  | Straw pipe                         | 1   |                                   | For cleaning process, help to collect most LM<br>Reusable  |
| 8  | Protect paper board(protect sheet) | 2   |                                   | For cleaning and re-apply process, avoid risk that LM spill on board by accident<br>Reusable if no damage, no stain on the paper           |
| 9  | Gloves                             | 1   | Anti-ESD gloves                   | For cleaning and re-apply process, avoid direct contact with liquid metal<br>Reusable, can be substituted by other nitrile gloves.         |



# Removal Process

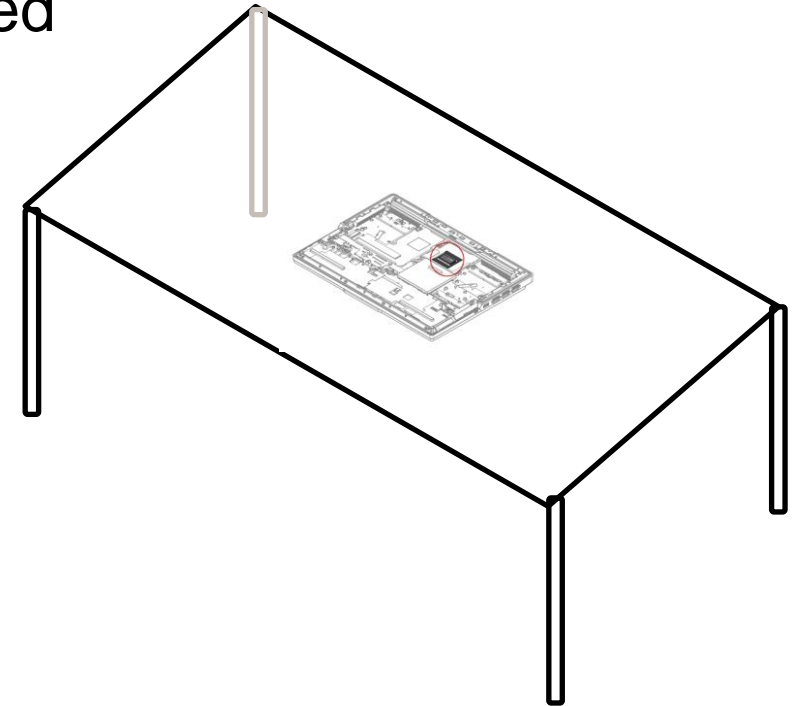
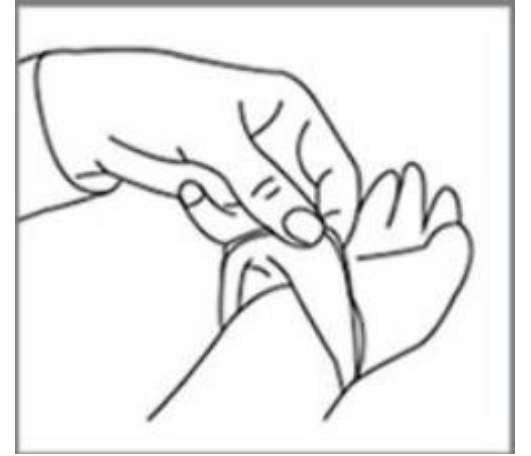
## Tools used in remove process

- Protect sheet
- A new brush
- Cleaning solution
- Cleaning wipes
- Straw pipe
- Gloves



# Preparation

- Open the plastic resalable bags, take out liquid metal and other tools from the FRU kit.
- Wear anti-ESD gloves.
- During liquid metal removal/application process, make sure the system board and thermal module are placed on flat surface with liquid metal side upward.



Liquid metal is fluid in room temperature, handling on flat surface and keep liquid metal side upward to avoid spill.

# Liquid Metal Removal

Step 1 : Disassemble thermal module, reference HMM.



○ 4 fan non-captured screws

○ 7 fan captured screws

□ 2 fan connectors

After disassembly, put the thermal module liquid metal side upward on a flat table to avoid spill liquid metal.

# Liquid Metal Removal

Step 2: Put protect sheet over CPU to prevent liquid spill on motherboard

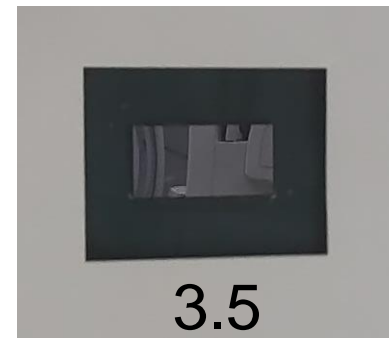
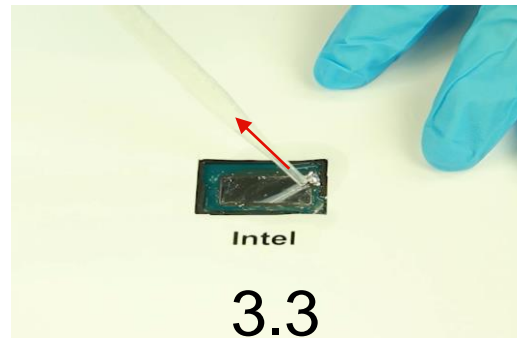
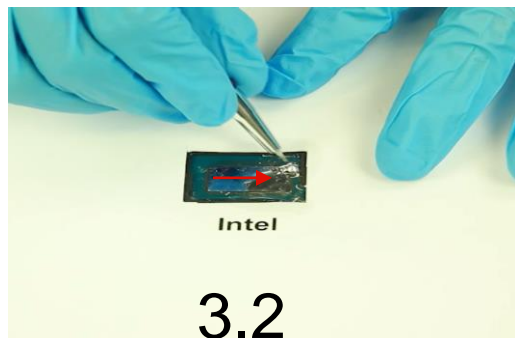


- Make sure the protect sheet is always used during removal and application steps, to avoid spill on motherboard by accident. The liquid metal is electrically conductive, spill on components would cause short circuit.



# Liquid Metal Removal

Step 3: Place 2-3 drops of cleaning agent onto the **CPU LM** and use the one brush to gather LM into a ball. Use the straw pipe to remove as much LM as possible. Then use wipes to clean the CPU surface. **Position the straw with the tip pointing upward to retain LM.** Use paper towel or used cleaning wipes to contain the removed liquid metal.



3.1 Place 2-3 drops of cleaning solution onto the CPU liquid metal.

3.2 Use the one brush to gather LM into a ball.

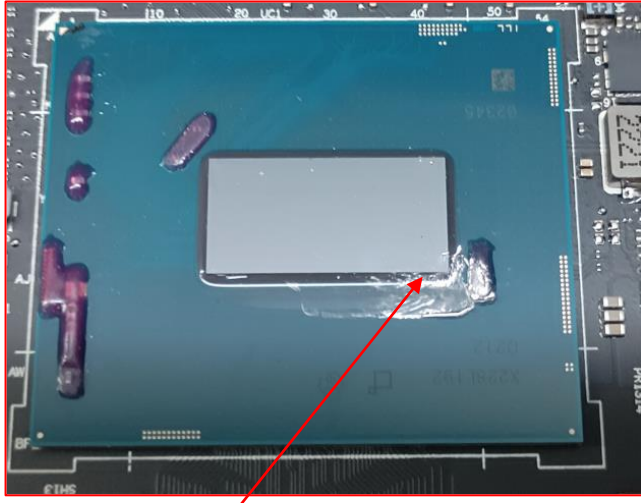
3.3 Use straw pipe to remove as much LM as possible, press the end of straw pipe with large force and then absorb the liquid metal ball at once.

3.4/3.5 Use wipes to clean the CPU surface.

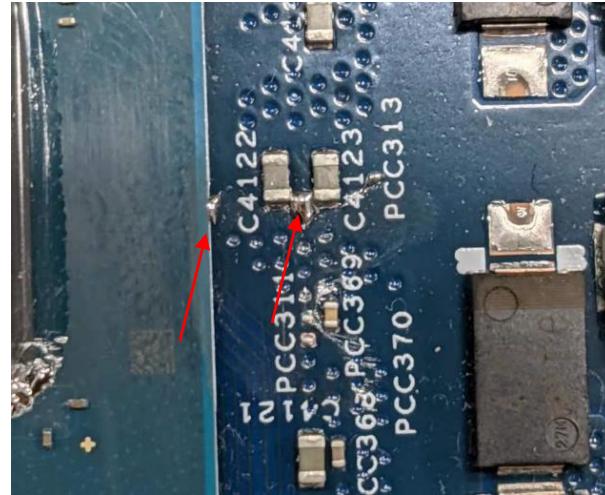
You may repeat the steps, soak wipes with 2-3 drops of cleaning solution for better cleaning. After this step, check the surface of the CPU, ensure there is no liquid residue. Dispose protect sheet if damaged.

# Liquid Metal Removal

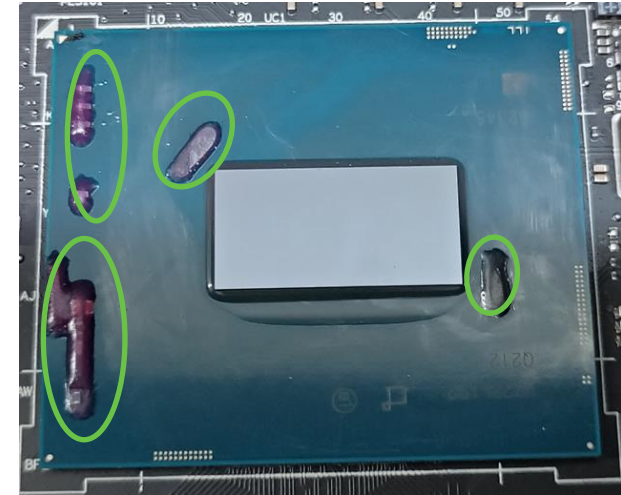
Note: Field servicers **MUST** clean the LM from the defective motherboard before return to reverse hub for RMA.



Liquid metal residue on CPU substrate



Liquid metal residue on component



No residue on CPU die and CPU substrate

Bad example of Insufficient cleaning

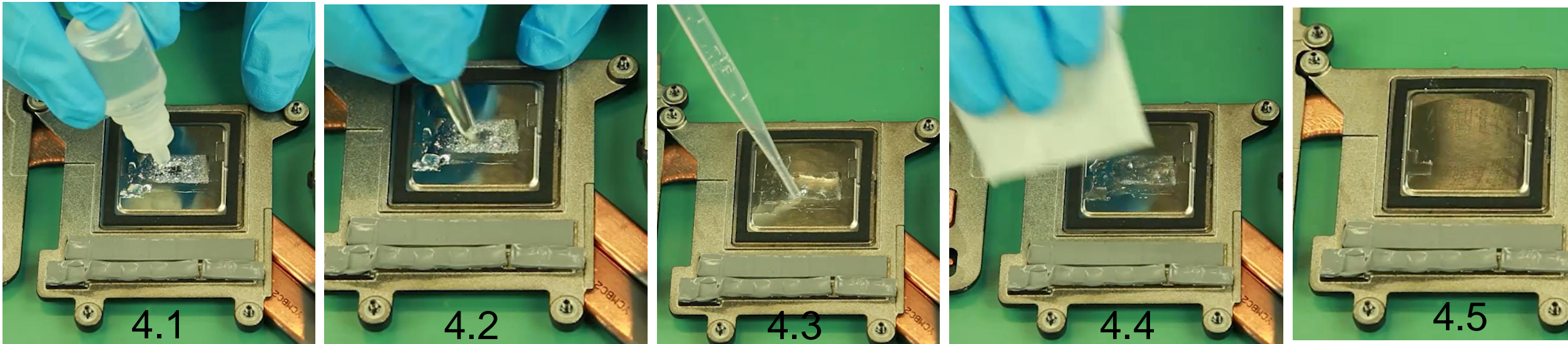
Good cleaning

Do not remove the conformal coating on the CPU, it was designed to provide isolation from liquids.



# Liquid Metal Remove

Step 4: Use same process to remove the remaining LM from thermal module. Use the same brush to gather LM into a ball. Do not use protection sheet.



4.1 Place 2-3 drops of cleaning agent onto the liquid metal on thermal module

4.2 use one brush to gather LM into a ball.

4.3 Use straw pipe to remove as much LM as possible, press the end of straw pipe with large force and then absorb the liquid metal ball at once.

4.4/4.5 Use wipes to clean the thermal module surface

You may repeat the steps, soak wipes with 2-3 drops of cleaning solution for better cleaning. After this step, check the surface of the heatsink, ensure there is no liquid residue.

# Application Process

Tools used in application process

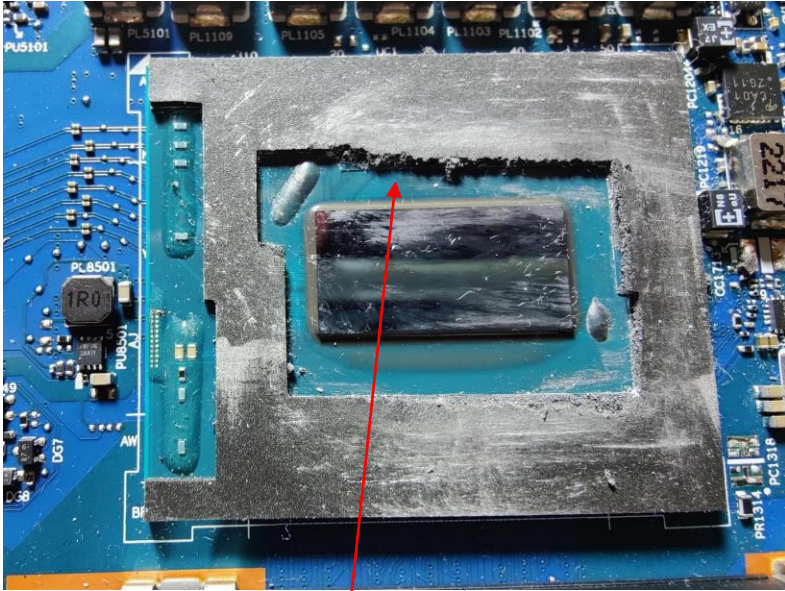
- Protect sheet
- Liquid metal syringe and needle
- A new brush
- CPU sponge
- Gloves



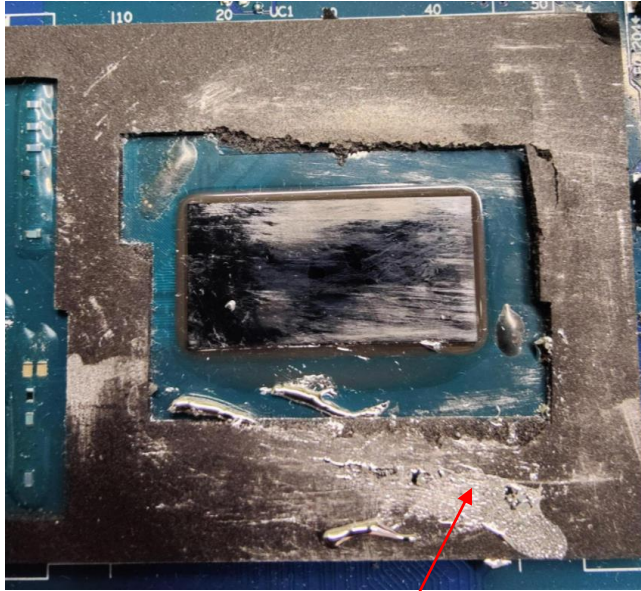
# Liquid Metal Application

Step 1 : Remove and Replace CPU sponge fence.

Peel off the old sponge from corner.



Sponge deformed



Liquid metal stain on sponge

Bad examples of sponge need be replaced

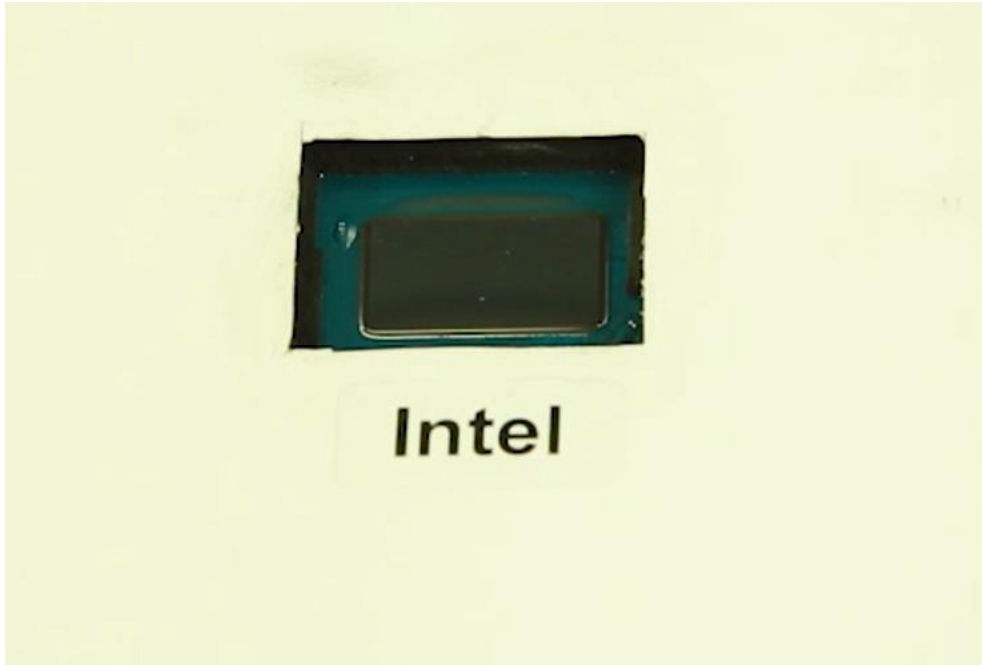


Good Intel CPU sponge

# Liquid Metal Application

Step 2: Put protect sheet over CPU to prevent liquid spill on motherboard

Before this step, please check again if thoroughly cleaned the thermal module and CPU die surfaces before applying new liquid metal.

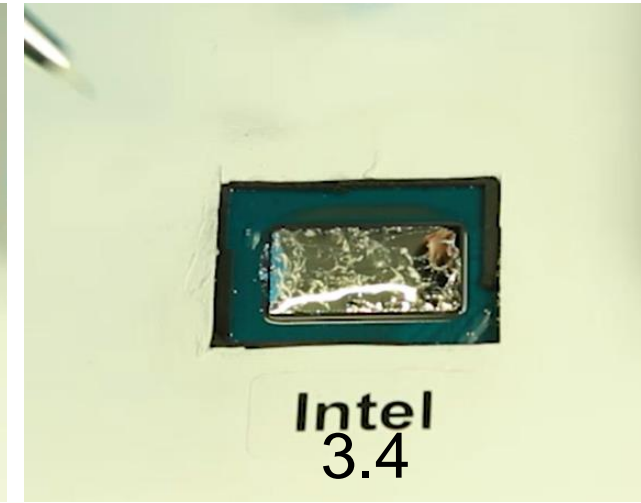
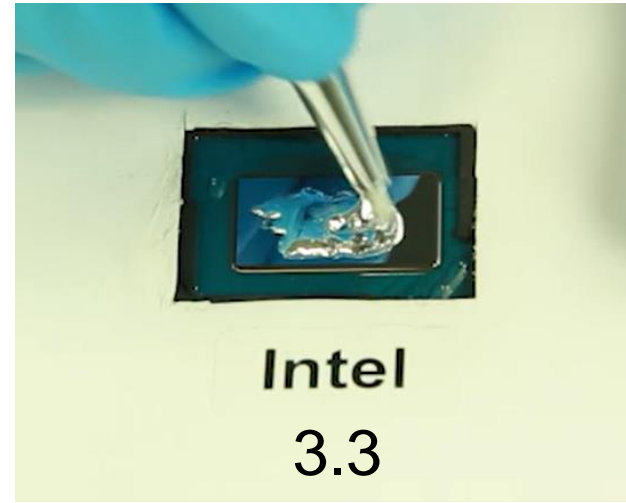
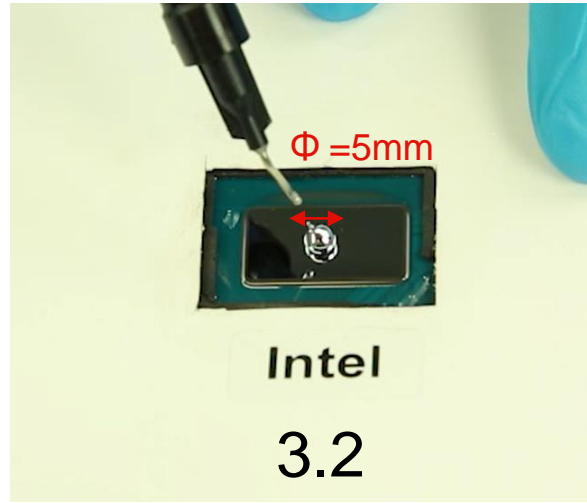
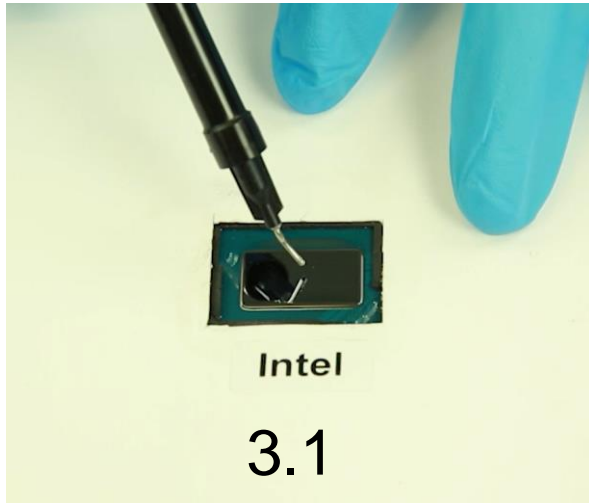


- Make sure the protect sheet is always used during removal and application steps, to avoid spill on motherboard by accident. The liquid metal is electrically conductive, spill on components would cause short circuit.



# Liquid Metal Application

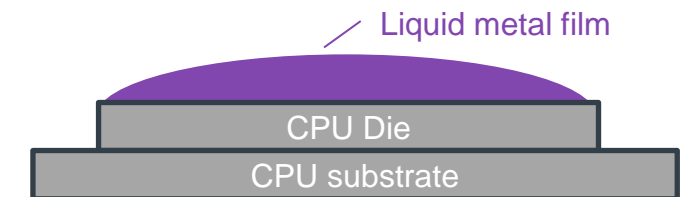
Step 3: Apply the LM in one small drop to the CPU die side only. Use a new unused brush to spread the drop into a film. The brush used for cleaning could introduce dirt and cleaning solution residue, the cleaning residue would add difficulties to spread liquid metal.



3.1 Remove the cap from LM syringe, install the needle.

3.2 Press one small drop (5 mm diameter ball by visual check) liquid metal on CPU die.

3.3/3.4 Use the **unused brush** to spread the drops into a thin film. Remove the needle from LM syringe, install back the cap.





# Liquid Metal Application

Step 4: Remember to clean and then apply thermal grease to GPU.

Step 5: Re-assemble the thermal module. reference HMM. When screws are fastened, the liquid metal will be pressed by heatsink to form a 0.2mm thickness film between CPU and heatsink.



- 4 fan non-captured screws
- 7 fan captured screws
- 2 fan connectors

# Closure

After-repair actions:

**Note: Field servicers MUST clean the LM from the defective motherboard before return to reverse hub for RMA, to avoid short-circuit on the motherboard.**

- Check if you have unused sponges, wipes and liquid metal leftover, you may keep and reuse them for next repair, in this case you may prepare some additional cleaning wipes or cleaning pads by yourself. Brush and straw pipe can be cleaned with water and cleaning wipes then dry for re-use.
- Ensure the cap of the liquid metal syringe is closed tight.
- Put the used paper towel/cleaning wipes containing removed LM into a small plastic resealable zip bag, seal the bag.
- Bring back the bag with used materials, dispose into non-recyclable bins.



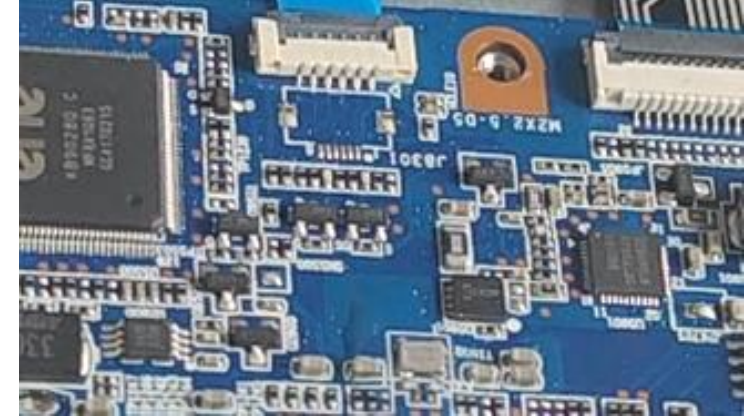
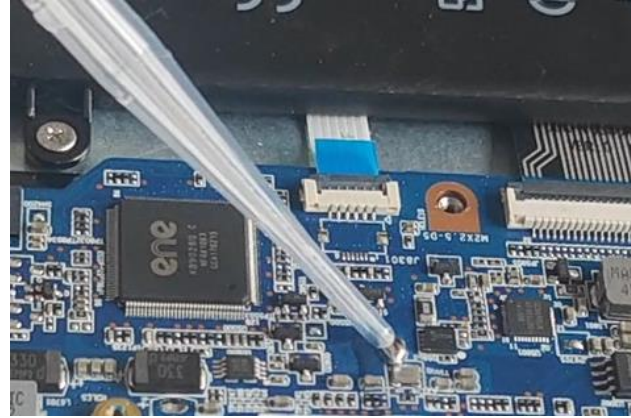
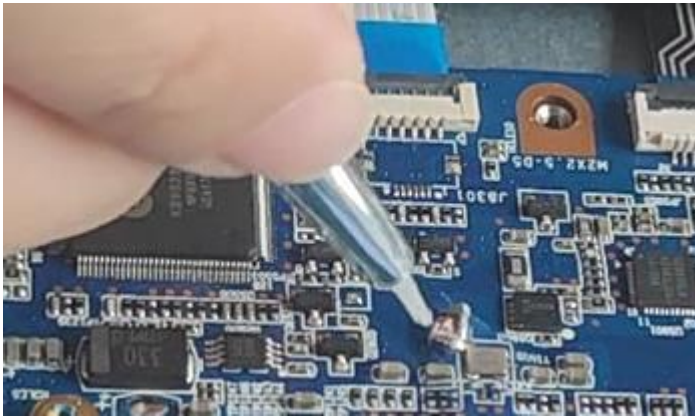
You may find the resealable zip bags as package in FRU kit, reuse them as trash bag.

**thanks.**



# Clean motherboard components

By small chance, if liquid metal spill on system board by accident, try to clean them using the same removal process.



Place 2-3 drops of cleaning solution onto the liquid metal on motherboard.

Use one brush to gather LM into a ball.

Use straw pipe to remove as much LM as possible.

Wipe all the liquid residue from motherboard.