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HARDWARE

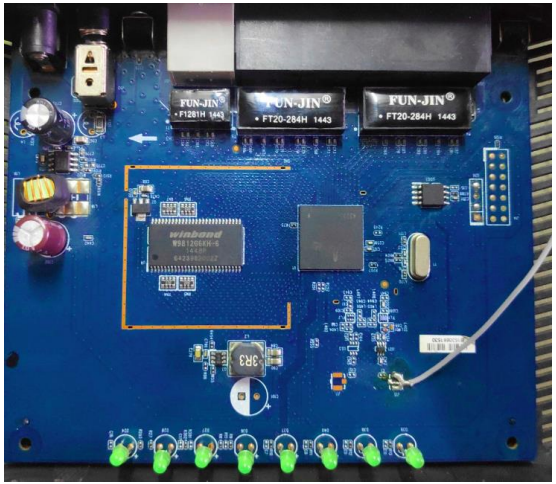
Soldering-Desoldering

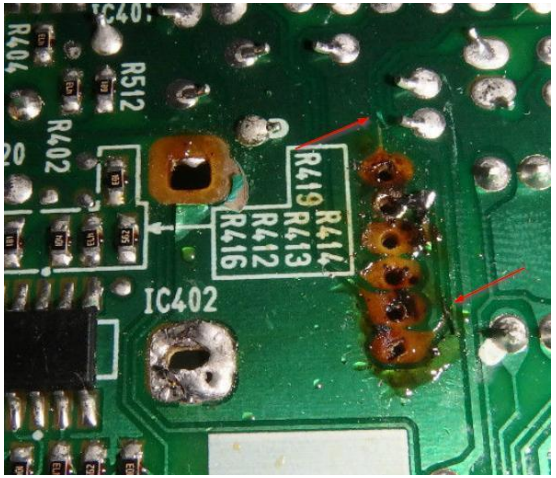
Agenda

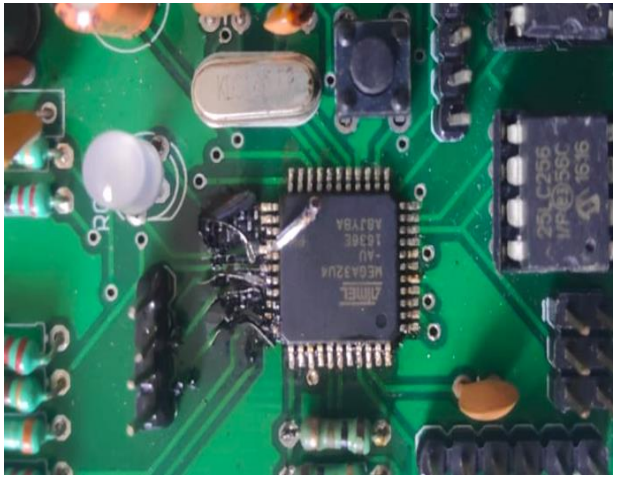
- Why Soldering is Important in Hardware Security
- What is Soldering
- Soldering Tools
- Soldering Process
- Desoldering Process
- Soldering Safety

Why soldering is important

- Soldering is an Art.
- While testing we find Test points , debug headers, Memory chips
- Solder or De-solder Properly to get the access of device, extract firmware
- A Bad solder can damage the board







What is Soldering

- **Soldering** is a joining process used to join different types of Electronic components or metals together by melting **solder**.
- **Solder** is a metal alloy usually made of Tin and Lead which is melted using a hot Soldering iron.
- Solder has very less Melting point as compared to the adjoining components.
- Thats why, Soldering Provides reasonably permanent but reversible electrical connections.

Soldering Tools

- Vise
- Solder (tin and lead)
- Soldering Iron
- Soldering Flux
- IPA Cleaner/Brush
- Desolder wick
- Damp Sponge
- Cutter / Stipper
- Tweezer
- Soldering Stand
- Safety Glasses

Soldering Iron Types

Adjustable soldering Station

15 Watt Soldering Iron

25 Watt Soldering Iron

60 Watt Soldering Iron

Solder Iron Tips

Soldering Iron care & Maintenance

- Before Performing soldering, Solder Iron must be coated with a thin coat of solder. This will allows, easy transfer of heat on the workpiece.
- This procedure is called Tinning.
- It is advisable that, Iron tip must be kept clean by occasional wiping and applying solder directly on the tip.
- Always Use Solder Iron Stand to keep the hot Solder Iron, as stand will also take cares Iron Tip.

Solder Iron Stand

Tinning Process

Dirty Solder Iron Tip

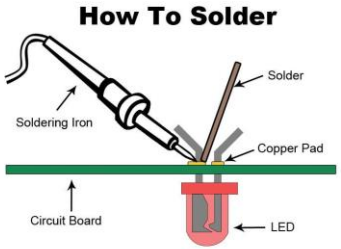
Apply Small Amount of Solder on Iron Tip

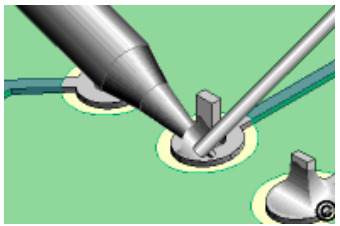
Wipe Solder Iron Tip using wet Sponge

Clean Solder Iron Tip

Soldering Process - Through Hole Component

- Soldering Process involves Soldering Iron, Solder and component to be solder.

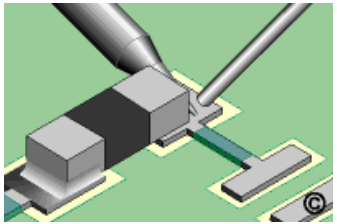


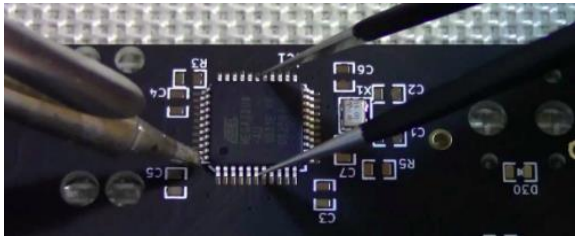


- As shown in above image, hold your soldering Iron at 45 Degree angle over a component pad with one hand and apply Solder at the junction of solder iron-component pad.

Soldering Process - SMD component

- For soldering SMD components requires soldering iron, solder, Tweezer and SMD component.

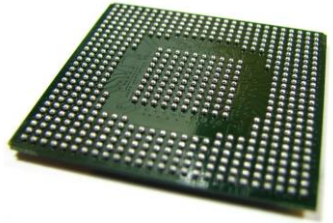




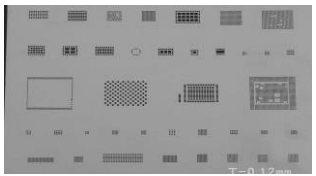
- As shown in above figure, with the help of Tweezer first aligned the SMD component on its pad.
- Hold the component, till you solder at least one pad / pin of it.
- Now remove the tweezer and apply solder one by one to its all pins.

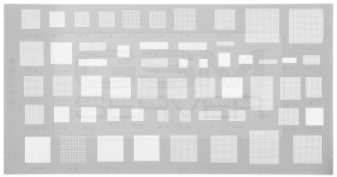
Soldering Process - BGA Components

- A Ball Grid Array (BGA) Component is a SMD component that possesses no leads. This SMD package employs an array of metal spheres that are made of solder called the solder balls for connections to the PCB.



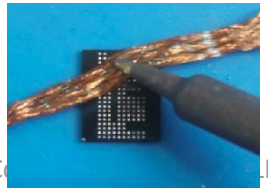
- To solder the BGA component, first we need to make Solder Balls on the component pins and solder balls can be prepared using BGA stencils available in market.
- Choose appropriate type of BGA stencil.
- Here you can see the sample stencil sets.

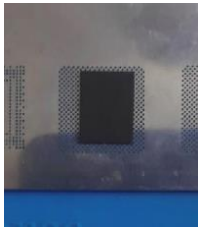
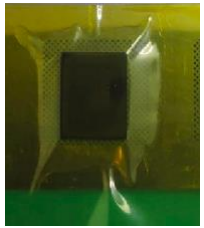




Soldering Process - BGA Components

- This Process we require rework station, BGA stencil, Solder paste, heat resistant tape, desoldering wick
- First using Desolder wick, Clean the BGA IC pins and footprint of IC on PCB.
- Now place the BGA IC below Stencil and stick it heat resistant tape. After that apply a layer of solder paste on it and heat using hot air station This process is called REBALLING.
- After removing stencil you will find balls of solder on the pins of IC.
- Then align the IC properly on its footprint and using rework station heat BGA chip all the side upto 40-50 sec. And the solder ball will melt and make bond between IC pin and IC footprint.



Desoldering process: Through Hole Component

- Desoldering Process involves use of Desoldering Sucker or Desoldering Wick.

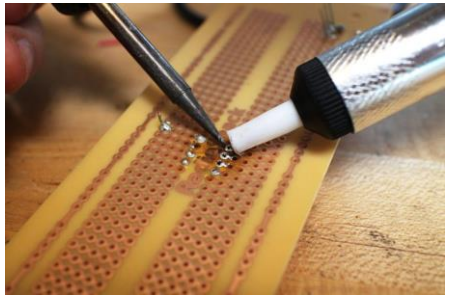


Figure 1

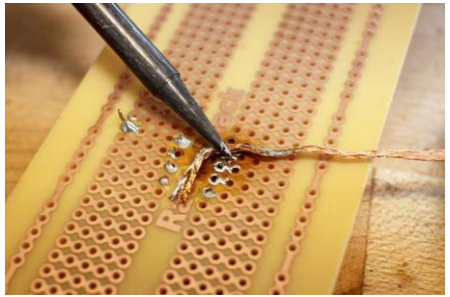


Figure 2

- For Desoldering the component first Heat up the respective solder pad using Solder Iron and then remove solder iron and immediately put solder sucker over the pad and suck the solder as shown in figure 1.
- While using Desoldering wick, keep the wick over the pad and put solder iron over it as shown in figure 2.

Desoldering process:Hot Air Station/rework station

- Is the device which used to remove SMD components, IC's which is not possible to remove using soldering iron.

- Set hot air stations temperature 300-400 degree Celsius. which component you have to desolder hold that component using tweezer and hold hot air pump in other hand.

Desoldering process:Hot Air Station

- Heat all the side equally. don't heat too much it will damage the component using twizzer. dont try to push or pull the component that will break pins or pull out traces of PCB

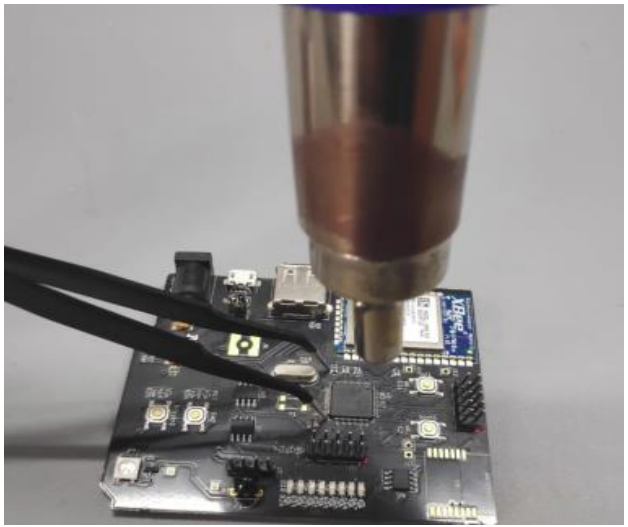


Fig 1

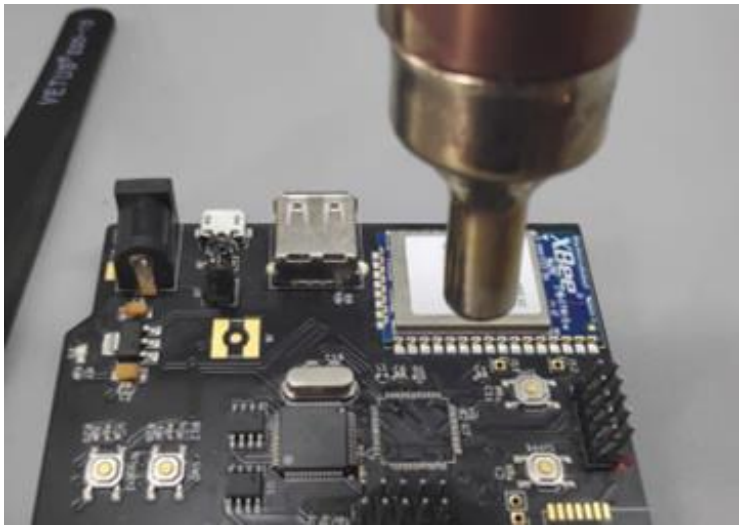


Fig 3

Soldering-Desoldering Safety

- Soldering iron can reach temperatures of 800 Fahrenheit so it is very important to know where your iron is at all times.
- Always use Soldering iron stand to prevent any burns or accidents.
- Do not touch the part soldered immediately, as the part will remain hot for few minutes.
- Make sure you are in well ventilated area. Because when solder is heated, there are fumes released that are harmful to your eyes and lungs.
- It’s always a good idea to wear protective eye wear in case of accidental splashes of hot solder.
- Make sure to wash your hands when done soldering, especially if using lead solder.

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