APPLICATION NOTE 319

Ericsson Power Modules

REPAIR/REWORK RECOMMENDATIONS FOR ERICSSON POWER MODULES

ABSTRACT

In case that a module needs to be replaced on the hosting board, recommended processes and guidelines described in this section should be applied.

Instructions are listed after fundamental principles and recommendations for rework processes for power modules.

Standard guidelines as per IPC-7711/7721 are also applicable for Ericsson Power Modules.

Specific details about equipment brand, rework nozzle design, reflow profile or other process related aspects are usually a part of infrastructure and know-how within each SMT assembly plant.

MODULE TYPE: SURFACE MOUNTED OPTION

Use selected reference pin number as described in technical datasheet for the minimum pin temperature recommendation since it will likely be the coolest solder joint during the reflow process.

Preparation

Host printed wired board should be baked at 125°C for 3-4 hours prior rework procedure to prevent moisture induced stress mechanisms e.g cracks and de-lamination.

Equipment

Tailored process, equipment and fixture are recommended to heat up the interconnection solder joints/pads above the solder melting temperature.

Aspects to consider are:

- Host printed wired board singled/dual mounted, thermal mass (layer stack up), copper density, component density close to and under the power module.
- Module size and weight.

Re-work system should meet minimum conditions e.g. computer controlled heating sources (e.g. Hot air or IR), vacuum pick and place, inspection and heating capability of host printed wired board.

Heating source/Nozzle design

To apply local heat to interconnection solder joints between power module and host board, hot air/gas source is recommended in connection with a proper nozzle design.

It is recommended to use a double wall design of the hot air nozzle to direct the air flow only to the edges of the product where the interconnection solder joints are placed, see technical datasheet for details.

The nozzle may also include a latching mechanism or vacuum nozzle for lifting the power module.

Keep away distance/clearance within 3mm from power module outline to closest component is recommended.

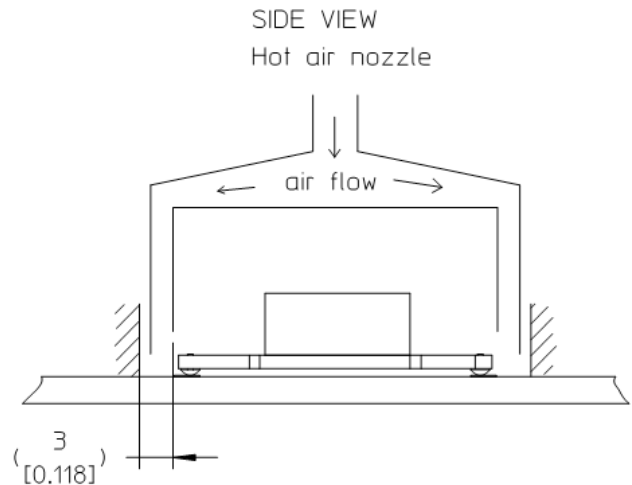

Fig. 1 Schematic hot air nozzle design

Power module and host board heating process

Preheating host printed power board and power module is required for successful removal/melting of solder joints while minimizing thermal shock, damage and board warpage.

Adjacent components should be taken into consideration to avoid overheating or moisture induced failure mode.

Host printed wired board should be preheated up to 100°C by hotplate or convection heater to secure a uniform ramp up to soldering melting temperature

Removal/Lift

Heat should be applied locally to interconnection solder joints/pads of the power module to be repaired to prevent solder reflow/thermal stress of closest components.

After heating the power module solder joint interconnections to above the melting temperature, the module can be removed either manually or by extraction device in used nozzle/fixture.

Solder pad preparation

After the module is removed, removal of residual solder, fluxing and solder paste deposition should follow by applying best practices and industry guidelines.

Solder deposition by using adequate stencil size (small) for solder printing or by dispensing equipment is recommended.

Module placement/re-flow/Inspection

Automatic placement controlled by accurate vision system in surface mounting line is recommended to avoid pad misalignment/electrical shorts, solder balling or defected solder joints.

Use similar approach as with preheating profile described in product technical datasheet.

Visual and x-ray inspection is recommended to verify solder joint quality of the module/host printed wired board assembly.

MODULE TYPE: THROUGH HOLE MOUNTED OPTION

Use selected reference pin number as described in technical datasheet for the minimum pin temperature recommendation since it will likely be the coolest solder joint during the reflow process.

Preparation

Apply high temperature tape/mask to flat surfaces close to the rework area protecting/insulating host printed wire board from temperature shock.

Host printed wired board should be baked at 125°C for 3-4 hours prior rework procedure to prevent moisture induced stress mechanisms e.g. cracks and de-lamination.

Apply flux to the interconnection pins by using brush or spray.

Fix host printed circuit board to appropriate fixture prior reflow.

Equipment

Tailored process, equipment and fixture are recommended to heat up the interconnection solder joints above the solder melting temperature.

Aspects to consider are:

- Host printed wired board singled/dual mounted, thermal mass (layer stack up), copper density, component-density close to and under the power module.
- Module size and weight.

Re-work solder fountain system should meet minimum conditions e.g. computer controlled solder temperature, adjustable wave height and exposure time.

Heating source

To apply local heat to interconnection solder joints between power module and host board, solder fountain system is recommended.

Solder fountain can transfer large amount of heat to a specific area within short time

Fig. 2 Typical selective solder fountain for re-work

Power module and host board heating process

Preheating host printed power board and power module is required for successful removal/melting of solder joints while minimizing thermal shock, damage and board warpage.

Adjacent components should be taken into consideration to avoid overheating or moisture induced failure mode.

Host printed wired board should be preheated up to 100°C-125°C by hot plate or convection heater to secure a uniform ramp up to soldering melting temperature.

Removal/Lift

Heat should be applied locally to interconnection solder joints/pins of the power module to be repaired to prevent solder reflow/thermal stress of closest components.

After heating the power module solder joint interconnections to above the melting temperature, the module can be removed either manually or by tailored extraction tool.

Solder plated through hole preparation

After the module is removed, secure removal of residual solder preferably by vacuum and if possible during solder de-soldering procedures or by applying best practices and industry guidelines described in IPC-7711/IPC-7721.

Module placement/re-flow/Inspection

Use similar approach as with preheating profile described in product technical datasheet or re-work procedures described above.

Visual inspection is recommended to verify solder joint quality of the module/host printed wired board assembly.

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Formed in the late seventies, Ericsson Power Modules is a division of Ericsson AB that primarily designs and manufactures isolated DC/DC converters and non-isolated voltage products such as point-of-load units ranging in output power from 1 W to 700 W. The products are aimed at (but not limited to) the new generation of ICT (information and communication technology) equipment where systems' architects are designing boards for optimized control and reduced power consumption.

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