

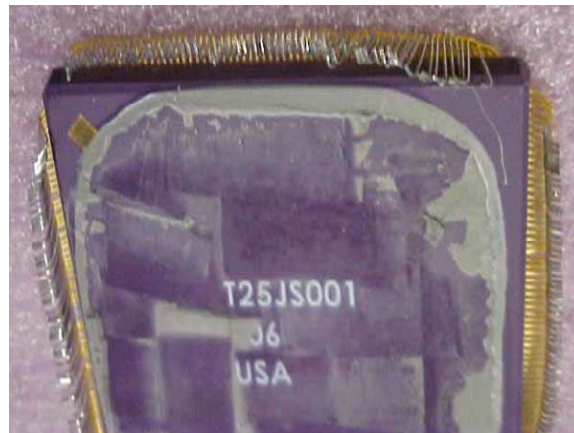
# Device Removal Instructions for Failure Analysis

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## Introduction

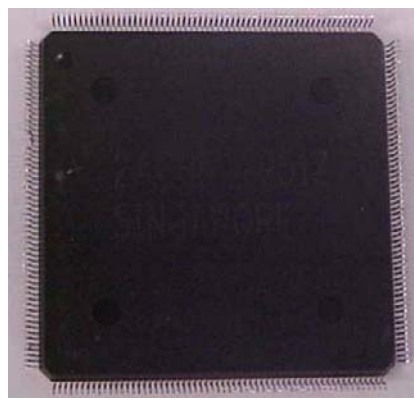
Devices that are submitted to Actel for Failure Analysis (FA) must be in good physical condition. Nearly all of the functional and electrical testing is done either on bench boards or on production testers. These boards and testers use sockets, similar to the ones used by the Silicon Sculptor. In order for Actel to obtain accurate information from the testers and bench boards, devices must have good contact with the sockets, and the package leads must be in their original condition. Since the vast majority of devices that are submitted for FA are soldered to customers boards, it is often necessary for Actel to perform extensive rework on packages to restore their original condition. This results in lengthy delays in the FA process as several iterations of rework are often required before good contact is established between the device and the sockets. [Figure 1](#) shows an example of a device received for FA that required extensive rework, and [Figure 2](#) shows a device that has been extracted properly.

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*Figure 1* • Improperly Extracted Device

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*Figure 2* • Properly Extracted Device

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## Device Removal Instructions

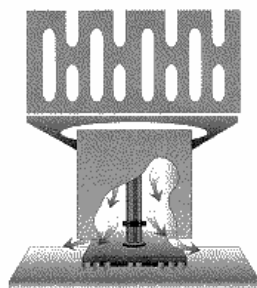
By following the instructions below, devices can be carefully removed from the board resulting in faster overall FA processing time.

1. Apply flux on the leads of the unit that will be removed for Failure Analysis. Use a flux brush applicator.
2. Use an SMT desoldering tool with hot air reflow and vacuum pick-up to heat up the solder and extract the device. This tool will allow you to preserve the condition of the leads on the device without any mechanical impact. [Figure 3](#) shows a diagram for a sample desoldering tool.
3. Install the appropriate nozzle. The nozzle aperture should be slightly larger than the package dimension. Make sure to observe the vent and height position as shown in [Figure 4](#).



Figure 3 • Sample Desoldering Tool

Close-Up of  
Device Extraction



Sample Nozzle  
Configuration



Figure 4 • Sample Nozzle Configuration And Device Extraction

4. Follow the desoldering tool operating procedure to heat and extract the device.
5. Inspect the leads for solder shorts. Rework if necessary to remove any solder bridges or excess solder on the leads. Extra caution must be taken when removing solder shorts to avoid damaging the integrity of the leads.
6. Place the device in an ESD protected container that will also protect the leads' integrity. Devices should be placed in their original container whenever possible; otherwise, a clamshell type of container should be used.

## Special Notes

### CQFP Packages

The procedure for removing CQFP packages is the same as for any SMT package. However, the sockets used by Actel require that the leads be straightened and a carrier frame be reattached to the package. Actel will perform this operation in-house; however, extra time may be necessary for this delicate process.

### BGA Packages

Since the balls on BGA packages cannot be preserved during device extraction, these devices must be re-balled. Actel does not provide this service in-house, so devices must be sent to an outside vendor. Extra time may be necessary for this process.

## Conclusion

Actel strives to perform quick and efficient Failure Analysis for customers. In order to achieve accurate results, care must be taken at all steps to ensure the device is not damaged by any of the tests being performed. Most of Actel's test equipment relies on sockets to hold the device, so the FPGA package must be in excellent physical condition to make good contact with the sockets. Therefore, the removal of any device from the PCB must be done carefully so the package leads are preserved and remain as close to their original condition as possible. It is also necessary to ensure that no ESD or Electrical Over Stress is introduced, which can cause additional damage to the device during this delicate process. By following the above suggestions, Actel will be able to perform Failure Analysis with accurate results and avoid delays in the process due to device package rework.

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