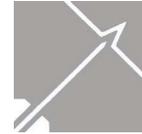




Precision Cutting of Packaged IC Devices from Printed Circuit Boards



Cutting and
Sectioning

1.0: Purpose

Two different cutting tasks are to be investigated using the Model 850 Wire Saw for cutting memory devices as mounted on a PC Board. Cutting of the lead frame to remove the package and cutting the package while maintaining wire attachment to the individual package pieces will be attempted. Important considerations are damage to the leads during the cutting process, preservation of the die and package integrity during cutting, and contamination of the parts.

2.0: Experiments and Procedures

Several different cuts were required for these specimens, all varying on the location and desired results. The first set of cuts were done to remove the IC package from the leads without damaging the bond between the lead and the PC Board. The second set of cuts were twofold: the first cuts were completed to cut the package in individual strips with one lead attached per strip; the second cut was to cut the package in half, leaving small pieces attached to each lead. Below is a schematic diagram of the package and the locations of the cuts needed for the experiment.

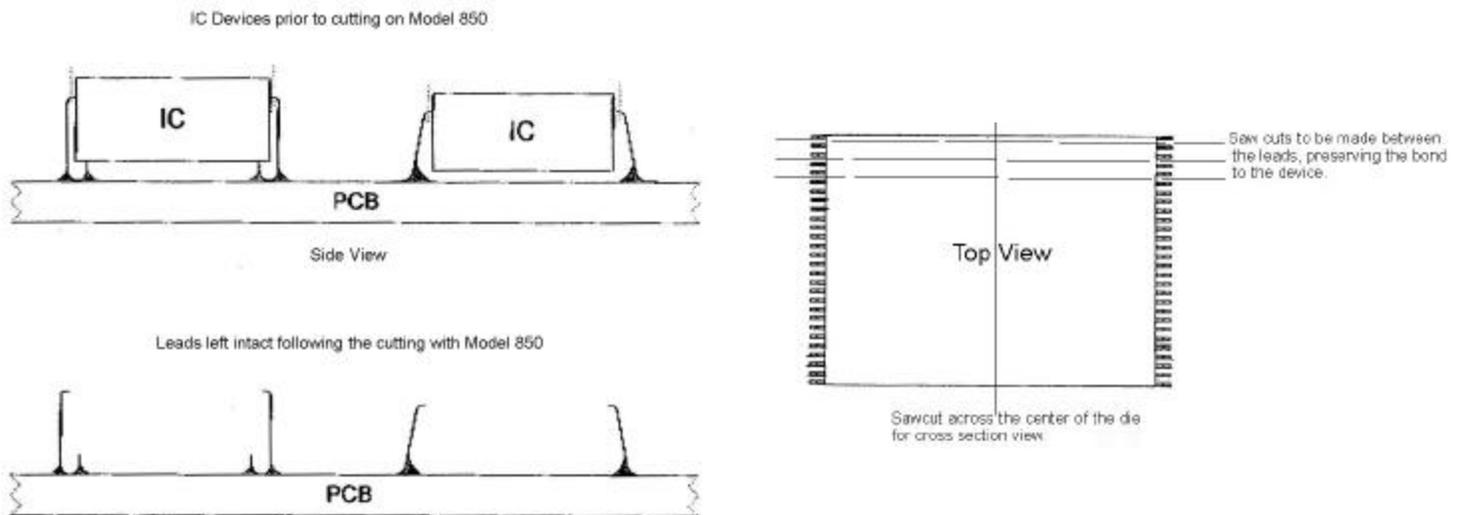


Figure 1: Illustration of the configuration of the cuts made on these devices. Two sets of cuts were made, one removing the complete device from the PCB and the other cutting individual slices of the device with the leads preserved.

All cutting operations were performed with a 0.010" diameter diamond impregnated wire to prevent any possible contamination of the devices using abrasive slurries or other lubricants of that nature. The saw parameters were as follows:

Load: 10 notch

Speed: 4 on dial

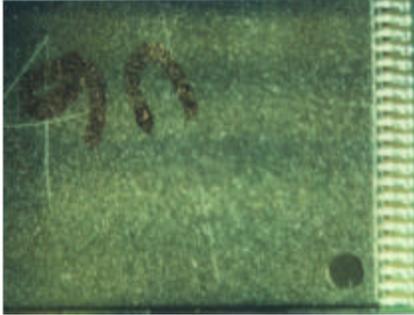
Cutting time: 30 seconds – 2 minutes

Coolant: Water

3.0: Results

The main advantage of using wire sawing techniques is illustrated in the figures below. The device prior to and following wire saw cutting shows that with very precise wire placement and small diameter wires, the cuts needed for this experiment were easily obtained. Using small diameter wires to get between the leads and precisely cut the package without damage to the solder joints and lead construction were critical in perfecting this application. Other sawing methods such as diamond wheel sawing and band sawing are either too aggressive or do not have the capability of cutting these fine structures. Saw kerfs as low as 0.006" can be produced using the Model 850.

Top View of mounted device prior to cutting on 850



Top View of mounted device following cutting on Model 850

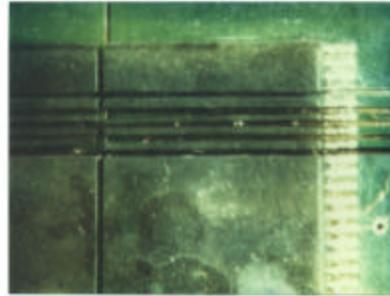


Figure 2: Illustration of the packaged devices prior to and following cutting on the Model 850. The cuts were made as illustrated in Figure 1 and show the preservation of the leads after the cuts were made.

4.0: Conclusion

It has been shown that the use of the Model 850 Wire Saw for cutting packaged IC devices is a viable method for failure analysis and structural integrity testing of these types of components. Diamond wire saw cutting has distinct advantages over other methods, with precise wire alignment, small diameter wires, little material loss, and cleanliness. All of these factors are important in the preparation of these materials and in successful analysis of fine structures.