



TRANSISTOR DEVICES, INC

Report number: FR-061201

Reference Number: 3M39278

June 23, 2011

ISOLATION AMPLIFIERS

Part Number: ISO124U

Manufacturer: Burr Brown

Quantity: 2

Submitted By: _____
Ken Turner

Approved By: _____
Mark Gores

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INTRODUCTION

Hi-Rel Laboratories received 2 isolation amplifiers from Transistor Devices, Inc for analysis. The isolation amplifiers were identified by the part number ISO124U and manufactured by Burr Brown. The devices were labeled “SN 00127” and “In Process”, and will be referenced as samples “1” and “2” respectively. It was reported that sample 1 failed in the field and sample 2 failed in-house.

ANALYSIS PROCEDURE/RESULTS

Visual inspection of the devices as received revealed no gross anomalies.

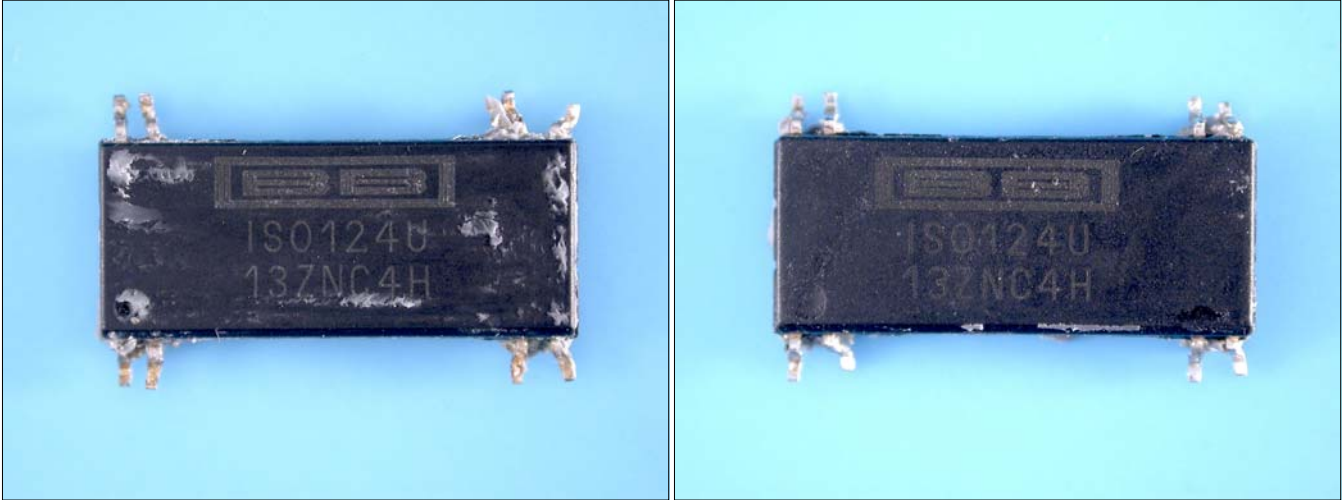


Figure 1. Optical macrograph of sample 1 as received. Figure 2. Optical macrograph of sample 2 as received.

Radiographic inspection was performed using a Fein Focus 160.24 Radiographic Inspection System. Inspection revealed no obvious anomalies.

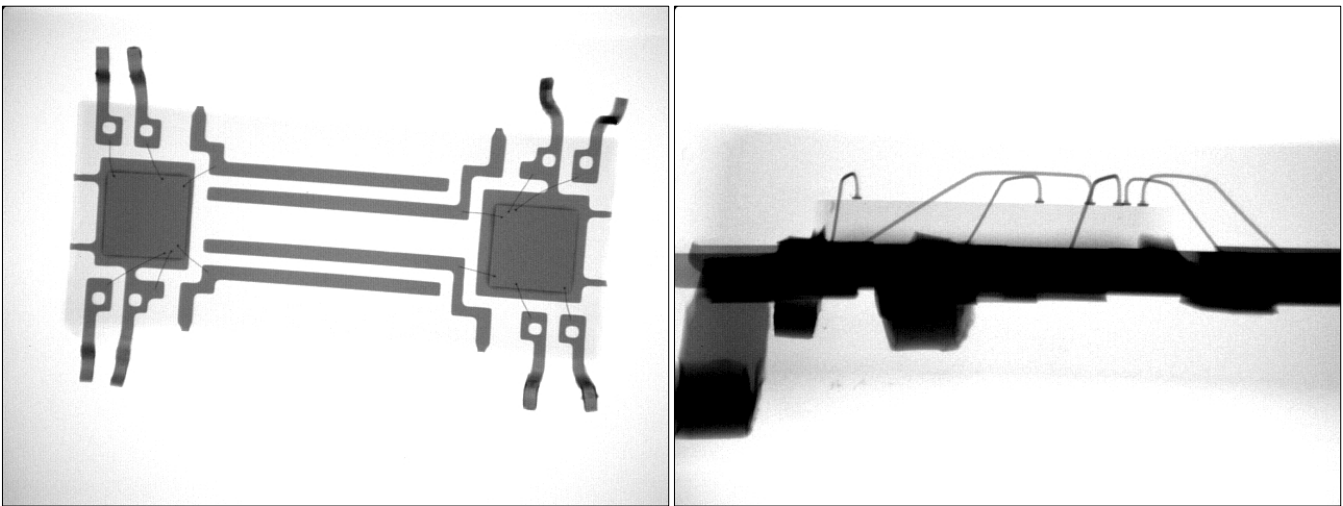


Figure 3. X-Ray image of sample 1 as received.

Figure 4. Side view image of the pin 1 die in sample 1.

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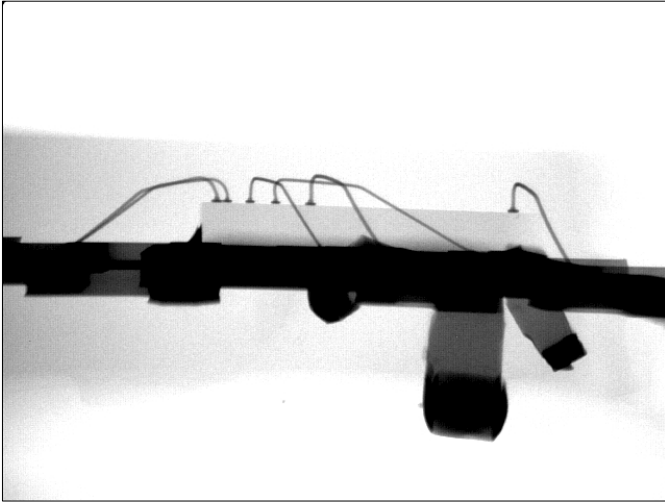


Figure 5. Side view image of the pin 14 die in sample 1.

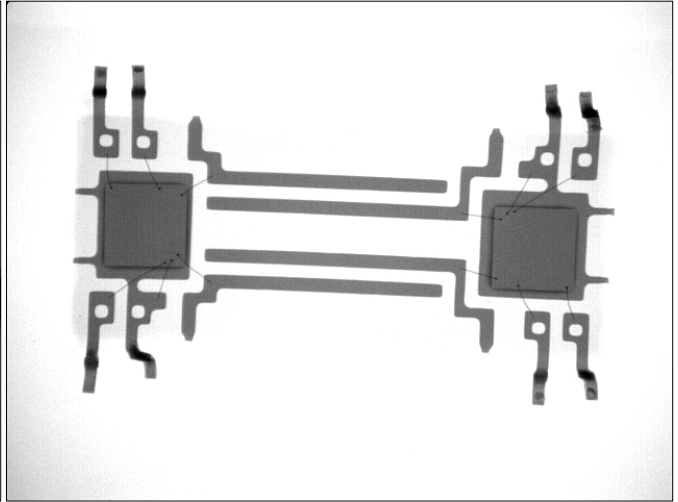


Figure 6. X-Ray image of sample 2 as received.

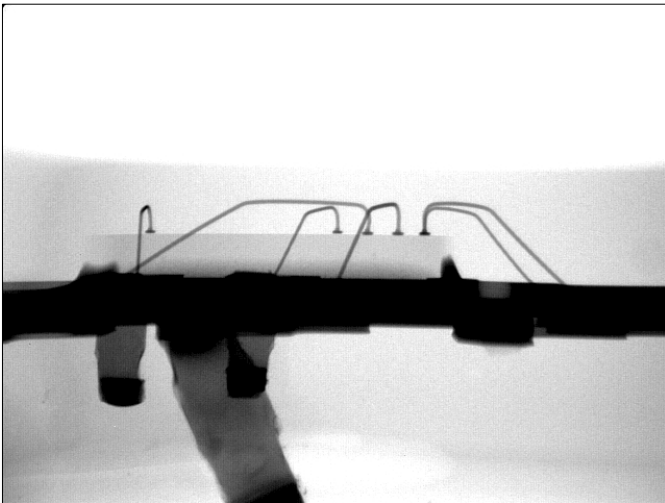


Figure 7. Side view image of the pin 1 die in sample 2.

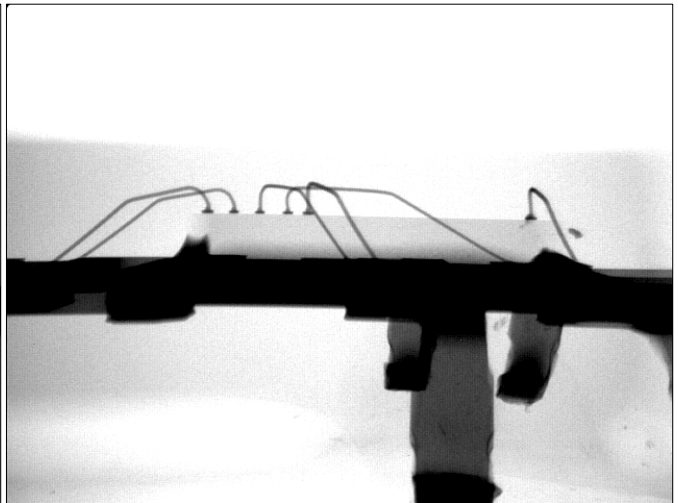


Figure 8. Side view image of the pin 14 die in sample 2. Note the possible alloy site.

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Electrical testing was performed using a Tektronix 576 curve tracer. Testing revealed no obvious degraded circuits in either device.

Decapsulation was performed using hot fuming nitric acid to dissolve the encapsulant over the dice. Optical inspection of the devices revealed a damaged junction connected to pin 13 (Vout) in both samples. The damage in sample 2 was more extensive and included fused metallization lines connected to the power supply pins.

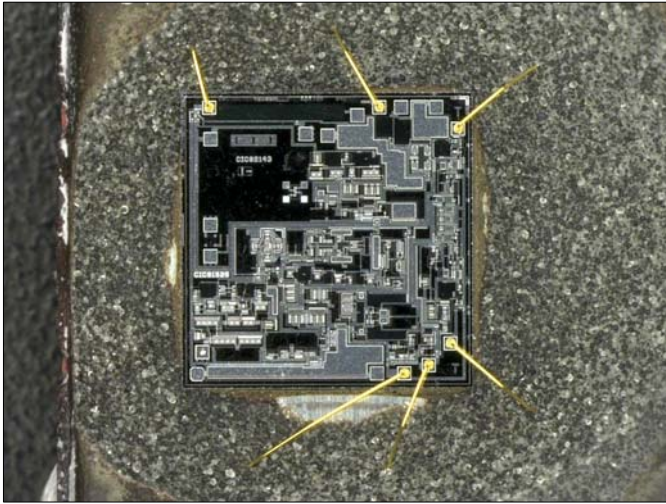


Figure 9. Optical micrograph of the pin 1 die in sample 1 after decapsulation.

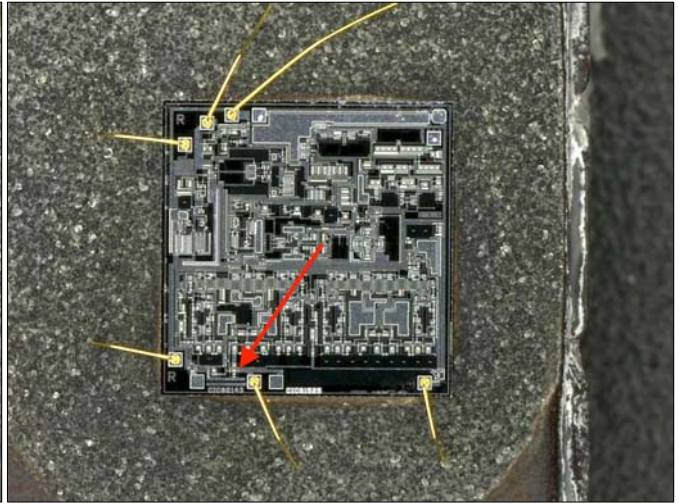


Figure 10. Optical micrograph of the pin 14 die in sample 1 after decapsulation. The arrow indicates the damaged area.

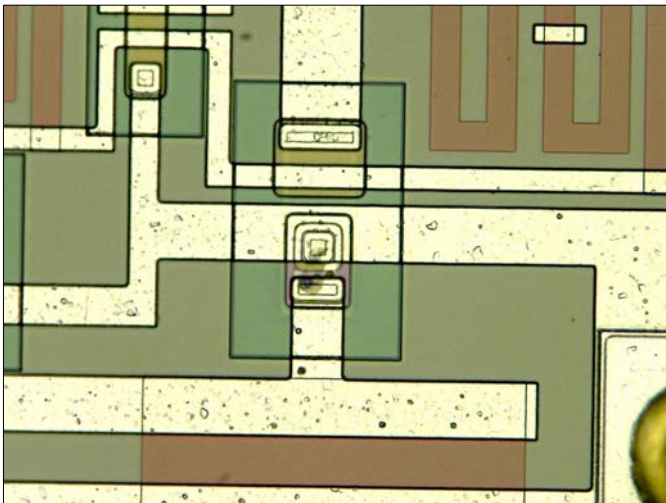


Figure 11. Detailed view of the damage junction connected to pin 13 in sample 1.

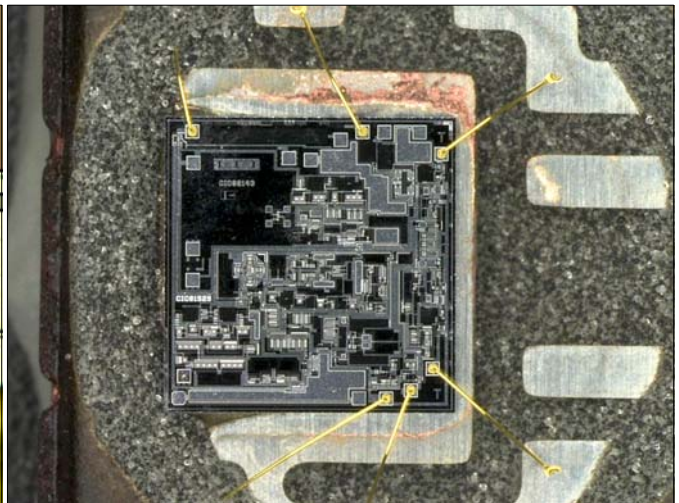


Figure 12. Optical micrograph of the pin 1 die in sample 2.

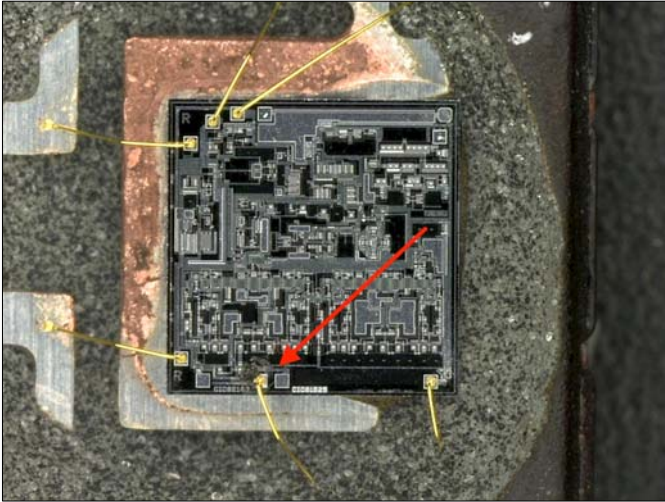


Figure 13. Optical micrograph of the pin 14 die in sample 2 after decapsulation. The arrow indicates the damaged area.

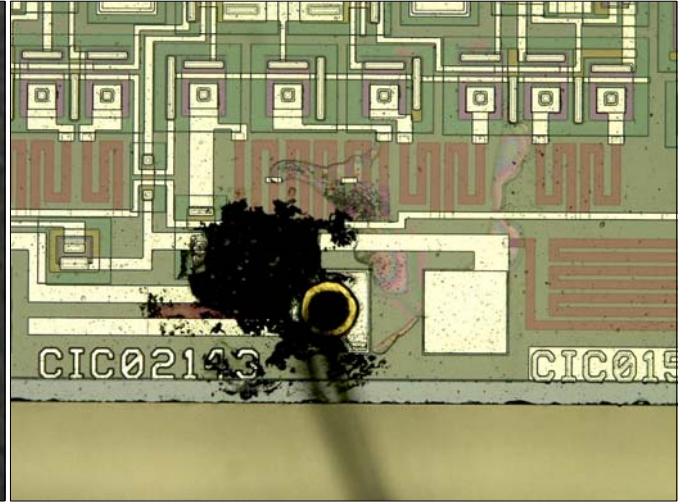


Figure 14. Close up view of the damage to the pin 13 area in sample 2.

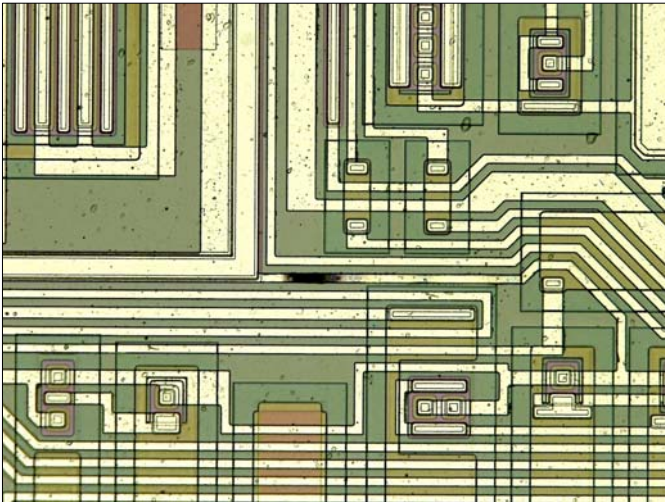


Figure 15. Close up view of the fused metallization line connected to pin 16 (-Vs2).

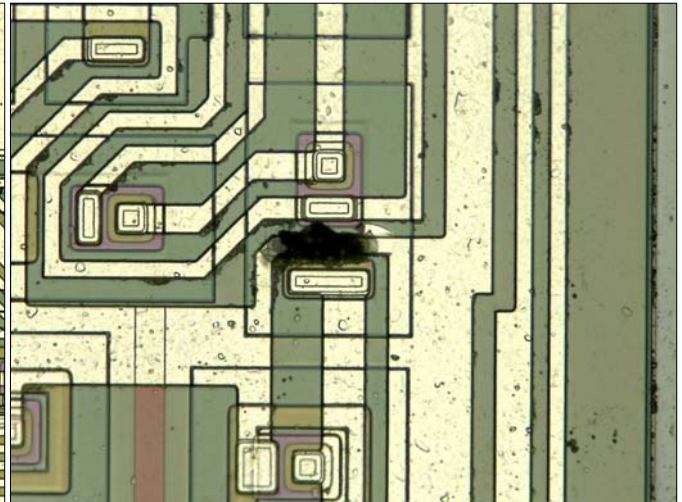


Figure 16. Close up view of the fused metallization connected to pin 14 (Gnd).

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SUMMARY CONCLUSION

The failure of the devices was verified. No anomalies were noted during external or radiographic inspection. Electrical testing revealed no obvious electrical degradation of either device. Optical inspection of the devices after decapsulation revealed damage to the output pin in both samples, with more extensive damage to sample 2.

The failure of the isolation amplifiers was due to a voltage transient on pin 13 (Vout). In sample 2, the failure event was longer in duration than sample 1 and subsequently caused the fusing of the metallization connected to the power supply pins.