

# GODDARD SPACE FLIGHT CENTER

## Test Lab Report Summary

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<i>Report Number:</i>	Q10155DPA	<i>Project:</i>	SWIFT
<i>Part Type:</i>	Microcircuit	<i>System:</i>	BAT
<i>Part Number:</i>	CMP402FS	<i>Initiated Date:</i>	05/01/2001
<i>Date Code:</i>	0010	<i>Report Date:</i>	08/02/2001
<i>Manufacturer:</i>	Analog Devices	<i>Investigator:</i>	C. Greenwell (562)
<i>Generic Number:</i>	CMP402	<i>Requester:</i>	B. Meinhold (562)
<i>Purchase Spec:</i>	Commercial	<i>Approval / Date:</i>	

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### Step 1: INCOMING INSPECTION

<u>Test</u>	<u>Quantity</u>	<u>Passed</u>	<u>Failed</u>
External Visual	N/A	N/A	N/A
PIND Condition A	N/A	N/A	N/A

### Step 2: DESTRUCTIVE PHYSICAL ANALYSIS

Destructive Physical Analysis (DPA) was conducted per GSFC document "Plastic Encapsulated Microcircuit (PEM) Guidelines for Screening and Qualification for Space Applications", except that cross-section was done without dye penetrant and glassivation integrity testing was not performed.

No rejectable defects or anomalies were observed during this analysis.

GODDARD SPACE FLIGHT CENTER

Part Type: Microcircuit  
 Manufacturer: Analog Devices

Part No: CMP402FS  
 Date Code: 0010

## Summary of Analysis:

	<i>Serial Number</i>	<u>I13</u>	<u>I15</u>	<u>I17</u>	<u>J15</u>	<u>J19</u>
<i>External Examination</i>						
1. Markings - legibility and correctness _____		A	A	A	A	A
2. Integrity of package seals _____		N/A	N/A	N/A	N/A	N/A
3. Condition of external leads and plating _____		A	A	A	A	A
4. Overall package condition _____		A	A	A	A	A
<i>Radiographic Examination</i>						
5. Die bonding material and die alignment _____		A	A	A	A	A
6. Package seal integrity _____		N/A	N/A	N/A	N/A	N/A
7. Presence of foreign material _____		A	A	A	A	A
8. Lead dress (if revealed) _____		A	A	A	A	A
<i>Acoustic Microscopy Inspection</i>						
9. Condition of material interfaces (delaminations) _____		A	A	A	A	A
10. Condition of molding material (voids, cracks) _____		A	A	A	A	A
<i>Internal Examination (including cross-section)</i>						
11. Presence of foreign material _____		A	A	A	A	A
12. Mechanical condition of die _____		A	A	A	A	A
13. Wire bonds and lead dress _____		A	A	A	A	A
14. Die bonding material _____		A	A	A	A	A
15. Condition of die surface _____		A	A	A	N/P	N/P
16. Condition of metallization _____		A	A	A	N/P	N/P
17. SEM Examination _____		A	A	A	N/P	N/P
<i>Bond Strength</i>						
18. Strength _____		A	A	A	N/P	N/P
19. Metallization adherence _____		A	A	A	N/P	N/P
<i>Die Bond Strength</i>						
20. Strength _____		N/P	N/P	N/P	N/P	N/P

SN's J15 and J19 subjected to cross-sectional examination.

(\* = Refer to comments, A = acceptable, U = unacceptable, N/A = not applicable, N/P = not performed)

Appended Photographs:

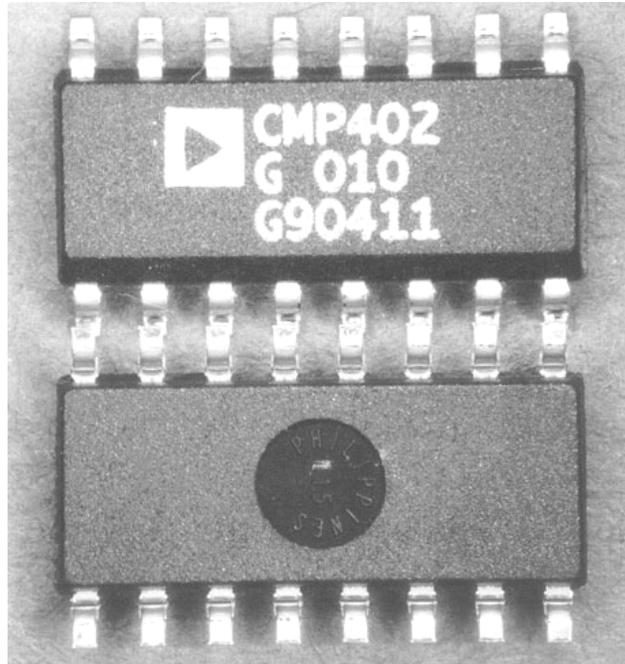


Figure 1. External top and bottom views of the CMP402FS devices. Each device had a unique three character alphanumeric code embossed on the bottom side that was used for reference designations during this analysis. 8X

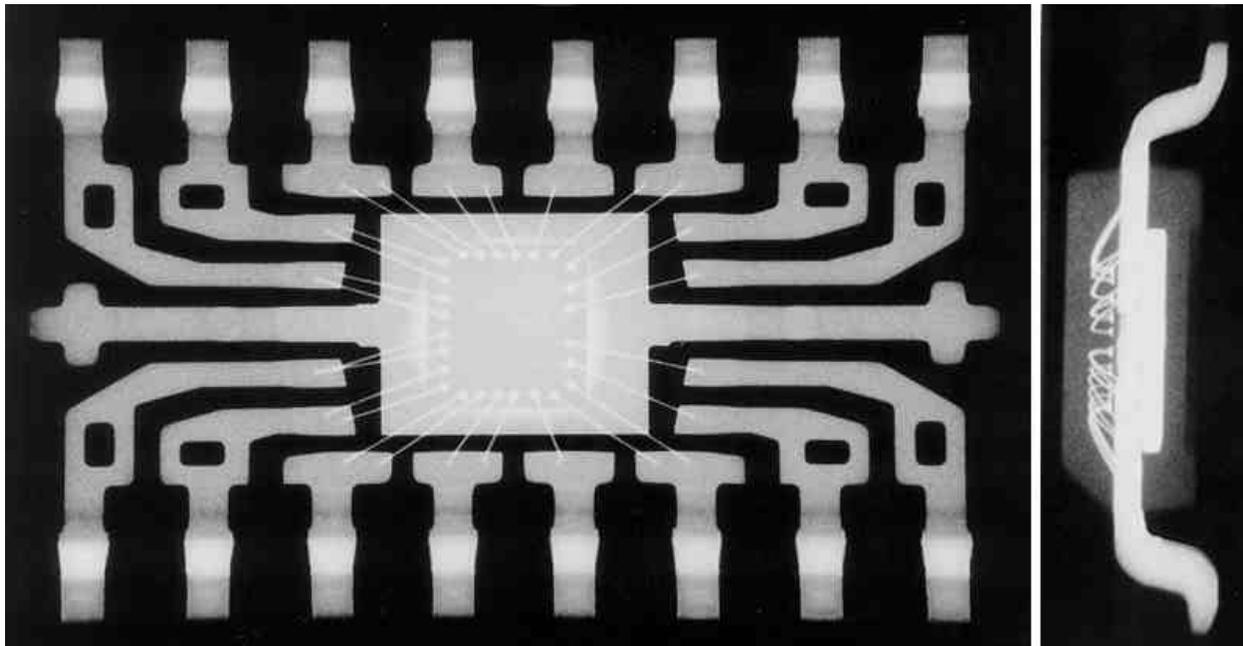


Figure 2. Top and side view radiographic images. 14X

Appended Photographs:

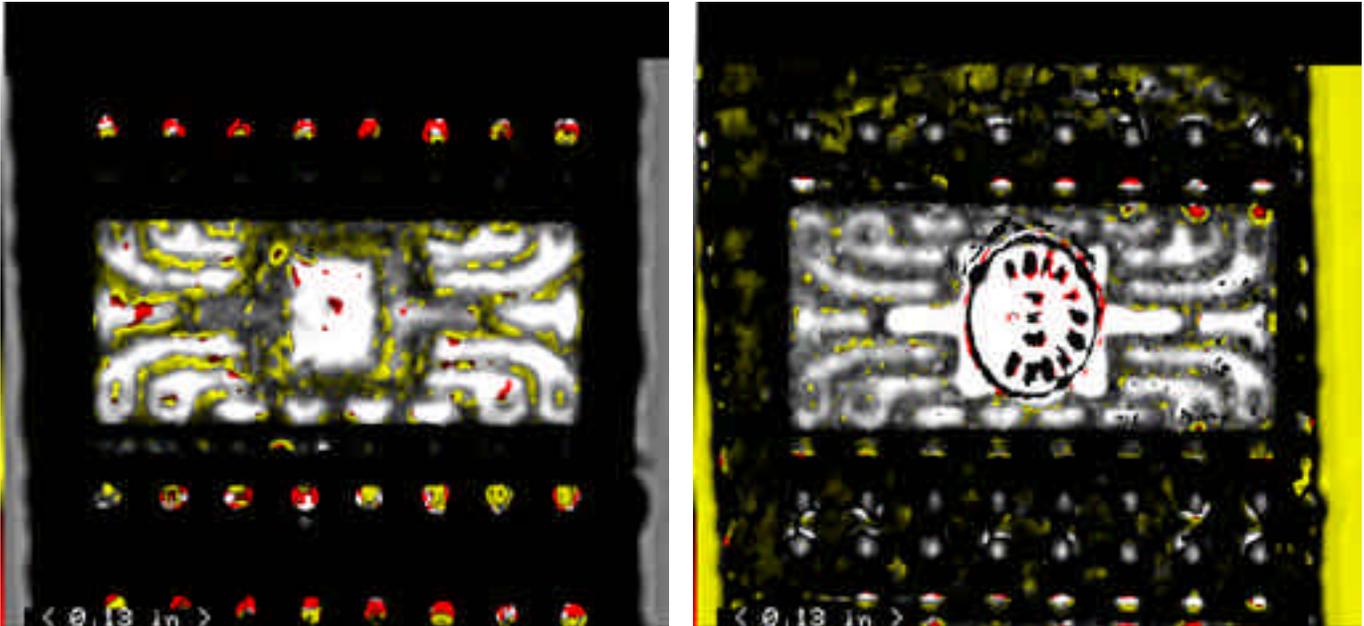


Figure 3. Top (left) and bottom C-SAM images of SN I13.

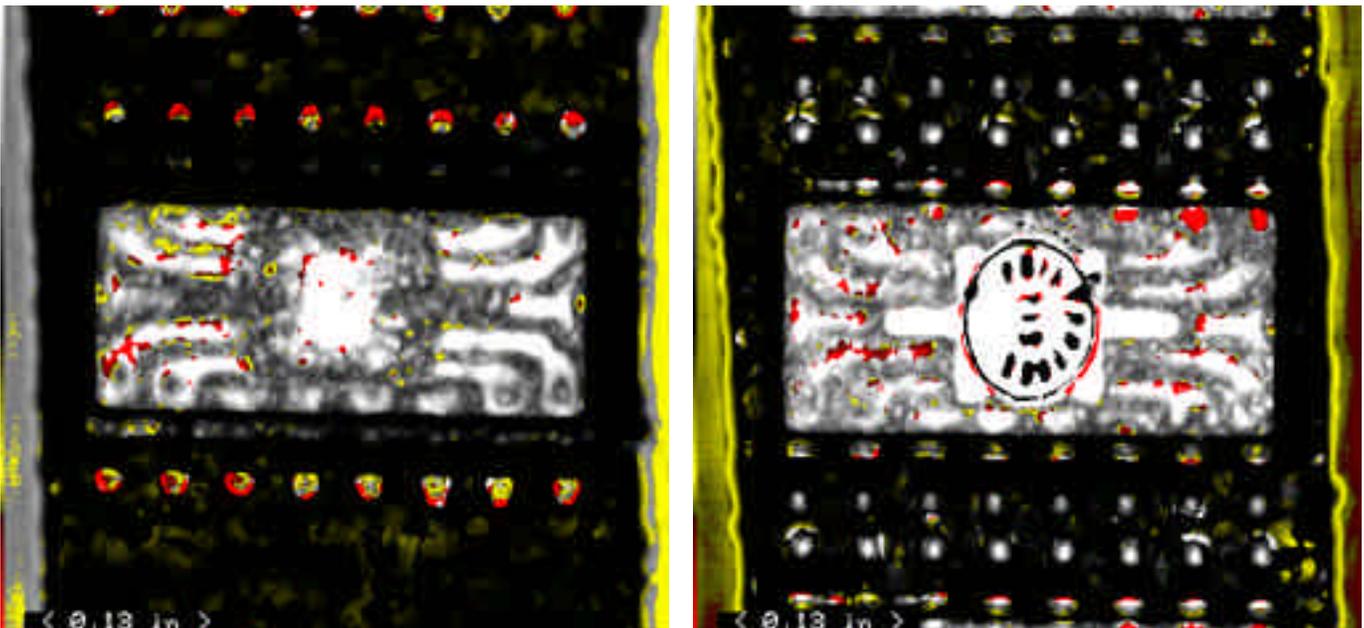


Figure 4. Top (left) and bottom C-SAM images of SN I15. Minor delaminations are delineated in red.

Appended Photographs:

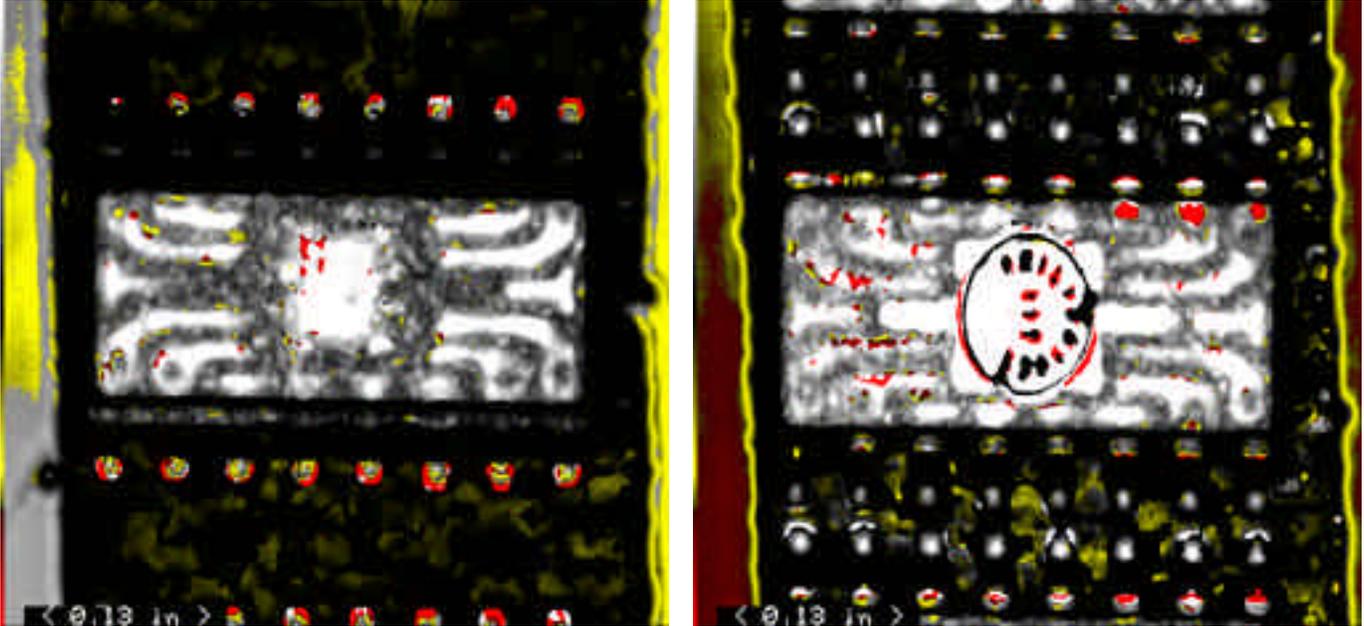


Figure 5. Top (left) and bottom C-SAM images of SN I17.

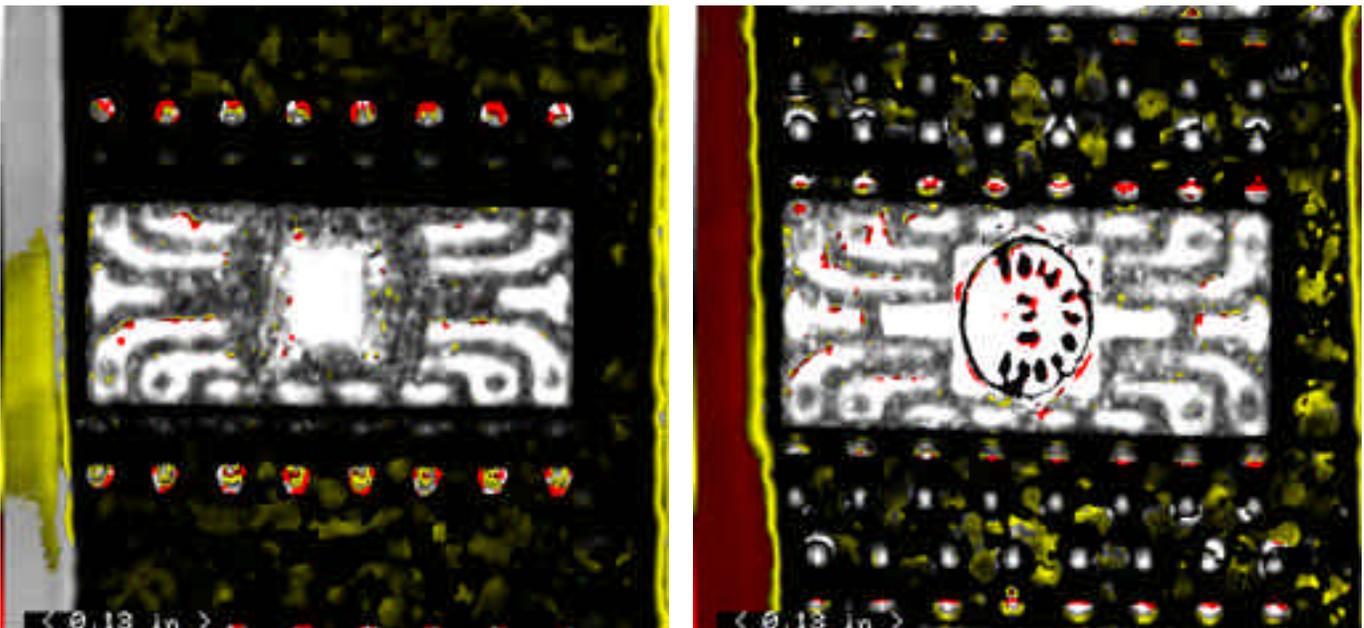


Figure 6. Top (left) and bottom C-SAM images of SN J15.

Appended Photographs:

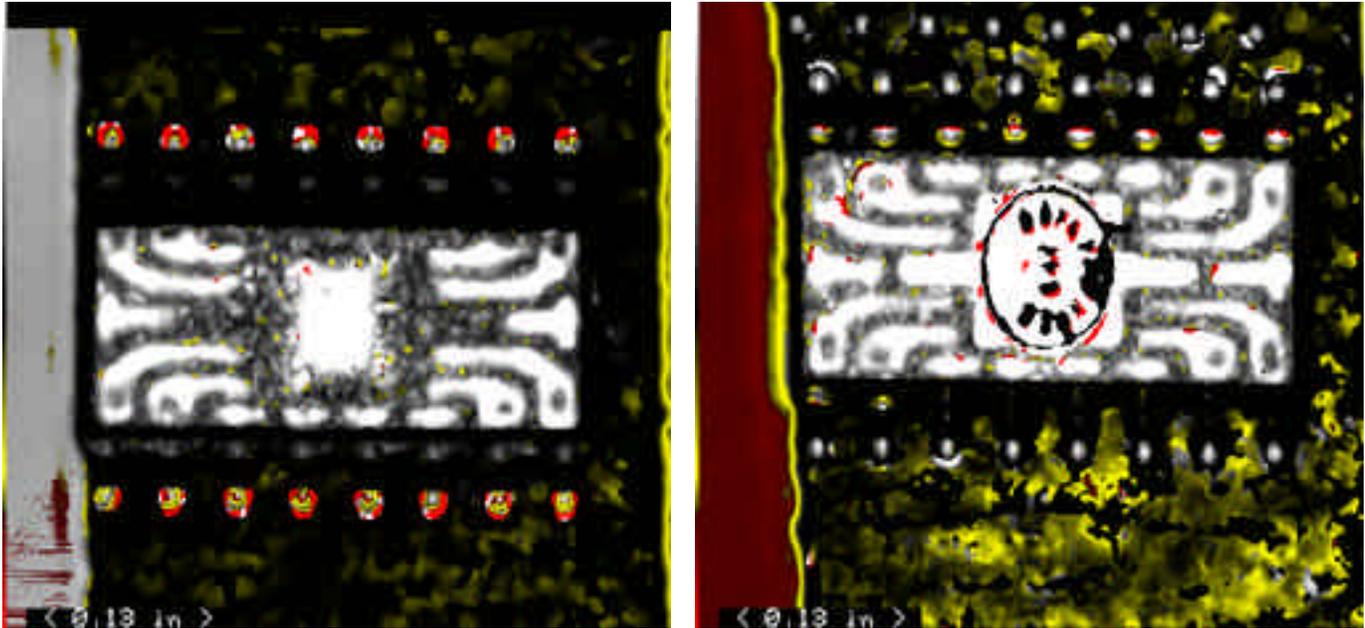


Figure 7. Top (left) and bottom C-SAM images of SN J19.

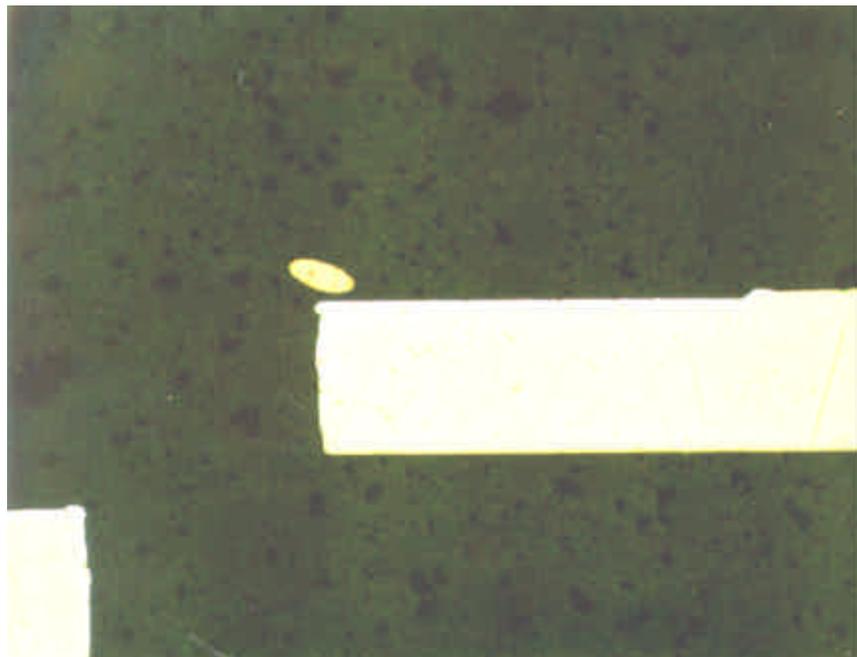


Figure 8. Cross-section image of SN I15. No delaminations or anomalies were observed, consistent with the C-SAM inspection results.  $\approx 200X$ .

Appended Photographs:

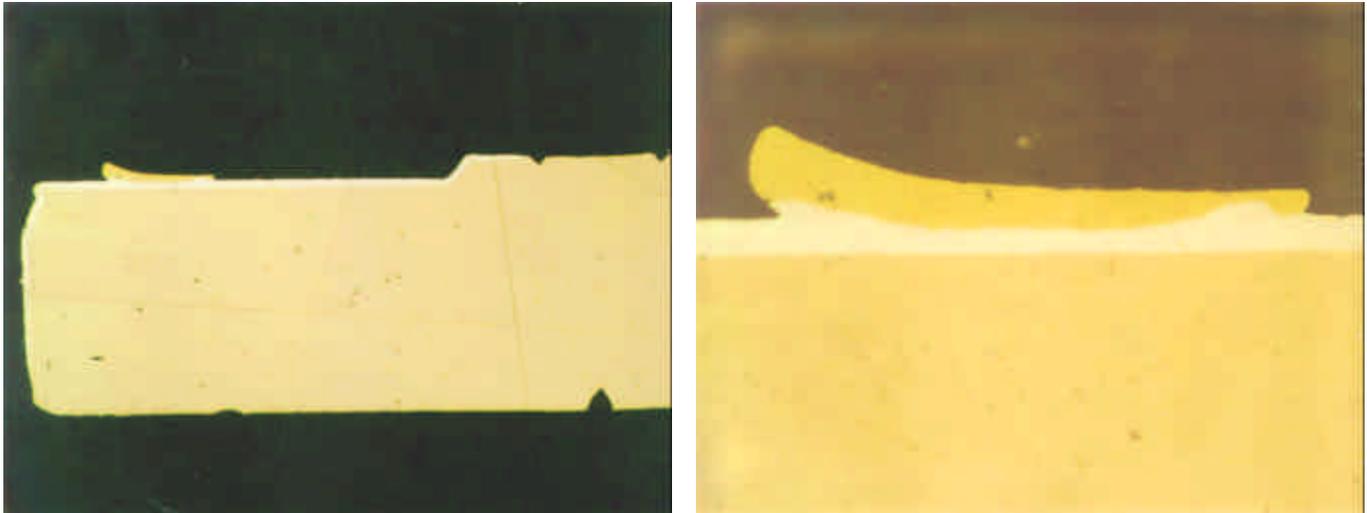


Figure 9. Cross-section images of SN J19. No delaminations or anomalies were observed. Left  $\approx$  200X, right  $\approx$  1000X.

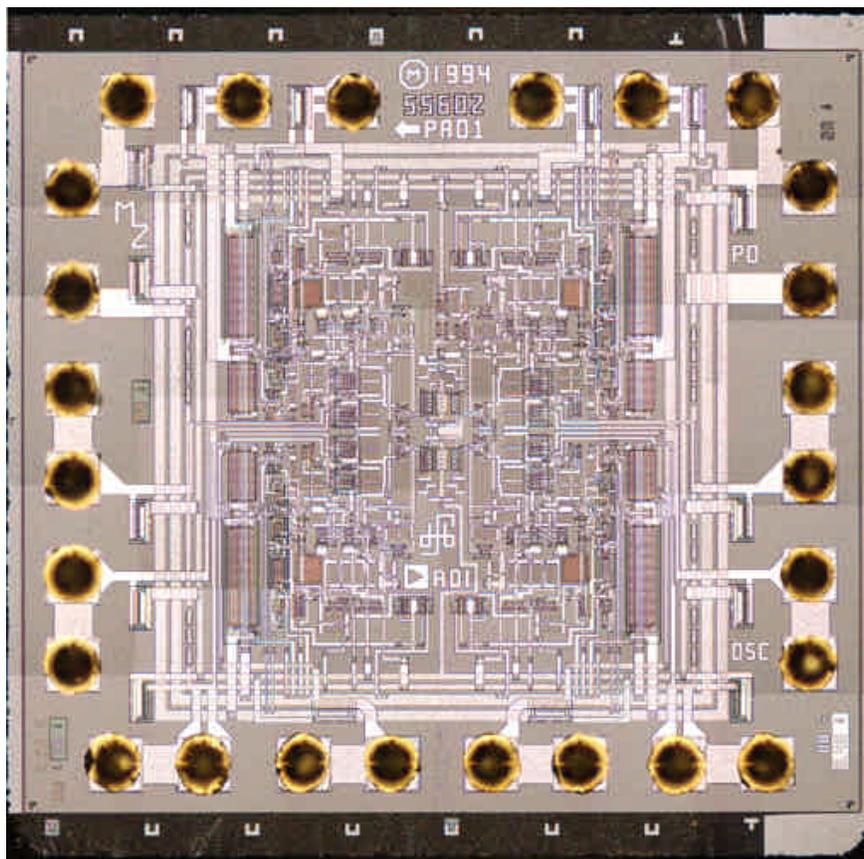


Figure 10. Overall image of CMP402FS die in SN I15.

Appended Photographs:

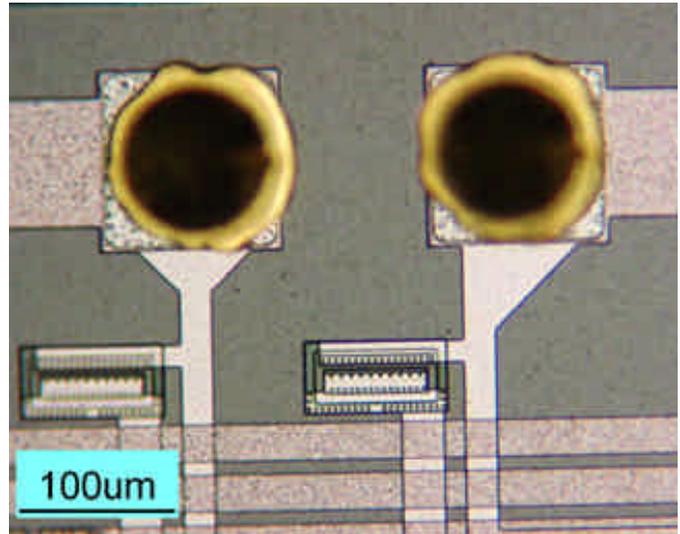
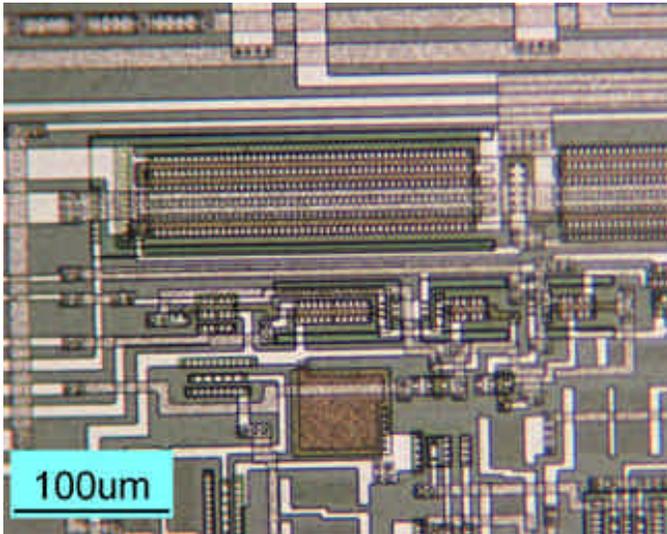


Figure 11. Optical micrograph images of SN I13 show general device features.

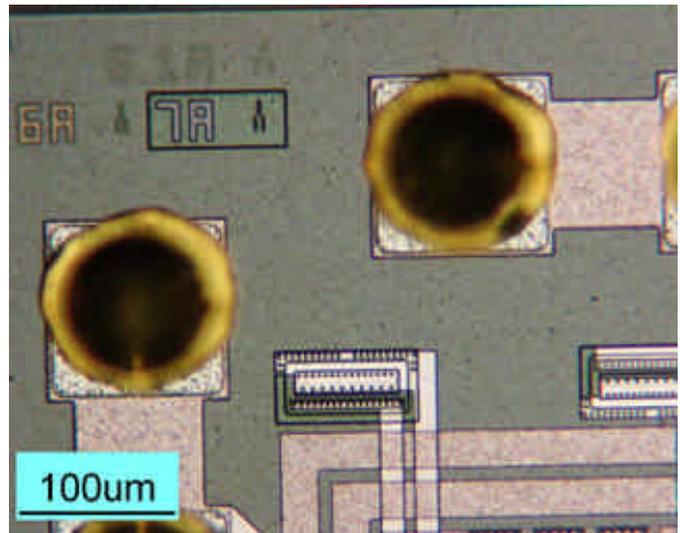
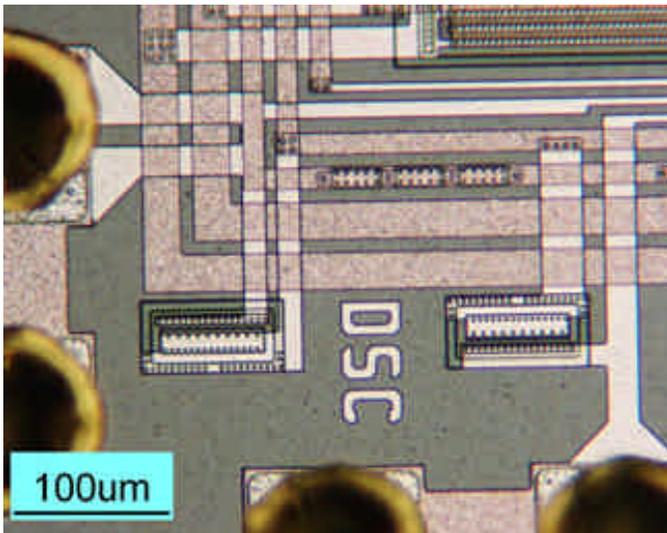


Figure 12. Optical micrograph images of SN I17 show general device features.

Appended Photographs:

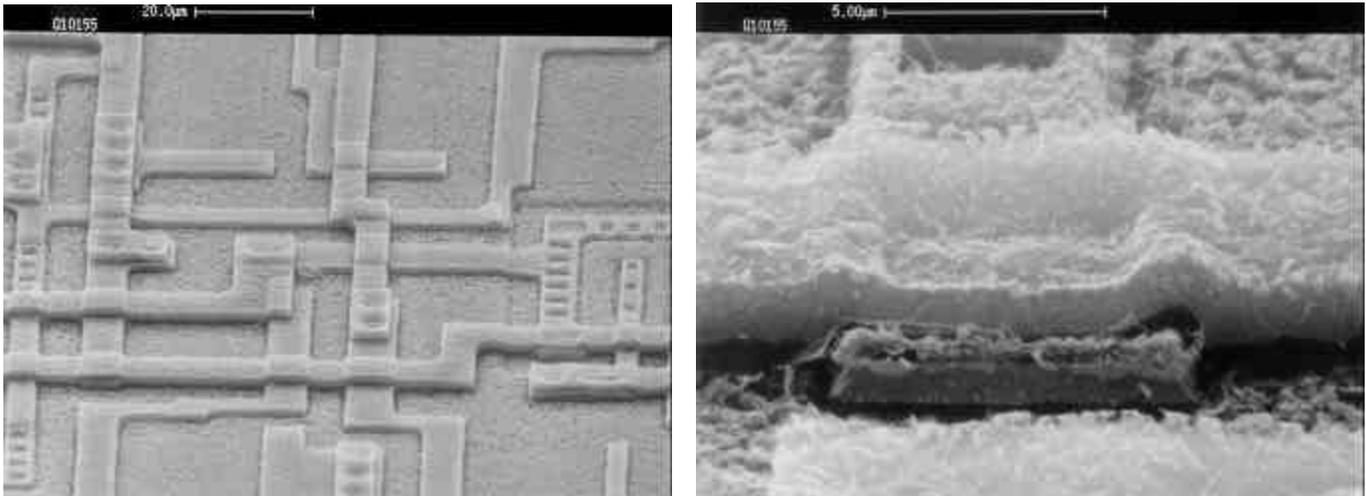


Figure 13. SEM micrographs of SN I13. The metallization has excellent step coverage. The deprocessing pickled the silicon and left artifact on the surfaces.

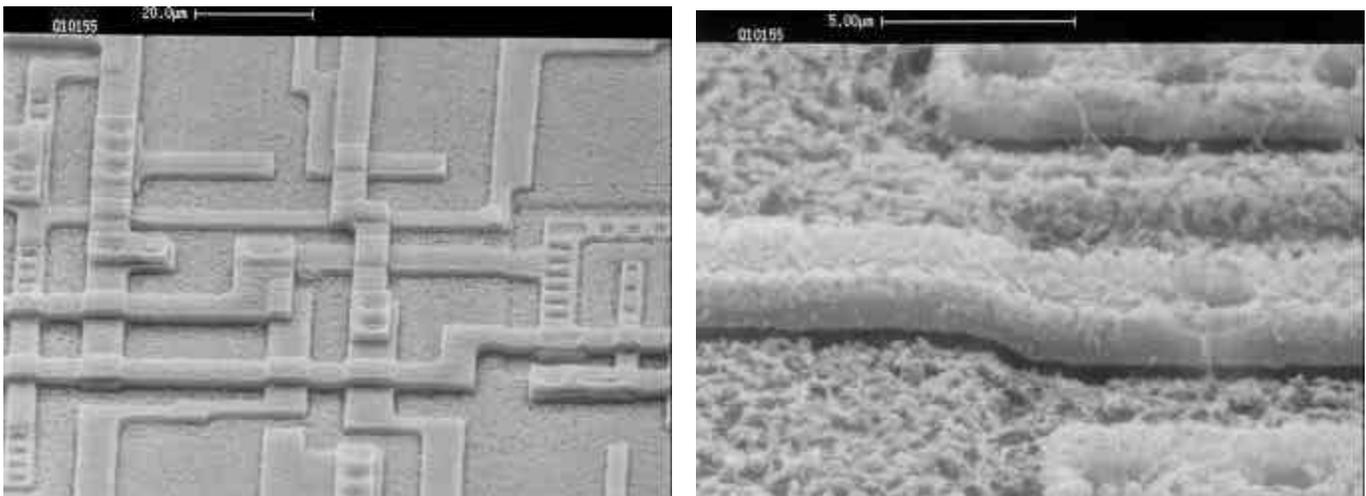


Figure 14. SEM micrographs of SN I15.

Appended Photographs:

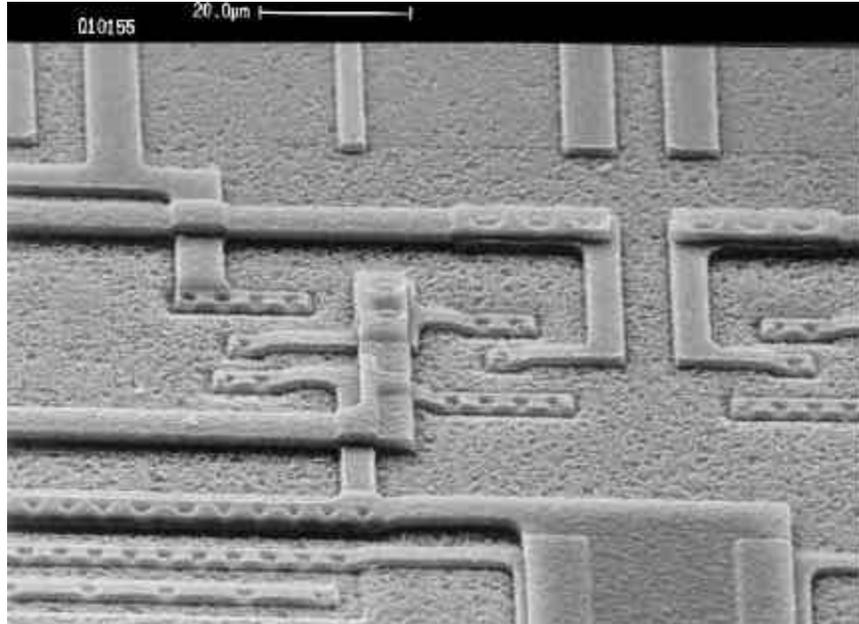


Figure 15. SEM micrograph of SN I17.

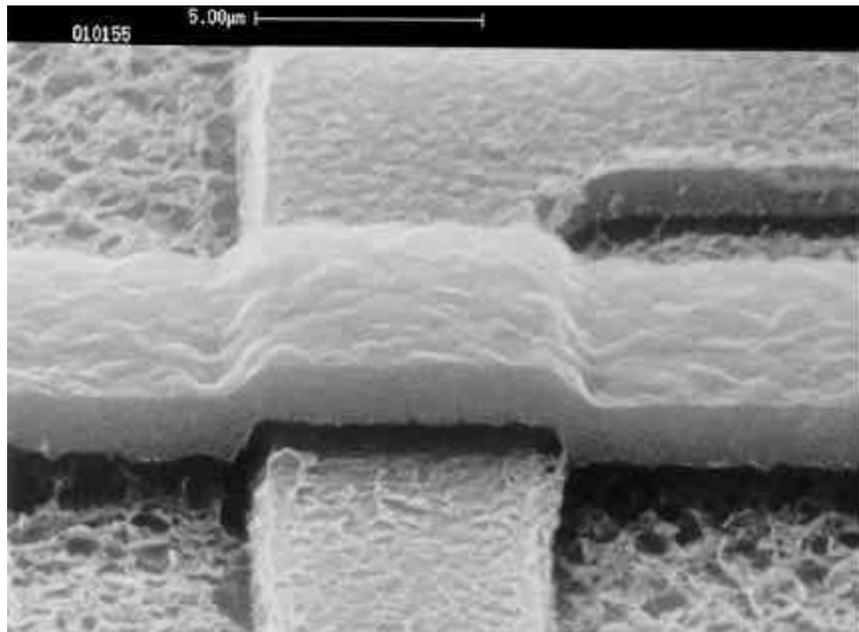


Figure 16. SEM micrographs of SN I17.