FAILURE ANALYSIS REPORT

FA QEM-CCR-1709-00009
ACTION-0074312

Analyst: Priority Labs

Reviewed: Scott Lisula Date: 9-9-17

Dallas **Device: TUSB4041IPAPRQ1**

Customer:	SERIAL SYSTEM (DSTR)	**Assy Site:**	PHI
Customer Tracking ID:		**Fab Site:**	DM6
Customer Part ID:		**Technology:**	C021
Customer Contact:	gujiabin	**Analyst:**	Scott Lisula
Device Type:	TUSB4041IPAPRQ1	**TI Contact:**	Lisa Liu(CQE SZ)
		Qty Submitted:	1
Flow Type:	Customer Return	**Date Submitted:**	2017-09-07
Reviewer:		**Approval:**	

SUMMARY

Fail Mode: One device was submitted for analysis.

Fail Mech: EOS damage was observed in the form of degraded mold compound, damaged, and reflowed metal. EOS damage was observed at the silicon layer.

Conclusion: The device failed due to an electrical overstress event.

TI Unit #	Cust. Unit #	Lot Trace Code	Symbolization	Wafer Fab Lot #	Assembly Lot #
1		73AF26W		6283871	7115513WCW

- **Customer Problem Description**
  Customer: Coagent;
  Failed step: NPI
  failure description:
  pin 33 and pin 34(USB1 D+/-) waveform anomaly;

- **TI Problem Description**
  2017/09/01: 1pcs sample received

- **External Visual Inspection**

  External visual inspection did not reveal any anomalies or defects.

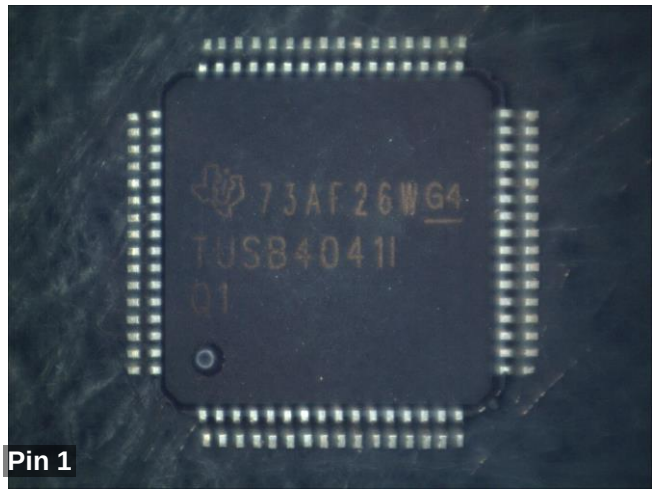

Figure Number: 1
Unit Number: 1

Optical image of the top side external condition of the package.

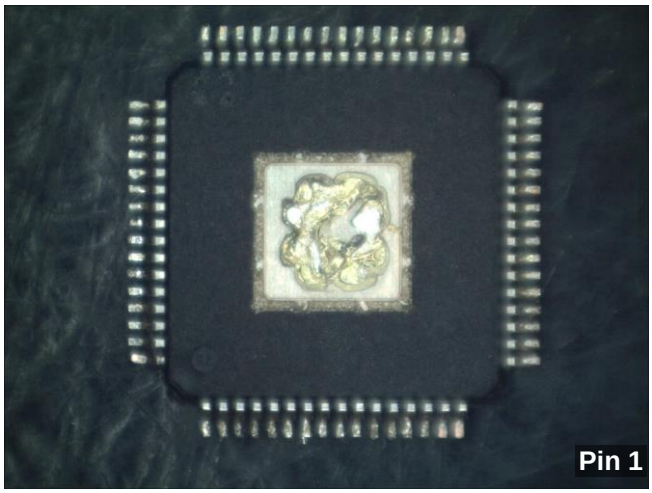

Figure Number: 2
Unit Number: 1

Optical image of the bottom side external condition of the package.

- **X-ray Analysis**

  X-ray analysis did not reveal any anomalies or defects. The bond wires were in place and no anomalous bond wire sweep was observed.

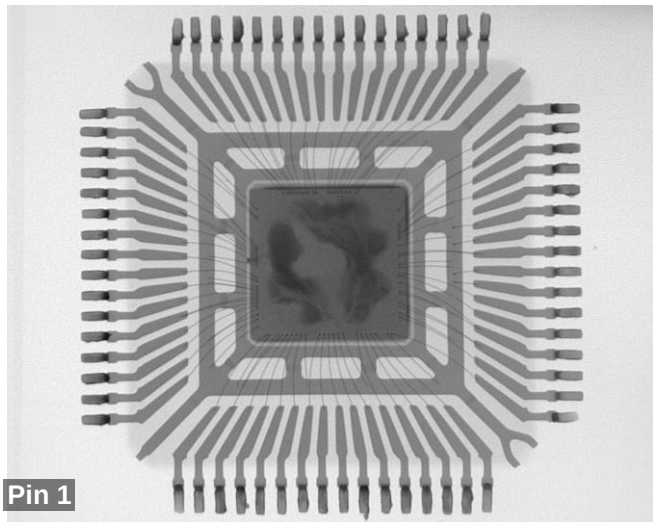

Figure Number: 3
Unit Number: 1
X-ray analysis did not reveal any anomalies.

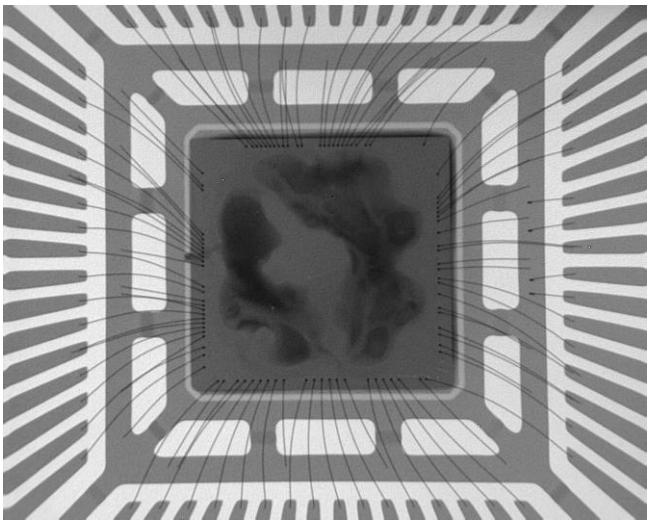

Figure Number: 4
Unit Number: 1
High magnification X-ray analysis did not reveal any anomalies.

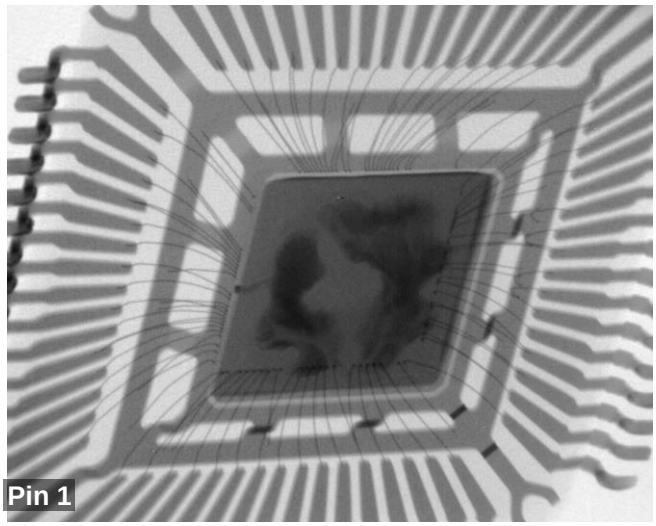

Figure Number: 5
Unit Number: 1
Angled X-ray analysis did not reveal any anomalies.

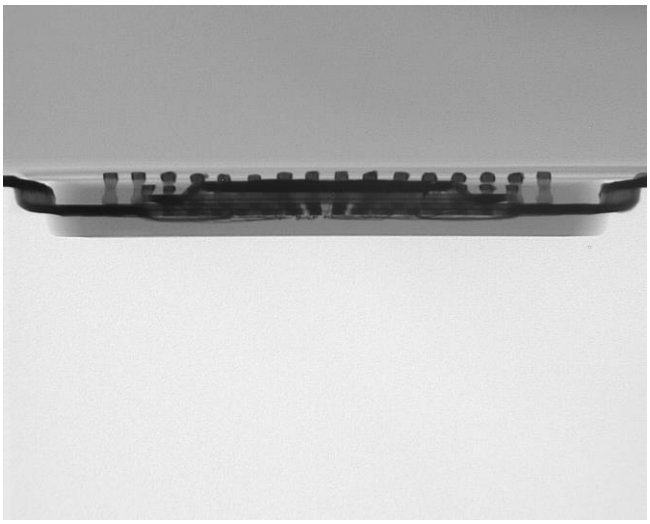

Figure Number: 6
Unit Number: 1
Side view X-ray analysis did not reveal any anomalies.

- **Scanning Acoustic Microscopy**

Scanning Acoustic Microscopy (SAM) did not reveal any delamination at the package/die interface.

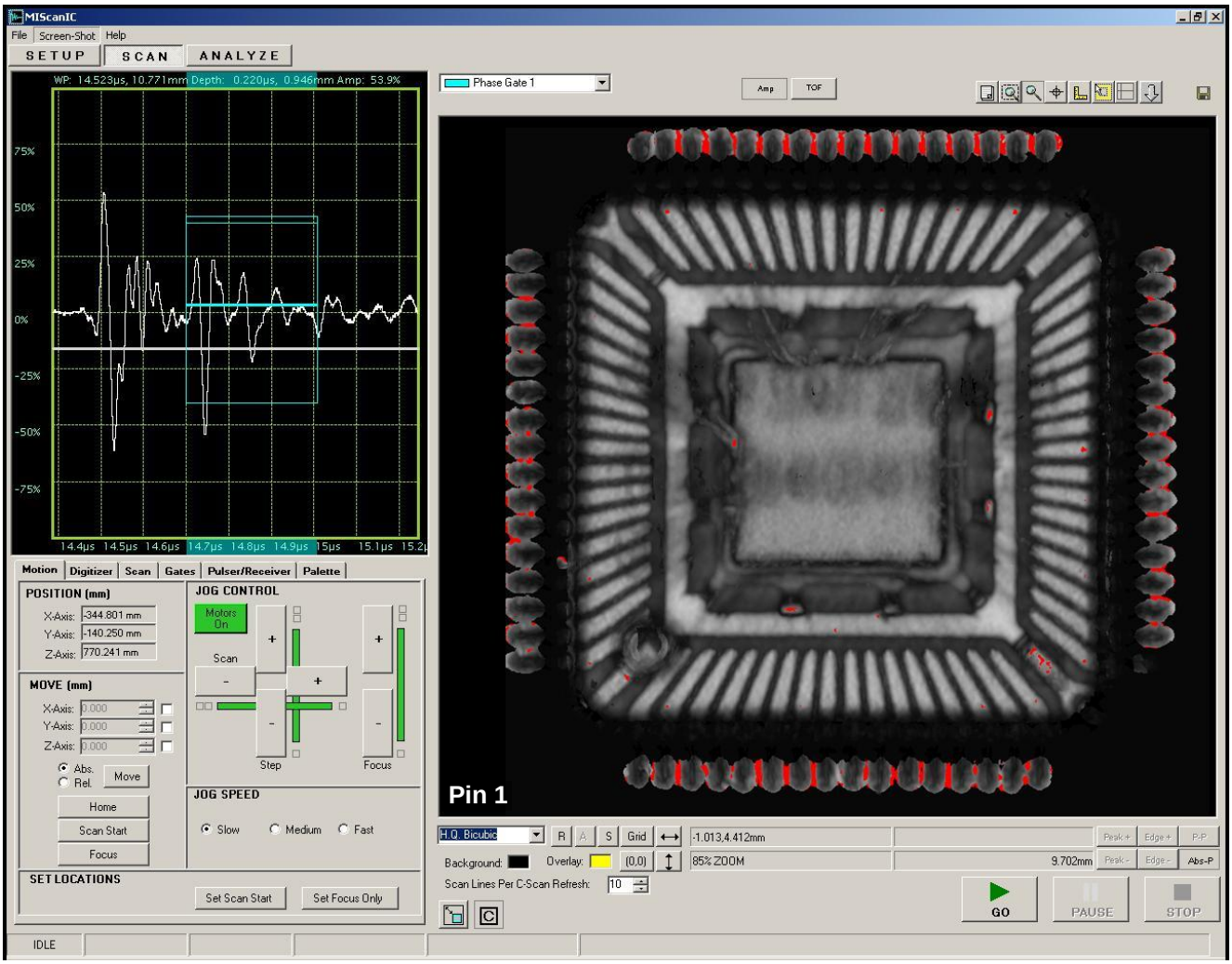

Figure Number: 7
Unit Number: 1

SAM analysis did not reveal any delamination at the package/die interface.

- **Electrical Characterization**

  An all pins curve trace confirmed the reported short from pin 33 and pin 34 to GND, when compared to a correlation unit.

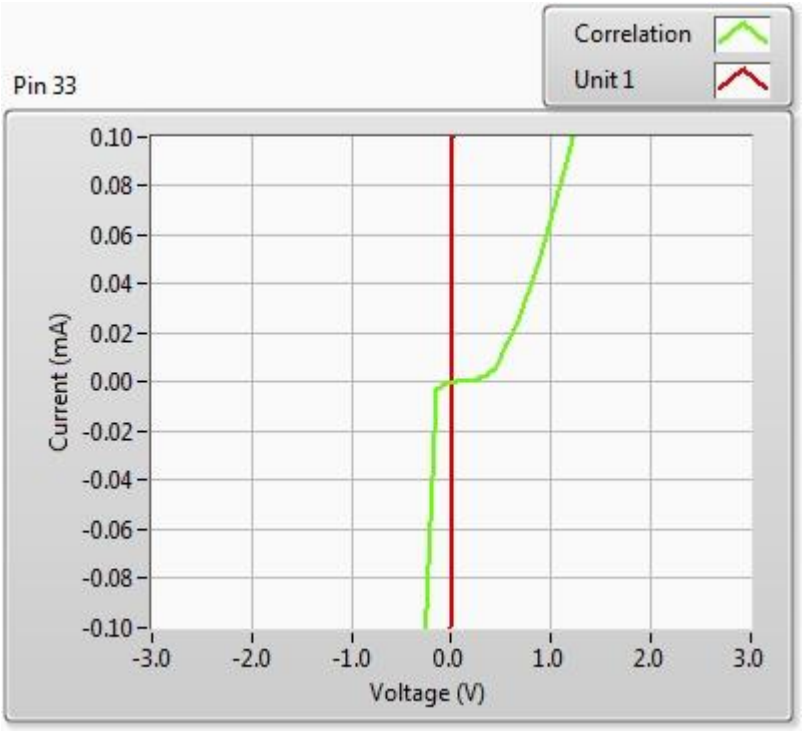

Figure Number: 8
Unit Number: 1

Curve trace image showing a short from pin 33 to GND.

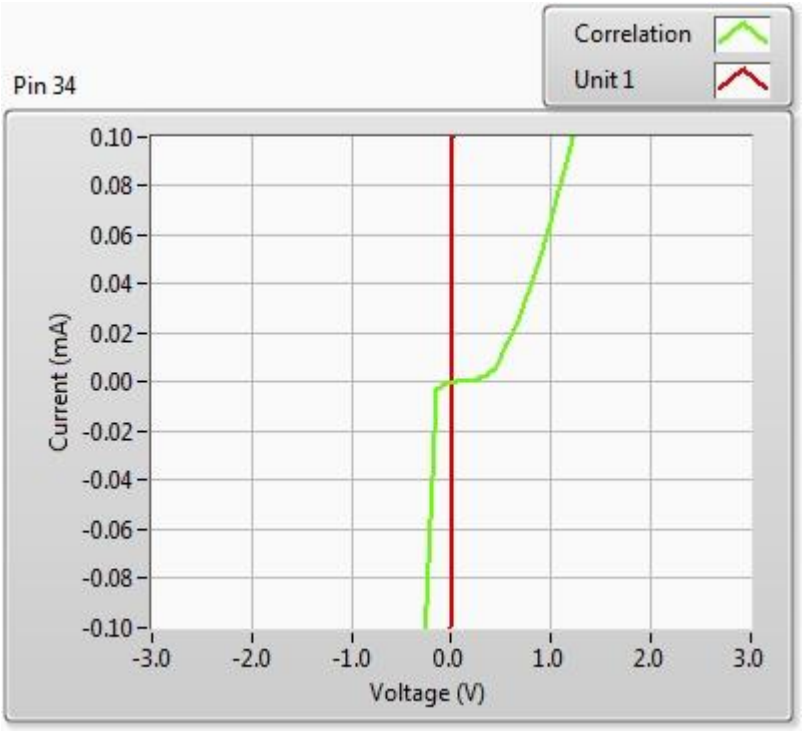

Figure Number: 9
Unit Number: 1

Curve trace image showing a short from pin 34 to GND.

- **Decapsulation and Internal Optical Inspection**

  The device was decapsulated using wet chemical etchants. Optical inspection of the die circuitry revealed EOS damage in the form of degraded mold compound, damaged, and reflowed metal.

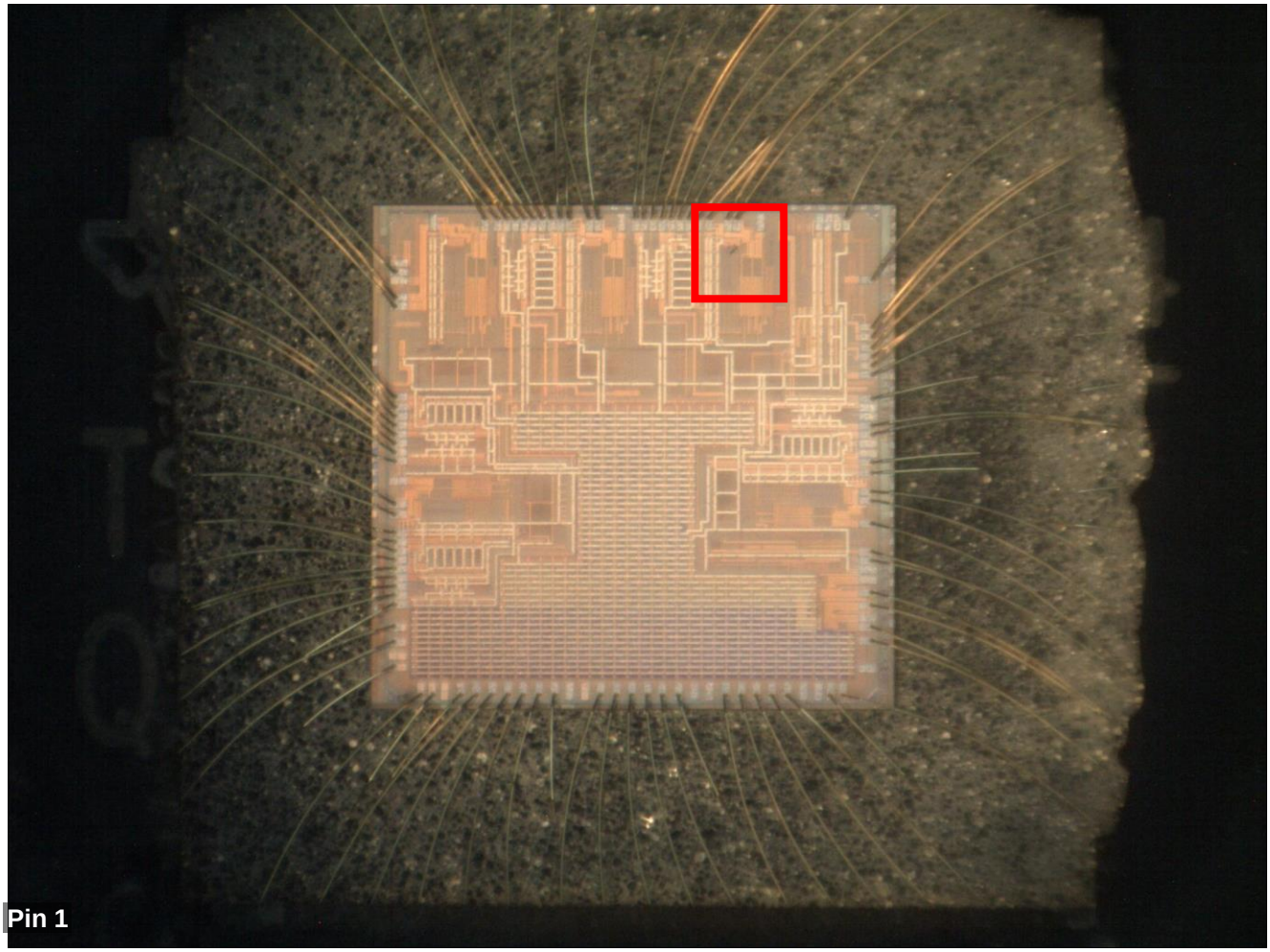

Figure Number: 10
Unit Number: 1
Layer: Protective Overcoat (PO)

Optical overview image showing the die area of the unit. EOS damage indicated by the red.

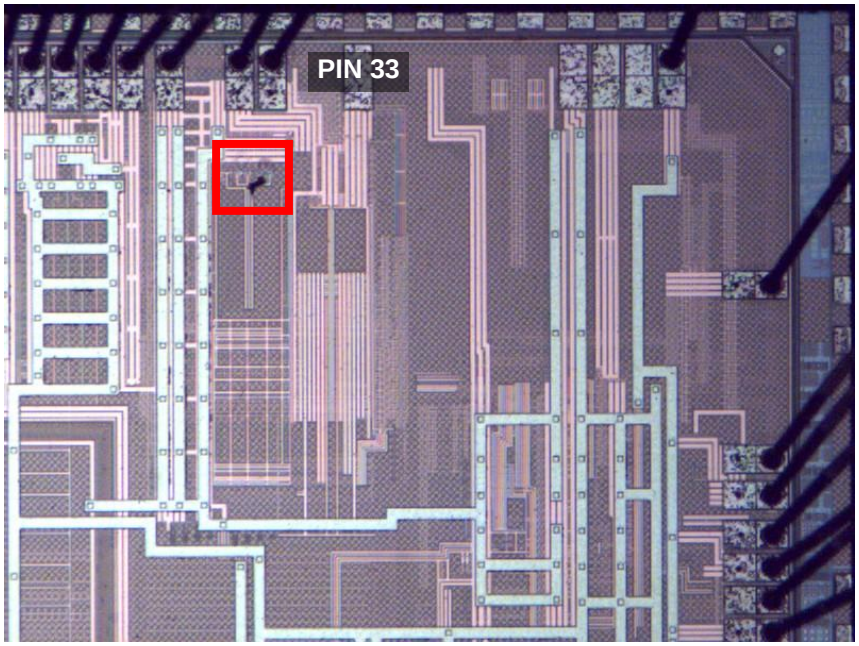

Figure Number: 11
Unit Number: 1
Layer: Protective Overcoat (PO)

High magnification optical image of the observed EOS damage, as indicated by the red.

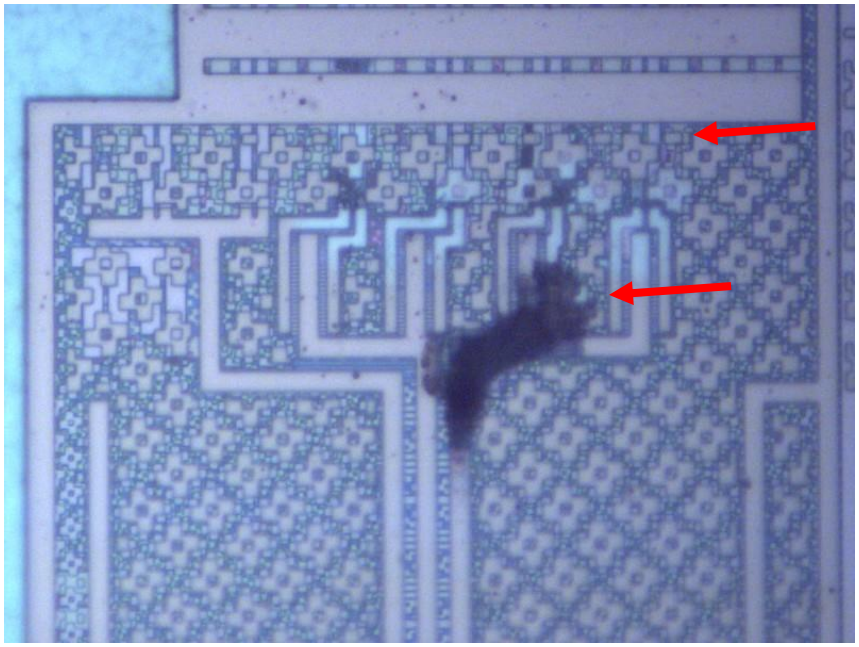

Figure Number: 12
Unit Number: 1
Layer: Protective Overcoat (PO)

High magnification optical image of the observed EOS damage, as indicated by the red.

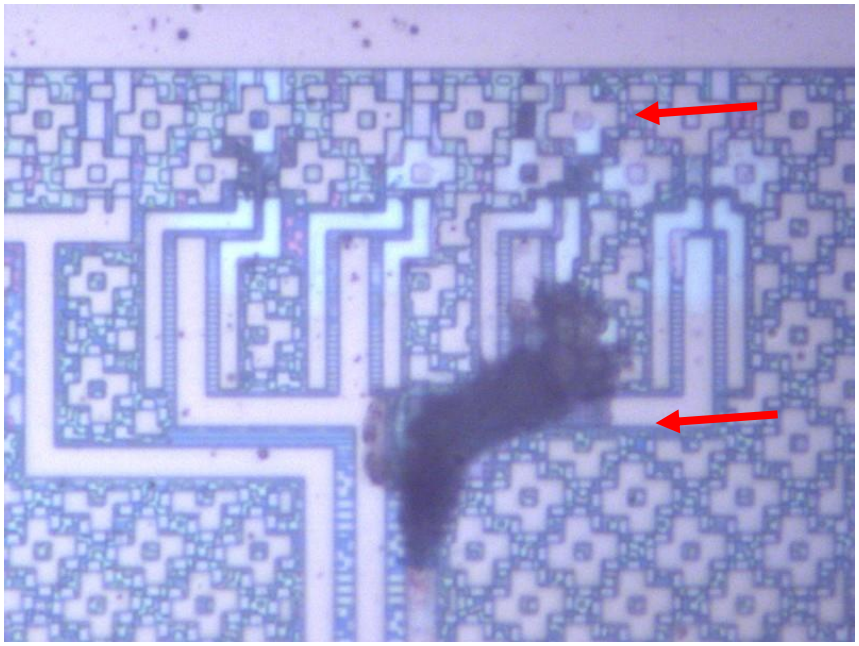

Figure Number: 13
Unit Number: 1
Layer: Protective Overcoat (PO)

High magnification optical image of the observed EOS damage, as indicated by the red.