Failure Analysis Report

TEXAS INSTRUMENTS

TI Information - Selective Disclosure

Device Analysis Services

FA QEM-CCR-1906-00715
ACTION-0303272

Customer:	WINTECH (DSTR)	**Assy Site:**	TAI
Customer Tracking ID:		**Fab Site:**	CU3
Customer Part ID:		**Technology:**	LBC5
Customer Contact:	Yi Dary	**Analyst:**	Rang Cheng
Device Type:	DRV8840PWPR	**TI Contact:**	Jerry Xiao
		Qty Submitted:	1
Flow Type:	Customer Return	**Date Submitted:**	2019-06-26
Reviewer:	Chaplin Tu	**Approval:**	Rang Cheng

Summary

Failure Analysis	Results
Customer Reported Failure Mode	Issue type: Electrical | Issue type details: Chip burned out, part of the pin short circuit. | Other details: One chip was returned by a Korean customer, Pins 3,5and 6 are short to the ground. The other 2pcs were burned out in the company's internal product test. The chips returned by Korean customers must be given a more detailed report.
TI Failure Description	Short failure was verified at pin3, 5, 6, 10 and 12-14. Open failure was verified at pin4(VM), pin7-9 and pin11(VM).
What effect does the defect or damage cause?	Short failure was verified at pin3, 5, 6, 10 and 12-14. Open failure was verified at pin4(VM), pin7-9 and pin11(VM).
Where and what is the defect/damage?	EIPD was observed.
Did the identified physical defect/damage explain the TI reported failure mode?	Yes.

TI Unit #	Cust. Unit #	Lot Trace Code	Symbolization	Wafer Fab Lot #	Assembly Lot #
1		89ALPYT		8171244	8897232TW8

- **Customer Reported Problem Description:**

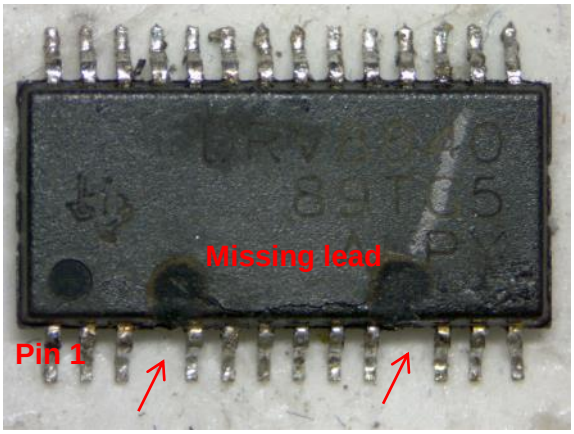
  Issue type: Electrical | Issue type details: Chip burned out, part of the pin short circuit. | Other details: One chip was returned by a Korean customer, Pins 3,5and 6 are short to the ground.
  The other 2pcs were burned out in the company's internal product test.
  The chips returned by Korean customers must be given a more detailed report.

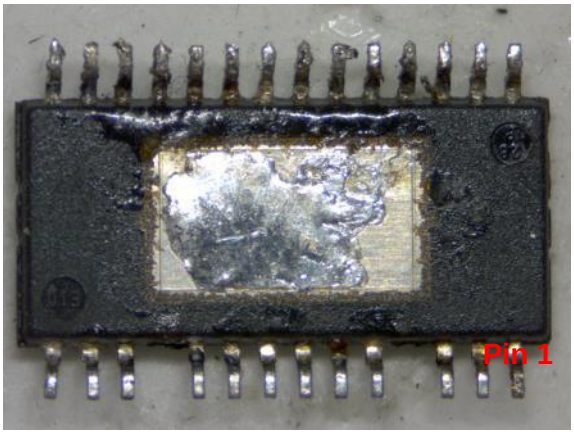
- **TI Problem Description:**

  Short failure was verified at pin3, 5, 6, 10 and 12-14. Open failure was verified at pin4(VM), pin7-9 and pin11(VM).

- **Package Analysis:**
  - **External Package Examination:**

    The returned unit was inspected under microscope. Missing leads were observed from external package.





Top View	Bottom View

Fig.1: Optical view of the returned unit.

  - **X-Ray Analysis:**

    The returned unit was inspected by X-ray. Broken leads and bonding wires were observed from internal package.

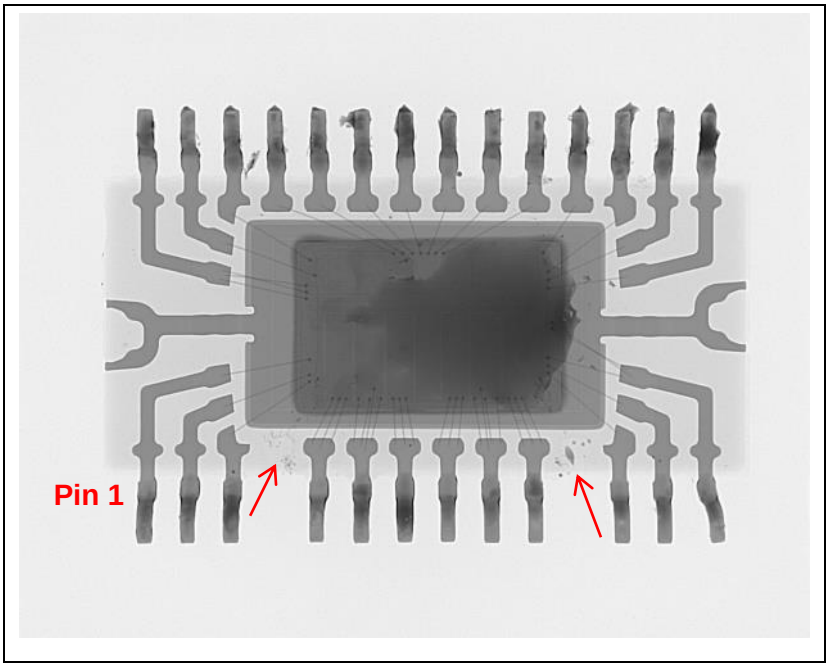


Fig.2: X-ray view of the returned unit.

- **Scanning Acoustic Microscopy (SAM):**

  CSAM was performed on returned unit. Delamination was observed over die surface of returned unit.

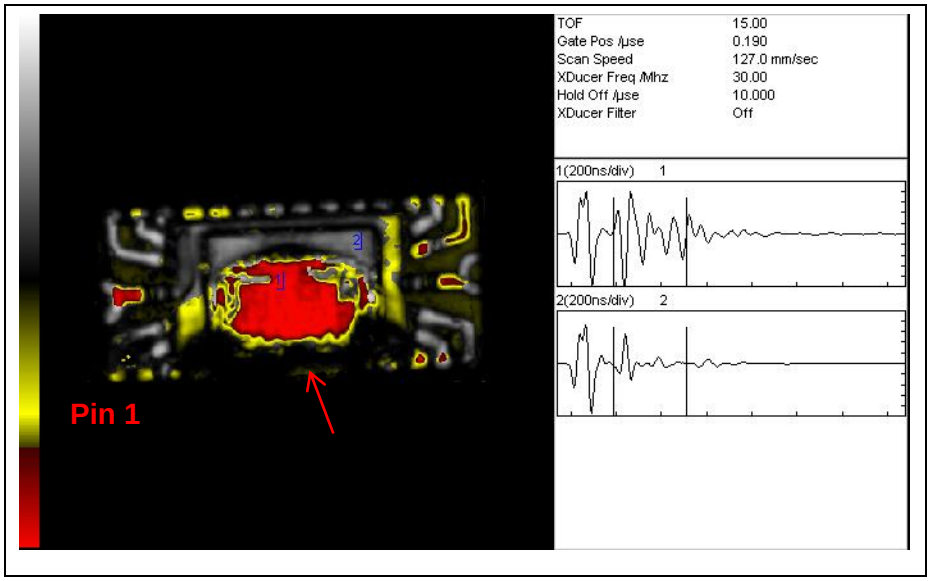


Fig.3: CSAM image of returned unit.

- **Electrical Characterization:**

  Curve trace analysis was performed on the returned unit. Short failure was verified at pin3, 5, 6, 10 and 12-14. Open failure was verified at pin4(VM), pin7-9 and pin11(VM).

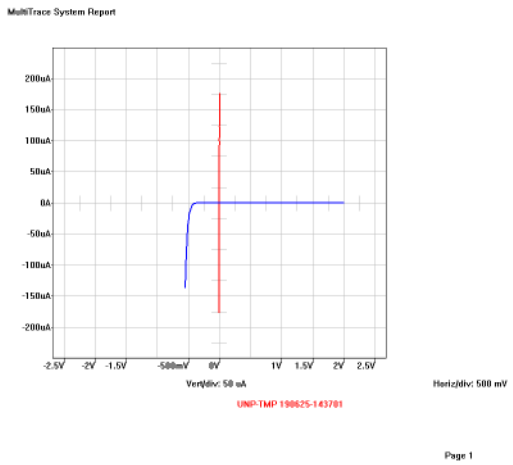
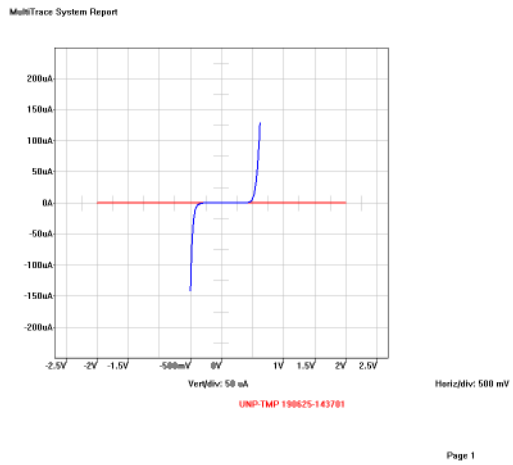
	
Pin3 vs. All pins(representing other pins)	Pin4 vs. All pins(representing other pins)

Fig.4: I/V curve image of returned unit. **Correlation unit (blue)** & **returned units (red).**

- **De-capsulation and Internal Optical Inspection:**

  The returned unit was chemically de-capsulated with fuming nitride acid. EIPD (Electrically induced physical defect) was observed on die surface.

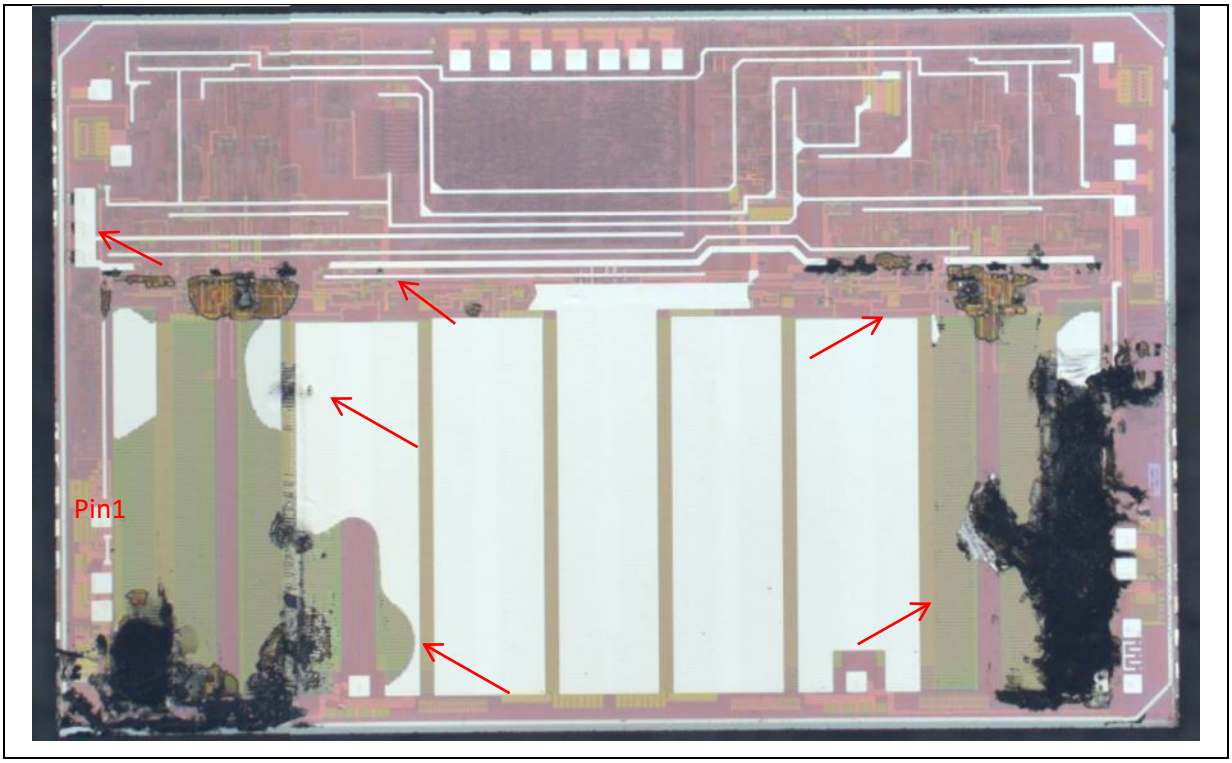


Fig.5: Optical image of the returned unit after de-capsulation.

- **Observation:**

  EIPD (Electrically induced physical defect) was observed.

  Short and open failure was caused by EIPD.

Note 1: Due to digital image capture, the magnification is not calibrated nor is the aspect ratio maintained. Not all tools provide a means recorded in the image for calibrating the measurements. When a calibration marker is supplied in the image, the measurements may be calibrated in the direction of the marker