

Chip Damage Evaluation for WPR19FA154

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Prepared for the National Transportation Safety
Board

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Overview

- **One part received for analysis**
 - Accident WPR19A154
 - Honeywell EGPWS KGP-500
 - Intel flash E28F320
- **Analyst**
 - S.R. Cain
- **Analyses**
 - Optical microscopy
 - Acoustic microscopy
 - X-ray has already been done by the NTSB
- **Scope**
 - To determine the level of damage to the chip
 - Evaluate the likelihood of successful data recovery
- **Results**
 - The package as received had suffered severe flex damage
 - There was little if any evidence of thermal damage
 - The package was badly fractured, but the segment containing the chip was whole, although damaged
 - Optical inspection showed that the segment containing the chip was badly bent
 - Inspection of the edge showed multiple fractures
 - Sonic imaging could not be done on the entire part due to the severe flex
 - The portion that could be imaged sonically showed evidence of overmold and chip cracking

Disposition: the chip appears to be cracked, successful data recovery is highly unlikely

Edge View Images Taken in Dark Field

Stitched Images taken at 50x: note the bend in the package

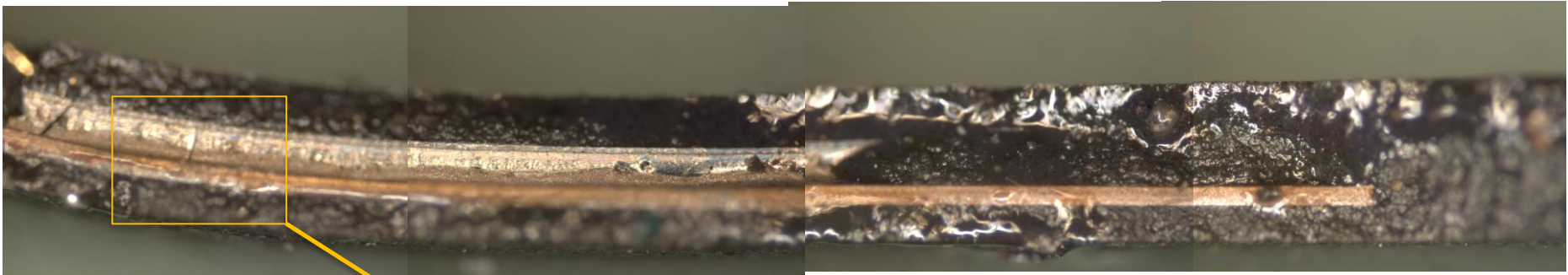
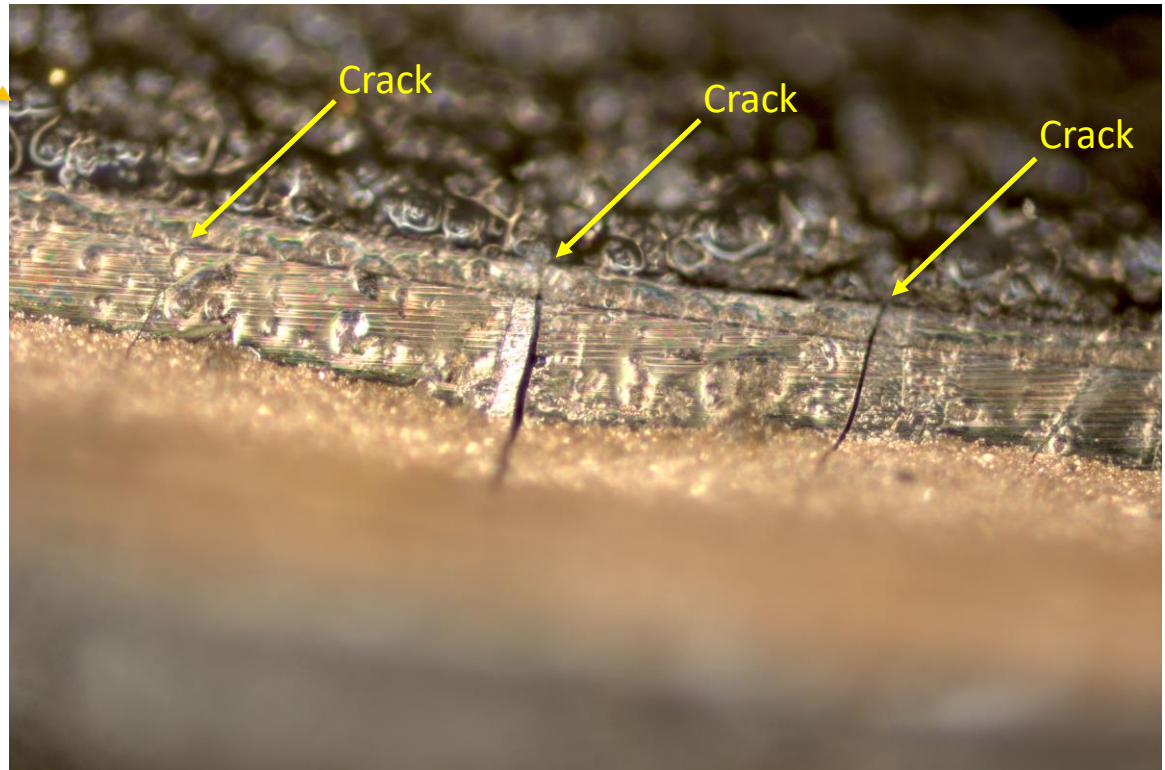
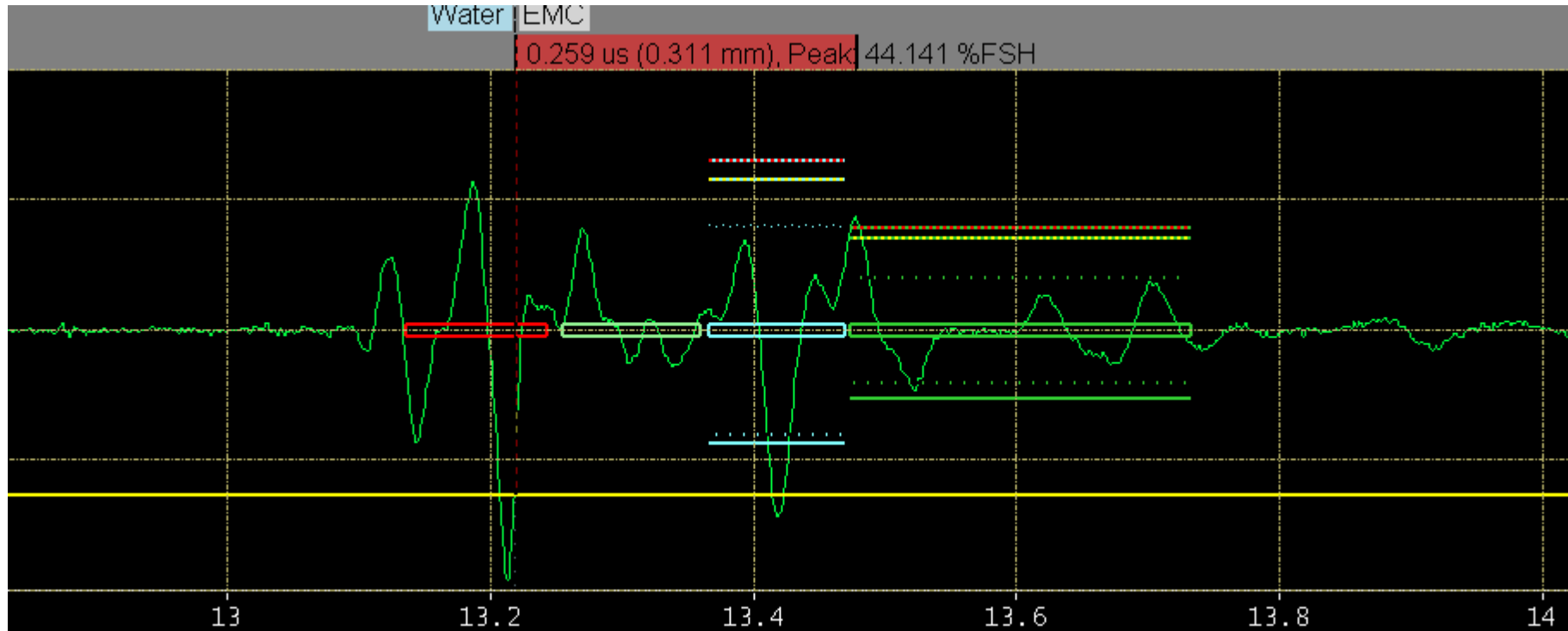


Image of the end segment at higher magnification (100x)



C-SAM Setup



- 50 MHz transducer
- Focused to 13 μ m time of flight
- Pulse echo mode

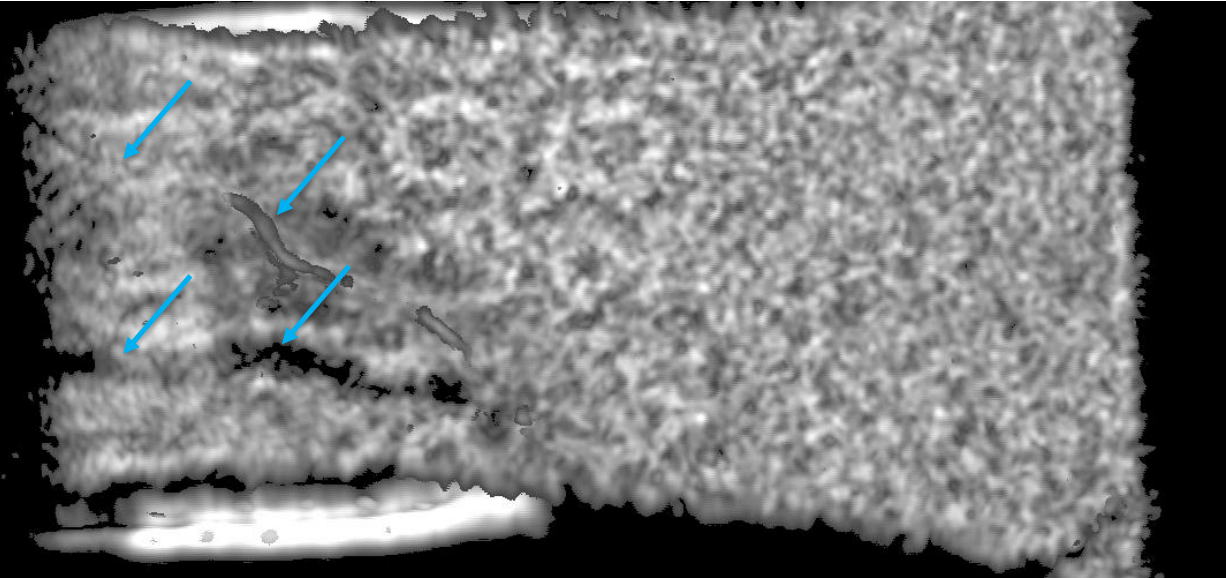
- Pixel size was set to 10 μ m
- An area of 5mm x 15mm was scanned

- Gate 1 – surface
- Gate 2 – overmold
- Gate 3 – chip
- Gate 4 – lead frame

Surface and Overmold Images

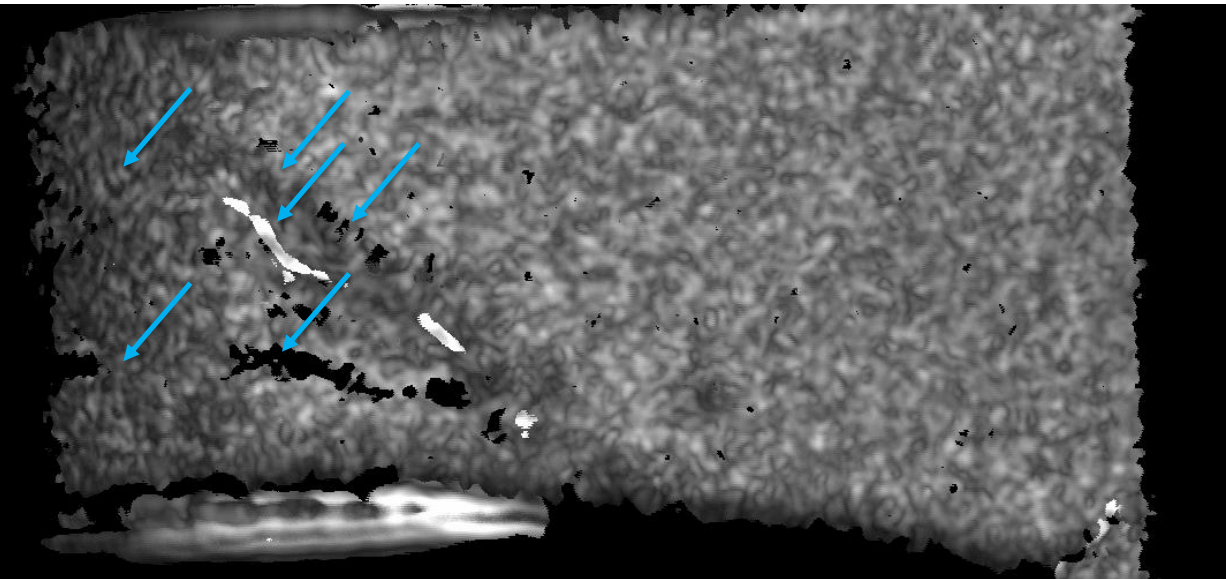
Surface

The bend deflected the sonic pulse away from the transducer: this region could not be imaged



Overmold

The bend deflected the sonic pulse away from the transducer: this region could not be imaged

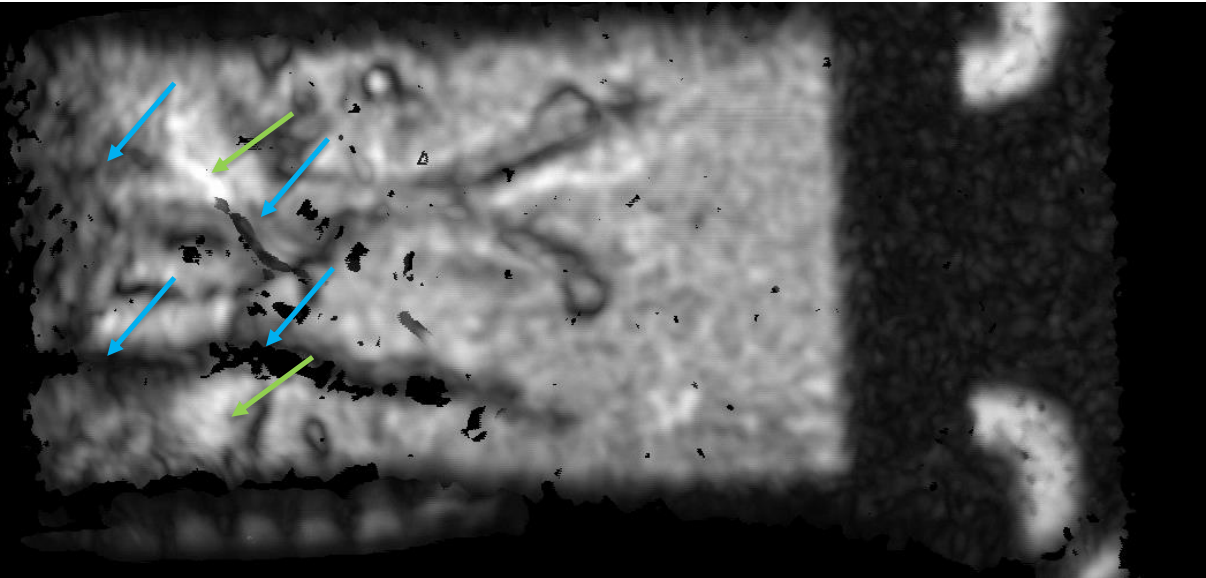


Blue arrows indicate regions of suspect cracks

Chip and Lead Frame Images

Chip

The bend deflected the sonic pulse away from the transducer: this region could not be imaged



Lead Frame

The bend deflected the sonic pulse away from the transducer: this region could not be imaged

