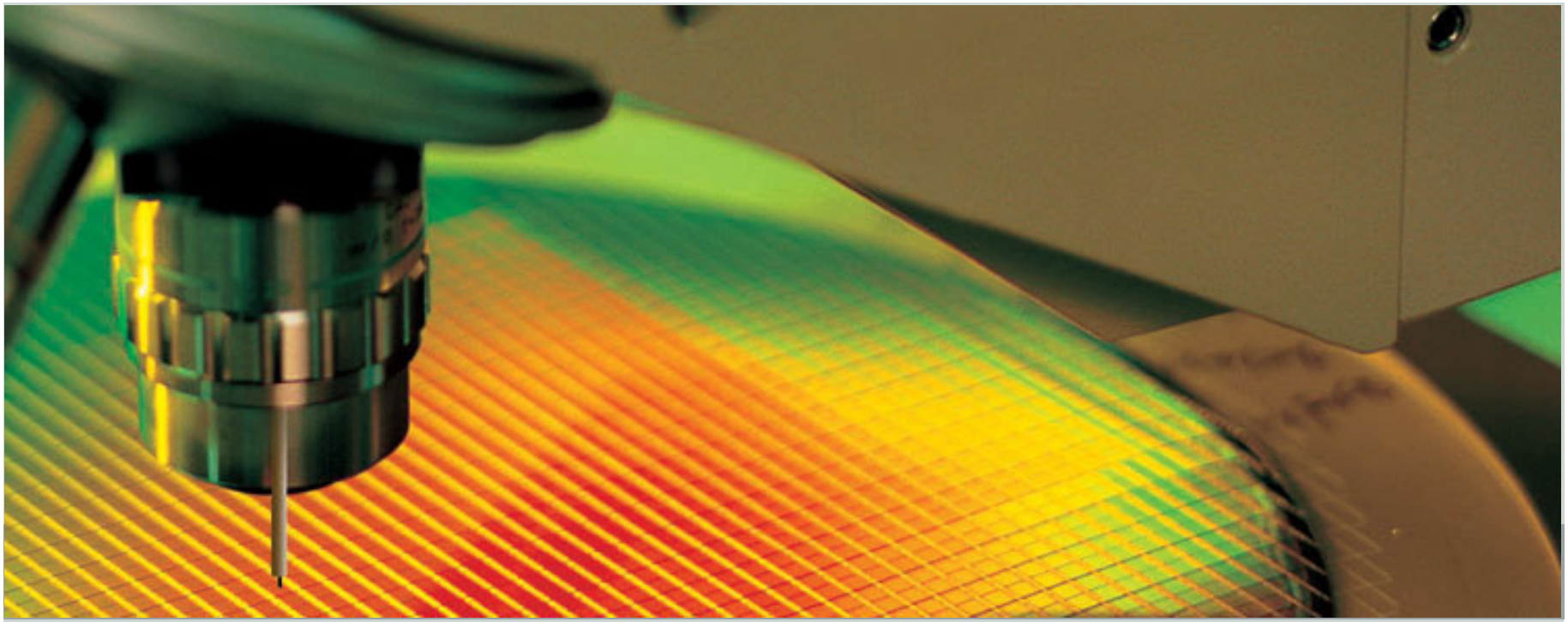

# Oak Hill Probe to KLM Probe Transfer
# 1M76G - Lance Correlation

19/05/2011, Sirajul Fahmi / Douglas Garrett



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# 0. Introduction – Reason for Probe Site Qualification

- ✓ **NPI Site to Mass Production Site** - Expected (normal) product transfer from NPI (Fab) Probe Site to Mass Production Site. This transfer minimizes logistical complexities and offers flexibility and synergy between Probe and Final Test.





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# 1. Objective and Considerations

## 1.1 Objective

- Objective is to qualify KLM Probe facility as joint probe site for probing 1M76G Lance**.** Complete list of affected parts is outlined in PCN QSD.
- Scheduled to complete by 06/15/2011
- (No) impact of customer deliveries

## 1.2 Considerations

- Test Platform Hardware in KLM Probe is identical platform used in OHP Probe, and verified by tester calibration and dual site Kappa comparative analysis (see slide).
- Identical probe card design used in both sites
- Test Program Revision and test limits are identical in both sites.
- Measurement Systems Analysis (GR&R) performed per 12MRM97179A proving bin / yield repeatability.
- Visual Inspection including Bond Pads per global specification 12M54564J





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# 2. Correlation Plan

## 2.1 Pre-Correlation items

- Installed and Verified:
  - Navigator setup and control map files
  - Tester config requirements (hardware/operating system version)
  - Probe card documents (PRVX, Schematic, Drawing)
  - Prober files (xx e.g. TEL-P8XL probe)
  - PROMIS flow (see slide)
  - All Bin monitoring systems and limit files
  - Zero Defect files (EWM, DPAT, and GDBC Files)
- Verified installation and lock-down of W81M76G test program version A03_B07C (Logic), version B07_001 (UTI).
- Probe Card Repair completed incoming inspection on probe card

## 2.2 OHP vs. KLM Correlation Plan

Probe Correlation:

- Completed hardware correlation
- 6 wafers (2 wafers from 3 separate wafer lots) / 3 Probe Cards
- Confirmed cross-site correlation on all 6 wafers on yield distribution

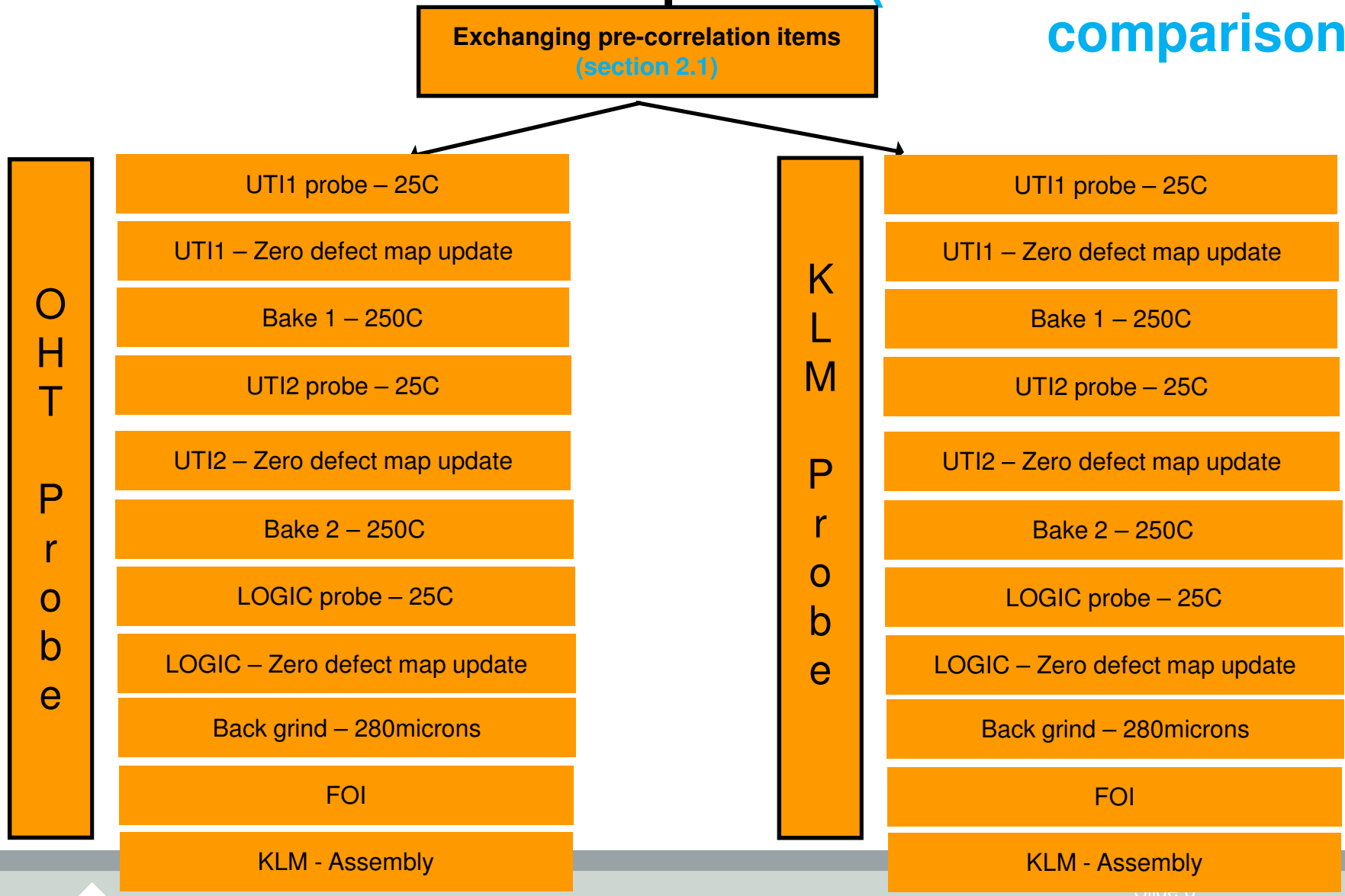
## 3.1 Correlation Criteria

## (According to Global Probe Transfer Specification 12MQS10020G)

**Yield & Bin Correlation**

- Fully probe (test) all six wafers (2 wafers from 3 separate wafer lots) in OHP Probe
- Fully probe (test) the same six correlation wafers in KLM Probe
  - Bin variation must pass within 6%
  - Yield variation must pass within 3%

# 4. Probe Flow Comparison (Promis Probe Flow comparison)





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# 5. Bin to Bin Variation – Overall UTI Results

| KLM \ ATX | 2 | 55 | 100 | 103 | 104 | 106 | 110 | 111 | 112 | 113 | 117 | 118 | 119 | 123 | 127 | 132 | 133 | 151 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 2.32 | | | | | | | | | | | | | | | | | |
| 55 | | 91.06 | | | | 0.13 | | | | | | | 0.06 | 0.13 | | | | |
| 100 | | | 0.77 | | 0.06 | | | | | | | | | | | | | |
| 103 | | | | 0.51 | | | | | 0.06 | | | | | 0.06 | | | | |
| 104 | | | | | 0.19 | | | | | | | | | | | | | |
| 106 | | | | | | 0.06 | | | | | | | | | | | | |
| 109 | | 0.06 | | | | | | | | | | | | | | | | |
| 110 | | | | | | | 0.06 | | | | | | | | | | | |
| 111 | | | | | | | | 0.26 | | | | | | | | | | |
| 112 | | 0.06 | | | | | | | 0.64 | | | | | | | | | |
| 113 | | | | | | | | | | 0.26 | | | | | | | | |
| 114 | | 0.32 | | | | | | | | | | | | | | | 0.06 | |
| 117 | | | | | | 0.06 | | | | | | | | | | | | |
| 118 | | | | | | 0.06 | | | | | | 0.06 | | | | | | |
| 119 | | | | | | | | | | | | | 0.06 | | | | | |
| 123 | | 0.13 | | | | | | | 0.06 | | 0.06 | | | 0.71 | | | 0.06 | |
| 127 | | | | | | | | | | | | | | | 0.06 | 0.06 | | |
| 132 | | | | | | | | | | | | | | | | 0.06 | | |
| 133 | | | | | | | | | | | | | | | | | 0.901 | |
| 151 | | | | | | | | | | | | | | | | | | 0.064 |
| 152 | | 0.193 | | | | | | | | | | | | | | | | |
| 158 | | | | | | | | | | | 0.064 | | | | | | | |
| 162 | | 0.129 | | | | | | | | | | | | | | | | |

Kappa Passed

*All data in percentage %





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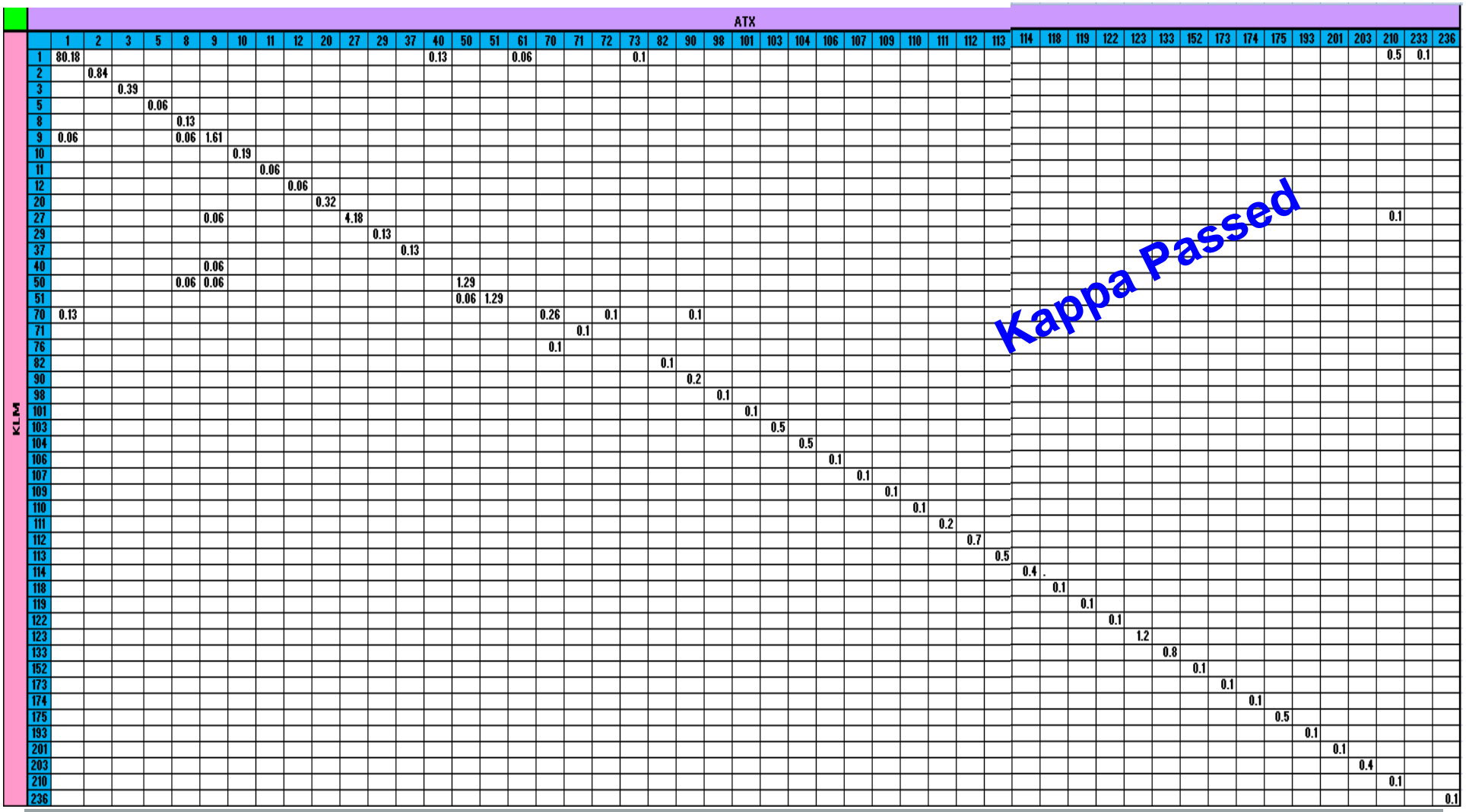
# 5. Bin to Bin Variation – Overall Logic Results




| KLM \ ATX | 1 | 2 | 3 | 5 | 8 | 9 | 10 | 11 | 12 | 20 | 27 | 29 | 37 | 40 | 50 | 51 | 61 | 70 | 71 | 72 | 73 | 82 | 90 | 98 | 101 | 103 | 104 | 106 | 107 | 109 | 110 | 111 | 112 | 113 | 114 | 118 | 119 | 122 | 123 | 133 | 152 | 173 | 174 | 175 | 193 | 201 | 203 | 210 | 233 | 236 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 80.18 | | | | | | | | | | | | | 0.13 | | | 0.06 | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | 0.1 | |
| 2 | | 0.84 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | 0.39 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | 0.06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | 0.13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 0.06 | | | | 0.06 | 1.61 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | 0.19 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | 0.06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | 0.06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | 0.32 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | | | | | | 0.06 | | | | | 4.18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | 0.13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | 0.13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | 0.06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50 | | | | | 0.06 | 0.06 | | | | | | | | | 1.29 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 51 | | | | | | | | | | | | | | | 0.06 | 1.29 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70 | 0.13 | | | | | | | | | | | | | | | | | 0.26 | | 0.1 | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 71 | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 76 | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 82 | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 90 | | | | | | | | | | | | | | | | | | | | | | | 0.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 98 | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 101 | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 103 | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | |
| 104 | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | | | |
| 107 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | | |
| 109 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | | | | | | |
| 111 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.2 | | | | | | | | | | | | | | | | | |
| 112 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.7 | | | | | | | | | | | | | | | | |
| 113 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | | | | | | | | | | | | | | | |
| 114 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.4 | | | | | | | | | | | | | | |
| 118 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | | |
| 119 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | | |
| 122 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | | | | |
| 123 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.2 | | | | | | | | | | |
| 133 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.8 | | | | | | | | | |
| 152 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | | |
| 173 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | | |
| 174 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | | | |
| 175 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.5 | | | | | |
| 193 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | | |
| 201 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | | | |
| 203 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.4 | | |
| 210 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 | |
| 236 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.1 |

*All data in percentage %





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# 6. Correlation Summary
## Kappa Assessment

| UTI Result | | | | |
|---|---|---|---|---|
| Wafer# | 2 | 3 | 4 | Overall |
| Bin Kappa Correlation Error Mean(<6.0%) | 1.73% | 2.50% | 1.54% | 1.93% |
| Yield kappa Correlation Error Mean (<3.0%) | 1.06% | 1.24% | 1.11% | 1.13% |

PASSED

| LOGIC Result | | | | |
|---|---|---|---|---|
| Wafer# | 5 | 6 | 7 | Overall |
| Bin Kappa Correlation Error Mean(<6.0%) | 1.35% | 1.35% | 2.70% | 1.80% |
| Yield kappa Correlation Error Mean (<3.0%) | 0.76% | 0.38% | 1.90% | 1.01% |

PASSED

- Kappa wafer analysis showed that the yield from both Probe sites are not statistically different in yield. Bin fallout from both sites were also comparable.





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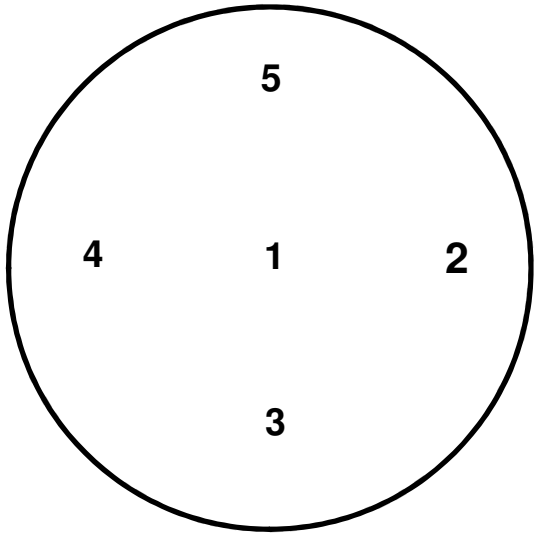
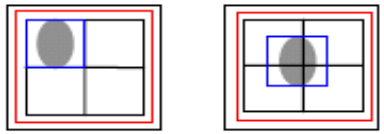
# 7. Probe Mark Inspection

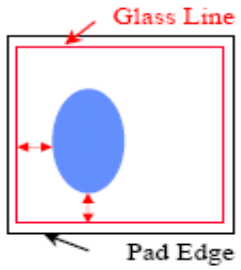
- **Criteria: Probe mark must be > than 5 microns from the passivation opening (Glass Line) per specification 12MTX10001G**




**Probe Mark Inspection Points**

| | Min Distance From Edge (microns) |
|---|---|
| Point 1 | 19 |
| Point 2 | 21 |
| Point 3 | 23 |
| Point 4 | 18 |
| Point 5 | 22 |











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# 8. Interlayer Dielectric Study

**Wafers:**
KLM W81M76G
• DD85622 wafer 1

**Probe Card:**
Single dut x1 (Cantilever type)
Card: 75M76G0104

**Platform:**
Teradyne J750 / TEL P8XL
KLM system KLJ750-28

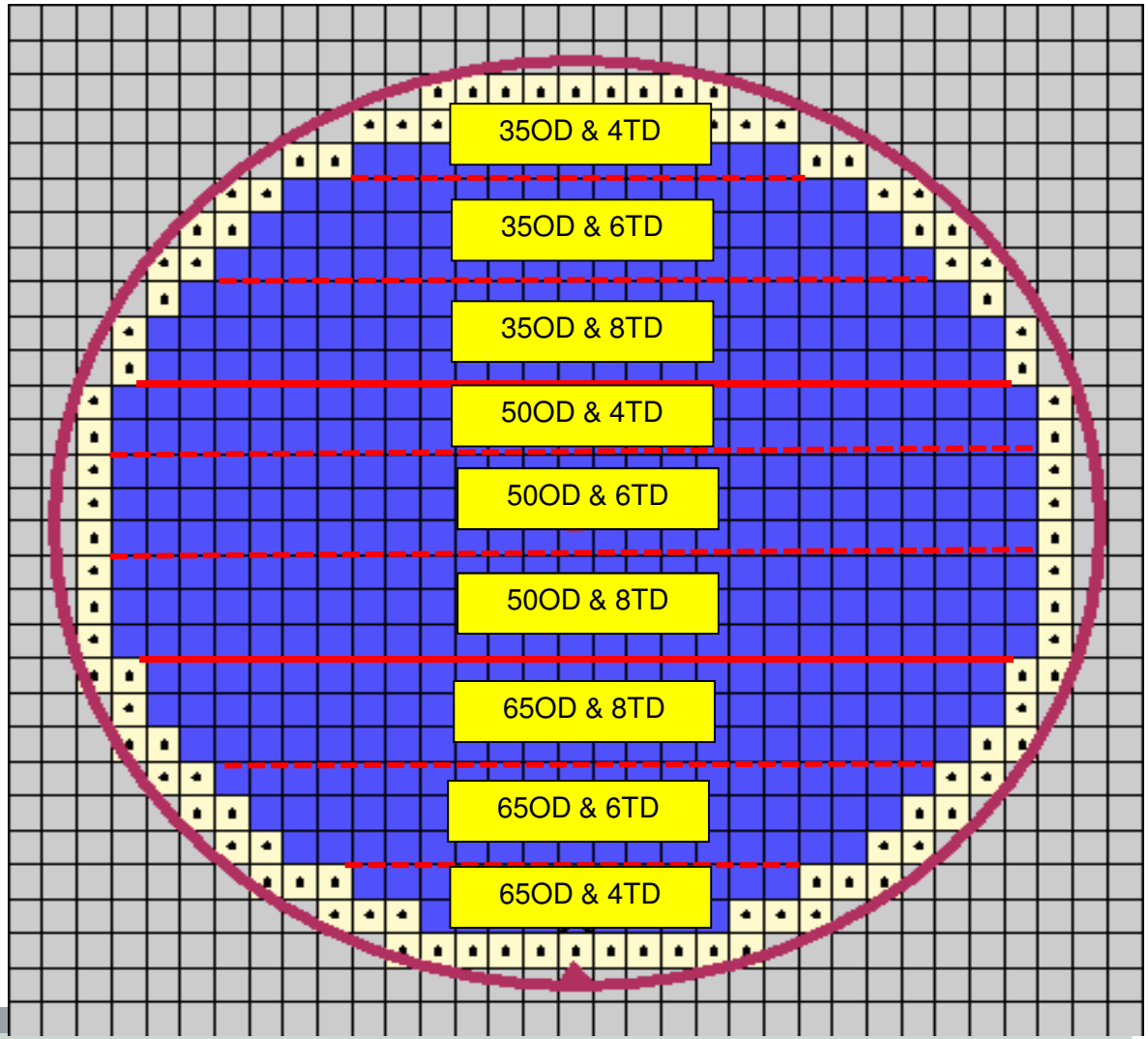
**Inputs:**
• 3 overdrives
• 50 - Nominal
• 35
• 65

• 3 levels of probe events (Touch downs, TD)
• 4 TD
• 6 TD
• 8 TD

• ZPTPA at -10
• measured planarity = 20-25µm

• Double touch probe
• Room temp probe (25C)

Note: ILD study is a destructive test that removes the aluminum bond pad to check for punctures or cracks in the ILD.





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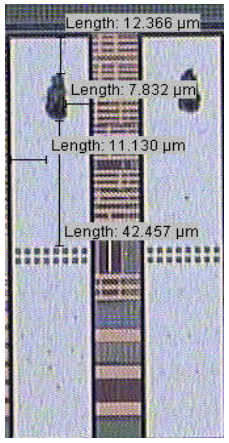
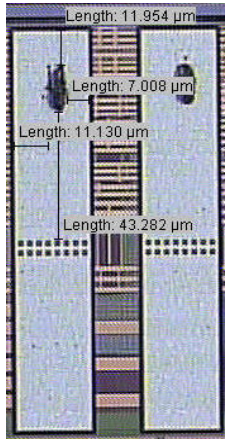
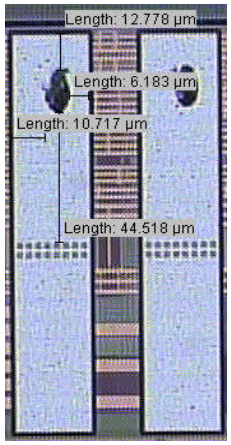
# 8.1 Interlayer Dielectric Results



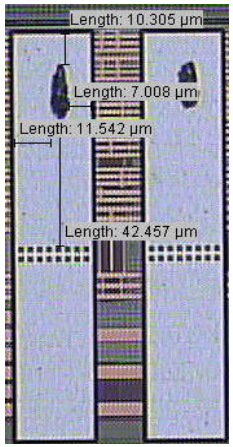

35um at 4TD



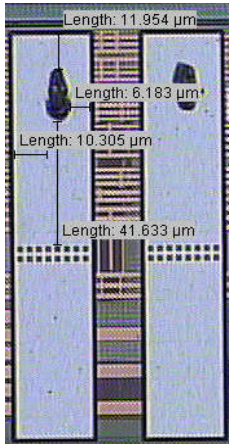

35um at 6TD



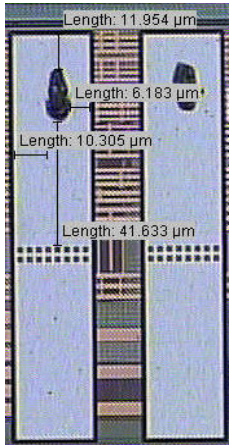

35um at 8TD



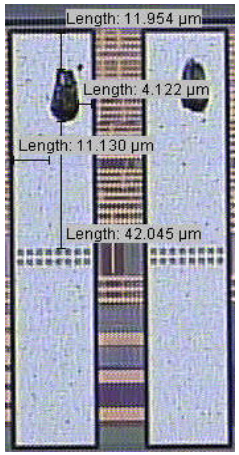

50um at 4TD



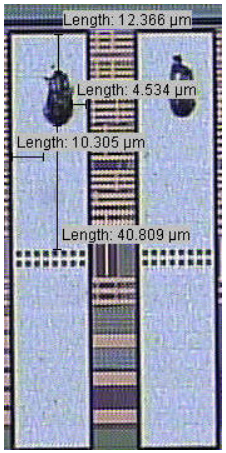

50um at 6TD



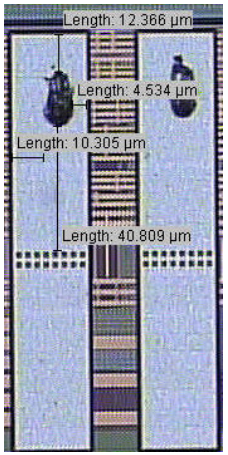

50um at 8TD




65um at 4TD




65um at 6TD




65um at 8TD



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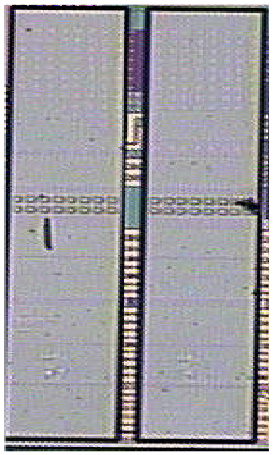
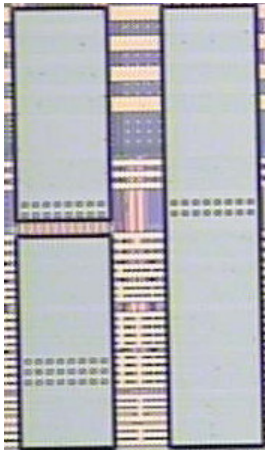
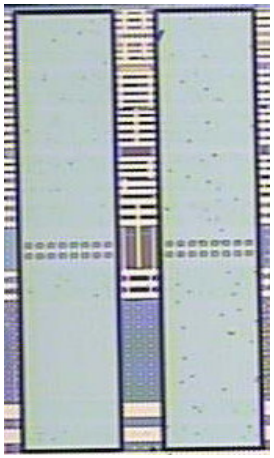
# 8.1 Interlayer Dielectric Results



65um at 6TD

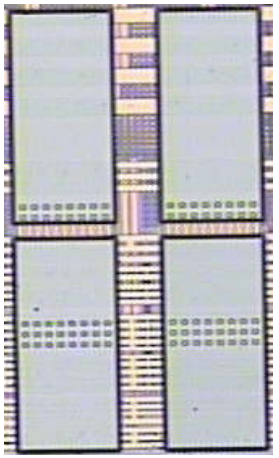


50um at 6TD



65um at 8TD

Note: With visual Inspection No Dimples or Cracks were seen.



50um at 8TD



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# 8.1 Interlayer Dielectric Results

M76G Probe ILD Inspection

Probe site: KLM

13-Jun-11

Inspected by Sirajul Fahmi

| Test Platform | Probe Stresses | | ILD Inspection Results | |
|---|---|---|---|---|
| | Overdrive | Probe Events | Die Inspected | % Failed (wafer#1) |
| Teradyne J750 | 35 | 4 | 100% dies | 0% |
| | | 6 | 100% dies | 0% |
| | | 8 | 100% dies | 0% |
| | 50 | 4 | 100% dies | 0% |
| | | 6 | 100% dies | 0% |
| | | 8 | 100% dies | 0% |
| | 65 | 4 | 100% dies | 0% |
| | | 6 | 100% dies | 0% |
| | | 8 | 100% dies | 0% |

100% pads inspected per die.

Pad failure rate reported in percentage of probed pads affected

# 9. Conclusion and Recommendation

## 9.1 Conclusion

- Based on this report, 1M76G passed all Probe correlation requirements according to FSL rules without any issues.

## 9.2 Recommendation

- Test program for 1M76G can be released in KLM Probe
- Track probe and final test yields to check for equivalence on lead production lots.




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