

GLAST LAT Visit at Hamamatsu Photonics (HPK)

March 15, 2002

Present:

GLAST

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| Takashi Ohsugi | Hiroshima Univ., | LAT SSD Lead |
| Hartmut Sadrozinski | UCSC | LAT TKR Scientist |
| Nick Virmani | Nav. Res. Lab | LAT EEE Parts and Electr. Pack. Manager |
| Darren Marsh | SLAC | LAT Mission Assurance Manager |
| Scott Lambros | GSFC | GLAST Deputy Project Manager |

HPK

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| Koei Yamamoto | Manager, Solid State Division |
| Kazuhisa Yamamura | SSD Design |
| Kenichi Sato | SSD Inspection |
| Toshikazu Suzuki | Quality Control |
| Toshihisa Atsumi | Export Sales |
| Tomoya Inutsuka | Sales |

Agenda:

- 1) Q/A Issues
 - a. Non-conforming SSD
 - b. Test Flow of SSD at HPK
 - c. Certification of HPK SSD for GLAST
- 2) Visit of SSD Production Line
- 3) Shipping of SSD cut-offs to INFN Pisa
- 4) Thermal issues for GLAST SSD

1) Q/A Issues

a. Non-conforming SSD (INFN Pisa list)

The list of non-conforming SSD based on INFN-Pisa testing was reviewed. It was iterated that the leakage current depends on the rate of voltage ramp among other factors, and thus will give different values for different measuring conditions. The role of the acceptance I-V testing at INFN was iterated: while the HPK measurements are used to establish acceptance criteria, the INFN Pisa testy results are used to find catastrophic failures before ladder fabrication. The correlation between the two sets of data is quite good with the exception of the SSD listed below. Proper handling of SSD should be discussed between HPK and INFN-Pisa.

| SSD # | Finding | Comment | Corrective Action | By whom |
|-------|--------------------|---------|--------------------------------------|------------------|
| 995 | High I, bad I-V | I,II | Ship back to HPK for investigation | INFN-HPK |
| 1077 | High I, bad I-V | I,II | Ship back to HPK for investigation | INFN-HPK |
| 1009 | Breakdown at ~200V | I,II | Ship back to HPK for investigation | INFN-HPK |
| 736 | Large chips | III | Ascertain if failure occurred @ Pisa | Marsh-INFN |
| | | IV | Review Handling Procedures | Virmani-HPK-INFN |
| 1135 | Large chips | III | Ascertain if failure occurred @ Pisa | Marsh-INFN |

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|------|------------------|----|----------------------------|------------------|
| | | IV | Review Handling Procedures | Virmani-HPK-INFN |
| 1087 | Shipped in Error | V | Review Shipping Procedures | HPK |

Comments:

- I. HPK will investigate the cause of failure of the first three cases. These SSD tested out ok before shipment to Pisa. In particular, the correlation of the high currents with small scratches/spots in the sensitive area will be investigated with an IR camera. If the cause of the failures is found to be the small spots, HPK and GLAST LAT will discuss improvement of the visual inspection by increasing the magnification by a factor 2-4.
- II. INFN Pisa needs shipping instruction from HPK for return of non-conforming SSD, to be sent to H. Sadrozinski and Sandro Brez. HPK Italy will handle this.
- III. The existence of large chips on the next two SSD would have been flagged by the visual inspection at HPK, which finds anomalies of 250um size. HPK offers to replace the two SSDs as a goodwill gesture.
- IV. HPK asked to be involved in the review of handling during testing and assembly. This concerns angle and pressure of probe tips, types of tweezers used (if any) and other ways the SSD are handled during assembly. Virmani will coordinate this, possibly with a visit of HPK at Pisa.
- V. The SSD shipped was a reject and was shipped by mistake. HPK will review the shipping procedures.

b. Test Flow at HPK

The Test flow was discussed at great length, and its conformity to the LAT Q/A provisions LAT-CR-00082 established. The only remaining question is the visual inspection, which will be revisited after HPK has performed tests on the 3 relevant SSD (Action HPK, Virmani, Sadrozinski).

c. Certification of GLAST SSD

HPK answered in writing Virmani's Q/A questions including charts of Q/A, change control and traceability.

A few additions/clarifications to the Q/A provision LAT-CR-00082 were brought up.

- I. GLAST LAT needs to develop procedures for handling of non-conformal SSD's. (Virmani, Brez, Sadrozinski)
- II. HPK will test bondability on 2 Bonding Test structures/Lot, 6 bonds each.
- III. Dicing accuracy will be checked on 5 SSD/lot.
- IV. Gluing tests will not be performed at HPK.
- V. Visual inspection with increased magnification is recommended

HPK was declared certified for GLAST SSD delivery and they will receive a certificate.

2) Visit of SSD Production Line

Lambros, Marsh and Virmani visited the production line and the testing area.

3) Shipping of SSD cut-offs to INFN Pisa

INFN needs urgently the GLAST cut-offs for gluing and bonding tests. HPK will ship in the week of March 18, 2002.

4) Thermal Issues for GLAST

The Thermal Operating Limits for GLAST were discussed. HPK was apprised of the recent studies of thermal run-away and noise increase. As for non-operating temperature limits for SSD, HPK and Ohsugi mentioned the temperature of 350°C, at which the aluminum deteriorates. A safe limit of 250°C was mentioned, but HPK would worry if the SSD is contaminated with finger-prints or saliva and would be exposed to temperatures in excess of 100°C for long time. One worry is that at higher temps the diffusion of ions is greatly enhanced which could poison the SSD.