Istituto Nazionale di Fisica Nucleare

INFN

NCR Number

NCR/FM/INFN/PI/76

Classification	Item name	Found on:
major	Mid tray Assembly with Payload	8/6/2004 2:40:15 PM

Part number	LAT-DS-00180 (rev3)
Serial number	011
Issued by	Luca Baldini
Short NCR description	Leakege Current out of limit
Approved by	Aldo Troianiello
Detected during	Test
Cause	other (see description)
NCR description	During test as per LAT-PS-03534-01 the leakage current out of limit on ladders the bottom facesheet, see annex 1

Action

disposition

disposition ***ID:*** 1

Waiting for disposition (08/06/2004)

Finding

responsible	***due date (mm/dd/yyyy)***	***closed***
Alessandro Brez	8/30/2004	☐

MRB disposition

Approval date	
Signature	
Customer approval date	
NCR status	open

Annex

annex N°	***Identification***
1	Test report

Istituto Nazionale di Fisica Nucleare

INFN

NCR Number

NCR/FM/INFN/PI/78

Classification	Item name	Found on:
major	Mid tray Assembly with Payload	8/9/2004 12:40:02 PM

Part number	LAT-DS-00180 (rev3)
Serial number	008
Issued by	Luca Baldini
Short NCR description	Leakege Current out of limit
Approved by	Alessandro Brez
Detected during	Test
Cause	other (see description)
NCR description	During test as per LAT-PS-03534-01 the leakage current out of limit on ladders the bottom facesheet.

Action

disposition

disposition ***ID:*** 1

Waiting for disposition (08/08/2004)

Finding

responsible	***due date (mm/dd/yyyy)***	***closed***
Alessandro Brez	8/8/2004	☐

MRB disposition

Approval date	
Signature	
Customer approval date	
NCR status	open

Annex

annex N°	***Identification***
1	Test report

Istituto Nazionale di Fisica Nucleare

INFN

NCR Number

NCR/FM/INFN/PI/79

Classification	Item name	Found on:
major	Mid tray Assembly with Payload	8/9/2004 12:42:49 PM

Part number	LAT-DS-00180 (rev3)
Serial number	012
Issued by	Luca Baldini
Short NCR description	Leakege Current out of limit
Approved by	Alessandro Brez
Detected during	Test
Cause	other (see description)
NCR description	During test as per LAT-PS-03534-01 the leakage current out of limit on ladders the bottom facesheet.

Action

disposition

disposition ***ID:*** 1

Waiting for disposition (08/08/2004)

Finding

responsible	***due date (mm/dd/yyyy)***	***closed***
Alessandro Brez	8/8/2004	☐

MRB disposition

Approval date	
Signature	
Customer approval date	
NCR status	open

Annex

annex N°	***Identification***
1	Test report

Annex 1 to NCR/FM/INFN/PI/076-78-79

August 09, 2004

Report on tray assembly activity in G&A:

1. MCMs and ladders have been assembled (and wire-bonded) on 6 flight trays:

   006 Mid
   008 Mid
   011 Mid
   012 Mid
   008 Heavy
   009 Heavy

2. MCMs have been glued on 3 more flight trays:

   004 Mid
   017 Mid
   046 Mid

3. The electrical test procedure (as specified in LAT-PS-03534-01) has been performed on the 6 trays specified in 1. The leakage current measurement indicates a short between the HV and ground (and/or shielding plane) on the back face for three of those trays:

   008 Mid – back face
   011 Mid – back face
   012 Mid – back face

   This short appears only when a bias voltage greater than ~20-30 V is applied.

4. A selective wire bonds removal and an accurate optical inspection on 011 Mid tray excluded any accidental contact between bondings and wafer substrate. Some metal chipping has been found along the edges of the three faces showing the shorts; shape and colour exclude those to be silicon chips. The visual inspection didn't show any evidence of ladder damage, as well.

5. The same metal chipping has been found on the back face of two of the Mid trays specified in 3 (004 Mid – back face and 017 Mid – back face). Most of the chips are located into the preventive cuts made on those trays as to avoid the waving.

The following table summarizes the current situation for all tower A trays:

Tray type	Tray S/N	W	Rework	Preventive cuts	Bubbles cutted (face)	MCM installed	Ladders installed	Short	Functional test
Mid	004	Hand sanded	yes	Cutted	Yes (top/bottom)	Yes			
Mid	006	Hand sanded	yes	Cutted	Yes (top)	Yes	Yes	No	Passed
Mid	007	Hand sanded	no	Cutted	Yes (bottom)	Yes	Yes	No	Passed
Mid	008	Hand sanded	yes (twice)	Cutted	Yes (top/Bottom)	Yes	Yes	Yes	
Mid	010	Hand sanded	no	Cutted	Yes (bottom)	Yes	Yes	No	Passed
Mid	011	Hand sanded	yes	Cutted	Yes (top/bottom)	Yes	Yes	Yes	
Mid	012	Hand sanded	yes	Cutted	Yes (top)	Yes	Yes	Yes	
Mid	017	Hand sanded	yes	Cutted	Yes				
Mid	046	sanded (sand blasted)	no	Not Cutted	Yes (top)	Yes			
Mid	047	sanded (sand blasted)	no	Not Cutted	failed last T-Vac				
Mid	048	sanded (sand blasted)	no	Not Cutted	Yes (top/bottom)				
Heavy	008	Hand sanded	no	Cutted	Yes (top/bottom)	Yes	Yes	No	Passed
Heavy	009	Hand sanded	no	Cutted	Yes (top/bottom)	Yes	Yes	No	Passed
Heavy	011	sanded (sand blasted)	no	Not Cutted	Yes (top)				
Heavy	035	sanded (sand blasted)	no	Not Cutted	Yes (bottom)				
Light	015	No tungsten	yes		Yes (bottom)				
Light	023	No tungsten	yes		Yes (top/bottom)				
Top	001	sanded (sand blasted)	no	Not Cutted	failed last T-Vac				
Bottom	002	No tungsten	no		Yes (top)				

Notes: 1) preventive cuts (2-4 cm long, 8 per wafer) have been systematically done on the back faces of hand-sanded trays; for all trays shorter cuts have been done in correspondence of small bubbles.

2) rework consists of removal of old kapton, heavier hand-sanded to increase surface roughness, gluing of new kapton

Conclusions:

Shorts have been only observed on the bottom faces of mid trays with preventive cuts on the kapton and reworked, hand-sanded tungsten.
A possible explanation is that preventive cuts have sometimes produced tungsten chips or moved around metal powder associated with the tungsten hand sanding. The action of the scalpel, together with the effect of the thermal vacuum test and of the applied bias electric field, can move these chips and create shorts between tray structure (grounded), shield plane and wafers back plane.

Shorts did not show on heavy trays with S/N 008 and 009, that had preventive cuts but did not have reworked tungsten tiles.
These show a lower surface roughness and the scalpel's action may have not produced any chipping.

Action items:

1. The trays showing the shorts (008Mid, 011 Mid and 012 Mid) have been marked as rejected

2. The assembly procedure has been suspended for those trays having preventive cuts on the back face (Mid 004, Mid 017)

3. Preventive cuts on 004 Mid and 017 Mid can be covered with suitable tape or 3M2216 glue; those trays could be kept as spare

4. The ladders can be glued on 046 Mid, where preventive cuts are absent

5. The two heavy trays with preventive cuts (008 Heavy and 009 Heavy) should undergo a second thermal vacuum tests in Rome to check stability of bias isolation. They could be kept as spare