EQA Studies

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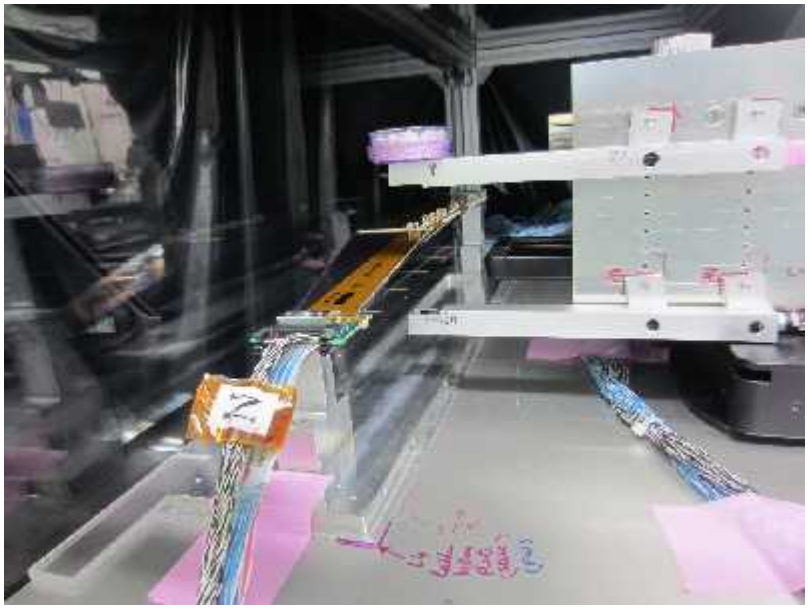
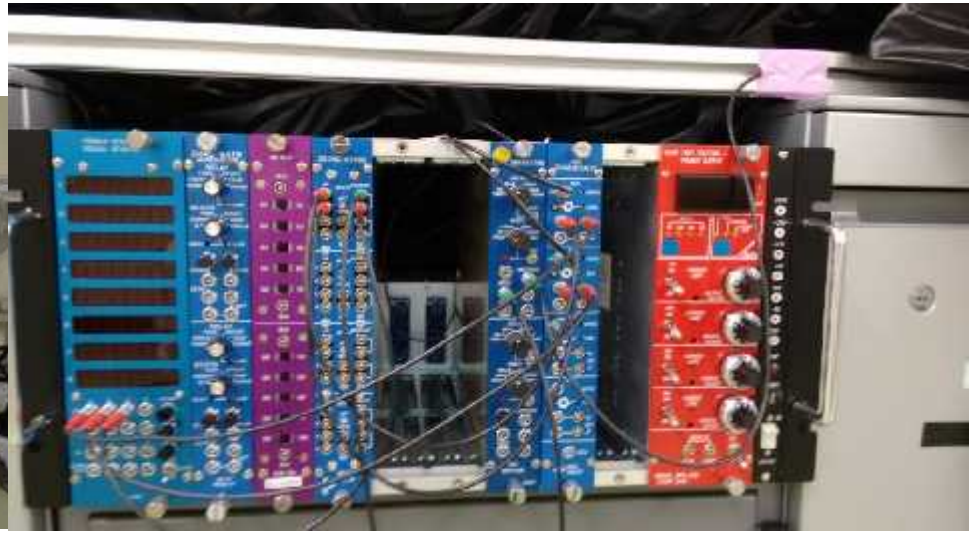
Electrical Quality Test



APVDAQ System

Low voltage power supplies

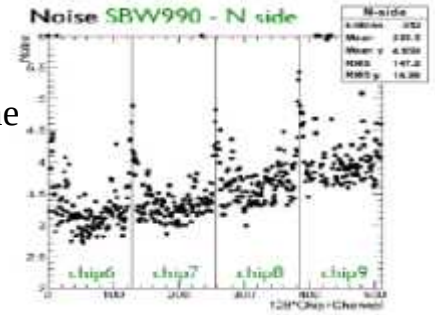
High voltage power supply



NIM power supply

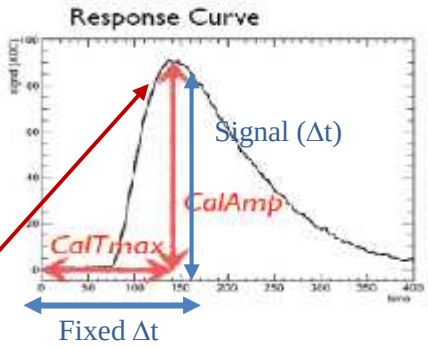
Electrical Quality Analysis and aDefectFinder

GOAL : To trace the quality of the SVD ladder assembly or to detect the problems in the assembling procedure.

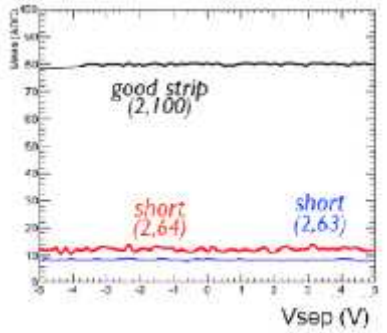


APVDAQ Internal Calibration Scan

- 600 events randomly triggered to evaluate Noise, RawNoise and Pedestal for each channel.
- The maximum amplitude (CalAmp) and the peaking time (CalTmax) are extracted with a fit to the curve.
- WARNING : In channels with very high noise (> 50 ADC), the fit can fail and return crazy values -> look at the response curve for that channel.
- Temperature effect : The hybrids heat up when DAQ is running (upto ~100 deg C). The performance decrease with temperature:
  - decrease of CalAmp
  - increase of CalTmax

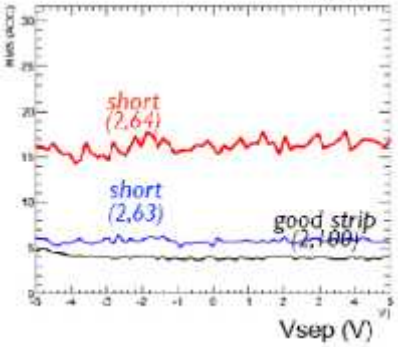


CalAmp from fit



APVDAQ IntCal vs Vsep Scan

- 600 events randomly triggered to evaluate Noise, RawNoise and Pedestal for each channel.
- APV response evaluated at a fixed Δt (no fit) for different values of Vsep.
  - average (Mean) and average (RMS) of the distribution of signal Δt are plotted as a function of Vsep.



$$\text{Mean} = \frac{\Sigma_i^N Signal_i(\Delta t)}{N} \qquad \text{RMS} = \sqrt{\frac{\Sigma_i^N (Signal_i(\Delta t) - Mean)^2}{N-1}}$$

APVDAQ Source Scan or Hardware Run

- 600 events randomly triggered to evaluate Noise, RawNoise and Pedestal for each channel.
- Apply the bias Vbias = 100 V, Vsep = -0.75 V in case of pinholes. Vsep = 0 otherwise.
- Scan of the N (and P) strips

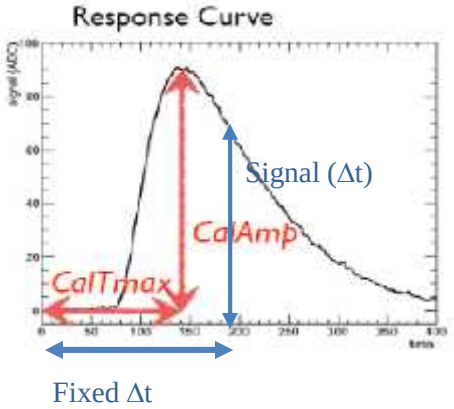
<aDefectFinder> Analysis

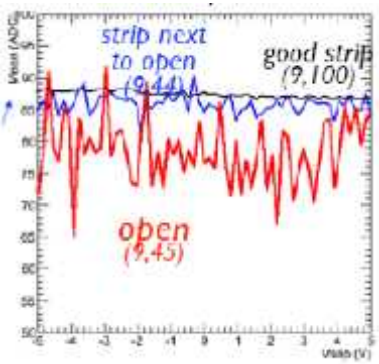
GOALS :- Find the problematic strips found in electrical tests performed by APVDAQ during SVD assembly.

- Provides a list of defective channels.
- Classifies the defects according to preassigned classification criteria.
- Provides relevant plots for each defects and cumulative plots of good strips.

SELECTION CRITERIA :- Strip is defective if:

1) Noise > 8 ADC
2) Max. amplitude (CalAmp) < 50 ADC || CalAmp > 150 ADC
   Peaking time (CalTmax) < 100 ns || CalTMax > 200 ns
3) It is recognized as a pinhole (defined later).
4) Particle Response < 0.5



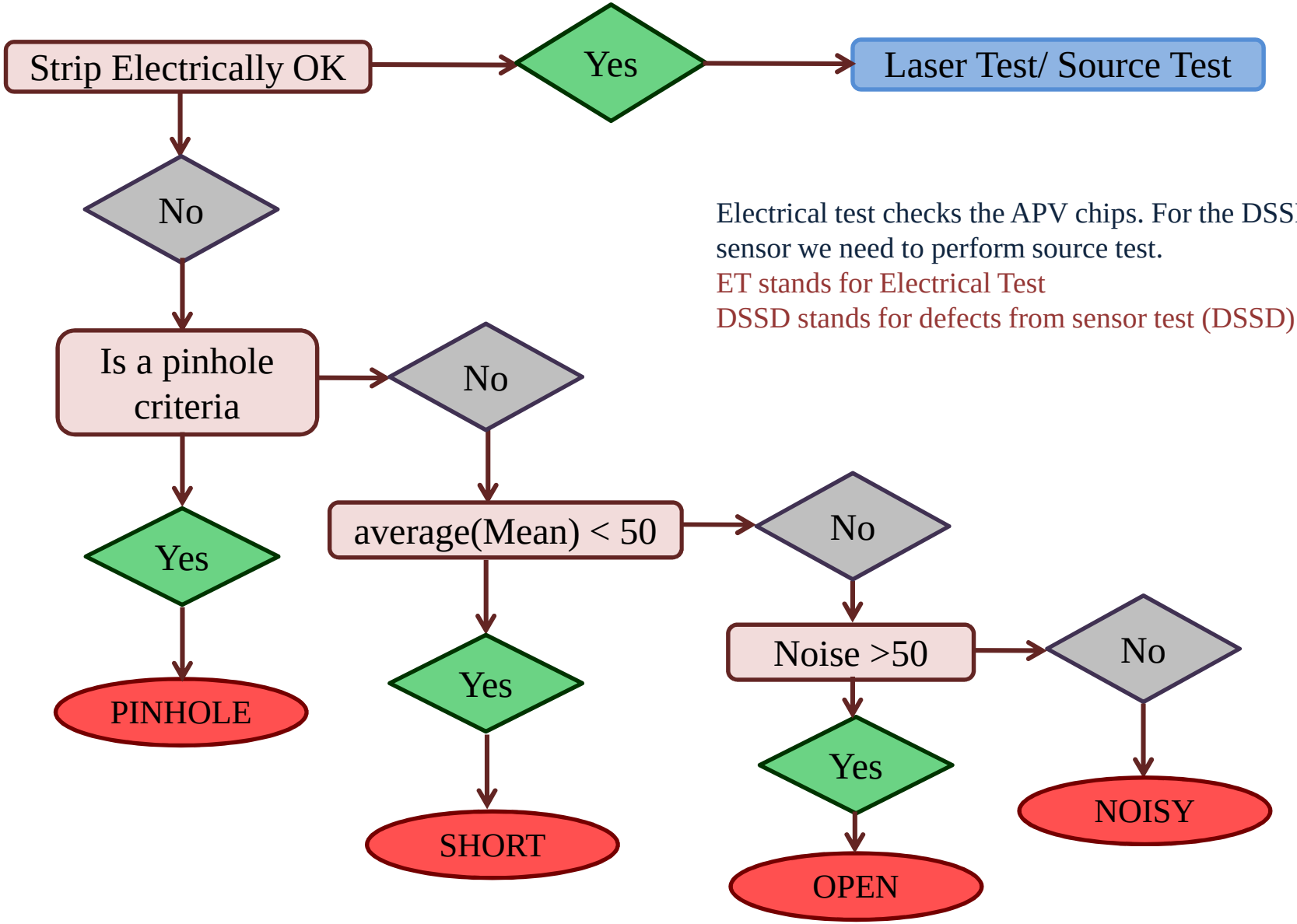


Since the CalAmp value is not always reliable since the fit to the response curve may converge to crazy values the CalAmp value cannot be used to classify the defect. Mean and RMS of the distribution of signal Δt are plotted as a function of Vsep. Average of Mean over different Vsep is used to estimate actual CalAmp or Gain.

$$\text{Mean} = \frac{\Sigma_i^N Signal_i(\Delta t)}{N}$$

GAIN = $$average(Mean) = \frac{\Sigma_{Vsep}^{N'} Mean(Vsep)}{N'}$$

CLASSIFICATION CRITERIA



Electrical test checks the APV chips. For the DSSD sensor we need to perform source test.

ET stands for Electrical Test

DSSD stands for defects from sensor test (DSSD)

PINHOLE CRITERIA

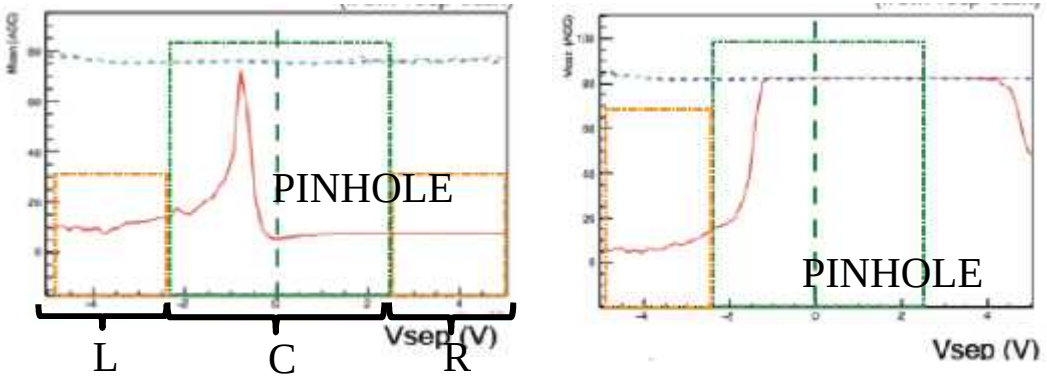
APV response evaluated at fixed Δt for different values of Vsep. Average mean of the distribution of signal Δt is plotted as a function of Vsep (i.e., Mean vs Vsep is plotted).

$$\text{Mean} = \frac{\Sigma_i^N Signal_i(\Delta t)}{N}$$

$$\text{RMS} = \sqrt{\frac{\Sigma_i^N (Signal_i(\Delta t) - Mean)^2}{N-1}}$$

| average $_{LR}$ (Mean) – max $_C$ (Mean) | > 20.0
| average $_L$ (Mean) – max $_C$ (Mean) | > 20.0
| average $_R$ (Mean) – max $_C$ (Mean) | > 20.0

Mean vs Vsep plots from the Vsep scan APVDAQ run

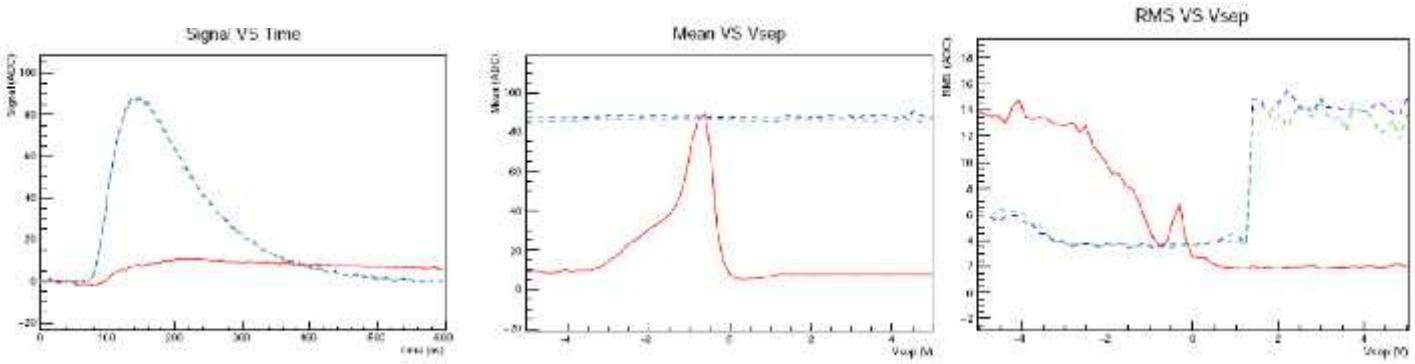


L denotes Vsep < -2.5 V, R denotes Vsep > 2.5V and C denotes |Vsep| < 2.5V

PINHOLE FINGERPRINTS

- Lower CalAmp or longer CalTmax at Vsep = 0V. Gain (partially) recovered at Vsep = -0.75 V.
- In some cases slightly higher noise at Vsep = 0V. Higher noise for Vsep < 0.75 V.
- Laser or source scan affected by lower gain.

DEFECTS: p_PINHOLE_ET
Side, strip = (1,109) – (chip,channel) = (0,109)
ET results :
Noise = 2.4, CalTAmp = 8.4, CalTmax=173.5
Response to particles = 1.00



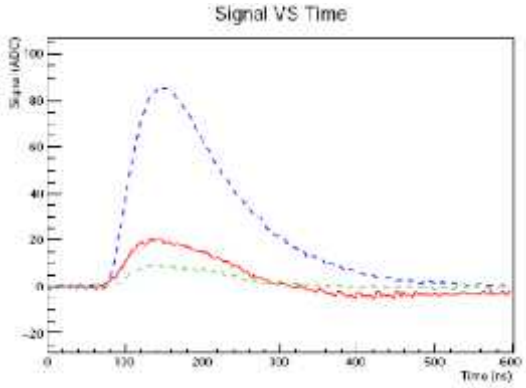
SHORT CRITERIA

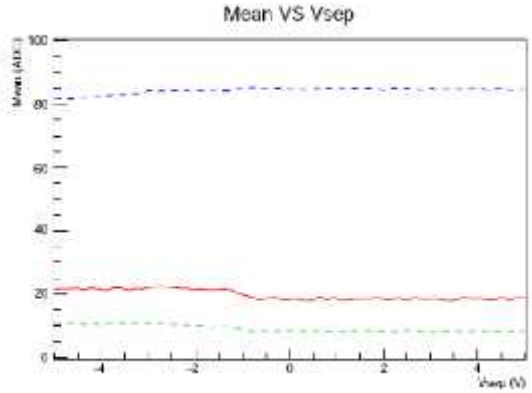
Is not a pinhole. Then if average(Mean) < 50.0 (Gain < 50) → Short

SHORT FINGERPRINTS

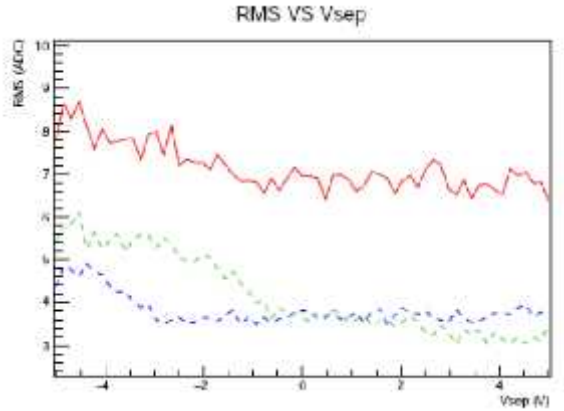
- Shorts consists of at least 2 adjacent strips, have lower CalAmp and longer CalTmax.
- Laser response affected by lower gain. Also show higher noise

DEFECTS: p_SHORT_ET
Side, strip = (1,8) – (chip,channel) = (0,8)
ET results : Noise = 5.9, CalTAmp = 19.9, CalTmax=141.2, Response to particles = 1.0

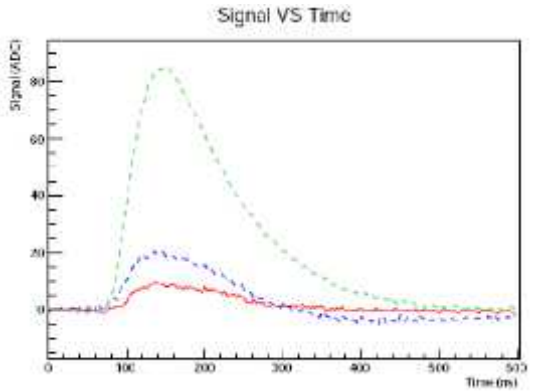


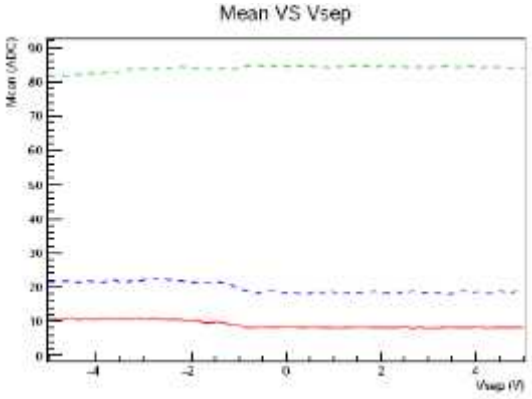


Side, strip = (1,9) – (chip,channel) = (0,9)
ET results : Noise = 3.2, CalTAmp = 9.0, CalTmax=144.2, Response to particles = 1.0

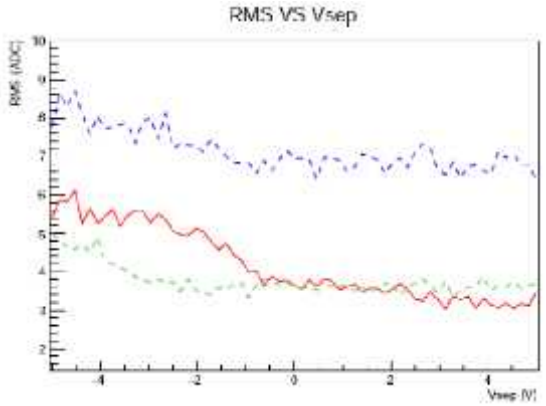


DEFECTS: p_SHORT_ET
Side, strip = (1,9) – (chip,channel) = (0,9)
ET results : Noise = 3.2, CalTAmp = 9.0, CalTmax=144.2, Response to particles = 1.0





Side, strip = (1,8) – (chip,channel) = (0,8)
ET results : Noise = 5.9, CalTAmp = 19.9, CalTmax=141.2, Response to particles = 1.0



OPEN CRITERIA

Is not a pinhole and not a short. If Noise > 50 ADC

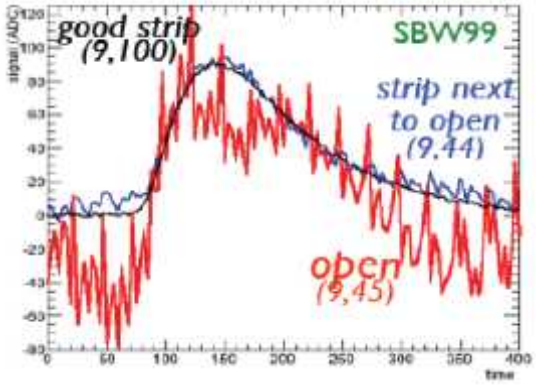
OPEN FINGERPRINTS

- Very high noise (Noise > 50 ADC) (high noise also on 2+2 adjacent strips).
- Normal CalAmp and CalTmax but the fit to the response curves may converge to crazy values.
- Laser response of the strip and of 2+2 adjacent strips affected by high noise.

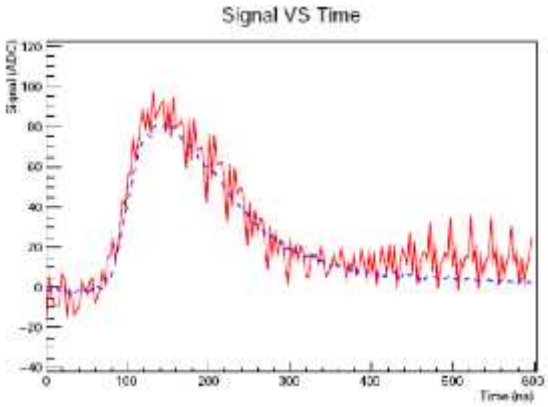
three adjacent strips with the central one with higher noise is a clear indication of an open

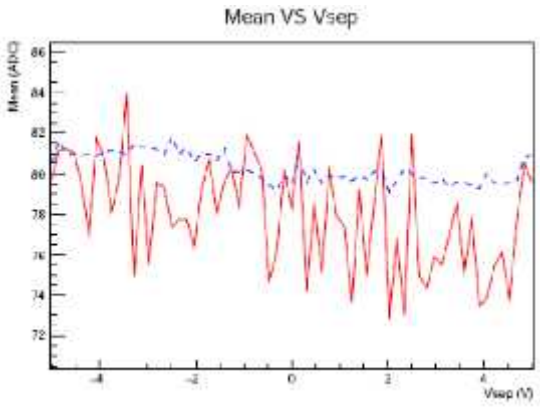
If a noisy strip is flagged as open it can be corrected by the **operator**

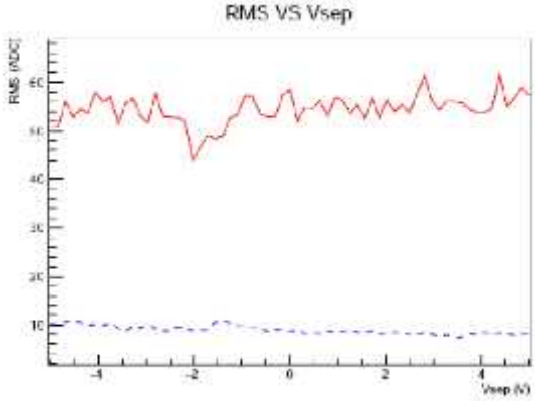
Response Curve



DEFECTS: n_OPEN_ET
Side, strip = (2,511) – (chip,channel) = (9,127)
ET results : Noise = 55.8, CalTAmp = 87.7, CalTmax=138.4, Response to particles = 1.00



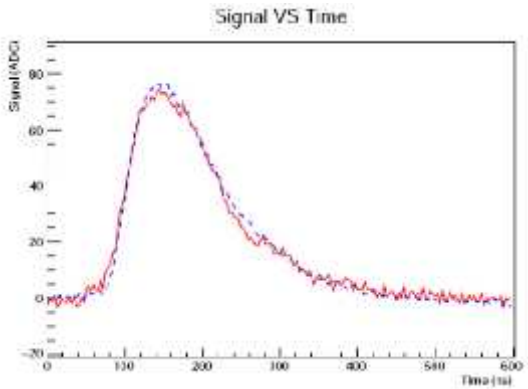


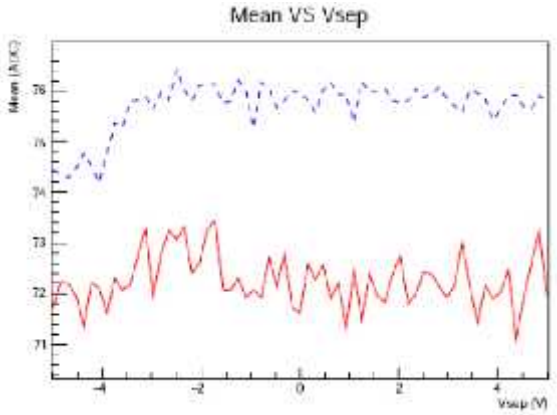


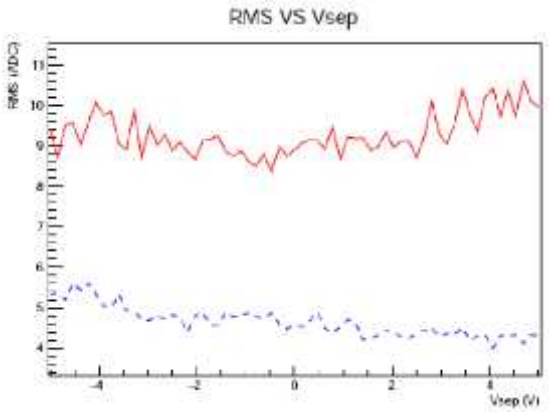
NOISY CRITERIA & FINGERPRINTS

Is neither a pinhole nor a short nor open. If Noise > 8 ADC and < 50 ADC

DEFECTS: p_NOISY_ET
Side, strip = (1,767) – (chip,channel) = (5,127)
ET results : Noise = 8.6, CalTAmp = 72.9, CalTmax=144.5, Response to particles = 1.00



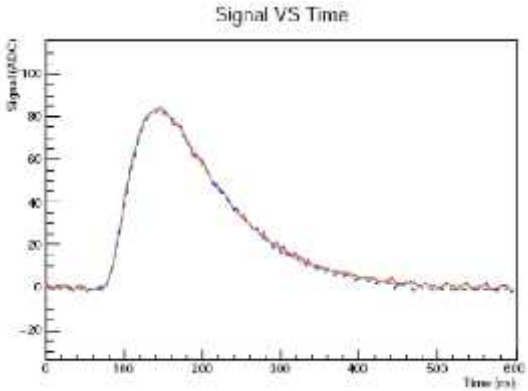


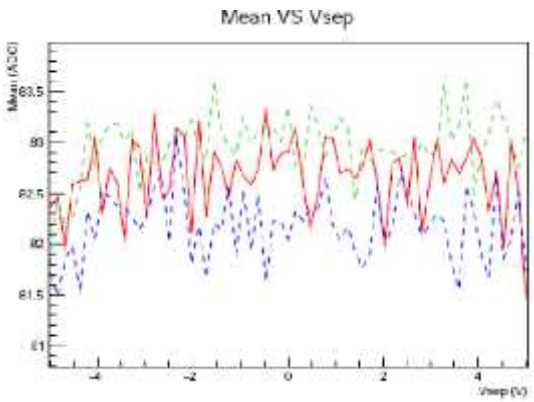


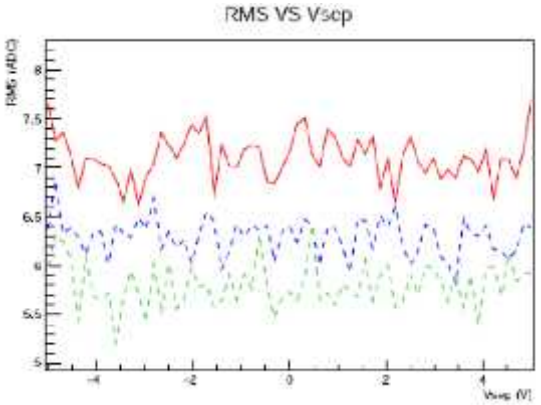
PARTICLE_RESPONSE DEFECTS CRITERIA & FINGERPRINTS

Particle response < 0.5 (Sensor defect obtained from Laser/Source test).

DEFECTS: p_Particle_Resp_ET
Side, strip = (1,228) – (chip,channel) = (1,100)
ET results : Noise = 7.2, CalTAmp = 83.4, CalTmax=144.8, Response to particles = 0.34

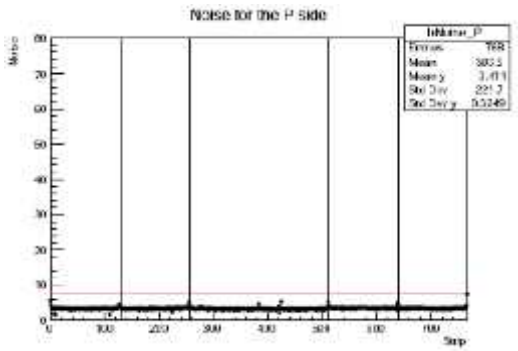


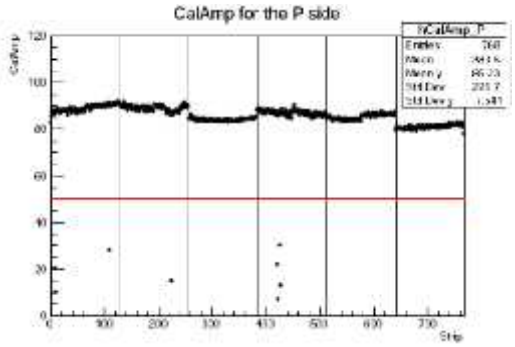


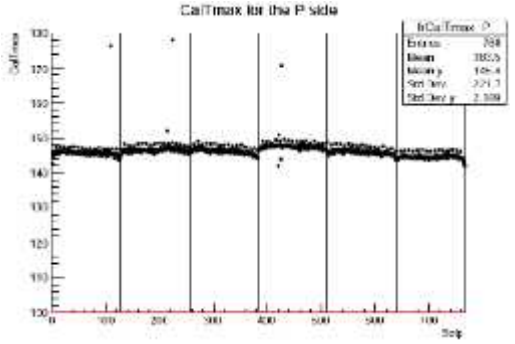


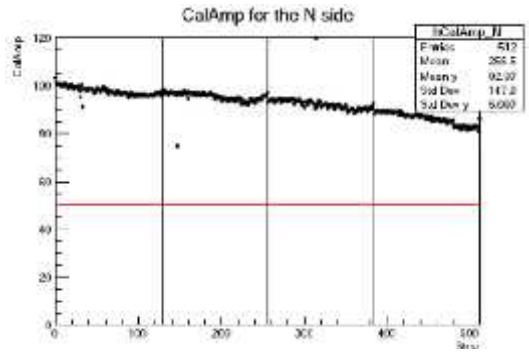
<aDefectFinder> Plots

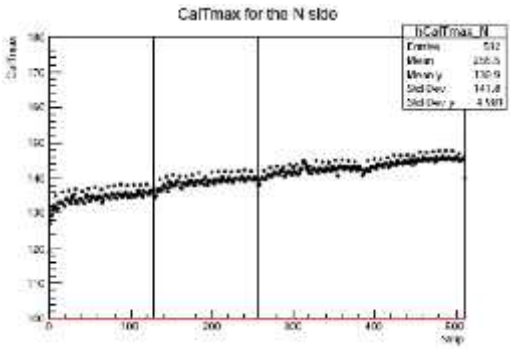
- Signal (ADC) vs time (APV response curve), Mean vs Vsep plot, RMS vs Vsep plot for the defects (as shown in the previous slides)
- Noise, CalAmp, CalTmax and Laser/Source response for the P and N sides

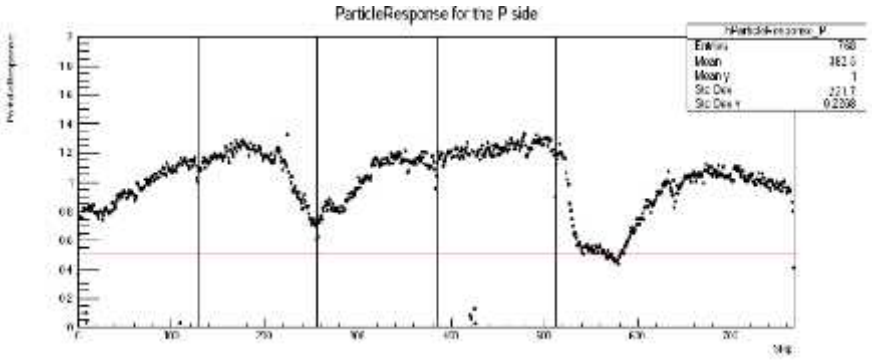


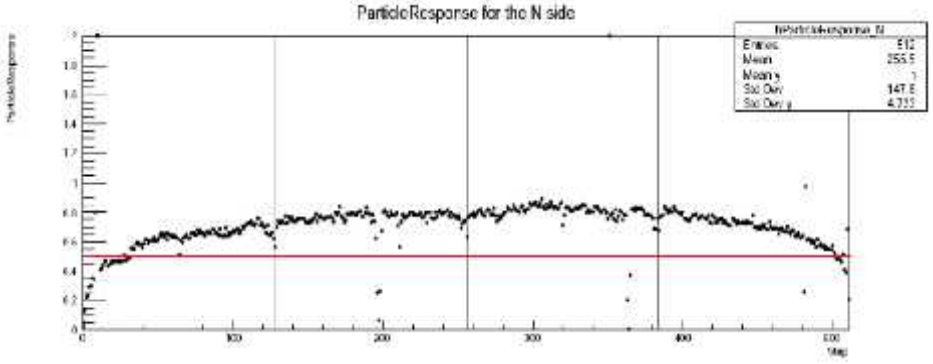






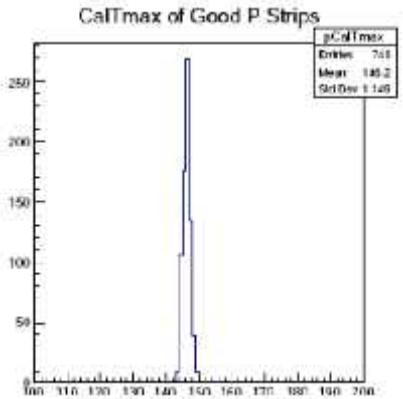


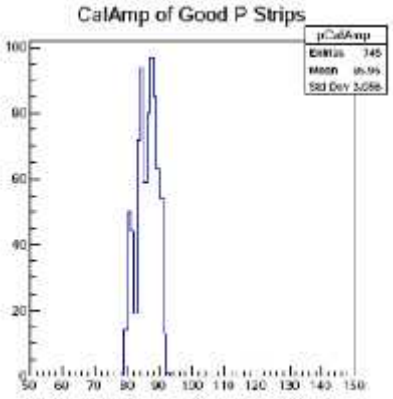


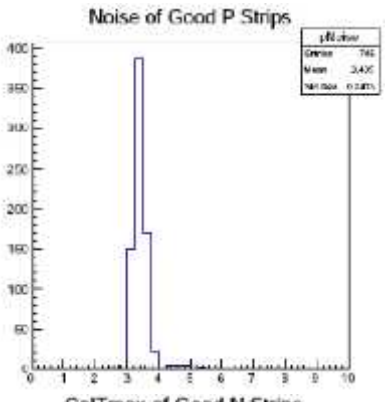


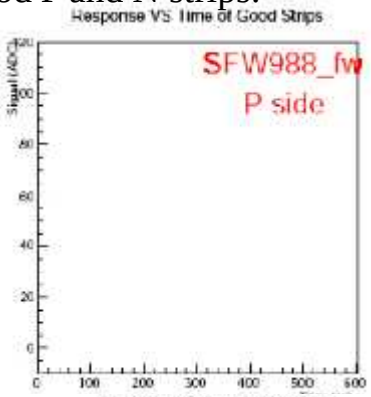
<aDefectFinder> Plots

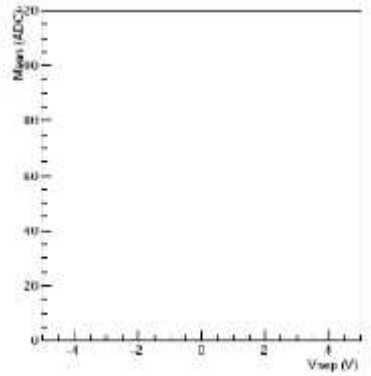
- CalTmax, CalAmp, Noise, Signal response vs time, Mean vs Vsep, RMS vs Vsep for good P and N strips.

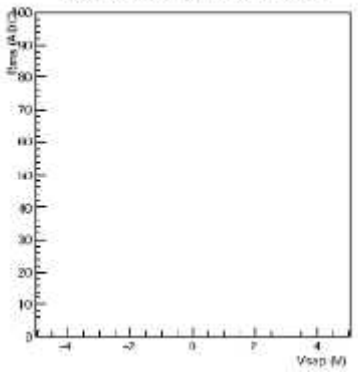


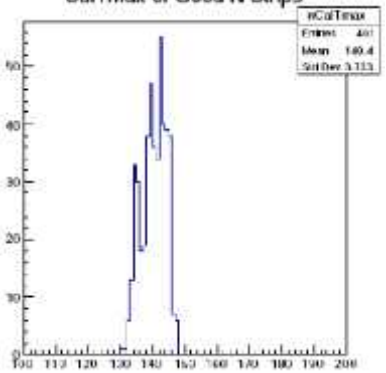


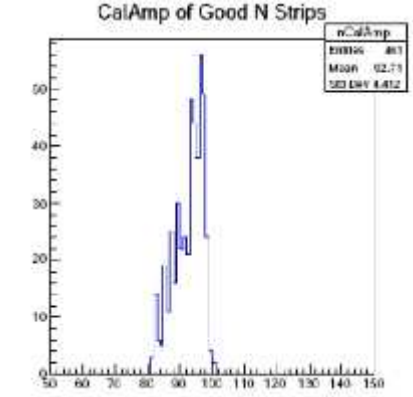


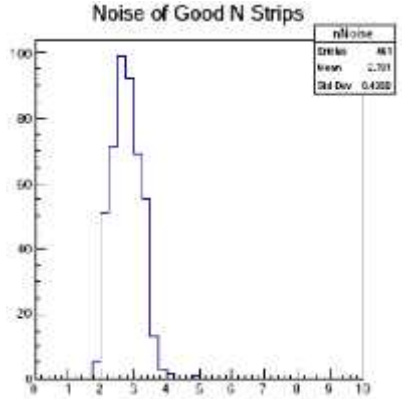


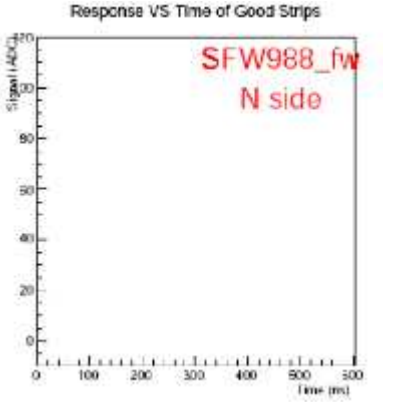


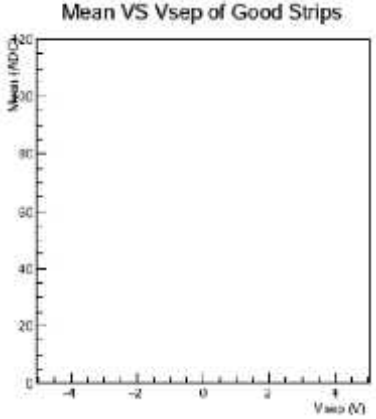


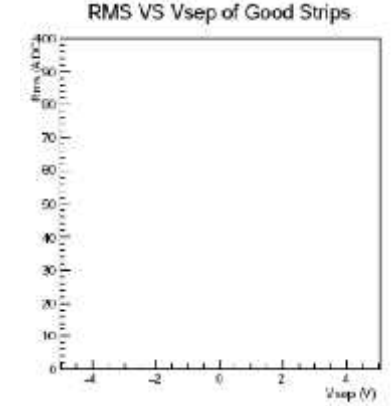












Installation and Running of aDefectFinder

INPUT FILES :

- csv files corresponding to calibration scan and Vsep scan.
- Rootfiles corresponding to source scan created using TuxOA (if source scan is performed). Otherwise default files to be used.
- DSSD defects files downloaded from the database.

INSTALLATION, SETUP AND RUNNING:

Setup basf2: source /sw/belle2/tools/setup_belle2
setuprel release-00-05-04
svn checkout https://belle2.cc.kek.jp/svn/groups/svd/aDefectFinder-tags/aDefectFinder-00-05-01/
cd aDefectFinder-00-05-04
make clean; make –f GNUMakefile; make – f Makefile
cd tools/autoprep
qmake ; make
cd to aDefectFinder-00-05-04 directory (i.e., cd ../..) and do source setup or ./setup.sh
Create directory (ex: SFW001) in the aDefectFinder-00-05-04 directory: mkdir SFW001
Put all the input files (or make a link of all input files) to the folder :
cd SFW001; ln –s …..cal...csv ./; ln –s …..cvs...csv ./; …..
cd to aDefectFinder-00-05-04 directory and call autoprep by typing autoprep : cd..; autoprep.
We will get this message : path is automatically set at /home/ddutta/… Enter y to continue and n to change.
Enter object ID : SFW001
Enter sensor ID : SENSOR (origami if O-Z is tested without sensor).
Enter module position : fw
We will get the message: The selection.config and classification.config are set as default. Enter y or n.
Then different options will come. Enter your choices.

List of Defects from aDefectFinder

Side, Strip (Chip, Channel): Type

1, 0 (0, 0): p_Particle_Resp_ET
1, 8 (0, 8): p_Short_ET
1, 9 (0, 9): p_Short_ET
1, 109 (0, 109): p_Pinhole_ET
1, 213 (1, 85): p_Pinhole_ET
1, 214 (1, 86): p_Pinhole_ET
1, 224 (1, 96): p_Pinhole_ET
1, 420 (3, 36): p_Short_ET
1, 421 (3, 37): p_Short_ET
1, 425 (3, 41): p_Short_ET
1, 426 (3, 42): p_Short_ET
1, 566 (4, 54): p_Particle_Resp_ET
1, 567 (4, 55): p_Particle_Resp_ET
1, 570 (4, 58): p_Particle_Resp_ET
1, 573 (4, 61): p_Particle_Resp_ET
1, 574 (4, 62): p_Particle_Resp_ET
1, 575 (4, 63): p_Particle_Resp_ET
1, 576 (4, 64): p_Particle_Resp_ET
1, 577 (4, 65): p_Particle_Resp_ET
1, 578 (4, 66): p_Particle_Resp_ET
1, 579 (4, 67): p_Particle_Resp_ET
1, 580 (4, 68): p_Particle_Resp_ET
1, 767 (5, 127): p_Particle_Resp_ET
2, 0 (0, 127): n_Noisy_ET
2, 1 (0, 126): n_Particle_Resp_ET
2, 2 (0, 125): n_Particle_Resp_ET
2, 3 (0, 124): n_Particle_Resp_ET
2, 4 (0, 123): n_Particle_Resp_ET
2, 5 (0, 122): n_Particle_Resp_ET
2, 6 (0, 121): n_Particle_Resp_ET
2, 7 (0, 120): n_Particle_Resp_ET
2, 11 (0, 116): n_Particle_Resp_ET
2, 12 (0, 115): n_Particle_Resp_ET
2, 13 (0, 114): n_Particle_Resp_ET
2, 14 (0, 113): n_Particle_Resp_ET
2, 15 (0, 112): n_Particle_Resp_ET
2, 16 (0, 111): n_Particle_Resp_ET
2, 17 (0, 110): n_Particle_Resp_ET
2, 18 (0, 109): n_Particle_Resp_ET
2, 19 (0, 108): n_Particle_Resp_ET
2, 20 (0, 107): n_Particle_Resp_ET
2, 21 (0, 106): n_Particle_Resp_ET
2, 22 (0, 105): n_Particle_Resp_ET
2, 23 (0, 104): n_Particle_Resp_ET
2, 24 (0, 103): n_Particle_Resp_ET
2, 25 (0, 102): n_Particle_Resp_ET
2, 26 (0, 101): n_Particle_Resp_ET
2, 28 (0, 99): s_Pinhole_ET
2, 29 (0, 98): s_Pinhole_ET
2, 30 (0, 97): s_Particle_Resp_ET
2, 31 (0, 96): s_Particle_Resp_ET
2, 32 (0, 95): s_Pinhole_ET
2, 146 (0, 109): n_Noisy_ET
2, 147 (0, 108): n_Noisy_ET
2, 148 (0, 107): n_Noisy_ET
2, 196 (0, 59): n_Particle_Resp_ET
2, 197 (0, 58): n_Particle_Resp_ET
2, 199 (0, 57): n_Particle_Resp_ET
2, 313 (7, 70): n_Noisy_ET
2, 314 (7, 69): n_Noisy_ET
2, 315 (7, 68): n_Noisy_ET
2, 355 (7, 28): n_Pinhole_ET
2, 363 (7, 20): n_Particle_Resp_ET
2, 364 (7, 19): n_Particle_Resp_ET
2, 365 (7, 18): n_Particle_Resp_ET
2, 481 (6, 30): n_Particle_Resp_ET
2, 503 (6, 8): s_Particle_Resp_ET
2, 504 (6, 7): s_Particle_Resp_ET
2, 505 (6, 6): s_Particle_Resp_ET
2, 506 (6, 5): s_Particle_Resp_ET
2, 509 (5, 3): s_Particle_Resp_ET
2, 509 (5, 2): s_Particle_Resp_ET
2, 510 (5, 1): s_Noisy_ET
2, 511 (5, 0): s_Noisy_ET

Defects Summary (ex: for L4.001 FW module AA)

P-Side	17 (2.21%)	4 (0.52%)	2 (0.26%)	6 (0.78%)	4 (0.52%)	1 (0.13%)
17 (2.21%)	27 (3.52%)	p_Noisy	p_Open	p_Short	p_Pinhole	p_Particle_Resp
-	no_DC_measuremer	0	0	0	0	0
1 (0.13%)	p_implant_short	0	0	0	0	0
10 (1.30%)	nplant_or_resistor_o	0	1	0	0	0
2 (0.26%)	p_high_current	0	1	0	0	1
0 (0.00%)	p_low_current	0	0	0	0	0
0 (0.00%)	p_high_resistor	0	0	0	0	0
0 (0.00%)	p_low_resistor	0	0	0	0	0
-	no_AC_measuremer	0	0	0	0	0
4 (0.52%)	p_pinhole	0	0	0	4	0
0 (0.00%)	p_metal_short	0	0	0	0	0
0 (0.00%)	p_metal_open	0	0	0	0	0
0 (0.00%)	p_low_cap	0	0	0	0	0
0 (0.00%)	p_bad_isolation	0	0	0	0	0

N-Side	5 (0.98%)	1 (0.20%)	1 (0.20%)	0 (0.00%)	1 (0.20%)	2 (0.39%)
1 (0.20%)	5 (0.98%)	n_Noisy	n_Open	n_Short	n_Pinhole	n_Particle_Resp
-	no_DC_measuremer	0	0	0	0	0
0 (0.00%)	n_implant_short	0	0	0	0	0
0 (0.00%)	nplant_or_resistor_o	0	0	0	0	0
0 (0.00%)	n_high_current	0	0	0	0	0
0 (0.00%)	n_low_current	0	0	0	0	0
0 (0.00%)	n_high_resistor	0	0	0	0	0
0 (0.00%)	n_low_resistor	0	0	0	0	0
-	no_AC_measuremer	0	0	0	0	0
1 (0.20%)	n_pinhole	0	0	0	1	0
0 (0.00%)	n_metal_short	0	0	0	0	0
0 (0.00%)	n_metal_open	0	0	0	0	0
0 (0.00%)	n_low_cap	0	0	0	0	0

Defects Summary of Electrical Test

Defects reducing (Some misidentification.)
Defects developed during shipment or assembly
BA : Before assembly, **AA**: After assembly
DA : During assembly i.e., Half Ladder and CE subassembly,

SFW001 subassembly and L4.001 FW results

P Side

	Pisa	BA	DA	AA
# No. of defects	**15(1.95%)**	18(2.34%)	15(1.95%)	17(7.16%)
# Pinholes	2(0.26%)	4(0.52%)	4(0.52%)	4(0.52%)
# Opens	2(0.26%)	2(0.26%)	2(0.26%)	2(0.26%)
# Shorts	6(0.78%)	6(0.78%)	6(0.78%)	6(0.78%)
# Noisy Strips	4(0.52%)	6(0.78%)	3(0.39%)	4(0.52%)
# Particle_resp.	----------	--------	----------	1(0.13%)

N-Side

	Pisa	BA	DA	AA
# No. of defects	**11(2.14%)**	3(0.59%)	3(0.59%)	5(0.98%)
# Pinholes	1(0.20%)	1(0.20%)	1(0.20%)	1(0.20%)
# Opens	0(0.00%)	1(0.20%)	0(0.00%)	1(0.20%)
# Shorts	1(0.20%)	0(0.00%)	0(0.00%)	0(0.00%)
# Noisy Strips	2(0.39%)	1(0.20%)	2(0.39%)	1(0.20%)
# Particle_resp.	----------	----------	----------	2(0.39%)

PISA defects are not adding up.

List of Defects (L4.001 O-Z) BA

1,13 (0,13) : p_pinhole, p_bad_isolation_DSSD
1,401 (3,17) : p_bad_isolation_DSSD
1,404 (3,20) : p_bad_isolation_DSSD
1,410 (3,26) : p_bad_isolation_DSSD
1,411 (3,27) : p_metal_open_DSSD
1,415 (3,31) : p_bad_isolation_DSSD
1,416 (3,32) : p_bad_isolation_DSSD
1,417 (3,33) : p_bad_isolation_DSSD
1,419 (3,35) : p_bad_isolation_DSSD
1,420 (3,36) : p_bad_isolation_DSSD
1,421 (3,37) : p_bad_isolation_DSSD
1,423 (3,39) : p_bad_isolation_DSSD
1,424 (3,40) : p_bad_isolation_DSSD
1,427 (3,43) : p_bad_isolation_DSSD
1,428 (3,44) : p_bad_isolation_DSSD
1,431 (3,47) : p_bad_isolation_DSSD
1,433 (3,49) : p_bad_isolation_DSSD
1,434 (3,50) : p_bad_isolation_DSSD
1,435 (3,51) : p_bad_isolation_DSSD
1,436 (3,52) : p_bad_isolation_DSSD
1,437 (3,53) : p_bad_isolation_DSSD
1,438 (3,54) : p_bad_isolation_DSSD
1,440 (3,56) : p_bad_isolation_DSSD
1,443 (3,59) : p_bad_isolation_DSSD
1,451 (3,67) : p_bad_isolation_DSSD
1,487 (3,103) : p_implant_or_resistor_open_DSSD
1,524 (4,12) : p_bad_isolation_DSSD
1,564 (4,52) : p_bad_isolation_DSSD
1,622 (4,110) : p_bad_isolation_DSSD
1,669 (5,29) : p_low_resistor_DSSD
1,670 (5,30) : p_low_resistor_DSSD
1,687 (5,47) : p_bad_isolation_DSSD

Defects present at all stages.
Defects changing or disappearing (probable misidentification).
Defects created at DA stage
Defects created at AA stage

List of Defects (L4.001 O-Z) DA

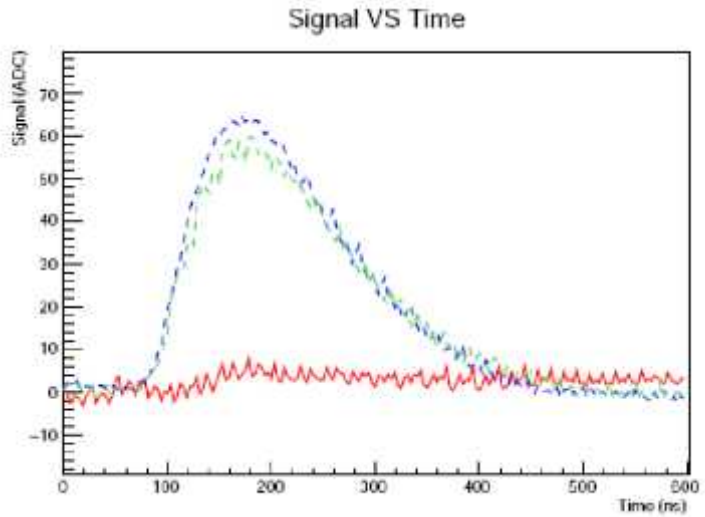
1,0 (0,0) : p_Short_ET → actually found to be Noisy
1,1 (0,1) : p_Noisy_ET
1,2 (0,2) : p_Noisy_ET
1,3 (0,3) : p_Noisy_ET (Noise = 9.4) → not observed before and after assembly.
1,13 (0,13) : p_Short_ET, p_pinhole, p_bad_isolation → Not a short
1, 192 (1,64) : p_Noisy_ET (Noise = 8.6)
1, 255 (1,127) : p_Noisy_ET (Noise=9.0) → These 2 defects are not observed before and after assembly.
1,383 (2,127) : p_Noisy_ET
1,384 (3,0) : p_Short_ET → actually may be Noisy (Noise = 9.4)
1,401 (3,17) : p_bad_isolation_DSSD
1,404 (3,20) : p_bad_isolation_DSSD
1,410 (3,26) : p_bad_isolation_DSSD
1,411 (3,27) : p_metal_open_DSSD
1,415 (3,31) : p_bad_isolation_DSSD
1,416 (3,32) : p_bad_isolation_DSSD
1,417 (3,33) : p_bad_isolation_DSSD
1,419 (3,35) : p_bad_isolation_DSSD
1,420 (3,36) : p_bad_isolation_DSSD
1,421 (3,37) : p_bad_isolation_DSSD
1,423 (3,39) : p_bad_isolation_DSSD
1,424 (3,40) : p_bad_isolation_DSSD
1,427 (3,43) : p_bad_isolation_DSSD
1,428 (3,44) : p_bad_isolation_DSSD
1,431 (3,47) : p_bad_isolation_DSSD
1,433 (3,49) : p_bad_isolation_DSSD
1,434 (3,50) : p_bad_isolation_DSSD
1,435 (3,51) : p_bad_isolation_DSSD
1,436 (3,52) : p_bad_isolation_DSSD
1,437 (3,53) : p_bad_isolation_DSSD
1,438 (3,54) : p_bad_isolation_DSSD
1,440 (3,56) : p_bad_isolation_DSSD
1,443 (3,59) : p_bad_isolation_DSSD
1,450 (3,66) : p_Short_ET
1,451 (3,67) : p_Short_ET, p_bad_isolation_DSSD → Appear as shorts but disappear after assembly (Misidentified).
1,458 (3,74) : p_Short_ET
1,459 (3,75) : p_Short_ET
1,487 (3,103) : p_implant_or_resistor_open_DSSD
1,524 (4,12) : p_bad_isolation_DSSD
1,564 (4,52) : p_bad_isolation_DSSD
1,622 (4,110) : p_bad_isolation_DSSD
1,669 (5,29) : p_low_resistor_DSSD
1,670 (5,30) : p_low_resistor_DSSD
1,687 (5,47) : p_bad_isolation_DSSD
1,765 (5,125) : p_Short_ET → (Gain =48.0, Noise = 9.6, marked as noisy after assembly) Actually a Noisy channel.
1,766 (5,126) : p_Short_ET
1,767 (5,127) : p_Short_ET → Appear as shorts but actually noisy
2,0 (6,0) : n_Noisy_ET
2,5 (6,5) : n_Noisy_ET (Noise = 8.5)
2,9 (6,9) : n_Noisy_ET
2,73 (6,73) : n_Noisy_ET
2,74 (6,74) : n_Noisy_ET
2,75 (6,75) : n_Noisy_ET
2,117 (6,117) : n_Open_ET → (Noise = 10.1) Not present before and after assembly, may be noisy or misidentified.
2,118 (6,118) : n_Noisy_ET
2,119 (6,119) : n_Noisy_ET (Noise = 10.2) → Not present before and after assembly
2,125 (6,125) : n_Open_ET
2,126 (6,126) : n_Noisy_ET
2,127 (6,127) : n_Noisy_ET
2,181 (7,53) : n_Open_ET
2,182 (7,54) : n_Noisy_ET
2,183 (7,55) : n_Noisy_ET → Not open, may be noisy channels but disappear after assembly. May be misidentified.
2,511 (9,127) : n_Open_ET

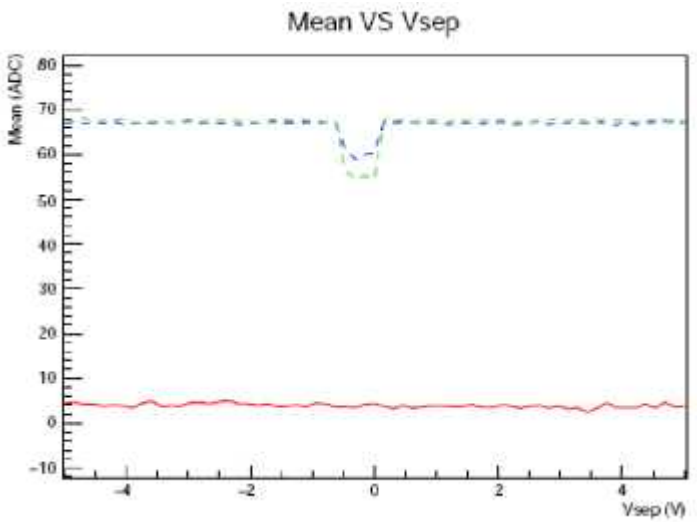
List of Defects (L4.001 O-Z) AA

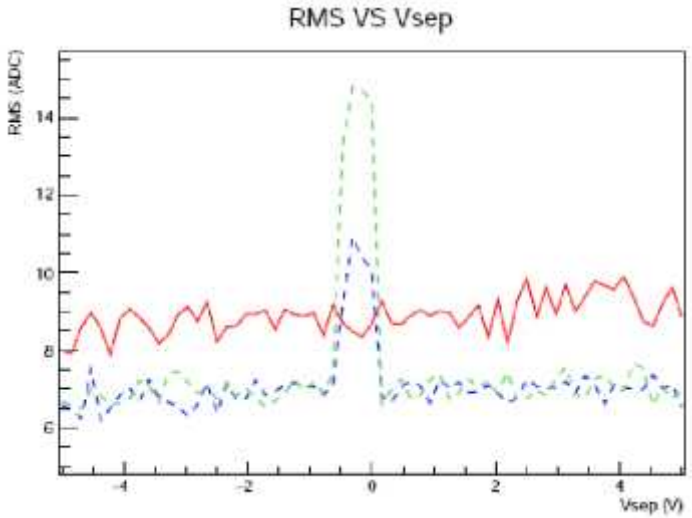
1,0 (0,0) : p_Short_ET → actually found to be Noisy
1,1 (0,1) : p_Noisy_ET
1,2 (0,2) : p_Noisy_ET
1,13 (0,13) : p_Short_ET, p_pinhole, p_bad_isolation → Not a short
1,127 (0,127) : p_Noisy_ET (Noise = 8.1)
1,383 (2,127) : p_Noisy_ET
1,384 (3,0) : p_Short_ET → actually may be Noisy (Noise = 9.4)
1,401 (3,17) : p_bad_isolation_DSSD
1,404 (3,20) : p_bad_isolation_DSSD
1,410 (3,26) : p_bad_isolation_DSSD
1,411 (3,27) : p_metal_open_DSSD
1,415 (3,31) : p_bad_isolation_DSSD
1,416 (3,32) : p_bad_isolation_DSSD
1,417 (3,33) : p_bad_isolation_DSSD
1,419 (3,35) : p_bad_isolation_DSSD
1,420 (3,36) : p_bad_isolation_DSSD
1,421 (3,37) : p_bad_isolation_DSSD
1,423 (3,39) : p_bad_isolation_DSSD
1,424 (3,40) : p_bad_isolation_DSSD
1,427 (3,43) : p_bad_isolation_DSSD
1,428 (3,44) : p_bad_isolation_DSSD
1,431 (3,47) : p_bad_isolation_DSSD
1,433 (3,49) : p_bad_isolation_DSSD
1,434 (3,50) : p_bad_isolation_DSSD
1,435 (3,51) : p_bad_isolation_DSSD
1,436 (3,52) : p_bad_isolation_DSSD
1,437 (3,53) : p_bad_isolation_DSSD
1,438 (3,54) : p_bad_isolation_DSSD
1,440 (3,56) : p_bad_isolation_DSSD
1,443 (3,59) : p_bad_isolation_DSSD
1,451 (3,67) : p_bad_isolation_DSSD
1,458 (3,74) : p_Short_ET
1,459 (3,75) : p_Short_ET
1,487 (3,103) : p_implant_or_resistor_open_DSSD
1,524 (4,12) : p_bad_isolation_DSSD
1,564 (4,52) : p_bad_isolation_DSSD
1,622 (4,110) : p_bad_isolation_DSSD
1,669 (5,29) : p_low_resistor_DSSD
1,670 (5,30) : p_low_resistor_DSSD
1,687 (5,47) : p_bad_isolation_DSSD
1,765 (5,125) : p_Noisy_ET → (Gain =54.8, Noise = 8.1), marked as short during assembly, Actually a Noisy channel.
1,766 (5,126) : p_Short_ET
1,767 (5,127) : p_Short_ET → Appear as shorts but actually noisy
2,0 (6,0) : n_Noisy_ET
2,1 (6,1) : n_Particle_Resp_ET (Particle_resp = 0.00)
2,4 (6,4) : n_Particle_Resp_ET (Particle_resp = 0.00)
2,5 (6,5) : n_Noisy_ET (Noise = 8.5)
2,6 (6,6) : n_Particle_Resp_ET (Particle_resp = 0.00)
2,8 (6,8) : n_Particle_Resp_ET (Particle_resp = 0.00)
2,9 (6,9) : n_Noisy_ET
2,73 (6,73) : n_Noisy_ET
2,74 (6,74) : n_Noisy_ET
2,75 (6,75) : n_Noisy_ET
2,118 (6,118) : n_Noisy_ET
2,125 (6,125) : n_Open_ET
2,126 (6,126) : n_Noisy_ET
2,127 (6,127) : n_Noisy_ET
2,510 (9,126) : n_Particle_Resp_ET (Particle_resp = 0.00)
2,511 (9,127) : n_Open_ET

Defects Cross-check: By Inspecting the plots

1,13 (0,13) : p_Short_ET, p_pinhole, p_bad_isolation







Configuration File:

```
[module]
name = SBWtest        name of the object (L4.001, SB3.001, ...)
tag = bw              position in the ladder = {bw, -z, ce, +z ,fw}

[input files]
calibration = ./default_trees/default_cal_tree.root
vsep = ./default_trees/default_cvs_tree.root          default trees exist in
laserP = ./default_trees/default_laserP_tree.root     case you have no
laserN = ./default_trees/default_laserN_tree.root     laser/radiation run

[output files]
rootfile = ../results/SBWtest/SBWtest_mergedTree.root
csv_defects = ../results/SBWtest/SBWtest_defects.csv
pdf_summary = ../results/SBWtest/SBWtest_summary.pdf

[Average Laser Response Cuts]
count_min = 0
count_max = 3000

[Defect Finding Cuts]                          change this file to change
include ./default_config/selection.config      the selection cuts

[Defect Classification Cuts]
include ./default_config/classification.config    change this file to change
                                                  the classification cuts
[Electrical Defects Analysis]
output = ../results/SBWtest/SBWtest_electrical_defects.csv
include ./default_config/electrical_defects_without_sensor.config

[Package Version]
include ./default_config/package_version.config
```

Thanks…