Characterization of the PASA Engineering Run Samples

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## Characterization of the PASA ER samples

- 500 chip packaged in plastic case were delivered 1\textsuperscript{st} week of September

- 16 chips delivered to CERN for the characterization and ER approval

- 2 FEC loaded and ready for test at the TPC Sector test

- 2 chips (32 channels) fully characterized in the laboratory

- The remaining 484 chips delivered to Darmstadt (TU) for screening test (see U. Bonnes presentation)
IMPULSE RESPONSE FUNCTION

CHIP #0 – CHANNEL #1

$A \times \frac{t}{\tau}^4 \times \exp^{-4 \times \frac{t}{\tau}}$

$Q \sim 150fC$

FWHM = 188ns

PASA Output (ADC counts)

time (x40ns)
CHIP #1 – CHANNEL #1
extra capacitive load (3.3pF, ~ 45% of nominal value)

\[ A \times \frac{t}{\tau}^4 \times \exp\left(-\frac{t}{\tau}\right) \]

FWHM = 188ns
CHIP #1 – CHANNEL #1
extra capacitive load (6.6pF, ~ 90% of nominal value)

\[ A \times \frac{t}{\tau}^4 \times \exp\left(-\frac{t}{\tau}\right) \]

FWHM = 188ns
CHIP #1 – CHANNEL #1 – POSITIVE POLARITY

\[ A \times t/\tau^4 \times \exp^{-4t/\tau} \]

\[ Q \sim 150\text{fC} \]

FWHM = 188ns
PASA LINEARITY

LINEARITY PLOT (chip 0, channel 1)

Conversion Gain = 12mV / fC
### Summary

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Requirement</th>
<th>MPR Version</th>
<th>ER Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>1000 e @12pF</td>
<td>566 e @12pF</td>
<td>560 e @12pF</td>
</tr>
<tr>
<td>Conversion gain</td>
<td>12mV / fC</td>
<td>10.8 mV / fC</td>
<td>12 mV / fC</td>
</tr>
<tr>
<td>Shaping time</td>
<td>190ns</td>
<td>190ns</td>
<td>188ns</td>
</tr>
<tr>
<td>Non linearity</td>
<td>&lt; 1%</td>
<td>&lt; 0.35%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Crosstalk</td>
<td>&lt; 0.3%</td>
<td>&lt; 0.4%</td>
<td>&lt; 0.1%</td>
</tr>
<tr>
<td>Baseline’s dispersion</td>
<td>200 mV</td>
<td></td>
<td>60 mV</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 20mW / ch</td>
<td>12mW / ch</td>
<td>11mW / ch</td>
</tr>
<tr>
<td>Area</td>
<td>16.7mm$^2$</td>
<td></td>
<td>18 mm$^2$</td>
</tr>
</tbody>
</table>

- The Engineering Run samples fulfill all requirements
- Improvements with respect the MPW:
  - crosstalk reduced by at least a factor 4
  - baseline dispersion reduced by a factor 2
  - better design compensation for the inaccuracy of the process models