Express Line TEC Module Tests with ARC

III. Physikalisches Institut B
&
I. Physikalisches Institut

RWTH Aachen
Overview

- Environment and Test Setup
- Performed tests and most important observations
- Table of results
- Outlook
Express Line TEC Modules

- 2 x 5 TEC Modules received from Karlsruhe

- Bar Codes:
  - 30216630200012
  - 30216630200017
  - 30216630200020
  - 30216630200022
  - 30216630200023
  - 30216630200026
  - 30216630200027
  - 30216630200029
  - 30216630200048
  - 30216630200056
Environment & Test Setup

- Clean room used for module test and storage

- ARC Test Setup
- LED Pulser
- CAEN Sy126
Performed Tests

Tests based on proposals from L. Demaria & M. Meschini:

- IV Curves
- Basic Tests at 150 V:
  - H0-Tests
  - F-Tests
  - Psh-Tests
- Advanced Tests at 150 V:
  - Pipe-Tests
  - L-Tests (pulsed light, 950 nm)
  - Laser-Tests (at 50 V, 1060 nm)
Measurements done at room temperature with no N₂ flush!
Different baselines at same APV settings!
RMS Noise

Noise of channels on the edges is often in the order of defect channels!

Chip Settings:
- ECAddress= 74
- Mode= 43
- Latency= 4
- IPRE= 98
- IPCASC= 52
- IPS= 34
- ISHA= 34
- ISSF= 34
- ISP= 55
- IMUXIN= 54
- ISPARE= 0
- ICAL= 20
- VFL= 30
- VFS= 60
- VISP= 40
- CDRV= 254
- CSSEL= 1
- MUXX= 1
- MUXX= 4
- Error= 0

Cat: 5'th RMS
Bad Channel:
- 0
- 119
- 127
Calibration Pulse Shapes
(Psh-Test at 150 V)

Pulse shape maxima distribution in peak mode

Pulse shape maxima distribution in deconvolution mode
Calibration Pulse Shapes and RMS Noise

**Open**

**Short**

**Dead**
IR LED Array

- 16 IR LEDs (950 nm)
- 4 fibres connected to 1 LED

“LEPP 16“
Automated „Running Light“

LED control window
(as implemented in ARCS)

Online data display
LED & Laser Tests

LED tests at 150 V, 950 nm

Laser tests at 50 V, 1050 nm
## Preliminary Test Results

<table>
<thead>
<tr>
<th>Module</th>
<th>Tests</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>Basic</td>
<td>Noise</td>
</tr>
<tr>
<td></td>
<td>PSh</td>
<td>LED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>512 511 442 431 430 257 256 209 129 1</td>
</tr>
<tr>
<td>17</td>
<td>X 400 V</td>
<td>512 443 442 384 259 256 129 93 92 1</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>512 511 442 384 255 257 256 93 92 1</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>512 511 385 384 257 256 129 1</td>
</tr>
<tr>
<td>23</td>
<td>X 480 V</td>
<td>512 511 385 384 258 257 256 129 1</td>
</tr>
<tr>
<td>26</td>
<td></td>
<td>512 480 385 384 257 256 129 128 1</td>
</tr>
<tr>
<td>27</td>
<td></td>
<td>512 385 384 257 256 248 129 128 93 1</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td>512 385 384 257 256 189 129 7 1</td>
</tr>
<tr>
<td>48</td>
<td>X 450 V</td>
<td>512 385 384 257 256 129 128 1</td>
</tr>
<tr>
<td>56</td>
<td></td>
<td>512 511 384 384 257 256 129 128 1</td>
</tr>
</tbody>
</table>

---

Markus Axer  
III. Physikalisches Institut B
Outlook

- Investigation of LED tests
- Comparison of LED and laser results
- Cooling tests
- Detailed comparison of results of both test systems
Environment & Test Setup

- Cooling Tests (with LED array)

- Cooling Box (can house 5 modules)