

Procedures for Express Line Module Test

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1 Introduction

In this document I propose a simple procedure in order to have a common reference for the results of the tests on the express line modules. It does not take into account any Data Base interface, the main purpose being to easily compare results from different production centers and to keep track of our present work for next future reference. All the results must be written in a report file as specified below. Many other tests are possible and very useful, this is only the minimal set that we must retain. This procedure can be applied to both ARC and CMS setups.

2 Download Parameters

Load in the APV25-S1 registers the nominal settings as reported in the User Guide version 2.2, sec.6.2, page 17.

The guide can be found in

http://www.te.rl.ac.uk/med/projects/High_Energy_Physics/CMS/APV25-S1/pdf/User_Guide_2.2.pdf

Please have a look also at M. Raymond's document about settings in

http://cmsdoc.cern.ch/~ghall/TKEL_0901/APVbias.html

3 HV Bias

If you are testing a complete module, apply bias voltage with a ramp up of 10V/s and write in the report the leakage current (in nA) at 100V and 500V; if 500V cannot be reached because breakdown happens below 500V, write current and max voltage reached. Keep the detector during data taking at 500V. If this is not possible keep detector at maximum allowed bias value for stable operation and write it in the report file; add your comments and explanations.

4 File Header

The header of the report file must contain:

Detector or Hybrid type (e.g. M_TIB for a TIB module, H_TEC for a TEC hybrid etc.)

Detector/hybrid ID

Testing center ID

Setup type (CMS or ARC)

Date of testing

Current at 100 V

Current at 500 V

Current at V_{max} reachable if $V_{max} < 500V$

5 Running APV

Run the APV and look for the correct delays in the DAQ chain to sample the analog signal with the appropriate timing (where applicable). In the report file the results of measurements must be reported in ADC units; possible normalization to electrons will be done afterwards looking at calibration response.

5.1 Data Taking

The following measurements must be reported for both PEAK and DECONVOLUTION mode:

1. Mean value and rms of pedestals distribution for each chip
2. Mean value and rms of channel noise (after cmn subtraction) distribution for each chip
3. Mean value and rms of calibration response distribution for each chip

A plot of the previous 3 distributions in postscript format is highly desirable.

To allow for a more detailed and deeper understanding of possible faults, also the quantities below must be written in the report:

- Pedestal value for every channel
- Channel noise before common mode subtraction
- Channel noise after common mode subtraction
- Response of each channel to the calibration pulse (1 calibration point only, no scan for the moment) as defined in the above reference (~25000 electrons, ICAL=29)

6.0 Numbering convention:

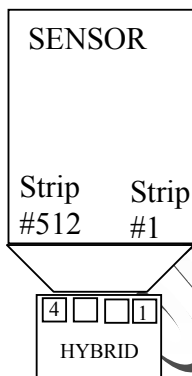


Figure 1

We should follow the physical numbers as marked on the sensors: looking at the module from hybrid end as shown in fig. 1, strip #1 will be on bottom right corner and strip #512 (or #768) will be on bottom left corner.

7.0 Data Format

Since for the time being there is no agreed format for the output data, I propose to write the report file in ASCII; as soon as common software tools and data format will be available for analysis we will conform to the standard.

Comments can be appended at the end of the report file.

I show here below an example of part of a report file with some dummy data

```
Hybr/Mod module_ID center_ID setup_type date I_100 I_500 I_@Vmax Vmax
M_TIB 12345 Firenze CMS/ARC 15022002 55 333 no no
*****
```

```
APV 1
pedmeanpk pedrmspk pedmeandec pedrmsdec
202.1 5.3 210.9 6.8
sigmeanpk sigrmspk sigmeandec sigrmsdec
1.85 0.5 2.3 0.7
calmeanpk calrmspk calmeandec calrmsdec
```

51.1 3.4 46.9 4.8

strip# pedpk sigcmpk sigpk calpk peddec sigcmdec sigdec caldec

1

2

.....

128

APV 2

pedmeanpk pedrmspk pedmeandec pedrmsdec

202.1 5.3 210.9 6.8

sigmeanpk sigrmspk sigmeandec sigrmsdec

1.85 0.5 2.3 0.7

calmeanpk calrmspk calmeandec calrmsdec

51.1 3.4 46.9 4.8

strip# pedpk sigcmpk sigpk calpk peddec sigcmdec sigdec caldec

129

130

.....

256

8.0 Reference Files

The full report file can be seen in the Module Test web page

http://hep.fi.infn.it/CMS/moduletest/procedures_2002/xpres.pdf

For ease of reference I append below the APV nominal settings from the 2.2 Guide