Question (ATLAS-CMS): II Prototype RUN Answer (HPK)

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| What is the root-cause of the gain layer non-uniformity? | Gain layer non-uniformity is due to heating (they can’t say more about the know-how of HPK) |
| Breaking of sensors after irradiation has 2 causes: a. at corner at highest bias, b. in the middle of the active area at lower bias. Can this be mitigated? | They will discuss about this and try to improve. Have requested hi-res pictures of both cases. |
| Packaging as a sandwich is very efficient, but glue on the top plastic is destructive when irradiated  | No more shipment with glue. HPK will investigate and propose a new packaging method (they might send some samples to us for irradiation) |
| Can we have UBM done on the 5x5 and bigger devices? | HPK can deposit UBM on one full wafer. So either it will be on all devices on the wafer or on zero. They need answer by end of December |
| What will they test on this prototype run?(we have a list of requests) | I-V and C-V: will be done on every pad, on the wafer, but with single needle and other pads floating.Full IV. CV around the Gain Layer depletion voltage. |
| Can HPK use a probe card, on the large structures, to test devices with all pads connected? | Please send probe card info to HPK and HPK will consider the option. |
| What is the shipping date? | End of May. HPK will send updated schedule of productions |
| Can we have a better identification of location of every single device on wafer? | Prototype will have numbers for location on the packing envelope |

Discussions on the final production run Answer (HPK)

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| Is there a price advantage if ATLAS and CMS will order identical LGAD sensors? (or almost identical… identical geometry and eventually different in Gain Layer profile) | HPK will discuss this and send feedback |
| What will be the testing done at HPK? We have some proposals, but it definitely needs to be discussed again (internally and with HPK) | Full IV and CV on every-pads looks like too much for them… too time consuming.Measure the IV of the device (probe-card with all pads connected) and check IV of every pad only in case of problems… sample CV on some pads?  |
|  | HPK requests the update with the precise # of sensors needed for the two projects. |