Annealing strategy and requisites

Direct current @ 100 mA and 10 V (1W) per SiPM = 150° C

Maybe **less** due to:

1. self heating (thermal power shared among more than one SiPM)
2. heating fluid

Constraints:

1. Segmentation (MasterPanel dictated):
   a. 8 VAnn per Master panel divided by 8
   b. down to 1/8th of PDU at the time (256/8*1W=32W)
2. polarization inversion by putting negative voltage in VBias respect to GND

Main tests:

1. Does it work?
2. can we reach 150° C?
3. Are all the components in the VAnn path suitable for the task?
4. Annealing with heating fluid
5. Thermal stresses on carrier and FEBs

FEB

bypass diodes

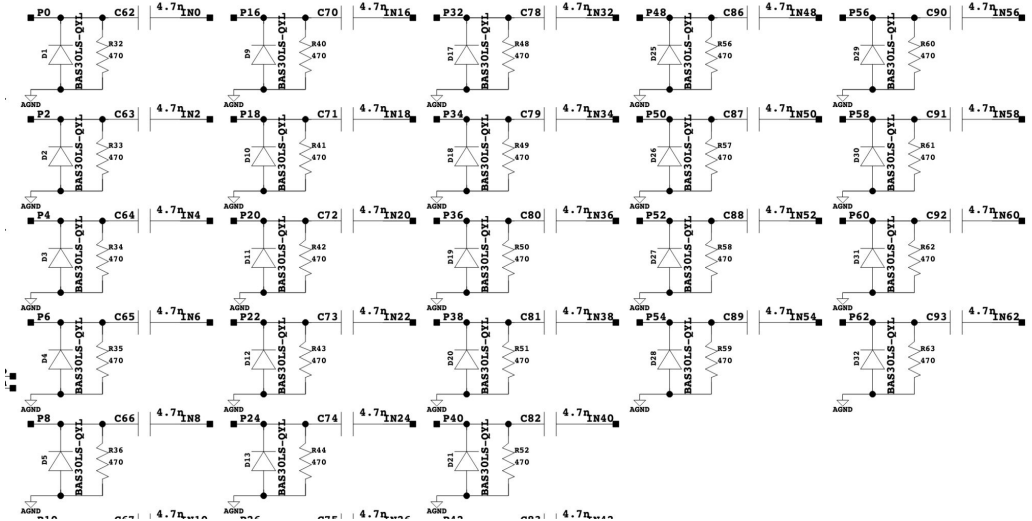
Vf = 0.75 - 1.0 V @ 100 mA

If = 250 mA

Ptot = 335 mW

Rthj = 375 K/W

BAS30LS-Q

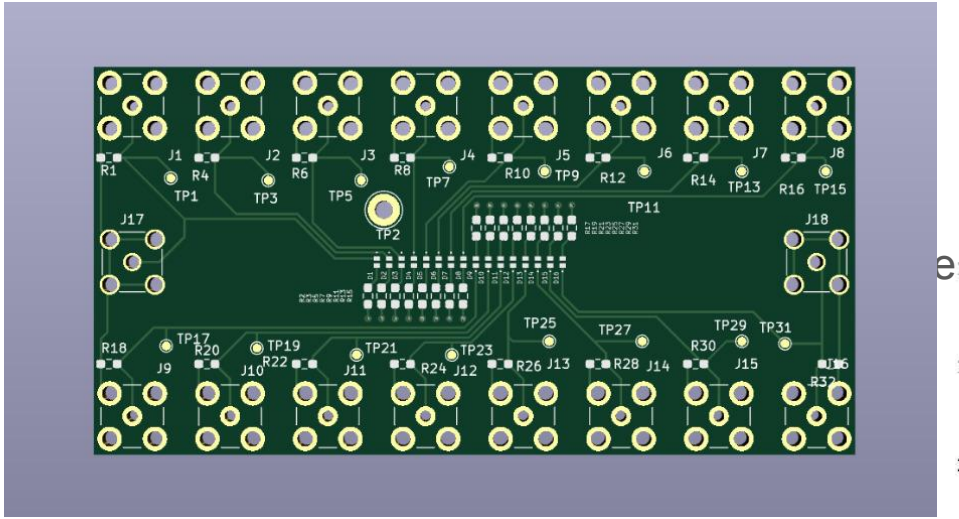


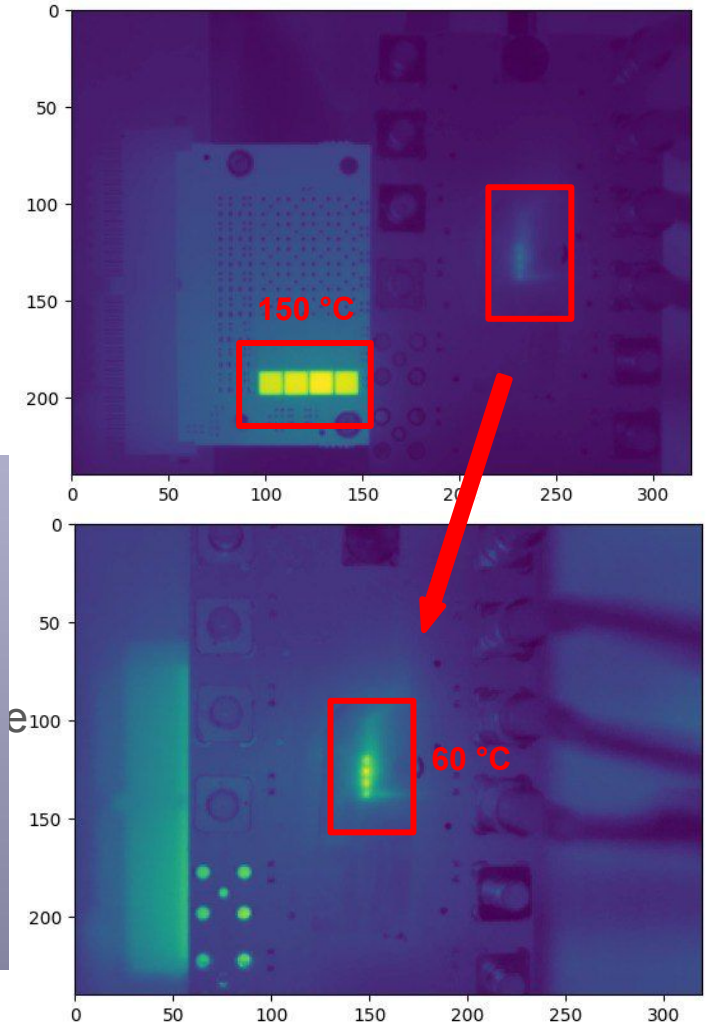
https://assets.nexperia.com/documents/data-sheet/BAS30LS-Q.pdf

Thermal test in lab

4 SiPMs in a row:

8 V 420 mA

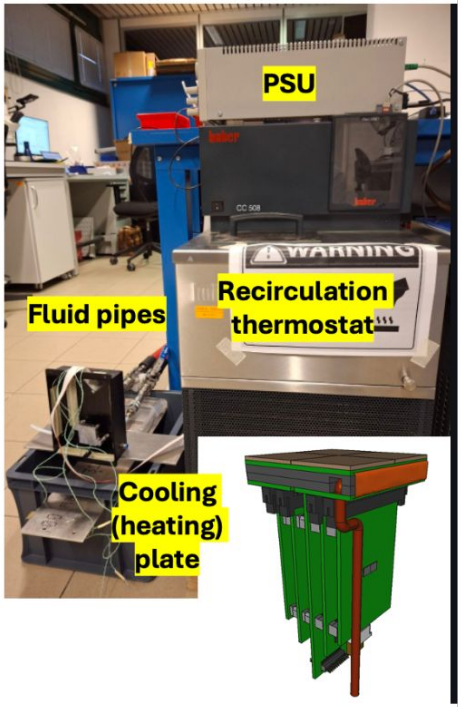


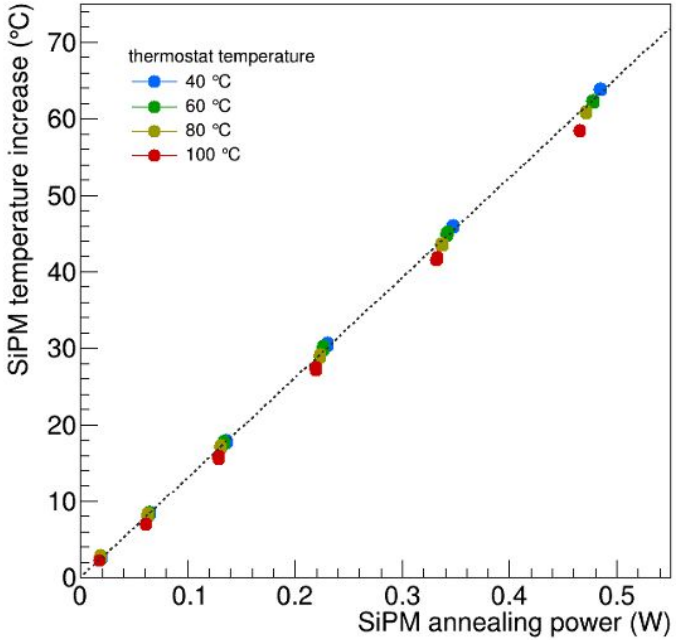


Thermally speaking minimal board design

Fluid-assisted annealing

(2024-2025)





Temperature readings:

Boards (NTC)
Plate (Thermocouple)
SiPMs (Thermo-camera)

By knowing the plate/board temperature and the power delivered by the PSU for the annealing, the temperature of the SiPM can be easily determined.

We have control on the annealing temperature without a thermo-camera

Evaluate the thermal impact on a FEB shaped board

thermal camera measurements, ntc close to ALCOR position?

Confirm the minimal impact of the diode on the SiPM signal

few channels with coax connection for oscilloscope measurements

Same FEB-Carrier connection allows to test annealing on SiPMs mounted on the carrier for the first time

proper evaluation on the annealing power

Confirm the MasterPanel strategies

MasterPanel prototype

Will the ferrites work in the magnetic field?