Resistive Divider Board Production and QA/QC Steps

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HV/FC/CA meeting
Tues. Oct. 15, 2019

Overview

Main components of resistive divider board

- Printed circuit board (PCB)

- Varistors (MOV)

- Resistors

- Assembly

Component Checks

Varistors only:
- Cool down crack test → selection of MOVs for further testing

Resistors and Varistors:
- Bag and label all components with unique identifier
- Mount components on test stand boards
  - 5 boards with 16 components each
  - → 80 compnents per cool down setup cycle
- Warm test
  - Varistors/Resistors: Record VI-curve for each component
- Cool down: gradual in nitrogen gas to liquid nitrogen (LN) immersion
- Cold test:
  - Varistors/Resistors: same test as at room temperature (RT)
- Warm up in nitrogen atmosphere followed by air drying

→ Multiple test stand mounts allow for parallelization of tasks

Data Analysis

Resistors:

- Extract resistance at RT and LN temperature

Varistors:

- Extract voltage at 0.5mA

- Use template excel data sheets allows to record measurements in standard format

→ Identify and flag components outside 2 standard deviations from the mean (warm, cold, w-c difference)
→ Master spreadsheet keeps running averages and standard deviations for measurements (warm, cold, w-c difference)

→ Depopulate boards and separate according to flags set
  → Some sorting correction required at end of batch testing for components with values near 2 standard deviation boundary

PCB assembly

- Pre-bend leads of components with dedicated jig
- Remove components from plastic bag with ID number and mount and solder components to PCBs
- Record component identifier in PCB template spreadsheet (PCB no., component position and ID)
- Clean PCB with flux remover and air-duster
- Visual inspection of solder joints and bumps
- Test all steps (integral test of 2 resistors and 3 varistors) of resistive divider board PCB and record measured resistance

Documentation/Logistics

- Detailed step by step procedure (suitable for non-expert undergraduate students) exists

- Tasks performed by several students with supervision from technicians

- Used self-enroll google-doc schedule to ensure steady progress and accommodate individual schedule constraints