



Module QA- Condition details

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Proposal draft

Module QA- Condition details

abstract

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Distribution List

History of Changes

<i>Rev. No.</i>	<i>Date</i>	<i>Pages</i>	<i>Description of changes</i>
A	25/01/02	All	First version

1 Introduction

A number of modules are now in hand, from the pre-series and site qualification, and experience of the module QA is being built up. In the QA processes, details of the QA in the module QA document, SCT-BM-FDR-7, have been studied in the clusters and it is now time to review these conditions collectively. Below, the conditions in question are listed and a consensus is sought.

The conditions, once agreed and unless found to be impractical, will be kept for an order of 100 modules, and will be revisited again to be simplified if that proves possible.

2 Conditions

2.1 ASIC stuffed hybrids

2.1.1 ASIC stuffing on hybrid

The cure condition of the electrically conductive epoxy, Eotite p-102: This condition is not given in the SCT-BM-FDR-7 but is given in SCT-BM-FDR-5.3 Section 7.2.1.

Temperature (environment): 50 °C

Duration: 2 hr or more

Condition: hold the hybrids at the steps of the bridges or over the bus lines in order to prevent warping

KEK has tested two holdings: one at the steps and the other along and over the backend (over the bus lines). Both prevented increase of warping. There is no strong preference for which method to use.

2.1.2 Long-term test of Hybrids with ASICs

SCT-BM-FDR-7 Section 2.1.3 states "initially 100 hrs, temperature by the thermistors of 45 °C". The temperature was visited in the Oct 01 SCT week and agreed to be 37 °C so that the ASIC temperature is about 50 °C, which is a safe temperature to the glass transition temperature of the adhesive between the flex circuit and the bridges. The testing duration of 100 hrs will be revisited after accumulating experience, e.g., 100 hybrids (i.e., 1,200 ASICs).

Temperature (measured by hybrid thermistors): 37 °C

Condition: hold the hybrids at the steps or over the bus lines to prevent warping

2.2 Completed modules

2.2.1 Long-term leakage current stability

The condition of SCT-BM-FDR-7 Section 3.1.2 is "24 hrs, 150 V, temperature (measured by hybrid thermistors) -10 °C, and can be performed in parallel with the long-term electrical test on modules (ASIC powered and clocked with a confirmation sequence in every few hours), section 3.5". One concern is the temperature:-- in the normal operating condition in the experiment, the temperature of hybrid is around 0 °C with the ASICs powered on, and the temperature of the sensors is lower, e.g., by 10 °C than that of the hybrid (thermistors); the typical leakage current of four sensors is less than 1 µA at the room temperature, which becomes less than 60 nA at -10 °C; also in experience, the hybrid/environment temperature in time may vary with the ASIC

power which varies the leakage current and this may confuse the understanding of the current stability. Despite these concerns, since the maximum increase of current allowed is 4 μA , a small difference/variation in temperature is not a problem.

A proposal is to change the temperature conditions such that

Temperature (measured by hybrid thermistors): 0 °C

Bias voltage: 150 V

Condition: in an environmental chamber, cold dry air (nitrogen), measured in the long-term electrical test (i.e., ASICs being powered, clocked, with confirmation sequence in every few hours)

2.2.2 Thermal cycling

SCT-BM-FDR-7 Section 3.4 specifies "every module, -30 °C to +50 °C, 10 times, ASIC powered and clocked, in an environmental chamber, inert atmosphere". A concern is the upper temperature in conjunction with ASICs being powered. The standard practice of the thermal cycling is "no power" because the temperature is the driving source of the stress and the reason for the thermal cycling, beside powering ASICs requires further attention in any failures. Considering softening of the epoxies in various parts of the module, it would be desirable to lower the upper temperature to +40 °C.

A proposal is

Temperature (measured by hybrid thermistors): -30 °C to +40 °C

Condition: every module, 10 times, NO ASIC power, in an environmental chamber, inert atmosphere

2.2.3 Long-term electrical test

SCT-BM-FDR-7 section 3.5 describes "run at reduced temperature, -10 °C as measured by the hybrid thermistors". The reasoning of the reduced temperature is to confirm the operation long enough in the operating condition. Under the operating condition, the typical hybrid temperature is 0 °C (measured by hybrid thermistors). Requiring a temperature -10 °C is equivalent to requiring an extreme condition in cooling, corresponding to being around -30 °C.

A proposal is

Temperature (measured by hybrid thermistors): 0 °C