



ATLAS SCT Barrel Module Site Qualification

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(DRAFT) SCT Barrel Module Site Qualification

SCT Barrel Module: Site Qualification Japan

Abstract

This document provides the site qualification of Japan for the ATLAS SCT Barrel Module.

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SCT Barrel Module Community

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1 SCOPE OF THE DOCUMENT

In Japan, number of successful modules has been made before and after the Barrel Module FDR in May 2001[1] with final prototype or pre-series components. In order to proceed to the series production of the modules, five successful modules have been built for the qualification of the site by Mid December 2001. This document provides the site qualification of Japan for the ATLAS SCT Barrel Module.

2 NAMED PERSONNEL

The assembly flow of the modules of Japan is described in the batch traveller's procedure document attached in this document. Assembly and the minimal tests are carried at clean and grey rooms at Hamamatsu Photonics Co. Ltd. Full tests are carried out at clean and grey rooms at KEK. The qualified personnel in the collaborating institutes supervise the assembly process and tests. The named personnel are listed in below.

A Cluster Responsible Person: Y. Unno, KEK
 A Cluster Quality Control Person: Y. Ikegami, KEK
 A qualified team of assembly, metrology and electrical test staff:
 Y. Unno, T. Kohriki, S. Terada, Y. Ikegami, N. Ujiie, T. Kondo, KEK
 K. Hara, T. Akimoto, Y. Kato, S. Shinma, University of Tsukuba
 Y. Iwata, Hiroshima University
 R. Tanaka, Okayama Univ.
 R. Takashima, Kyoto University of Education
 H. Mori, H. Honda, and 3 technicians, Hamamatsu Photonics Co. Ltd

3 REQUIRED FACILITIES

The clean and grey rooms associated with the assembly and test of the modules are equipped with

- Inert gas (dry nitrogen) storage for components and completed modules
- Appropriate glue storage in refrigerator
- Class 100 to 1000 Clean room for module assembly equipped with all necessary wire bonding, module assembly station, glue dispensing, metrology station
- Commissioned jigging for all processes
- Database terminal and barcode reader
- Hardware and software for electrical QA as listed in SCT-BM-FDR7 in Class 1000 to 10000 grey room

A photograph of the clean room inspected by the SCT project leader, M. Tyndel, and other ATLAS members is shown in Fig. 1.

4 STEPS TO HAVE BEEN COMPLETED

Three generic criteria set for the site qualification. The criteria are listed below together with the accomplishments.

(1) Production of at least 5 electrical modules, satisfying every aspect of the electrical and mechanical specifications listed in SCT-BM-FDR4 and SCT-BM-FDR7, from a starting date to be agreed by the Module Co-ordinators for each site.

The five modules are made in two periods:

Two modules, 20220170200001 and 20220170200002, in September aiming for irradiating the completed modules in the Oct. irradiation. Since the available time was short, the modules were made in haste. Although the modules were within the spec, the assembly team felt these were not as perfect as they regarded. The modules were set in the T7 beamline at CERN 24 GeV PS; however, the irradiation was cancelled due to the failure of the magnet. There was a minor irradiation and the leakage current of the modules were increased to a few micro A compared to the initial less than a micro A.

Three modules in November, 20220170200003, 20220170200004, 20220170200005, prior to this review. All modules were within the spec.

- (2) Yield: no more than one failed module to have been part of the qualifying series.

All modules were within the specification.

- (3) At least two modules to have been exchanged between pairs of sites to verify metrology and electrical measurements

This process with the above five modules is yet to be completed. However, the basic process has already made with the modules in the FDR time. Electrical performance comparison was made and there was no noticeable difference. In addition, S. McMahon of RAL visited Japan with their metrology frame and a metrology comparison was carried out at KEK for a module made with mechanical grade components in October. A consistent result was obtained with the frames of KEK and of RAL.

5 DOCUMENTATION

The assembly of the modules followed the flow of the assembly procedures in series-production as much as possible. There are documentation and manuals for operator use in assembly and test, a batch-traveller procedure for module production and test, procedure in place for component accountability and yield statistics. These documents can be found in the appendix. The [results of QA are on the web](#) (password protected) in the form of datasheets and transferred to the SCT database when the implementation in the database and an uploading program is ready.

6 INSURANCE AND TAX EXEMPTION

When the components and completed modules are in the assembly process and in transportation, the company responsible insures them. When stored at KEK, those are in the area with limited access, locked with card-keys. KEK, as the practice of institute, has no policy to make an insurance contract.

A number of components, such as the baseboards and ASIC's, are delivered from the collaborating institutes abroad. Japanese government imposes domestic tax (general consumption tax of 5%). For those to be used in the academic research, Japanese tax law has a classification of tax exemption: donation for academic research. In order to apply, two steps are required:

- (1) A letter of donation from the institute responsible
- (2) Tax exemption application by the courier company for the AWB with the associated documents together with the above letter, prepared by KEK

7 APPENDICES

- A.1 3D metrology results of the site qualification modules (Presentation)
- A.2 Electrical performance of the site qualification modules (Presentation)
- A.3 Batch-traveller procedure for module production and test
- A.4 Procedures in place for component accountability and yield statistics
- A.5 Operator manual – ASIC stuffing and wire-bonding of the ASIC hybrids (in Japanese)
- A.6 Operator manual – Module assembly (in Japanese)
- A.7 Operator manual – 3D metrology (in Japanese)
- A.8 Operator manual – Electrical characterisation of the modules (in Japanese)

8 REFERENCES

- [1] Final Design Review of the SCT Barrel Modules, ATC-RI-ET-0015



Fig. 1 Module assembly clean room at Hamamatsu Photonics Co. Ltd. Shown in the photograph are, from left to right, Y. Unno/KEK, M. Tyndel/SCT project leader/RAL, and other ATLAS members