

# SERMS

Laboratorio per lo Studio degli  
Effetti delle Radiazioni sui Materiali  
per lo Spazio  
Via Pentima Bassa, 21 Terni  
05100 TR  
phone/fax: +39.0744.49.29.13

## ENVIRONMENTAL TEST REPORT



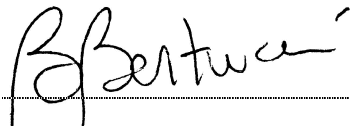
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date: 9/12/08  
rev: A01  
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file: ENVRPT33-S3019R-  
9DEC2K8.doc

INFN - Roma

## ENVIRONMENTAL TEST REPORT – UG crate FM - ESS

ENVRPT33\_S3019R-UG crate FM\_ESS-9DEC2K8.doc  
date: December 09, 2008  
Prot: 001-09/SERMS

signature

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### change record

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09/12/2008	first issue	A01

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#### **TEST REPORT DESCRIPTION**

This document is generated by the S.E.R.M.S. Laboratory and reports on the setup, the operation and the results of the test performed on the customer Device Under Test (D.U.T.); several sections compose this report: all of them have been integrated and adapted to the specific tests performed on the D.U.T.

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### **GENERAL INFORMATION**

**Job Number:**

S3019R

**Test performed on:**

UG crate FM

**Contractor:**

INFN - Roma

**Contractor responsible:**

B.Borgia

**Test responsible:**

Two subjects - INFN Roma and S.E.R.M.S. - have participated to this test. The applicable procedure has been written by INFN Roma (B.Borgia) **UG electronics FM Crate Thermal Stress and Thermal-Vacuum Test Procedure.doc**.

Roles and responsibilities of the participating subjects are defined as follow:

- Test conduction has been responsibility of INFN Roma. The test procedure as well as its modifications have been issued by INFN Roma. INFN Roma personnel unit at SERMS has contributed to the setup.
- All the recorded data from the electronics functional test, switch-on/switch-off operations and monitoring are under responsibility of INFN Roma. Personnel units from INFN Roma have contributed to the disassembly phases.
- SERMS has been responsible for the test facility and the measurement hardware (thermal chamber, thermal sensors, data acquisition chain) and has insured a continuous monitoring of the test execution.
- SERMS has been responsible of the environmental parameters along the whole test. Recorded data have been handled only by SERMS qualified personnel.

The SERMS project manager responsible for the test has been Ing. Serena Borsini.

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### **APPLICABLE LAWS AND RULES**

#### **CUSTOMER TEST PROCEDURE**

UG electronics FM Crate Thermal Stress and Thermal-Vacuum Test Procedure.doc

<http://ams.cern.ch/AMS/Electronics/SubD/qa/>

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#### **D.L. 19 settembre 1994, n.626**

Attuazione delle direttive 89/391/CEE, 89/654/CEE, 89/655/CEE, 89/656/CEE, 90/269/CEE, 90/270/CEE, 90/394/CEE e 90/679/CEE riguardanti il miglioramento della sicurezza e della salute dei lavoratori sul luogo di lavoro, e successive modifiche;

#### **MIL-HDBK-831 23 Aprii 1999**

Preparation of Test Reports (guidance only);

#### **UNI -10653 - November 1997**

Quality product technical documentation (guidance only) ;

#### **UNI CEI EN45001**

general criterion for test laboratory operation;

#### **UNI CEI 70001**

norm certificate test laboratory terms and definitions;

#### **UNI CEI 70011**

guide for test result presentation;

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### TEST SUMMARY

The thermal profile of the test is schematically presented in Figure 1.

It derives from the approved reference profile on the AMS procedure:

- UG electronics FM Crate Thermal Stress and Thermal-Vacuum Test Procedure.doc
  - <http://ams.cern.ch/AMS/Electronics/SubD/qa/>
- and the related modifications issued by B.Borgia & G.Ambrosi.

The thermal test consists in:

- 10 thermal cycles according to figure 1
- 5 thermal cycles according to figure 1 that have to be performed after the vibration test.

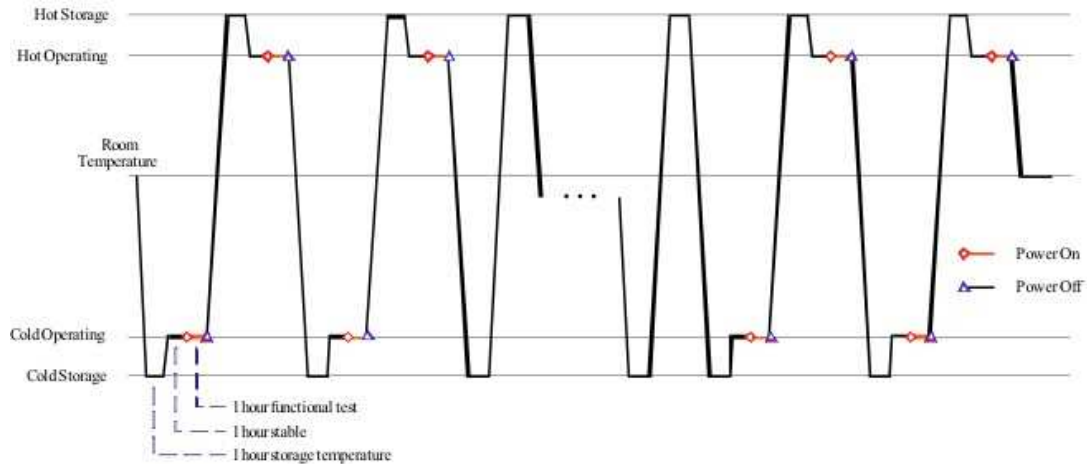


FIGURE 1 – TEST TEMPERATURE PROFILE

The cycle temperature values are listed in the following table.

	HOT	COLD
Non-operating phase	80°C	-40°C
Operating phase	50°C	-20°C

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### **TEST RESULTS**

The UG crate flight model has been tested at S.E.R.M.S. in the ESS thermal chamber during the period April 28<sup>th</sup> – May 3<sup>rd</sup> 2008. The environmental parameters in the thermal chamber matched the customer requests and were continuously recorded.

The test has been performed according to the test profile shown in the previous section of this report. INFN experts have attended the test and operated the electronics during the switch-on/switch-off and functional test phases. The Functional test report has been issued by INFN (INFN Roma AMS 07/08).

No thermal sensors have been installed on the UG crate. Only the temperature inside the thermal chamber has been continuously monitored and recorded using the PT100 sensor of the chamber.

All the commitments of S.E.R.M.S. with the customer have been fulfilled and the test can be declared successfully completed for what concerns the items under S.E.R.M.S. responsibility.

All the functional test on the equipment are reported on the following customer document:

**UG Crate FM acceptance test, AMS Roma 02/08 (5/5/2008)**

### **REMARKS**

#### REMARK #1

During the last cycle of the ESS test done before the vibration test (from cold operational temperature to hot non operational temperature), to avoid the night shift, the crate has been maintained at ambient temperature (20 °C) for all the night (from 22:30 to 06:00 of the next morning). The decision has been made according with INFN personnel.  
During this period the chamber temperature has been continuously monitored.

#### REMARK #2

During the first cycle of the ESS test done after the vibration test (from hot operational temperature to cold non operational temperature), to avoid night shifts during the whole test, the crate has been maintained at ambient temperature (20 °C) for two hours (from 00:00 to 02:00). The decision has been made according with INFN personnel.  
During this period the chamber temperature has been continuously monitored.

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## TEST DIARY

DUT incoming:	april 24, 2008;
First test Set-Up:	april 28, 2008;
First thermal test (before vibration):	april 28, 2008 – april 30, 2008.
Disassembly:	april 30, 2008.
Second test Set-Up:	may 02, 2008;
Second thermal test (after vibration):	may 02, 2008 – may 03, 2008.
Disassembly:	may 03, 2008.

### TEST SET-UP

The UG crate has been tested in the thermal chamber placed on the plate without any fixture.

During the set up phase the main activities performed have been:

- unpackage and cleaning of the crate (both internally and externally)
- positioning of the hardware needed to test UG crate functionality
- cabling of the crate

The hardware needed to test crate functionality have been placed outside the thermal chamber.



**Figure 2 – UG crate FM placed inside the thermal chamber ready for the test.**



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### **TEST GRAPHS**

The temperature of the chamber has been continuously monitored and recorded during the test. The UG crate temperature has not been monitored.

In this section, the graph summarizing the temporal evolution of the chamber temperature during the whole test period is reported.

Hereby the S.E.R.M.S. guarantees that:

- the handling of the test data has been done only by qualified members of the S.E.R.M.S. staff.
- the graph presented in this report is a truthful representation of the recorded data and has been solely produced by the S.E.R.M.S. engineer in charge of the test.

The complete set of recorded data and more detailed graphs relative to specific measurements can be provided on request.

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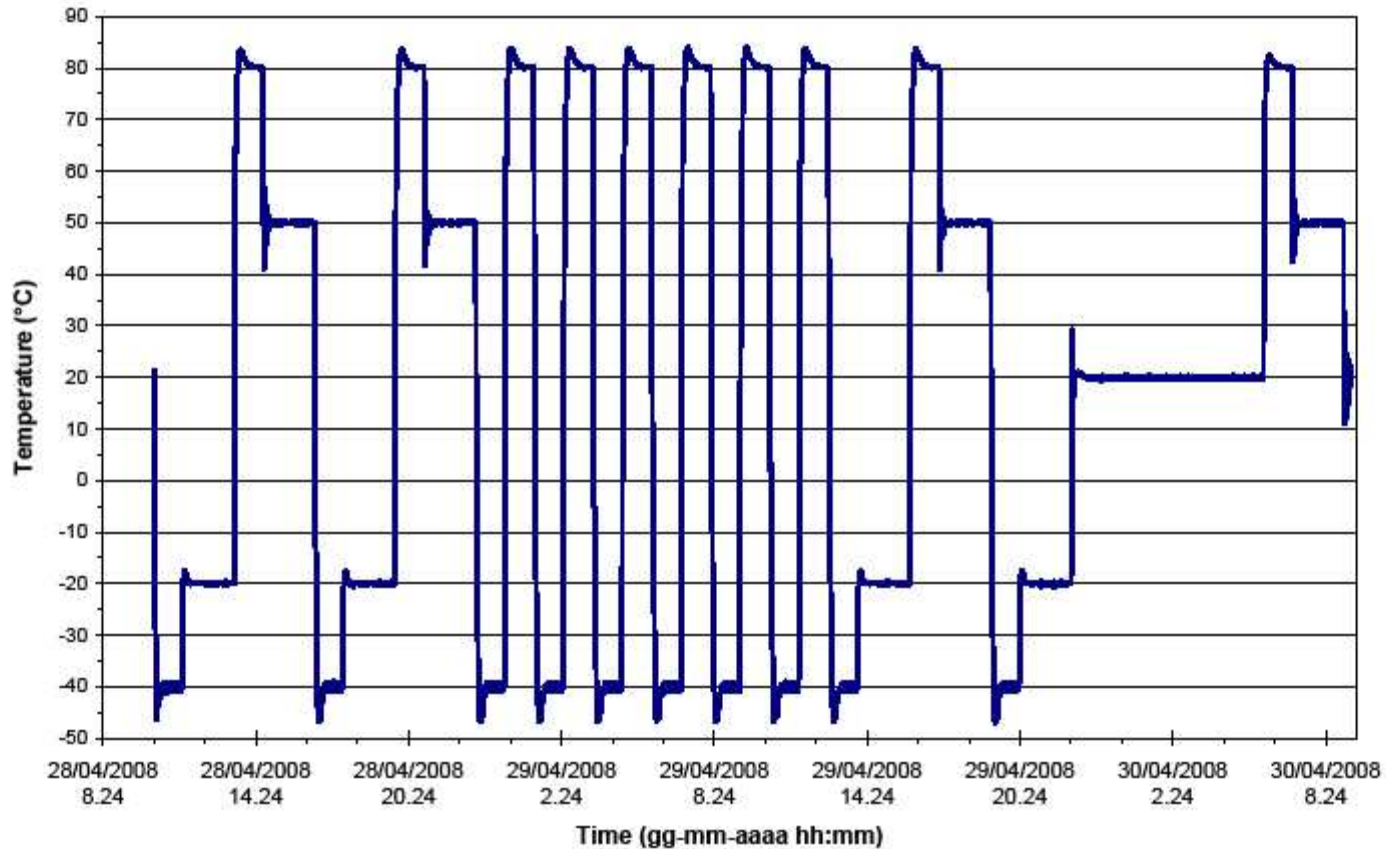


FIGURE 3 – THERMAL TEST BEFORE VIBRATIONS. TEMPERATURE PROFILE OF THE CHAMBER.

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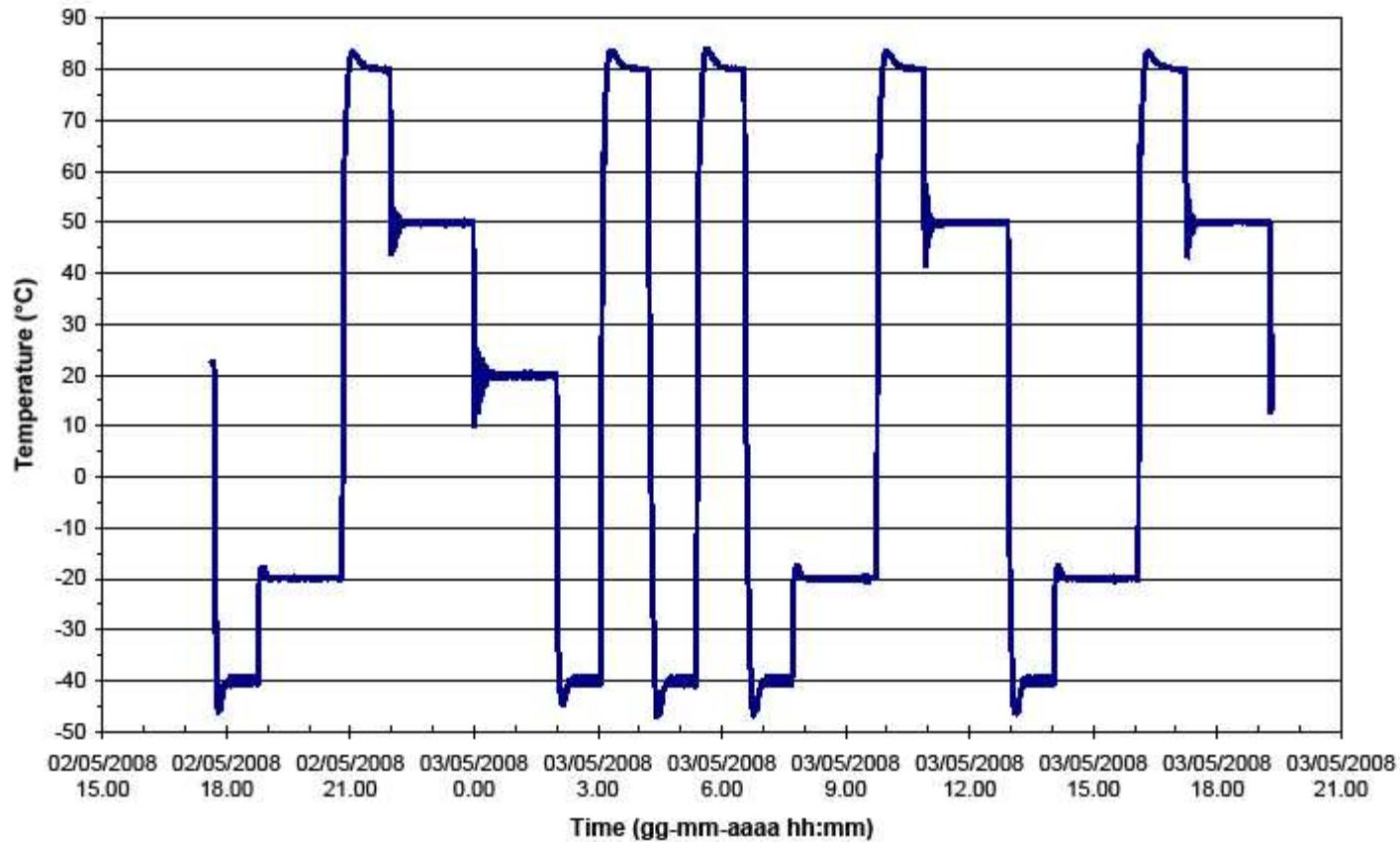


FIGURE 4 – THERMAL TEST AFTER VIBRATIONS. TEMPERATURE PROFILE OF THE CHAMBER.

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