

Center for Quality Engineering

Test Report No.: T1AY0001

Order No.: T1AY

Pages: 15

Munich,

Client: Schroff GmbH

Equipment Under Test: ACTA-Prototype

Manufacturer: Schroff GmbH

Task: Fire Spread Test

Test Specification(s): GR 63-CORE
[not covered by
accreditation] Issue 2, April 2002
Section 4.2.2

Result: The EUT fulfils all of the tested requirements

The results relate only to the items tested as described in this test report.

approved by:

Date

Signature

Metzger
Vice-Pres. 'Environmental Engineering'

This document was signed electronically.

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1 Summary

Requirement	Criteria met (yes/no)	Remark
GR 63-CORE Issue 2, April 2002 Section 4.2.2	Yes	The heat flux density was not recorded

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2 References

2.1 Specifications

2.2 Glossary of Terms

3 General Information

3.1 Identification of Client

Schroff GmbH
Langenalber Str. 96-100
75334 Straubenhardt
Eberhard Eisele

3.2 Test Laboratory

Center for Quality Engineering
Siemens AG
Hofmannstraße 51
81359 München

3.3 Time Schedule

Delivery of EUT: Oct 24, 2005
Start of test: Oct 25, 2005
End of test: Oct 25, 2005

3.4 Participants

Name	Function	Phone	E-Mail
Udo Alt		+49 89 722-26105	udo.alt@siemens.com

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4 Equipment Under Test

The EUT was a 16-Slot ATCA Chassis, material number 11592-502 (standard ATCA chassis).

5 Test Equipment

5.1 Test Facility

The measurements were carried out in the Center for Quality Engineering: Siemens AG, Department Com CTO CQE 3, Hofmannstraße 50, 81359 München, Germany.

5.2 Measuring Equipment

ID No.	Equipment	Manufacturer	Status	Last Cal.	Next Cal.
S0060	DV-Camcorder DM-XM1	Canon	cnn		
S5323	Mass Flow Controller	Bronkhorst	cal	May 24, 2005	May 2006

cal = Calibration, car = Calibration restricted use, chk = Check, chr = Check restricted use, cpu = Check prior to use, cnn = Calibration not necessary, ind = for indication only

5.3 Measurement Uncertainty

a53MeasurementUncertainty

The measurement uncertainty is given by the used equipment. Detailed information can be seen in the technical descriptions of the used equipment and in the calibration data sheet. It is available on request

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6 Test Specifications and Results

The test results in the report refer exclusively to the test object described in section 4 and the test period in section 3.3.

6.1 Specification

R4-21 [85]	Equipment assemblies that are supplied as shelf-level units shall be tested in accordance with the shelf level procedures of Section 5.2. This test shall be conducted on a unit that is configured in accordance with the second paragraph of Section 4.2.2
R4-22 [86]	<p>When ignited according to the procedures of Section 5.2, fire shall not spread beyond the confines of the equipment assembly being tested. The fire shall be judged to have spread beyond the equipment under test if any of the following occur:</p> <ul style="list-style-type: none"> • Ignition of the circuit boards placed above the test shelves as specified in Section 5.2 or any material in equipment frames placed adjacent to the test frame • Visible burning of any exterior surface material for 30 seconds or more • Visible flames extending beyond the horizontal confines of the equipment under test for 30 seconds or more • Visible flames extending beyond the vertical confines of the equipment under test for 30 seconds or more, after 3.5 minutes past the start of the test • Flaming drippings that continue to burn upon reaching the ground • Heat flux, as measured by the radiometers specified in Section 5.2, that exceeds 15 kW/m² for 30 seconds or more • Temperature, as measured by any of the thermocouples specified in Section 5.2, exceeding 540°C (1004°F) for 30 seconds or more.

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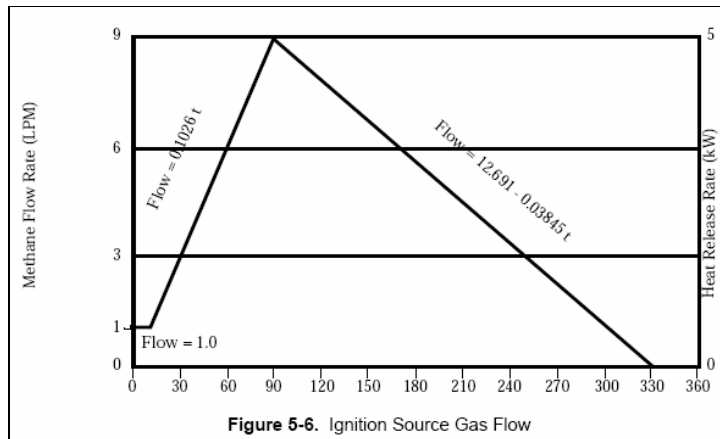
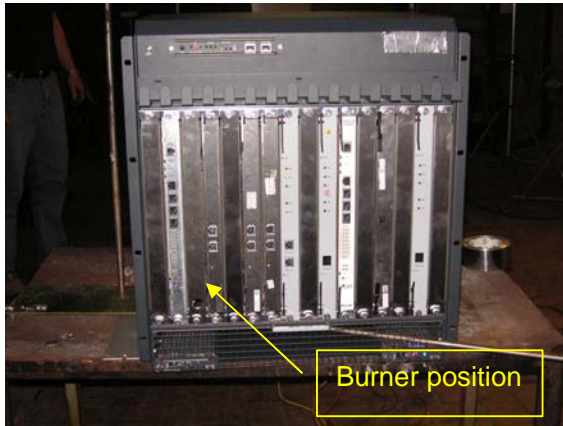


Figure 1 : Gas flow of the line burner

6.2 Test 1



Pic. 1 : Front View



Pic. 2 :Back View

All tests are performed with slot covers and partly assembled with original PCB's. The slot cover are covering additional the vertical air flow between the board.

The start of the test was rather difficult. The very strong dominating air flow inside the ducts are extinguishing the the flame. It was only possible to start the test with a gas flow with 6 l/min and a covered air out let of the rear side. After the flame stablisation inside the shelf we are removing slowly the cover at the air outlet.

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Result of Test 1



Pic. 3 : Neighbour board after Test 1



Pic. 4 : Neighbour board after Test 1



Pic. 5 : Fan-Modul after first test

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There are no burning tracks on the neighbour boards visible.

The inlet fan filter was burned by the test flame. The very high inlet air flow are soaking the flame out of the hole into the main air intake and finally into the fan filter.

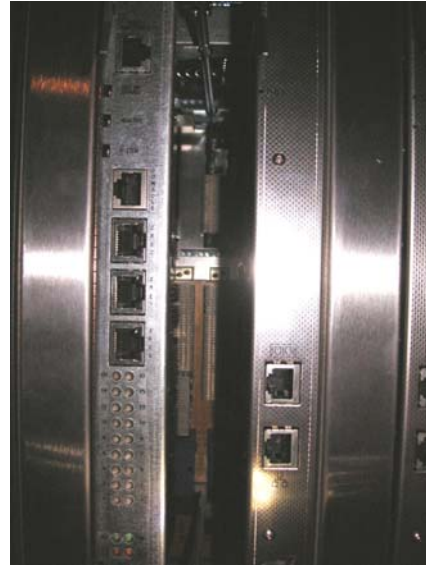
6.3 Test 2

Test was a rerun of test 1. The slot cover was replaced by a simple face plate. The face plate was covering only the front side. The air flow will not be disturbed.

Result of Test 2



Pic. 6 : Slot after test

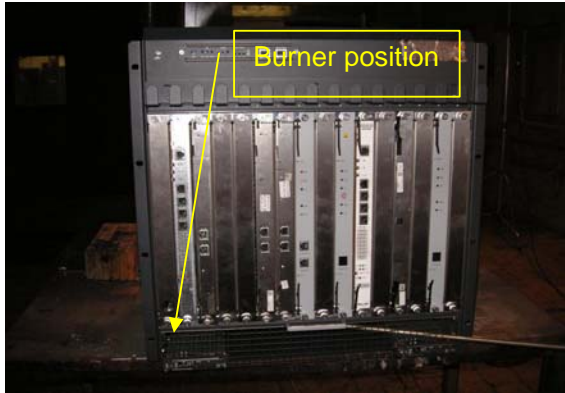


Pic. 7 : Slot after test

There are no burning tracks on the neighbour boards visible.

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6.4 Test 3



Pic. 8 : Front View



Pic. 9 : experiment set-up



Pic. 10 : Positioning of the line burner

The burner position was at slot 1 (from the left side).

Results of Test 3

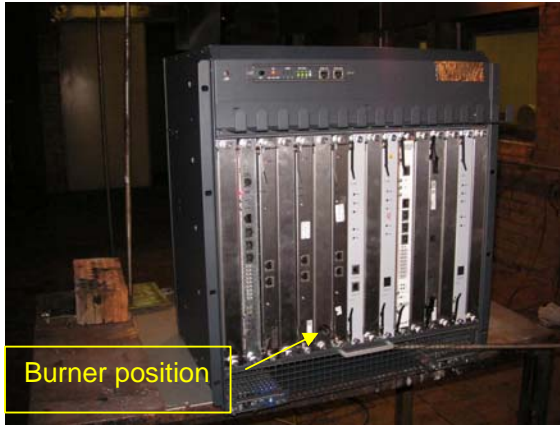


Pic. 11 : Slot after test

There are no burning tracks on the neighbour boards visible.

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6.5 Test 4



Pic. 12 : Front View



Pic. 13 : Line burner set-up

The burner was located between fans to consider the different air flow conditions.

Results of Test 4

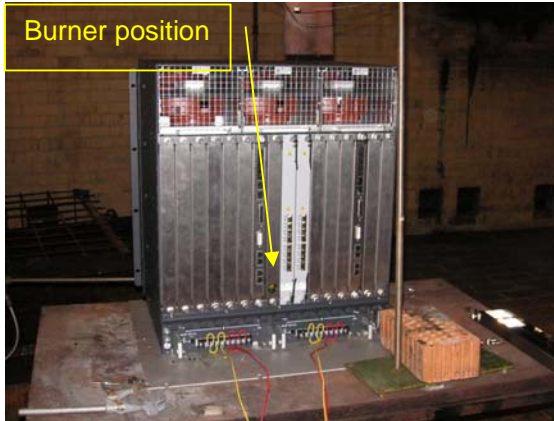


Pic. 14 : Slot after test

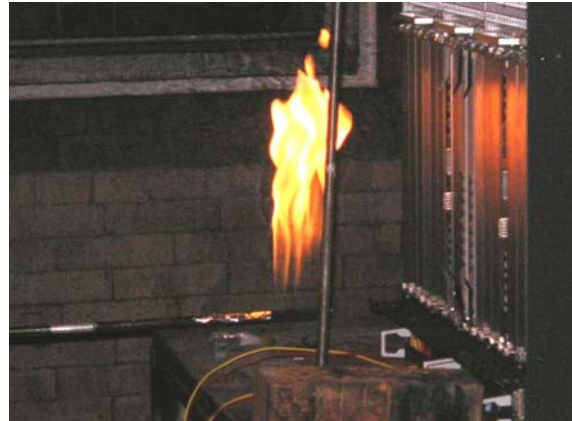
There are no burning tracks on the neighbour boards visible.

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6.6 Test 5



Pic. 15 : Back View



Pic. 16 : Line burner partly covered

The dept of the rear compartment was smaller than the length of line burner. We have covered 50% of the burner holes the gas flow was not reduced.

Results of Test 5

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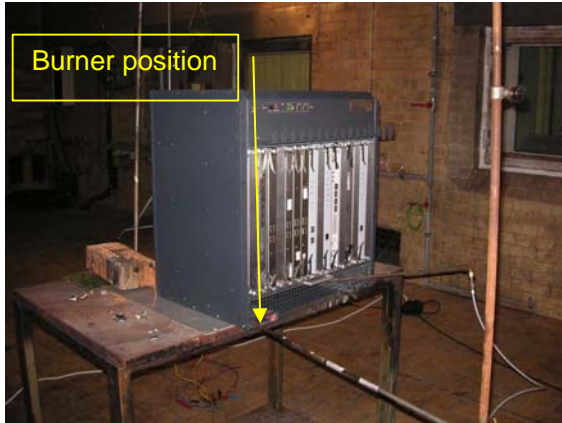
Pic. 17 : Neighbour boards



Pic. 18 : Neighbour board

There are only small burn traces visible at the neighbour boards.

6.7 Test 6



Pic. 19 : Front View

This was performed with a constant gas flow of 5 liter/minute for 120s.

Results of Test 6

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Pic. 20 : Fan Filter



Pic. 21 : Filter burning

6.8 Summary of Results

The measurement of the heat flux density was not performed. The high air flow through the EUT are reducing strongly the the heat dissipation of the flame. On the basis of the facts there was no high heat flux density during all tests.

The heat flux density on the outside surfaces measured by a thermography camera was not measured. During and after the test there are no high temperature on the outer surfaces of the system occurred. With this low temperature (approx. 1 °C) difference between the EUT and the ambient it is not possible to reach great heat flux density.

We have noticed no major burning traces of other boards (not directly in contact with the line burner) and face plates.

The EUT fulfils all of the tested requirements.

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