

# Temperature Test-Report

**Product: KBox B-101**

**Date: 29.01.2014**

**Location: Eching of Kontron RD-V Division**

Name	KEU-EC1212130-TR_Temp._KBox B-101	Page 1 of 26
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Kontron embedded computers GmbH

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# 1 Revision History

Date	Revision	Author	Chapters affected	Remarks
16-01-14	1.0	A. Ehrmeier		

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## 2 Introduction

### 2.1 General, Purpose and Objective

This document describes the environmental test procedures, test assembly and device under test (DUT) with the affiliated results and photographs.

### 2.2 Associated Documents

<b>Nr.</b>	<b>Document</b>	<b>Issue / Rev</b>	<b>Title</b>
01	IEC 60068-2-1	2007	ENVIRONMENTAL TESTING – PART 2: - TESTS- TEST A: COLD
02	IEC 60068-2-2	2007	ENVIRONMENTAL TESTING - TESTS B: DRY HEAT
03	IEC 60068-2-14	2009	ENVIRONMENTAL TESTING - PART 2-14 - TESTS - TEST N - CHANGE OF TEMPERATURE
04	IEC 60068-2-30	2005	BASIC ENVIRONMENTAL TESTING PROCEDURES - TEST DB AND GUIDANCE - DAMP HEAT, CYCLIC (12+12 HOUR CYCLE)

### 2.3 Terminology, Definitions and Abbreviations

D1	Deviation determined prior to testing
D2	Deviation determined during testing
DUT	Device under test
HDD	Hard disk drive
KEU	Kontron Europe GmbH, Eching
OS	Operating system
PSU	Power supply
TDP	Thermal Design Power

### 3 Summary Test Report

The tested sample fully complies with the requirements set forth in

- IEC 60068-2-1
- IEC 60068-2-2
- IEC 60068-2-14
- IEC 60068-2-30

#### 3.1 Performed tests and results in detail

##### Test overview

Nr.	Test	Parameters
1	Low Temperature, operating	<ul style="list-style-type: none"> <li>▶ Temperature: 0 °C</li> <li>▶ Duration (1 cycle): 16 h</li> <li>▶</li> </ul>
2	High Temperature, operating	<ul style="list-style-type: none"> <li>▶ Temperature: 50 °C</li> <li>▶ Duration (1 cycle): 16 h</li> <li>▶</li> </ul>
3	Change of Temperature, operating	<ul style="list-style-type: none"> <li>▶ Temperature: 0-55 °C</li> <li>▶ Duration (4 cycles): 25 h</li> <li>▶</li> </ul>
4	Damp Heat, Non operating	<ul style="list-style-type: none"> <li>▶ Temperature: 40°C</li> <li>▶ Dampness: 90-95%</li> <li>▶ Duration (6 cycles): 144 h</li> <li>▶</li> </ul>

## Test results

<i>Nr.</i>	<i>Tests</i>	<i>Result class</i>	<i>Results</i>	<i>Comments</i>
1	Low Temperature, operating	A	Passed	
2	High Temperature, operating	A	Passed	
3	Change of Temperature, operating	A	Passed	
4	Damp Heat, Non operating	A	Passed	

## 3.2 Result classes

Definitions according to ISO16750-1

<i>Class</i>	<i>Description</i>
A	The complete DUT works as designed during and after the test.
B	The complete DUT works as designed during and after the test. One or more components or functions go beyond their specified limit during test but automatically return to normal limits after the test.
C	One or more components or functions do not perform as designed during test but automatically return to normal operation after the test.
D	One or more components or functions do not perform as designed during test and do not return to normal operation after the test until being reset by a simple operator/user action.
E	One or more components or functions do not perform as designed during test and must be repaired or replaced to return to normal operation.

## 4 Configuration

### 4.1 Test assembly

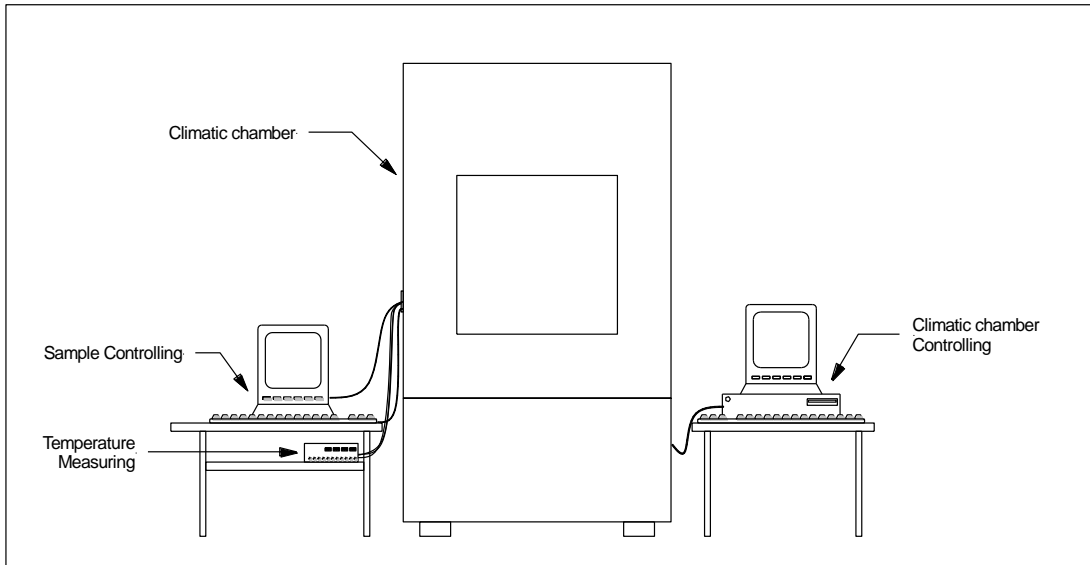


Fig. 1: Test assembly schematic

### 4.2 Test- and Measurement- Equipment

<b>Component</b>	<b>Model</b>	<b>Manufacturer</b>	<b>Ser. No.</b>	<b>Cal. until</b>
Climatic chamber	Vötsch VC 4060	Vötsch	59566145160 010	25.06.2012
Temperature- and Humidity- Sensor	Hygrophil K4326-23	Bartec	0502/P25279. 0004	09.09.2012
Universal Measurement system	34970A	Hewlett Packard	US37005297	20.09.2012
Measurement module	Hewlett Packard	34901 A	US37005583	20.09.2012
Testsoftware	BurnIn Test V7.0 Pro SIW	Passmark G. Topala	-	-

### 4.3 Nominal values for climate chamber

All climate nominal values will be exceeded towards the critical side (high temperatures increased, low temperatures decreased) in order to have sufficient safety clearance even under worst case conditions.

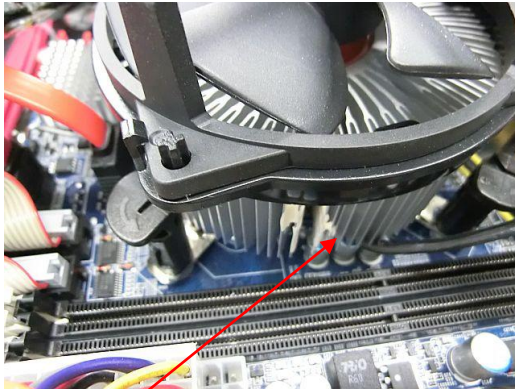
### 4.4 Device under Test

Name	▶ KBox B-101
Part number	▶ 2-A0CS-2xxx
Hardware	<ul style="list-style-type: none"> <li>▶ CPU: Intel i7-4770S</li> <li>▶ MB: KTH81/mITX</li> <li>▶ Memory: 4GB DDR 3 (1x)</li> <li>▶ HDD (internal): WDC WD5000LUCT-63Y8HY0 (500 GB)</li> <li>▶ HDD (remove): WDC WD3200BUCT-63TWBY0 (320 GB)</li> <li>▶ PSU: FSP 180-50LE</li> <li>▶ Graphic-Card: NVIDIA NVS300</li> <li>▶</li> </ul>
Software	<ul style="list-style-type: none"> <li>▶ BIOS: UEFI2.31; PII0.9</li> <li>▶ OS: WIN 7 Ultimate 64bit SP1</li> <li>▶ FW: V1.21 06/24/13</li> </ul>
Serial number	▶

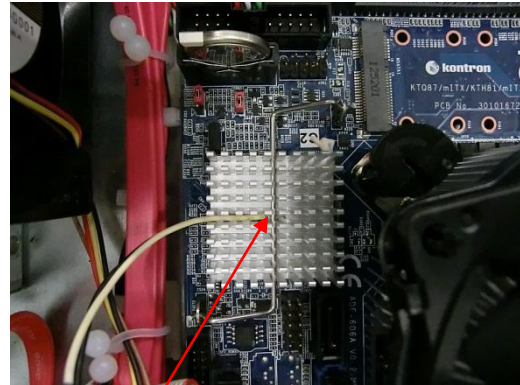
### Interfaces

<i>Interface</i>	<i>Attached devices</i>
▶ 230VAC=	▶ Power supply, 230V
▶ DVI	▶ Display via VGA-Adapter
▶ USB	▶ Mouse, Keyboard
▶ LAN	▶
▶	▶

## 4.5 Sensor Positions



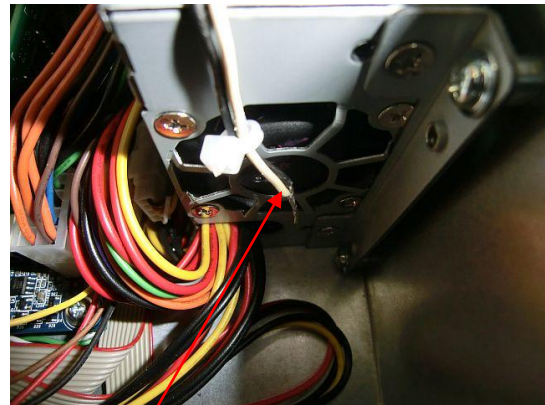
CPU Temp. Sensor 1



Chipset Sensor 2



Memory Sensor 3



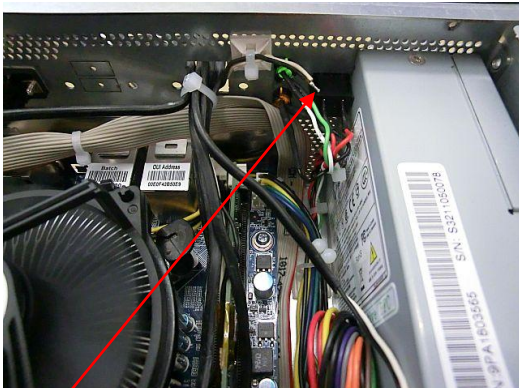
PSU Sensor 4



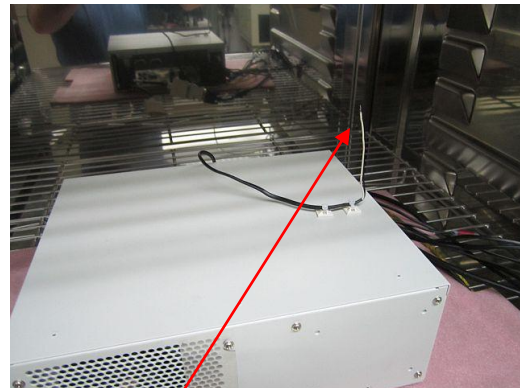
HDD (removeable) Sensor 5



HDD (internal) Sensor 6



Backside Sensor 7



Ambient Sensor 8

## Test Programs

### 4.5.1 Burnin Test (v. 7.0 Pro)

#### Preferences

<i>Menu</i>	<i>Configuration</i>
USB:	▶ Max. number of USB ports = 4
LAN	▶ Max. number of LAN ports = 2
CPU:	▶ Intel i7-4770S

#### Tests selected

<i>Test</i>	<i>Configuration</i>
CPU	100 %
RAM	100 %
2D Graphics	100 %
3D Graphics	100 %
Disk	100 %

## 5 Test Procedures and Results

### 5.1 Low Temperature, operating

#### General test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Preconditions	▶ None

#### Pre-test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Checks, measurements	<ul style="list-style-type: none"> <li>▶ Visual inspection</li> <li>▶ Burnin Test</li> <li>▶ SIW</li> </ul>

#### Test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Conditions	<ul style="list-style-type: none"> <li>▶ Temperature: 0 °C (Refer to Fig. below)</li> <li>▶ Duration (1 cycle): 16 h</li> <li>▶ Standard: IEC 60068-2-1</li> <li>▶ Test category: Ab</li> <li>▶ Gradient: max. 1 K / Min.</li> </ul>
Sample status	<ul style="list-style-type: none"> <li>▶ operating</li> <li>▶ Position: Horizontal,</li> </ul>
Checks, measurements	▶ None

## Temperature Diagram

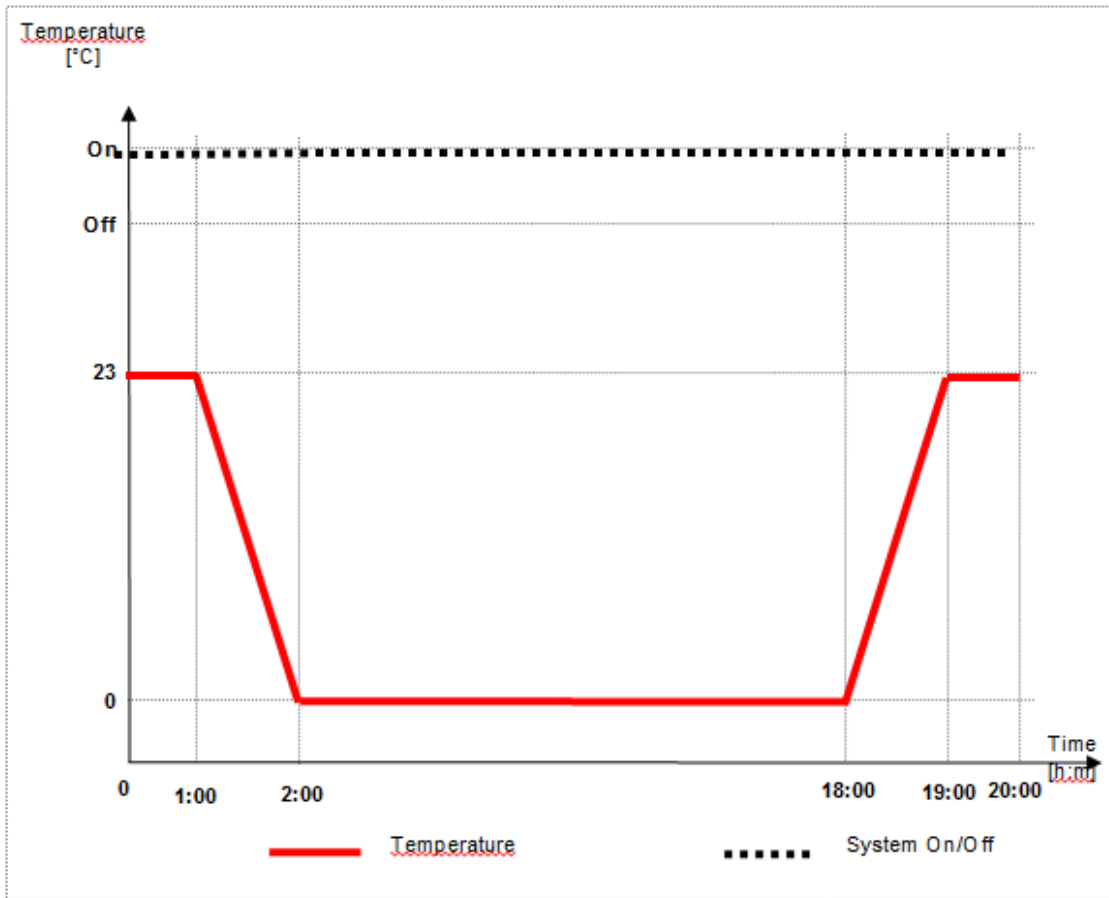


Fig. 2: Temperature diagram: Low Temperature, operating

## Post-test parameter

Parameter	Values, [References]
Checks, measurements	<ul style="list-style-type: none"> <li>▶ Visual inspection</li> <li>▶ BurnIn Test</li> <li>▶ SIW</li> </ul>

**KBox B-101 (IEC-68068-2-1)**

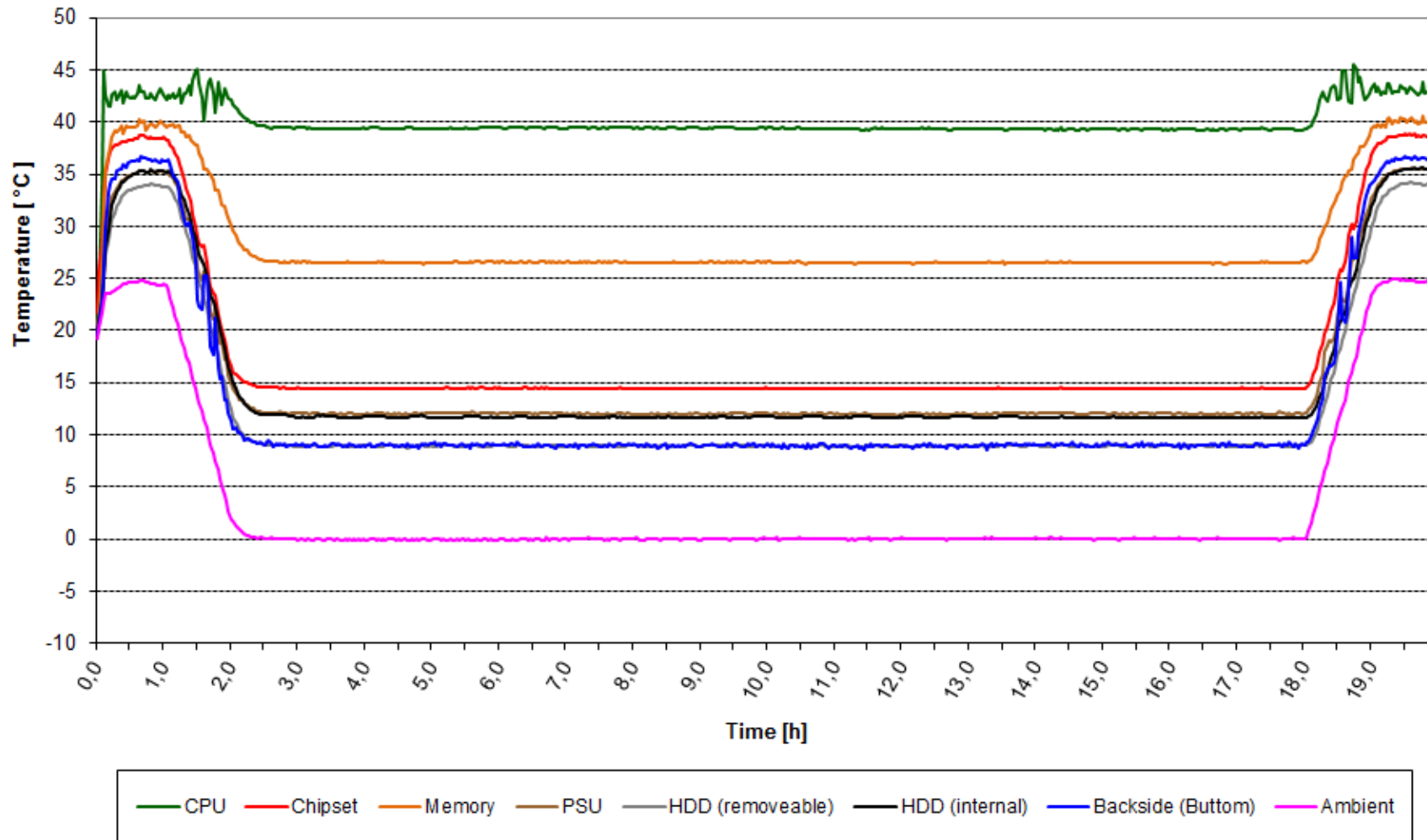


Fig. 3 Measurement diagram: Low temperature, operating

## 5.2 High Temperature, operating

### General test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Preconditions	▶ None

### Pre-test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Checks, measurements	<ul style="list-style-type: none"> <li>▶ Visual inspection</li> <li>▶ Burnin Test</li> <li>▶ SIW</li> </ul>

### Test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Conditions	<ul style="list-style-type: none"> <li>▶ Temperature: 50 °C (Refer to Fig. below)</li> <li>▶ Duration (1 cycle): 16 h</li> <li>▶ Standard: IEC 60068-2-2</li> <li>▶ Test category: Bb</li> <li>▶ Gradient: max. 1 K / Min.</li> </ul>
Sample status	<ul style="list-style-type: none"> <li>▶ operating</li> <li>▶ Position: Horizontal,</li> </ul>
Checks, measurements	▶ None

### Temperature Diagram

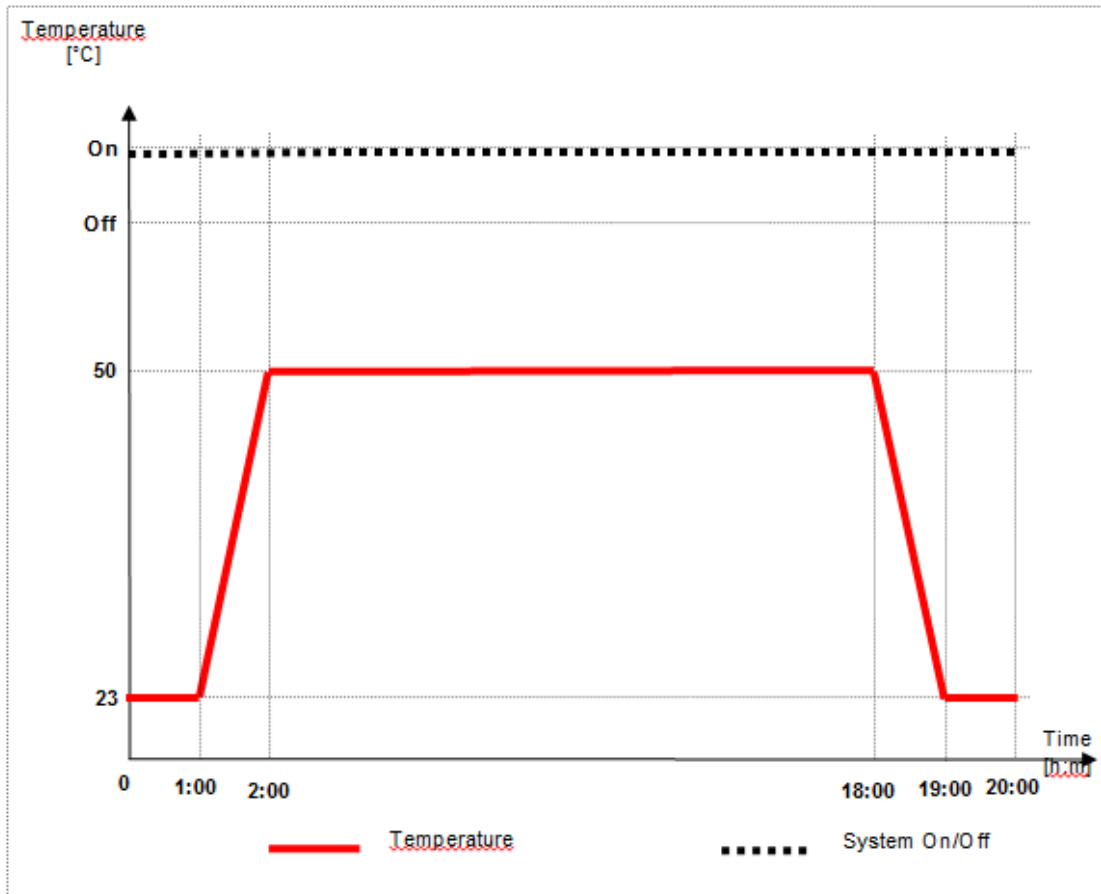


Fig. 4: Temperature diagram: High Temperature, operating

### Post-test parameter

Parameter	Values, [References]
Checks, measurements	<ul style="list-style-type: none"> <li>▶ Visual inspection</li> <li>▶ BurnIn Test</li> <li>▶ SIW</li> </ul>

**KBox B-101 (IEC-68068-2-2)**

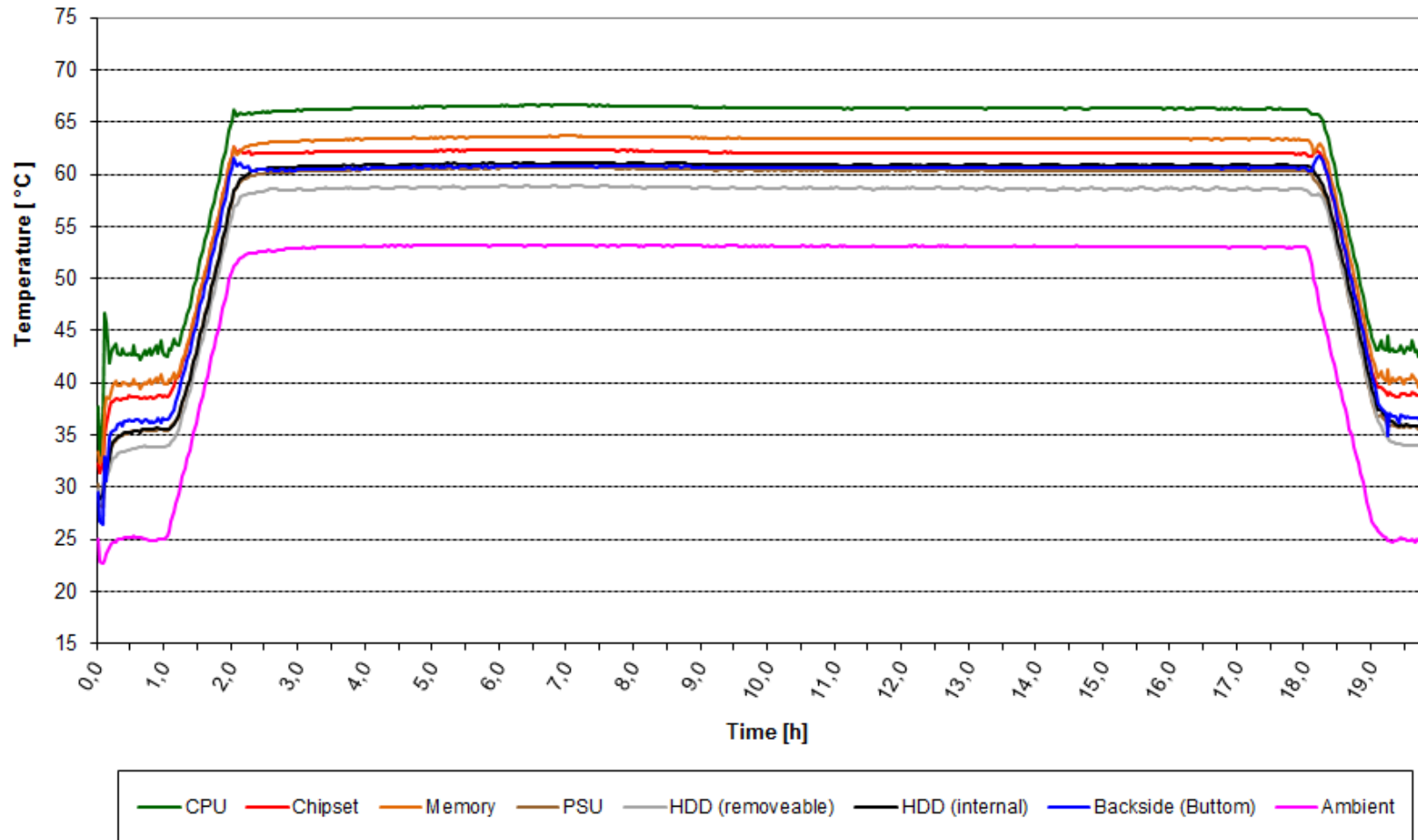


Fig. 5 Measurement diagram: High temperature, operating

### 5.3 Change of Temperature, operating

#### General test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Preconditions	▶ None

#### Pre-test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Checks, measurements	<ul style="list-style-type: none"> <li>▶ Visual inspection</li> <li>▶ Burnin Test</li> <li>▶ SIW</li> </ul>

#### Test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Conditions	<ul style="list-style-type: none"> <li>▶ Temperature: 0-55 °C (Refer to Fig. below)</li> <li>▶ Duration (4 cycles): 25 h</li> <li>▶ Standard: IEC 60068-2-14</li> <li>▶ Test category: Nb</li> <li>▶ Gradient: max. 1 K / Min.</li> </ul>
Sample status	<ul style="list-style-type: none"> <li>▶ operating</li> <li>▶ Position: Horizontal,</li> </ul>

Checks, measurements	▶ None
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Temperature Diagram

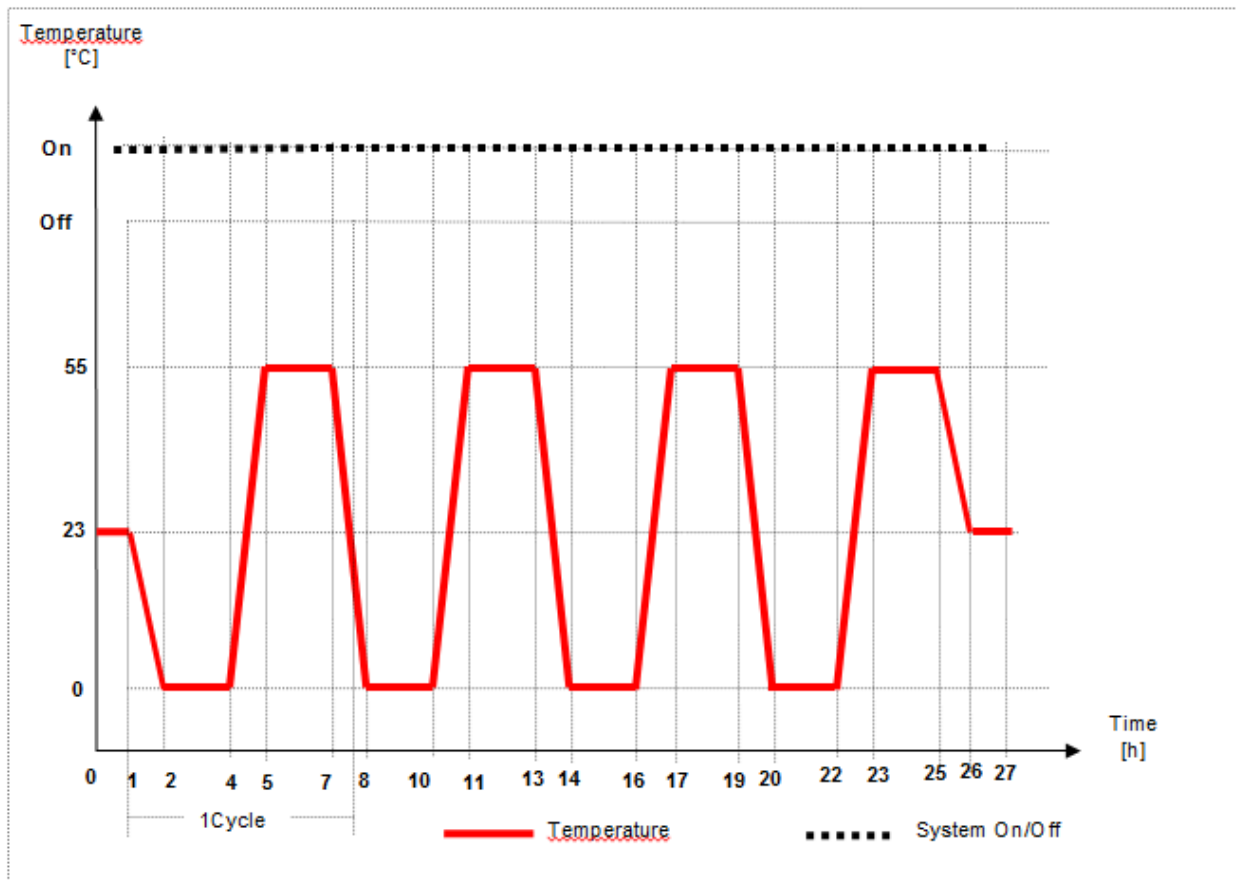


Fig. 6: Temperature diagram: Change of Temperature, operating

**Post-test parameter**

Parameter	Values, [References]
Checks, measurements	<ul style="list-style-type: none"> <li>▶ Visual inspection</li> <li>▶ BurnIn Test</li> <li>▶ SIW</li> </ul>

**KBox B-101 (IEC 68068-2-14)**

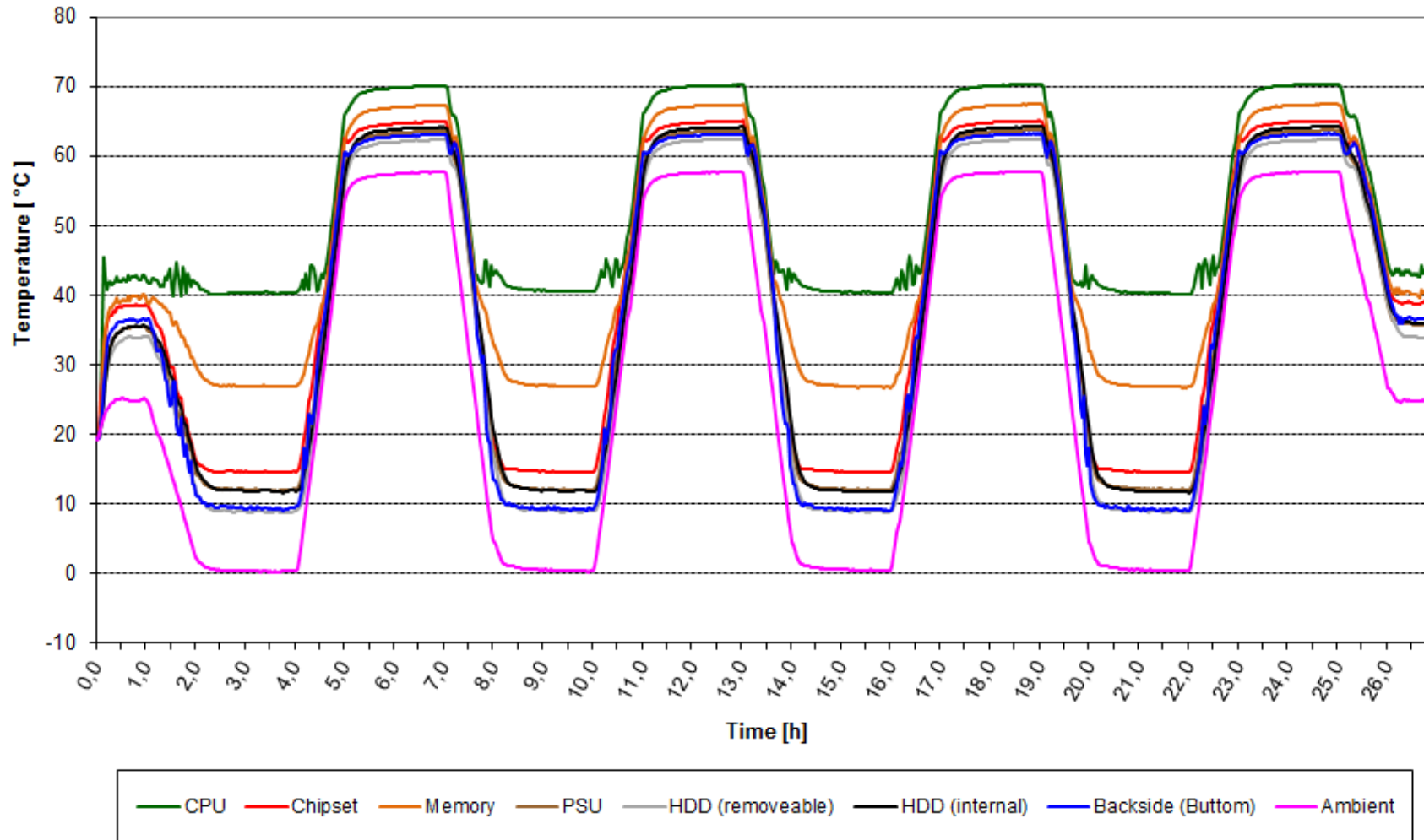


Fig. 7 Measurement diagram: Change of temperature, operating

## 5.4 Damp Heat, non operating

### General test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Preconditions	▶ None

### Pre-test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Checks, measurements	<ul style="list-style-type: none"> <li>▶ Visual inspection</li> <li>▶ BurnIn Test</li> <li>▶ SIW</li> </ul>

### Test parameter

<i>Parameter</i>	<i>Values, [References]</i>
Conditions	<ul style="list-style-type: none"> <li>▶ Temperature: 40 °C</li> <li>▶ Damp 90-95% (Refer to Fig. below)</li> <li>▶ Duration (6 cycles): 144 h</li> <li>▶ Standard: IEC 60068-2-30</li> <li>▶ Test category: Db</li> <li>▶ Gradient: max. 1 K / Min. , 1%/Min</li> </ul>
Sample status	<ul style="list-style-type: none"> <li>▶ Non operating</li> <li>▶ Position: Horizontal,</li> </ul>
Checks, measurements	▶ None

Temperature Diagram

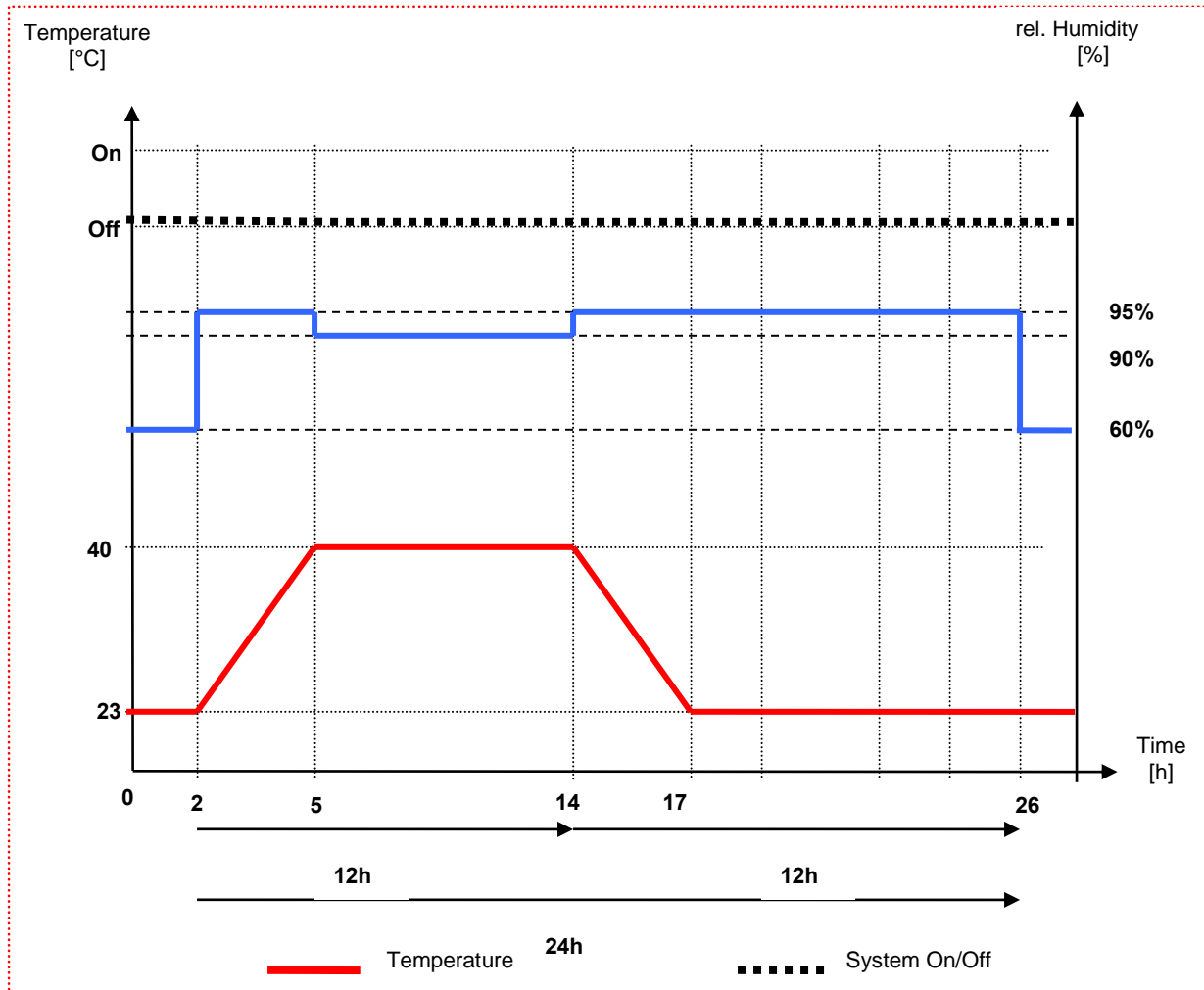


Fig. 8: Temperature diagram: Damp Heat, non operating

**Post-test parameter**

Parameter	Values, [References]
Checks, measurements	<ul style="list-style-type: none"> <li>▶ Visual inspection</li> <li>▶ BurnIn Test</li> <li>▶ SIW</li> </ul>

**KBox B-101 (IEC-68068-2-30)**

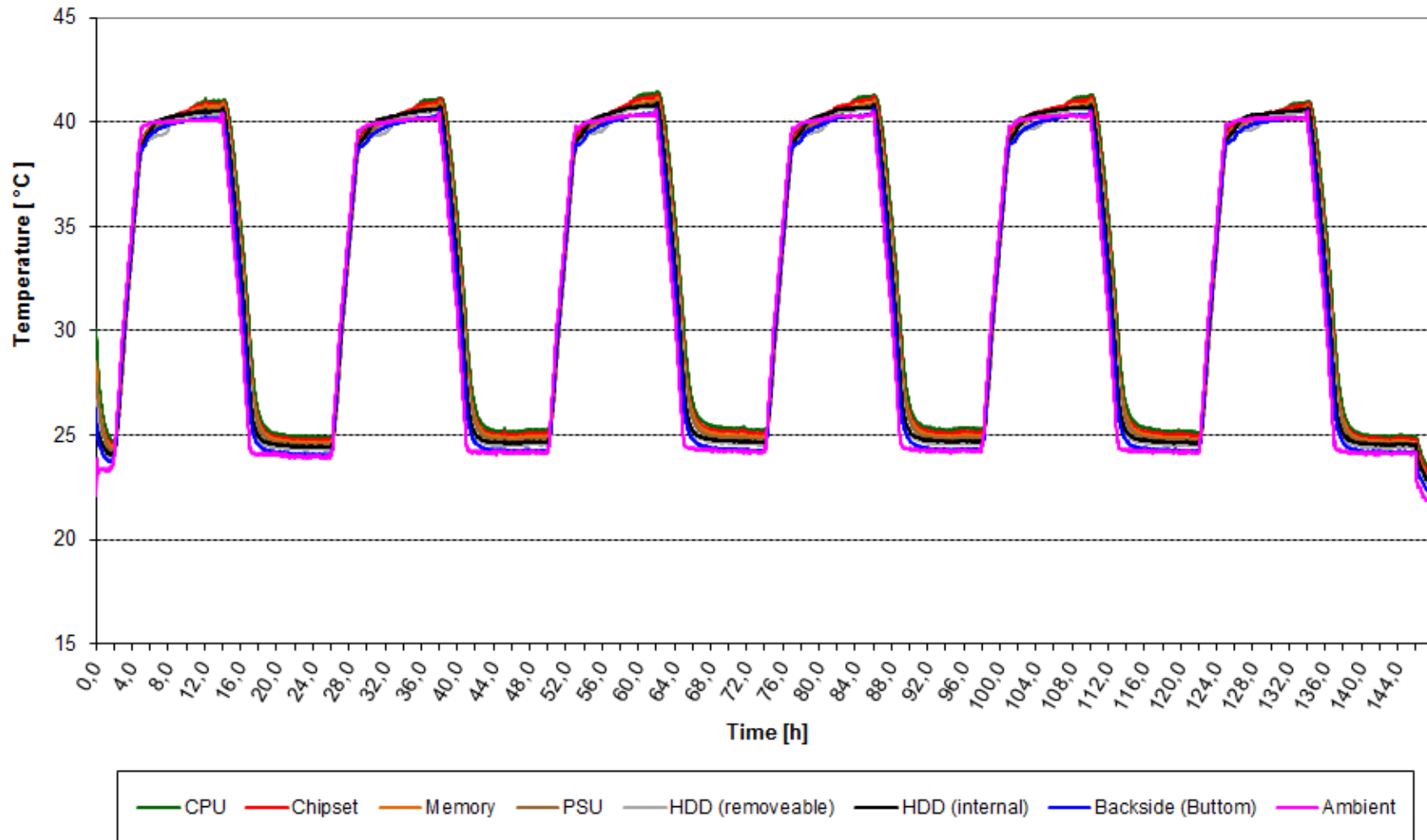


Fig. 9 Measurement diagram: Damp, Heat, non operating

## 6 Appendix

### 6.1 Photographs



Fig. 10: Climatic chamber with control PC

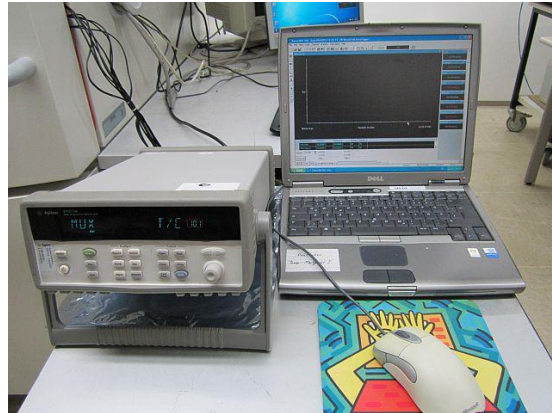


Fig. 11: Test assembly (Temp.-Data-Logger)

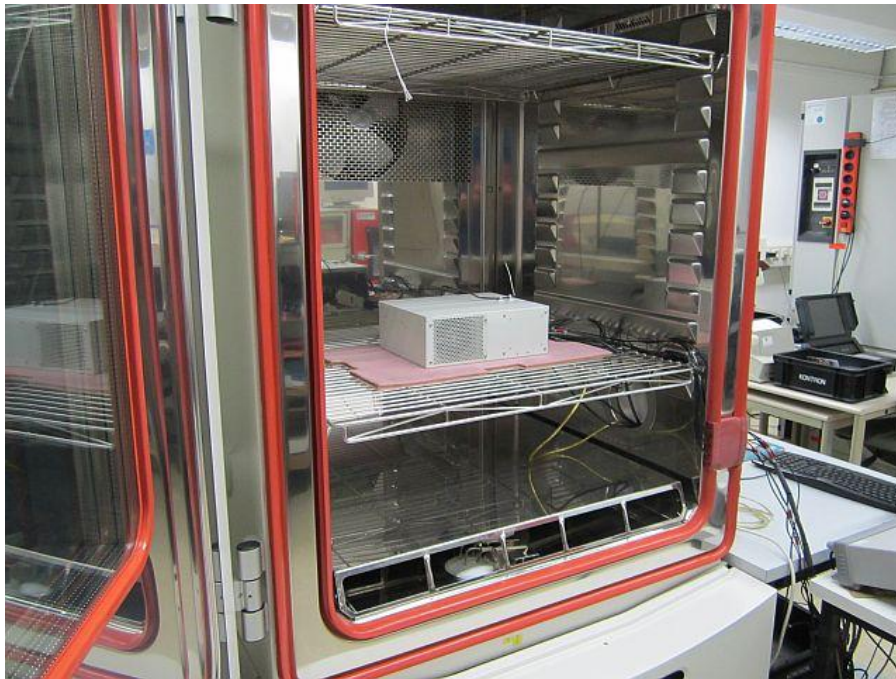


Fig. 12: Device in Climatic Chamber

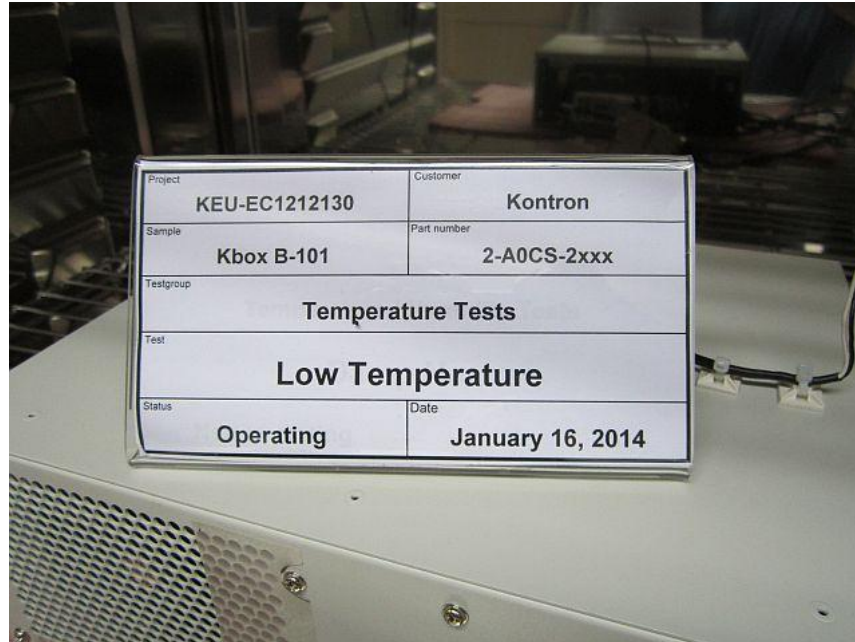


Fig. 13: Sample (KBox B-101) Low temperature test, operating

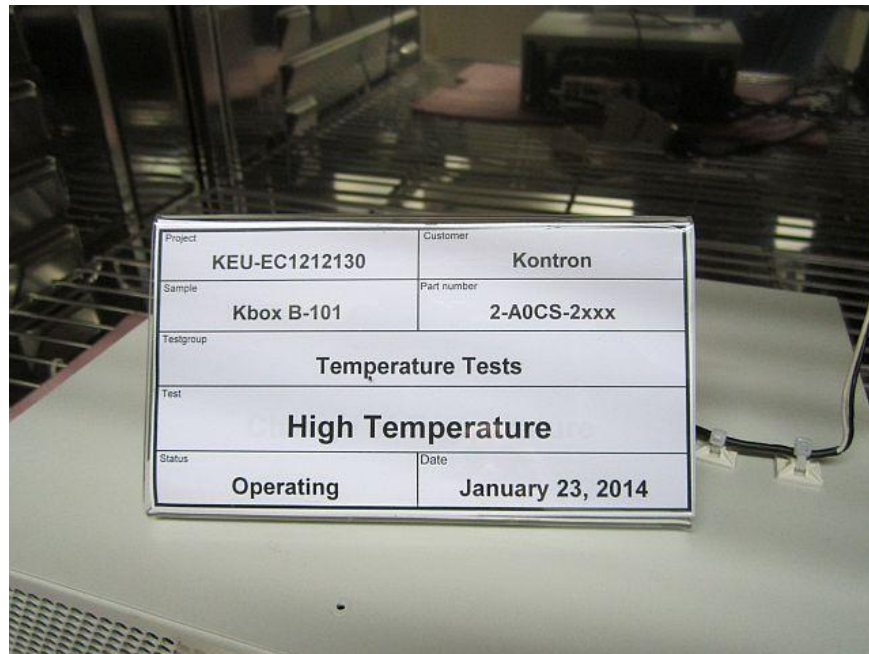


Fig. 14: Sample (KBox B-101) High temperature test, operating

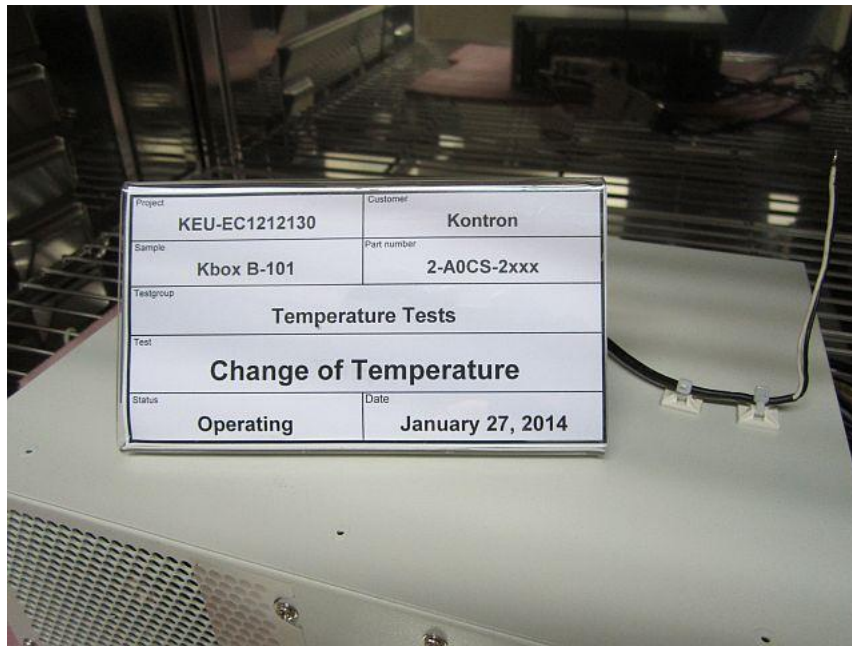


Fig. 15: Sample (KBox B-101) Change of temperature, operating

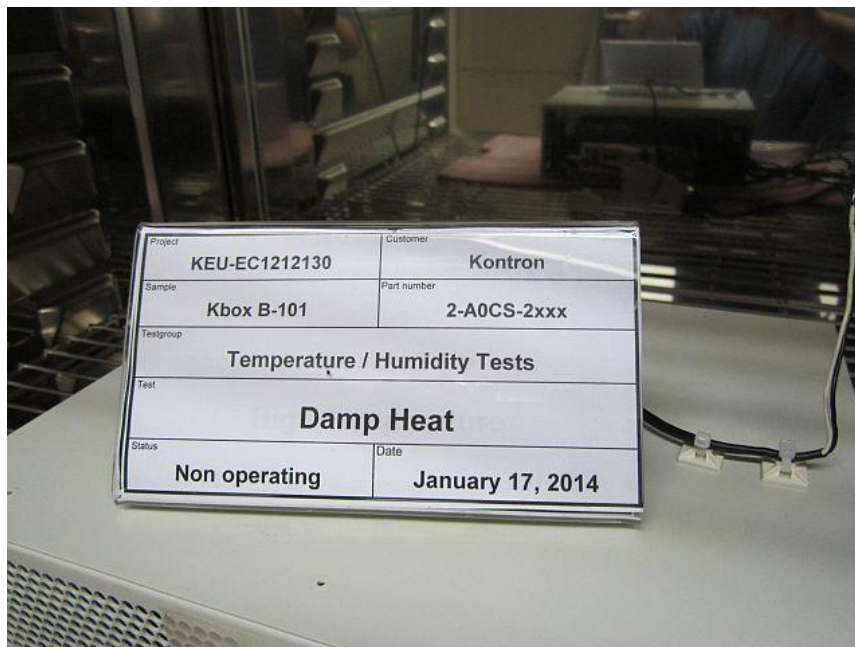


Fig. 16: Sample (KBox B-101) Damp, Heat, non operating