

**NOVAsom 6**

**NOVAsom 7**

**NOVAsom 8**

**Product code: NI240613-FS01-00**

***Climatic Chamber Tests Report***  
**(Cooling Test and Dry heat test)**

**Customer: NOVASIS**

**Date Test:** : 30/04/2014-05/05/2014

**PlaceTest:** Avicel Solution s.r.l. Laboratories in Limbiate (MB) - Italy

**Test Engineer:** Stefano Ferronato (AE-Novasis)

**Check for Customer:** -

**Result:** Pass

Document code.:	NI240613-VR01-00	Version:	0	Date:	07/05/14
Author:	Stefano Ferronato- AE	Controlled	Teodoro Bove- BM-PM	Approved by	Christian Carrieri- GM-CEO
	<i>SFerronato</i>		<i>TBove</i>		<i>CCarrieri</i>
Customer reserved fields		Document code:			

TUTTI I DIRITTI SONO RISERVATI - Questo documento é di proprietà esclusiva di Novasis Ingegneria S.r.l. e sul presente, l'azienda in questione si riserva ogni diritto. Pertanto questo documento non può essere copiato, riprodotto, comunicato o divulgato ad altri o usato in qualsiasi maniera, nemmeno per fini sperimentali, senza autorizzazione scritta di Novasis ingegneria S.r.l.

ALL RIGHTS RESERVED - This document is the exclusive property of Novasis Ingegneria S.r.l. which reserves all rights thereto. Therefore this document may not be copied, reproduced, communicated or disclosed to others or used in any way, not even for experimental purposes, without written permission of Novasis Ingegneria S.r.l.





## MODIFICATION LIST

Date	Version	Author	Description	Major Impact
07/05/2014	0	SF	first issue	

## REFERENCE DOCUMENTS/ANNEXES

Item	Code/Version	Document
RD1	NI240613-FS01-se-00	Novasom 6/7/8 Board – Schematics

## TERMS AND DEFINITIONS

---

<b>NOVASOM</b>	Novasis System On Module Board
<b>OS</b>	Operating System
<b>DUT</b>	Device Under Test
<b>RS232</b>	Asynchronous Serial Interface
<b>I2C</b>	Inter-Integrated Circuit
<b>USB</b>	Universal System Bus
<b>SD</b>	Secure Digital Card
<b>e-MMC</b>	Multi Media Card



## SUMMARY

---

<b>1. SCOPE .....</b>	<b>4</b>
<b>2. APPLICABILITY .....</b>	<b>5</b>
<b>3. CONVENTIONS .....</b>	<b>5</b>
<b>4. TOOLS AND INSTRUMENTS.....</b>	<b>5</b>
<b>5. CLIMATIC CHAMBER TESTS.....</b>	<b>6</b>
5.1 CLIMATIC CHAMBER AND HW CONFIGURATION SET-UP .....	6
5.2 HARDWARE CONFIGURATION .....	7
5.3 PERFORMANCE TEST EXECUTION .....	8
5.4 COOLING TEST.....	8
5.4.1 COOLING TEST EXECUTION Report .....	8
5.4.2 NOVA <sup>Asom</sup> 6 COOLING TEST EXECUTION Report .....	9
5.4.3 NOVA <sup>Asom</sup> 7 COOLING TEST EXECUTION Report .....	10
5.4.4 NOVA <sup>Asom</sup> 8 COOLING TEST EXECUTION Report .....	11
5.5 DRY HEAT TEST .....	12
5.5.1 DRY HEAT TEST EXECUTION Report.....	12
5.5.2 NOVA <sup>Asom</sup> 6 DRY HEAT TEST EXECUTION Report.....	13
5.5.3 NOVA <sup>Asom</sup> 7 DRY HEAT TEST EXECUTION Report.....	14
5.5.4 NOVA <sup>Asom</sup> 6 DRY HEAT TEST EXECUTION Report.....	15



# 1. Scope

Execution and report of NOVASom6, NOVASom7, NOVASom8 product line environmental qualification tests (Thermal chamber type test) in compliance with the specifications in standard EN 60068-1, EN 60068-2.



## 2. Applicability

This document is applicable to the project Novasis RD1.

## 3. Conventions

n.a.

## 4. Tools and Instruments

Validation tests have been done used the following tools and instrumentation:

nr.	S/N	Description
RT1	A000001,DC:12/2014	NOVAsom 6, NI240613-FS01 CPU BOARD
RT2	A000006,DC:12/2014	NOVAsom 7, NI240613-FS01 CPU BOARD
RT3	A000009,DC:12/2014	NOVAsom 8, NI240613-FS01 CPU BOARD
RT4	AVICEL	HW: Angelantoni Climatic Chamber with temperature limits from -75°C to + 185°C.
RT5	A130311_2	HW: POWER SUPPLY - Instruments (HK) CO. LTB - LONG WEI mod. TPR3005-2D
RT6	G260813	HW: Waveform generator Siglent SDG1020
RT7	M130311-3	HW: Multimeter VICHY mod. VC99
RT8	M130311-4	HW: Multimeter VICHY mod. VC99
RT9	Novabook 11	HW: PC ASUS I3 Processor Windows 7
RT10	N.A	HW: USB to RS232 Adapter
RT11	N.A	SW: Teraterm V. 4.75 Terminal emulator SW



# 5. CLIMATIC CHAMBER TESTS

## 5.1 Climatic Chamber and HW Configuration Set-up



figure1: Angelantoni Climatic Chamber

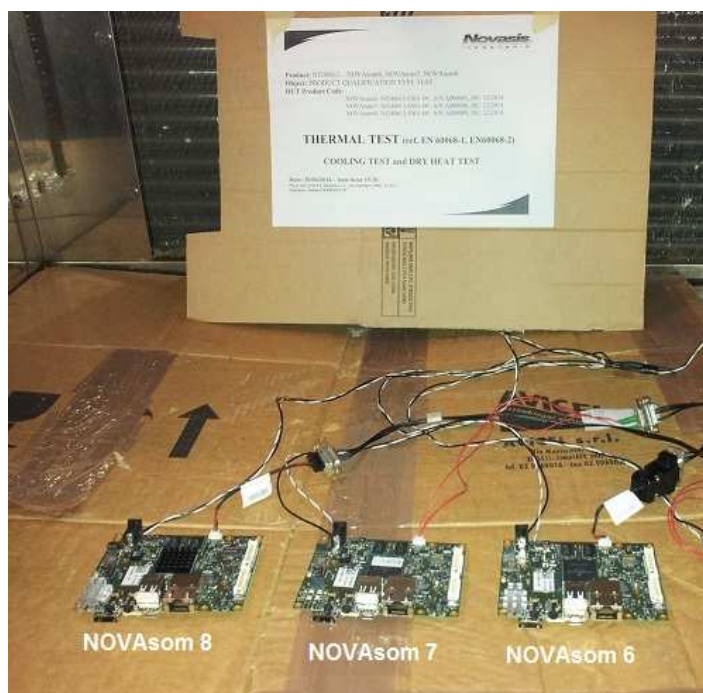


Figure2: DUT Internal chamber Set-up Test

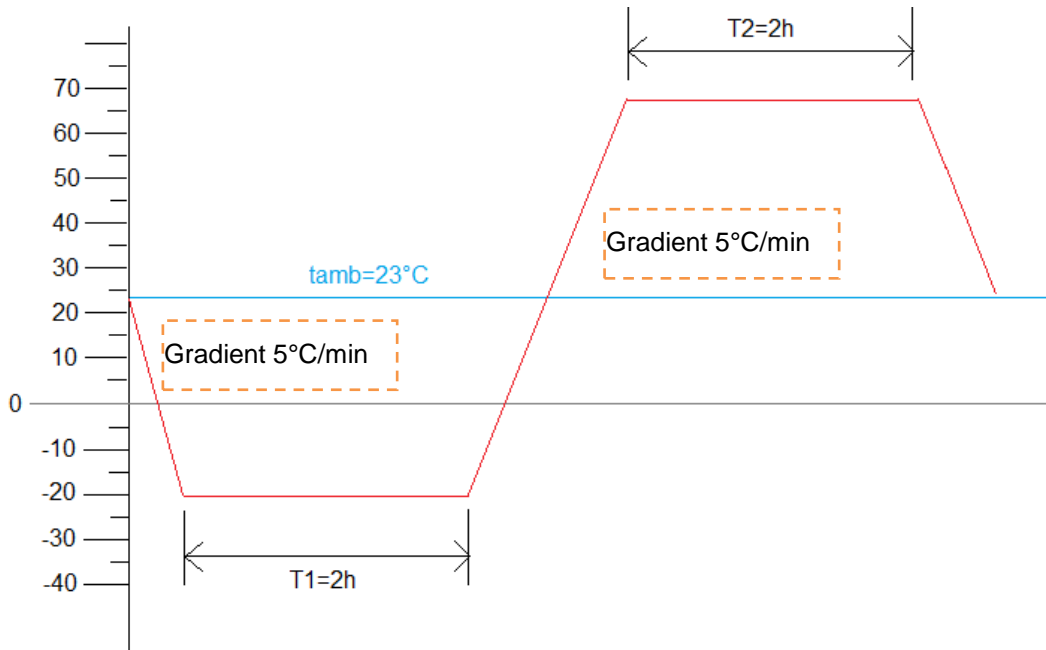


Figure3: Thermal Cycle test

## 5.2 Hardware Configuration

The following configuration HW has been used for the test:

Item Description	Board Code	Rev.	Q.ty
NOVAsom 6, NI240613-FS01 CPU BOARD	A000001,DC:12/2014	00	1
NOVAsom 7, NI240613-FS01 CPU BOARD	A000006,DC:12/2014	00	1
NOVAsom 8, NI240613-FS01 CPU BOARD	A000009,DC:12/2014	00	1



### 5.3 PERFORMANCE TEST EXECUTION

A test program will start automatically at power on of the DUT. The program will check cyclically internal devices such as I2C , USB , SD and e-MMC memories, executing scan, status verification, and read operations.

Test Check:

- 1) On target DUT: The blinking of a diagnostic led will indicate that the test is OK and running.
- 2) In remote out of chamber via console: all Operating System's process running will be monitored with a remote connection PC through the RS232 interface.

### 5.4 COOLING TEST

The test was performed with the following temperature cycle profile:

- Start test at ambient temperature +23°C (Device turned OFF)
- Cooling phase : cooling down to -20°C (gradient 5°C/min)
- Temperature maintained at -20°C for 2 hours (Device Turned OFF)
- Device Turned ON at -20°C
- Performance Test Execution

#### 5.4.1 COOLING TEST EXECUTION Report



Figure4: -20°C Temperature test phase



Figure 5: Temperature measured on NOVASom 8 case processor after power on at -20° (Multimeter on right side)





## 5.4.2 NOVA<sup>Asom</sup> 6 COOLING TEST EXECUTION Report

Test Check 1 - Led Blinking : **OK**

Test Check 2 - RS232 Connection / OS process : **OK**

```
[~]$ ps
PID  USER  COMMAND
1    root   init
2    root   [kthreadd]
3    root   [ksoftirqd/0]
4    root   [kworker/0:0]
5    root   [kworker/u:0]
6    root   [migration/0]
7    root   [khelper]
8    root   [kworker/u:1]
289  root   [sync_supers]
291  root   [bdi-default]
293  root   [kblockd]
314  root   [khubd]
335  root   [ipu1_task]
336  root   [ipu1_task]
348  root   [l2cap]
351  root   [cfg80211]
444  root   [usb_wakeup thre]
448  root   [usb_wakeup thre]
461  root   [ksuapd0]
462  root   [ksmd]
463  root   [fsnotify_mark]
464  root   [crypto]
526  root   [kaphd]
628  root   [vpu_uq]
633  root   [galcore workque]
634  root   [galcore daemon ]
635  root   [galcore daemon ]
677  root   [hmcqd/0]
698  root   [krfcommd]
711  root   [hmcqd/2]
712  root   [hmcqd/2boot0]
713  root   [hmcqd/2boot1]
720  root   [flush-1:0]
721  root   [kworker/0:2]
722  root   [ext4-dio-unwrit]
740  root   /sbin/syslogd -n 0
742  root   /sbin/klogd
756  dbus  dbus-daemon --system
759  root   {background_eth0} /bin/sh /etc/init.d/background_eth0_network st
769  root   udhcpc -i eth0
770  root   [flush-179:0]
776  root   -sh
791  root   [kworker/0:1]
797  root   ps
```

Figure 6: Process running on NOVA<sup>Asom</sup> 6 after power on at -20°

**Result : NOVA<sup>Asom</sup> 6 – PASS**



### 5.4.3 NOVA<sup>Asom</sup> 7 COOLING TEST EXECUTION Report

Test Check 1 - Led Blinking : **OK**

Test Check 2 - RS232 Connection / OS process : **OK**

```

[~]~$ ps
PID  USER  COMMAND
  1  root  init
  2  root  [kthreadd]
  3  root  [ksoftirqd/0]
  4  root  [kworker/0:0]
  5  root  [kworker/u:0]
  6  root  [migration/0]
  7  root  [migration/1]
  8  root  [kworker/1:0]
  9  root  [ksoftirqd/1]
 10  root  [khelper]
 11  root  [kworker/u:1]
294  root  [sync_supers]
296  root  [bdi-default]
298  root  [kblockd]
319  root  [khubd]
340  root  [ipu1_task]
341  root  [ipu1_task]
353  root  [l2cap]
358  root  [cfg80211]
449  root  [usb_wakeu]
453  root  [usb_wakeu]
466  root  [ksuapd0]
467  root  [ksnd]
468  root  [fsnotify_mark]
469  root  [crypto]
531  root  [kaped]
587  root  [kworker/1:1]
634  root  [vpu_uq]
639  root  [galcore_w]
640  root  [galcore_d]
641  root  [galcore_d]
683  root  [nmcqd/0]
704  root  [krfcommd]
716  root  [ext4-dio-un]
720  root  [flush-1:0]
728  root  [nmcqd/2]
729  root  [nmcqd/2boot0]
730  root  [nmcqd/2boot1]
744  root  /sbin/syslogd -n 0
746  root  /sbin/klogd
756  root  {background_} /bin/sh /etc/init.d/background_} network st
763  root  udhcpc -i eth0
769  root  [flush-179:0]
775  root  -sh
778  root  [kworker/0:2]
789  root  [kworker/0:1]
792  root  ps
[~]~$

```

Figure 7: Process running on NOVA<sup>Asom</sup> 7 after power on at -20°

**Result : NOVA<sup>Asom</sup> 7 – PASS**



#### 5.4.4 NOVA<sup>Asom</sup> 8 COOLING TEST EXECUTION Report

Test Check 1 - Led Blinking : **OK**

Test Check 2 - RS232 Connection / OS process : **OK**

```

ps
PID  USER      COMMAND
  1  root      init
  2  root      [kthreadd]
  3  root      [ksoftirqd/0]
  4  root      [kworker/0:0]
  5  root      [kworker/u:0]
  6  root      [nigrat ion/0]
  7  root      [nigrat ion/1]
  8  root      [kworker/1:0]
  9  root      [ksoftirqd/1]
 10  root      [nigrat ion/2]
 11  root      [kworker/2:0]
 12  root      [ksoftirqd/2]
 13  root      [nigrat ion/3]
 14  root      [kworker/3:0]
 15  root      [ksoftirqd/3]
 16  root      [khelper]
 17  root      [kworker/u:1]
 306  root      [sync_supers]
 308  root      [bdi-default]
 310  root      [kblockd]
 331  root      [khubd]
 352  root      [ipu1_task]
 353  root      [ipu1_task]
 354  root      [ipu2_task]
 355  root      [ipu2_task]
 367  root      [l2cap]
 370  root      [kworker/0:1]
 372  root      [cfg80211]
 463  root      [usb_wakeup thre]
 467  root      [usb_wakeup thre]
 480  root      [ksuapd0]
 481  root      [ksnd]
 482  root      [fsnot ify_mark]
 483  root      [crypto]
 502  root      [kworker/2:1]
 505  root      [kworker/1:1]
 547  root      [kaped]
 599  root      [kworker/3:1]
 642  root      [kworker/u:2]
 650  root      [vpu_uq]
 655  root      [galcore workque]
 656  root      [Vivante Kernel ]
 657  root      [Vivante Kernel ]
 658  root      [galcore daemon ]
 659  root      [galcore daemon ]
 660  root      [galcore daemon ]
 702  root      [nmcqd/0]
 723  root      [krfconnd]
 736  root      [nmcqd/2]
 737  root      [nmcqd/2boot0]
 738  root      [nmcqd/2boot1]
 745  root      [ext4-dio-unurit]
 749  root      [flush-1:0]

```

Figure 8: Process running on NOVA<sup>Asom</sup> 8 after power on at -20°

**Result : NOVA<sup>Asom</sup> 8 – PASS**



## 5.5 DRY HEAT TEST

The test was performed with the following temperature cycle profile:

- Start test at -20°C
- Heating up to +70°C (gradient 5°C/min)
- Temperature maintained at +70°C for 2 hour
- Performance Tests Execution (1st RUN)
- Power OFF Device
- Power ON Device
- Performance Tests Execution (2nd RUN)
- Cooling down to 25°C
- Performance Tests Execution (3rd RUN)
- Power OFF Device
- Power ON Device
- Performance Tests Execution (4th RUN)

### 5.5.1 DRY HEAT TEST EXECUTION Report



Figure 9: +70° C Temperature test phase



Figure 10: Temperature measured on NOVAAsom 8 processor after 2 Hours at +70°



## **5.5.2 NOVA<sup>Asom</sup> 6 DRY HEAT TEST EXECUTION Report**

Performance Tests Execution (1st RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

Performance Tests Execution (2nd RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

Performance Tests Execution (3rd RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

Performance Tests Execution (4th RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

**Result : NOVA<sup>Asom</sup> 6 – PASS**



### **5.5.3 NOVA<sup>som</sup> 7 DRY HEAT TEST EXECUTION Report**

Performance Tests Execution (1st RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

Performance Tests Execution (2nd RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

Performance Tests Execution (3rd RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

Performance Tests Execution (4th RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

**Result : NOVA<sup>som</sup> 7 – PASS**



## **5.5.4 NOVA<sup>8</sup>som 6 DRY HEAT TEST EXECUTION Report**

Performance Tests Execution (1st RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

Performance Tests Execution (2nd RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

Performance Tests Execution (3rd RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

Performance Tests Execution (4th RUN)

*Test Check 1 - Led Blinking : **OK***

*Test Check 2 - RS232 Connection / OS process : **OK***

**Result : NOVA<sup>8</sup>som 8 – PASS**