

**Test item:**

NESU Smart Phone Card

**Manufacturer:**

Presencia d.o.o., Podrebernica 15a, 10000 Zagreb, Croatia.

**Test ordered by:**

Presencia d.o.o., Podrebernica 15a, 10000 Zagreb, Croatia.

**Number of contract:**

Order dated 11/2013.

**Test specification:**

Specific tests, ordered by the manufacturer, for the passive card.

**Test method:**

Radiated disturbances measurement  
Radiated electromagnetic field immunity test

**Location of test:**

EMC Laboratory

**Date of test:**

26.11.2013. – 27.11.2013.

**Date of issue:**

28.11.2013.

**Additions:**

-

**Conclusion:**

Test results are shown in Clause 4. NESU Smart Phone Card does not affect results from this report.

**Test realized by:**

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**Head of Laboratory:**

Saša Gros, B.Sc.

*Saša Gros*



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## 1. DEVICE UNDER TEST / PRODUCT DESCRIPTION

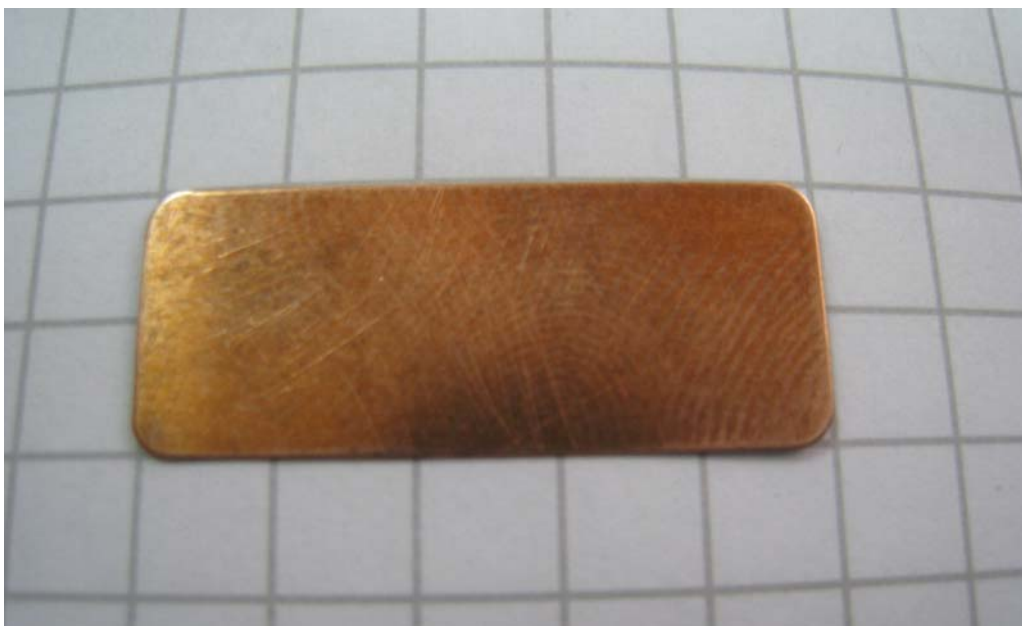
### 1.1. DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT)

NESU Smart Phone Card is an electrically passive object.

The EUT is shown by the pictures 1 - 2:



Picture 1: Photo of equipment under test – EUT



Picture 2: Photo of equipment under test

## 1.2. DECLARED CONFIGURATION OF THE EQUIPMENT UNDER TEST (EUT)

Auxiliary equipment used is HP notebook, as stated below:

### Summary

Operating System  
MS Windows XP Professional 32-bit SP3

CPU  
AMD Processor  
AMD Processor

RAM  
2,23 GB

Motherboard  
Hewlett-Packard 168B (Socket FS1)

Graphics  
Default Monitor (1366x768@60Hz)  
AMD Radeon(TM) HD 6480G  
AMD Radeon HD 7450M

Hard Drives  
733GB Hitachi Hitachi HTS547575A9E384 (ATA)

Optical Drives  
hp DVD A DS8A8SH

Audio  
AMD High Definition Audio Device

Operating System  
MS Windows XP Professional 32-bit SP3

### CPU

AMD Processor  
Cores 1  
Threads 1  
Name AMD Processor  
Specification AMD A4-3305M APU with Radeon(tm) HD Graphics

AMD Processor  
Cores 1  
Threads 1  
Name AMD Processor  
Specification AMD A4-3305M APU with Radeon(tm) HD Graphics

RAM

Memory slots  
Total memory slots 2  
Used memory slots 1  
Free memory slots 1  
Memory  
Size 2288 MBytes  
Physical Memory  
Memory Usage 25 %  
Total Physical 2.23 GB  
Available Physical 1.63 GB  
Total Virtual 2.00 GB  
Available Virtual 1.90 GB  
SPD  
Number Of SPD Modules 0

Motherboard

Manufacturer Hewlett-Packard  
Model 168B  
Version A0000C02  
Chipset Vendor AMD

BIOS

Brand Hewlett-Packard  
Version 68CPC Ver. F.21

Graphics

Monitor  
Name Default Monitor on AMD Radeon HD 6480G  
Current Resolution 1366x768 pixels  
Work Resolution 1366x738 pixels  
Monitor Frequency 60 Hz

AMD Radeon(TM) HD 6480G  
Memory 512 MB  
Memory type 2  
Driver version 6.14.10.7230

AMD Radeon HD 7450M  
Memory 512 MB  
Memory type 2  
Driver version 6.14.10.7230

Hard Drives

Hitachi HTS547575A9E384  
Manufacturer Hitachi  
Product Family Travelstar

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### Optical Drives

hp DVD A DS8A8SH  
 Media Type CD-ROM  
 Name hp DVD A DS8A8SH

### Audio

Sound Cards  
 AMD High Definition Audio Device  
 IDT High Definition Audio CODEC  
 Playback Device  
 IDT Audio  
 Recording Device  
 IDT Audio

### Peripherals

HP HD Webcam [Fixed]  
 Device Kind Camera/scanner  
 Device Name HP HD Webcam [Fixed]

Disk drive 1  
 Device Kind USB storage  
 Device Name Disk drive  
 Vendor STOREJET  
 Comment StoreJet Transcend USB Device

Disk drive 2  
 Device Kind USB storage  
 Device Name Disk drive  
 Vendor STOREJET  
 Comment StoreJet Transcend USB Device

Disk drive 3  
 Device Kind USB storage  
 Device Name Disk drive  
 Vendor STOREJET  
 Comment StoreJet Transcend USB Device

Disk drive 4  
 Device Kind USB storage  
 Device Name Disk drive  
 Vendor STOREJET  
 Comment StoreJet Transcend USB Device

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**Possible simulations:**

- 1) Full simulation of the notebook, together with the auxiliary devices, using Burn in test Pro version 7, and according to the CISPR 22 setup.

*\*note → used standards are applied to the auxiliary equipment used in the setup (notebook). NESU Smart Phone Card was inserted in the setup as an addition to it. Final results are given as a comparison of the measurements (tests) with and without the card.*

**WORKING (TESTING) MODE OF THE EUT:**

**Mode 1: simulation according to the Burn in test Pro 7 possibilities.**

**During immunity testing the following conditions must be accomplished:**

- 1) Device must not stop working properly, depending of the performance criteria for the each particularly method.

**During immunity testing following situations must be respected:**

- 1) The EUT must stay in its defined functions.  
No change of the state is allowed without the actual command prepared by the manufacturer.
- 2) Internal clock and memory must not be interrupted.
- 3) Connection must not be lost.

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#### MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in EN 55016-4-2:2004.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Radiated disturbance OATS; horizontal polarization (3 m)	± 4.82 dB
Radiated disturbance OATS; vertical polarization (3 m)	± 4.96 dB
Radiated disturbance OATS; horizontal polarization (10 m)	± 4.52 dB
Radiated disturbance OATS; vertical polarization (10 m)	± 4.68 dB
Radiated disturbance SAC; Frequency range from 30 – 1000 MHz	± 4.60 dB
Radiated disturbance FAR; Frequency range from 1000 – 6000 MHz	± 4.96 dB

**EMC Laboratory is accredited by Croatian Accreditation Agency (HAA) according to HRN EN ISO/IEC 17025:2007.**

#### LIST OF ACCREDITATION USED IN THIS TEST REPORT:

Type of test	Accreditation
Radiated disturbances	Accredited
Radiated Electromagnetic Field Immunity Test	NOT accredited



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## 2. TEST RESULTS

### Test configuration:

- 1) Emission measurements are found on its maximum values of the EUT during normal working conditions.
- 2) EUT must be adjusted like in real working conditions as close as possible.
- 3) If the device consist an integrated antenna together with the EUT, the testing were accomplished with the same antenna put on its original place.
- 4) If the EUT needs some auxiliary equipment to work properly or to put all functions to action, it is allowed to put that equipment together with the EUT.
- 5) If the device consist of a large number of ports, for the purpose of the testing it is necessary to load sufficient number of inputs/outputs.
- 6) Testing configuration and working conditions must be stated by each test method used.

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## 2.1. RADIATED DISTURBANCES

### 2.1.1. Test requirements

*Radiated disturbances were measured in full-anechoic chamber, to avoid any reflections during the test. This would cause difference in comparison of the results.*

- Frequency band: 30 MHz – 1000 MHz
- Frequency band: 1000 MHz – 6000 MHz not observed, due to low disturbances produced by the auxiliary device (notebook) and passive EUT.
- Limits: the EUT was measured on a distance of 3 m between the antenna and the EUT!

### 2.1.2. Test configuration

Radiated emissions were investigated over the frequency range from 30 MHz to 1000 MHz. Horizontal and vertical antenna polarizations were evaluated. To ensure maximum radiation electromagnetic field results the EUT was rotated from 0° to 360°.

Pre-scan measurements were completed in full anechoic chamber without height scanning.

#### WORKING (TESTING) MODE OF THE EUT: MODE 1.

Radiated emissions were investigated over the frequency range from 1000 MHz to 6000 MHz. Horizontal and vertical antenna polarizations were evaluated. To ensure maximum radiation electromagnetic field results the EUT was rotated from 0° to 360°.

Measurements were completed in full anechoic chamber.

#### WORKING (TESTING) MODE OF THE EUT: MODE 1.

### 2.1.3. Measurement Equipment

Type	Model	Manufacturer	Serial No.	Končar Id. No.
ANECHOIC CHAMBER	Spacesaver 26H	ETS LINDGREN	2000112	840818
OATS	Jankomir	-	-	-
EMI RECEIVER	FCLE 1535	Schwarzbeck	107	897834
LOG-PERIODIC ANTENNA	VULB 9163	Schwarzbeck	298	EMC 21583 07 07 02
SPECTRUM ANALYZER	MS2719B	Anritsu	1010078	D-854627
WIDE-BAND HORN ANTENNA	BBHA 9120 B	Schwarzbeck	540	-

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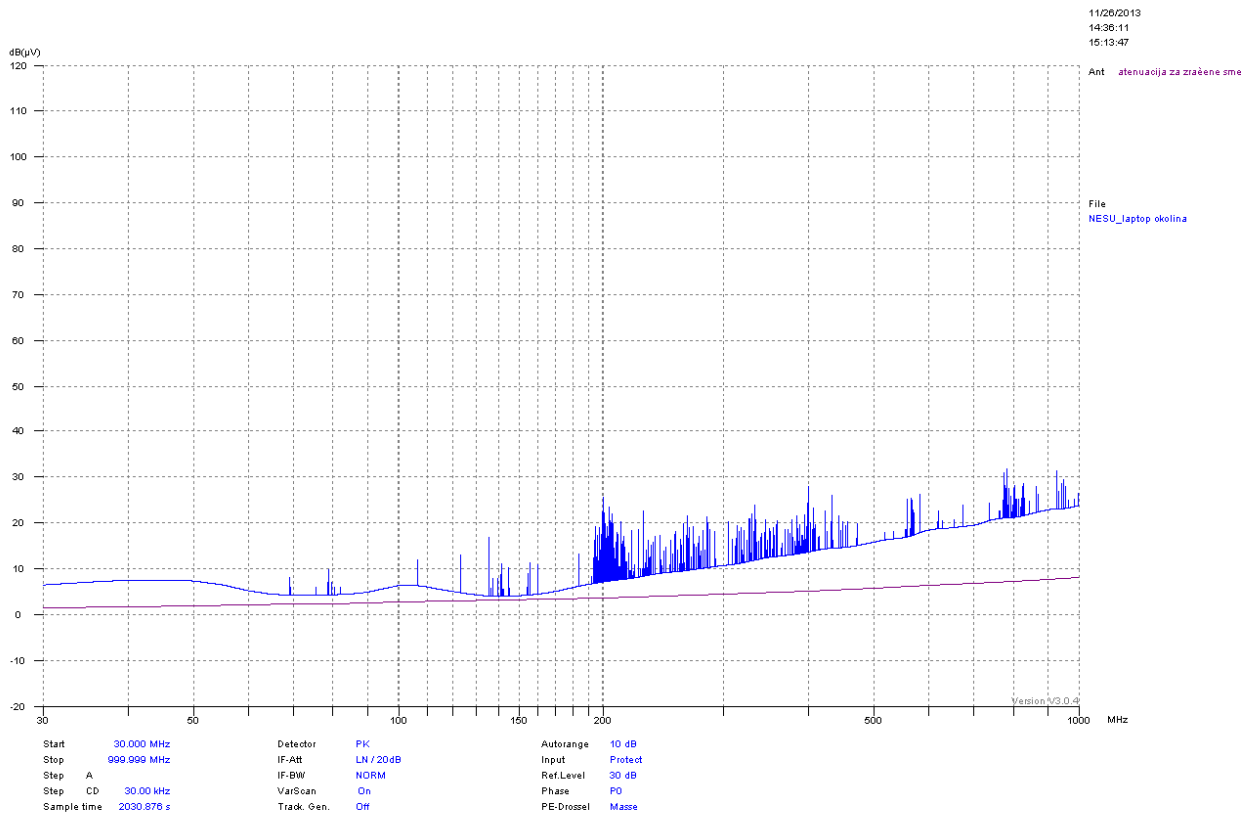
**2.1.4. Test results**

**Devices tested: HP notebook (see clause 1.2.) + auxiliary setup**

**Temperature: 19°C; Humidity: 43%; Air pressure: 1003 mbar.**

**Detector: Peak (pre-scan)**

**Polarization: VERTICAL**



**Graph 1: Radiated disturbances – vertical polarization**

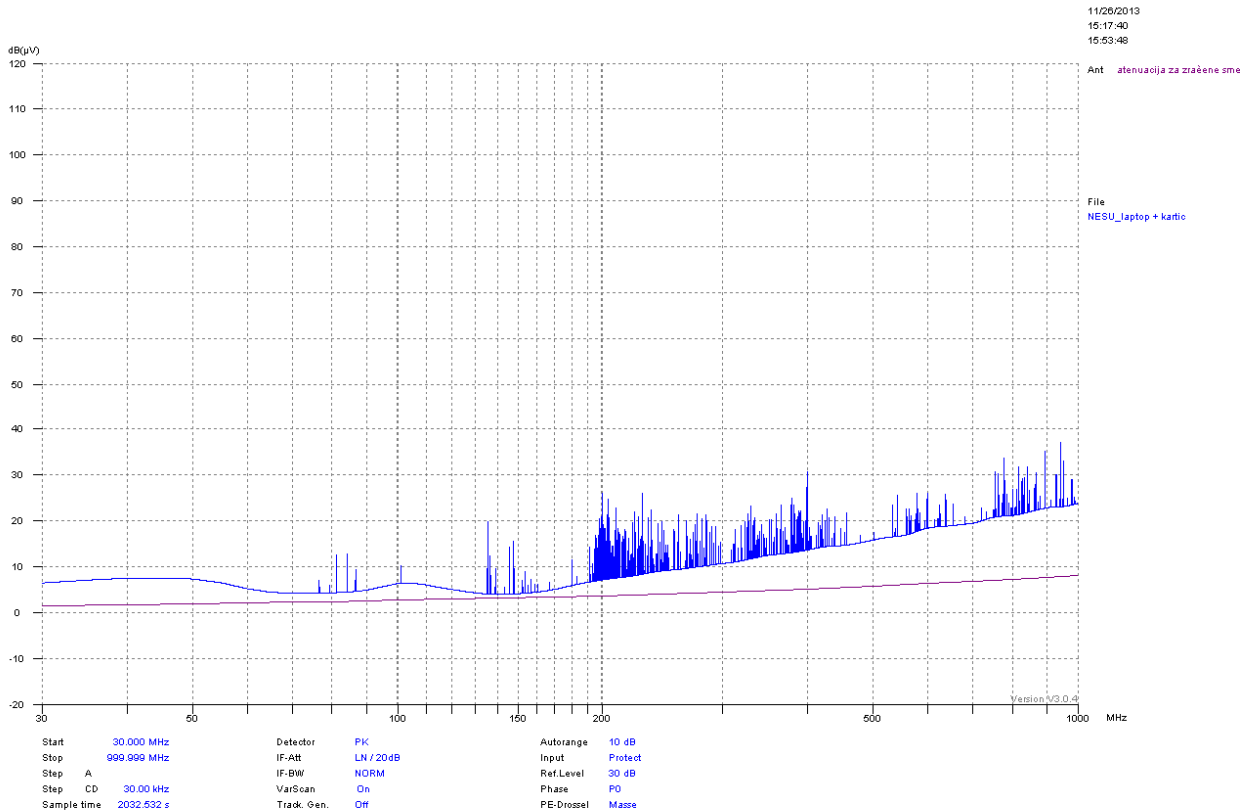
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Devices tested: HP notebook (see clause 1.2.) + auxiliary setup + NESU Smart Phone Card

Temperature: 19°C; Humidity: 43%; Air pressure: 1003 mbar.

Detector: Peak (pre-scan)

Polarization: VERTICAL



**Graph 2: Radiated disturbances – vertical polarization**

Given results are maximum values of the radiated disturbances.

Maximum results were captured using the vertical polarization.

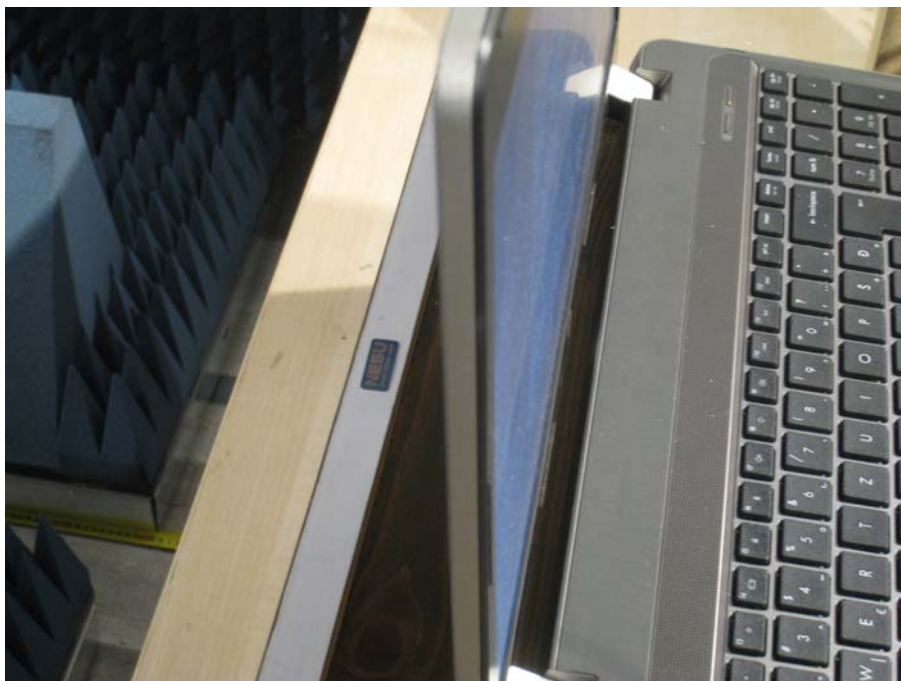
Correction factors are included in the results given here (antenna factors and cable losses).

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Photos of the pre-scan measurements are on the following pictures:



Picture 3: Photo of the measurement setup



Picture 4: Photo of the measurement setup

**Final Test Result: NESU Smart Phone Card does not affect results of the radiated disturbances.**

## 2.2. RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

### 2.2.1. Test requirements

- Frequency range: 80 MHz – 1000 MHz (3 V/m),
- Dwell time: 3s
- AM 1 kHz 80%
- Performance criteria: A (no changes are allowed during the test)

### 2.2.2. Test configuration

Test configuration consists of full anechoic room, signal generator, power amplifier and measurement receiver for registration of electric field strength signal. Test was performed in agreement with the manufacturer.

Transmitting antenna was located at a distance of 3 meters from the EUT. Frequency ranges were as stated above. Sweep rate did not exceed  $1.5 \times 10^{-3}$  decsde/s. During the radiation test, the equipment under test is to be in operation under normal load and power supply, and is connected to external wiring with the manufacturers recommended procedure.

Field strength levels as stated above are measured by measurement receiver from received antenna previously positioned in the location of the EUT.

Testing was performed with the EUT exposed to both vertical and horizontally polarized fields on each of four sides.

### WORKING (TESTING) MODE OF THE EUT: MODE 1

### 2.2.3. Measurement Equipment

Type	Model	Manufacturer	Serial No.	Končar Id. No.
ANECHOIC CHAMBER	Spacesaver 26H	ETS LINDGREN	2000112	-
AMPLIFIER	MT 200 S	1112-1102	PRANA	84-2793
RECEIVER	8053	PMM	0220J10750	D845053
MEASUREMENT PROBE	EP 330	PMM	1010J10751	EMC 21583 36
LOG-PERIODIC ANTENNA	VULB 9163	Schwarzbeck	298	EMC 21583 07 07 02
GENERATOR	N5183A MXG	Agilent Technologies	N10149	84-2157
AMPLIFIER	AP32 SV125A	PRANA	0904-0936	84-2488

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#### 2.2.4. Test results

**ATMOSPHERIC CONDITIONS; Temperature: 20°C; Humidity: 40%; Air pressure: 1010 mbar.**

Frequency	Polarization	Azm	Field Strength	Remarks
80 MHz – 1000 MHz	V	0	3 V/m	Complies, no influence on the results
80 MHz – 1000 MHz	V	90	3 V/m	Complies, no influence on the results
80 MHz – 1000 MHz	V	180	3 V/m	Complies, no influence on the results
80 MHz – 1000 MHz	V	270	3 V/m	Complies, no influence on the results
80 MHz – 1000 MHz	H	0	3 V/m	Complies, no influence on the results
80 MHz – 1000 MHz	H	90	3 V/m	Complies, no influence on the results
80 MHz – 1000 MHz	H	180	3 V/m	Complies, no influence on the results
80 MHz – 1000 MHz	H	270	3 V/m	Complies, no influence on the results

**Note: Laboratory is not accredited by HRN EN ISO/IEC 17025 for this test method.**

Photo of the test is on the following picture:



**Picture 5: Photo of the test**

**Final Test Result: Auxiliary notebook complies with the request, NESU Smart Phone Card does not affect results of the radiated electromagnetic field test.**