

LAB TOOL

User's Guide

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Abbreviations and symbols

US:	Ultra Smart
CMT:	Contact Media Tester
CLT:	Contact Less Tester
ATR:	Answer To Reset
ATQ:	Answer to Request
DUT:	Device Under Test
ICC:	Integrated Circuit Card
PICC:	Proximity Integrated Circuit Card
US-ICC:	UltraSmart ICC Reader
US-PICC:	UltraSmart PICC Reader

1 INTRODUCTION

The laboratory tool software is used to performed contact and contactless tests and measurements.

It can determine the contact card model and gives informations about its capabilities
It can determine the contactless card model and gives information about its capabilities.
It can measure the Resonance Frequency and Quality Factor of a PICC.
It can perform Capacitance, FIMV and FVMI measurements.
It can perform open short and continuity tests.

1.1 INSTALLATION

The Laboratory tool is automatically included with Smargear. See below for more information.

1.2 REQUIREMENT

Minimal software requirement:
SmartGear v2r36

Hardware requirement:

Contact: US-ICC or US-CMT

Contactless: US-PICC or US-CLT

2 GENERAL

2.1 INSTALLATION

If Smartgear is not installed in the default directory (c:\Smartgear), some configuration paths need to be change for the lab tool.

2.1.1 File: SmartGear\Bin\Start.ini

```
[PAC:LABGUIOB]
AutoStart=1
Path = c:\smartgear\bin\labguiob.dll

[PAC:CARDOB]
AutoStart=1
Path = c:\smartgear\bin\cardob.dll

[PAC:CMT]
AutoStart=1
Path = c:\smartgear\bin\cmt.dll

[PAC:CLT]
AutoStart=1
Path = c:\smartgear\bin\clt.dll

[PAC:CMTOB]
AutoStart=1
Path = c:\smartgear\bin\cmtob.dll

[PAC:CLTOB]
AutoStart=1
Path = c:\smartgear\bin\cltob.dll
```

2.1.2 File: SmartGear\Bin\Smartgear.ini

```
[STMENU_1]
Name = Tools
MenuItem1_Label = Lab tool
MenuItem1_Script = SourcePath := path("C:\Smartgear\MLL\LabGui", 'FF');
file(SourcePath + "LabGui.mll").MLLEval;
```

2.2 CONFIGURATION

The main configuration of the lab tool software is made in the file "INITLAB.mll".
The user defines three SmartTalk script iterators:

- **ContactCfg** : it describes the contact interfaces used in the Lab tool Contact tab.
- **ContactlessModuleCfg** : it describes the contactless interfaces used in the Lab tool Contactless Module tab.
- **ContactlessCardCfg** : it describes the contactless interfaces used in the Lab tool Contactless Card tab.

Each interfaces is described in a SmartTalk script structure with the following information:

- **Head**: Head label to display in the head list of the associated view
- **Interface**: The string Id that identify the interface on the reader
- **Node**: Node of the concerned reader
- **ReaderClass**: Script class that match the reader type.
-

INITLAB.MLL

```
ContactCfg := iter(
    struct( Head = "Head 0", Interface = "SC1", Node = 1, ReaderClass = CMTLab),
    struct( Head = "Head 1", Interface = "SC2", Node = 1, ReaderClass = CMTLab),
    struct( Head = "Head 2", Interface = "SC3", Node = 1, ReaderClass = CMTLab),

    struct( Head = "Head 3", Interface = "SC4", Node = 1, ReaderClass = CMTLab)
);

ContactlessCardCfg := iter(
    struct( Head = "Head 0", Interface = "CL1", Node = 1, ReaderClass = CLTLib),
    struct( Head = "Head 1", Interface = "CL2", Node = 1, ReaderClass = CLTLib),
    struct( Head = "Head 2", Interface = "CL1", Node = 2, ReaderClass = CLTLib),
    struct( Head = "Head 3", Interface = "CL2", Node = 2, ReaderClass = CLTLib)
);

ContactlessModuleCfg := iter(
    struct( Head = "Head 0", Interface = "CL1", Node = 1, ReaderClass = CLTLib),
    struct( Head = "Head 1", Interface = "CL2", Node = 1, ReaderClass = CLTLib),
    struct( Head = "Head 2", Interface = "CL1", Node = 2, ReaderClass = CLTLib),
    struct( Head = "Head 3", Interface = "CL2", Node = 2, ReaderClass = CLTLib)
););
```

Note: Set a specific iterator to null value (ex: ContactlessCardCfg := null;) to disable the associated tab on the Lab tool GUI.

2.2.1 Contact

Head: Text appears in the head list, see below

Interface: Defines the type of interface to address.

- "SC1" (0x10) : First contact interface.
- "SC2" (0x18) : Second contact interface.
- "SC3" (0x20) : Third contact interface.
- "SC4" (0x28) : Fourth contact interface.
- "SC5" (0xD0) : Fifth contact interface.
- "SC6" (0xD8) : Sixth contact interface.
- "SC7" (0xC0) : Seventh contact interface.
- "SC8" (0xC8) : Eighth contact interface.

Node: Node of the reader station where the smart card interface is physically implemented.

Class: Class name to use.

- "ICCLab": for US-ICC.
- "CMTLab": for US-CMT.

2.2.2 Contactless Module

Head: Text appears in the head list, see below

Interface: Defines the type of interface to address.

- "CL1" (0x40) : First contactless interface.
- "CL2" (0x48) : Second contactless interface.
- "CL3" (0xB0) : Third contactless interface.
- "CL4" (0xB8) : Fourth contactless interface.

Node : Node of the reader station where the smart card interface is physically implemented.

Class: Class name to use.

- "PICCLab" for US-PICC.
- "CLTLab" for US-CLT.

2.2.3 Contactless Card

Head: Text appears in the head list, see below

Interface: Defines the type of interface to address.

- "CL1" (0x40) : First contactless interface.
- "CL2" (0x48) : Second contactless interface.
- "CL3" (0xB0) : Third contactless interface.
- "CL4" (0xB8) : Fourth contactless interface.

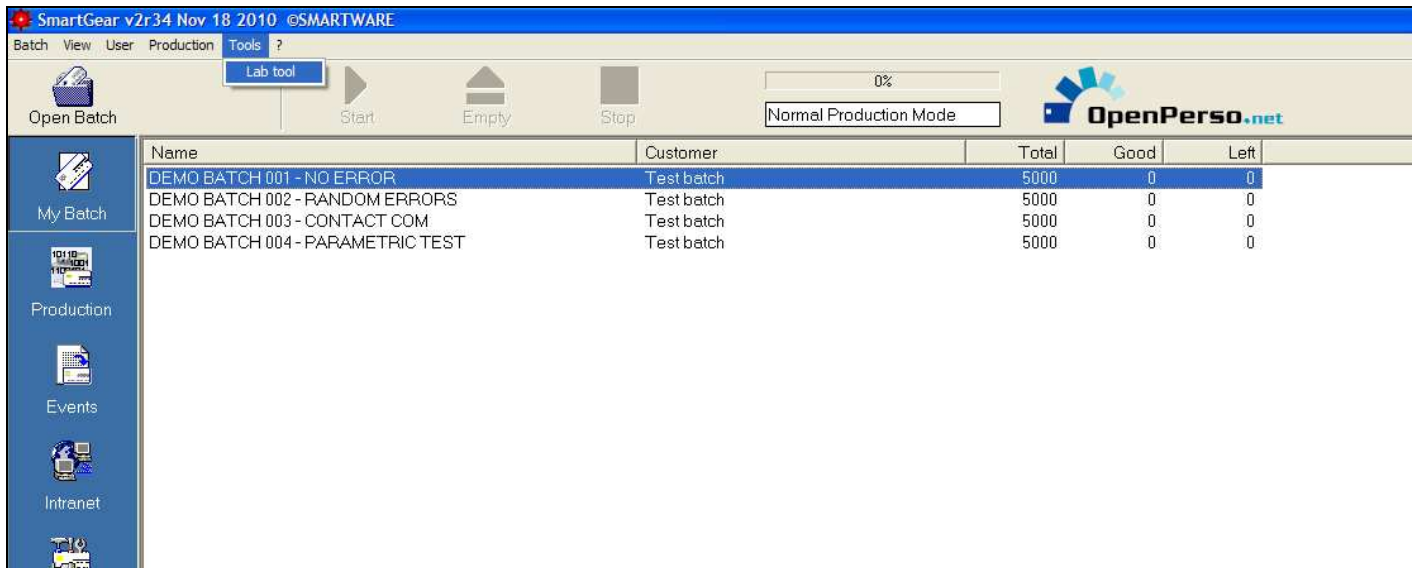
Node : Node of the reader station where the smart card interface is physically implemented.

Class: Class name to use.

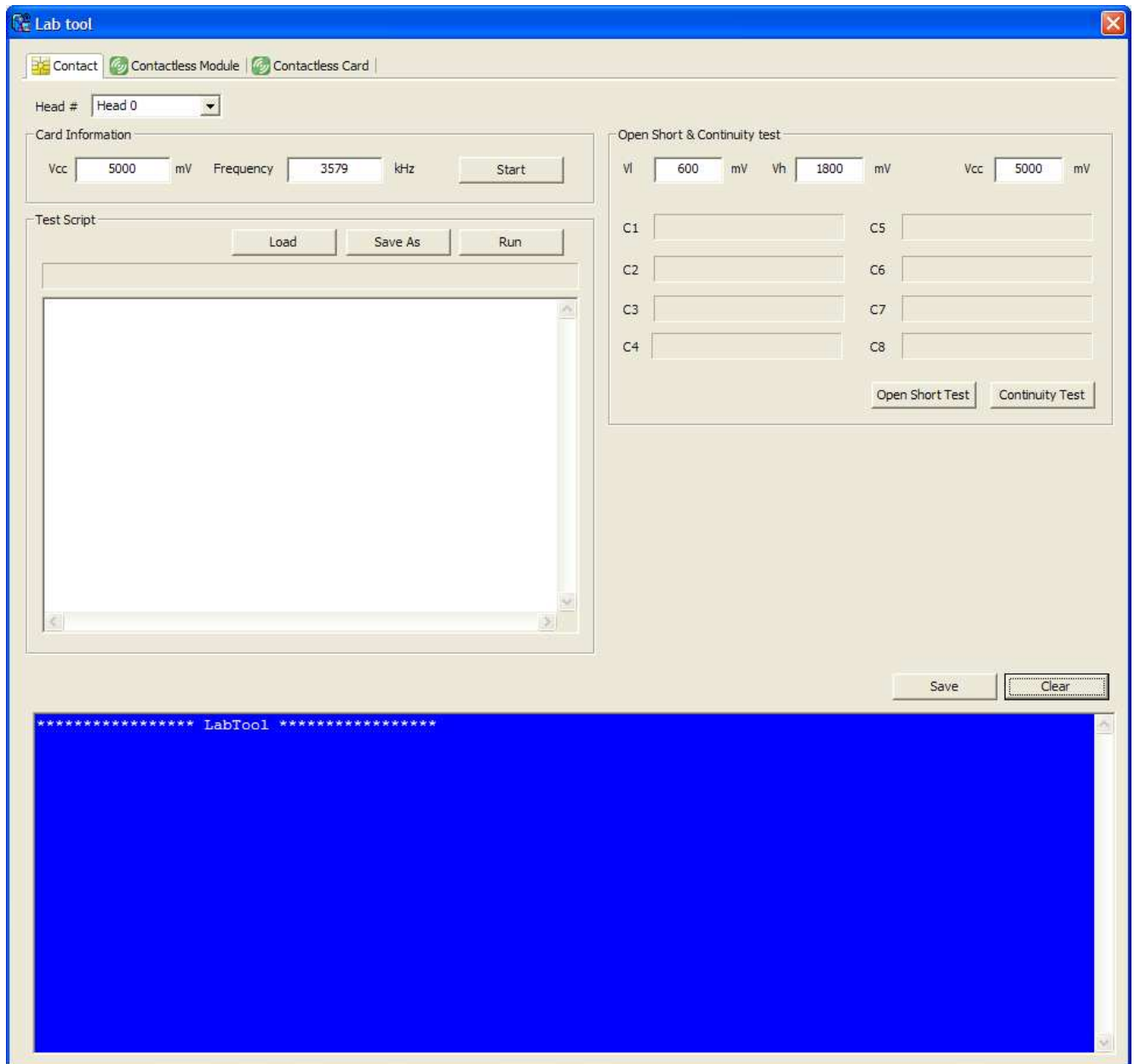
- "PICCLab" for US-PICC.
- "CLTLab" for US-CLT.

2.3 EXECUTION

To launch the Lab Tool software click “*Lab Tool*” in the “*Tools*” menu of SmartGear.



3 CONTACT



3.1 CARD INFO

Retrieve card information on contact card that follows the ISO7816 standard, T=0 and T=1 protocols.

3.1.1 Vcc value

The VCC value represents the voltage applied on C1 when the card is powered.
The default value is 5000 mV.

The Vcc value range is from 0 to 7400 mV.

3.1.2 Frequency value

Set the card frequency value on contact C3 when the card is powered.

The default value is 3579 kHz.

The card's frequency range is 800 to 30000 kHz.

3.1.3 Execution

Click on the "Start" to retrieve the card information.

3.1.4 Generals Parameters

- ATR : Answer-To-Reset is the value of the sequence of bytes sent by the card to the interface device as the answer to a reset.
- Coding Convention : Condition used to code: Direct /Inverse.
- Maximum frequency value : The maximum frequency value is calculated thanks to FI value.
The default maximum value is 5 MHz.
- Etu min : Minimum bit duration in card clock counts.
- FI : Reference to the clock rate conversion factor.
- Fi : Clock rate conversion factor.
- DI : Reference to the Baud rate adjustement factor.
- Di : Baud rate adjustement factor.
- Protocol supported : Refers to the transmission protocol.
 - T0 : half-duplex transmission of asynchronous characters.
 - T1 : half-duplex asynchronous transmission of blocks.

3.2 OPEN SHORT TEST

CrossContact Test' allows selecting automatically all chip contact.

Vh and Vl are applied for all contact.

The "Open/Short Test" button processes an Open/Short test on all chip contact:

- Force a current ('CurrentForced') on a contact.
- Get the voltage measurement on the others contacts.

Open/Short results are displayed for each contactl.

Note: Vh and Vl must be set between 0 and 5000 mV, and Vh must be upper then Vl.

3.3 CONTINUITY TEST

The "Continuity Test" button processes a continuity test on all chip contacts:

- Force a voltage Vcc on C1 contact.
- Force a voltage (vh then vl) on others contacts.
- Get the measured impedance value.

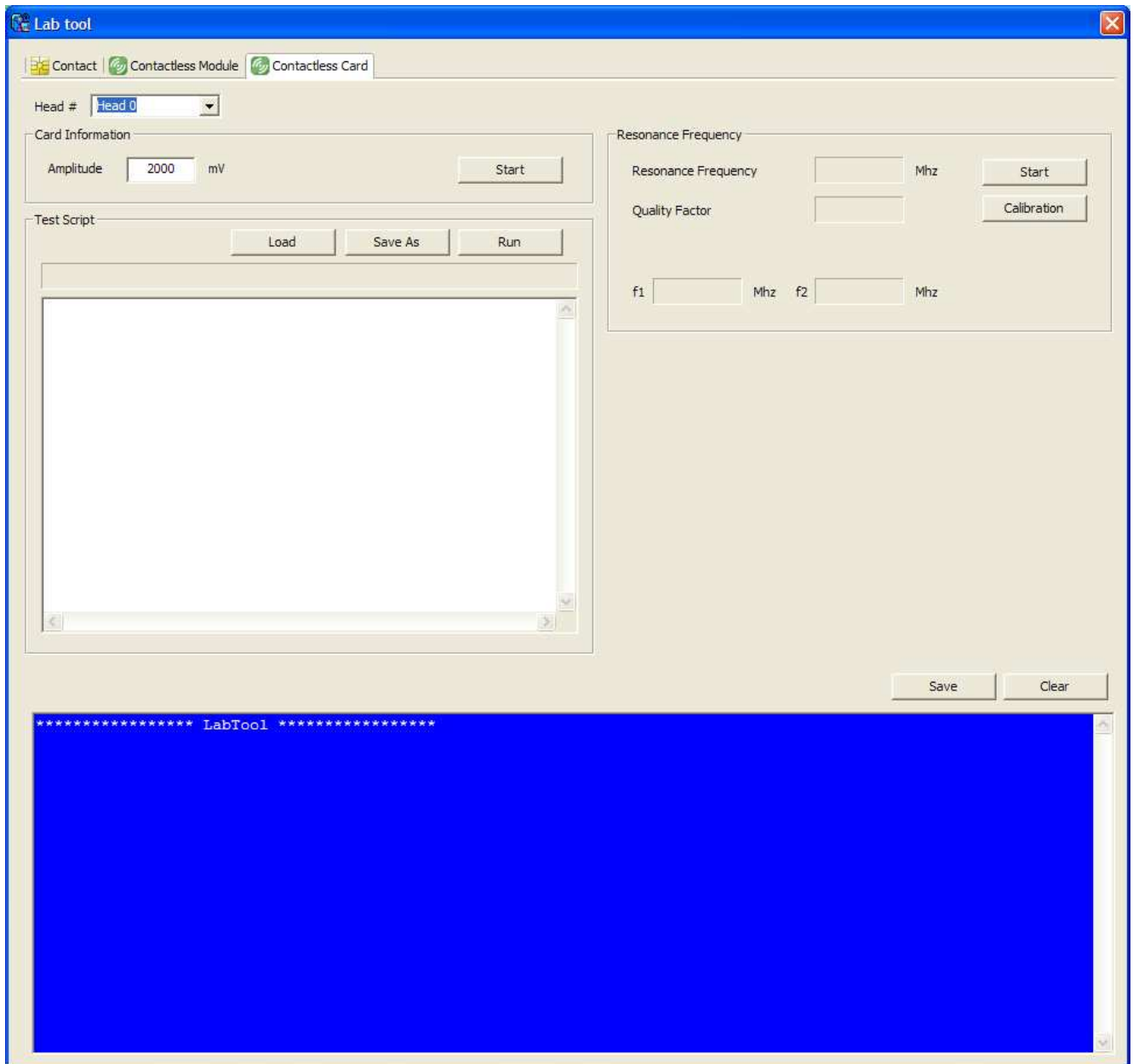
The continuity measurement test verifies the physical connection between the reader and the smartcard.

For each smartcard contact line, it returns the physical impedance and a status indicating if the contact seems properly connected and if the measurement is within the system's capabilities. It also returns the clamp diode threshold voltage when the measured impedance allows it.

Note: Vmax and Vmin must be set between 0 and 5000 mV, and Vmax must be upper than Vmin.

Vcc must be set between 0 and 7500 mV.

4 CONTACTLESS CARD



4.1 CARD INFO

The User Interface is only used to launch the application and to get the report about the contactless card.

It manages only contactless card Type A and contactless card Type B which follow the ISO 14443 standard.

4.1.1 Field Amplitude

Set the carrier field amplitude. The carrier field on the selected antenna will be shortly enabled to automatically measure the new field amplitude value and configure the reception stage.

Values are given in mV (Default value is 2000).

4.1.2 Execution

The 'Start' Button launches the CardInfo application.

Depending on the contactless card type information will not be the same:

4.1.3 Information contactless card type A

- Card Model: Determines the contactless card model.
- UID: Identifier of the contactless card.
- ATQAValue: Answer to request command for Type A cards.
- Compliant ISO14443-4: Tells if the PICC is compliant with ISO/IEC 14443-4.
- ATS: Answers to select command.

4.1.4 Information contactless card type B

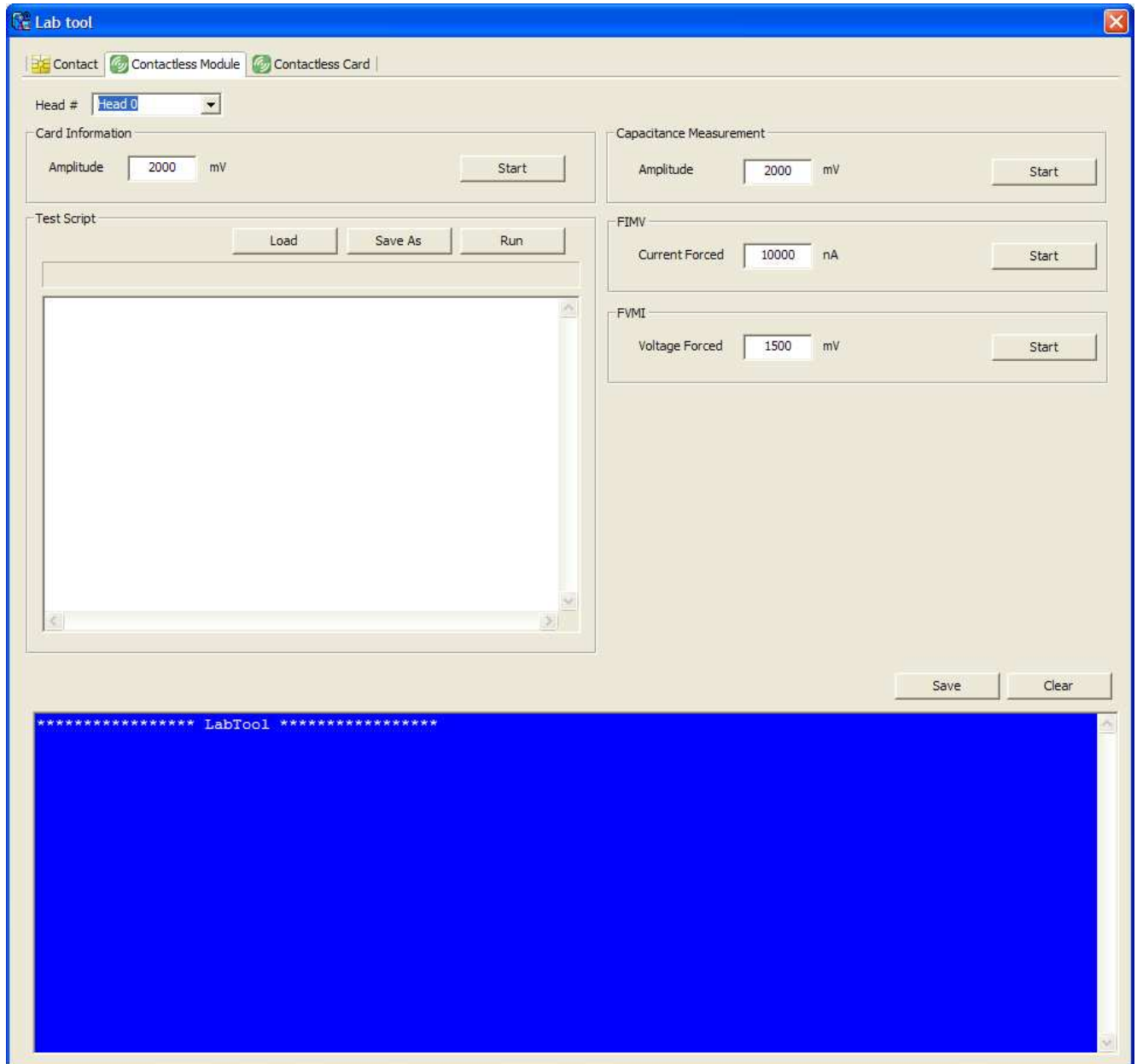
- Card Model: Determines the contactless card model.
- PUPI: Identifier of the contactless card.
- ATQB Value: Answer to request command for Type B cards.

4.2 RESONANCE FREQUENCY

To perform measurements click on the Start button in the *Resonance Frequency* section. Measurements have to be done using a 1 meter coaxial cable connected on AC1 channel and an ISO Coil.

In order to perform a resonance frequency measurement, the US-CLT must be first calibrated. The calibration steps must be done at least one time, when the US-CLT is powered-on. To perform a calibration, click on the Calibration button.

5 CONTACTLESS MODULE



5.1 CARD INFO

The User Interface is only used to launch the application and to get the report about the contactless card.

It manages only contactless card Type A and contactless card Type B which follow the ISO 14443 standard.

5.1.1 Field Amplitude

Set the carrier field amplitude. The carrier field on the selected antenna will be shortly enabled to automatically measure the new field amplitude value and configure the reception stage.

Values are given in mV (Default value is 2000).

5.1.2 Execution

The 'Start' Button launches the CardInfo application.

Depending on the contactless card type information will not be the same:

5.1.3 Information contactless card type A

- Card Model: Determines the contactless card model.
- UID: Identifier of the contactless card.
- ATQAValue: Answer to request command for Type A cards.
- Compliant ISO14443-4: Tells if the PICC is compliant with ISO/IEC 14443-4.
- ATS: Answers to select command.

5.1.4 Information contactless card type B

- Card Model: Determines the contactless card model.
- PUPI: Identifier of the contactless card.
- ATQB Value: Answer to request command for Type B cards.

5.2 CAPACITANCE MEASUREMENT

To measure the contact chips' capacitors set a field amplitude (default 2000 mV) and click on the start button.

Capacitance measurement can be done from 1V up to 9V. The measurement of a true capacitor should not change according to the voltage, which is not true for a micromodule

5.3 FORCE CURRENT AND MEASURE VOLTAGE (FIMV)

Set a current in the FIMV section (default 10000 nA) and click the Start button to measure the voltage.

Forced current range in nA, with a step of 5000 nA : -5000000 to +5000000.

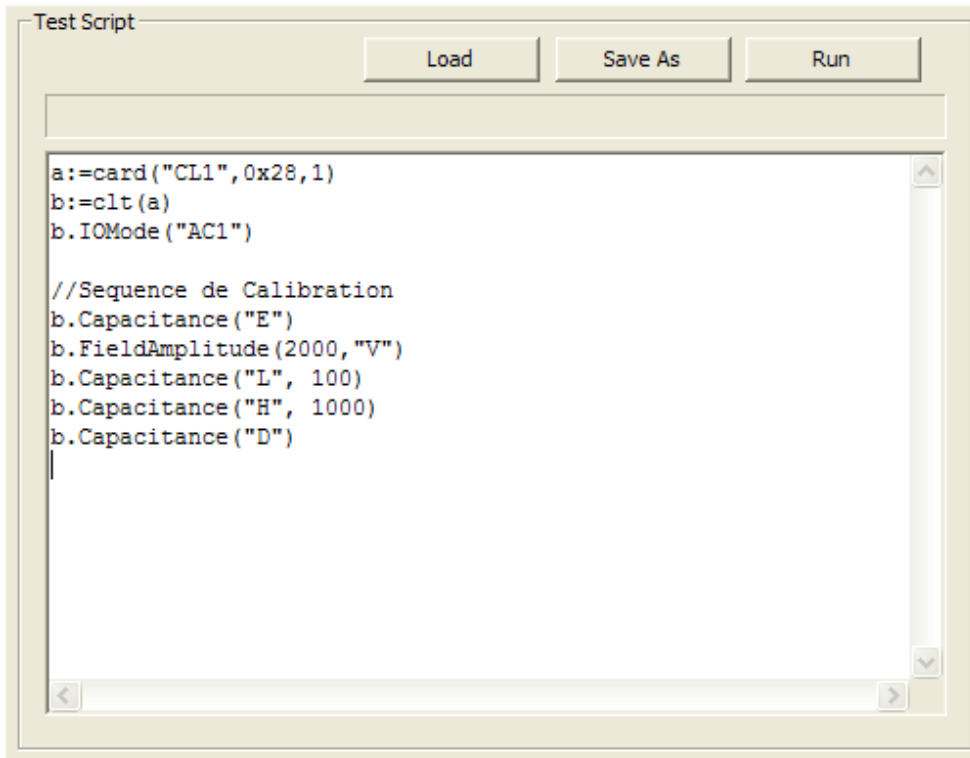
5.4 FORCE VOLTAGE AND MEASURE CURRENT (FVMI)

Set a voltage in the FVMI section (default 1500 mV) and click the Start button to measure the current.

Voltage range in mV, with a step of 5 mV: -8500 to +9500.

6 SCRIPT EXECUTION

In each view of the lab tool software a dedicated script window allow you to run SmartTalk script commands.



You can directly write your own script sequences by editing the script window or load an existing script file (*.mll) with the Load button.

Click on the Run button to execute your script. The result will be displayed in the lab tool output window.

Click the Save as button to save your script on a disk.

End of document