



## VisionArray Analysis Package

**REF** E-4060-1

 1 Piece

For the analysis of hybridization signals on VisionArray Chips



**IVD**

In vitro diagnostic medical device  
according to EU directive 98/79/EC

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## 1. Introduction

The VisionArrayAnalysis Package stands for a simple visualization and a quick analysis of the VisionArray Chip data. The analysis of a chip and the report of the results can be achieved in just a few minutes. Due to its *Wizard* format, the program navigation is easy and intuitive for the user. The scans are stored including all sample and chip data in an integrated database on the enclosed external hard drive.

## 2. Intended use

The software is intended to be used for the detection and analysis of hybridization signals on VisionArray Chips in combination with the corresponding VisionArray Chip File. When properly used, the presence or absence of the examined target sequences in a sample can be evaluated. In addition to the initial amount of the target sequences, further factors can influence the system. It is therefore not possible to access quantitative data on the basis of signal intensities. Depending on the chip type, the specific capture sequence for every dot is stored in the corresponding chip file and allows a qualitative evaluation of the sample. The identification of the dots is fully automated due to algorithms for pattern recognition.

For the rare case of damage or pollution of the glass slide, a tool for manual correction is implemented. The result of the dot identification is monitored by 3 control mechanisms.

This product is designed for *in vitro* diagnostic use (according to EU directive 98/79/EC).

Interpretation of results must be made within the context of the patient's clinical history with respect to further clinical and pathologic data of the patient by a qualified pathologist.

## 3. Clinical relevance

Please refer to the instructions for use of the respective chip.

## 4. Test principle

Sequence-specific DNA fragments in a pool of DNA fragments are detected by DNA/DNA hybridization with immobilized DNA catchers on a glass chip. First, the target sequences in this material have to be amplified via PCR and simultaneously marked with biotin molecules. Subsequently, the amplified sequences hybridize with the complementary DNA catchers on the glass chip. After the hybridization, unspecifically bound DNA fragments are removed by short and stringent washing steps. The specifically bound and biotinylated sequences are visualized by secondary marking with a streptavidin-peroxidase conjugate and a staining with tetramethylbenzidine (TMB).


## 5. Safety Precautions and Disposal

- ✓ Read the operating instructions prior to use!
- ✓ Do not alter any components of the VisionArray Analysis Package (including hardware and software)! For repairs contact your local distributor!
- ✓ Use an adapter for the local power line!
- ✓ Do not attempt to disassemble any components of the VisionArray Analysis Package! There is danger of an electrical shock! Opening your scanner will void your warranty!
- ✓ Do not subject the scanner to excessive vibration! It may damage the internal components!
- ✓ Your scanner operates best in temperatures between 10° C to 40° C!
- ✓ Do not use the scanner in rooms with high humidity ( $\geq 70\%$ )!
- ✓ Operate the system only after you have been advised by a qualified person!
- ✓ For disposal, send the hardware back to ZytoVision GmbH!

## 6. The VisionArray System

### 6.1 Terminological Conventions and Symbols

Following terminological conventions and symbols are used in the instruction for use:

<i>Italic</i>	specific terms (e.g. <i>Wizard</i> ); terms that occur in the software itself (e.g. <i>Save Changes</i> ); and trade names (e.g. <i>VisionArray</i> )
<b>Framed, bold</b>	buttons that occur in the software (e.g. <b>Scan</b> )
	critical steps that should be performed with particular care

### 6.2 Components and Accessories

The VisionArray Analysis Package consists of the components and accessories displayed in Figure 1:




Figure 1: Components of the VisionArray Analysis Package: 1) Scanner 8100; 2) Slide Holder; 3) Hand Scanner; 4) PC with preinstalled VisionArrayAnalyzer; 5) USB-Hub; 6) 1 TB External Hard Drive; 7) Computer Mouse

The provided PC runs under an English Windows operating system. The software is preinstalled on the computer and can be put into operation immediately.

### 6.3 Assembly




The VisionArray Analysis Package should be assembled by a sales representative in order to ensure the proper operation.

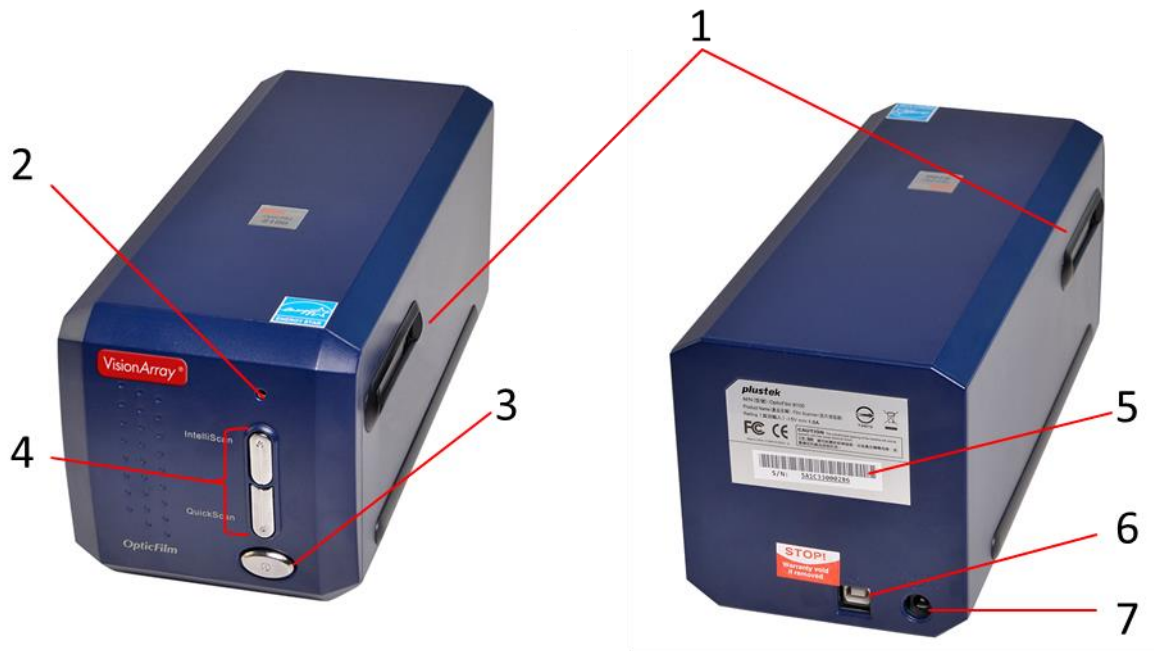
1. Connect the laptop with the enclosed power supply to a 220-250 Volt power outlet.
2. Connect the Scanner 8100 to a 100-240 Volt power outlet.
3. Plug the enclosed USB hub into a free USB 3.0 socket of the laptop and connect it to a 220-250 Volt power outlet. Mind the USB 3.0 symbol  for a faster data transfer.



Enclosed adaptors for the local power line might be necessary for step 1,2 and 3.


4. Plug the enclosed USB cable with the USB type B plug into the USB type B port (6 of Figure 2) at the back of the Scanner 8100 and connect it to any free USB port of the USB-Hub.
5. Plug the hand scanner in any free port of the USB-Hub.
6. Plug the USB 3.0 cable of the external hard drive into a free USB port of the USB-Hub.

-  The external hard drive is mandatory for the proper operation of a VisionArray analysis. Use only the enclosed product.
-  Do not install other hardware or software from 3rd party manufacturers, except printer driver.
- 7. A printer can be added to the system via the USB hub. If a driver has to be installed use the driver CD of the manufacturer.
- 8. The mouse dongle can be plugged into a free USB port on either the USB hub or the laptop.
-  Whenever unexpected problems occur, please contact [helptech@zytovision.com](mailto:helptech@zytovision.com) or your local distributor.



**Figure 2: Left: Scanner 8100 Front View; Right: Scanner 8100 Back View; 1) Slot for Slide Holder; 2) Power LED; 3) Power Button; 4) No function; 5) Serial Number Sticker; 6) USB Port; 7) Power Receptor**

Switch on the Scanner 8100 by pressing the power button. Afterwards switch on the PC with the VisionArray Analyzer Software. Restart the PC if you have started the scanner after the PC and the scan does not work. The software opens automatically when the system has started.

The VisionArrayAnalyzer Software runs under Windows as operating system. The Windows components are hidden for an easier handling and only the VisionArray Analyzer Software is visible in full screen mode. The windows button  gives access to the system functions.

Please note that it is not possible to make changes that influence the system in user mode.

All data are stored on an external hard drive in order to ensure security of personal data.

## 6.4 Test Material

The VisionArrayAnalyzer Software is delivered preinstalled on a laptop together with the Scanner 8100 and a hand scanner. A smooth chip analysis can only be assured in combination with the matching components.



The VisionArray Analysis Package should only be used for the analysis of VisionArray Chips. The corresponding VisionArrayChip File information needs to be present in the VisionArrayAnalyzer Software in order to be able to scan. New chip files can be imported if required.

## 6.5 Important Information

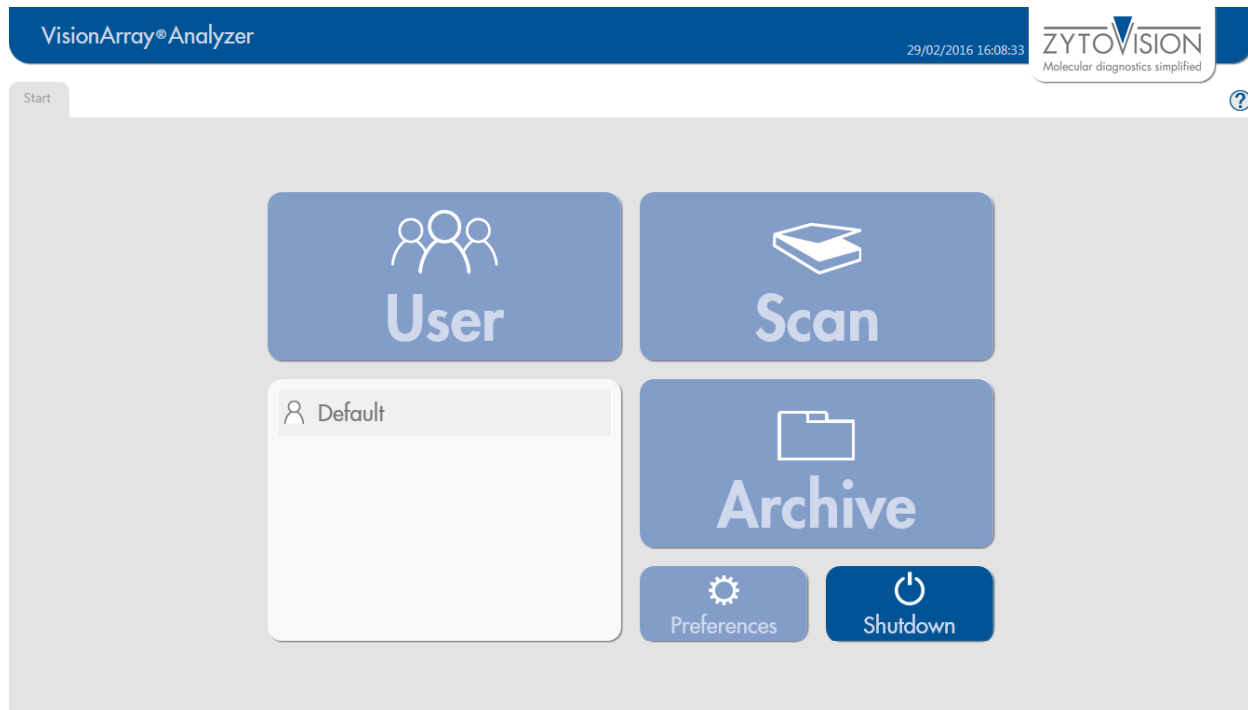
The following should be kept in mind:

- ✓ The VisionArrayChips and the Scanner 8100 have to be kept dust-free at all times! Dust particles and other foreign objects may damage the unit.
- ✓ The enclosed external hard drive must be used and be connected to the system at all times! Otherwise, the system will malfunction.
- ✓ Each new chip type has its own characteristic chip file that has to be installed prior to use!

## 7. Quick Guide Scanning

- 1) Turn on Scanner 8100.
- 2) Turn on PC.
- 3) Select a user  on the starting screen.
- 4) Press **Scan**, enter data and import chip information.
- 5) Insert chip into the Scanner 8100 and press **Scan**.
- 6) Check scan preview.  
Ok: proceed by pressing **Analysis**  
Not Ok: press **Previous** or **Rescan**
- 7) Check scan analysis.  
Ok: press **Next** to report  
Not Ok: Edit in expert mode 
- 8) Close view (data are stored automatically) or press **Print Report**.

## 8. Starting Screen

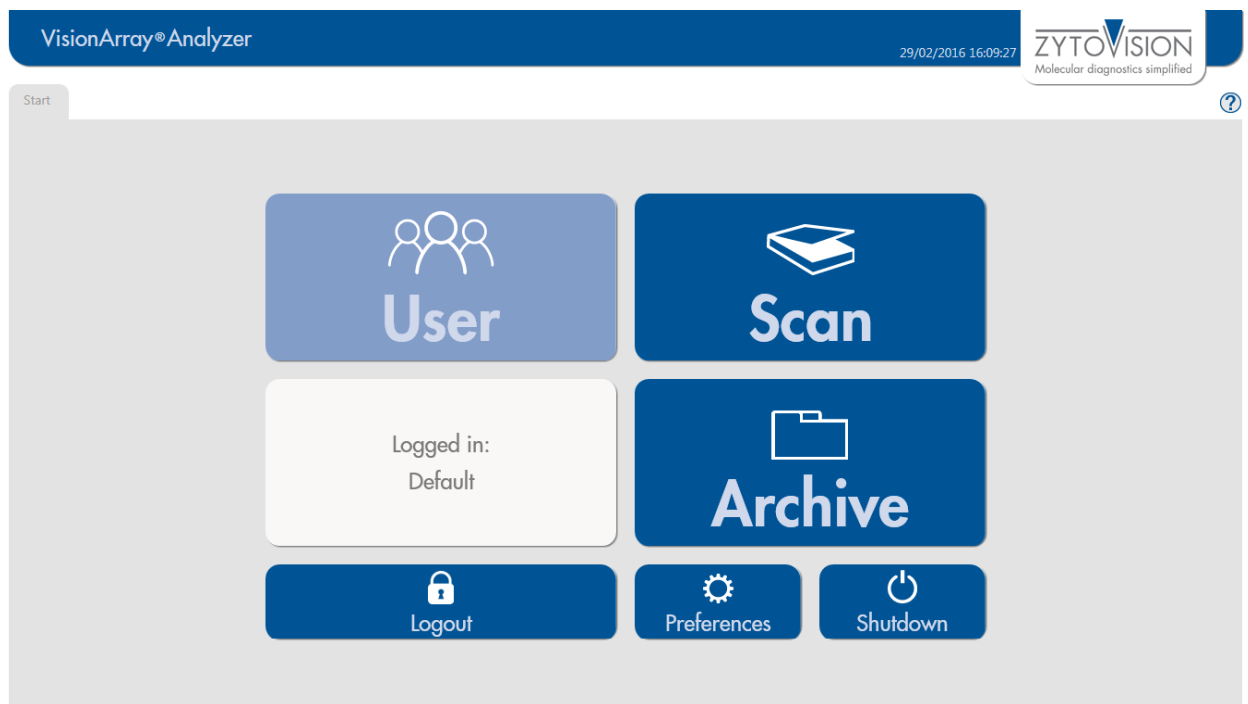


**Figure 3: Starting Screen, no user logged in**

The starting screen (Figure 3) of the VisionArrayAnalyzer Software gives access to all main control elements of the software. A user has to be logged in to be able to activate all control elements. Under **Preferences** a new user can be created.

Regardless of the login status the button **Shutdown**, which closes the program and shuts down the PC, and the Help-Function (?), can always be selected.

For the first setup of the system, select the preinstalled default user by double clicking.



**Figure 4: Starting Screen, user logged in**

When a user has logged in, all functions of the starting screen are accessible (Figure 4). All subsequent steps are saved under the logged in user.

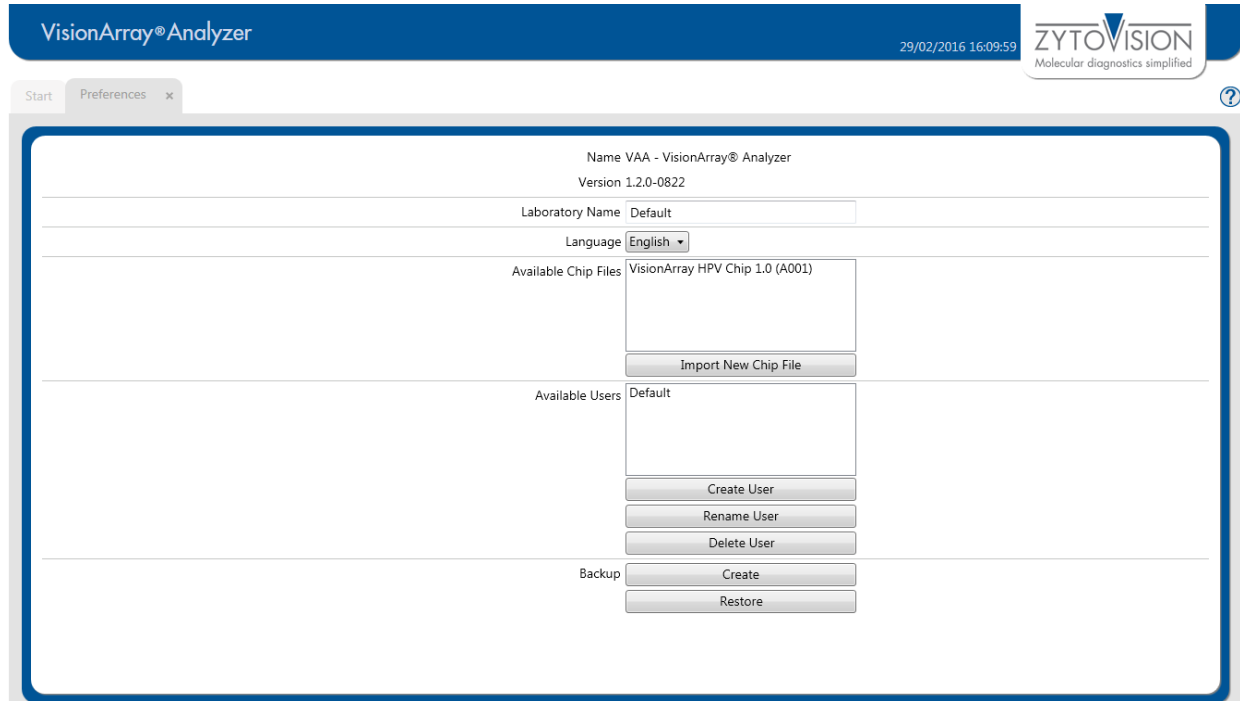
**Scan** enables the scanning of a VisionArrayChip. The data are stored automatically into a searchable **Archive** on the provided external hard drive and can be opened or edited if necessary.

**Logout** logs out the active user, but does not close the program.

**Preferences** leads to all program information of the installed software version. Additionally, new chip files can be imported, new users can be edited, and a backup can be produced and restored under this tab.

**Shutdown** closes the program and shuts down the PC.

## 9. Preferences



**Figure 5: Preferences tab**

The Preferences tab (Figure 5) gives an overview of the implemented program information such as version number, installed chip files and users. It is also possible to import new chip files, to create new users, to change the name of the laboratory, or to change the language. The default language is English.

### Chip Files

**Import New Chip File** imports the VisionArrayChip File of a new type of chip. The button opens an explorer window in which the chip file can be selected and imported from an external device.

New chip files can be downloaded as a .zip file on the ZytoVision Homepage:

<https://www.zytovision.com/products/visionarray>



The Chip file has to be unpacked before it can be imported.

After the import, the new chip file appears in the list and can be used immediately.

### User

Below the section with the installed chip files the users created for the program are listed. The buttons **Create User**, **Rename User** and **Delete User** are also located in this section.

### Backup

Furthermore, it is possible in the Preferences tab to backup all saved data via **Create** or to **Restore** saved data from a secondary external device. The recovery process overwrites the database entirely with the recovery file.



All data in the database that are not saved will be lost during this process. We recommend creating backup files on a secondary external device periodically in order to minimize the risk and amount of data loss due to computer problems.

Changes will be saved by closing the Preferences tab.

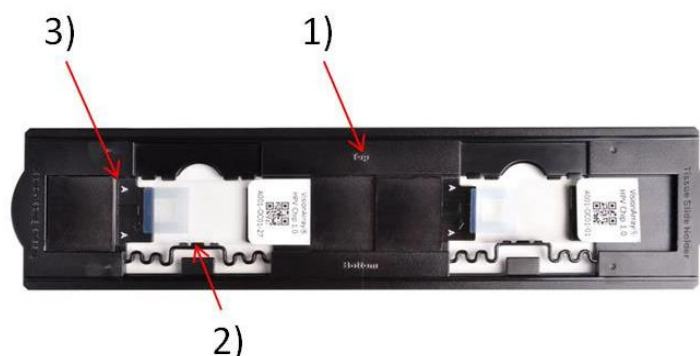


## 10. Scan of an Array

The slide holder of the Scanner 8100 (Figure 6) includes 2 slide slots that both can be used for scanning of an array. The VisionArrayChip is held in place by plastic rails that help with the insertion and ensure a successful scan.

The upper rim of the slide holder is marked with the word *Top* (1), the lower rim with the word *Bottom*. The VisionArrayChip has to be placed in the holder with the labelling on the top and the label field on the right.

In order to insert a VisionArrayChip, push the spring mechanism at the bottom of the slide holder (2) with the lower edge of the slide down and fix it to the top of the holder. The chip should be flush with the plastic edges of the holder (3). Poor positioning in the scanner may result in irregular scans, or the scanner may not recognize the array field and the scan may need to be repeated.



**Figure 6: Two VisionArrayChips in the slide holder of the Scanner 8100; 1) Marking of the upper side (Top); 2) spring mechanism; 3) plastic border**

The slide holder can be inserted into the Scanner 8100 via the two slide holder slots on both sides of the scanner. The slide holder has to be inserted into the scanner until the chip is fully comprised by the scanner and the holder clicks into place (Figure 7). Do not alter this position, since small deviations from this position lead to irregular scans and the array field might not be scanned properly.



**Figure 7: Left: Scanner 8100 with slide holder; Right: inserting a slide holder**

In order to scan a chip in the second slot of the chip holder, push the holder further into the scanner as indicated in Figure 8 until it clicks into place.



Figure 8: Scanner 8100 with slide holder; scanning the second slot

## 11. Enter Data and Start a Scan

**Scan** on the starting screen opens a tab for data entry (Figure 9). All individual data about the case/patient and the chip can be entered here.

Figure 9: Scan tab

### Case (sample and/or patient data)

In the upper section of the Scan tab case/patient data may be entered. The completion of the field is optional and not necessary for conducting a scan. The entered data are stored in the archive. Editing or completion of the data is not possible at a later time. We recommend a detailed entry of all essential data in order to make the assignment as easy as possible.

Slide (chip-information)

In the lower section of the Scan tab all relevant data for the chip type are entered. The information can be entered manually or quick and easy by clicking **Get Slide-ID via Hand Scanner** and scanning the QR-Code on the VisionArrayChip with the enclosed hand scanner. This hand scanner should be held a few centimetres above the QR-code (Figure 10/11). By pressing the switch on the scanner it is activated and a light indicates the scanning area. When the data are captured, an acoustic signal sounds and the chip information is collected automatically.



Figure 10: Hand scanner and chip in a slide holder



Figure 11: Exemplary chip label with unique identifier

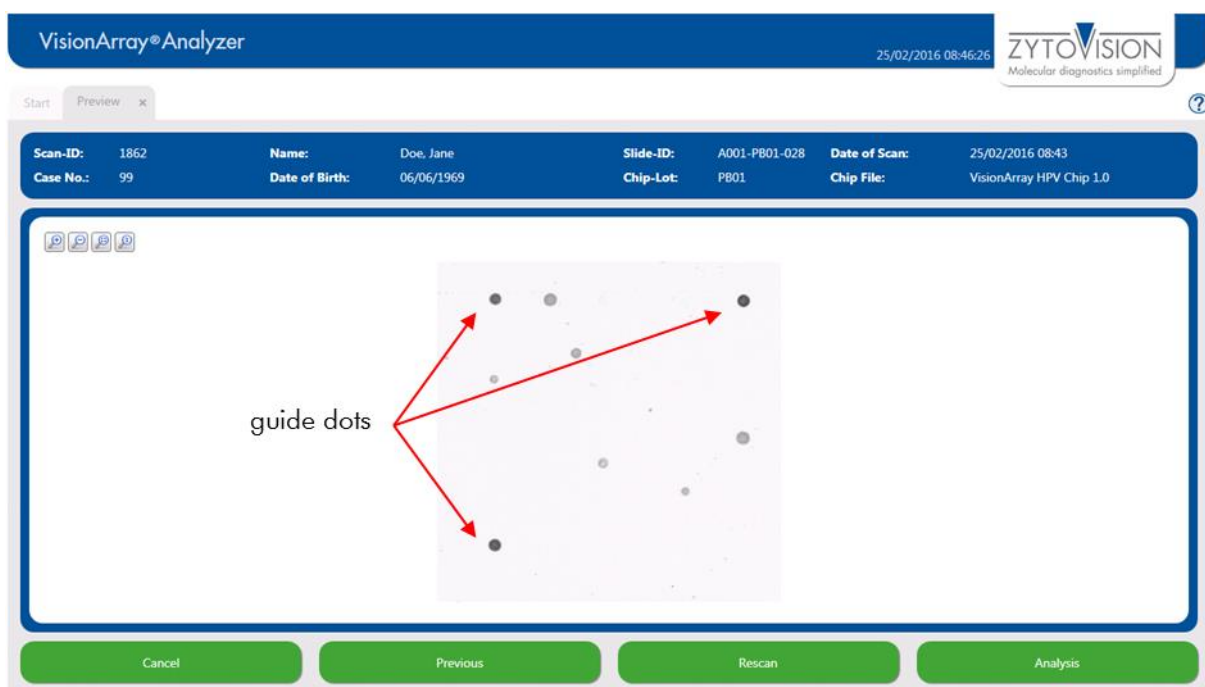
**12. Preview of a Scan**

Figure 12: Preview of a scan

In the Preview tab the performed scan is displayed as a greyscale image (Figure 12). This tab can be used to check whether the chip is inserted correctly (using the 3 guide dots on each VisionArray chip) or whether there is major pollution on the array field. If necessary, the chip holder can be removed and corrections can be made by adjusting the orientation of the chip or removing the pollution. A new scan can then be performed by clicking **Rescan**.

Click **Previous** to return to the Scan tab and correct spelling mistakes, for example. The changes are applied automatically and the chip is scanned again by clicking **Scan**.



**Cancel** closes the view and all entered data about patient/sample and chip are lost.

If the preview of the scan is correct, the automated evaluation of the scan can be started by pressing **Analysis**.

## 13. Analysis Screen

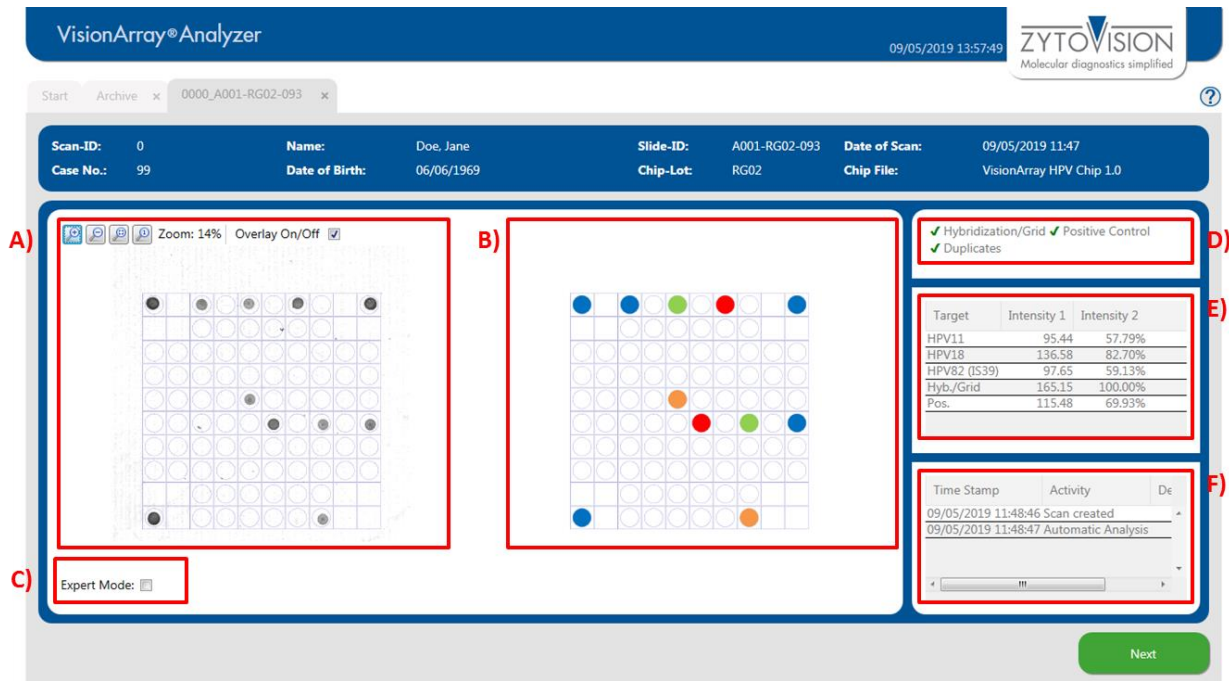


Figure 13: Analysis screen; A) Original Scan; B) Schematic view of the detected dots; C) Expert mode; D) Control mechanisms; E) Signal intensities; F) Analysis Protocol

### 13.1 Overview of the Analysis Screen

The analysis screen is divided into 3 parts (Figure 13):

On the left side the original greyscale scan is displayed (Figure 13 A). A grid can be toggled on/off by checking the box *Overlay On/Off*. The grid is toggled on per default. The visualization of the signals of the chip can be adjusted with the and buttons (see chapter 13.4). The automated evaluation of the array is performed based on the preview. The scan and all corresponding data are now saved in the database and cannot be edited anymore.

The centre of the analysis screen (Figure 13 B) shows a schematic view of the dots that have been detected by the software. The signals depend on the chip type. The associated information is stored in the corresponding chip file. The signals are colour-coded depending on the chip type (see manual of the VisionArrayChip).

On the right side of the screen the control mechanisms, the signal intensities, and the analysis protocol are located (Figure 13 D,E,F).

### 13.2 Control mechanisms

The VisionArrayAnalyzer Software has 3 different control mechanisms (Figure 13 D).

#### Hybridization/Grid-control:

This control mechanism is based on the 3 guide dots in the corners of the array field that the software uses for orientation. The software spans the grid based on these 3 dots and allocates the positions to the signals. Additionally, the presence of the guide dots shows successful hybridization, labelling and staining. If the guide dots are too weak (intensity 1 < 150), a warning appears at this point. This may indicate poor hybridization.

#### Positive control

The positive control on the VisionArray Chips is used for assessment of the quality of the used PCR-template and of the PCR.

### Duplicates

The third control mechanism implements a check by duplicates. This control is based on the fact that all catcher molecules are applied in duplicates at different positions on the chip. A positive signal is therefore always visualized by 2 dots.

A green checkmark indicates the correct sequence of checks for each test. Irregularities are displayed by a red cross. Weak guide dots are highlighted by a yellow exclamation mark. The software evaluates the data even if the positive control or duplicates fail. The user has to assess the validity of the data by himself.

## 13.3 Signal Intensities and Analysis Protocol



The signals with corresponding intensities are listed below the control mechanism tab (Figure 13 E). Since all dots are applied as duplicates (triplicates for the guide dots) the intensity value of the dots is the result of the mean.

Intensity 1 shows the arithmetic mean of the grey value of the dots.

Intensity 2 shows the percentage signal of the guide dots. The guide dots are set as 100% intensity for an optimal hybridization result.

Below is a list of all actions that were performed after saving in the analysis protocol (Figure 13 F).

## 13.4 Zoom Level

The original scan and the schematic view are originally shown as an overview of the chip (Figure 13A). A section of the chip can be enlarged by pressing the  or by clicking into the overview and scrolling the mouse wheel up (Figure 14). In order to zoom out it is possible to either use the  or to scroll the mouse wheel down after clicking on the scan.

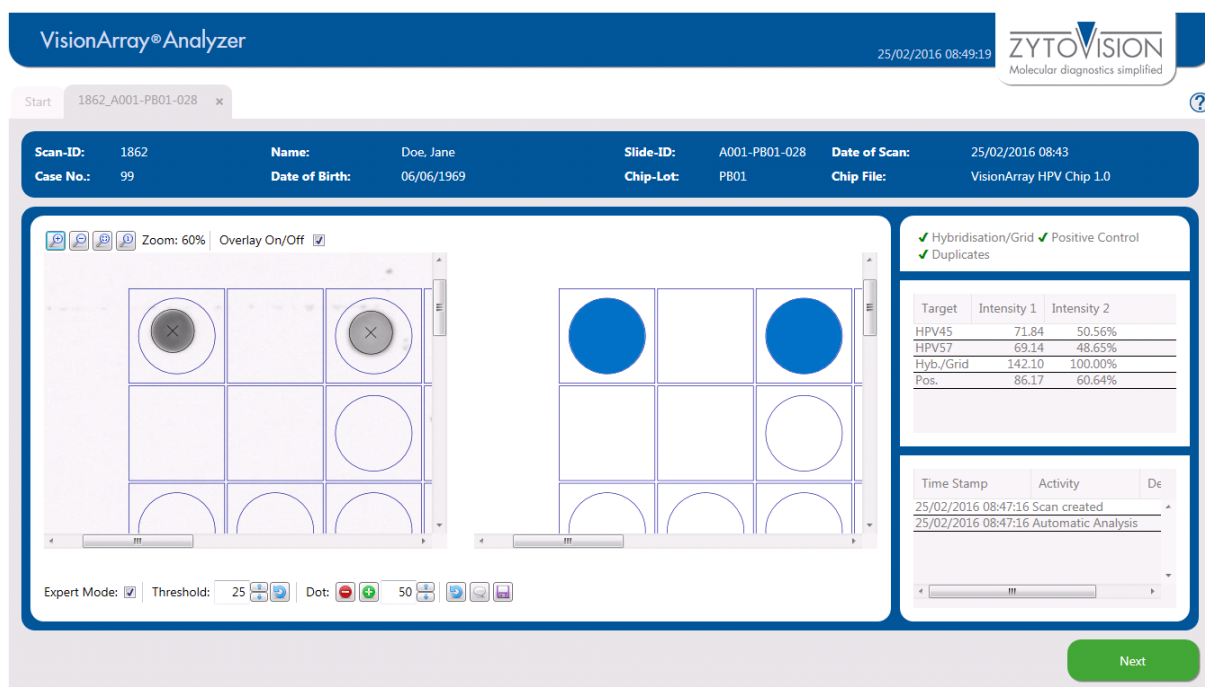


Figure 14: Analysis screen - zoomed in

## 13.5 Expert Mode

If it is necessary to make manual changes during chip analysis, the Expert Mode can be toggled on (Figure 13 C). All tools in the expert mode are visible when the box in the lower left corner is checked (Figure 15).



Figure 15: Active Expert Mode



### 13.5.1 Change Threshold


The threshold describes the negligible background on the chip (Figure 16). The threshold is predefined for each chip type. All dot signals that are stronger than the threshold are visualized in the schematic view and the table. Weaker signals are neglected and are not used for the evaluation. Depending on the samples and the detection process, signals or background could be extremely strong. By adjusting the threshold manually it is possible to react to the individual circumstances. By pressing  the original threshold is reset.



Figure 26: Expert Mode - Threshold

### 13.5.2 Add/Delete Dots





If the software does not correctly detect a weak dot or a dot with an unusual morphology, it is possible to add it manually via Dot:  (Figure 17). It is possible to either add a dot with a preset size or set the size with the radius indicator. The added dot is displayed in the scan and the schematic view, respectively.



Figure 37: Expert Mode – Add/Delete Dots

In rare cases, pollutions on the array field can be wrongly interpreted as positive dots. Via Dot: , false positive dots can be removed in the Expert Mode (Figure 17). After clicking  the dot of interest can be selected and removed. The affected grid field is marked with an "X" to indicate a deleted dot. The changes are visible immediately in the schematic view, the detection status, and the listing table (Figure 18). The changes appear in the protocol only after changes have been saved by clicking the  symbol.

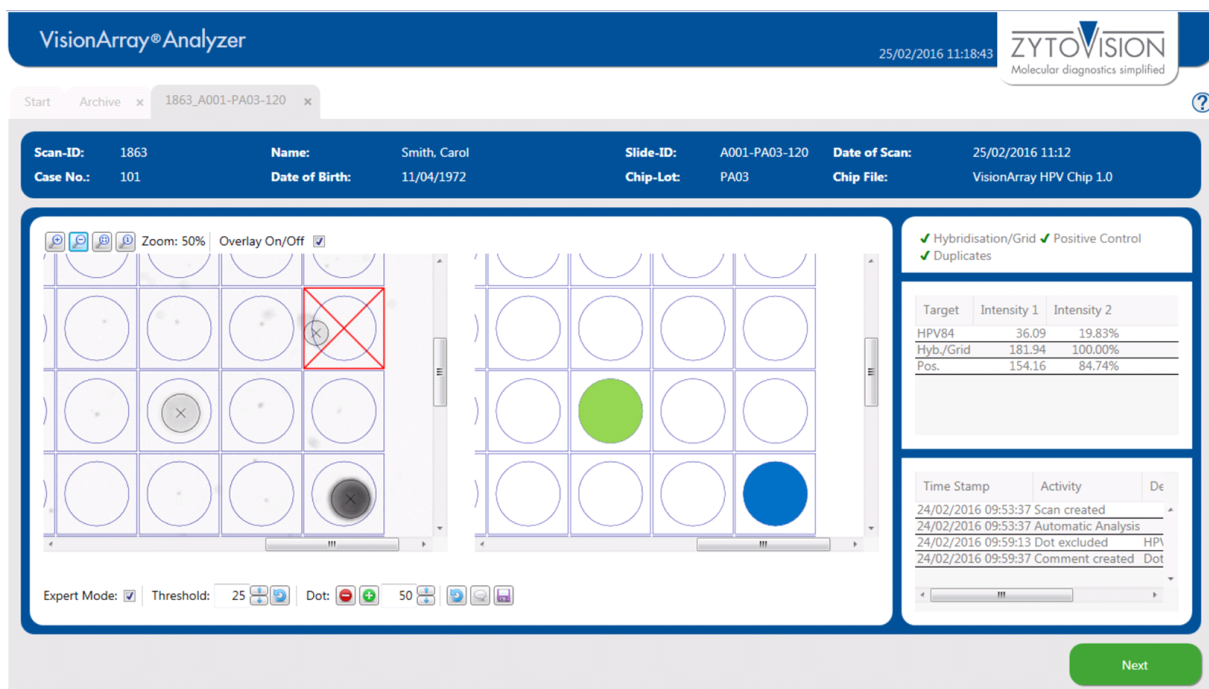





Figure 48: Analysis screen - excluding a dot


Addition or deletion of dots can be repeated infinitely. A deleted dot can be added again for the analysis by pressing  and vice versa.

### 13.5.3 Reset and Saving Options

All changes that have been made manually can be reset to the state of the automated scan by pressing the  button.

The changes can be saved by clicking the floppy disc symbol  or by closing the Expert Mode. After saving, all changes are listed in the analysis protocol.

### 13.5.4 Comments

The speech bubble icon  enables a comment field, where remarks can be made by the user. The comments will be displayed in the analysis protocol. Note that comments are also displayed in the anonymous reports. Personal data should therefore not be included in the comments.

## 14. Report

All information about a chip analysis can be printed or saved as a PDF-report (Figure 19).

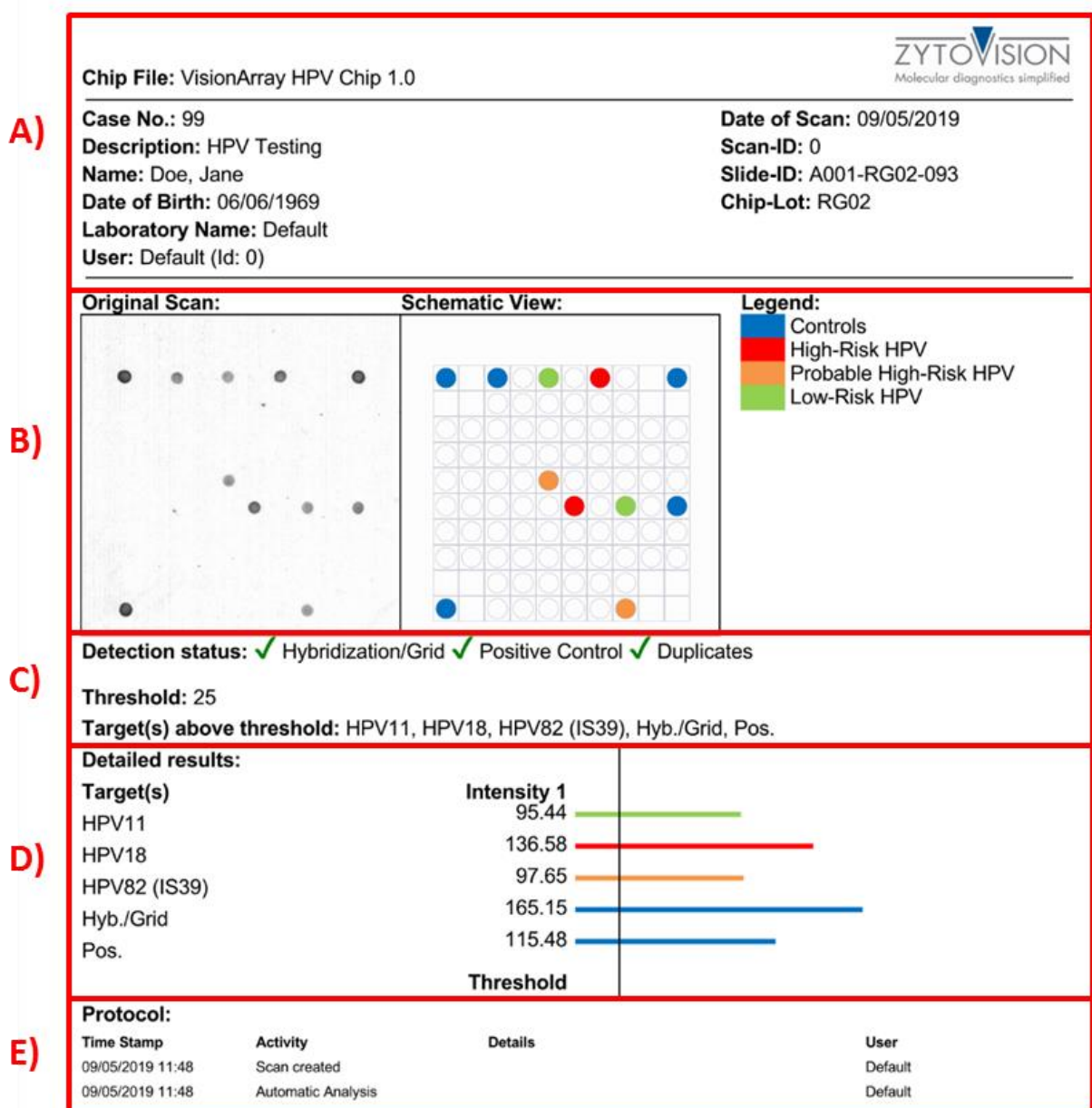


Figure 59: PDF-Report: A) Sample, patient, and chip information; B) Original scan and schematic view of the scan including legend; C) List of all controls, of the threshold, and of the detected signals; D) List and graphical display of the signal intensities; E) Protocol with detailed listing of all performed actions.

15. Data Export

In addition to the report of the data, it is possible to export the scan and the calculated signal intensities (Figure 20). Two common data and graphic formats are available under *Advanced Export*. To ensure data protection, the reports can be printed or exported anonymously by activating the anonymous report checkbox.

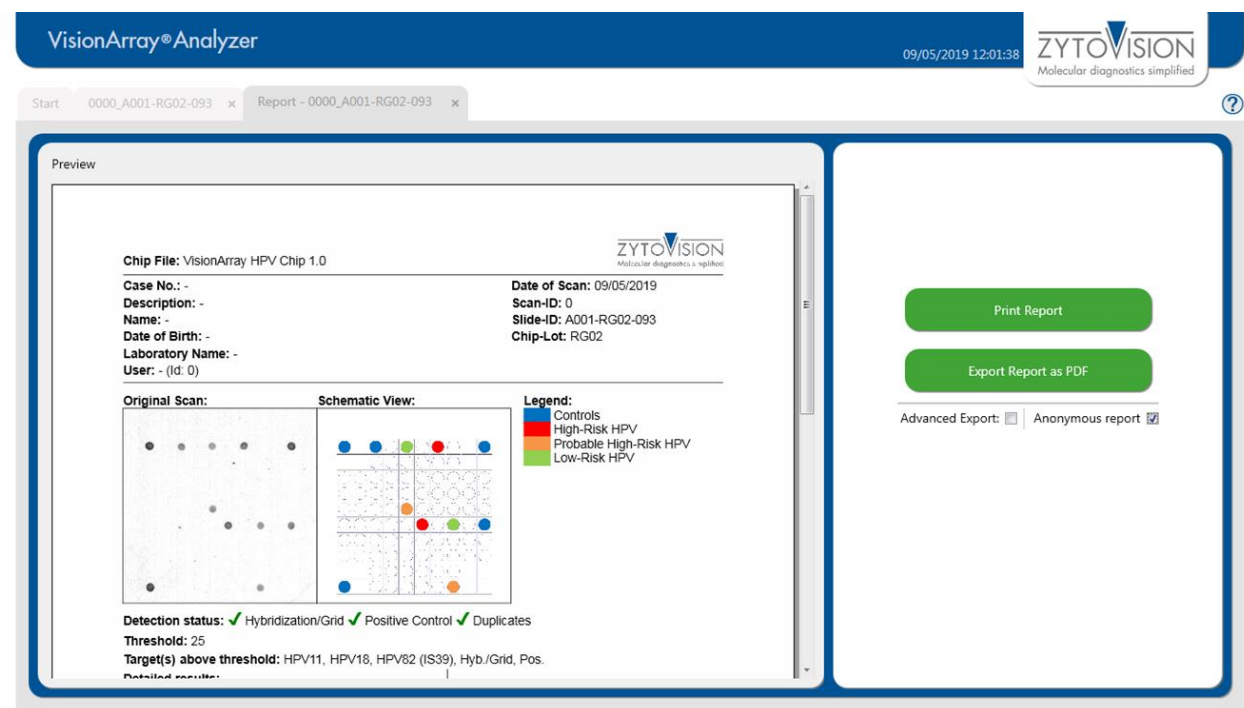


Figure20: Possible export options

16. Archive

The Archive tab can be accessed from the start screen of the program. All chip files and the collected data of the VisionArray Analyzer software are automatically stored in the database on the supplied external hard drive and are accessible from this tab.

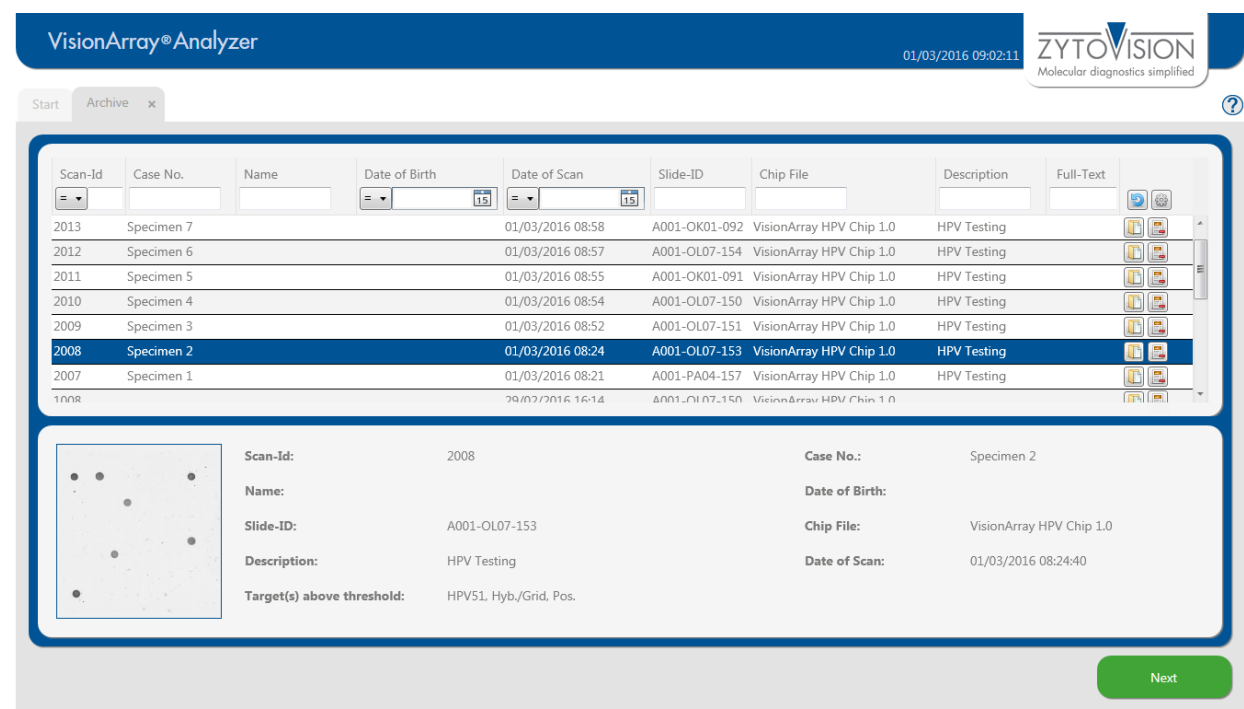







Figure21: Archive tab



The database entries are displayed in table format (Figure 21). The information corresponds to the entered data in the Scan tab. The columns can be individually adjusted. Columns can be inserted or hidden via the setup icon , or moved into different positions by clicking and holding the column with the mouse and dragging them to the desired position. The database display is set to the default settings by selecting *reset* under  or after restarting the program.

It is possible to search the single columns or with the *Full-Text Search* the whole database for specific datasets. The button  deletes all entries in the search masks.

By selecting a single dataset, a preview of the scan is shown. The dataset of interest can be opened with a double click or by selecting it and clicking the open-icon  or **Next**. The selected dataset opens in the Analysis view and can be edited or the report can be opened as described above (see chapter 12).


A dataset can be deleted irretrievably by clicking the delete button .

## 17. Data Storage and Security

All scans or analyses that were produced by the VisionArray Analyzer Software are stored in an internal database located on the enclosed external hard drive in order to guarantee the protection of personalized data and data loss due to technical issues with the computer.

We recommend making regular backups of the data on a secondary external device in order to avoid data loss (see chapter 9).

## 18. Help Function

The Help Function can be activated via the question mark  in the upper right corner in order to open a comprehensive guide for every tab of the VisionArray Analyzer Software.

Our experts are available to answer your questions. Please contact [helptech@zytovision.com](mailto:helptech@zytovision.com)



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