

OneArray[®]



Model Plant miRNA OneArray[®] User Guide

www.OneArray.com



Notice to the User



It is important that users read the entire manual before commencing work.

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✧ **User Guide and Technical Support**

Electronic version of this manual is available on the enclosed Product Support CD, and online at:

www.onearray.com

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✧ **Feedback**

We welcome your feedback regarding our products and this manual.

Please contact us at:

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All comments are welcome.

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Last updated Sep 2011

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Thank You

Phalanx Biotech Group would like to extend special thanks to our customers who have provided feedback that enabled us to improve the Model Plant miRNA OneArray[®] User Guide.

Model Plant miRNA OneArray[®]

User Guide

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Getting Started

Please read the introductory information below to help familiarize yourself with miRNA OneArray[®] before use.

Product Contents

- Model Plant miRNA OneArray[®] DNA Microarrays
- miRNA OneArray[®] 1.5X Hybridization Buffer I
- miRNA OneArray[®] Hybridization Buffer II
- Spare round cap tube
- Model Plant miRNA OneArray[®] User Guide
- Spotted Region Guide
- Product Support CD, which contains the following:
 - Sample Images
 - Model Plant miRNA OneArray[®] gal file(s)
 - Model Plant miRNA OneArray[®] probe sequences
 - Model Plant miRNA OneArray[®] annotation file
 - Model Plant miRNA OneArray[®] microarray layout
 - Model Plant miRNA OneArray[®] Control Probe list
 - Model Plant miRNA OneArray[®] User Guide (electronic version)

Other Necessary Apparatus (Not Supplied)

Apparatus

- Water bath/heating block
- Powder-free gloves
- Clean, blunt forceps
- Micropipettors
- Sterilized and nuclease-free pipet tips
- Sterilized and nuclease-free microcentrifuge tubes
- High-speed microcentrifuge
- Low-speed tabletop microcentrifuge with slide holder attachment
- Vortex mixer
- Hybridization oven
- Hybridization accessories: chamber cover slides, etc.
- Rectangular slide staining dish and slide rack for washing microarrays
- Thermocycler
- Microarray scanner for standard 1” x 3” format (see Table 8 under “miRNA OneArray[®] Microarray Scanner Specifications” for a list of compatible scanners)
- Hybridization systems (optional)
- Automated hybridization station (optional)

Other Necessary Reagents (Not Supplied)

Reagents

- De-ionized nuclease-free water
- Cyanine 3- or 5-labeled miRNA sample
- 20X SSPE stock solution, sterile filtered
- 20X SSC stock solution, sterile filtered
- Wash Solutions, sterile filtered (four types, approximately 250 mL of each is required per experiment):
 - Wash I: 2 X SSC, 0.2% SDS
 - Wash II: 2 X SSC
 - Wash III: 0.2 X SSC
 - **NOTE:** SDS must be molecular biology grade.
- 100% Ethanol
- Pre-hybridization Buffer, prepared and sterile filtered immediately prior to pre-hybridization:
 - 5 X SSPE, 0.1% SDS, 1% BSA
 - **NOTE:** BSA must be molecular biology grade.
- Deionized **formamide** to be added to the miRNA OneArray[®] 1.5 X Hybridization Buffer prior to use (see Step 4A).

Important Notes on Microarray Handling and Storage

Storage Conditions

- Store unopened miRNA OneArray[®] product at room temperature.
- Store opened miRNA OneArray[®] product at 4°C.
- Store miRNA OneArray[®] 1.5 X Hybridization Buffer I at room temperature.
- Store miRNA OneArray[®] Hybridization Buffer II at -20°C temperature.

NOTE: If the product is received with an open bag, please contact Phalanx Biotech Customer Service for an immediate replacement.

Handling Microarrays



Please read this section carefully and follow the instructions!

- Polynucleotide probes are printed on the side of the slide with the barcode.
- To avoid irreparable damage of the printing area, **do not touch** the surface with bare hands, or with any other objects.
- Whenever possible, handle microarrays with clean blunt forceps to avoid contamination.



Open arrays should be used within a week.

Product Description and Overview

Model Plant miRNA OneArray[®] microarrays are made of polydeoxynucleotide probes spotted onto a proprietary chemical layer coated on top of a 1" x 3" (25 mm x 75 mm) standard-format microarray glass slide.

Each probe is spotted onto the array in a highly consistent manner using a proprietary, non-contact spotting technology adapted for microarray manufacturing.

Model Plant miRNA OneArray[®] v3 Content

Each microarray contains 1,018 unique Model Plant miRNA probes and 87 experimental control probes. Each unique probe has 3 features, and probes contain 100% of Sanger miRBase v17 miRNA content.

Model Plant miRNA OneArray [®] v3							
Scientific Name	<i>Arabidopsis thaliana</i>	<i>Brachypodium distachyon</i>	<i>Glycine max</i>	<i>Oryza sativa</i>	<i>Sorghum bicolor</i>	<i>Vitis vinifera</i>	<i>Zea mays</i>
Common Name	Arabidopsis	purple false brome	soybean	Rice	sorghum	Grape Vine	Maize
miRBase Code	ath	bdi	gma	osa	sbi	vvi	zma
Probe No.	211	104	188	350	65	119	200
miRNA No.	266	143	207	548	148	186	319
Total Probe No	1,018						
Repeat/ Probe	3						
Control Probe No.	117						
Database	Sanger miRBase v17						

Table 1: Model Plant miRNA OneArray[®] v3 Content

Using Model Plant miRNA OneArray®

This section provides you with detailed information about how to perform the steps necessary to complete the hybridization process to study gene expressions using the Model Plant miRNA OneArray® microarray.



Follow these detailed steps *exactly* to achieve the best experimentation results.

- **Step 1:** [Prepare the RNA Sample](#)
- **Step 2:** [Label the Target](#)
- **Step 3:** [Pre-Hybridize the Microarray](#)
- **Step 4:** [Perform the Hybridization Protocol](#)
- **Step 5:** [Wash the Hybridized Microarray](#)
- **Step 6:** [Scan and Extract Gene Expression Results](#)
- **Step 7:** [Check Control Probe Data](#)

Step 1:

Prepare the RNA Sample

IMPORTANT!



High-quality, intact RNA is essential for all gene expression microarray experiments.

There are many different RNA isolation protocols and commercially available RNA isolation kits. You should choose a solution that meets your specific needs. Kreatech, Stratagene, Ambion, Invitrogen and other reagent companies offer many different RNA isolation products. For more information, you can visit each company's Web site.

Once the RNA samples are isolated, you must confirm the quantity and quality of the samples. Similarly, many different protocols are available and you should choose a solution that is suitable for your needs.

For faster and more automated RNA analysis, you may want to consider the "No Cuvettes" Spectrophotometer from NanoDropTM, or the 2100 Bioanalyzer from Agilent Technologies. For more information, visit each company's Web site.

Step 2: Label the Target

General Guidelines for Target Labeling

There are many commercially available labeling kits for microarray analysis. Select a labeling kit or labeling method that is most suitable for your specific needs.

You may want to confirm the quality of the labeled target with the “No Cuvettes” Spectrophotometer from NanoDrop[®].

Follow the instructions provided by the reagent supplier. Indirect labeling with NHS ester dye and Kreatech miRNA labeling kit are recommended. Table 3, below, contains a list of products that have been tested for use with Model Plant miRNA OneArray[®].

<i>Table 3: Model Plant miRNA Preparation Products</i>	
Manufacturer	Product Name and Description
Ambion [®]	miRVana™ miRNA Isolation Kit
Ambion [®]	miRVana™ miRNA Labeling Kit
Kreatech	ULS micorRNA Labeling Kit
Pall	Nanosep 100K (miRNA isolation)

For RNA labeling, 2.5 µg total RNA (for Kreatech Labeling Kit) or 1 µg enriched miRNA (for Ambion Labeling Kit). Smaller volumes can lead to significant loss of sample and may increase the concentration of contaminants in the labeled RNA sample, leading to higher background signal.

It is best to use RNA as soon as possible after labeling, as exposure to air and light can reduce the signal of some dyes. If it must be left overnight, it is best to aliquot your labeled RNA

and store in the dark at -80°C. Avoid thawing and re-freezing RNA if possible, as freeze-thaw cycles can damage the RNA.

Step 3:**Pre-Hybridize the Microarray****General Instructions**

Model Plant miRNA OneArray[®] requires a pre-hybridization step prior to hybridization of the labeled target. The pre-hybridization step reduces background signals and increases the performance of the microarray. Complete the pre-hybridization step by carefully following the instructions below.

- 1) Warm the pre-hybridization solution (5X SSPE, 0.1% SDS, and 1% BSA) to 42°C.
- 2) Pour 25 ml room temperature 100% ethanol into the spare array tube.
- 3) Preheat the Model Plant miRNA OneArray[®] (s) in the round cap tube at 60°C for 10 min (hybridization oven recommended).
- 4) Remove the Model Plant miRNA OneArray[®] (s) from the round cap tube, place in the two outermost slots inside the tube containing 100% ethanol, close the cap, and let sit for approximately 15 sec.
- 5) Shake the round cap tube for 20 sec.
- 6) Remove and thoroughly rinse each array with deionized water to remove any residual ethanol.
- 7) Carefully and slowly, fully submerge the Model Plant miRNA OneArray[®] in an abundant amount of pre-hybridization solution for 2 hr at 42°C (35 ml is sufficient if using a round cap tube).



Try to insert the slides into the correct position the first time. Avoid inserting and removing the slides more than once in the pre-hybridization buffer.

- 8) After 2 hr, transfer the slide(s) to room temperature, distilled water and wash gently for 2 min.
- 9) Spin dry the slide(s) for 2 min. Store in a dry, dark place until hybridization. It is recommended that you use the slides in the hybridization protocol within 1 hr of completing the pre-hybridization process.

Step 4: Complete the Hybridization Protocol

Once you have completed the pre-hybridization step using one of the methods outlined in the [Step 3: Pre-Hybridize the Microarray](#) section, you are ready to complete the hybridization protocol.

There are many different hybridization protocols, apparatus, and instruments available that may be compatible for use with the Model Plant miRNA OneArray[®] microarray. Detailed instructions for using the glass cover slide method are described below.

For best performance and consistent hybridization results, it is recommended that you use the miRNA OneArray[®] Hybridization Buffers included with this product to complete the hybridization process.

Step 4A: ➔ Prepare Hybridization Solution Using the miRNA OneArray[®] 1.5 X Hybridization Buffer I (Included)



For correct use of this buffer, you must add a specific amount of formamide and labeled target. Please follow the instructions below carefully.

- 1) Spin down the stock miRNA OneArray[®] 1.5 X Hybridization Buffer I (~410 µl in each tube).
- 2) Add 90 µl of deionized formamide.
- 3) Warm the mixture to 42°C to completely dissolve the solution. Mix thoroughly.

Yield: 500 µl of miRNA OneArray® 1.5 X Hybridization Buffer I.

Step 4B.1:→ Complete the Hybridization Using the Glass Cover Slide Method

Hybridization Using Labeled Targets from Enriched miRNA Labeling Approaches

NOTE: The protocol that follows is for use with a single array. Take care when using a cover slide that the solutions from neighboring arrays printed on the same slide do not mix.

NOTE: If you perform hybridization using methods other than the basic glass cover slide method, it is recommended that you validate the protocol experimentally.

To complete this step, you will need to select a type of chamber or glass cover slide. Table 5, below, contains a list of products that have been tested and confirmed compatible for use with the miRNA OneArray® Buffer.

<i>Table 5: Compatible Glass Cover Slide Products</i>	
Manufacturer	Product Name
Corning®	Cover Glass (22 X 22 mm)
Erie Scientific Company®	mSeries LifterSlip™ 22X25I-M5226
BioMicro™	MAUI Mixer DC**
Phalanx Biotech Group	miRNA OneArray® Dual Hyb Chamber

**The MAUI DC Chamber requires the use of the MAUI Hybridization System. Details can be found at the manufacturer's website: <http://www.biomicro.com>.

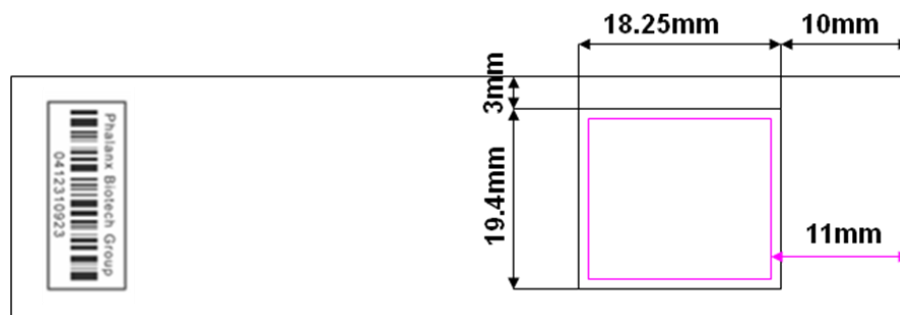
- 1) Ensure your work and experimentation area, as well as the Model Plant miRNA OneArray[®], are clean before adding the Hybridization Buffers solution to the target array.
- 2) Pre-warm the miRNA OneArray[®] 1.5 X Hybridization Buffer I with formamide at 37 °C for 10 minutes.
- 3) Mix your labeled miRNA sample and Blocker buffer with nuclease-free H₂O to yield a final volume of 17 µL.
- 4) Prepare the hybridization mix in a 0.2 ml Eppendorf tube according to the Table 6, below.

<i>Table 6: Hybridization Mix Measurements</i>	
For each array: 55 µl	
<i>Component</i>	<i>Final Volume</i>
1.5 X miRNA OneArray[®] Hybridization Buffer I	37 µl
miRNA OneArray[®] Hybridization Buffer II	1 µl
Target preparation plus nuclease-free ddH₂O	17 µl

- 5) Heat the mixture to 95 °C for 2 minutes (thermocycler recommended).
- 6) Maintain the mixture at a temperature of 60 °C until pipetting onto the array (thermo-cycler recommended¹).

¹ It may be helpful to set a Denature program in the thermocycler as follows:
 95 °C – 2 minutes
 60 °C – Hold

- 7) Place the Model Plant miRNA OneArray[®] slide, bar code up, atop the “Probe Printed Region Guide” (included, see Figure



1).

Figure 1: Model Plant miRNA OneArray[®] Microarray Glass Slide with “Probe Printed Region Guide” Plastic Underlay. (One array per slide)

- 8) Pipette the hybridization mixture onto the spotted region of Model Plant miRNA OneArray[®] Microarray. Avoid creating any bubbles.
- 9) Carefully place the glass cover slide over the spotted area in an even manner.
- 10) Place the entire labeled target plus the microarray set-up into a closable, chambered box* that is humidified by 2 X SSC buffer in the 37°C oven for 14 to 16 hours. A sealed chamber ensures that the appropriate humidity level is maintained during incubation. (See Figure 2).

Figure 2, below, provides an illustration of Step 4B.1, where the hybridization protocol is completed using the glass cover slide method, and specifically, the Model Plant miRNA OneArray[®] Microarray is placed into the chambered box.

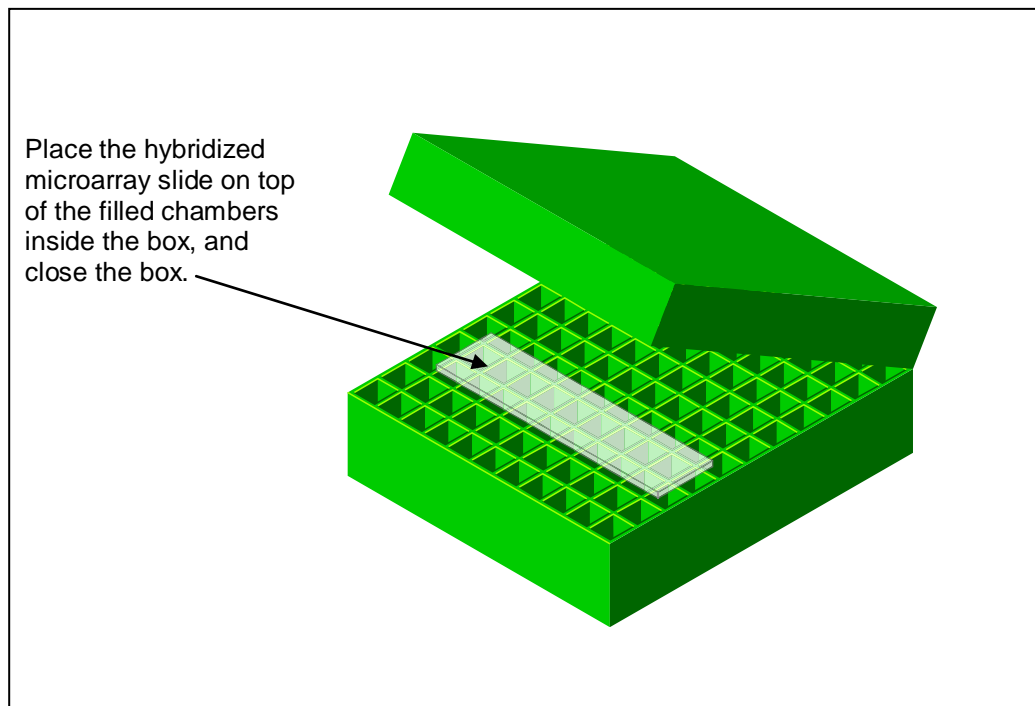


Figure 2: Step 4B.1 → Glass Slide inside Chamber Box²

² The Hinged 100-Place Storage & Freezer Polypropylene Box from USA Scientific has been used to complete this step with frequent success. The small (approximately ½ inch x ½ inch) chambers within the box are filled about ¾ full of buffer, then the microarrays are laid on top of the chambers. The box is then closed and placed inside the oven. For information about this product or other USA Scientific products, access their Web site at: www.usascientific.com

Step 4B.2: ➔ Complete the Hybridization Using the miRNA OneArray® Double Chamber Method

Hybridization Using Labeled Targets from Enriched miRNA Labeling Approaches

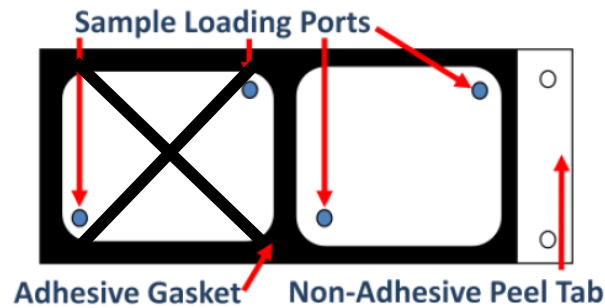


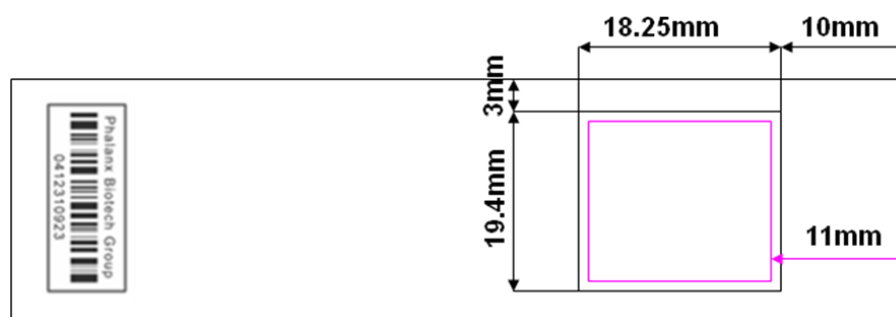
Figure 3: *miRNA OneArray® Double Chamber. (Model Plant miRNA OneArray® v3 is one array per slide only)*

- 1) Ensure your work and experimentation area, as well as the Model Plant miRNA OneArray®, are clean before adding the Hybridization Buffers solution to the target array.
- 2) Remove the clear liner on the back of the hybridization chamber.
- 3) Align the tab-end of the chamber to the edge of the microarray opposite to the barcode.
- 4) Slowly guide the chamber onto the microarray. If necessary, pivot the chamber at the tab- end to align the chamber to the microarray.
- 5) After the chamber has adhered, flip the microarray upside-down with the barcode facing down. On a hard and flat surface, use the applicator stick provided to press along the edges on the glass slide to ensure a secure seal.
- 6) Allow the adhesive to set for at least 30 minutes at 42 °C.
- 7) Pre-warm the miRNA OneArray® 1.5 X Hybridization Buffer I with formamide at 37°C for 10 minutes.
- 8) Mix the labeled miRNA sample and blocker buffer with nuclease-free H₂O to yield a final volume of 29 µL.

- 9) Prepare the hybridization mix in a 0.2 ml Eppendorf tube according to the Table 7, below.

<i>Table 7: Hybridization Mix Measurements</i>	
For each array: 90 µl	
<i>Component</i>	<i>Final Volume</i>
1.5 X miRNA OneArray[®] Hybridization Buffer I	60 µl
miRNA OneArray[®] Hybridization Buffer II	1 µl
Target preparation plus nuclease-free ddH₂O	29 µl

- 10) Heat the mixture to 95°C for 2 minutes (thermo-cycler recommended).
- 11) Maintain the mixture at a temperature of 60°C until pipetting onto the array (thermo-cycler recommended³).
- 12) Place the Model Plant miRNA OneArray[®] slide, bar code up, atop the “Probe Printed Region Guide” (included, see Figure



4).

Figure 4: Model Plant miRNA OneArray[®] Microarray Glass Slide with “Probe Printed Region Guide” Plastic Underlay. (One array per slide)

³ It may be helpful to set a Denature program in the thermocycler as follows:
 95°C – 2 minutes
 60°C – Hold

- 13) Pipette 75 - 80 μ l of labeled RNA solution through one port of the chamber of the array printing area while allowing air to escape through the other port. Avoid creating any bubbles.
- 14) Wipe excess solution from the ports. Covert ports with supplied circular seals.
- 15) Apply pressure to both seals simultaneously to ensure a secure adhesion.
- 16) Keep the chamber/ microarray assembly at 37 °C for 14-16 hrs. Rotation of the assembly during hybridization has been shown to increase the signal intensity.
- 17) Prepare the first wash solution of 2 X SSC, 0.2 % SDS and warm to 42°C.
- 18) Remove the chamber/microarray assembly from the hybridization oven and completely submerge it under the wash solution. Use forceps to slowly lift and remove the chamber starting from the tab-end. Use the holes in the tab for a better grip. Be sure to keep the microarray under the wash solution during removal.

NOTE: Please refer miRNA OneArray[®] sealed Hybridization chamber Guide to operate the chamber.

Step 5:

Wash the Hybridized Microarray

IMPORTANT!



Washed and dried microarrays should be scanned within a couple of hours.

NOTE: Do not allow the microarray(s) to be exposed to air for a significant amount of time; otherwise, an increased fluorescent background signal could appear.

- 1) Submerge the entire labeled target and microarray set-up with the cover slide still intact into a large container filled with 37°C 2 X SSC, 0.2% SDS solution.
- 2) Carefully remove the cover slide from the glass by gently shaking the glass slide so that the cover slide is freed while the slide is submerged.

NOTE: At this stage, the microarray has the highest concentration of unhybridized target and dye. Transfer the array quickly to the slide rack to minimize exposure to air.

- 3) Wash the slide(s) in the “rectangular, slide staining dish and slide rack” with the excess amount of pre-warmed 2 X SSC, 0.2% SDS solution for 5 min at 37°C.
- 4) Transfer the slide rack to a second slide staining dish that contains 2 X SSC solution and wash for 5 min at room temperature.
- 5) Transfer the slide rack to a third slide staining dish that contains 2 X SSC and wash for 5 min at room temperature.
- 6) Rinse each array carefully with 0.2 X SSC using a squeeze bottle.
- 7) Spin dry with a centrifuge for at least one minute.
- 8) Keep the microarray dry and in the dark until ready to scan.

Step 6:**Scan and Extract Gene Expression Results**

There are many scanners available to extract signals from Model Plant miRNA OneArray[®]. Data extraction using GenePix[™] 4100 from Molecular Devices is described below. Please refer to the respective company product instructions for appropriate use.

For a list of scanners that are compatible with the Model Plant miRNA OneArray[®], please refer to Table 8, below.

NOTE: The performance of each scanner may differ. Therefore, to ensure best results, it is recommended that the scanner be adjusted based on standard microarray calibration parameters. Turn on and warm up the scanner for the duration according to manufacture instructions for the scanner.

Use the .gal file and Gene List provided with this product, or refer to our Web site at:

www.onearray.com

Model Plant miRNA OneArray[®] Microarray Scanner Specifications

Select and use a microarray scanner that meets the specifications below.

Microarray Scanner Specifications

Format capabilities:	1" x 3" (one inch by three inch) glass slide
Molecular capabilities:	Able to accurately detect, activate and read Cy3 and Cy5 fluorescent molecules

Table 9, below, contains a partial list of microarray scanner products that are compatible for use with the Model Plant miRNA OneArray[®] microarray. Please refer to the respective company website for more information about the products listed below.

<i>Table 9: Compatible Microarray Scanners</i>	
Manufacturer	Product Name and Description
Molecular Devices	Axon GenePix[®] 4000, 4100, and 4200 series
Genomic Solutions[®], Inc.	GeneTAC[™] 2000
Perkin Elmer[®], Inc.	ScanArray[™] 5000
TECAN[®]	LS 200/300/400
Agilent Technology	DNA Microarray Scanner G2565B

Step 7:

Check the Control Probe Data

Model Plant miRNA OneArray[®] Microarrays contains built-in control probes for performance monitoring of the hybridization process. They are used to confirm or deny whether the experiment was completed successfully. Please visit

http://www.phalanx.com.tw/Support/MRmiOA_CP.php

for more detailed information about the experimental controls on your miRNA OneArray[®] product.

Additional information about the control probes is included on the Product Support CD, and on our Web site at:

www.onearray.com

OneArray[®] Product Family

■ Human OneArray[®] v5



- 29,187 human genome probes
- 1,088 experimental control probes
- Composition: RefSeq release 38 and Ensembl release 56

■ Mouse OneArray[®] v2



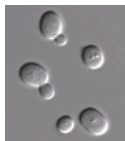
- 26,423 mouse genome probes
- 872 experimental control probes
- Composition: RefSeq release 42 and Ensembl release 59

■ Rat OneArray[®] v1



- 24,358 rat genome probes
- 980 experimental control probes
- Composition: RefSeq release 42 and Ensembl release 59

■ Yeast OneArray[®] v1



- 6,958 yeast genome probes
- 684 experimental control probes
- Composition: AROS v1.1 and YBOX v1.0

■ Rice OneArray[®] v1



- 22,003 rice genome probes
- 824 experimental control probes
- Composition: RGAP v6.1 and BGI 2008

OneArray[®] Product Family (miRNA)

■ Human miRNA OneArray[®] v3



- 1,711 unique miRNA probes
- 189 experimental control probes
- 3 features per probe
- 99.94% of Sanger miRBase v17 Human miRNAs

■ Mouse&Rat miRNA OneArray[®] v3



- 1,320 unique miRNA probes
- 144 experimental control probes
- 3 features per probe
- 100% of Sanger miRBase v17 miRNAs

■ Model Plant miRNA OneArray[®] v3



- 1,018 unique miRNA probes
- 117 experimental control probes
- 3 features per probe
- 100% of Sanger miRBase v17 miRNAs



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