

## 96-Well Microplate printing using Arrayjet Inkjet Bio-Printing Technology

### Printing Versatile High-Resolution Microarrays onto 96 Shallow Well Plates and 96 Well 2 Part microplates Using Arrayjet Microarrayers

#### Introduction

Shallow well plates and two part plates (flat glass or similar material of same dimensions than a microplate) can be printed using Arrayjet instruments by replacing the slide trays by target microplates trays. It has been observed that excellent printing will be achieved by printing onto microplates and that the only testing needed refers to good spot spacing and accurate morphology in the 96 areas of the microplate.

#### Experimental Design

The test indicates spot printing onto 96 well microplates. This procedure only covers for testing the printing capabilities onto Proxiplates (shallow well) and two part-plates type substrates. The fluorescence levels or any other indication for consistency is not covered.

#### Substrates

The following substrates could be considered:

##### 1. Shallow well plates (Proxiplates)

Proxiplates are standard flat bottom 96 well microplates, specifically the Perkin Elmer ProxiPlate 96 or other plates of the same dimensions (dimensions shown in figure 1). The shallow plates have a height of approximately 1.4 cm and a special tray needs to be built to accommodate that height.

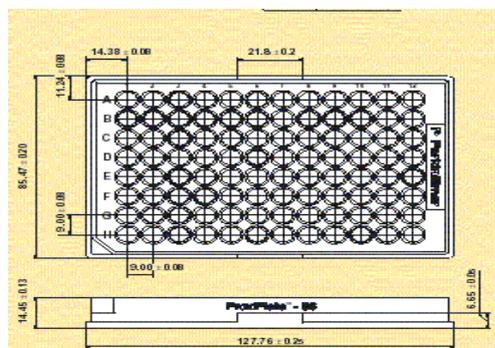


Fig. 1 ProxiPlate-96. Perkin Elmer Product No 6006270.

The design intent for the well plate tray holder is that it should be interchangeable with the diverse scalable slide trays manufactured by Arrayjet allowing the end user to quickly alternate substrate types. The Arrayjet Sprint instrument should be able to accommodate 4 x 96 Perkin Elmore well plates; Product No 6006270 (figure 2). The well plates should be easily fitted to the tray with a mechanism for positively locating the trays against the reference edges of the tray holder. The system should retain the ability to perform a test slide when the well plate tray holder is in use. The Arrayjet Marathon can accommodate a maximum of 20 microplates and Ultra Marathon can accommodate up to 200 microplates into specially designed tray holders.

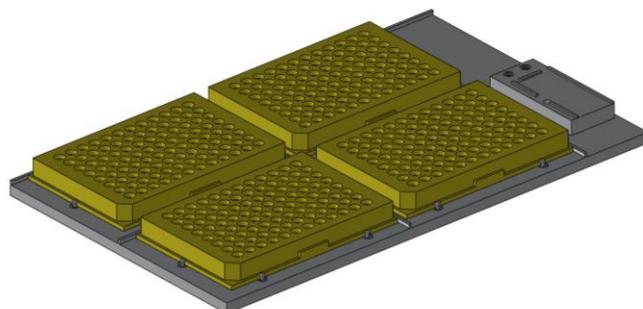


Fig. 2 ProxiPlate-96well tray holders designed by Arrayjet.

The depth of the well is 3.14mm. The clearance from the nozzle plate to the top of the well should be 0.8mm. This makes the throw distance around 4mm. Labelled DNA was printed using Arrayjet's Jetastar™ Nucleic Acid Printing buffer as shown in figure 3.

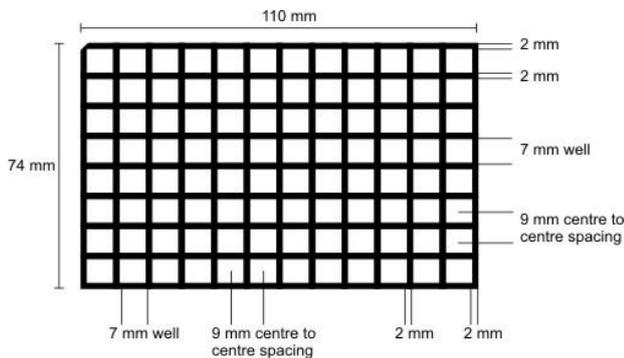


Fig. 3 ProxiPlate-96well spot printing.

## 2. Two part-plates.

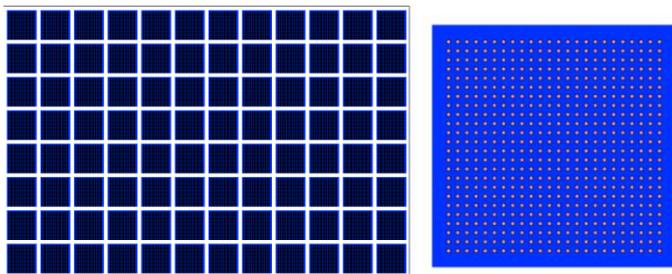
The probes are printed onto a flat surface of the same dimensions as a 96 micro titer plate in a layout of 96 identical subarrays. An upper structure is then fixed to the glass surface to multiplex to 96 different samples as shown in figure 4. Schott Nexterion<sup>®</sup> MPX-96-well 2 part microplate is used for this study.

<http://www.schott.com/nexterion/english/products/multiwell/mtp/mtp.html#03>



**Fig. 4 Two part-plate overview.**

Array software allows a printable area of 6mm x 6mm on microplate printing mode, as shown in figure 5.



**Fig. 5 Target microplate properties tab in Marathon Command Centre**

For example if a 300  $\mu\text{m}$  spacing is set horizontally and vertically and with a safe margin of 400  $\mu\text{m}$ , an array of 24 can be printed, i.e. a total of 576 features per subarray (figure 5).

If a specific surface chemistry is preferred, availability of coated substrates in the three mentioned substrate should be checked. Arrayjet can print onto any required surface chemistry. Non-coated plastic is also an option.

### Conclusion

Arrayjet systems are fast and efficient for 96-well microplate printing. Printing a 24x24 array format into 20 such 96 well 2 part plates would take 12 hours approximately. The Printing onto this type of plate has advantages too. Arrayjet software and hardware can be modified to accommodate any 96 well microplate format and printing layout.

- High density feature printing
- Efficient inkjet printing using Arrayjet technology
- Multiplex assay development
- Efficient use of space
- Reproducibility tests
- high sample throughput
- cost savings
- compatibility with automated handling systems

To know more about the 2 part plate printing and the shallow well printing, contact Arrayjet scientists.