

## DPN Single Pens: Types A and B

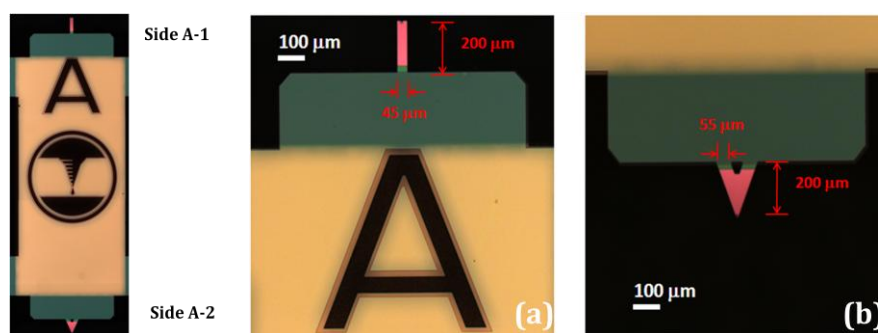
### Introduction

Silicon nitride Types A and B single pens are optimized for DPN<sup>®</sup> applications using NanoInk's NSCRIPTOR™, DPN 5000, and NLP 2000 systems. Type A and B pens are also suitable for use with any commercial atomic force microscope (AFM).

### Type A Pens

To provide greater versatility the pen chip features two different cantilever configurations. Side A-1 contains a “diving board” shape cantilever designed for contact mode imaging. It is well suited for applications such as thiol patterning on gold. Side A-2 contains an “A-frame” cantilever with a higher spring constant and is useful for patterning higher viscosity inks.

The Type A Pens are designed to be used with NanoInk's Universal Inkwell (Part # IWL-0009-03) to form a simple and effective method of delivering ink to the pen tips.



**Figure 1:** Left) Optical microscope image showing a Type A pen chip. Right) Optical microscope images of Type A Pen cantilever configurations and their measurements. (a) Side A-1 shows the “diving-board” shaped cantilever. (b) Side A-2 shows the “A-frame” shaped cantilever.

### Type B Pens

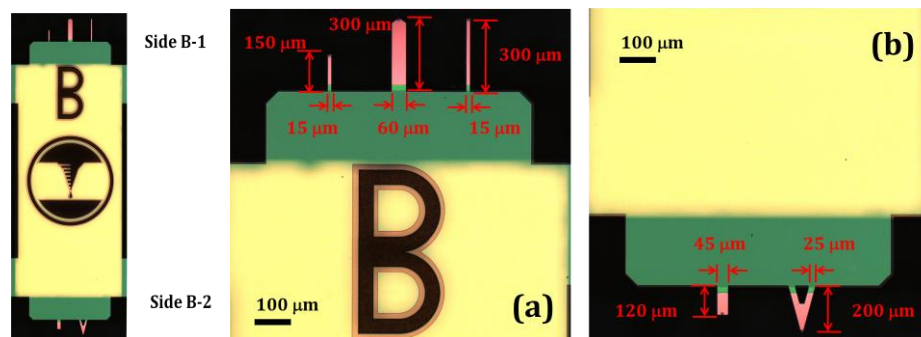
To provide greater versatility the pen chip features two different cantilever configurations. Side B-1 contains three cantilevers. Pen B-1a (on the right side) is long, thin, and flexible - it is designed for soft materials. Pen B-1b (in the middle) features a wider design for more durability, but still offers a low spring constant. Pen B-1c (on the left side) is shorter and produces less drag in more viscous inks.

On side B-2 there are two cantilevers: Pen B-2a (on the right side) is an “A-frame” cantilever designed for contact mode imaging while Pen B-2b (on the left side) is shorter, wider, and stiffer to accommodate sticky inks.

The Type B Pens are designed to be used with NanoInk's Universal Inkwell (Part # IWL-0009-03) to form a simple and effective method of delivering ink the pen tips.

# DPN Single Pens: Types A and B

(continued)

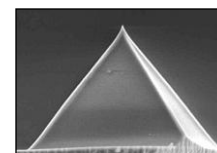


**Figure 2:** Left) Optical microscope image showing a Type B pen chip. Right) Optical microscope images of Type B Pen cantilever configurations and their measurements. (2a) Side B-1, the top of the pen chip, has 3 different cantilevers. (2b) Side B-2, the bottom of the pen chip, has 2 different cantilevers.

### Nominal Dimensions of DPN Type A and B Pens

Pen Type	Spring Constant (N/m)	Cantilever Length (μm)	Cantilever Width (μm)	Pitch (μm)
A-1	0.041	200	45	n/a
A-2	0.100	200	55	n/a
B-1a	0.004	300	15	n/a
B-1b	0.016	300	60	n/a
B-1c	0.032	150	15	n/a
B-2a	0.046	200	25	n/a
B-2b	0.190	120	45	n/a

Note: Tip radius ~15 nm



**Figure 3:** FESEM image of the probe tip with a radius of ~15 nm.

Item Name: Pens, Type A or B

Part #: PEN-0011-05 (Type A) or PEN-0012-03 (Type B)

Compatible with the NLP 2000 System, DPN 5000 System, and NSCRIPTOR™ DPN System

Learn more about NanoInk products and services at [www.nanoink.net](http://www.nanoink.net). Or call us at 847-679-NANO (6266).