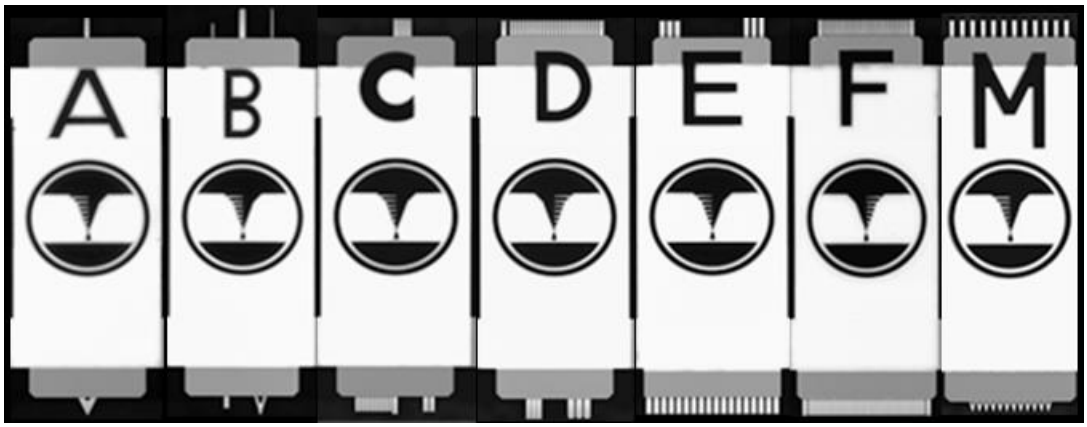
Probes and Consumables: data sheet

Introduction

Silicon nitride single probes and probes arrays are designed for a variety of applications. These Fabricated chips features two different cantilever configurations, one on each side of the chip: single pens (types A and B) and pen arrays (types C, D, E, F, and M) have a nominal tip radius of 15 nm.

The variety of geometries of the probes provides the customer with a range of spring constants and loading capabilities. These properties are important for an effective material development; stiffer probes are more suited to viscous solutions, while softer probes are more suited for molecular materials.

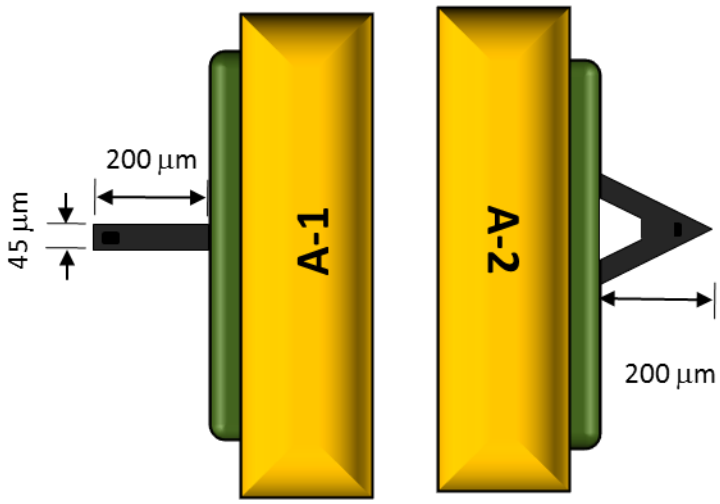
These probe arrays have been used to fabricate a wide variety of materials. These probes are often used in conjunction with reservoirs arrays, which are used to load controlled amounts of materials onto individual probe tips. Contact us for any inquiries about materials, probes, and reservoirs compatibility.



Probes - Type A

Item #: P-A0005

- ***Side A-1***: A "diving board" shape cantilever well-suited for patterning molecular materials. It can also be used for contact mode imaging.
- **Side A-2**: An "A-frame" cantilever with higher spring constant and useful for patterning liquid solutions.



Nominal Specifications

Probe	# probes	Pitch (µm)	Spring Constant k (N/m)	Cantilever Length (µm)	Cantilever Width (µm)
A-1	1	--	0.04	200	45
A-2	1	--	0.1	200	200 @base

Reservoir Compatibility

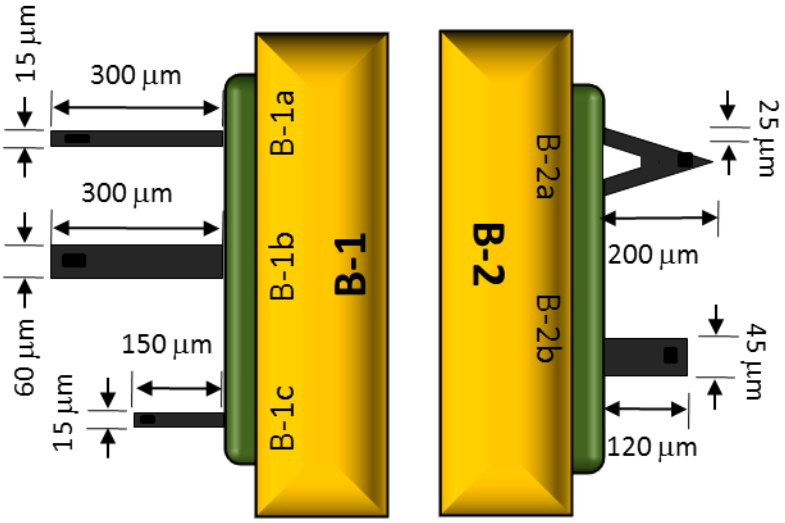
Probe	Universal	66x12-M2-1	69x12-F2-3	70x12-F1-2	100x12-M1-1
A-1	✓	✓	✓	✓	✓
A-2	✓	✓	✓	✓	✓

Probe - Type B

Item #: P-A0006

- ***Side B-1***: Three different types of cantilevers: Pen B-1a (on the right side) is long, thin, and flexible, designed for imaging soft substrates. Probe B-1b (in the middle) features a wider design but still offers a low spring constant. Probe B-1c (on the left side) is shorter and stiffer.

- ***Side B-2***: Two distinct types of cantilevers. Probe B-2a (on the right side) is an "A-frame" cantilever designed for contact mode imaging while Probe B-2b (on the left side) is shorter, wider, and stiffer to accommodate printing with liquid solutions.



Nominal Specifications

Probe	# Probes	Pitch (µm)	Spring Constant k (N/m)	Cantilever Length (µm)	Cantilever Width (µm)
B-1a	1	--	0.004	300	15
B-1b	1	--	0.02	300	60
B-1c	1	--	0.03	150	15
B-2a	1	--	0.05	200	25
B-2b	1	--	0.2	120	45

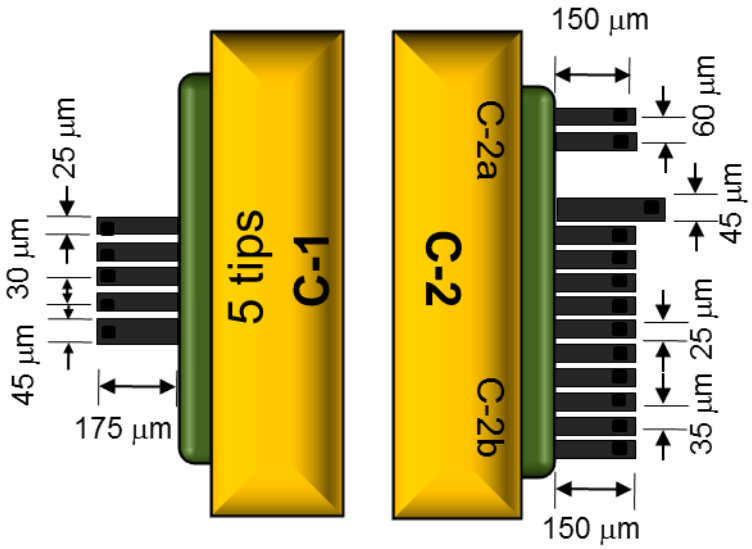
Reservoir Compatibility

Probe	Universal	66x12-M2-1	69x12-F2-3	70x12-F1-2	100x12-M1-1
B-1a	✓	✓	✓	✓	✓
B-1b	✓	✓	✓	✓	✓
B-1c	✓	✓	✓	✓	✓
B-2a	✓	✓	✓	✓	✓
B-2b	✓	✓	✓	✓	✓

DPN Pen - Type C

Item #: P-A0007

- ***Side C-1***: 5-cantilever array with 4 of the cantilevers designed for multi-patterning, referred to as "fabrication" probes. The wider cantilever is designed for laser alignment and imaging, "imaging" probe.
- ***Side C-2***: 2 different arrays: Probe array C-2a (on the top right) is a simple 2-cantilever array. Probe array C-2b (on the bottom right) is similar to C-1, but is a stiffer array of 10 fabrication probes and 1 imaging probes.



Nominal Specifications

Probe	# Fabrication Probes	Pitch (µm)	Imaging k (N/m)	Imaging Length (µm)	Imaging Width (µm)	Fabrication k (N/m)	Fabrication Length (µm)	Fabrication Width (µm)
C-1	3	30	0.06	175	45	0.03	175	25
C-2a	2	60				0.1	150	45
C-2b	10	35	0.06	175	45	0.05	150	25

Reservoir Compatibility

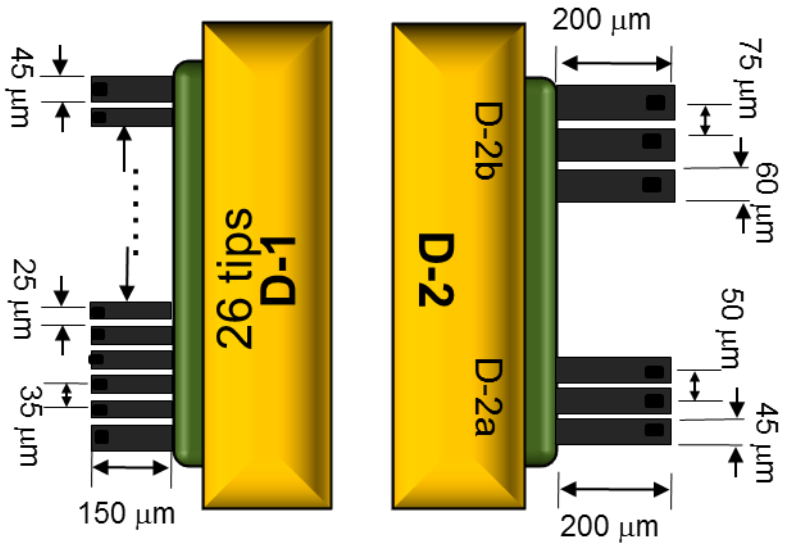
Pen	Universal	66x12-M2-1	69x12-F2-3	70x12-F1-2	100x12-M1-1
C-1	✓				
C-2a	✓				
C-2b	✓			✓[1]	

[1] Every second pen of the array.

Probe - Type D

Item #: P-A0008

- ***Side D-1***: 26-cantilever array featuring 24 for fabrication, referred to as "fabrication" pens. Located on the left and right edges of this array are 2 "imaging" pens designed for laser alignment and imaging. The width of this array helps in achieving more precise leveling of the probe array to the substrate plane.
- ***Side D-2***: 2 different 3-cantilever arrays, each with different spring constants, probe widths, and pitches.



Nominal Specifications

Probes	# Fabrication Probes	Pitch (µm)	Imaging k (N/m)	Imaging Length (µm)	Imaging Width (µm)	Fabrication k (N/m)	Fabrication Length (µm)	Fabrication Width (µm)
D-1	24	35	0.1	150	45	0.05	150	25
D-2a	3	50				0.04	200	45
D-2b	3	75				0.06	200	60

Reservoir Compatibility

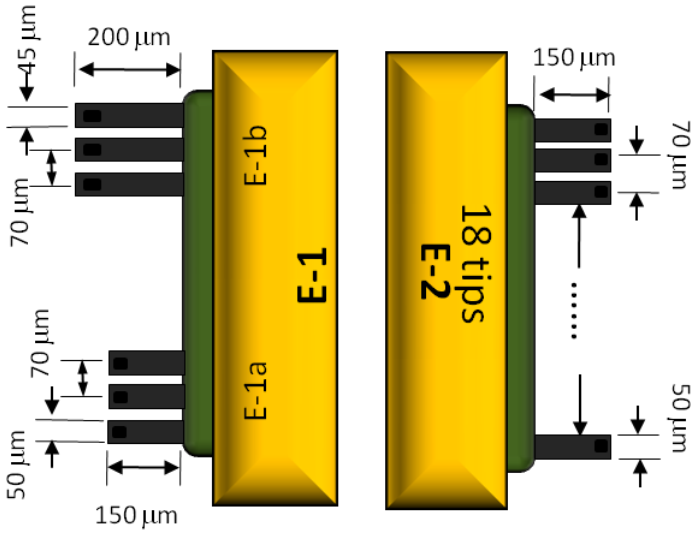
Pen	Universal	66x12-M2-1	69x12-F2-3	70x12-F1-2	100x12-M1-1
D-1	✓			✓[2]	
D-2a	✓				✓[2]
D-2b	✓				

[2] Every second probe of the array

Probe - Type E

Item #: P-A0009

- ***Side E-1***: 2 different 3-cantilever arrays. Probes E-1a (to the left) are shorter and wider with a higher spring constant. Probes E-1b (to the right) are longer and narrower with a lower spring constant.
- ***Side E-2***: 18-cantilever array for multi-fabrication with the same properties as the E-1a probes.



Nominal Specifications

Probe	# Fabrication Probes	Pitch (µm)	Imaging k (N/m)	Imaging Length (µm)	Imaging Width (µm)	Fabrication k (N/m)	Fabrication Length (µm)	Fabrication Width (µm)
E-1a	3	70				0.1	150	50
E-1b	3	70				0.04	200	45
E-2	18	70				0.1	150	50

Reservoir Compatibility

Pen	Universal	66x12-M2-1	69x12-F2-3	70x12-F1-2	100x12-M1-1
E-1a	✓			✓	
E-1b	✓			✓	
E-2	✓			✓[4]	

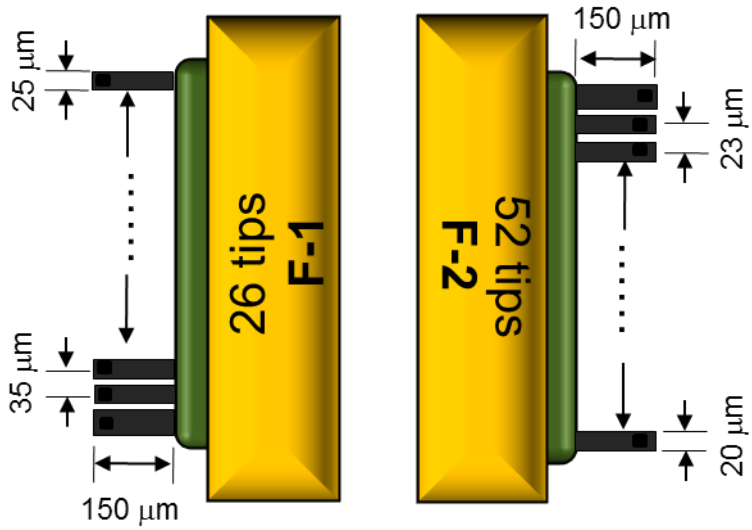
[3] Each or every 2nd probe same material

[4] 12 of the 18 pens, 12 different materials

Probe - Type F

Item #: P-A0010

- ***Side F-1***: 26-cantilever array featuring 24 designed for fabrication, referred to as "fabrication" pens. On the left and edge of the fabrication probes array is a "imaging" probe designed for imaging
- ***Side F-2***: 52-cantilever array featuring 50 fabrication probes and 2 imaging probes. The multiple probes of the F-1 and F-2 sides are higher density probe arrays with lower spring constants making them ideal for high throughput fabrication on soft surfaces.



Nominal Specifications

Probe	# Fabrication Probes	Pitch (µm)	Imaging k (N/m)	Imaging Length (µm)	Imaging Width (µm)	Fabrication k (N/m)	Fabrication Length (µm)	Fabrication Width (µm)
F-1	24	35	0.097	150	45	0.05	150	25
F-2	50	23	0.097	150	45	<0.03	150	20

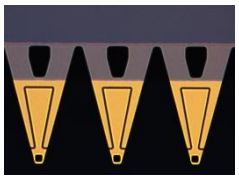
Reservoir Compatibility

Pen	Universal	66x12-M2-1	69x12-F2-3	70x12-F1-2	100x12-M1-1
F-1	✓			✓[5]	
F-2	✓		✓[6]		

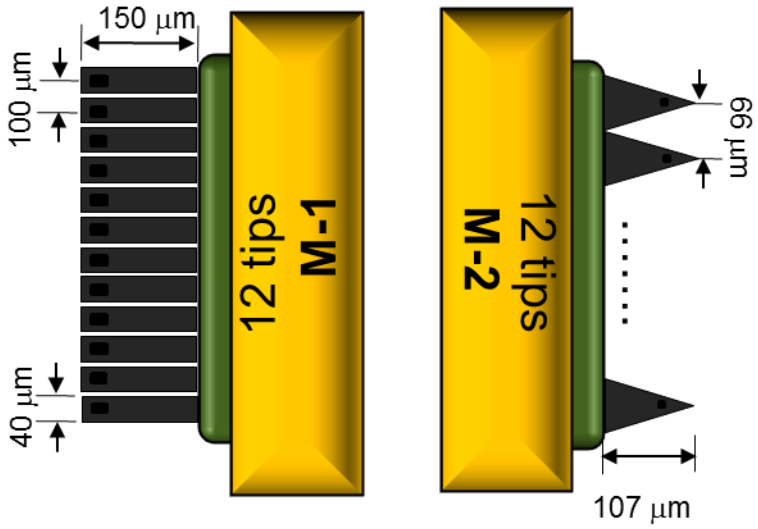
[5] Every second pen, multiple inks
[6] Every third pen, multiple inks

Probe - Type M

Item #: P-A0011 (with gold coating)
Item #: P-A0012 (without gold coating, transparent)



- ***Side M-1***: 12 "diving board" shaped cantilevers with a pitch of 100 µm.
- ***Side M-2***: 12 "A-frame" cantilevers with a higher stiffness and spring constant designed specifically for fabricating more viscous solutions such as DNA or protein. Side M-2 probes contain channels specially optimized to increase the volume of solutions that can be loaded onto the cantilever.
- Transparent M-type probe arrays have identical geometry to standard M-type arrays, but are transparent because they lack the reflective gold coating. Transparent pens are particularly suitable for probe alignment on pre-fabricated devices. Transparent M-type probe arrays also allow the user to see the solutions on the cantilever and observe material flow during fabrication.



Nominal Specifications

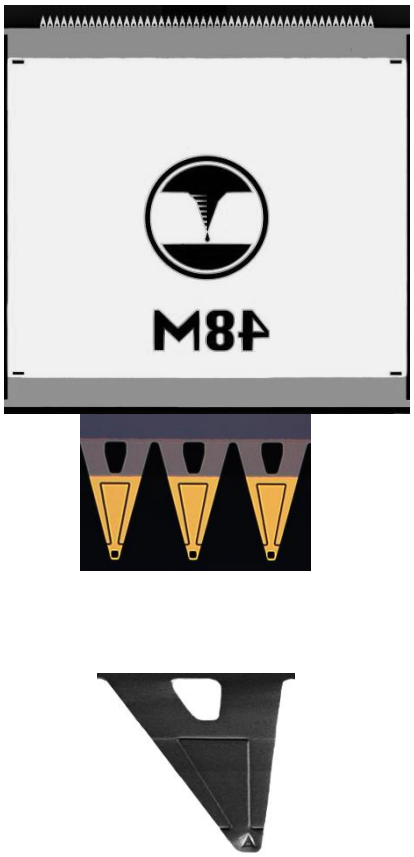
Probe	# Fabrication Probes	Pitch (µm)	Imaging k (N/m)	Imaging Length (µm)	Imaging Width (µm)	Fabrication k (N/m)	Fabrication Length (µm)	Fabrication Width (µm)
M-1	12	100				0.4	150	40
M-2	12	66				2.6	107	22
M-2 No Au	12	66				0.6	107	22

Reservoir Compatibility

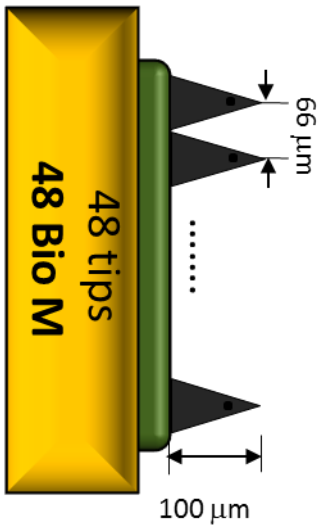
Pen	Universal	66x12-M2-1	69x12-F2-3	70x12-F1-2	100x12-M1-1
M-1	✓				✓
M-2	✓	✓			

Probe – 48 Bio M

Item #: P-A0013 (no gold coating)



- One single side of 48 "A-frame" cantilevers with a higher stiffness and spring constant designed specifically for fabricating more viscous solutions such as DNA or protein. Like for the M type, 48 Bio M pens contain channels specially optimized to increase the volume of solutions that can be loaded onto the cantilever.
- The absence of the reflective gold coating makes these probes particularly useful for probe alignment on pre-fabricated devices but also allows the user to see the materials on the cantilever and observe material flow during fabrication.
- 48 Bio M pen array is only compatible with the 48 Bio M reservoir array.



Nominal Specifications

Probe	# Fabrication Probes	Pitch (µm)	Imaging k (N/m)	Imaging Length (µm)	Imaging Width (µm)	Fabrication k (N/m)	Fabrication Length (µm)	Fabrication Width (µm)
48 Bio M	48	66				0.6	107	22

Reservoir Compatibility

Probe	48 Bio M Reservoir Array
48 Bio M	✓

Inkwell Array Compatibility Chart

For simple and easy transfer of materials to the probe tips, we have various configurations of reservoir array chips to match available probe arrays. (Please refer to the reservoir datasheet for details or contact ACS Technology.)

Probe	Universal	66x12-M2-1	69x12-F2-3	70x12-F1-2	100x12-M1-1
A-1	✓	✓	✓	✓	✓
A-2	✓	✓	✓	✓	✓
B-1a	✓	✓	✓	✓	✓
B-1b	✓	✓	✓	✓	✓
B-1c	✓	✓	✓	✓	✓
B-2a	✓	✓	✓	✓	✓
B-2b	✓	✓	✓	✓	✓
C-1	✓				
C-2a	✓				
C-2b	✓			✓[1]	
D-1	✓			✓[2]	
D-2a	✓				✓[2]
D-2b	✓				
E-1a	✓			✓	
E-1b	✓			✓	
E-2	✓			✓[4]	
F-1	✓			✓[5]	
F-2	✓		✓[6]		
M-1	✓				✓
M-2	✓	✓			
48 Bio M	*Compatible only with 48 Bio M Inkwell Array*				

[1] Every second probe of the array.
[2] Every second probe of the array
[3] Each or every 2nd probe same material
[4] 12 of the 18 probes, 12 materials
[5] Every second probes, multiple materials
[6] Every third probe, multiple materials

Ordering information:

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