

2 Reagent Droplet Chips

Contents

1	Description.....	2
2	Benefits.....	3
3	Specification.....	3
4	Sealing Interface	5
5	Geometry.....	5
6	Surface Coatings	8
7	IP License	9
8	Droplet Formation	9
9	Custom Options	10
10	Optical Transmission.....	10

Part Name

Part Number

2 Reagent Droplet Chip (50µm etch depth)	3200286
2 Reagent Droplet Chip (50µm etch depth), Hydrophobic	3200287
2 Reagent Droplet Chip (50µm etch depth), Fluorophilic	3200511
2 Reagent Droplet Chip (100µm etch depth)	3200241
2 Reagent Droplet Chip (100µm etch depth), Hydrophobic	3200242
2 Reagent Droplet Chip (100µm etch depth), Fluorophilic	3200510
2 Reagent Droplet Chip (190µm etch depth)	3200255
2 Reagent Droplet Chip (190µm etch depth), Hydrophobic	3200256
2 Reagent Droplet Chip (190µm etch depth), Fluorophilic	3200557
2 Reagent Droplet Chip (400µm etch depth)	3200258
2 Reagent Droplet Chip (400µm etch depth), Hydrophobic	3200259
2 Reagent Droplet Chip (400µm etch depth), Fluorophilic	3200560

1 Description

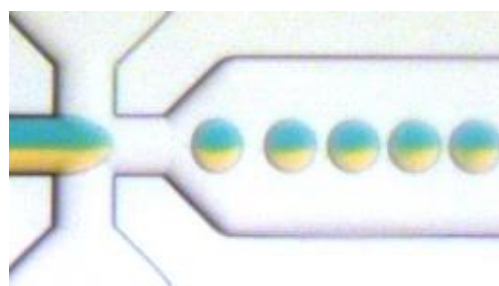
Designed for a wide range of applications such as high throughput chemistry, biochemical analysis of cells, Janus particle formation and polymerization research, Dolomite's 2 Reagent Droplet Chips are glass microfluidic devices for generating droplets containing 2 reagents.

The 2 reagent streams meet close to the junction, so that mixing is minimised prior to the formation of droplets. The Dolomite flow focussing junction design enables thousands of reactions per second to be carried out in volume controlled compartments isolated by a flowing carrier stream.

Quick fluidic connection can be made using Dolomite's Chip Interface H (Part No. 3000155) and two Linear Connectors 4-way (Part No. 3000024) providing a straight through flow path from chip to tube which is beneficial for droplet collection.



2 Reagent Droplet Chip (Part No. 3200241)



Example of Chip Interface H with 2 x Linear Connector 4-way (left) and 2 Reagent Droplets (right)

2 Benefits

- Rapid generation of droplets containing 2 reagents
- Ideal for carrying out reactions inside droplets
- Hydrophilic and hydrophobic and fluorophilic versions of 50 μm , 100 μm , 190 μm , and 400 μm variants
- High visibility (excellent access for optics)
- Compatible with Dolomite Multiflux® Linear Connectors for quick and reliable fluidic connection
- Straight through flow path for improved droplet collection (50 μm , 100 μm , 190 μm , and 400 μm)
- Wide temperature and pressure range
- Excellent chemical compatibility

3 Specification

2 Reagent Droplet Chip 50 μm and 100 μm

Specification	3200286	3200287	3200511	3200241	3200242	3200510
Channel cross-section at junction (depth x width)	50 μm x 55 μm			100 μm x 105 μm		
Wide channel cross-section (depth x width)	50 μm x 250 μm			100 μm x 300 μm		
Droplet size range	20 - 75 μm *			20 - 150 μm *		
Surface coating	Hydrophilic	Hydrophobic	Fluorophilic	Hydrophilic	Hydrophobic	Fluorophilic
Number of inputs	4					
Number of outputs	1					
Chip size (length x width x thickness)	22.5mm x 15.0mm x 4mm					
Chip top and base layer thickness	2.0mm					
Channel length after junction	11.5mm					
Back pressure with 100 $\mu\text{l}/\text{min}$ flow of water	0.2 Bar			0.02bar		
Surface roughness of channels (R_a)	5nm					
Max. operating pressure	up to 30bar					
Material	Glass					
Fabrication	HF etching and thermal bonding					

* Depending on chemicals used

** There is no channel widening/narrowing on this chip

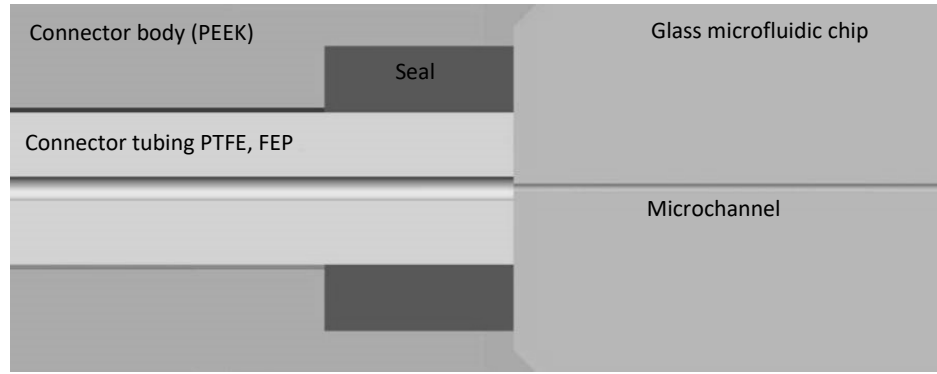
2 Reagent Droplet Chip 190 μm and 400 μm

Specification	3201055	3201056	3201057	3201058	3201059	3201060
Channel cross-section at junction (depth x width)	190 μm x 195 μm			400 μm x 405 μm		
Wide channel cross-section (depth x width)	190 μm x 390 μm			400 μm x 405 μm**		
Droplet size range	80 - 280 μm *			160 - 400m μm *		
Surface coating	Hydrophilic	Hydrophobic	Fluorophilic	Hydrophilic	Hydrophobic	Fluorophilic
Number of inputs	4					
Number of outputs	1					
Chip size (length x width x thickness)	22.5mm x 15.0mm x 4mm					
Chip top and base layer thickness	2.0mm					
Channel length after junction	11.5mm					
Back pressure with 100μl/min flow of water	0.002 mBar			< 0.001 Bar		
Surface roughness of channels (R _a)	5nm					
Max. operating pressure	up to 30bar					
Material	Glass					
Fabrication	HF etching and thermal bonding					

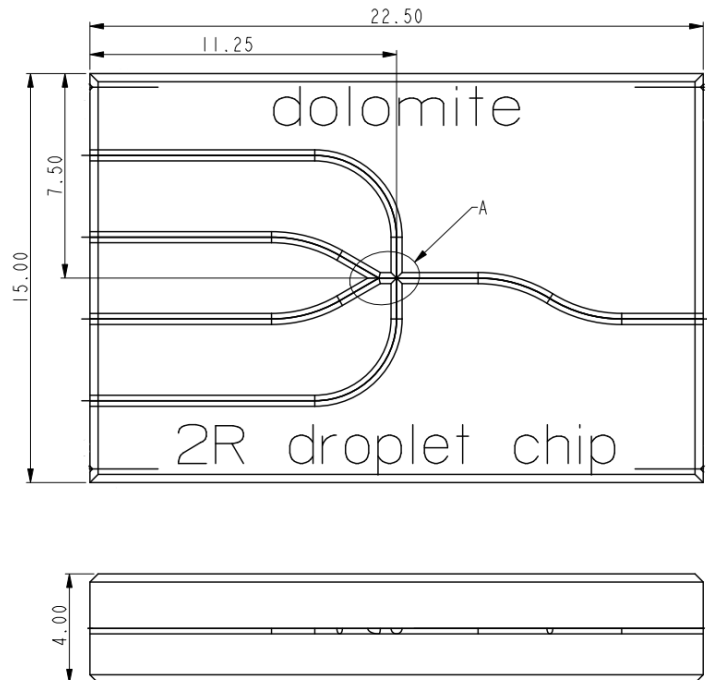
* Depending on chemicals used

** There is no channel widening/narrowing on this chip

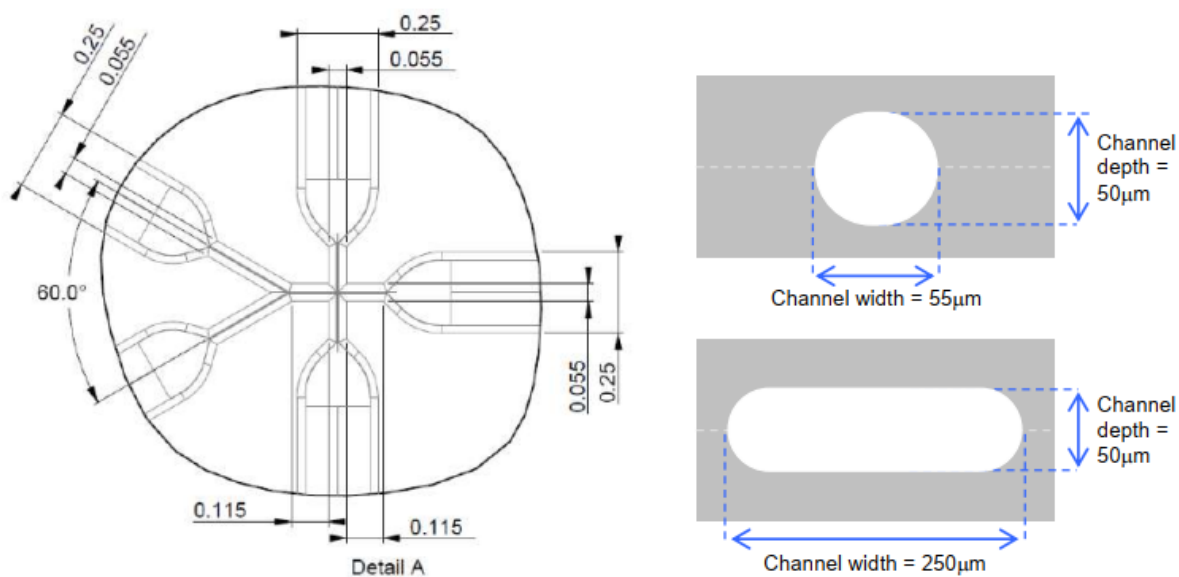
4 Sealing Interface



5 Geometry

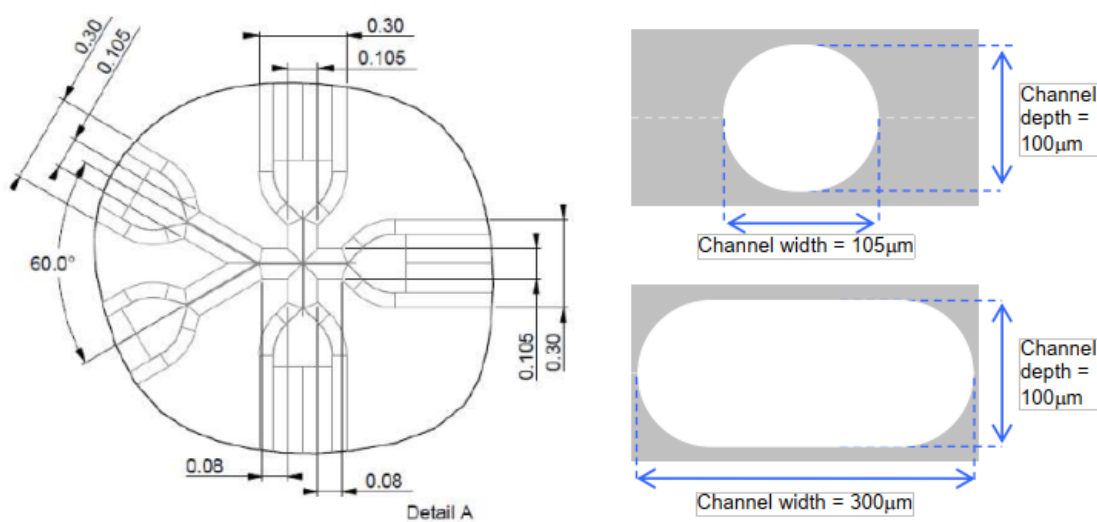


2 Reagent Droplet Chip (50µm etch depth)



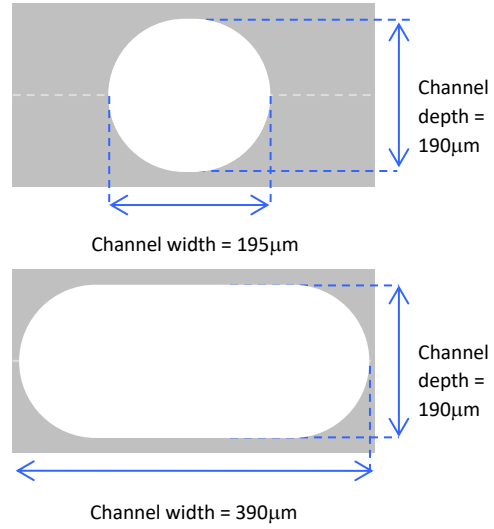
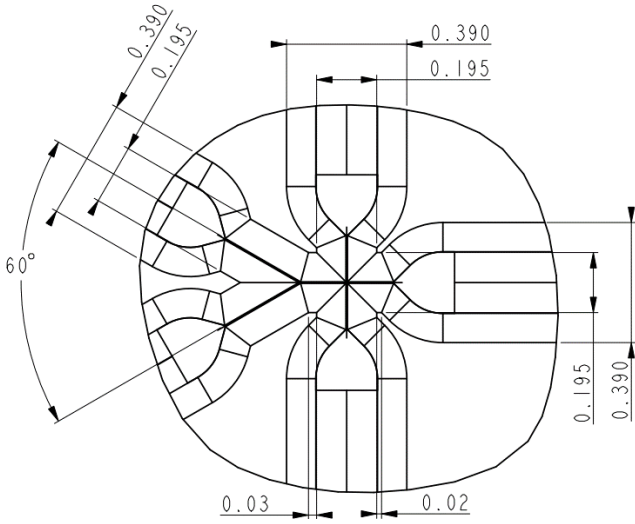
Above Left: Part No.3200286, 3200287, 3200511 layout of flow junction, **Above Right:** Cross-section of the isotropically etched channels in junction

2 Reagent Droplet Chip (100µm etch depth)



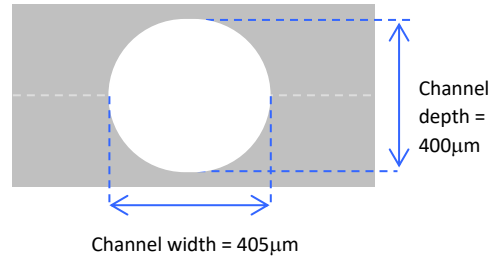
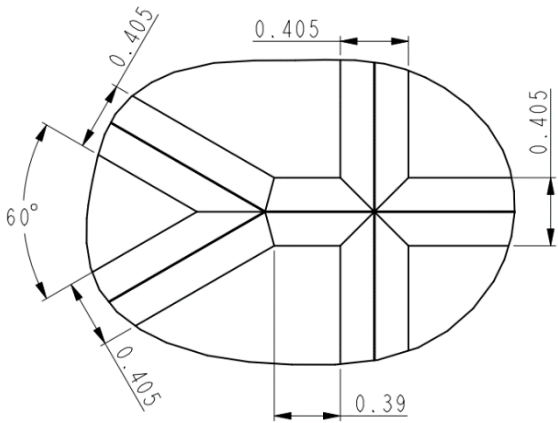
Above Left: Part No.3200241,3200242, 3200510 layout of flow junction, **Above Right:** Cross-section of the isotropically etched channels in junction.

2 Reagent Droplet Chip (190µm etch depth)



Above Left: Part No. 3201055, 3201056, 3201057 layout of flow junction, **Above Right:** Cross-section of the isotropically etched channels in junction.

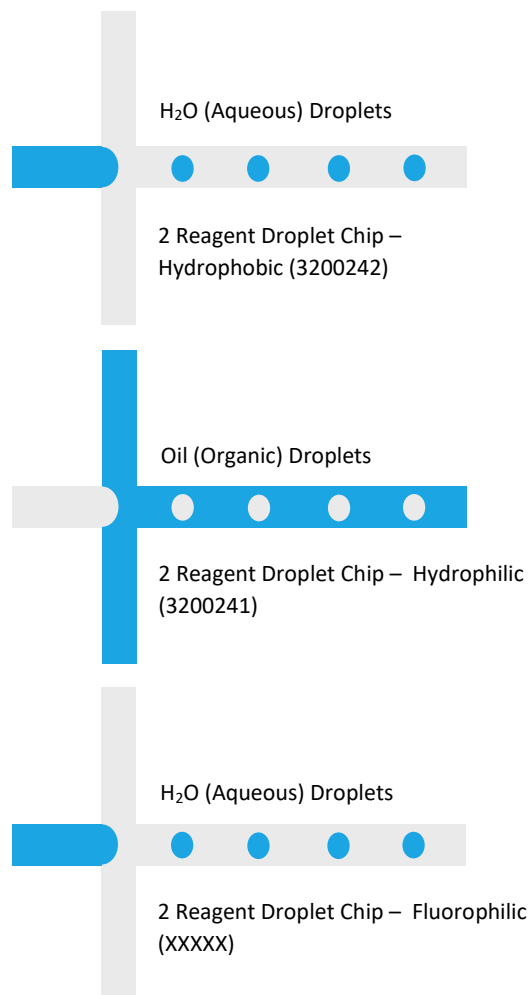
2 Reagent Droplet Chip (400µm etch depth)



Above Left: Part No. 3201058, 3201059, 3201060 layout of flow junction, **Above Right:** Cross-section of the isotropically etched channels in junction.

6 Surface Coatings

The glass channel surface is naturally hydrophilic. This will form organic droplets in an aqueous carrier phase. To form aqueous droplets in an organic phase, a hydrophobic coating is required. Part numbers for the two chip types are shown below:



The hydrophobic coating is resistant to organic solvents. It can be removed using acidic or basic solutions, for example a 0.1M Sodium Hydroxide for 24 hours.

7 IP License

Dolomite is a licensee of Japan Science and Technology Agency (“JST”) under JST’s microdroplet generation technology. Please see our website for further details.

8 Droplet Formation

The size, consistency, and production rate of droplet formation is a function of several physical parameters, including:

- Channel size
- Viscosity and surface tension of the various fluids
- Presence of surfactants
- Miscibility of the fluids
- Use of hydrophobic or hydrophilic coating on the channel walls
- Total flow rate and relative flow rate of each fluid
- Flow stability

To accelerate development work in droplet microfluidics, Dolomite offers a range of modular micro droplet systems featuring Dolomite’s industry leading microfluidic pumps, connectors and chips. The Droplet Advanced System is recommended for use with the 2 Reagent Droplet Chip for optimum results. This features the MitoS P-Pump, which provides stable, pulse-free flow for generation of droplets with extremely consistent diameters (monodisperse). Please contact Dolomite to configure a droplet system that fits your requirements.



MitoS P-Pump, Flow Resistors and Droplet Chips featured in the Droplet Advanced System

9 Custom Options

Other chip configurations are available on request. If you would like to generate droplets of a different size, operate with challenging fluids or perform complex droplet functions, Dolomite can design the junction geometry required. The range of Dolomite services available covers all aspects of the development process from characterization of liquids for droplet generation to the design of commercial instruments in the field of droplet microfluidics. Please contact Dolomite to discuss your application.

10 Optical Transmission

Spectral Transmittance of 2mm glass layer

