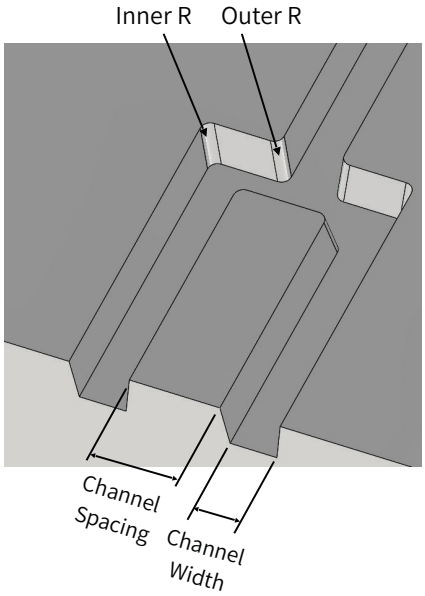
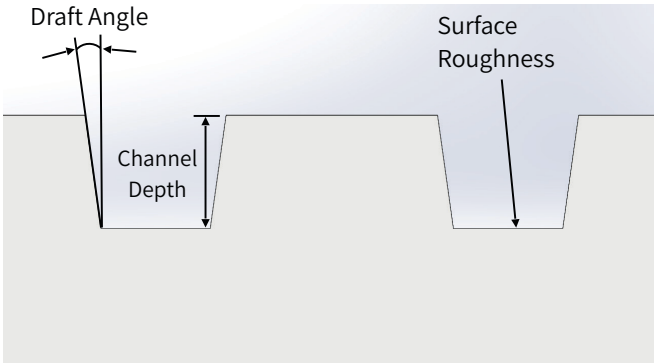
Vantiva Precision BioDevices Design Guide

DFMA Recommendations for Microfluidic Chips

The following design recommendations are based on PBD's deep experience of design for manufacturing and assembly (DFMA) for injection molded microfluidic devices providing the basis for high quality, efficient manufacturing workflows. PBD understands that each customer project has its own unique requirements. Our engineers work with customers to provide solutions to the design and manufacturing challenges that are a part of all microfluidic prototyping projects.

	CNC/Ultra-Precision Machining Tooling Insert	Lithography Tooling Insert
Minimum Channel Width	50 µm	5 µm
Channel Depth	50 - 500 µm	5 - 150 µm
Channel Tolerance	5 - 10%	
Channel Aspect Ratio (Depth/Width)	Channel Aspect Ratio (D/W) | **≤1.0** | **1.0 - 2.0** | **≥2.0**	
Channel Spacing (Wall) Aspect Ratio (Height/Spacing)	Spacing Aspect Ratio (H/S) | **≤0.5** | **0.5 - 1.0** | **≥1.0**	
Minimum Inner Corner Radius	10 µm	2 µm
Minimum Outer Corner Radius	130 µm	2 µm
Optimum Sidewall Draft Angle	3° - 7°	3° - 5°
Surface Roughness	Min. 20 nm Ra	50 - 150 nm Ra
Other	• Multi-depth: stepped/ramped features possible • Vias: 0.5 mm diameter minimum (in-mold or post molding CNC)	





Microfluidic Device - Rapid Prototyping Services

Vantiva Precision BioDevices (PBD) offers a broad array of rapid prototyping services for microfluidic chips. VPB has a selection of development mold bases with inserts supporting a range of injection molding form factors and part thicknesses to accommodate most prototyping requirements. Custom form factors are supported by post-molding CNC operations or custom mold inserts.

Injection Molding Prototyping Form Factors

Microscope Slide	25.4 mm x 76.2 mm x 1 mm 25.5 mm x 75.5 mm x 0.75 mm 25.5 mm x 75.5 mm x 0.5 mm
Business Card (3.5”x2”)	50.8 mm x 88.9 mm x 1 mm (Figure 1)
Mini-Luer-Chip	25.5 mm x 75.5 mm x 1.5 mm (Figure 2) Mini-luer ports: 14 x 2 configuration with 4.5 mm pitch
Feature Area	Minimum distance of features to the edge of the part: 3 mm (Figure 3)

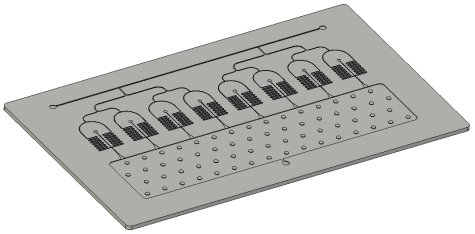


Figure 1: Business Card

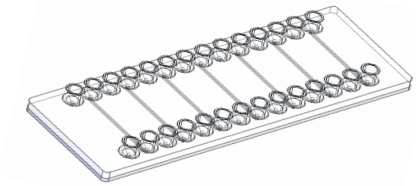


Figure 2: Mini-Luer-Chip

PBD offers a full range of available technologies for mastering/patterning and tooling development through to assembly/bonding and inspection. PBD engineers analyze each project to provide technology options and recommendations to offer the highest quality, fastest microfluidic prototyping development cycle.

Core Technologies & Capabilities

Mastering	• CNC / UPM (Ultra-Precision Machining) • Lithography (Mask, DWL, DRIE)
Mold Tooling	• Electroformed nickel insert from master • Machined metal insert *Note: utilizing PBD’s development molds*
Injection Molding	• Precision injection molding • COC, COP, PC, PP, PS, TPE, and etc.
Assembly	• Laser welding • Solvent bonding • Thermal bonding • PSA lamination • pL – µL volume liquid dispensing

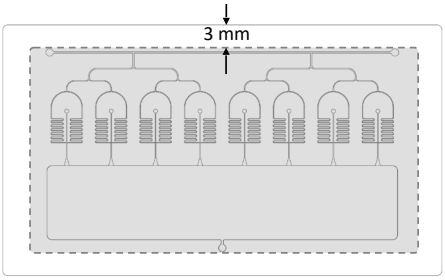
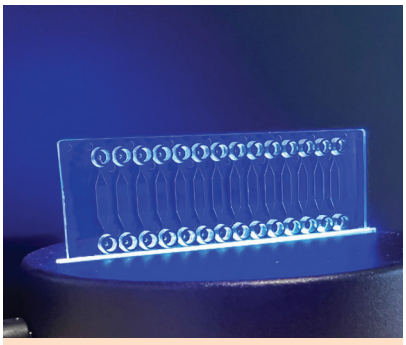
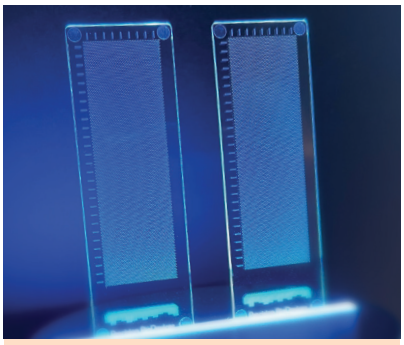


Figure 3: Feature Area

3.5” x 2” Droplet Generator



3” x 1” Mini-Luer-Flowcell



3” x 1” Microwell Array Slide

Bring your device to market with the precision, accuracy and global logistics expertise of **Vantiva Precision BioDevices.**

Get Started Today — microfluidics.vantiva.com | pbd.marketing@vantiva.com

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