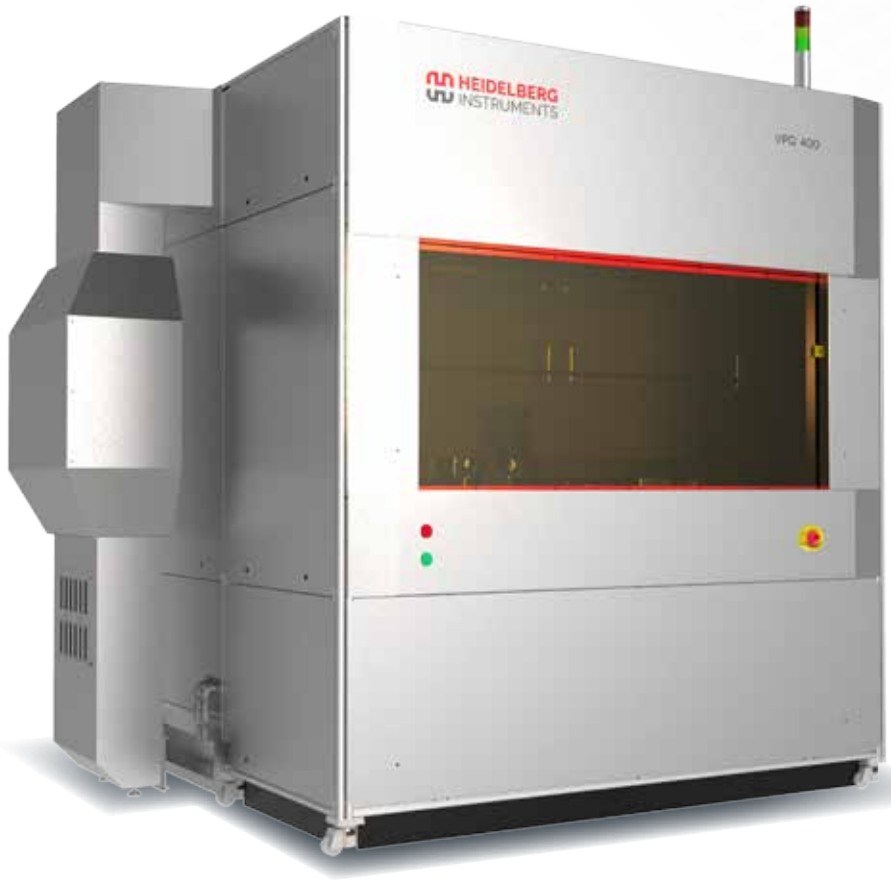
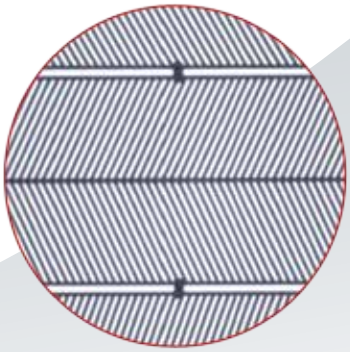
HEIDELBERG INSTRUMENTS

VPG+ 200 / 400

The Multi-Purpose Volume Pattern Generators





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HEIDELBERG INSTRUMENTS

VPG+ 200 / 400
THE SMALL AREA MULTIPURPOSE VOLUME PATTERN GENERATORS

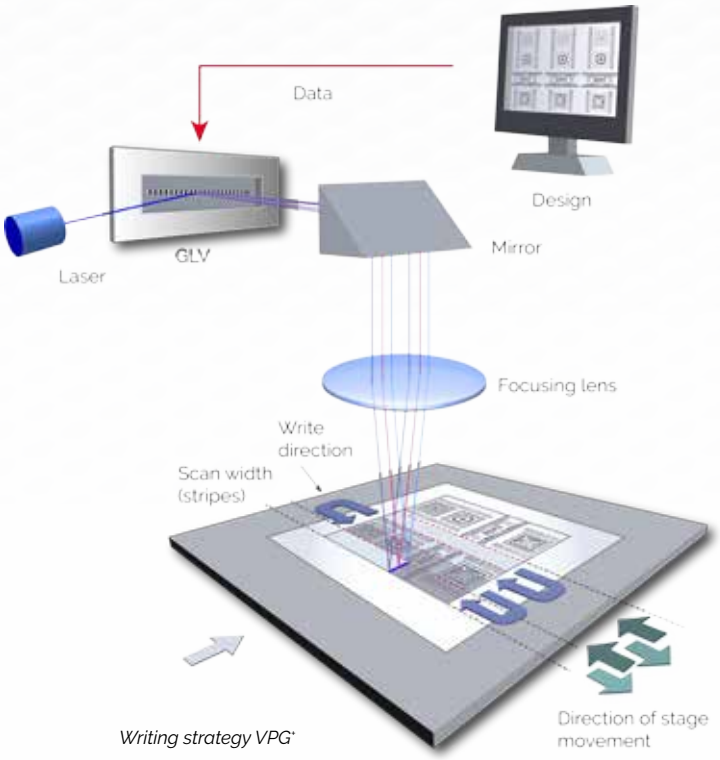
Our Multi-Purpose Volume Pattern Generators VPG+ 200 and VPG+ 400 are perfectly suited for the production of standard photomasks as well as for i-line resist applications. An ultra-high-speed exposure engine and automated alignment capability both contribute to systems that excel through high resolution, outstanding image quality, and fast throughput.

The Small Area Volume Pattern Generators

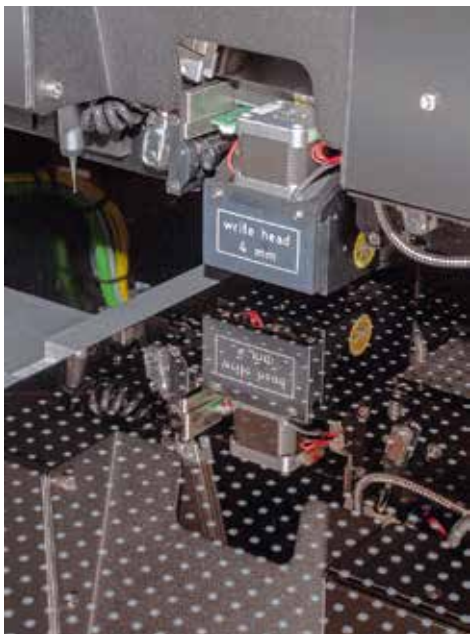
The VPG 200 and 400 family of systems have always benefitted from Heidelberg Instruments' vast experience in small area lithography; and just as much from the field-proven technology employed on the company's industry standard large area VPG platforms. VPG systems both large and small share the same powerful technology.

Even higher exposure speed

The „plus" has been added ever since the series has been featuring an even significantly faster high-speed spatial light modulator (custom-made for Heidelberg Instruments and therefore exclusive to this series). The entire exposure engine operates at a higher rate than ever before and the data path too has been vastly enhanced. At the new maximum speed, an exposure can be completed up to three times as fast as with the original VPG: This makes the VPG+ the fastest tool for mask-writing in this market-segment.



Writing strategy VPG+


Photograph courtesy of IMS Chips

LIGHT SOURCE AND STAGES

The VPG+ small area systems operate with a high power pulsed UV laser source with a wavelength of 355 nm. The systems can be equipped with air-bearing stages designed to accommodate substrates of up to 8″ (VPG+ 200) and 17″(VPG+ 400) respectively.

The Small Area VPG+ in a Nutshell

- Ultra-high-speed exposure engine
- Real time auto focus system
- High power DPSS laser with 355 nm
- Exchangeable write modes
- Camera system for metrology and alignment
- Closed-loop climate chamber
- Automatic substrate loading system
- Stage map correction
- Edge detector system
- Multiple data input formats
- User programmable interface

ENVIRONMENTAL CONTROL

Rigorous environmental monitoring and feedback control ensure the specified overlay accuracy: software corrections based on precise measurements compensate for any variations in environmental parameters. An integrated metrology system enables self-calibration functions and various critical dimension measurements. Standard data formats are supported.

ALIGNMENT AND CALIBRATION

The systems feature an automated alignment capability allowing multilayer exposures with excellent overlay accuracy and repeatability. The alignment functionality includes distortion compensation and field-by-field alignment. The 2D Stage Map Correction automatically calibrates stage positioning.

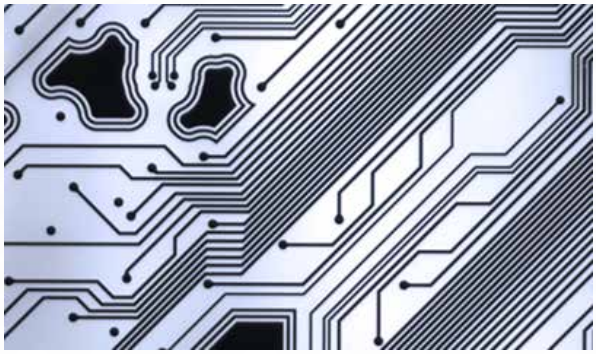
APPLICATIONS

The VPG+ 200 and VPG+ 400 are perfectly suited for the production of standard photomasks and also for applications that use i-line resists such as SU-8 and IP 3600. The ability to expose SU-8 in fact makes the VPG+ a perfect solution for rapid prototyping of microfluidics or in other areas where thick negative resists are required. In effect, the Heidelberg Instruments small area VPG+ systems represent an excellent alternative to any i-line stepper. The systems can be used in a range of demanding fields that require microstructures: Typical applications include MEMs, advanced packaging, 3D integration, LED production and compound semiconductors.

Applications in a Nutshell

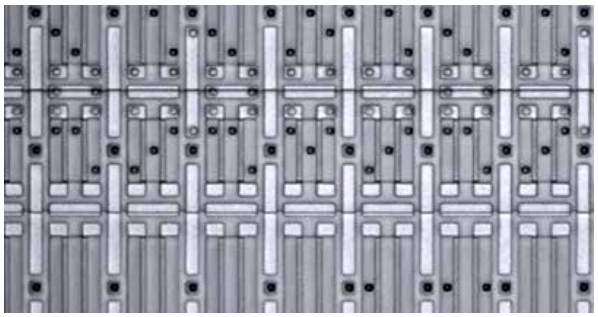
- Photomask writing
- Rapid prototyping
- Microfluidics, MEMS
- Advanced packaging, 3D integration, LED production, compound semiconductors
- Particularly suitable for i-line resists such as SU-8 and IP 3600

Advanced Packaging



The VPG+ series presents the solution for the fabrication of the high-quality photomasks required for advanced packaging applications. For some critical applications direct write lithography is currently the only available solution. The VPG+ series of maskless lithography systems offer high speed, automatic distortion compensation, and excellent resolution in order to master these applications.

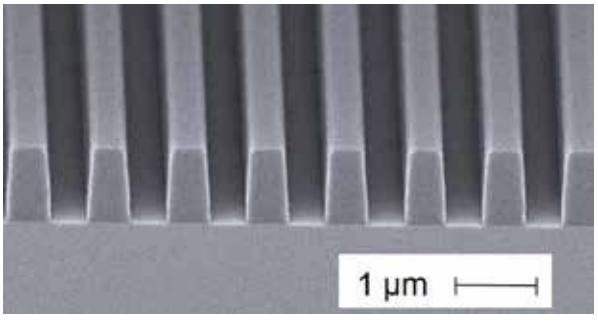
Mix-and-Match applications



The example shows a"sea-of-gates" type mixed-signal gate array (IMS Gate Forest® technology) which allows the integration of analog and digital functionality on a single chip. The microelectronic elements on the master can be individually configured by adding the respective contacts. In a Mix&Match-approach, IMS Chips fabricated the CMOS masters by stepper lithography and added the personalized contacts and metallization layers with direct write laser lithography, using a VPG 400.

Courtesy of IMS Chips

High-Resolution Structures



Structures created with IP3250 (1 µm thickness).

Courtesy of IMS Chips.

VPG+ 100 / VPG+ 400
SYSTEM SPECIFICATIONS

Write mode		I	II	III	IV	
Writing performance						
Minimum structure size [µm]		0.75	1	2	4	
Address grid [nm]		12.5	25	50	100	
Edge roughness [3σ, nm]		40	50	70	150	
CD uniformity [3σ, nm]		65	75	110	300	
Stitching [3σ, nm]		60	70	100	250	
2nd layer alignment [3σ, nm]		225	350	500	700	
Write speed [mm²/min]		970	3150	6400	13500	
System features						
Light source	High power DPSS laser with 355 nm					
Maximum substrate sizes	9″ x 9″ / 17″ x 17″					
Substrate thickness	0 to 9 mm					
Maximum exposure area	205 mm x 205 mm / 410 mm x 410 mm					
Autofocus	Realtime autofocus system					
Autofocus compensation range	80 µm					
Flowbox	(Closed-loop) temperature controlled environmental chamber					
Alignment	Camera system for metrology and alignment					
Other features	Stage map correction, Mura correction, Edge detector system, Multiple data input formats (DXF, CIF, GDSII and Gerber files)					
System dimensions						
	VPG+ 200		VPG+ 400			
	System	Electronic rack	System	Electronic rack		
Width [mm]	2140	800	2150	800		
Depth [mm]	1215	650	1610	650		
Height [mm]	2100	1800	2300	1800		
Weight [kg]	2600	180	3000	180		
Installation requirements						
Electrical	400 VAC ± 5 %, 50/60 Hz, 32 A					
Compressed air	6 - 10 bar					

Please note: Specifications depend on individual process conditions and may vary according to equipment configuration. Write speed depends on exposure area. Design and specifications are subject to change without prior notice.

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HEIDELBERG INSTRUMENTS
The power of direct writing

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