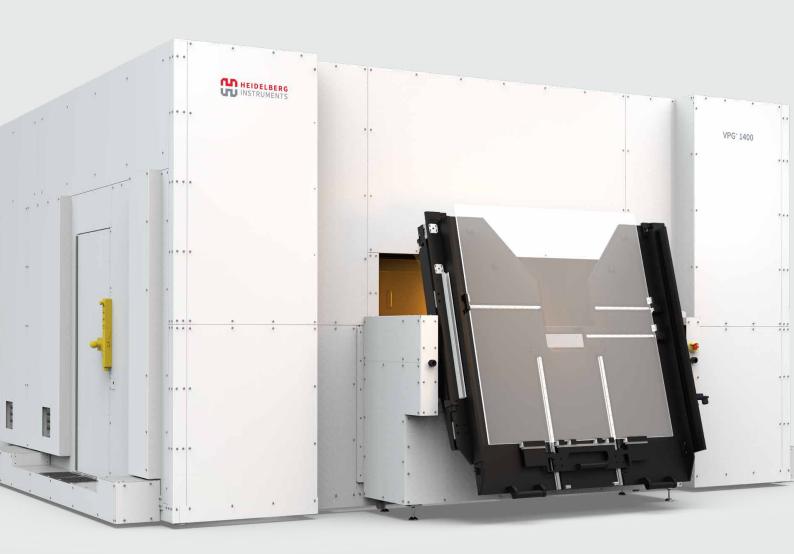


# VPG<sup>+</sup> 800 / VPG<sup>+</sup> 1400

### THE LARGE-AREA MULTIPURPOSE VOLUME PATTERN GENERATORS





heidelberg-instruments.com

### **VPG<sup>+</sup> 800 / VPG<sup>+</sup> 1400** THE LARGE AREA VOLUME PATTERN GENERATORS FOR FABRICATION OF MASKS AND DISPLAYS

Photomask making at the cutting edge requires high speed, maximum stability and utmost precision and that is precisely what the VPG<sup>+</sup> line of Volume Pattern Generators provides. High resolution, outstanding image quality, and fast throughput: This makes the VPG<sup>+</sup> family the ideal systems for rapid photomask fabrication, particularly in the fields of electronic packaging, color filters, light emitting diodes, and touch panels.

## THE LARGE AREA VOLUME PATTERN GENERATORS

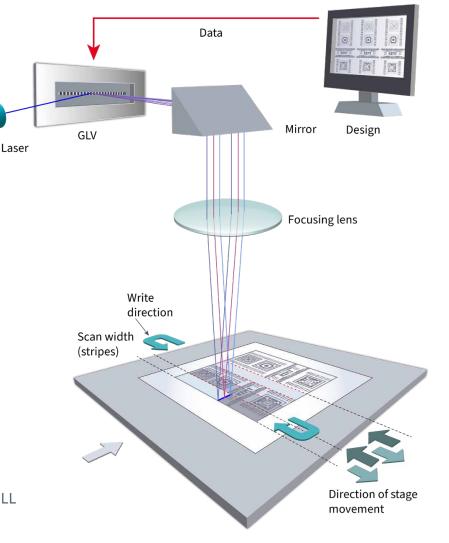
The VPG line of lithography systems was originally introduced in 2007. The technology was based on a patented vast-exposure process parallelization and quickly became the industry standard. For fifteen years now, Heidelberg Instruments VPG (now VPG<sup>+</sup>) systems have proven to be the ideal solution for the high-volume production of demanding photomasks particularly in the fields of electronic packaging, color filters, light emitting diodes, and touch panels.

#### EVEN HIGHER EXPOSURE SPEED

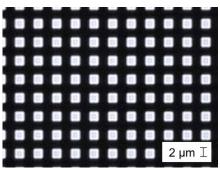
The VPG<sup>+</sup> series meanwhile features a significantly faster high-speed spatial light modulator (custom-made for Heidelberg Instruments and therefore exclusive to this series). The entire exposure engine operates at a higher rate than ever before and the data path too has been vastly enhanced, making the VPG<sup>+</sup> the fastest tool for mask-writing in this market-segment.

#### THE LARGE-AREA VPG<sup>+</sup> IN A NUTSHELL

- Ultra-high-speed exposure engine
- Real-time auto focus system
- High power DPSS laser with 355 nm
- Automatic write mode exchanger
- Camera system for metrology and alignment
- Closed-loop climate chamber
- Semi-automatic substrate loading system
- Stage map correction
- Mura correction, panel pitch optimization
- Edge detector system
- Multiple data input formats
- User-programmable interface



Writing strategy VPG<sup>+</sup>



1 µm II

Photomask structures, 2  $\mu$ m squares

Computer Generated Hologram

#### FEATURES AND OPTIONS

The VPG<sup>+</sup> large-area systems are equipped with a semi- or fully automatic feeder for substrate loading, a high power pulsed UV laser source with a wavelength of 355 nm, and an air-bearing stage. Stages of varying dimensions are available to meet a wide range of requirements: VPG<sup>+</sup> systems can be configured to accommodate substrate sizes of up to 800 mm (VPG<sup>+</sup> 800) or 1400 mm (VPG<sup>+</sup> 1400) respectively.

An automatic calibration tool enables superb registration and positioning of written structures; the small write grid ensures excellent edge roughness and stripe butting. The flexible system configuration also allows for the addition of an automated write mode exchanger unit. All industrial data formats are of course supported; and VPG<sup>+</sup> systems offer mura and panel pitch optimization functions ensuring good mura conditions and therefore excellent CD uniformity and resolution.

#### ENVIRONMENTAL CONTROL

All VPG<sup>+</sup> systems are housed in solid, state-of-the-art flow boxes: the VPG<sup>+</sup> 800 in particular now boasts a cleverly redesigned chamber with a footprint considerably smaller than before. The closed-loop environmental chamber complies with the stringent requirements associated with advanced photomask technology. There is a continuous monitoring of ambient pressure, humidity and temperature to compensate any deviations and to minimize the influence on the beam- and stage positioning system.



The VPG<sup>+</sup> 800

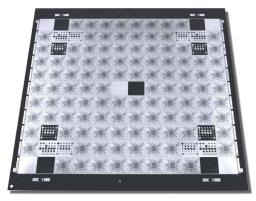


The predecessor of the VPG<sup>+</sup> 1400, the VPG 1400, with a photomask

While all VPG<sup>+</sup> systems share the same powerful technology at their core, each of them retains their own characteristics, specific applications, and areas of use. The VPG<sup>+</sup> 1400 is our largest system and particularly aimed at applications in the display industry: FPD applications like TFT-arrays and color filters, ITO and so on. On the outside, the VPG<sup>+</sup> 1400 features an extremely powerful, impressive environmental chamber; on the inside, a differential interferometer with a resolution down to 1.2 nm. In addition, these systems are equipped with advanced mura correction capabilities such as panel pitch optimization.

#### PHOTOMASK PRODUCTION

A photomask serves as a master template for photolithographic manufacturing and as such it has to fulfill highest requirements. Typical photomask specifications include line-width uniformity, pattern position accuracy, edge roughness and minimum feature size. To enable a large process window for the final process, the photomask specifications have to be considerably better than the target application. Our VPG and VPG<sup>+</sup> systems have proven themselves to be the ideal solution for the high-volume production of demanding photomasks – particularly in the fields of electronic packaging, color filters, light emitting diodes, and touch panels. Options for emulsion photomasks are available.



#### A SYSTEM APART - THE VPG<sup>+</sup> 1400

# VPG<sup>+</sup> 800 / VPG<sup>+</sup> 1400 SYSTEM SPECIFICATIONS

Writing performance     Iminum structure size [µm]     0.75     1       Address grid [nm]     12.5     25       Edge roughness [3σ, nm]     40     50       CD Uniformity [3σ, nm]     65     75       Plate-to-plate overlay [3σ, nm] VPG* 800     160     160       Plate-to-plate overlay [3σ, nm] VPG* 1400     250     250       Stitching [3σ, nm]     60     70       Registration [3σ, nm]     200     200       Write speed [mm²/min] VPG* 800     1100     3925       Write speed [mm²/min] VPG* 1400     1125     4125       System features     32" x 32" / 1400 x 1400 mm²     40       Maximum substrate sizes     32" x 32" / 1400 x 1400 mm²     40       Autofocus     Realtime autofocus system (optical and Autofocus compensation range     150 µm     41       Automation     Semi-automatic loading system     40     40       Other features     Stage map correction, Mura and panel system, Multiple data input formats (D automatic writemode changer ; option automatic (doors closed, loader extended)     VPG* 800       Width [mm]     3100     4250     4250       Height [mm]	Ш
Address grid [nm]   12.5   25     Edge roughness [3σ, nm]   40   50     CD Uniformity [3σ, nm] VPG* 800   160   160     Plate-to-plate overlay [3σ, nm] VPG* 1400   250   250     Stitching [3σ, nm]   60   70     Registration [3σ, nm]   60   70     Registration [3σ, nm]   200   200     Write speed [mm²/min] VPG* 1400   1125   4125     System features   1125   4125     Light source   High-power DPSS laser with 355 nm   32" x 32" / 1400 x 1400 mm²     Maximum substrate sizes   32" x 32" / 1400 x 1400 mm²   100     Substrate thickness   0 to 13.2 mm   140     Autofocus   Realtime autofocus system (optical and Autofocus compensation range   150 µm     Autonation   Semi-automatic loading system   160     Flowbox   Closed-loop temperature controlled end system, Multiple data input formats (Da automatic writemode changer ; option   160     Autonation   Sage map correction, Mura and panel system, Multiple data input formats (Da automatic writemode changer ; option   160     Autofocus closed, loader extended)   VPG* 800   10     Width [mm]   31	
Edge roughness [3σ, nm]4050CD Uniformity [3σ, nm] VPG* 800160160Plate-to-plate overlay [3σ, nm] VPG* 1400250250Stitching [3σ, nm]6070Registration [3σ, nm]200200Write speed [mm²/min] VPG* 80011003925Write speed [mm²/min] VPG* 80011254125System features11254125Light sourceHigh-power DPSS laser with 355 nm32" x 32" / 1400 x 1400 nm²Maximum substrate sizes32" x 32" / 1400 x 1400 nm²100Substrate thickness0 to 13.2 mm100AutofocusRealtime autofocus system (optical and Autofocus compensation range150 µmAutofocusSemi-automatic loading system100AutomationSemi-automatic loading system100FlowboxClosed-loop temperature controlled end system, Multiple data input formation system, Multiple data input formation s	2
CD Uniformity [3σ, nm] VPG* 800   160   160     Plate-to-plate overlay [3σ, nm] VPG* 1400   250   250     Stitching [3σ, nm]   60   70     Registration [3σ, nm]   200   200     Write speed [mm²/min] VPG* 800   1100   3925     System features   1125   4125     Light source   High-power DPSS laser with 355 nm   32" x 32" / 1400 x 1400 nm²     Maximum substrate sizes   32" x 32" / 1400 x 1400 nm²   10     Substrate thickness   0 to 13.2 mm   10     Maximum exposure area   800 x 800 mm² / 1400 x 1400 mm²   10     Autofocus   Realtime autofocus system (optical and autofocus system (optical and autofocus system) (optical and autofocus compensation range   150 µm     Automation   Semi-automatic loading system   10     Flowbox   Closed-loop temperature controlled et autofocus system (optical and system, Multiple data input formats (Da automatic writemode changer; option	50
Plate-to-plate overlay [3σ, nm] VPG* 800   160   160     Plate-to-plate overlay [3σ, nm] VPG* 1400   250   250     Stitching [3σ, nm]   60   70     Registration [3σ, nm]   200   200     Write speed [mm²/min] VPG* 800   1100   3925     System features   1125   4125     Light source   High-power DPSS laser with 355 nm   32" x 32" / 1400 x 1400 mm²     Maximum substrate sizes   32" x 32" / 1400 x 1400 mm²   100     Substrate thickness   0 to 13.2 mm   100     Autofocus   Realtime autofocus system (optical and Autofocus compensation range   150 µm     Autofocus   Semi-automatic loading system   100     Alignment   Closed-loop temperature controlled end automatic writemode changer; optical and system, Multiple data input formats (Da automatic writemode changer; optical and system, Multiple data input formats (Da automatic writemode changer; optical and system, Multiple data input formats (Da automatic writemode changer; optical automatic (doors closed, loader extended)   VPG* 800     Width [mm]   3100   100     Depth [mm]   4250   1000	70
Plate-to-plate overlay [3σ, nm] VPG* 1400     250     250       Stitching [3σ, nm]     60     70       Registration [3σ, nm]     200     200       Write speed [mm²/min] VPG* 800     1100     3925       Write speed [mm²/min] VPG* 1400     1125     4125       System features     1125     4125       Light source     High-power DPSS laser with 355 nm     Maximum substrate sizes     32" x 32" / 1400 x 1400 mm²       Substrate thickness     0 to 13.2 mm     1400 x 1400 mm²     1400 x 1400 mm²       Autofocus     Realtime autofocus system (optical an Autofocus compensation range     150 µm     150 µm       Automation     Semi-automatic loading system     150 µm     150 µm     150 µm       Closed-loop temperature controlled er Alignment     Camera system for metrology and align automatic writemode changer ; option automatic w	110
Stitching [3σ, nm]   60   70     Registration [3σ, nm]   200   200     Write speed [mm²/min] VPG* 800   1100   3925     Write speed [mm²/min] VPG* 1400   1125   4125     System features   1125   4125     Light source   High-power DPSS laser with 355 nm   Maximum substrate sizes   32" x 32" / 1400 x 1400 mm²   100     Substrate thickness   0 to 13.2 mm   400 x 1400 mm²   400 mm²   400 mm²     Autofocus   Realtime autofocus system (optical and 400 focus compensation range   150 µm   400 mm²   400 mm²     Autofocus compensation range   150 µm   400 mm²   400 mm²   400 mm²     Automation   Semi-automatic loading system   400 mm²   400 mm²   400 mm²   400 mm²     Automation   Stage map correction, Mura and panel system, Multiple data input formats (Da automatic writemode charger ; option 300 mm² (Da automatic writemode charger ; option 3100 mm²   4250 mm²     Main unit (doors closed, loader extended)   VPG* 800 mm² (Da automatic writemode charger ; option 4250 mm²   4250 mm²     Width [mm]   3100   4250 mm²   4250 mm²   4250 mm²     Height [mm]   2700   4250 mm²   425	220
Registration [30, nm]   200   200     Write speed [mm²/min] VPG* 800   1100   3925     Write speed [mm²/min] VPG* 1400   1125   4125     System features   1125   4125     Light source   High-power DPSS laser with 355 nm   Maximum substrate sizes   32" x 32" / 1400 x 1400 mm²   100     Substrate thickness   0 to 13.2 mm   100   100   100     Maximum exposure area   800 x 800 mm² / 1400 x 1400 mm²   100   100   100     Autofocus   Realtime autofocus system (optical and Autofocus compensation range   150 µm   100 <td>300</td>	300
Write speed [mm²/min] VPG* 800   1100   392.5     Write speed [mm²/min] VPG* 1400   1125   412.5     System features   1125   412.5     Light source   High-power DPSS laser with 355 nm   1     Maximum substrate sizes   32" x 32" / 1400 x 1400 mm²   1     Substrate thickness   0 to 13.2 mm   1     Maximum exposure area   800 x 800 mm² / 1400 x 1400 mm²   1     Autofocus   Realtime autofocus system (optical and Autofocus compensation range   150 µm     Automation   Semi-automatic loading system   1     Flowbox   Closed-loop temperature controlled er   1     Alignment   Stage map correction, Mura and panel   1     Other features   Stage map correction, Mura and panel   1     System dimensions   3100   10     Width [mm]   3100   1   1     Depth [mm]   4250   1   1     Height [mm]   2700   10,000   10,000	100
Write speed [mm²/min] VPG* 140011254125System featuresLight sourceHigh-power DPSS laser with 355 nmMaximum substrate sizes32" x 32" / 1400 x 1400 mm²Substrate thickness0 to 13.2 mmMaximum exposure area800 x 800 mm² / 1400 x 1400 mm²AutofocusRealtime autofocus system (optical amAutofocus compensation range150 µmAutomationSemi-automatic loading systemFlowboxClosed-loop temperature controlled erAlignmentCamera system for metrology and align system, Multiple data input formats (D automatic writemode changer ; optionSystem dimensionsVPG* 800Width [mm]3100Depth [mm]4250Height [mm]2700Wight [kg]10,000	200
System featuresLight sourceHigh-power DPSS laser with 355 nmMaximum substrate sizes32" x 32" / 1400 x 1400 mm²Substrate thickness0 to 13.2 mmMaximum exposure area800 x 800 mm² / 1400 x 1400 mm²AutofocusRealtime autofocus system (optical and Autofocus compensation rangeAutomationSemi-automatic loading systemFlowboxClosed-loop temperature controlled erAlignmentCamera system for metrology and alignOther featuresStage map correction, Mura and panelSystem dimensionsStage map correction, Mura and panelMain unit (doors closed, loader extended)VPG* 800Width [mm]3100Depth [mm]4250Height [mm]2700Weight [kg]10,000	7825
Light source High-power DPSS laser with 355 nm Maximum substrate sizes 32" x 32" / 1400 x 1400 mm² 320 x 32" x 32" / 1400 x 1400 mm² 320 x 320 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 x 800 mm² / 1400 x 1400 mm² 320 x 300 mm² / 1400 x 1400 mm² 320 x 3100 x 3100 x 3100 x 3100 x 3100 x 320 x 3100 x 320 x	8250
Maximum substrate sizes32" x 32" / 1400 x 1400 mm²Substrate thickness0 to 13.2 mmMaximum exposure area800 x 800 mm² / 1400 x 1400 mm²AutofocusRealtime autofocus system (optical and Autofocus compensation rangeAutofocus compensation range150 µmAutomationSemi-automatic loading systemFlowboxClosed-loop temperature controlled er AlignmentOther featuresStage map correction, Mura and panel system, Multiple data input formats (D automatic writemode changer ; optionSystem dimensionsVPG* 800Width [mm]3100Depth [mm]4250Height [mm]2700Weight [kg]10,000	
Substrate thickness0 to 13.2 mmMaximum exposure area800 x 800 mm² / 1400 x 1400 mm²AutofocusRealtime autofocus system (optical and 150 µmAutomationSemi-automatic loading systemFlowboxClosed-loop temperature controlled er AlignmentAlignmentCamera system for metrology and align system, Multiple data input formats (D automatic writemode changer ; optionSystem dimensionsVPG* 800Width [mm]3100Depth [mm]4250Height [mm]2700Weight [kg]10,000	
Maximum exposure area800 x 800 mm²/ 1400 x 1400 mm²AutofocusRealtime autofocus system (optical and Autofocus compensation rangeAutomationSemi-automatic loading systemFlowboxClosed-loop temperature controlled er AlignmentAlignmentCamera system for metrology and align Stage map correction, Mura and panel system, Multiple data input formats (D automatic writemode changer ; optionSystem dimensionsVPG* 800Width [mm]3100Depth [mm]4250Height [mm]2700Weight [kg]10,000	
AutofocusRealtime autofocus system (optical and Autofocus compensation rangeAutomation150 μmAutomationSemi-automatic loading systemFlowboxClosed-loop temperature controlled erAlignmentCamera system for metrology and align system, Multiple data input formats (D automatic writemode changer ; optionOther featuresStage map correction, Mura and panel system, Multiple data input formats (D automatic writemode changer ; optionSystem dimensionsVPG* 800Width [mm]3100Depth [mm]4250Height [mm]2700Wight [kg]10,000	
Autofocus compensation range150 μmAutomationSemi-automatic loading systemFlowboxClosed-loop temperature controlled erAlignmentCamera system for metrology and alignOther featuresStage map correction, Mura and panelsystem dimensionssystem, Multiple data input formats (DMain unit (doors closed, loader extended)VPG* 800Width [mm]3100Depth [mm]4250Height [mm]2700Weight [kg]10,000	
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Stage map correction, Mura and panel system, Multiple data input formats (D automatic writemode changer ; optionSystem dimensionsMain unit (doors closed, loader extended)VPG* 800Width [mm]3100Depth [mm]4250Height [mm]2700Weight [kg]10,000	vironmental chamber
Other featuressystem, Multiple data input formats (D automatic writemode changer ; option)System dimensionsVPG* 800Main unit (doors closed, loader extended)VPG* 800Width [mm]3100Depth [mm]4250Height [mm]2700Weight [kg]10,000	nment
Main unit (doors closed, loader extended)VPG* 800Width [mm]3100Depth [mm]4250Height [mm]2700Weight [kg]10,000	XF, CIF, GDSII and Gerber files)
Width [mm] 3100   Depth [mm] 4250   Height [mm] 2700   Weight [kg] 10,000	
Depth [mm]     4250       Height [mm]     2700       Weight [kg]     10,000	VPG <sup>+</sup> 1400
Height [mm]     2700       Weight [kg]     10,000	5370
Weight [kg] 10,000	7000
	2800
Installation requirements	25,000
Electrical 400 VAC ± 5 %, 50/60 Hz, 32 A	
Compressed air 8 - 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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