



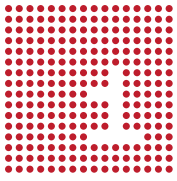
# VULQ 1 MODULE

PROGRAMMABLE MULTIBEAM TECHNOLOGY

D A T A S H E E T



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# QiOVA : OUR STORY, OUR VISION

*Pioneers of multibeam laser microprocessing*



Since its inception in 2011, **QiOVA** has been designing innovating laser processing solutions to help our customers produce in a more effective way.

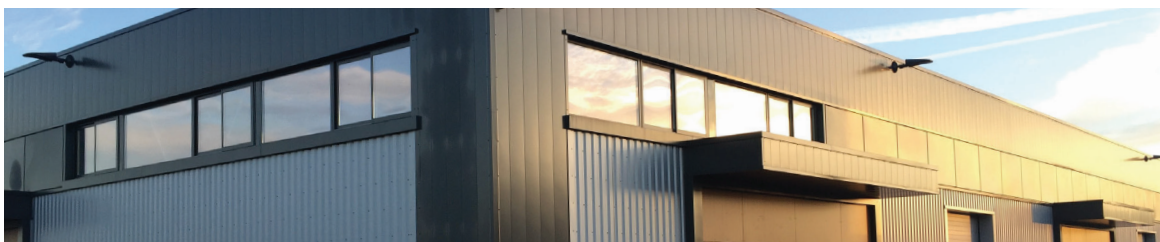
Our vision has 2 fundamental beliefs:

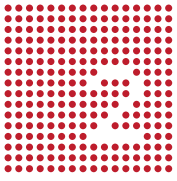
**1. Laser is the production tool of the future.** Thanks to its unmatched benefits such as high resolution, permanent, contact-less, consumable-less, laser light delivers a superior level of production added value with minimal ecological footprint.

**2. Throughput is the main driver for broader industry adoption of laser tools.** With the large choice of high-power industrial laser available today, the productivity bottleneck lies in the ability to deliver the light to the workpiece in the most efficient manner. Galvanometric scanners reached their speed; better tools are needed for emerging mass applications.

QiOVA's unique **Programmable Multibeam technology** makes sure our customers are always processing parts in the most optimized conditions.

**VULQ1** modules and systems offer industrials the production tools needed to lead in the 4th industrial revolution.





# PROGRAMMABLE MULTIBEAM LASER PROCESSING

Why use only one beam when you can have hundreds ?

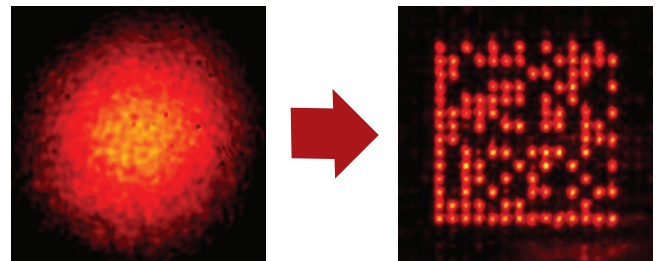
**VULQ1 Programmable Multibeam technology** uses software configurable **Laser Light Tools** to maximize throughput in precision material processing applications.

**VULQ1** generates up to hundreds laser beamlets on-demand, from one single laser beam.

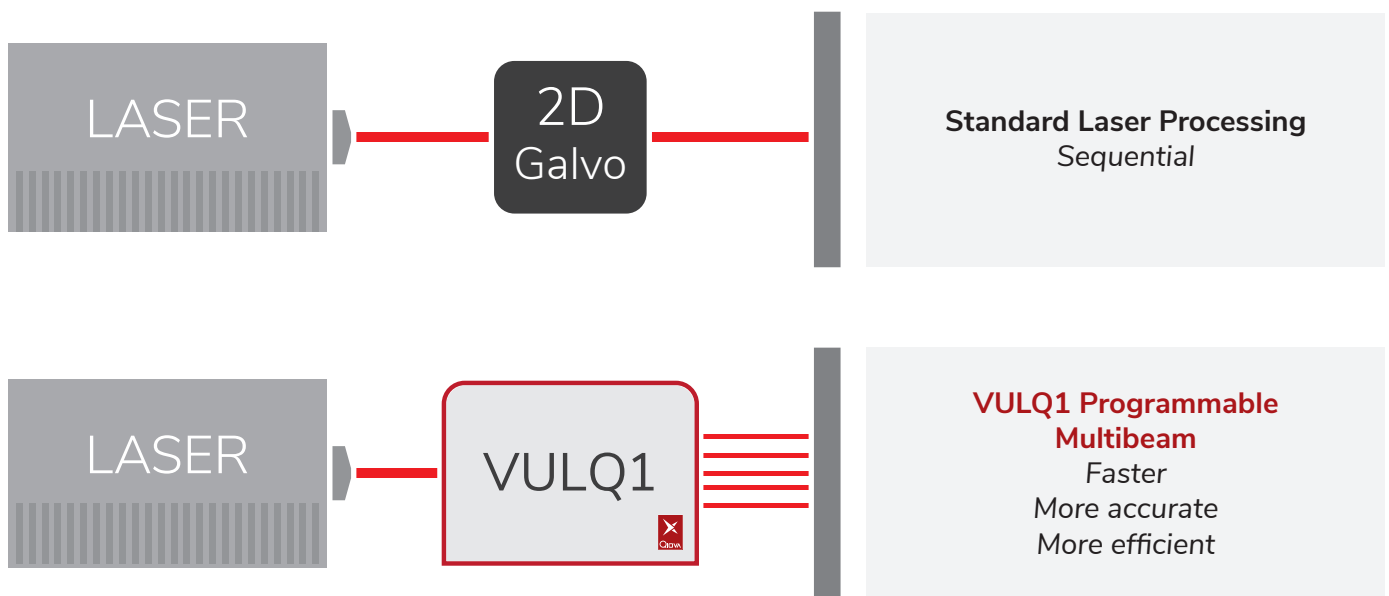
The beamlets characteristics are individually and dynamically controlled by software - in position, profile and energy - to create the "Laser Light Tool" fitted to the process needs.

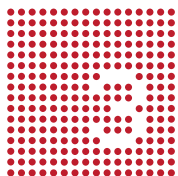
The many beamlets composing the "Laser Light Tool" are applied simultaneously to the material, scaling up process throughput with no compromise on quality.

Figure 1: VULQ1 shaping the laser beam into a Laser Light Tool dedicated to datamatrix marking application.



Throughput & efficiency x10 / Spatial resolution < 50µm





# VULQ1 MODULES

## STANDARD OFFER

Faster. Finer. More efficient.



### WHAT IS A VULQ1 MODULE ?

The **VULQ1 module** is a sub-system in the laser machine design, offering programmable multibeam processing capabilities. It needs to be operated with an external laser source.

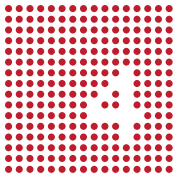
The **VULQ1 module** is composed of three main components:

- **VULQ1 optical head:** VULQhead
- **VULQ1 controller:** VULQontrol
- **VULQ1 software:** BeamForge, stand-alone or API version for integration

#### VULQ1 module overview

| Application domain | Scientific | Industrial applications<br>Marking |             | Industrial applications<br>Micromachining |
|--------------------|------------|------------------------------------|-------------|---|
| VULQ1 module model | BBD-P010   | VIS-P050                           | NIR-P050    | NIR-P100                                  |
| Wavelength range   | 500-1100nm | 500-550nm                          | 1000-1100nm | 1000-1100nm                               |
| Maximum power      | 10W        | 50W                                | 50W         | 100W                                      |
| Pulse duration     | >1ns       | >1ns                               | >1ns        | >500fs                                    |





# VULQ1 MODULES STANDARD OFFER

*Faster. Finer. More efficient.*



## VULQ1 OPTICAL HEAD: VULQhead

VULQhead is the optical head for the **VULQ1 module**. It is available in 4 standard models:

- **VULQ1-BBD-P010**: product allowing a very flexible use, particularly adapted to laboratories and technical centers. It features the broadest spectral band, including the visible and near infrared regions.
- **VULQ1-NIR-P050**: product optimized for industrial laser marking applications in the near infrared (NIR). It offers the highest operating energy specification.
- **VULQ1-VIS-P050**: product optimized for industrial laser marking applications in the visible range.
- **VULQ1-NIR-P100**: product optimized for micro-machining applications. It is specified for use with ultra-short pulse lasers (picosecond, femtosecond). Its power handling is the highest in the range, thanks to its built-in water-cooling system.

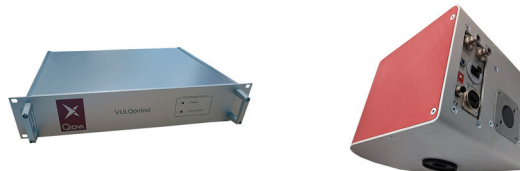


Figure 2: the VULQontrol controller and VULQhead optical head



## VULQ1 CONTROLLER: VULQontrol

**VULQontrol** is the controller of the **VULQhead**.

The standard version «VULQontrol-STD» provides power and control signals to **VULQhead**.

The advanced version «VULQontrol-ADV» also integrates the generation of analog and/or digital input/output signals to control external devices - laser source, translation plates, galvanometric scanners - with **VULQ1 BeamForge** software.





# VULQ1 MODULES STANDARD OFFER

*Faster. Finer. More efficient.*

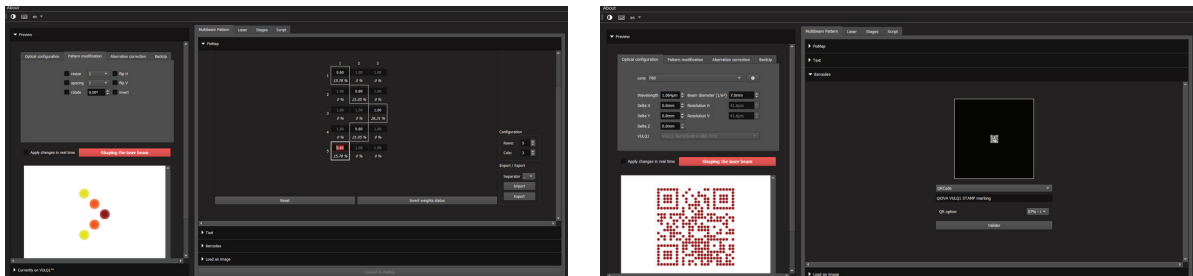


## VULQ1 SOFTWARE: BeamForge

Our proprietary software **BeamForge** puts the power of programmable multibeam processing within everyone's reach. A simple and ergonomic user interface offers many powerful functions like:

- **PixMap generation:** creation of an interactive multi-beam pattern, allowing point-to-point energy control (exclusive to our software)
- **Automatic 2D code generation** including Datamatrix, QR code and dotcode
- **Automatic generation of multibeam patterns** from alphanumeric characters or images
- **Toolbox for multibeam pattern control and optimization:** rotation, dilation, symmetry...
- **User assistance tools** for pattern creation: preview, distance measurement...
- **Beam Quality Control functions** for optimal quality throughout the life of the laser solution
- **Export/import capabilities** to create our own customized multi-beam patterns libraries
- **Proprietary scripting language** for experts who want complex custom-made marking sequences

**BeamForge** is available as a stand-alone software or also as an API for OEM integration.





# VULQ1 MODULES FOR MARKING

*High speed individual traceability enabler*



## APPLICATIONS

- High-speed marking on technical primary packages: polymers, glass, ceramics
- High speed high-resolution marking on small parts and components
- On-the-fly marking on fast lines
- Discrete marking



## UNIQUE FEATURES

- **One laser pulse = one pattern:** 2D code, alphanumerics, logo
- Shortest marking time on the market
- Highest marking rate on the market



## CUSTOMER BENEFITS

- Ideal for in line marking: straightforward integration, insensitive to speed and vibrations
- Perfect marking quality for micro-markings
- Intrinsic shallow marking properties





# VULQ1 MODULES FOR MICROMACHINING

*Enjoy the full potential of your USP laser*



## APPLICATIONS

- High-speed surface texturing
- High-speed micro-drilling
- Beam quality management along laser lifetime



## UNIQUE FEATURES

- Superior throughput on freeform objects
- Programmable multibeam microprocessing
- Integrated beam cleaning and beam quality management functions

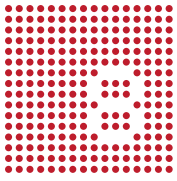


## CUSTOMER BENEFITS

- **10% investment = 400% productivity**
- Boundless possibilities for process optimization
- Homogeneous output performance with beam cleaning
- Maximum uptime with remote beam quality management







# SCIENTIFIC

*A simple and highly versatile tool, boundless capabilities*



## APPLICATIONS

- Flexible multibeam generation
- Advanced beam profile generation: top-hat, vortex, Bessel
- Emerging applications: glass welding, 3D micro-printing, photopolymerization



## UNIQUE FEATURES

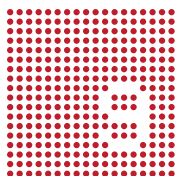
- Broadest specified spectral operation range covering visible and NIR range
- Intuitive graphic software interface with powerful built-in functions
- User customizable main software: scripting mode, BeamForge function libraries, add-ons for satellite devices



## CUSTOMER BENEFITS

- Focus on your research, not on laser beam shaping
- Boundless innovative value creation capabilities





# SPECIFICATIONS

| Specifications                           | Unit | BBD – P010                                  | VIS – P050 | NIR – P050 | NIR – P100 |
|--|------|---|------------|------------|------------|
| Spectral range                           | nm   | 500 – 1100                                  | 500-550    | 1000-1100  | 1000-1100  |
| Optical transmission (typical value) [1] | %    | 70 % (75%)                                  | 90% (95%)  | 90% (95%)  | 90% (97%)  |
| Cooling system [2]                       |      | -   | -          | -          | Water      |
| VULQhead dimensions                      | mm   | 264 x 170 x 183                             |            |            |            |
| VULQhead weight                          | kg   | < 4   |            |            |            |
| VULQontrol dimensions                    | mm   | Rack 19' 2U x 411                           |            |            |            |
| VULQontrol weight                        | kg   | < 4   |            |            |            |
| Storage temperature                      | °C   | 5-50°C, sans condensation / non condensing  |            |            |            |
| Spécifications of use                    |      |   |            |            |            |
| Input beam profile                       | -    | TEM00 ; M² < 1.3                            |            |            |            |
| Output polarization ratio [3]            | -    | > 100 : 1                                   |            |            |            |
| Beam size [4]                            | mm   | 5,0 - 7,5                                   |            |            | 5,0 – 9,0  |
| Maximum input optical power              | W    | 10  | 50         |            | 100        |
| Maximum input energy per pulse [5]       | mJ   | 10  | 15         | 30         | 1          |
| Minimum pulse duration                   |      | 1 ns  | 1 ns       | 1 ns       | 500 fs     |
| Operating temperature                    | °C   | 15-30°C, sans condensation / non condensing |            |            |            |
| Input centering tolerance [6][7]         | mm   | +/- 0,5                                     |            |            |            |
| Input angular tolerance [6][7]           | mrad | +/- 2,5                                     |            |            |            |
| Output centering precision [8]           | mm   | +/- 0,5                                     |            |            |            |
| Output angular precision [8]             | mrad | +/- 5                                       |            |            |            |

[1] : Incident beam perfectly aligned, no output lens

[2] : Cooling system not included

[3] : For input polarization ratio >100:1

[4] : d80 according to ISO 11145

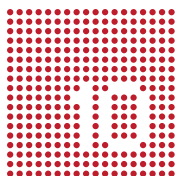
[5] : On the specified beam diameter range

[6] : Reference provided by the mechanical mounting interface of VULQhead

[7] : Tolerance inducing less than 10% variation of the beamlets fluence

[8] : Reference to the nominal output axis



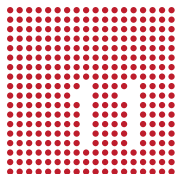


# SPECIFICATIONS

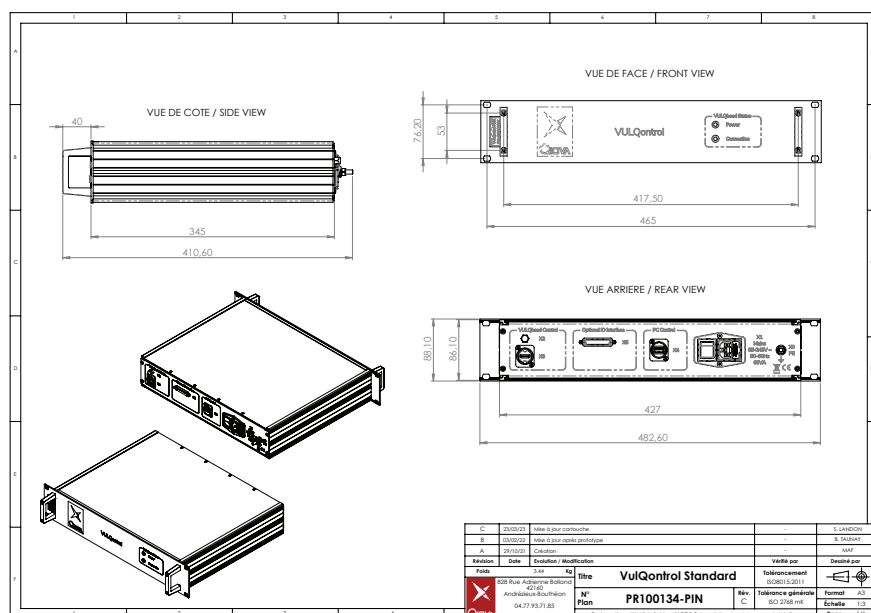
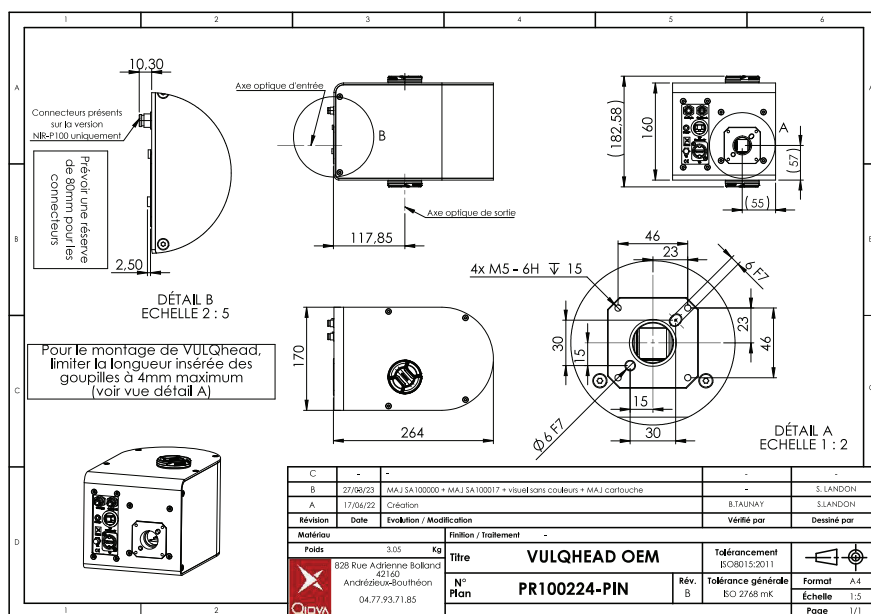
| Typical application data                         | Unit | BBD – P010 | VIS – P050 | NIR – P050 | NIR – P100 |
|--|------|------------|------------|------------|------------|
| Pattern display latency                          | ms   | 55         |            |            | 100        |
| Pattern flow                                     | Hz   |            | 20         | 10         |            |
| Output focal length                              | mm   | 160        |            |            | 80         |
| Used wavelength                                  | nm   | 1064       | 532        | 1064       | 1030       |
| Maximum recommended distance to the optical axis | mm   | 3          | 1.5        | 3          | 1          |
| Minimum focused beamlet diameter [9]             | µm   | 42         | 21         | 42         | 13         |
| Maximum focused beamlet diameter [9]             | µm   | 63         | 32         | 63         | 23         |
| Spatial resolution                               | µm   | 83         | 42         | 83         | 27         |
| Maximum distance to the optical axis             | mm   | 5,6        | 2,8        | 5,6        | 2,8        |

[9] : QiOVA selected focusing lens data





# DRAWINGS





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