



BioPipeline **SLIDE**

Microscope Automated Slide
Imaging System



Experiment Pipeline

Sample Que
Samples for high resolution imaging and archiving can stack up quickly



Instrument Time
Attending to the imaging system to insert samples, obtain images, check results, then move to the next sample takes significant time.



Multiple slide cassettes automatically load and unload samples from the microscope.



Imaging
Experiments are run and images acquired in an automated fashion.



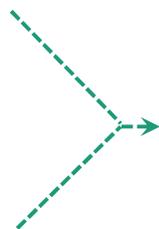
Getting Samples to and from the Instrument
Reliably moving samples on and off of the instrument requires a stable and robust platform.



Robotics transfer slides to and from the microscope



Processing and Analysis
During and post-acquisition, processing and analysis functions are performed to generate statistics for further interpretation.



An optional dedicated server can manage offline processing, analysis, and storage.



Data Archival
Storage of experimental data, especially large data, can be difficult if it has to be transferred off of the acquisition workstation.

 **Potential Bottleneck**

Key Features

The Perfect Platform for High Content Slide Imaging

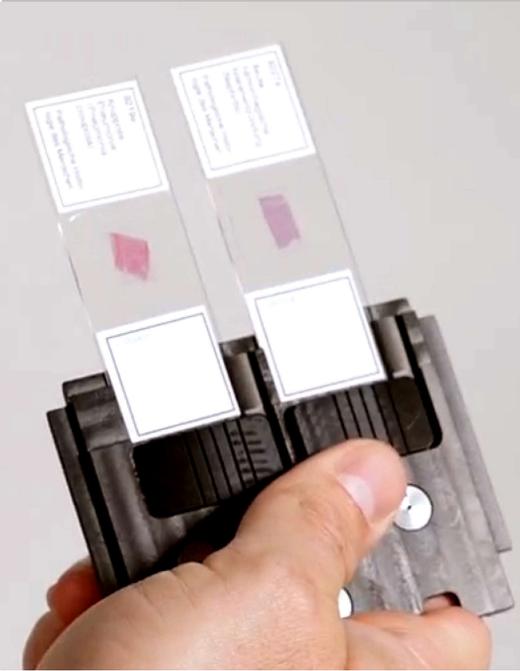
An Ni-E motorized upright microscope platform with several choices for high performance optics and a wide range of available detectors means the highest quality results.

Using the Marzhauser Slide Express 2 automated slide loader, stability and repeatability is maintained by a solid platform with precision connection to the microscope body, resulting in flawless loading and unloading of samples.

With a unified software package across all microscope platforms, data can be easily shared and visualized as well as learning time reduced.



STABLE AND RELIABLE



Slides are inserted into the cassette using two-slide holders, which insure the slides are flat and oriented properly for imaging.

Cassettes are loaded into a motorized enclosure with space for up to 3 cassettes, or a total of 120 slides.

To place slides on the imaging area, the two slide holders are extracted from the cassettes by magnetic attachment. Because the stage is integrated and attached to the loading mechanism, a stable and reliable transfer of slides results.



NIS-Elements Software



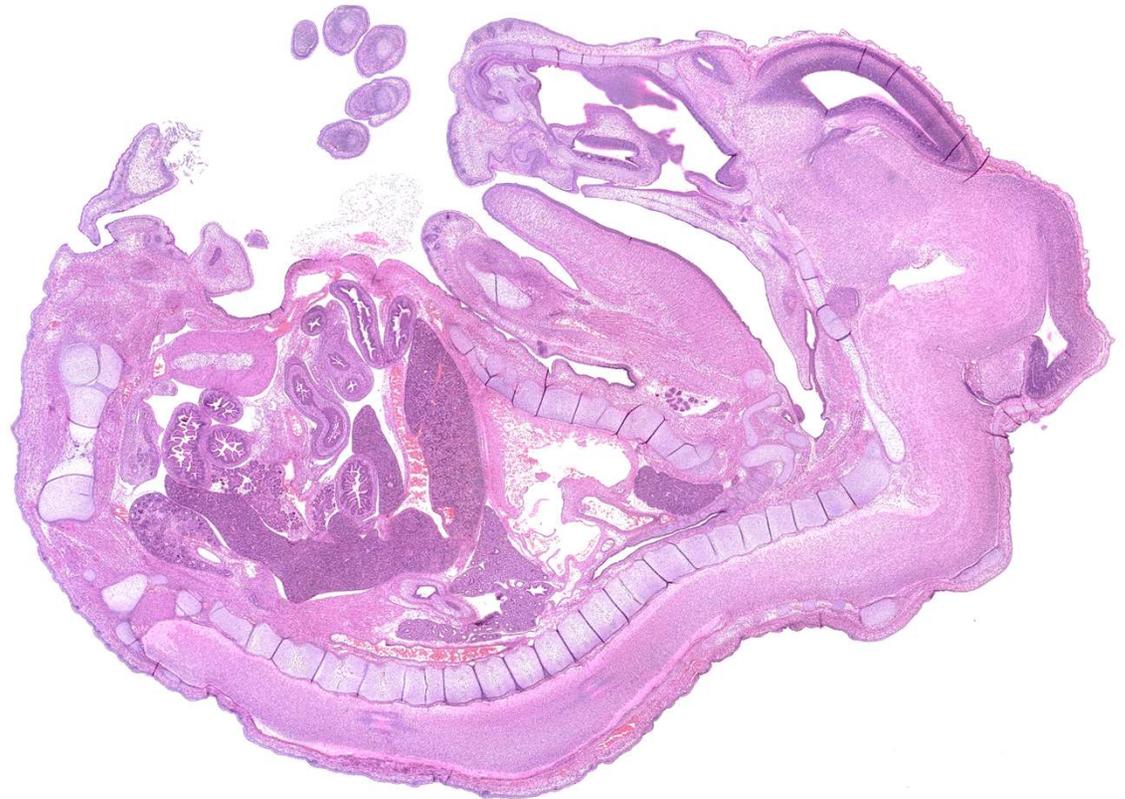
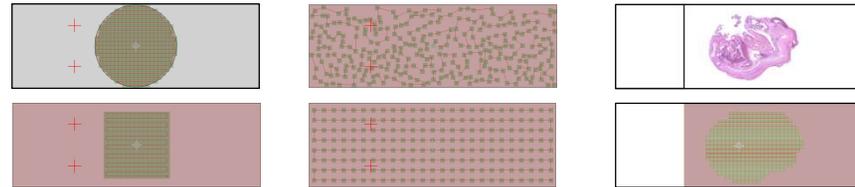
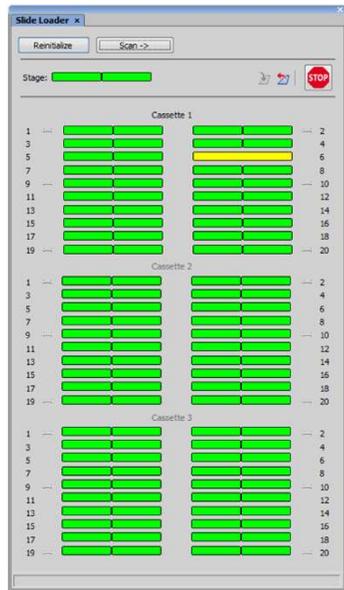
NIS-Elements reads and catalogs the cassettes, and automates the delivery of specimens to the microscope. An indicator shows which cassette location is currently loaded onto the microscope stage.

Slide scanning can be in a defined area and/or pattern, or specimen boundaries can be detected and the area within used as a tiling, fixed, or random pattern.

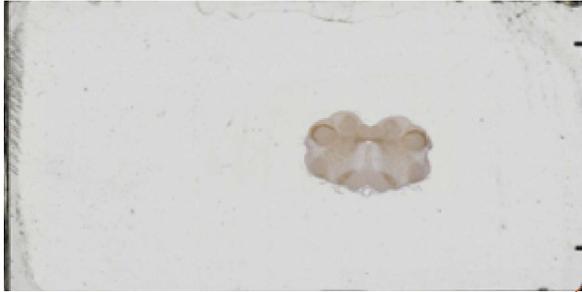
These areas can be defined at the time each slide is loaded, or a predefined area used for all slides. Users

can select specific slides to acquire, or choose to scan all slides in all cassettes in one run.

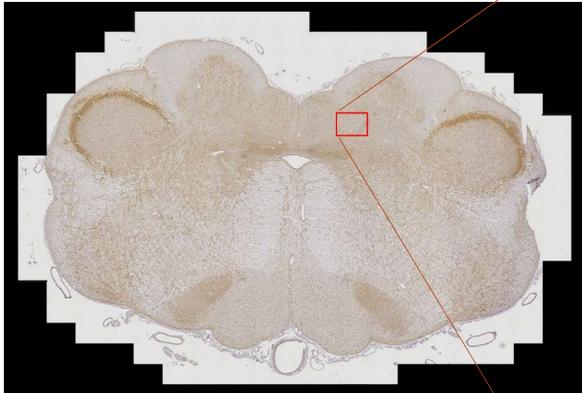
Imaging can be performed in brightfield and/or epifluorescence modalities, with results tiled or presented as image stacks.



Acquisition



Slides can be quickly scanned at low magnification to locate items of interest, including several separate items per slide...



...then rescanned at high resolution and high magnification, so that only the areas of the slide with useful data are acquired and tiled.

High resolution images make up the tiled scan. Not acquiring blank areas results in much faster scanning and less storage space required per slide.

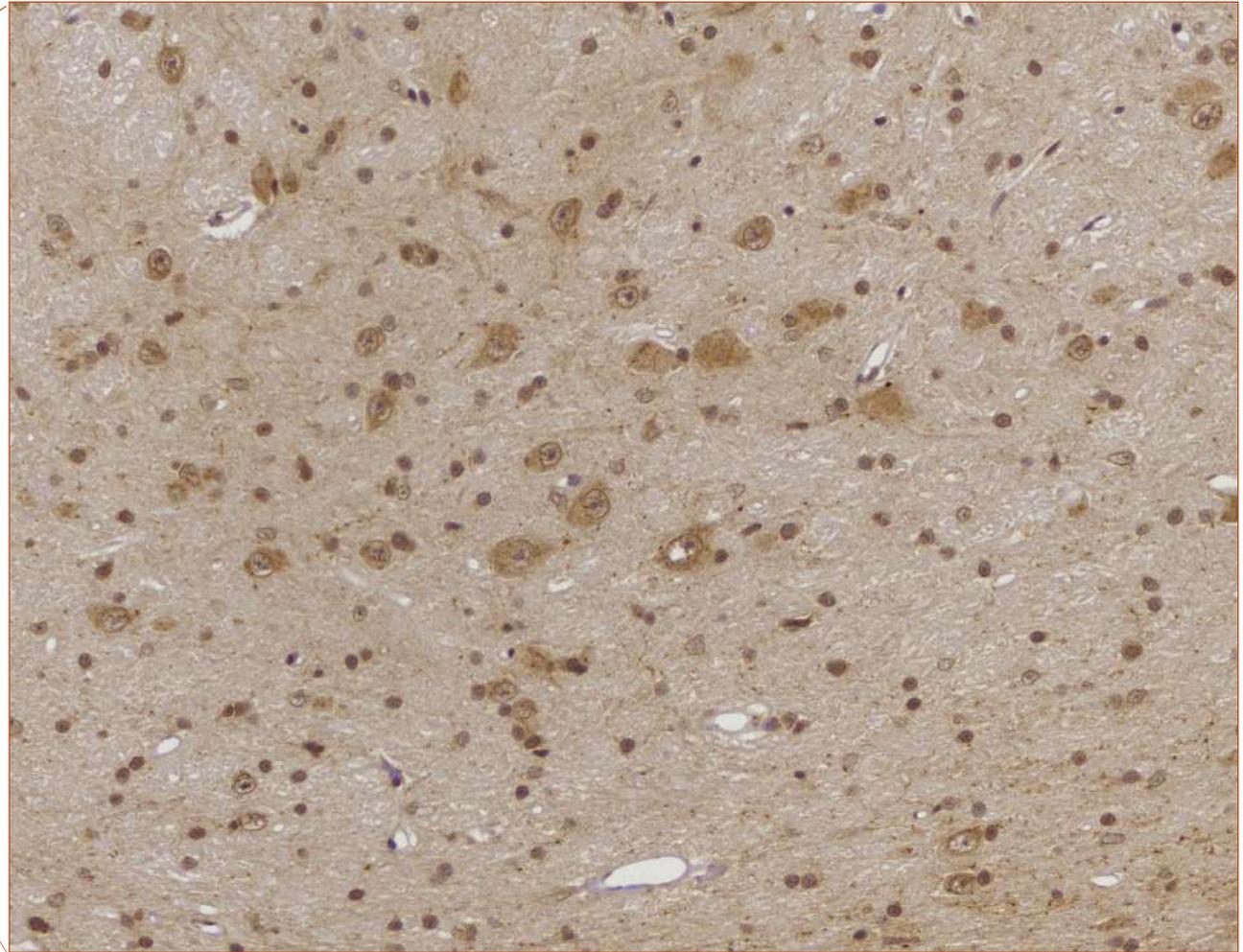


Image Analysis



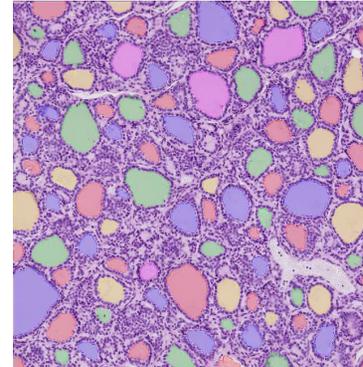
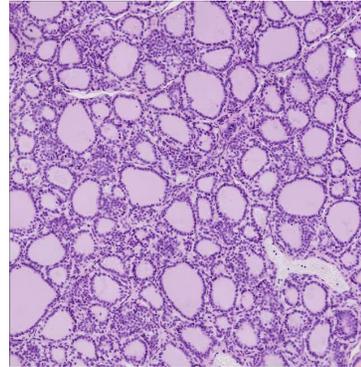
NIS-Elements' **General Analysis** engine employs a powerful processing and analysis toolbox for users.

Dedicated turnkey assays can be applied to image data as well as user-customized assays for specific applications.

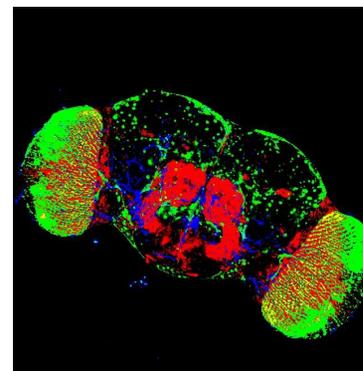
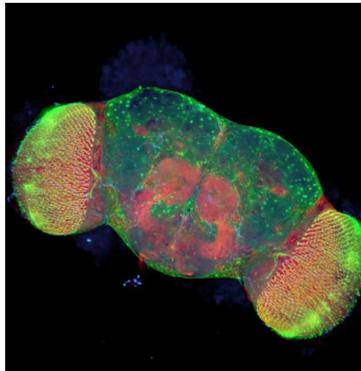
All routines can be executed during acquisition, for example: to modify the course of an experiment, or post-acquisition on the dedicated server.

Assay results can be collated and statistical information displayed, or be exported.

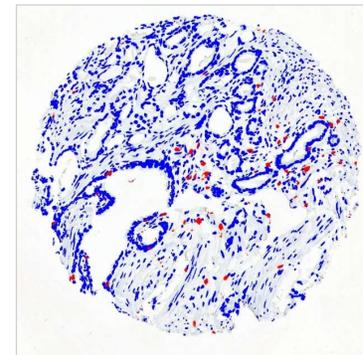
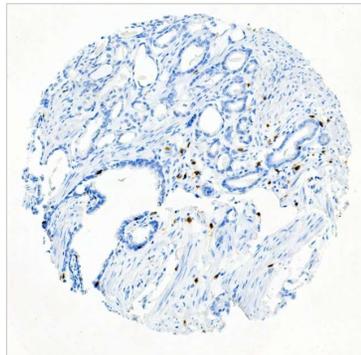
Some examples are shown here.



There are many tools which can be customized to detect and automatically segment and classify objects. In this example, pituitary gland sections were imaged over a large field of view, tiled, and colloids were auto-detected and measured.

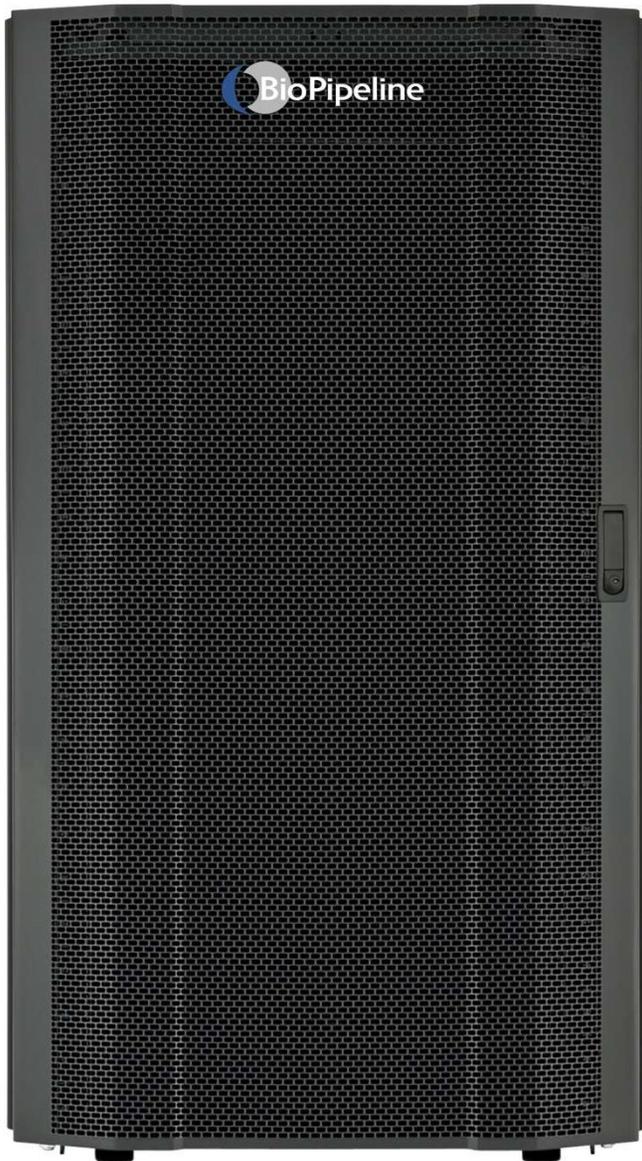


This example tool computes areas occupied by different fluorescence markers in tiled brain images.



This tissue microarray punch was segmented using an IHC detection tool which automatically finds hematoxylin and diaminobenzidine (DAB) colors.

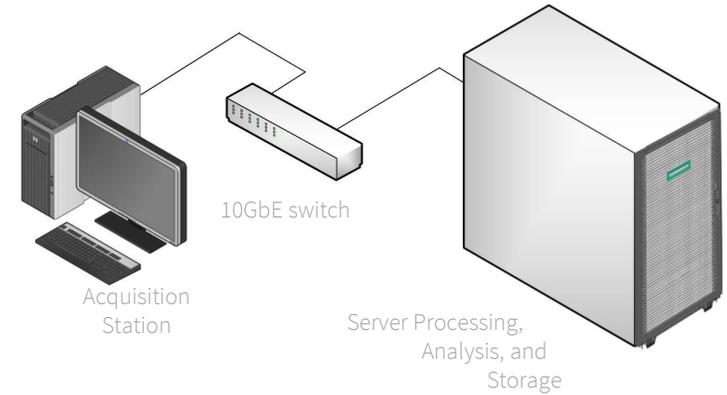
Dedicated Server



Server-side Processing, Analysis, and Storage

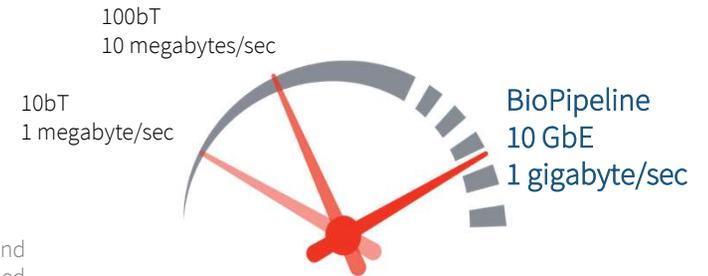
Because data can be saved directly to the server, it means multiple users can view their data while the system is busy acquiring new images. Likewise, the server can perform processing and analysis tasks automatically on designated locations when data is placed there.

Because the server is connected to the imaging workstation by a dedicated switch, slow traffic on the existing network will not affect the transfer speed between acquisition and storage devices.



Data Transfer

BioPipeline's data transfer rates from the imaging workstation to the dedicated server exceed most traditional networks by 10-100x by using dedicated 10 GbE connections.



Storage Capacity

Having over 40x the storage capacity of a typical high-end imaging workstation, with expandability for more, the included **BioPipeline Server** with direct dedicated 10GbE network connection allows for more uninterrupted imaging and offline processing and analysis.

Typical Imaging workstation: 6TB

BioPipeline Server: 200TB*

*expandable

Configurations

Full Configuration



Microscope



Robotics



Software and modules



Workstation



DIA and EPI light sources



Server storage



Server-side software



Anti-vibration table

Lite Configuration



Microscope



Robotics



Software and modules



Workstation



DIA light source

The Lite configuration of BioPipeline Slide is for users who may not require epifluorescence or are space limited, and do not require server processing or storage.

Epifluorescence can be added to this configuration if desired.

Selectable Components



Options for All Configurations



Detectors



Objectives



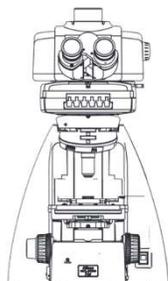
Additional software modules



Workstation desk

Both full and lite configurations have selectable detectors, objective lenses, and additional software components to customize the system for the desired applications.

Specifications



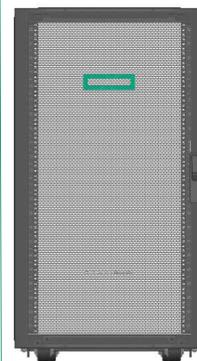
Microscope Specifications

Imaging Modalities	Transmitted Light Brightfield Widefield Epifluorescence Point Scanning confocal (option with C2)
Illumination	8 channel Epifluorescence LED LED transmitted Light Laser illumination for confocal sources (option)
Objectives	All air objectives lenses can be used for high content
Imaging Methods	Multidimensional XY, Z, wavelength, multi-stage position including tiling
Autofocus	Software contrast-based autofocus
Hardware Triggering	Supports direct hardware triggering of light sources and shutters
Antivibration Table	Included 30x48" x 6" table with full system
Dimensions (without detector*)	32cm x 60cm x 510cm typical (height increases 70mm with additional EPI port)
Power Consumption	

*see detector brochures for detector specification details

Slide Loader Specifications

Device	Marzhauser Wetzlar SlideExpress2
Application	Slide loading
Capacity	3 Cassettes each holding up to 40 1x3 inch glass slides: total of 120 slides
Robotics	Internal elevator robot and picker robot
Communication	USB through Tango controller
Power Requirements	100V / 50Hz 115V / 60Hz / 240V / 50Hz ; switchable
Stage Specifications	Accuracy +/- 1um; repeatability <1um bidirectional; resolution 0.05um step; max speed 100mm/s
Power Consumption	<100W
Dimensions	108 x 75 x 108.5cm



Server Specifications

Rack Size	22U
Processor	Intel Xeon Silver 412 2.6 GHz
OS	Windows Server
RAM	128 GB
Storage Type	SAS
Storage Capacity	250TB
Network	12x 10GBase-T + 4x 1Gbit/10Gbit SFP+
Support	3 year Foundation Care Service and Support
Power Consumption	600W (average) – 1300W
Options	Tape Backup, 144TB Expansion
Physical Dimensions	(W x D x H) 90.00 x 129.20 x 151.00 cm

Specifications and equipment are subject to change without any notice or obligation on the part of the manufacturer. August 2019 ©2019 Nikon Instruments, Inc.

 WARNING	TO ENSURE CORRECT USAGE, READ THE CORRESPONDING MANUALS CAREFULLY BEFORE USING YOUR EQUIPMENT.
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**WARNING-LASER RADIATION
AVOID EXPOSURE TO BEAM
CLASS 3B LASER PRODUCT**
Total Power 500mW MAX.
CW 400~700nm
IEC/EN60825-1 : 2007, 2014

Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007

**DANGER-VISIBLE AND INVISIBLE
LASER RADIATION AVOID EYE
OR SKIN EXPOSURE TO DIRECT
OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT**
Total Power 1500mW MAX.
CW 370~790nm
IEC/EN60825-1 : 2007, 2014

Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.50 dated June 24, 2007.



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