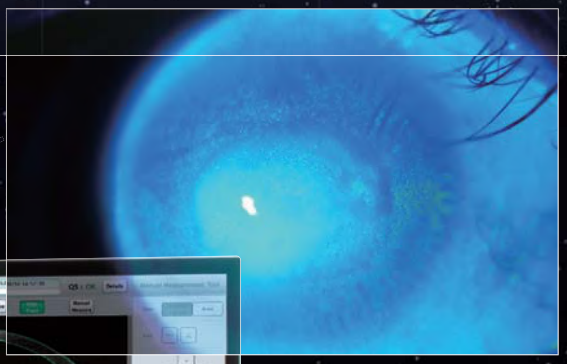
Cornea/Anterior Segment OCT

# CASIA2

## User Experience

TOMEY

# CASIA2 User Experience

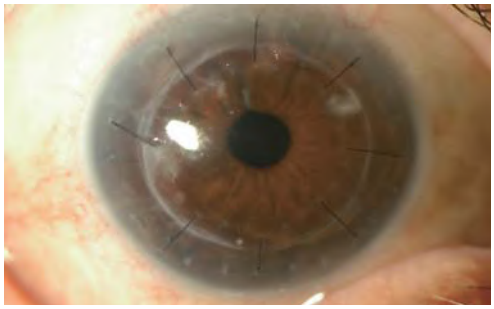
Tokyo Medical University /
Kohsei Chuo General Hospital

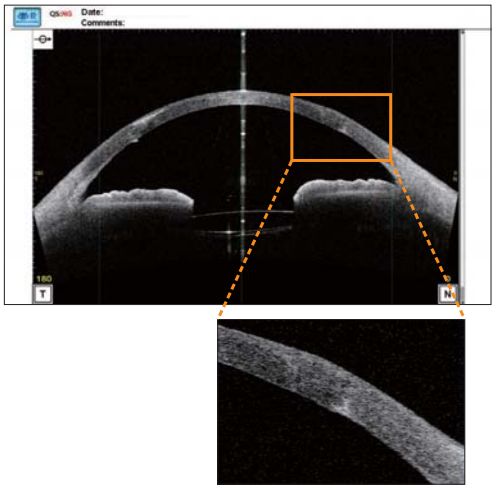
## Hideki Mori MD, PhD

**Almost eight years have passed since the anterior segment OCT was launched.***
**The Anterior Segment OCT SS-1000 CASIA which I have worked on from the initial development, has now become CASIA2, whose measurement area and functionality has improved. In this user experience, I summarized cases in which CASIA2 was beneficial - mainly corneal transplantation cases. I also introduced an interesting use of hard contact lenses and cornea for reference.**

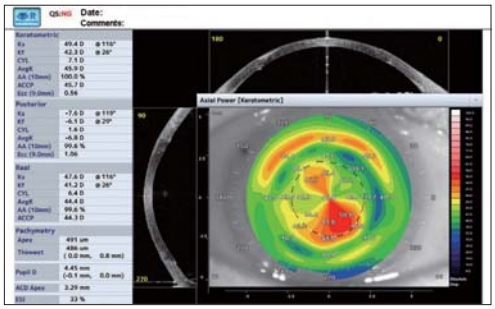
*At the time of writing

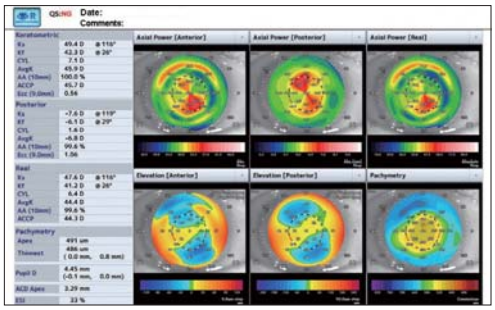
## Case#1 Post Penetrating Keratoplasty





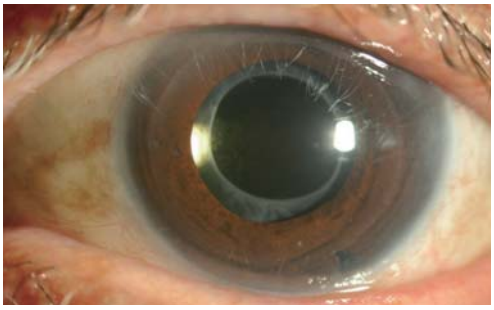
After a penetrating keratoplasty, it is important to observe the transparency of the graft and the wound healing.
By using CASIA2, the junctions of the suture wound can be observed in detail and the conditions of the anterior chamber angle can be simultaneously examined.
In tomographic images, when a multi-image is selected, it is possible to see the image from 16 directions at once.

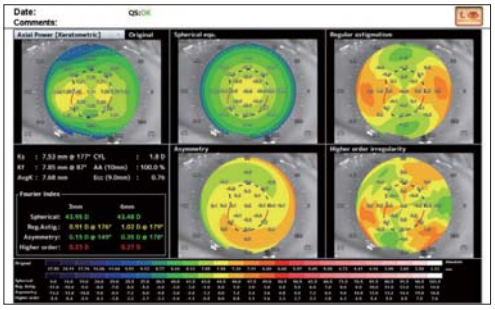


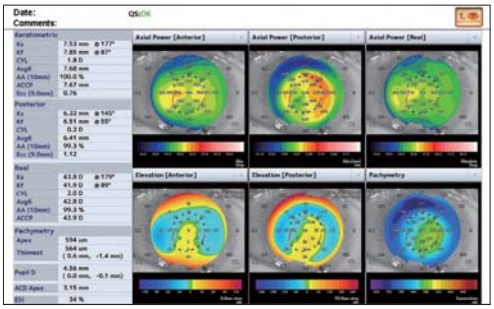


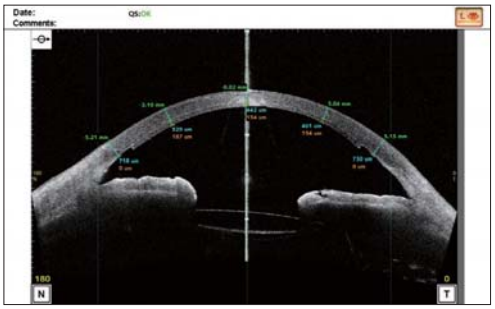
After a penetrating keratoplasty, evaluation of the corneal shape is essential as post-op corneal astigmatism greatly affects the visual function. The topographic function of CASIA2 has accurate repeatability toward higher-order corneal irregular astigmatism. In the corneal shape evaluation, the 6-map display enables numerous maps and allows customized settings.

# Case#2 Post-DSAEK







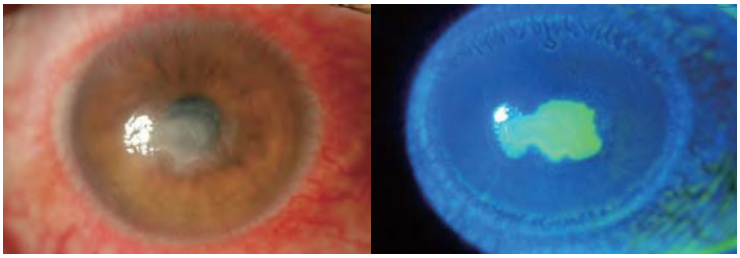


After DSAEK, since post-op corneal astigmatism is less likely to occur, a better visual function can be obtained.
The upper images in the 6 maps show axial power. Corneal irregular astigmatism is seen more in the posterior surface than in the anterior, but seen in Real power, the posterior surface is not greatly affected.
The right image on the bottom row shows a Pachy Map, and it is possible to evaluate distribution of corneal thickness combine recipient with donor.

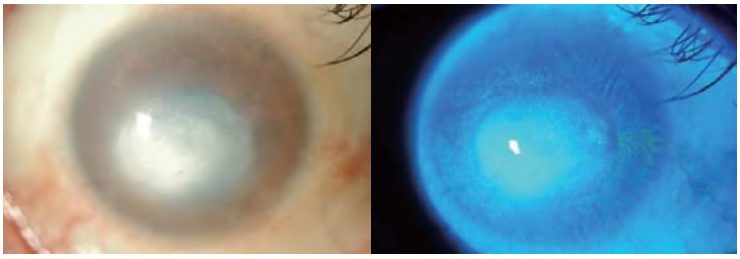
If the anterior corneal shape is further analyzed by Fourier analysis, it is possible to evaluate irregular corneal astigmatism with asymmetry astigmatic components and higher-order irregularity.
To evaluate graft thickness, the Flap Tool is convenient as it can evaluate the donor thickness.
Currently, analysis is still done manually but is expected to become an automatic function in the future.

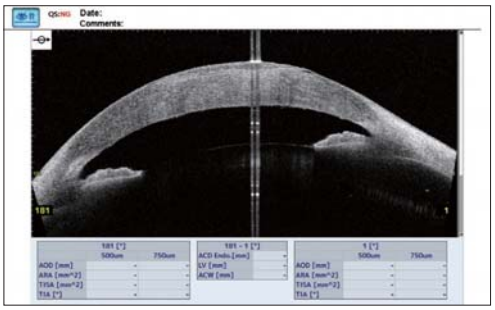
# Case#3 Infectious Keratitis

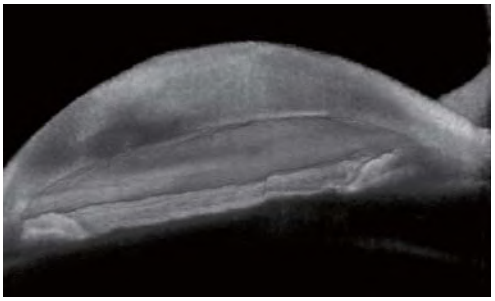
1 week after treatment



5 months after treatment





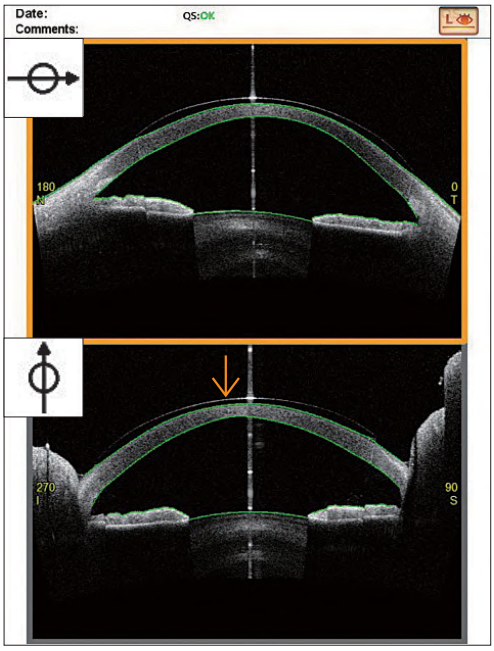


In this case of infectious keratitis, Acanthamoeba was detected in the antigen test.
Since it took a long time to settle the keratitis, the cornea suffered severe opacity. Also during treatment, the patient developed iritis; therefore a secondary glaucoma was anticipated. Before the corneal transplantation, evaluation of the anterior chamber angle was necessary.

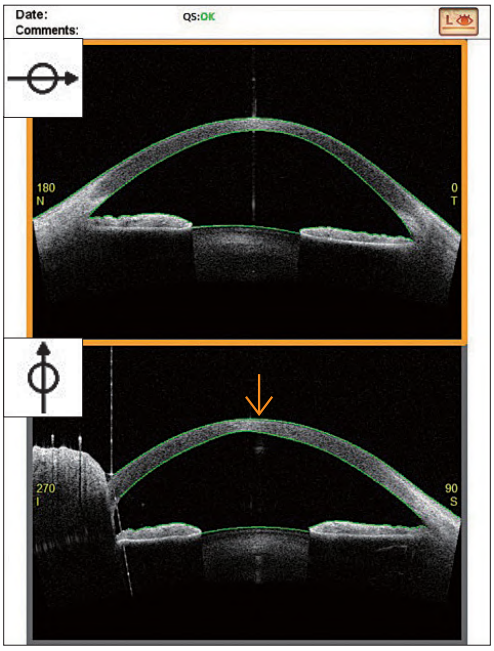
With the severe corneal opacity, it was impossible to evaluate with an ordinary gonioscope, but using CASIA2, screening of the angle closure in the tomographic images and Angle View was possible.
A secondary glaucoma after the corneal transplant can affect prognosis, so we can conclude that angle closure screening is a significant test.

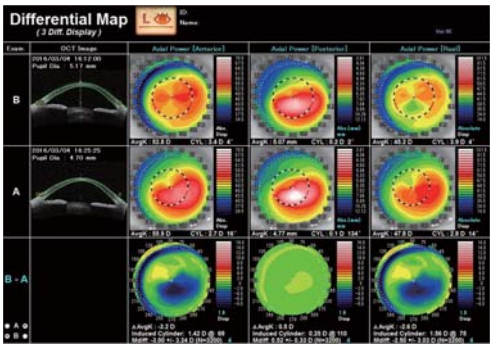
# Case#4 Changes of Corneal Shape after Removing Hard Contact Lenses

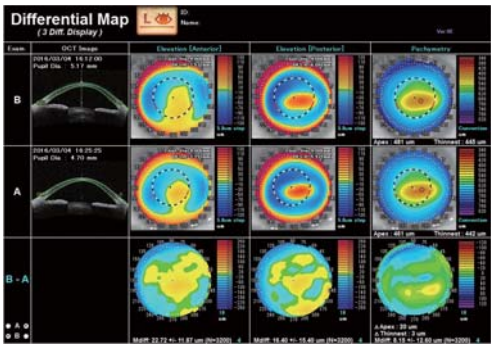
Wearing HCL




15 minutes after removing HCL



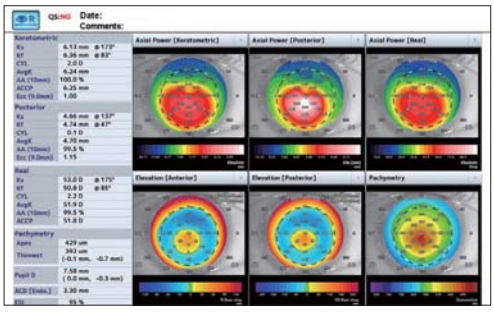



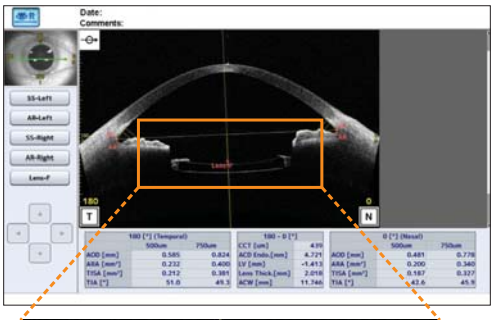



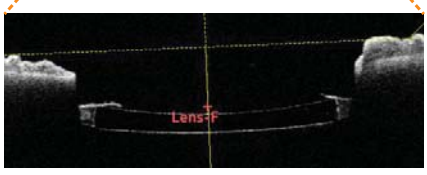

With the CASIA2, it is possible to evaluate corneal shape while wearing hard contact lenses (HCL).
In this case, an OCT tomographic image of keratoconus eye compares wearing HCL with HCL removed.
While wearing HCL, the anterior cornea is getting spherical, but after removal, the corneal shape goes back to its original keratoconic shape.

The corneal shape changes, between wearing HCL and removal can be clearly seen in the Differential Map.
The images in the left map show the changes of the Axial Map; the left column shows changes of the anterior Axial Power, the center column shows the posterior Axial Power and the right column shows Real Power. The upper row images show changes during HCL wearing, the center row shows changes after removing the HCL, and the bottom row images show the Power changes. In terms of the Power change, the change in the anterior cornea is significant but that of the posterior is small.
The right map images show changes in the Elevation Map and the Pachy Map. After removing the HCL, the center of the anterior surface of cornea is in the anterior displacement, and so is the posterior surface of cornea. After removing the HCL, the corneal thickness below the center is increasing.

# Case#5 Cataract Surgery with Keratoconus Eye






Cataract surgery with keratoconus eye tends to be difficult. One of the problems is IOL power calculation. By using CASIA2, it is possible to acquire an IOL power calculation based on accurate corneal shape data. In this case, the post-op vision was 0.8 (1.0 x -1.0D), and it was an expected value. We could see IOL is a minus lens, and is concave meniscus lens in the tomographic image.

# CASIA2 User Experience

Department of Ophthalmology,
Faculty of Medicine, University of Tsukuba

**Yuta Ueno MD**

In 2008, the SS-1000 CASIA was introduced as the first Anterior Segment 3D OCT in the world. It had a huge impact on visualizing not only the clear cornea but also opaque tissue such as muddy cornea, conjunctiva, sclera, iris and angle recess which has led to innovation in a number of clinical fields including cataract, glaucoma, refractive surgery and corneal transplantation. 7 years later, the CASIA2 has emerged as the next-generation Anterior Segment OCT. With the CASIA2, the imaging performance is greatly improved in terms of an expanded measurement range of depth to 13mm, which has made it possible to visualize the anterior and posterior surface of a crystalline lens to detect lens opacity and to perform lens shape analysis.

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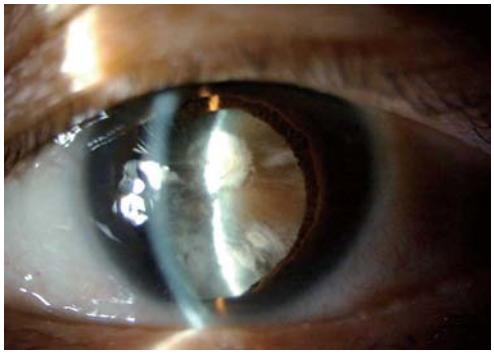
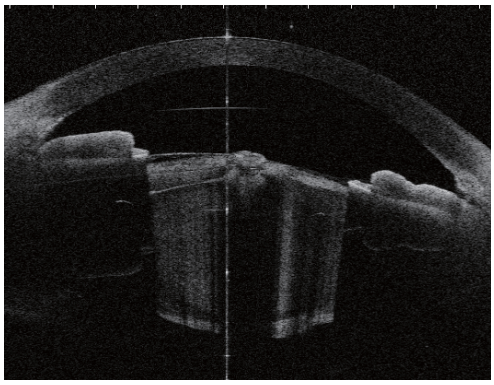
Extracted from [User Experience of Anterior Segment OCT CASIA2]

## Case#1 Anterior Capsular Calcification (Traumatic Cataract)

Anterior segment image

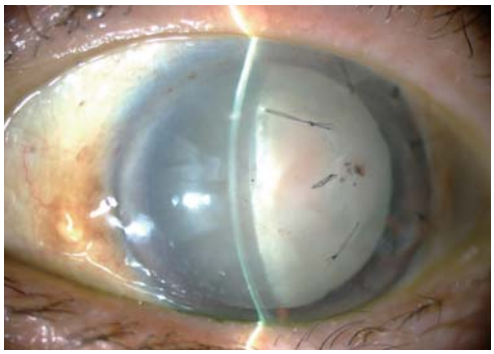


CASIA2

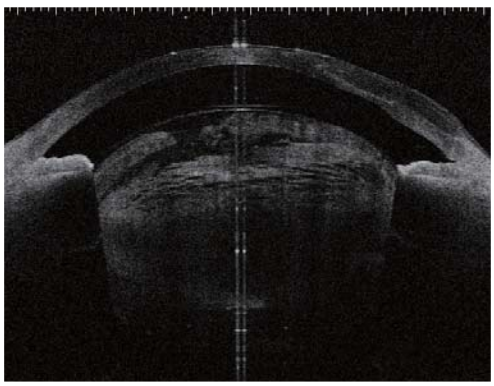


## Case#2 Mature Cataract

Anterior segment image

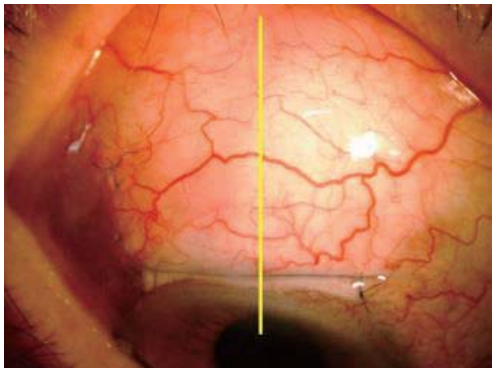


CASIA2

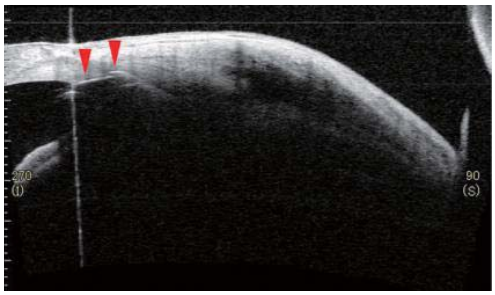


## Case#3 EX-PRESS® Glaucoma Shunt Surgery (Post-op 4M)

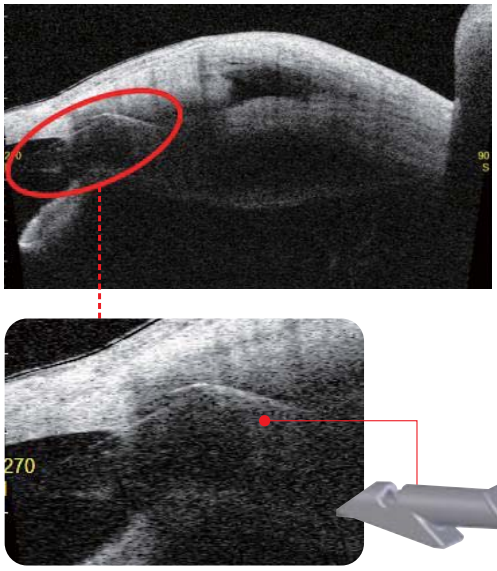
Anterior segment image



SS-1000 CASIA



CASIA2

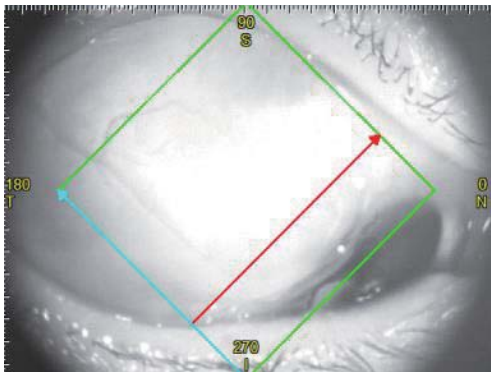


With the SS-1000 CASIA, the internal structure of the filtering bleb and the position of the EX-PRESS® glaucoma shunt (red arrow head) can be observed. With the CASIA2, the EX-PRESS® shunt (red circle) is more clearly visualized, and the depth information including the sub-scleral flap and the ciliary body can be observed.

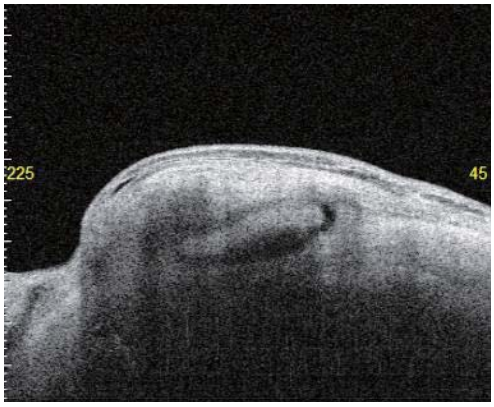
## Case#4 Trabeculectomy (Post-op 3M)

Anterior segment image

CASIA2 CCD image




CASIA2 Cross sectional image




The imaging sections using “bleb” mode can be adjusted by 15 degrees step in addition to the vertical and horizontal directions. Even in surgery performed at a diagonal angle, it is possible to measure with the section crossing the scleral flap, and becomes easier to observe the filtration openings on both sides of the flap.

# Specifications

### [Body]

| | | |
|---|---|---|
| **Resolution** | Axial (Depth) | 10µm or less (in tissue) |
| | Transverse | 30µm or less (in tissue) |
| **Scan rate** | | 50,000 A scans / second |
| **Scan range** | Depth | 13mm |
| | Transverse | Radial Scan: φ16mm |
| | | Raster Scan:12mm×12mm |
| **Stroke range of moving section** | | 40mm(Y axis); 88mm(X axis); 45mm(Z axis) |
| **Stroke range of chin rest** | | 70mm |
| **Dimensions and weight** | | 530(W)×560(D)×455(H)mm / approx. 33kg |
| **Type of light source** | | Swept laser source |
| **Wavelength** | | 1,310nm |
| **Output power** | | Less than 6mW |

### [Power source]

| | |
|---|---|
| **Voltage** | 100 - 240V AC |
| **Frequency** | 50/60Hz |
| **Power consumption** | 170VA |

### [External HDD]

| | |
|---|---|
| **Capacity** | 8TB |

### [Touch panel LCD monitor]

| | |
|---|---|
| **Display** | 20 inch touch panel LCD monitor<br>(Screen resolution 1920 x 1080) |

### [Workstation computer]

| | |
|---|---|
| **OS** | Windows®8.1 64bit |
| **CPU** | Intel® Core i7 processor |
| **Memory** | 8GB |
| **SSD** | 128MB |
| **Data output** | Printer (LAN/USB) |

Specifications are subject to change without notice.
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For Ophthalmology Professionals

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TOMEY


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