

# Aperio GT 450

## Specifications



## Aperio GT 450 Specifications

This manual applies to Aperio GT 450 Controller, Aperio GT 450 Console, and Aperio GT 450 SAM versions 1.1 and later


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### Customer Resources

- ▶ For the latest information on Leica Biosystems Aperio products and services, please visit [www.LeicaBiosystems.com/Aperio](http://www.LeicaBiosystems.com/Aperio).

### Contact Information – Leica Biosystems Imaging, Inc.

Headquarters	Customer Support	General Information
 Leica Biosystems Imaging, Inc. 1360 Park Center Drive Vista, CA 92081 USA Tel: +1 (866) 478-4111 (toll free) Direct International Tel: +1 (760) 539-1100	Contact your local support representative with any query and service request.  <a href="https://www.leicabiosystems.com/service-support/technical-support/">https://www.leicabiosystems.com/service-support/technical-support/</a>	US/Canada Tel: +1 (866) 478-4111 (toll free) Direct International Tel: +1 (760) 539-1100 Email: <a href="mailto:ePathology@LeicaBiosystems.com">ePathology@LeicaBiosystems.com</a>



23GT450, 23GT450SAM

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# Notices

## Revision Record

Rev.	Issued	Sections Affected	Detail
H	March 2022	"Aperio GT 450 Hardware Specifications" and "Aperio GT 450 Scanner Administration Manager (SAM) Server Specifications"	Updated SAM server specifications to Windows Server 2019 and updated scanner environmental specifications.
G	March 2021	"Aperio GT 450 Scanner Administration Manager (SAM) Server Specifications"	Removed SAM Server model number to accommodate multiple SAM server models.
F	December 2020	"Aperio GT 450 Scanner Administration Manager (SAM) Server Specifications"	Clarified that a VM can be used for SAM.
E	April 2020	"Viewing Station Specifications"	Adjusted number of monitors to accommodate multiple viewing station models.
D	February 2020	"Aperio GT 450 Network Configuration"	Corrected typographical error in diagram.
C	October 2019	"Aperio GT 450 Hardware Specifications"	Corrected JPEG2000 to JPEG.
B	July 2019	Introduction and "Aperio GT 450 Hardware Specifications"	Updated scanning throughput speed.
A	June 2019	All	New document.

## Cautions and Notes

- ▶ **Serious Incidents Reporting** - Any serious incident that has occurred in relation to the Aperio GT 450 shall be reported to the manufacturer and the competent authority of the member state in which the user and/or the patient is established.
- ▶ **Specifications and Performance** - For device specifications and information on performance characteristics, refer to this document, *Aperio GT 450 Specifications*.
- ▶ **Installation** - Aperio GT 450 must be installed by a trained Leica Biosystems Technical Services representative.
- ▶ **Repair** - Repairs may be done only by a trained Leica Biosystems Technical Services representative. After repairs are done, ask the Leica Biosystems technician to perform operation checks to determine the product is in good operating condition.
- ▶ **Accessories** - For information on using Aperio GT 450 with third-party accessories such as a Laboratory Information System (LIS) not provided by Leica Biosystems, contact your Leica Biosystems Technical Services representative.

- ▶ **Quality Control** - For information on image quality checks, see the *Aperio GT 450 User's Guide*.
- ▶ **Maintenance and Troubleshooting** - For information on maintenance and troubleshooting problems, see the *Aperio GT 450 User's Guide*.
- ▶ **Cybersecurity** - Be aware that workstations are susceptible to malware, viruses, data corruption, and privacy breaches. Work with your IT administrators to protect workstations by following your institution's password and security policies. For Aperio recommendations on protecting your workstations and servers, see the document *Aperio GT 450 IT Manager and Lab Administrator Guide*.

To protect workstations from malware intrusion, use caution when inserting USB drives and other removable devices. Consider disabling USB ports that are not in use. If you plug in a USB drive or other removable device, you should scan the devices with an anti-malware utility.

If a suspected Aperio GT 450 cybersecurity vulnerability or incident is detected, contact Leica Biosystems Technical Services for assistance.

- ▶ **Training** - This manual is not a substitute for the detailed operator training provided by Leica Biosystems or for other advanced instruction.
- ▶ **Safety** - Safety protection may be impaired if this device is used in a manner not specified by the manufacturer.



*For additional information on this product, including intended use and symbols glossary, please refer to the primary instructions for use, **Aperio GT 450 User's Guide**.*

## Introduction

This document lists the latest specification information for the Aperio GT 450 scanner. For details on using this device, refer to the *Aperio GT 450 User's Guide*.

The Aperio GT 450 is a high performance, brightfield whole slide scanner that includes continuous loading with 450 slide-capacity across 15 racks, priority rack scanning, automated image quality check and a scan speed of ~32 seconds at 40x scanning magnification for a 15 mm x 15 mm area.

This system is intended for use by trained histotechnicians, IT professionals, and pathologists. Ensure you follow appropriate good laboratory practices and the policies and procedures required by your institution for slide preparation, processing, storage, and disposal. Use this equipment only for this purpose and in the manner described in the *Aperio GT 450 User's Guide*.

Component	Description
Scanner Administration Manager (SAM) Server	The SAM server connects to multiple Aperio GT 450 scanners and runs the SAM Client Application Software. For requirements for this server, see " <i>Aperio GT 450 Scanner Administration Manager (SAM) Server Specifications</i> " on page 10.
SAM Client Application Software	The Scanner Administration Manager (SAM) client application software enables IT implementation, PIN configuration, and service access of multiple scanners from a single desktop client location for IT professionals.
Aperio Viewing Station	The viewing station includes calibrated monitor(s) and a workstation with Aperio ImageScope version 12.4 or higher. For requirements for the viewing station see " <i>Viewing Station Specifications</i> " on page 11.

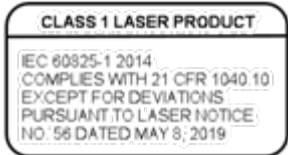
## Aperio GT 450 Scanner Specifications

The following sections contain specifications for the Aperio GT 450.

Routine setup and functional verification is required by a Leica Biosystems Service representative after shipping.

### General Scanner Specifications

Feature	Details
Part number	23GT450
Scanner on/off switch	Located on the right side, near the back of the scanner.
Scanning region	≤ 23.6 mm x 58 mm
Objective lens	Custom optics by Leica Microsystems for native 40x scanning with 1 mm FOV (Field of View).
Brightfield imaging	4k Trilinear camera
Overview image resolution	13 μm/pixel for label, barcode, and tissue macro (overview image).

Feature	Details
Label/barcode imaging	High resolution main imaging camera used to capture the label/barcode region.
Focusing system	Real-time automatic focusing (U.S. Patent 9841590B2).
Digital slide file format	Standard pyramid tiled TIFF with JPEG image compression.
Illumination	White LED
Operating system	Linux
Connections	The Aperio GT 450 has two connectors on the back panel: 1) Power. The appropriate power cord for your geographical region is shipped with the scanner. The power cord plugs into the AC/DC adapter that connects to the back panel. Only use the approved power cord supplied by the manufacturer. 2) Network. You will need to supply your own network cable.
	Laser Compliance. This product is a Class 1 Laser Product and is in compliance with international standards and US requirements.

## Aperio GT 450 Features


Feature	Details
Scanning priority	By rack, up to 3 racks at a time.
Continuous loading	Continuous rack loading without interrupting scanning.
Slide loading	Automatic: up to 450 1-inch x 3-in (2.54 cm x 7.62 cm) slides.
Slide calibration	Each slide scan is automatically calibrated.
Automated image quality check	Each scan image is automatically checked for image quality during scanning.
Tissue finding	Automatic
Touch-screen	<ul style="list-style-type: none"> <li>• 10.1" diagonal, IPS, 16:10, 1280 x 800 resolution</li> <li>• Viewing angles: 85/85/85/85</li> <li>• Contrast ratio: 800:1</li> </ul>
Embedded Vision Processing Unit (VPU)	The VPU is an embedded processor that runs the Aperio GT 450 controller software. Refer to the <i>GT 450 IT Manager and Lab Administrator Guide</i> for instructions on determining the version of the software included on this unit.

## Performance Specifications

Feature	Details
Scan speed	< 32 sec/slide, 15 mm x 15 mm at 40x.
Throughput	Sustained throughput 81 slides per hour 15 mm x 15 mm (40x).

Feature	Details
Scanning resolution	0.26 µm/pixel at 40x.

## Power Specifications

Feature	Details
Input Power	External AC/DC adapter (Power Supply Unit): 100-240V, 50/60Hz, 5A max; Instrument: 24V  10.5A
Power consumption	+24vdc @ 10.5 amps RMS
Uninterruptible Power Supply (UPS)	To protect the scanner, Leica Biosystems recommends using a UPS rated at 2200VA with power conditioning that protects connected loads from electrical surges and spikes, lightning and other power disturbances. The UPS allows the scanner to run for an additional 20-30 minutes, giving you time to safely shut it down.

## Slides and Racks Specifications

Feature	Details
Slides accepted	<p>The Aperio GT 450 is optimized for scanning glass slides with coverslips affixed with mounting media.</p> <ul style="list-style-type: none"> <li>• 1-inch x 3-inch (2.54 cm x 7.62 cm) glass slides. Measurements comply with ISO 8037/1.</li> <li>• Minimum slide size: 25 mm (wide) x 75 mm (long)</li> <li>• Maximum slide size: 26 mm (wide) x 76 mm (long)</li> <li>• Thickness: Optimized for range of 0.9 mm to 1.1 mm, excluding coverslip</li> </ul> <p>The coverslip/label shall not protrude beyond the edge of the glass slide. The entire coverslip and label must be adhered to the glass slide. There must be no lifted edges or parts of the coverslip/label. The outer surface of the slide must be dry.</p> <p>Slides are typically prepared using:</p> <ul style="list-style-type: none"> <li>• Glass coverslip with mounting media such as Eukitt</li> <li>• Film coverslip with integrated glue</li> </ul> <p>Maximum tissue thickness (including mounting media) optimized for 3-5 µm.</p>
Coverslips accepted	Optimized for coverslip with thickness of .17 mm, made of typical coverslip material: Standard microscope cover glass or Cellulose Tri-Acetate film (microscope cover film).



Feature	Details
Label area	<p>25 mm x 25 mm. Handwritten/printed non-transparent, matte (paper-like reflecting) sticker.</p> <p>Labels shall not protrude beyond the edge of the slides or be lifted.</p> <p>Labels shall not be attached to the bottom of the slide, but only attached to the coverslip-side of the slide.</p> <p>Maximum label thickness 200 microns</p> <p>Minimum label size 12 mm x 25 mm</p> <p>There must be a minimum of 0.5 mm between each side of the barcode and the edge of the label.</p>
Racks accepted	Optimized and recommended for use with Leica HistoCore Spectra workstation racks (stainer and coverslipper), which include the Leica Universal Rack 30-slide capacity. Sakura Prisma Stainer and Coverslipper Rack 20-slide capacity racks also accepted.
Racks provided	15 Leica Universal racks, 30-slide capacity (part number 23RACKGT450) are provided with the Aperio GT 450.
Barcodes supported	<p>NW7</p> <p>QR Code</p> <p>Data Matrix</p> <p>Interleaved 2 of 5</p> <p>Code 39</p> <p>Code 128</p> <p>PDF417</p> <p>MicroPDF417</p>

## Environmental Specifications

Feature	Details
Dimensions	20.8" (52.83 cm) Width x 28" (71.2 cm) Depth x 19.5" (49.53 cm) Height
Weight	140 lbs (63.5 kg)
Work surface specifications and required clearances	Standard laboratory grade work bench with at least 24" (61 cm) Width x 28" to 32" (71.12 cm to 81.28 cm) Depth x 29.25" (74.3 cm) Height, open area leveled to +/- 1.0 degrees. Ensure you leave 13 inch (33 cm) clearance on the left side of each scanner to provide access for maintenance activities, and leave 3-4 inches (8 cm-10 cm) on the right side of each scanner for access to the power switch.
Operating conditions	<p>The Aperio GT 450 is designed to be operated under the following environmental conditions:</p> <ul style="list-style-type: none"> <li>• Indoor use</li> <li>• Overvoltage Category II</li> <li>• 0% - 80% humidity, non-condensing</li> <li>• Operating temperature: 15-30° C (59-86° F)</li> </ul>

Feature	Details
Storage conditions	+5 to 40° C, 5 to 85% RH
Transport conditions	0 - 50° C, 10% - 95% humidity, non-condensing
System heat dissipation	Maximum 870 BTU/hr.
Altitude	Maximum elevation 10,000 ft
Degree of pollution	2
Environmental	RoHS conform (Restriction of Hazardous Substances) according to Directive 2011/65/EU

## Network Specifications

Feature	Details
Network interface	1 gigabit per second Ethernet
Bandwidth requirements	For the connection between the Aperio GT 450 and the SAM server, the required minimum bandwidth is a gigabit ethernet with a speed equal to or greater than 1 gigabits per second (Gbps) with no more than 60ms of latency. For the connection between the SAM server and the image repository (DSR), the required minimum bandwidth is 10 gigabits per second and no more than 16ms of latency.

## Aperio GT 450 Scanner Administration Manager (SAM) Server Specifications

**i** *The Scanner Administration Manager (SAM) supports up to 4 Aperio GT 450 scanners. Multiple SAM servers can be added to your network.*

For information on network configuration and data flow in the Aperio GT 450 system, refer to “*Aperio GT 450 Network Configuration*” on page 13 and the *Aperio GT 450 IT Manager and Lab Administrator Guide*.

Feature	Details
CPU	Intel Xeon Silver 4114 2.2G, 10C/20T, 9.6GT/s, 14M Cache, Turbo, HT (85W) DDR4-2400
Hard disk space	(2) 800GB SSD SATA Mix Use 6Gbps 512n 2.5in Hot-plug Drive, Hawk-M4E,3 DWPD,4380 TBW
Memory	Memory DIMM Type and Speed Quantity: (2) 16GB 2666MT/s RDIMMs
Network card	Broadcom 57416 2 Port 10Gb Base-T + 5720 2 Port 1Gb Base-T, rNDC
Operating system	Windows Server 2019

You may purchase your own server or provide a virtual server to host the SAM application software.

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## Viewing Station Specifications

The viewing station (part number 23VS101) uses calibrated monitor(s) and a workstation with Aperio ImageScope version 12.4 or higher.

A viewing station is optional and is not included in the Aperio GT 450 base product. The following specifications are required for optimal image viewing.

### Client Workstation

Feature	Details
CPU speed	Intel Core 2 Duo (or newer) processor, running at 3.9 GHz or faster
Hard disk space	80GB free disk space
Memory	8GB or more recommended
Network card	1 Gigabit network card or faster
Video card	24-bit color at monitor's resolution
Operating system	Windows 7 64-bit and later

### Monitor

For best image quality during viewing, a calibrated monitor must be used.

The monitor(s) included in the Aperio Viewing Station are calibrated to a Leica internal specification which is specific for stain colors and optimized for digital slide viewing by pathologists. However, if you purchase your own monitor, calibrating to sRGB standards will give an acceptable viewing experience.

Feature	Details
Display type	LCD (flat panel)
Screen resolution	1920(h) x 1200(v) pixels
Screen size	24 inch (60 cm) or larger
Color support	16.7 million colors
Color depth	24-bit
Brightness	300 cd/m <sup>2</sup> , 180 cd/m <sup>2</sup> (DICOM preset)
Contrast ratio	1000:1
Calibration	A calibrated monitor must be used

## Aperio GT 450 Compliance Specifications

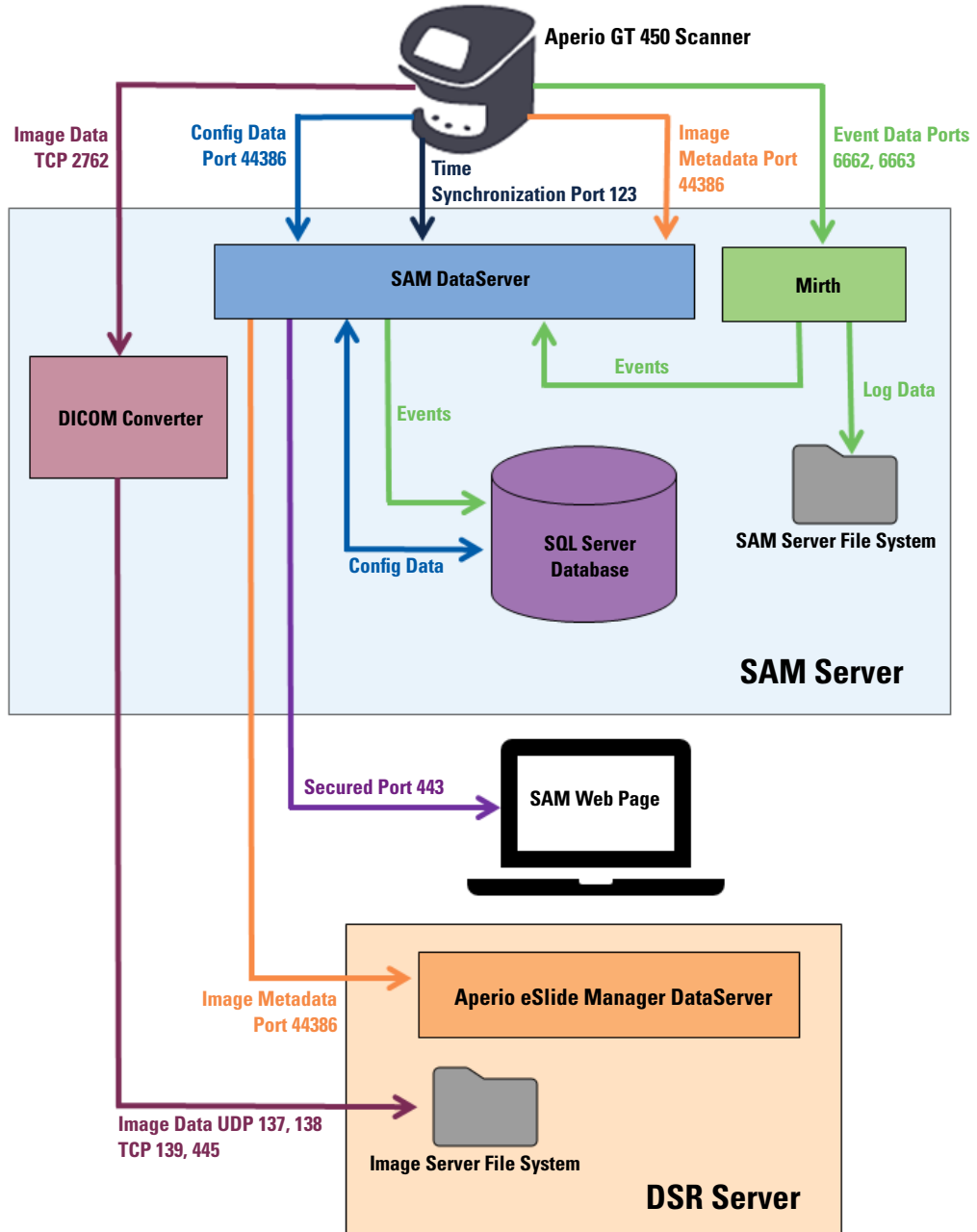
This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device has been evaluated against and conforms to the following standards:

Feature	Details
Safety	<div style="text-align: center;">  </div> <p>IEC 61010-1:2010            IEC 61010-1:2010/AMD1:2016            IEC 61010-2-081:2018            UL 61010-1:2012/R:2019-07            UL 61010-2-081:2019            CAN/CSA C22.2 No. 61010-1:2012/A1:2018            CAN/CSA C22.2 No. 61010-2-081:2019            EN EIC 61010-2-081:2020            EN 61010-1:2010/A1:2019</p>
EMC	<p>EN 61326 (Emissions)            VCCI CISPR 32            KN 32            FCC/IC</p>

# Aperio GT 450 Network Configuration

This section contains information on how the Aperio GT 450 fits into your network for optimized scanning and image viewing performance. For more details on this topic, see the *Aperio GT 450 IT Manager and Lab Administrator Guide*.



Data Type	Description	Port
<b>Image Data</b>	The Scanner sends DICOM image data to the DICOM Converter. The data is sent using TLS encryption.	TCP 2762
	Configure the communication between the scanner and the DICOM converter using the Hostname and Port settings on the Images configuration page.	
	The DICOM Converter sends the image data (either as a converted SVS file, or as raw DICOM data) to the Image File System on the DSR Server. The data is sent using SMB3 Encryption.	UDP 137, 138
	Configure the communication between the DICOM converter and the DSR using the File Location setting on the Images page.	TCP 139, 445
<b>Scanner Configuration Data</b>	The scanner sends a call to the SAM DataServer to request configuration data. The SAM DataServer returns the configuration data to the scanner. The data is sent using TLS Encryption. Communication between the scanner and the SAM DataServer is configured on the scanner.	44386
	The SAM DataServer stores the configuration data on the SQL Server Database on the SAM Server.	
	The SAM DataServer displays the configuration data through the SAM web page.	
<b>Time Synchronization</b>	Timeclock synchronization between SAM and Multiple Scanners is maintained using network time protocol.	UDP 123
<b>Image Metadata</b>	The Scanner sends Image Metadata to the SAM DataServer. The data is sent using TLS encryption. Communication between the scanner and the SAM DataServer is configured on the scanner.	44386
	The SAM DataServer sends image metadata to the Aperio eSlide Manager DataServer located on the DSR. The data is sent using TLS encryption.	
	Configure the communication between the SAM DataServer and the scanner using the Hostname and Port settings on the DSR page.	
<b>Messaging and Event Data</b>	The scanner sends logs and event data to the Mirth Connect Server. No sensitive data is transferred.	6662, 6663
	Configure the communication between the scanner and the Mirth Connect Server on the Event Handling configuration page.	
	The Mirth Connect Server copies critical event and error data to the SAM DataServer then the SAM DataServer sends this data to the SQL database. This is the data reported out via the SAM Event Logs.	
	The SAM DataServer displays the event data through the SAM web page.	
	Mirth Connect Server processes the Log data and appends the Event Log, which resides on the file system. The communication between Mirth and the Event Log is configured within the Mirth Application setup. It is not accessible through the SAM.	



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