Agilent BioTek Cytation 5
Cell Imaging Multimode Reader

Powerful imaging and microscopy, and advanced multimode detection
Agilent BioTek Cytation 5 Cell Imaging Multimode Reader

The Agilent BioTek Cytation 5 cell imaging multimode reader combines automated, digital microscopy and conventional microplate detection in a configurable, upgradable platform. This proprietary design, along with Agilent BioTek Gen5 microplate reader and imager software, enables automated workflows across a vast range of biochemical and imaging applications.

Multimode plate reader with sophisticated imaging

Cytation 5 extends the legacy of the Agilent BioTek multimode plate readers with a modular and upgradable imaging mode. Imaging opens up a range of applications for cell-based assays that cannot be performed on a standard plate reader. Information on cell morphology, localization of signal, cell count, and more is obtained using the Cytation 5 imaging mode.

**Plate reading:** absorbance, fluorescence; luminescence; advanced reading modes.

**Imaging:** fluorescence; phase contrast; high-contrast brightfield; brightfield; color brightfield.
“The combination of luminescence fluorescence and imaging covers a wide variety of assays from one instrument. It is robust and can accommodate numerous fluorescent wavelengths using LED cubes, has a wide range of objectives, and the software is easy to use.”

- Laura McMullan, CDC

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**Ready for any assay**

With its combination of hybrid plate reading and advanced microscopy mode, Cytation 5 is truly ready for any assay. Contact us to learn how Cytation 5 can transform your lab and greatly increase your productivity.

**Advanced microscopy—unlimited possibilities**

Cytation 5 automates many traditionally manual microscopy tasks, from slide scanning to time-lapse live cell assays; from low to high magnification. Cytation 5 is ready for any imaging assay.

**Flexible hardware**: Six-objective turret, 1.25x to 60x, 20+ colors available, wide field of view (WFOV) camera.

**Full automation**: Automated stage, autofocus, automated turret.

**Live cell imaging**: Temperature and gas (CO₂ and O₂) control for time-lapse live cell imaging.
Variable bandwidth for sensitivity and specificity

Cytation 5 offers quad monochromator optics with variable bandwidths. The excitation and emission bandwidths can be set between 9 and 50 nm in 1 nm increments. Large bandwidths (1) provide increased sensitivity and lower limits of detection. Small bandwidths (2) provide increased specificity when multiple signals are present, reducing crosstalk and enhancing assay performance.

Powerful image processing and analysis

No need to process and analyze images one by one on a dedicated computer. In Gen5, preprogram your analysis tasks and walk away.

Image processing: stitching, Z-projection, deconvolution, digital phase contrast.

Image analysis: cell count, confluence, cytoplasm analysis, intracellular analysis, subpopulation analysis, signal translocation, and much more.

Hybrid plate reader–flexibility and performance

With its unique combination of monochromator and filter optics, Cytation 5 is an advanced plate reader that delivers both the flexibility and performance you need for any microplate assay in your lab.

Monochromator: variable bandwidth, absorbance, fluorescence, luminescence.

Filters: fluorescence polarization, time-resolved fluorescence, Alpha laser.
Microvolume analysis with the Take3 microvolume plate

Enable microvolume analysis with the Cytation 5 using the Agilent BioTek Take3 microvolume plate. Measure up to 16 or 48 samples in one run and save time compared to using single-sample devices. Gen5 microplate reader and imager software has customizable protocols for ssDNA, dsDNA, RNA, and protein quantification in 2 μL.

Cytation 5

The Cytation 5, along with Gen5 software, can easily automate and manage a broad range of imaging, microscopy, and multimode detection application workflows.

Hit picking—multimode detection and imaging saves time and data storage

(1) Plate reader quickly identifies GFP-positive wells.

(2) Only GFP-positive wells are imaged, saving both time and computer memory.
Applications—imaging

Label-free cell counting

Use high-contrast brightfield imaging for accurate label-free cell counting without the need for cell labeling dyes.

Calcium kinetics

The Cytation 5 dual-reagent injectors enable capture and analysis of fast inject/image assays like calcium kinetics.

Time-lapse live cell imaging

Cell proliferation studies require controlled environments. Cytation 5 automates image capture through analysis.

3D cell culture


Microbiology

High-magnification objectives, multiple imaging channels, and advanced image analysis capabilities enable analysis of a variety of microorganisms.

Cell viability/toxicity

Classic live/dead assays use fluorescent probes or membrane-impermeable dyes; viability or toxicity is measured in real time.

Virology

The flexibility of the Cytation 5 and Gen5 software enable a variety of assays to be imaged and analyzed when performing viral research.

Whole-organism imaging

Essential to current drug screening methods, whole organisms like zebrafish and nematodes are effectively imaged and analyzed with Cytation 5 and Gen5 software.

Cell viability/toxicity

The progression of cell growth though the cell cycle is a highly regulated process. Automated histogram analysis of objects facilitates threshold definition.
The Agilent BioTek Gen5 spot counting module enables users to gain information about a second set of objects within primary and/or secondary mask compartments, which are tied to the original primary mask data.

The Agilent BioTek Gen5 object tracking module provides the ability to track single objects over time. Relative motility can be visualized by selecting single cells or entire populations within an image. Calculated metrics include total distance, Euclidean distance, and mean, median, and maximum object velocity.

The automatic region-of-interest (AutoROI) module is a three-step process to eliminate superfluous image capture. A low magnification step quickly images the entire area. The regions of interest are automatically identified, and then imaged at high magnification.

The Agilent BioTek Gen5 object tracking module provides the ability to track single objects over time. Relative motility can be visualized by selecting single cells or entire populations within an image. Calculated metrics include total distance, Euclidean distance, and mean, median, and maximum object velocity.

Advanced Gen5 image analysis modules

Beyond the powerful analysis features in Gen5 software, specialized add-on modules expand method-specific analyses to automate processes and generate advanced metrics.

Spot counting

The Agilent BioTek Gen5 spot counting module enables users to gain information about a second set of objects within primary and/or secondary mask compartments, which are tied to the original primary mask data.

Automatic region of interest

The automatic region-of-interest (AutoROI) module is a three-step process to eliminate superfluous image capture. A low magnification step quickly images the entire area. The regions of interest are automatically identified, and then imaged at high magnification.

Single object tracking

The Agilent BioTek Gen5 object tracking module provides the ability to track single objects over time. Relative motility can be visualized by selecting single cells or entire populations within an image. Calculated metrics include total distance, Euclidean distance, and mean, median, and maximum object velocity.

The Agilent BioTek Scratch Assay app provides an integrated workflow to capture, process, and analyze images from 2D scratch-wound healing assays. Predefined protocols for 24- and 96-well plates include automated processing and analysis to calculate average wound width, percent wound confluence, and maximum wound healing rate.

The Agilent BioTek Gen5 neurite outgrowth module accurately quantifies neuronal cell metrics and provides masking options including soma and neurite masks, along with skeletonized images. The module also accurately detects neuronal outgrowth in kinetically monitored, unlabeled live cells.
Fluorescence polarization is widely used in research labs to study molecular binding or dissociation events, and in screening labs to screen for drug candidates. Fluorescence polarization is sensitive, robust methods. Cytation 5 and Gen5 provide excellent sensitivity for optimal Z-factors.

AlphaScreen technology provides high signal-to-background ratios. The measurable energy transfer is emitted in the 520 to 620 nm range.

AlphaScreen

ELISA

Luciferase reporter assays

Nucleic acid and protein quantification

ELISA methods with colorimetric, fluorescent, and luminescent substrates are easily detected with Cytation 5.

Luciferase-based reporter assays measure luminescent signal. This enables users to quantify the activity of factors that affect particular signaling pathways.

Nucleic acid and protein quantification assays can be executed by spectrophotometric or fluorescent determination with Cytation 5, in microplates or in microvolumes with the Agilent BioTek Take3 microvolume plate.

Microbial growth assays, such as those using yeast and bacteria, can be measured by several methods, including turbidimetric measurements with Cytation 5.

TR-FRET and HTRF are sensitive, robust methods. Cytation 5 and Gen5 provide excellent sensitivity for optimal Z-factors.

Cell growth

TR-FRET

Nucleic acid and protein quantification

Applications—multimode detection
Peripherals

BioSpa 8 automated incubator
The BioSpa 8 environmental controls and labware handling capabilities, integrated with Cytation 5, facilitate long-term live cell kinetic imaging processes for up to eight microplates and other labware.

BioStack microplate stacker
The BioStack microplate stacker manages up to 50 microplates for automated imaging or multimode operations, including de and relidding of microplates used with cell-based assays.
AutoScratch wound making tool
The Agilent BioTek AutoScratch wound making tool automatically creates reproducible scratch wounds in cell monolayers grown in 24- or 96-well microplates, used for cell migration and invasion studies.

CO₂/O₂ controller
The compact gas controller maintains control of CO₂ and O₂ levels in the Cytation 5 to support live cell assays.

Dual-reagent injector
The dual-reagent injector module enables fast inject/read processes. Angled injector tips protect cell monolayers from shear stress during injection.

Peltier cooling module
The Peltier cooling module cools the interior of the Cytation 5 after incubated processes, enabling efficient switching between multiple applications without unwanted temperature influences. The cooling module maintains environmental stability allowing less than a 1 °C rise in ambient temperature, regardless of external and internal temperature fluctuation.

Take3 microvolume plate
Measure multiple 2 μL samples at a time with the Take3 microvolume plate, which is used with Cytation 5. Microvolume nucleic acid and protein quantification are fast and easy.
## General

| Microplate Types | Monochromator: 6- to 384-well plates  
Filters: 6- to 1536-well plates  
Imaging: 6- to 1536-well plates |
| Other Labware Supported | Microscope slides, Petri and cell culture dishes, cell culture flasks (T25), counting chambers (hemocytometer)  
Take3 microvolume plates |
| Environmental Controls | Temperature control to 65 °C  
CO\textsubscript{2}/O\textsubscript{2} controller available  
Peltier cooling module available |
| Shaking | Linear, orbital, double-orbital |
| Automation | Agilent BioTek BioSpa 8, BioStack, Agilent BenchCel, and third-party automation capability |
| Modularity and Configurability | Cytation 5 has many available configurations including imaging only, multimode only, and combinations. Modules can be added as laboratory needs change |

## Software

- Gen5 microplate reader and imager software (included)
- Optional software:
  - Gen5 Image+: Image analysis
  - Gen5 Image Prime: Advanced image analysis
- Neurite outgrowth module, AutoROI module, spot counting module, object tracking module, and Scratch Assay app

## Imaging

### Imaging Modes

Fluorescence, brightfield, high-contrast brightfield, color brightfield, phase contrast

### Imaging Methods

Single color, multicolor, montage, time lapse, Z-stacking

### Light Source

Long-life LEDs

### Camera

Sony CMOS, 16-bit grayscale, standard or WFOV

### Imaging Objectives/Capacity

1.25x to 60x magnification/six-position automated turret

### Imaging Filter Cubes

More than 20 filter/LED cubes available

### Imaging Filter Cube Capacity

Four color channels plus brightfield

### Autofocus Methods

Image-based and laser autofocus

## Multimode Detection

### Detection Modes

- UV-Vis absorbance
- Fluorescence intensity
- Luminescence
- Fluorescence polarization
- Time-resolved fluorescence
- Alpha

### Reading Methods

End point, kinetic, spectral scanning, well-area scanning