applied biosystems®
by life technologies™

QuantStudio™ 12K Flex Real-Time PCR System

the all-in-one qPCR instrument

life technologies™

Expand the boundaries of your research

Life Technologies is taking qPCR to the next level. Designed for maximum throughput, flexibility, and scalability, the QuantStudio™ 12K Flex Real-Time PCR System sets the new standard for what a real-time PCR instrument should be. Combining flexible throughput capabilities with a streamlined workflow, intuitive software, and a state-of-the-art industrial design, this is the one instrument that can take you from targeted discovery through confirmation and screening, and everything in between.

Maximum throughput, minimal resources

The QuantStudio™ 12K Flex system can simultaneously run up to four 3,072-reaction QuantStudio™ 12K Flex OpenArray® Plates in about 4 hours. A streamlined workflow and automated plate handling minimize start-up and hands-on times.

Outstanding flexibility

TaqMan® Assays are available for all 5 thermal cycling blocks: OpenArray®, TaqMan® Array Card, 384-well, and standard or Fast 96-well blocks. Block changes typically take less than 1 minute and require no tools, providing the ultimate in format flexibility. Achieve consistent, high-quality results across different plating formats as your research progresses.

Scales to your research

With five interchangable thermal cycling blocks, you can analyze from 1 to over 12,000 data points per run in the assay format that's right for your project—today and in the future.

Maximum throughput, minimal resources

Ultimate combination of speed, throughput, and data analysis capabilities

The QuantStudio™ 12K Flex Real-Time PCR System sets a new standard for automated analysis for researchers conducting large genotyping or gene expression studies. The streamlined OpenArray® workflow helps save time and resources compared to running experiments in multiple 384-well plates. When equipped with the OpenArray® block and the QuantStudio™ 12K Flex OpenArray® AccuFill™ System, the QuantStudio™ 12K Flex system can produce up to 110,000 data points or more in an 8-hour day with minimal training, as little as 20 minutes of hands-on time per run, and no third-party robotics.

- **Maximum speed and throughput.** The OpenArray® format can accelerate genomic confirmation and screening programs by generating up to 110,000 data points or more per 8 hour day, completing your project in days rather than weeks.
- **Simple workflow.** Load your samples onto the plate (Figure 1) using the QuantStudio™ 12K Flex AccuFill™ System, then run up to four plates to generate over 12,000 data points per run. Integrated software tracking features help you easily map and track your samples, giving you the ultimate confidence in your results.
- **Reduce start-up and hands-on time.** Start a 12,000 data point experiment in typically less than 20 minutes using automated sample loading with the QuantStudio™ 12K Flex AccuFill™ System (Figure 2).
- **Integrated analysis and quality systems.** Comprehensive software analysis tools for gene expression, genotyping, and digital PCR are available at your fingertips. Laboratory Information Management Systems (LIMS) and features that assist with 21CFR Part 11 compliance are enabled for high-throughput, validated environments.
- **Economical processing.** Save precious samples and reduce reagent costs through cost-effective usage of nanoliter volumes.

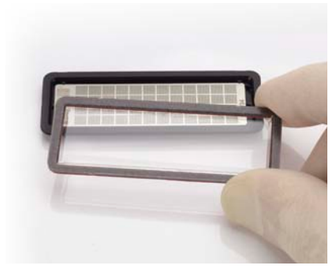


Figure 1. QuantStudio™ 12K Flex OpenArray® Plates are supplied in an alloy case for easy handling. After loading samples, place a lid on the array and fill with immersion fluid. The QuantStudio™ 12K Flex system can run up to four plates at once.

OpenArray® technology

OpenArray® technology is a broadly applicable nanoliter fluidics platform for low-volume, solution-phase reactions. Benefit from the parallelism of microarrays and the data quality of solution-phase reactions such as PCR with the QuantStudio™ 12K Flex system.

QuantStudio™ 12K Flex OpenArray® plates are microscope slide–sized and are arranged in 48 subarrays of 64 through-holes, with a total of 3,072 through-holes for individual 33 nL reactions (Figure 3). Plates are coated with hydrophilic and hydrophobic compounds to retain reagents in through-holes via surface tension.

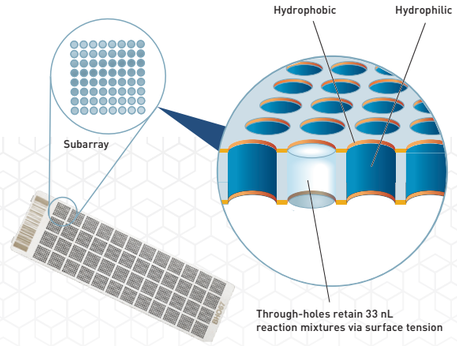


Figure 3. OpenArray® plate technology.

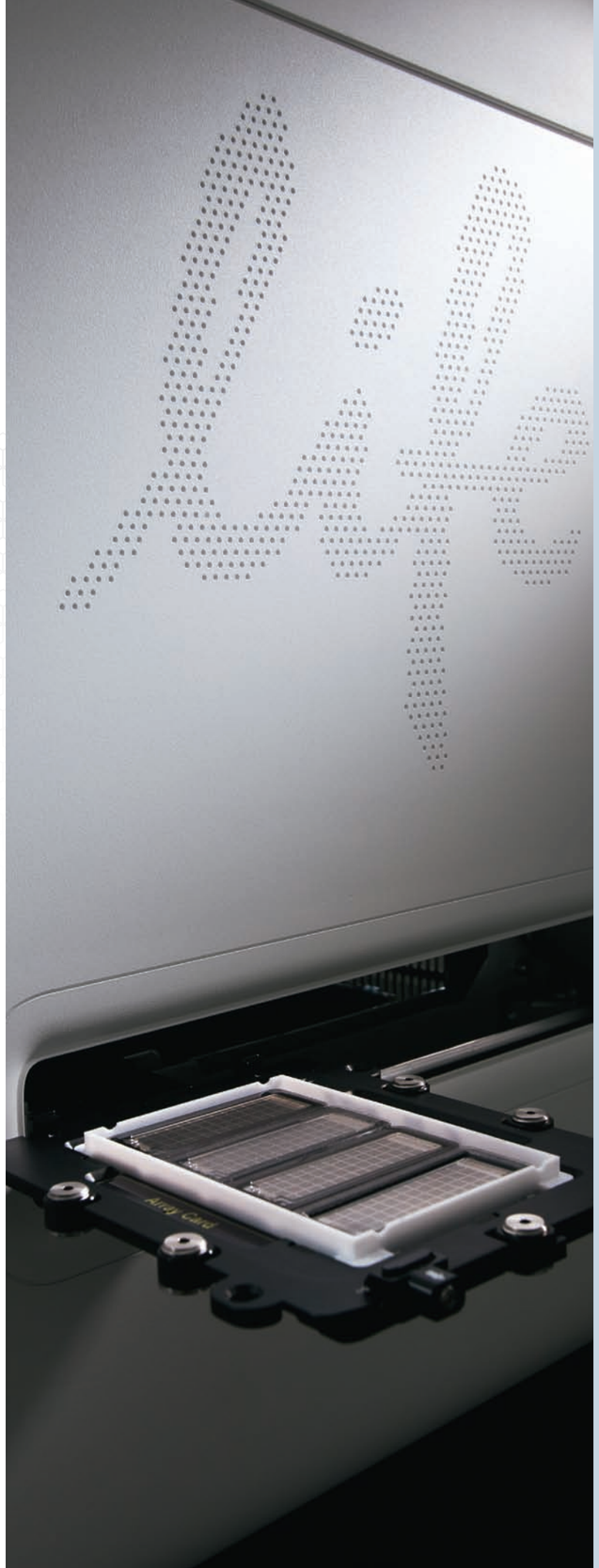
Figure 2. The QuantStudio™ 12K Flex AccuFill™ System simplifies sample loading into QuantStudio™ 12K Flex OpenArray® Plates.

Flexibility

No compromises necessary—full compatibility with diverse applications, plus single-tube to 12,000 reaction per run throughput

It's often the unexpected results in the lab that lead to the important breakthroughs. With this one instrument, your lab can be ready for many types of experiments and users, from low- to high-throughput sample processing and virtually any PCR application that requires fluorescence detection.

- **Five interchangeable blocks.** Choose and load the thermal-cycling block you need for the experiment at hand. Additional blocks are available to scale your throughput capability to up to 12,000 data points in a single run.
- **Provides a seamless switch from qPCR to digital PCR.** Increase the precision and sensitivity of your experiments by switching from real-time PCR to digital PCR mode using QuantStudio™ digital PCR kits and DigitalSuite™ Software with the QuantStudio™ OpenArray® block. From late C_t values to undetermined copy numbers, digital PCR provides a method to rescue ambiguous qPCR results, increasing the success rate of your experiments.
- **Multiplexing flexibility.** With up to six independent excitation and emission filter channels, the QuantStudio™ 12K Flex system flexibly accommodates your real-time chemistry needs and provides ample multiplexing capability. Dual-color detection is enabled for QuantStudio™ 12K Flex OpenArray® plates.
- **Impressive throughput without complicated robotics.** With 384-well TaqMan® Array Cards, there's no need for liquid-handling robotics or complex pipetting to load; simply add your sample and master mix and run on the QuantStudio™ 12K Flex system.



Enhanced OptiFlex® System
The QuantStudio™ 12K Flex Real-Time PCR System uses a white light LED optics system enabling powerful, extremely accurate and sensitive data collection (Figure 4). Additionally, the white light LED provides a broad spectrum of light for maximum resolution of 12,000 data points. The Enhanced OptiFlex® System can also capture QuantStudio™ 12K Flex OpenArray® plate identities from their bar codes. You can instantly load the appropriate experiment files for one-touch runs to help ensure that the plates were loaded correctly.

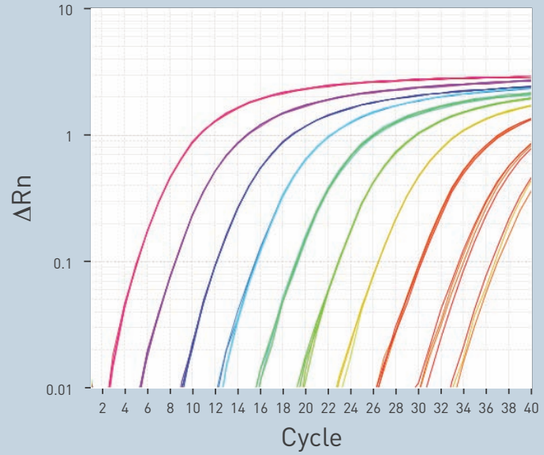


Figure 4. Real-time PCR reproducibility and 9-log dynamic range. Amplification plot shows results from real-time PCR of 18S DNA in 10-fold dilutions starting at 25,000 copies using the 384-well block. The data show highly reproducible results for input target quantities covering nine orders of magnitude (9 logs). These data illustrate the broad dynamic range of the system.

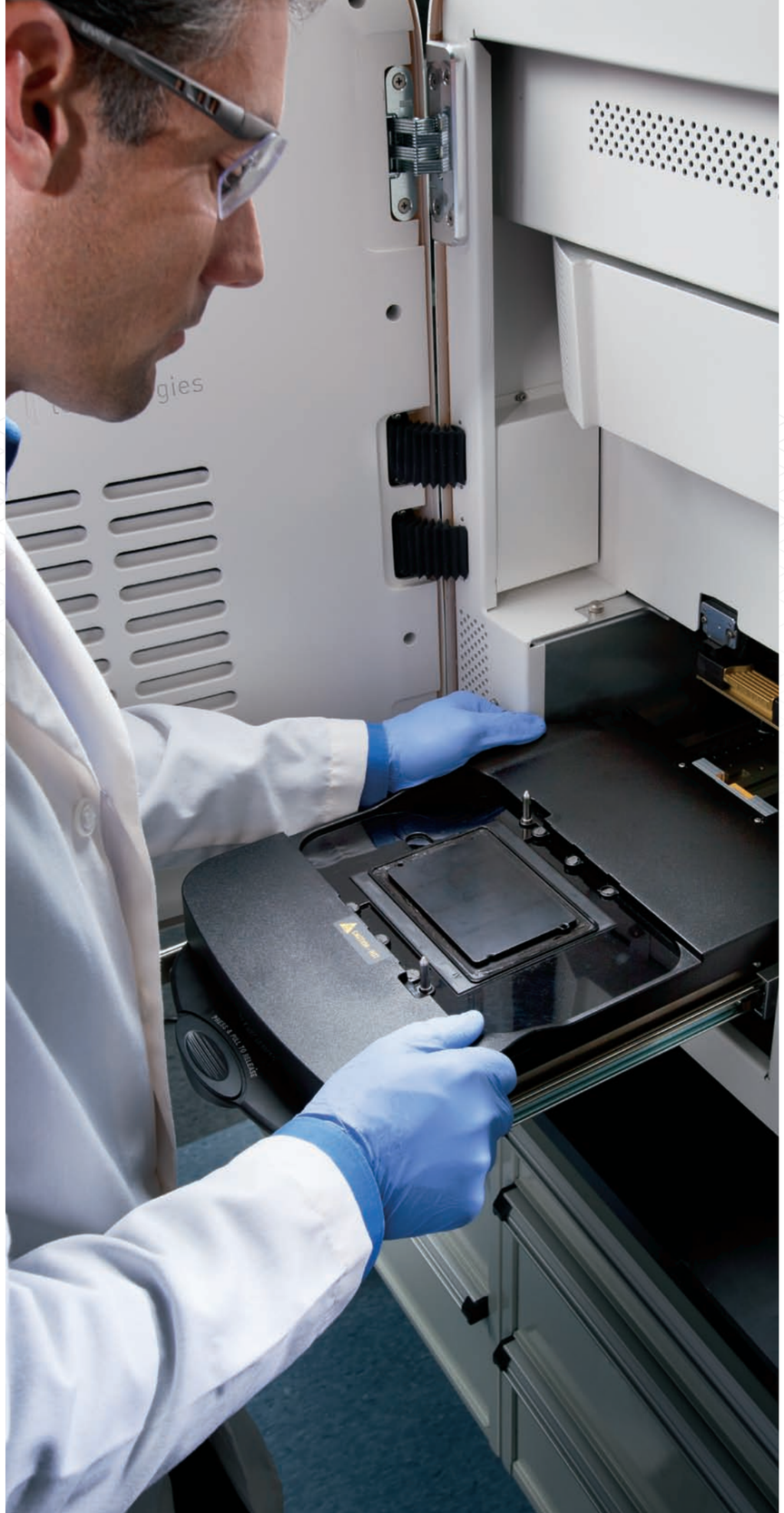
Scalability

A single instrument for your real-time PCR needs today… with the capabilities you'll need tomorrow

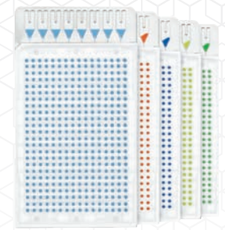
Take on the experiments you've always wanted to do, the QuantStudio™ 12K Flex system has the capabilities you'll need to follow your research leads with ease. Start your project with lower-throughput feasibility experiments and then scale up to get statistically significant answers for publishing groundbreaking results.

- **Quick, simple block changes.** Thermal blocks are easy to change for all users in the lab—and no tools or service calls are needed. In just minutes, you can get the QuantStudio™ 12K Flex system ready for experiments requiring just a few data points per run—or thousands.
- **Ample data storage.** Know that your data are always secure. The QuantStudio™ 12K Flex system can store data from over 100 runs without an external database, so your productivity won't be limited by data storage concerns.
- **Fully compatible with TaqMan® Assay formats and chemistry.** As you scale your experiments and increase throughput, be assured that TaqMan® Assay sensitivity, specificity, and wide dynamic range are optimized across all QuantStudio™ 12K Flex system block formats.
- **Automation capability.** With the QuantStudio™ 12K Flex Twister® II Automation Robot (Figure 5), you can automate your real-time PCR runs to accommodate sample throughput increases.

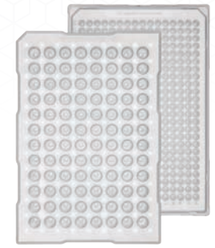
Figure 5. The QuantStudio™ 12K Flex System can be fully integrated with the Twister® II Robot for real-time PCR in automated environments.



QuantStudio™ 12K Flex OpenArray® plates



384-well TaqMan® Array Cards



TaqMan® Assays in 96- and 384-well plates

Single-tube TaqMan® Assays

QuantStudio™ 12K Flex Software

User friendly

Feature-rich touch screen interface makes it easy to get started and keep going (Figure 6).

- **Intuitive interface.** Easily identifiable icons on the touch screen guide you through the workflow to set up runs and analyze experiments. The graphical interface makes it easy to edit thermal cycling conditions for your 96-well, 384-well, and TaqMan® Array Card blocks, and enables one-touch runs for the OpenArray® block.
- **Sample tracking from start through analysis.** The OpenArray® SampleTracker helps you take your samples from 96-well plate format, to visually planning your OpenArray® plate configuration, to the AccuFill™ Software for loading your OpenArray® plates, and finally integrates with QuantStudio™ 12K Flex Software for one-touch runs.
- **Real-time monitoring.** Monitor up to 15 instruments simultaneously and view amplification plots or multicomponent data from subarrays.

A data analysis suite at your fingertips

Innovative software applications to analyze your data.

- **Enhanced gene expression analysis.** ExpressionSuite Software v1.0 can analyze data from small or large projects, even 100+ runs. Quickly check data quality and perform sophisticated statistical analysis to understand expression patterns and relationships between samples.
- **Real-time control for genotyping cluster analysis.** You can optimize your genotyping run times using a real-time PCR progress monitor to determine the ideal cycle for cluster analysis.
- **Straightforward transition to digital PCR.** With DigitalSuite™ Software v1.0 you can increase the precision and sensitivity of your qPCR experiments by switching to digital PCR mode (Figure 7). Digital PCR provides new capabilities to help you get more from your experiments.

High-throughput capable

Easily keep track of your samples and your results.

- **High-throughput experiment setup.** Create multiple experiment files simultaneously with the push of a single button and match them with your unique sample files. You can import your plate setup files from other Applied Biosystems® real-time systems to facilitate experiment setup.
- **Easy, automated data export.** Set up experiment templates with export preferences that direct the system software to auto-export your results to a file or email them to you.
- **LIMS compatibility.** Open application program interfaces (API) allow integration with third-party systems such as LIMS (laboratory integration management systems) or custom automated platforms. The optional 21 CFR Part 11 compliance module assists with security, auditing, and e-signature records for data traceability.

Figure 6. Easy analysis of OpenArray® runs: toggle between targets, samples, and subarray.

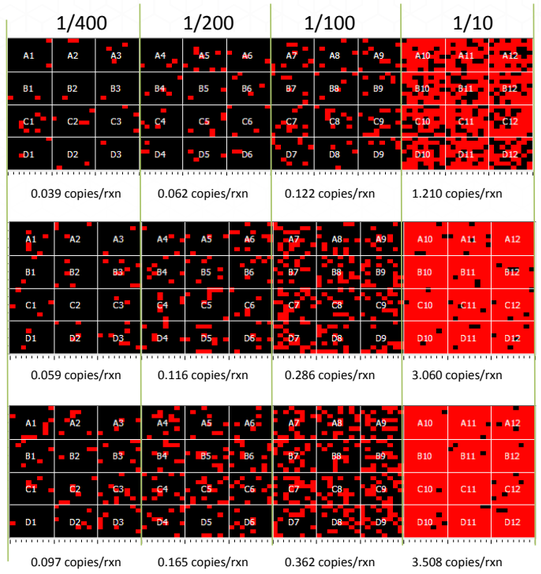


Figure 7. Analyze your digital PCR results using DigitalSuite™ Software for absolute quantitation with greater sensitivity and precision of rare target detection.

Applications & Technologies

A wide range of TaqMan® Assays offer superior performance for both routine and challenging applications.

- **Gene expression analysis.** TaqMan® Gene Expression Assays are the most comprehensive set of quantitative gene expression assays available, providing more than 1.3 million primer/probe sets for 23 species, in four sizes, including your choice of FAM™ or VIC® dye labels. Custom assays are available for studying the expression of any gene or splice variant in any organism.

- **SNP genotyping.** The precision of TaqMan® probe–based chemistry makes SNP genotyping studies easy. Choose from over 4.5 million predesigned human and mouse TaqMan® SNP Genotyping Assays and 2,700 TaqMan® DME Genotyping Assays, or Custom TaqMan® SNP Genotyping Assays, in various sizes.

- **Copy number analysis.** TaqMan® Copy Number Assays are a collection of over 1.6 million predesigned assays with genome-wide coverage for human, over 180,000 assays targeting exons for mouse, and Custom Plus and standard Custom TaqMan® Copy Number Assays when a predesigned assay is not readily available.

- **Digital PCR technology.** Ideal for sensitive detection of rare targets such as in cancer mutations, viruses, and GMO detection. In digital PCR, reactions are split into hundreds to thousands of mini-reactions to provide a digital readout of real-time PCR results.

- **castPCR™ technology.** TaqMan® Mutation Detection Assays are designed to detect and measure DNA mutations with extremely high specificity against a background of wild-type genomic DNA (gDNA). These assays are powered by competitive allele-specific TaqMan® PCR technology, known as castPCR™ technology, for detection of mutations present at less than 0.1% in gDNA.

- **MicroRNA and other noncoding RNA analysis.** Innovative TaqMan® Assays and tools are available for long noncoding RNA quantification, miRNA profiling, pri-miRNA quantification, small RNA quantification, and targeted miRNA quantification.

- **High Resolution Melt (HRM) Analysis.** HRM analysis is a rapid, economical method for mutation scanning and methylation analysis in genomic DNA.

Innovative assay panels to take your research to the next level

Life Technologies research and development scientists continue to develop new collections of TaqMan® Assays to use with Applied Biosystems® real-time PCR technology. Most recently we've introduced the following novel products:

- **Pharmacogenomics panels.** For researchers involved in pharmacogenomics, our fixed-content panel of selected TaqMan® DME assays is ideal for high-throughput analysis of the effects of genes on human responses to drugs. This panel contains all known high-value DME pharmacogenetics markers, including PharmaADME core markers.

- **Barcoding panels.** For high-throughput tracking and confirmation of sample identity and gender within a large biorepository setting, our fixed-content OpenArray® panels contain a defined set of select autosomal and Y-chromosome SNP markers common to commercial arrays.

- **Gene expression pathway panels.** For researchers performing disease studies, these fixed-content gene expression OpenArray® Pathway Panels are for high-throughput analysis of commonly studied, disease-related gene families. These include human cancer, kinome, inflammation, signal transduction, and stem cell panels, and mouse inflammation panels.

Hardware specifications

QuantStudio™ 12K Flex Real-Time PCR System

Description	Specification	
Block configurations and volume	• 96-well (10–100 µL reactions), • Fast 96-well (15–30 µL reactions) • 384-well (5–20 µL reactions) • TaqMan® Array Cards (~1 µL reactions) • OpenArray® Plates (33 nL reactions)	
Block change design	Block change from front in less than 1 min; no tools or service call required	
Excitation source	Enhanced OptiFlex® system, White LED	
Instrument control	Instrument touch screen, networked computer, or attached computer	
Detection channels	• Decoupled: 6 emission, 6 excitation (96-well/Fast, 384-well, TaqMan® blocks) • Coupled: 4 emission, 4 excitation (OpenArray® blocks)	
21 CFR p11 enablement	Optional software module	
Dimensions (W x D x H)	50.5 cm x 67.2 cm x 73.8 cm	
Weight	69 kg (152 lbs)	
Power	100–240 V	
Remote monitoring	Available to monitor up to 15 networked instruments simultaneously	
Data export format	User configurable: *.xls, *xlsx, *.txt	
	96-well, 96-well Fast, 384-well, TaqMan® Array Card blocks	**OpenArray® block**
Detection channels	Decoupled: 6 emission, 6 excitation	Coupled: 4 emission, 4 excitation
Well-to-well variability	+/– 0.25°C	+/– 0.75°C
Max block ramp rate	3.0°C/sec (384-well)	3.0°C/sec
Run time	• 30 min expected (Fast 96-well block) • 35 min (384-well block, using Fast master mix)	• 2 hr (gene expression) • 4 hr (genotyping)
Demonstrated sensitivity	To 1 copy	To 1 copy
Dynamic range	To 9 logs	To 7 logs
Resolution	As low as 1.5-fold change for single-plex reaction	As low as 2-fold change for single-plex reaction

Software specifications

Download from www.appliedbiosystems.com

Software name	Description	Blocks supported
Embedded in QuantStudio™ 12K Flex Software v1.0		
SampleTracker v1.0 Software	• Facilitate sample tracking from 96-well to 384-well plates • Illustrates mapping to OpenArray® plates	QuantStudio™ 12K Flex OpenArray® block
HRM Software Module for QuantStudio™ 12K Flex system	High resolution melt analysis	96-well, 384-well blocks
21 CFR Part 11 Software Module for QuantStudio™12K Flex system	Quality control system compliance features	All blocks
Downstream applications accessible from QuantStudio™ 12K Flex software home screen		
DigitalSuite™ Software	Digital PCR Analysis that enables duplex analysis, one-click launch, and amplification curves & heat-maps.	All QuantStudio™ 12K Flex system blocks
ExpressionSuite Software	Gene expression analysis supporting up to 100 files with enhanced performance time. The software features relative quantification with p-value, correlation plots, box plots, heat maps, and volcano plots.	All QuantStudio™ 12K Flex system blocks
TaqMan® Genotyper Software	Improved version of existing software product that includes single-plate views	All QuantStudio™ 12K Flex system blocks

“The highly flexible QuantStudio™ 12K Flex system allows you to perform the experiments that were difficult in the past.”

Kevin Munelly, Life Technologies

Applied Biosystems® service & support

Applied Biosystems® service plans offer:

Highly valued field services

- Protect your technology investment with a wide range of service plans that fit your laboratory requirements and budget needs.
- Highly trained, certified service engineers use the latest technology to quickly diagnose and fix your instruments.
- Realize up to 45% savings on instrument care through purchase of a service plan.

Award-winning remote services

- Remotely and proactively monitor, alert, diagnose, and correct your instrument performance for maximum uptime.
- Avoid unplanned interruptions in lab operations with automatic alerts sent to your field service engineer (FSE).
- Remotely track critical system parameters with real-time reporting.

Compliance and validation services

- Broad range of audit-quality services, including installation qualification (IQ), operation qualification/instrument performance verification (OQ/IPV), pure dye calibration, on-site temperature verification, computer system validation, and risk assessment.
- Comprehensive packages with rigorously executed protocol documentation including all the data collected.
- A partnership with you that utilizes the latest technology to move quickly into testing and production using audit-quality expert support to minimize the frustration and burden of developing and maintaining compliance and change control.

Applied Biosystems® service plans

	AB Complete	AB Assurance	AB Maintenance
Repair response time (business days)	Guaranteed next day: on-site repairs	Guaranteed 2-day: on-site repairs	Target 2-day: remedial repairs
Remote instrument monitoring and diagnostics	+	+	–
Priority phone and email access to instrument support	+	+	–
Priority phone and email access to application technical support	+	+	+
Instrument operating software upgrades	+	–	–
Instrument qualification services	+	–	–
Planned maintenance	+	+	+
Parts, labor, and travel	Included	Included	Discount with Plus plan

Ordering information

Instrument systems (with desktop computer)	Cat. No.
QuantStudio™ 12K Flex Real-Time PCR System with OpenArray® Block (includes AccuFill™ system)	4471090
QuantStudio™ 12K Flex Real-Time PCR System with OpenArray® Block (without AccuFill™ system)	4472380
QuantStudio™ 12K Flex Real-Time PCR System with TaqMan® Array Card Block	4471089
QuantStudio™ 12K Flex Real-Time PCR System with 384-Well Block	4471134
QuantStudio™ 12K Flex Real-Time PCR System with 96-Well Fast Block	4471088
QuantStudio™ 12K Flex Real-Time PCR System with 96-Well Block	4471087
Additional thermal cycling blocks and accessories	
96-Well Block Upgrade Kit	4453543
96-Well Fast Block Upgrade Kit	4453544
384-Well Block Upgrade Kit	4453545
TaqMan® Array Card Block Upgrade Kit	4453546
OpenArray® Block with AccuFill™ System	4471067
QuantStudio™ 12K Flex AccuFill™ Upgrade Kit (For existing AccuFill™ system users)	4471022
QuantStudio™ 12K Flex Twister ® II Automation Robot	4471066
Applied Biosystems® Service Plans	
Applied Biosystems® Complete Service Plan	Contact us
Applied Biosystems® Assurance Service Plan	Contact us
Applied Biosystems® Maintenance Service Plan	Contact us

For more information about the QuantStudio™ 12K Flex Real-Time PCR System or any of our real-time PCR products, contact your Life Technologies representative or visit www.appliedbiosystems.com/quantstudio

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