

RPA MASTER MIXES

Recombinase Polymerase Amplification



Isothermal • Lyophilized • DNA & RNA Detection



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About biotechrabbit

Molecular Biology Expertise from Berlin

biotechrabbit™ develops and manufactures molecular biology reagents for research, diagnostics and applied molecular testing. Research, development and manufacturing are performed in Berlin, Germany, enabling close integration of innovation, production and quality assurance.

RESEARCH & DEVELOPMENT

Our research and development team combines scientific expertise with product development focused on molecular applications. Working closely with customers and partners, the team develops innovative solutions for molecular biology workflows and nucleic acid amplification technologies.

ENZYME & PROTEIN PRODUCTION

Molecular biology enzyme and protein production is at the core of biotechrabbit's expertise. High-density prokaryotic and eukaryotic fermentation processes are combined with optimized purification workflows to deliver highly pure proteins and molecular biology reagents. Production capabilities range from small-scale development to industrial batch manufacturing.



Quality and Manufacturing Excellence

Certified Quality and Lyophilization Expertise

Consistent product performance requires rigorous quality standards throughout development and manufacturing. biotechrabbit™ combines certified quality management, extensive analytical testing and specialized lyophilization expertise to ensure reliable reagent performance.

CERTIFIED QUALITY MANAGEMENT

ISO 13485 and ISO 9001 certified quality management systems support development, production and distribution of molecular biology reagents, proteins and in vitro diagnostic components.



QUALITY CONTROL

Comprehensive quality control is performed throughout production. Activity testing, purity assessment, concentration measurements and contamination analyses help ensure consistent product quality and reliable assay performance.

LYOPHILIZATION EXPERTISE

Lyophilization technologies support long-term reagent stability while reducing reliance on temperature-controlled supply chains. Optimized lyophilized cakes and beads are designed to maintain both stability and amplification performance throughout storage and transportation.

RPA - Fast Molecular Detection in Minutes

The biotechrabbit™ RPA Master Mixes enable ultra-rapid isothermal nucleic acid amplification. Four optimized formulations support DNA and RNA targets, endpoint and real-time detection, and convenient storage in a lyophilized format.



Fast Results

Detectable amplification products can be obtained within minutes.



Isothermal Workflow

Amplification at a constant temperature of 37–42 °C.



DNA & RNA Detection

Solutions available for both DNA and RNA targets.



Endpoint & Real-Time Readout

Compatible with gel-, lateral flow- and fluorescence-based detection.

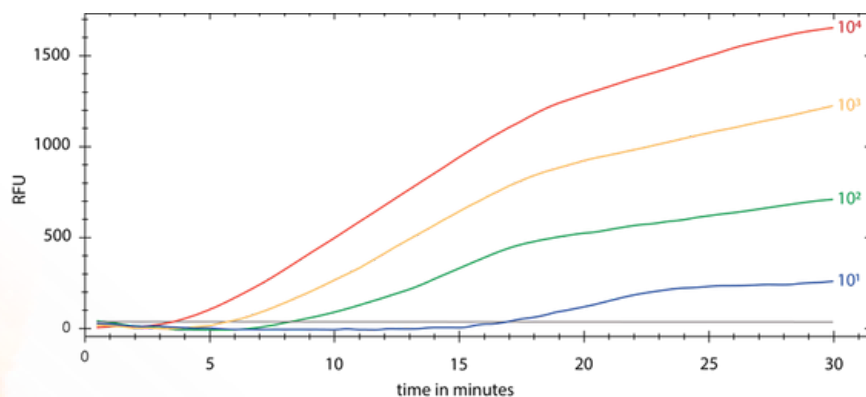


Freeze-dried Format

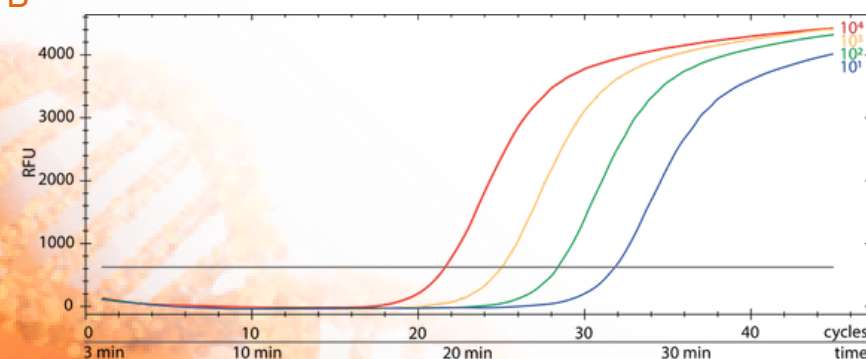
Simplified storage and transportation at room temperature.

RPA vs. Polymerase Chain Reaction (PCR)

A



B



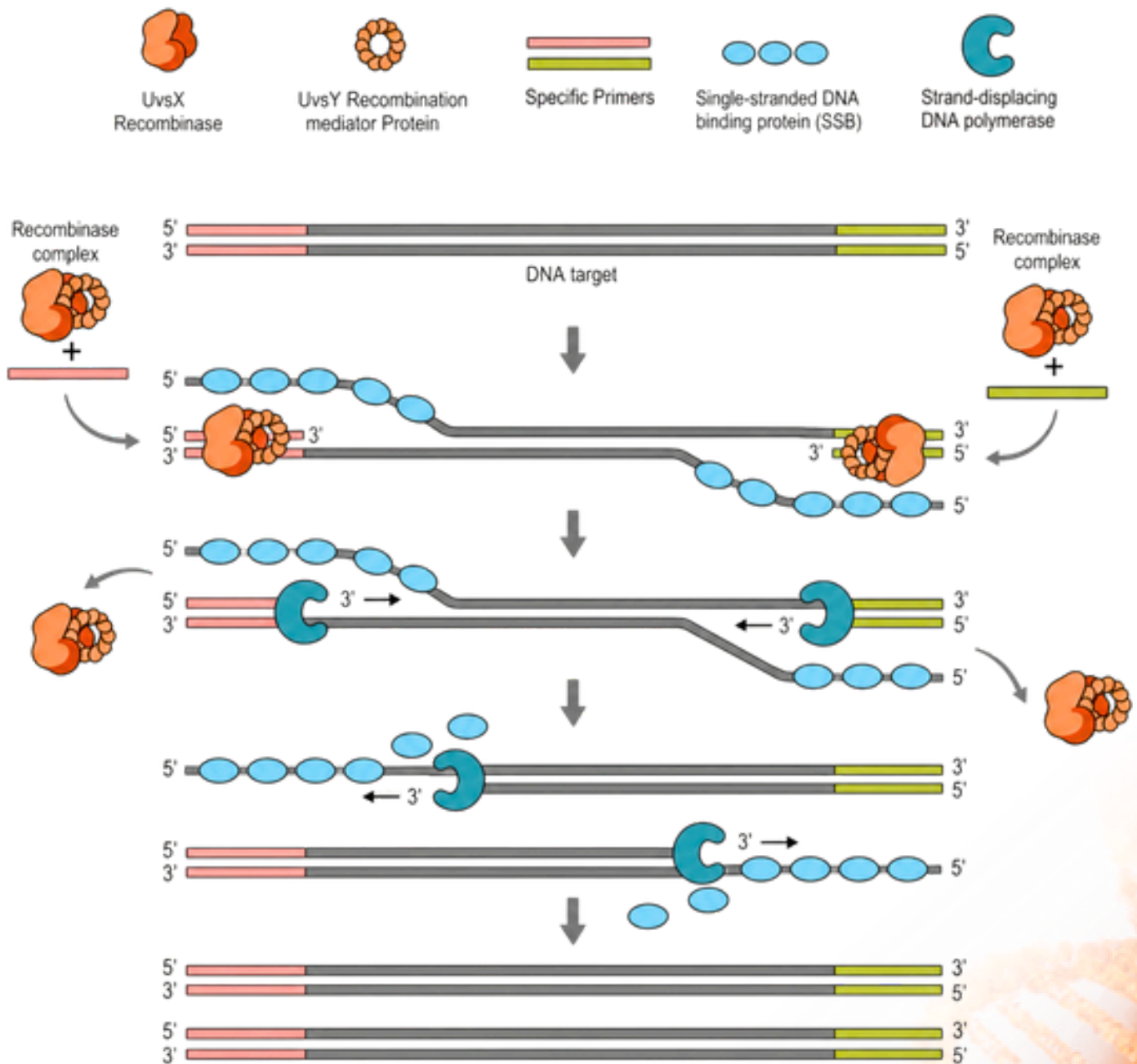
Unlike PCR technology, which begins with a long initial denaturation step and relies on repeated heating and cooling cycles, RPA amplifies nucleic acids continuously at a constant temperature of 37–42 °C.

As shown in the comparison, RPA (A) detects 10⁴ target copies within just 4–5 minutes. Under the same comparison, qPCR (B) requires more than 18 minutes to generate a detectable signal, including the initial denaturation step.

By eliminating prolonged thermal cycling, RPA enables substantially faster results while reducing the need for complex equipment. This makes it a powerful solution for rapid molecular assays in laboratory and field environments.

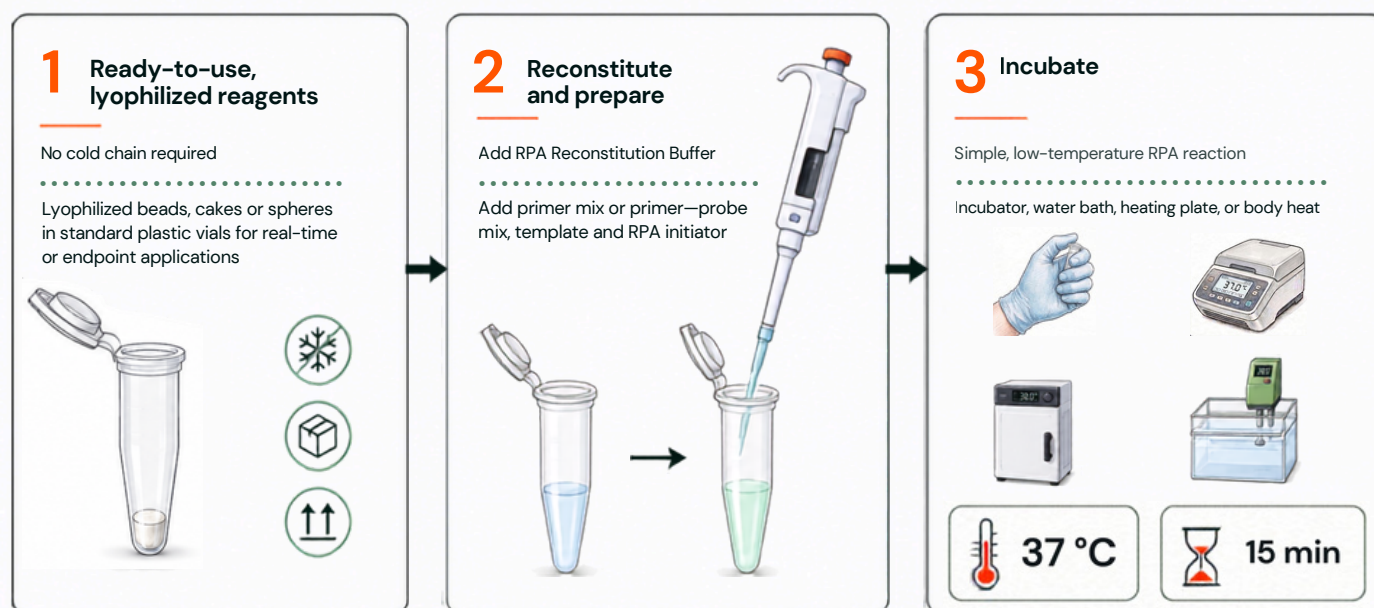
The RPA Reaction Mechanism

RPA starts with the formation of nucleoprotein complexes consisting of UvsX recombinase proteins and target-specific primers, facilitated by the recombination mediator protein UvsY. The resulting complexes recognize homologous sequences within double-stranded DNA and promote primer insertion. Single-stranded DNA binding proteins stabilize the displaced DNA strand, while a strand-displacing polymerase extends the primers. Repeated cycles of this process result in rapid exponential amplification.



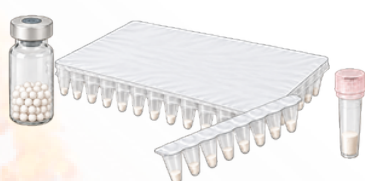
From Sample to Result

Simple workflows are essential for rapid molecular testing. The biotechrabbit™ RPA Master Mixes combine lyophilized reagents, minimal hands-on time and isothermal amplification to enable nucleic acid detection without complex instrumentation. From assay setup to amplification, the workflow can be completed using simple laboratory equipment and a single incubation step.



Broad Target Compatibility

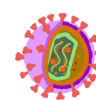
The flexibility of RPA technology enables amplification of diverse DNA and RNA targets across a broad range of applications. The biotechrabbit™ RPA Master Mixes have been successfully applied to human nucleic acid targets, clinically relevant viral pathogens and a variety of additional target types. Through target-specific primer and probe design, RPA assays can be adapted for applications in molecular diagnostics, life science research, environmental monitoring, food and agricultural testing, and other nucleic acid detection workflows. The targets presented here are representative examples and corresponding results are included in this brochure. They do not reflect the full range of applications supported by the biotechrabbit™ RPA Master Mixes.



HUMAN gDNA & RNA



HCV



HIV-1

*In addition to the results in this brochure, the biotechrabbit RPA products have been successfully used to detect:

Marburg virus, respiratory viruses (COVID, Influenza), Norovirus, Ebolavirus, RSV, Malaria, Listeria

Choosing the right RPA Master Mix

The biotechrabbit™ RPA Master Mixes provide flexible solutions for DNA and RNA amplification using both endpoint and real-time detection formats. Select the appropriate Master Mix based on your target type and preferred detection method.

2X RPA basic Master Mix

DNA · Endpoint Detection

Rapid isothermal amplification of DNA targets with endpoint detection by agarose gel electrophoresis or lateral flow assay.

2X RT-RPA basic Master Mix

RNA · Endpoint Detection

Rapid isothermal amplification of RNA targets with integrated reverse transcription and endpoint detection by agarose gel electrophoresis or lateral flow assay.

2X RPA exo Master Mix

DNA · Real-Time Fluorescence

Rapid isothermal amplification of DNA targets with fluorescence-based real-time detection using Exo III-cleavable probes.

2X RT-RPA exo Master Mix

RNA · Real-Time Fluorescence

Rapid isothermal amplification of RNA targets with integrated reverse transcription and fluorescence-based real-time detection using Exo III-cleavable probes.

Product Comparison

Feature	Basic	Exo
Target	DNA / RNA*	DNA / RNA*
Detection	Endpoint	Real-Time
Readout	Gel / LFA	Fluorescence
Probe required	Optional (Nfo)	Yes (Exo III)
Temperature	37–42 °C	37–42 °C

* RT variants include Reverse Transcriptase

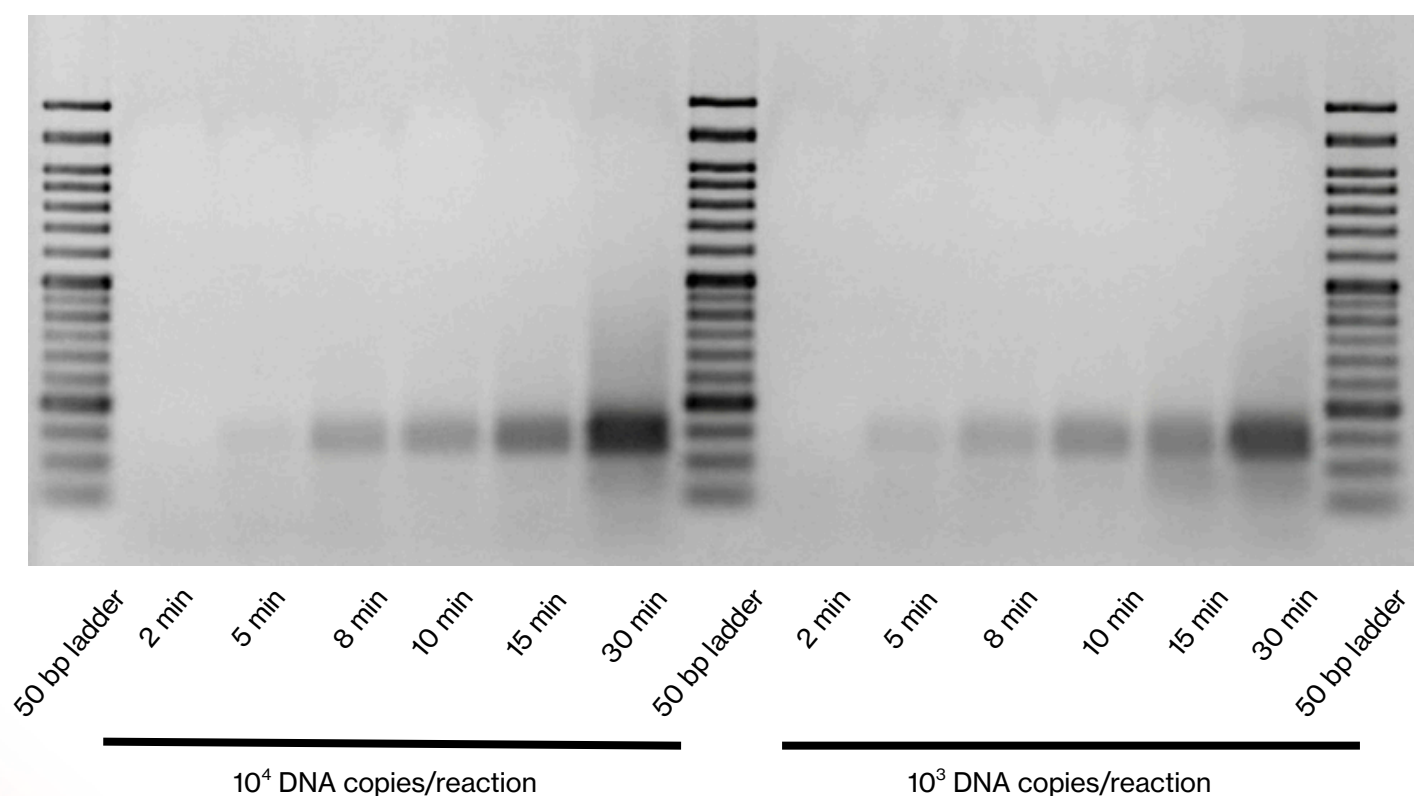
Rapid Isothermal Amplification

Ultra-rapid amplification within minutes

Ultra fast amplification is a defining characteristic of RPA technology. Combined with isothermal reaction conditions and flexible detection options, the biotechrabbit™ RPA Master Mixes enable efficient nucleic acid amplification with minimal instrumentation requirements. The following data demonstrate key performance characteristics, including amplification speed, sensitivity, and compatibility with commonly used fluorescence detection platforms.

Simple Equipment - Rapid Results

Amplification products can be detected as early as 5 minutes after reaction initiation using a standard laboratory incubator or thermomixer.

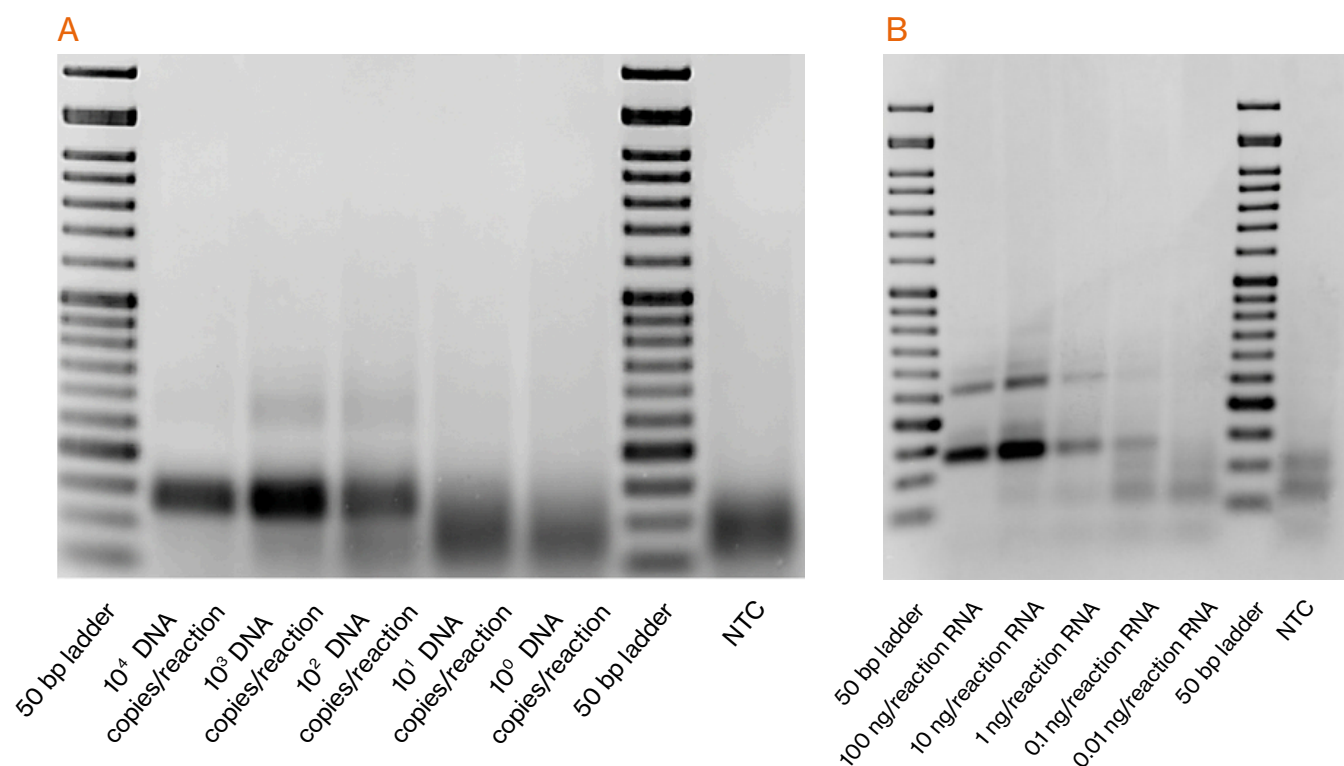


Ultra rapid amplification within 5 minutes. Time-course amplification of human genomic DNA using the biotechrabbit™ 2X RPA basic Master Mix. Reactions containing 10^4 and 10^3 DNA template copies per reaction were incubated under isothermal conditions and analyzed after 2, 5, 8, 10, 15 and 30 minutes by agarose gel electrophoresis. Specific amplification products became detectable after 5 minutes for both template concentrations and increased in intensity with prolonged incubation, demonstrating the rapid amplification of the RPA workflow.

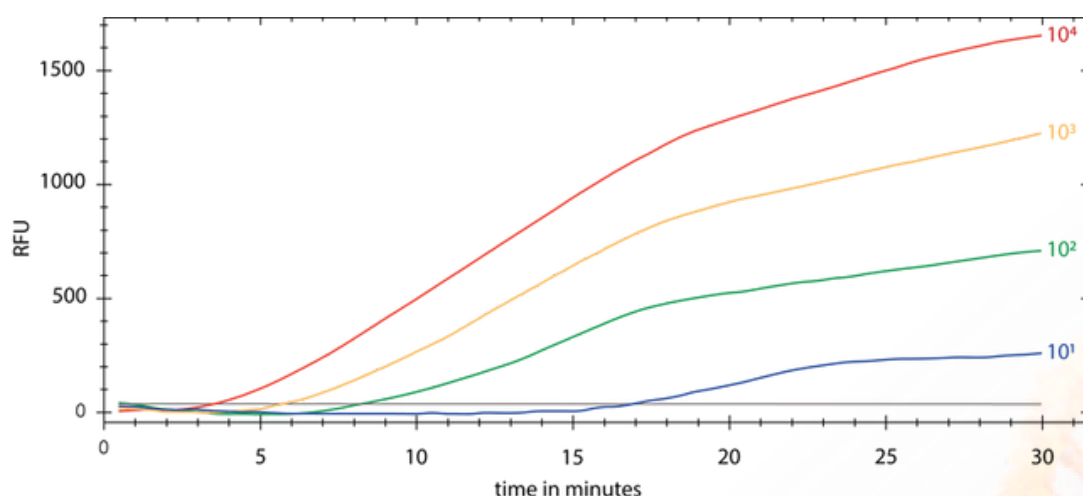
Sensitive Detection of DNA and RNA

Sensitive Detection of low copy numbers

The biotechrabbit™ RPA Mixes support amplification of both DNA and RNA targets. To demonstrate assay sensitivity across different nucleic acid types, human GAPDH genomic DNA and RNA templates were amplified using serial template dilutions. DNA (A) and RNA (B) targets were tested at 10^4 – 10^0 copies and 100 – 0.01 ng per reaction, respectively.



Sensitive detection of human GAPDH DNA and RNA targets. Human genomic DNA was amplified using the biotechrabbit™ 2X RPA basic Master Mix (A) from 10^4 to 10^0 copies per reaction, while human RNA was amplified using the biotechrabbit™ 2X RT-RPA basic Master Mix (B) from 100 ng to 0.01 ng total RNA input. Amplification products generated from serial template dilutions were analyzed by agarose gel electrophoresis. Specific amplification products were detected across the tested dilution series, demonstrating sensitive amplification of both DNA and RNA targets. Detection performance depends on factors such as target sequence, primer design and assay conditions.



Sensitive detection across a broad concentration range using the biotechrabbit™ 2X RPA exo Master Mix. Serial template dilutions ranging from 10^4 to 10^1 copies per reaction were amplified under isothermal conditions and analyzed by real-time fluorescence detection. Consistent amplification across the dilution series demonstrates the broad dynamic range and sensitivity of the RPA workflow.

Broad Instrument Compatibility

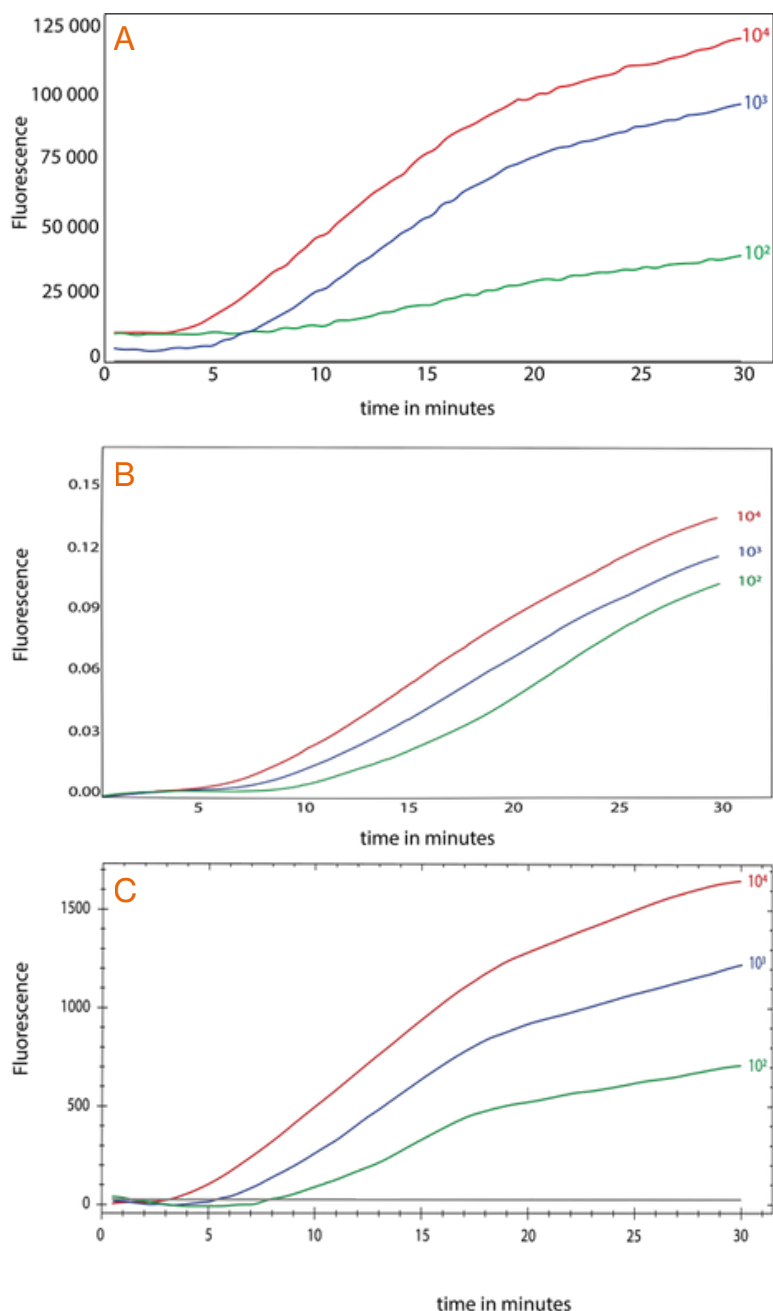
Consistent Results across various platforms

The biotechrabbit™ 2X RPA exo Master Mix delivers consistent amplification across a range of commonly used fluorescence detection platforms. Its broad instrument compatibility allows researchers to integrate real-time RPA into their existing laboratory setup.

Real-time amplification performance of the biotechrabbit™ 2X RPA exo Master Mix was evaluated on three fluorescence detection platforms: A) ABI 7500, B) Rotor-Gene Q and C) Bio-Rad CFX96. Serial template dilutions ranging from 10^4 to 10^2 copies per reaction were amplified under isothermal conditions, enabling comparison across instruments and template concentrations.

Consistent amplification was observed across all three tested instruments over the investigated range of template concentrations. These results demonstrate broad instrument compatibility and reliable real-time amplification with the biotechrabbit™ 2X RPA exo Master Mix, supporting its use with different fluorescence detection platforms for isothermal amplification.

Further testing confirmed compatibility with additional fluorescence detection platforms, including Roche LightCycler®, Thermo Fisher QuantStudio™, QIAGEN® Tube Scanner and Axxin instruments (data not shown). Together, these findings highlight the flexibility of the biotechrabbit™ 2X RPA exo Master Mix for use across a variety of fluorescence detection systems.

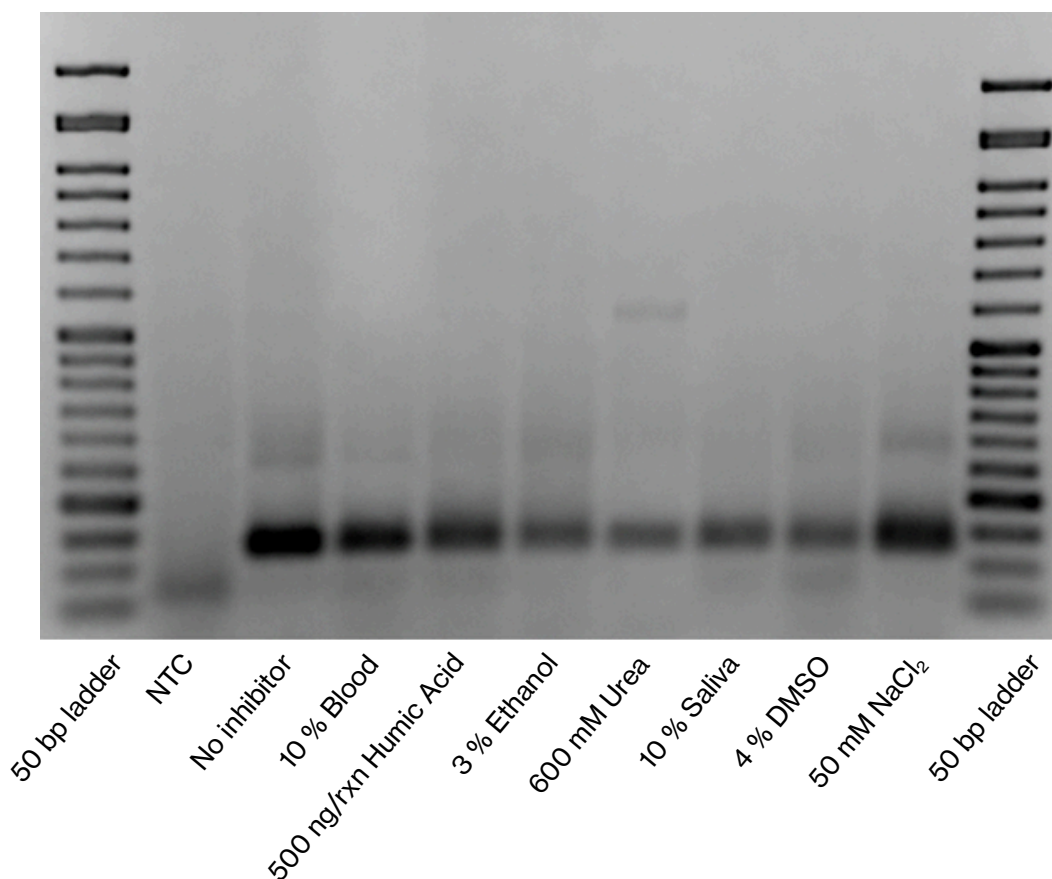


Inhibitor Tolerance

Robust Performance in Challenging Samples

In practical applications, amplification reactions are frequently exposed to substances that can inhibit enzyme activity or interfere with target detection. Commercially available RPA solutions often show limitations in amplification speed, sensitivity or workflow simplicity.

The biotechrabbit™ 2X RPA exo Master Mix was developed to provide exceptional amplification and sensitive target detection, delivering performance that exceeds what is typically available in current commercial RPA workflows. The robustness of the biotechrabbit™ RPA Master Mixes was evaluated using a range of common inhibitors and sample-derived contaminants.



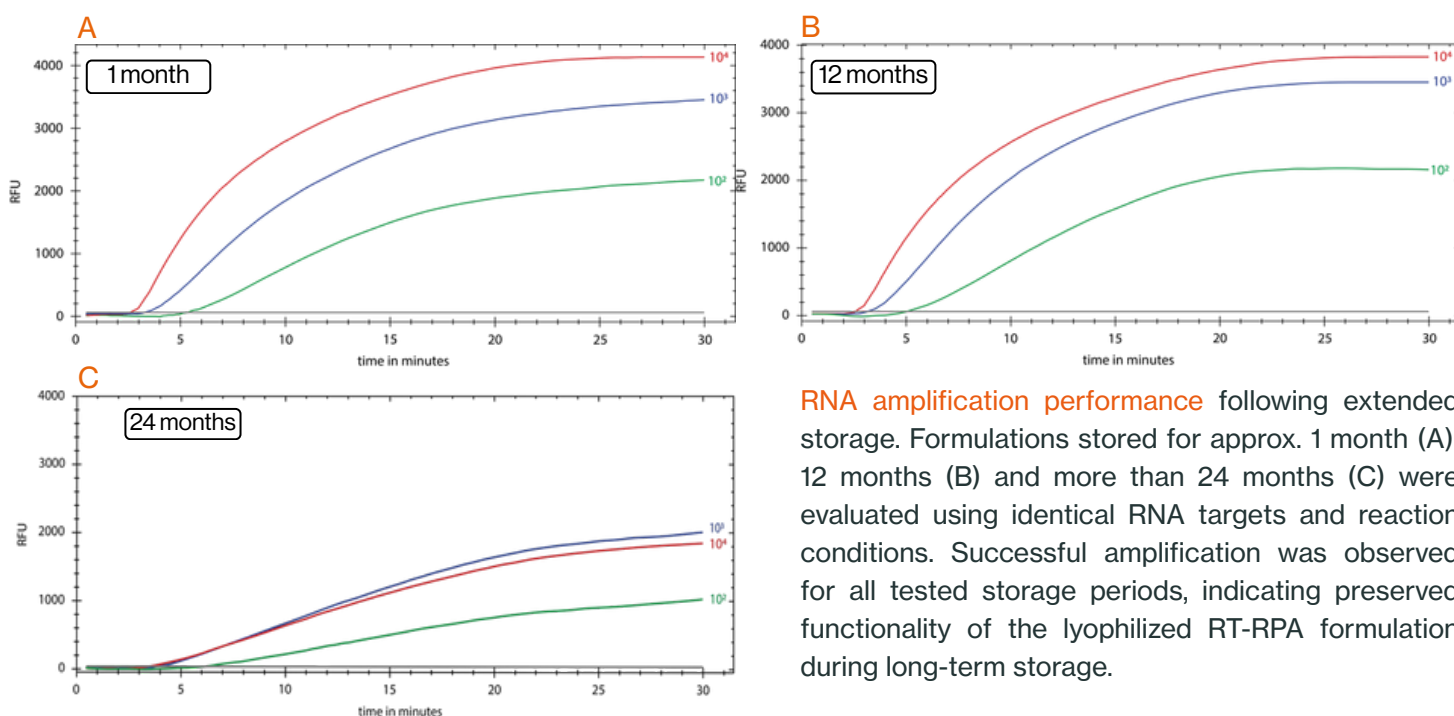
Inhibitor tolerance analysis using the biotechrabbit™ 2X RPA exo Master Mix: Amplification performance was evaluated in the presence of no inhibitor, blood (10 %), humic acid (500 ng/reaction), ethanol (3 %), urea (600 mM), saliva (10 %), DMSO (4 %) and NaCl₂ (50 mM).

Reactions were performed under standard isothermal conditions and analyzed by agarose gel electrophoresis. Amplification was observed across all tested conditions, demonstrating robust performance in the presence of commonly encountered inhibitors and complex sample matrices. The ability to maintain amplification under these conditions represents a level of robustness that is rarely achieved with currently available nucleic acid amplification workflows.

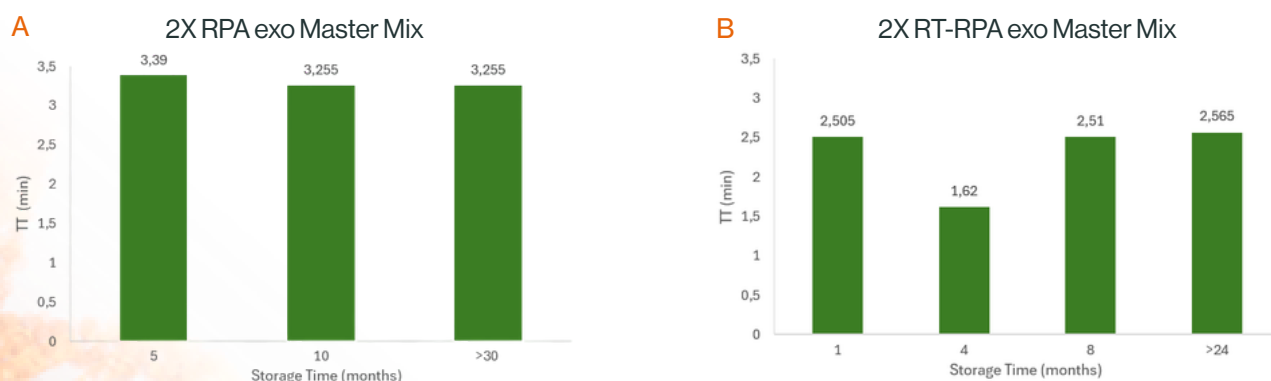
Long-term Stability

Maintained RNA Amplification Performance after extended Storage

Lyophilized formulations are designed to support long-term storage while maintaining amplification performance. To evaluate storage stability, recently manufactured and long-term stored lots of the biotechrabbit™ 2X RT-RPA exo Master Mix were compared using identical RNA targets and amplification conditions.



To further evaluate long-term storage stability, Time-to-Threshold (TT) values were determined for the biotechrabbit™ 2X RPA exo Master Mix (DNA) and 2X RT-RPA exo Master Mix (RNA). TT represents the time required for the fluorescence signal to reach a predefined threshold and provides a quantitative measure of assay performance. Consistent TT values across different lots and storage periods indicate maintained amplification performance and reliable long-term stability.

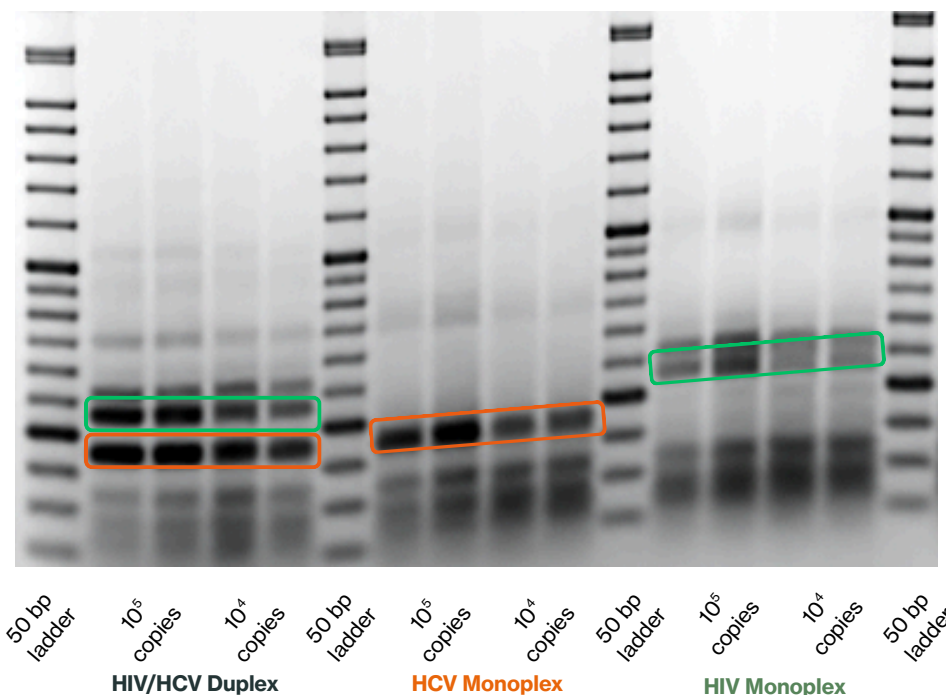


Maintained amplification performance following extended storage: (A) TT values obtained from independent production lots of the biotechrabbit™ 2X RPA exo Master Mix using 10⁴ DNA copies per reaction after approximately 5, 10 and more than 30 months of storage. (B) TT values obtained from independent production lots of the biotechrabbit™ 2X RT-RPA exo Master Mix using 10 ng RNA per reaction and same GAPDH primer/probe sets following different storage periods. Amplification was observed across all evaluated lots and storage durations, demonstrating consistent lot-to-lot performance and maintained assay functionality after extended storage.

Multiplex Detection

Simultaneous Target Detection of HIV and HCV

Multiplex amplification enables the simultaneous detection of multiple targets within a single reaction. It is an important feature for molecular testing applications. By reducing sample consumption and reagent usage, multiplex workflows can improve assay efficiency while maintaining reliable target detection.

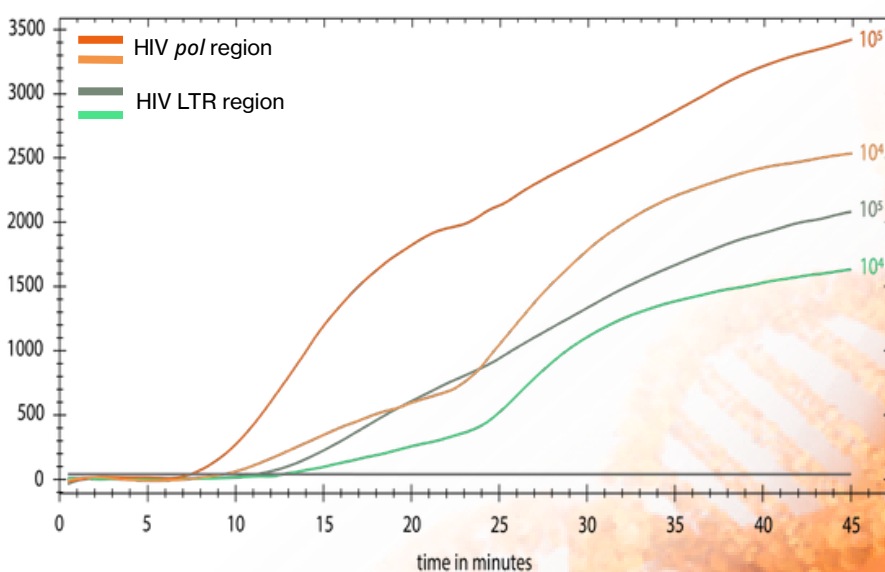


Simultaneous detection of HIV (blue) and HCV (red) targets using a multiplex RPA workflow. Amplification products were analyzed by agarose gel electrophoresis and resolved according to amplicon size. Distinct amplification products corresponding to the HIV and HCV targets were detected within a single reaction, demonstrating the multiplexing capability of the biotechrabbit™ RPA platform.

Simultaneous Target Detection of HIV *pol* and LTR region

Multiplex capabilities are not limited to endpoint analysis. Real-time fluorescence detection enables simultaneous monitoring of multiple targets, combining multiplex functionality with rapid and sensitive target detection. The use of multiple genomic target regions is a common strategy in HIV diagnostics to support reliable detection of wild-type HIV as well as genetically diverse viral strains.

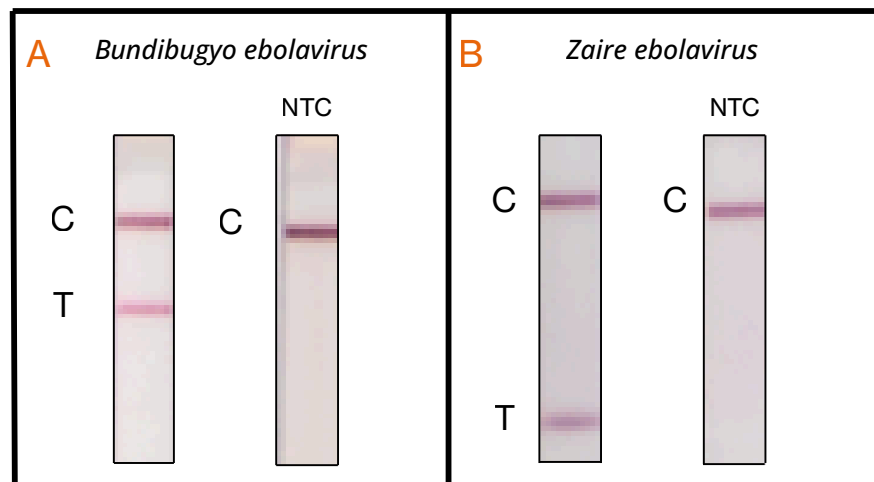
Real-time amplification of HIV target sequences using the biotechrabbit™ 2X RPA exo Master Mix. Amplification was evaluated for target sequences derived from the HIV *pol* region and the HIV LTR region using template concentrations of 10^5 and 10^4 copies per reaction. Real-time fluorescence monitoring showed clear amplification signals for both target regions across the tested concentration range, demonstrating sensitive and robust detection of clinically relevant HIV sequences under isothermal conditions.



Lateral Flow Detection

Rapid Visual Readout of Amplification Products

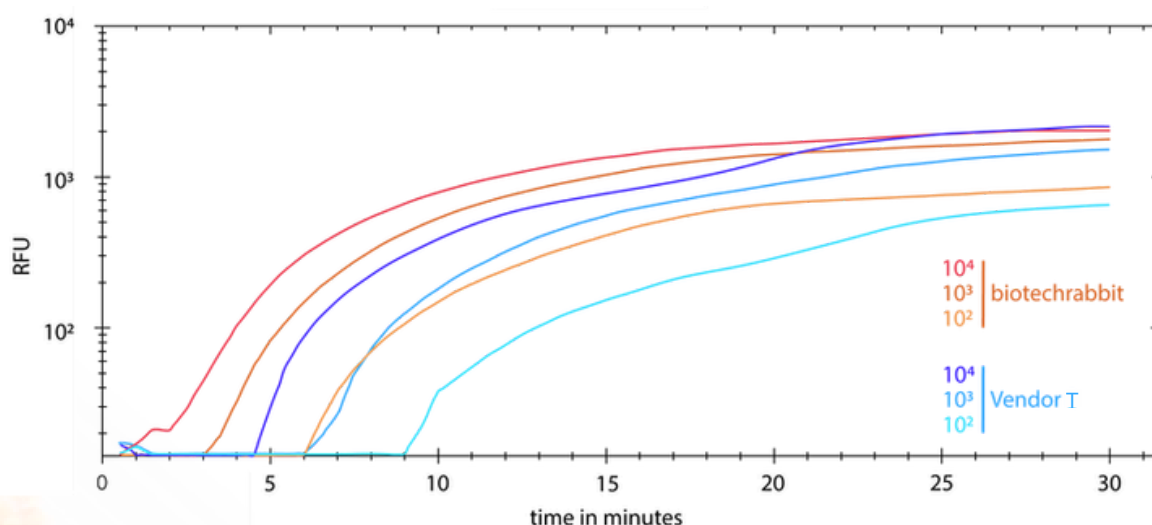
Lateral flow assays provide a simple endpoint detection method for RPA amplification products. Combined with RPA amplification, this approach enables rapid visual confirmation of target amplification, allowing amplified targets to be detected directly on a test strip. The workflow supports straightforward endpoint analysis using minimal equipment and offers an accessible alternative to fluorescence- or gel-based detection methods for reliable screening and field testing.



Detection of *Ebolavirus* target sequences using the biotechrabbit™ 2X RPA basic Master Mix. Following RPA amplification, products were analyzed using lateral flow test strips. Clear positive test signals were observed for both *Bundibugyo ebolavirus* (A) and *Zaire ebolavirus* (B) target sequences, while corresponding NTC reactions remained negative, demonstrating specific target-dependent detection.

Performance Comparison

The performance of the biotechrabbit™ 2X RPA exo Master Mix was evaluated in comparison with a commercially available real-time RPA workflow using identical target sequences and template inputs. Real-time fluorescence measurements were performed to compare amplification results and time-to-result across a dilution series ranging from 10^4 to 10^2 target copies per reaction.



Comparative real-time amplification performance of the biotechrabbit™ 2X RPA exo Master Mix and a commercially available real-time RPA workflow. Amplification reactions containing 10^4 , 10^3 and 10^2 target copies per reaction were monitored by real-time fluorescence detection. Differences in amplification were observed across all target dilutions, with the biotechrabbit™ 2X RPA exo Master Mix producing earlier detectable amplification signals and shorter time-to-threshold values.

Convenient master mixes and single enzymes

The biotechrabbit™ RPA Master Mixes provide flexible solutions for DNA and RNA amplification using endpoint and real-time detection formats. All formulations are supplied in a convenient lyophilized format and are available in different pack sizes to support assay development, routine testing and high-throughput applications.

Product Code	Name	Reactions
BC1600100	2X RPA Basic Master Mix	8 reactions
BC1600101	2X RPA Basic Master Mix	96 reactions
BC1600200	2X RPA Exo Master Mix	8 reactions
BC1600201	2X RPA Exo Master Mix	96 reactions
BC1600300	2X RT-RPA Basic Master Mix	8 reactions
BC1600301	2X RT-RPA Basic Master Mix	96 reactions
BC1600400	2X RT-RPA Exo Master Mix	8 reactions
BC1600401	2X RT-RPA Exo Master Mix	96 reactions

In addition to RPA Master Mixes, biotechrabbit™ offers specialized lyophilization-ready enzymes and proteins for custom assay development, molecular diagnostics and reagent manufacturing. Bulk quantities, custom formulations and LYO-ready products are available to support tailored workflow and product development needs.

Product Code	Name	Quantity
BR1500201	LYO-ready T6 UvsX DNA Recombinase, 5 mg/ml	100 µg
BR1500202	LYO-ready T6 UvsX DNA Recombinase, 5 mg/ml	500 µg
BR1500301	LYO-ready T4 UvsY Protein, 2 mg/ml	100 µg
BR1500302	LYO-ready T4 UvsY Protein, 2 mg/ml	500 µg
BR1500101	LYO-ready Exonuclease III, 100 U/µl	10,000 U
BR1500102	LYO-ready Exonuclease III, 100 U/µl	25,000 U
BR1500103	LYO-ready Exonuclease III, 100 U/µl	100,000 U
BR1500401	LYO-ready RB69 Gene 32 Protein, 10 mg/ml	500 µg
BR1500402	LYO-ready RB69 Gene 32 Protein, 10 mg/ml	1,000 µg
BR1500501	LYO-ready T4 Gene 32 Protein, 10 mg/ml	500 µg
BR1500502	LYO-ready T4 Gene 32 Protein, 10 mg/ml	1,000 µg

biotechrabbit Product Portfolio

High-quality reagents for molecular biology

In addition to RPA technologies, biotechrabbit™ offers a broad portfolio of molecular biology reagents supporting nucleic acid amplification, reverse transcription, protein production and molecular diagnostics workflows.

REAL-TIME PCR

CAPITAL™ qPCR Probe Mix
CAPITAL™ qPCR Green Mix
CAPITAL™ qRT-PCR Probe Mix
CAPITAL™ qRT-PCR Green Mix
UniFi™ qRT-PCR Probe Master Mix

PCR & AMPLIFICATION

Taq / Hot Start Polymerases
HiFi DNA Polymerase
Long Range PCR Mixes
Direct PCR Solutions
Lyophilized Master Mixes

REVERSE TRANSCRIPTION

Reverse Transcriptase
One-Step RT-PCR Mixes
cDNA Synthesis Kits

ENZYMES & PROTEINS

T7 RNA Polymerase
T4 DNA Ligase
RNase Inhibitor
Heat-Labile UDG
Proteinase K
Antibodies & Affinity Reagents

SAMPLE PREPARATION & ANALYSIS

Nucleic Acid Purification Kits
DNA Ladders
RNA Ladders
Nucleotide Mixes
Electrophoresis Reagents

COMING SOON

Bsu Polymerase
Creatine Kinase
Lateral Flow Assay Kit



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