Primer Design Ltd

R00542

Human Immunodeficiency Virus Type 2

Kit version: 2

Target region:
5' Untranslated Region (5' UTR)

genesig® Easy Kit

for use on the genesig® q16
50 reactions

GENESIG
Kits by Primerdesign

For general laboratory and research use only

Introduction to Human Immunodeficiency Virus Type 2

Human immunodeficiency virus (commonly known as HIV, and formerly known as HTLV-III and lymphadenopathy-associated virus) is a retrovirus that is the cause of the disease known as AIDS (acquired immunodeficiency syndrome), a syndrome where the immune system begins to fail, leading to many life-threatening opportunistic infections.

HIV is transmitted through direct contact of a mucous membrane with a bodily fluid containing HIV, such as blood, semen, vaginal fluid, pre-seminal fluid or breast milk. This transmission can come in the form of penetrative (anal or vaginal) sex, oral sex, blood transfusion, contaminated needles and exchange between mother and infant during pregnancy, childbirth, or breastfeeding.

Since the start of the epidemic in 1981, AIDS has been responsible for the deaths of over 40 million people, making it one of the most devastating pandemics in recorded history. According to the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO), an estimated 1.3 million people were newly infected with HIV in 2022. Of the estimated 624,000 people who died of AIDS-related illnesses in 2022, approximately 16 per cent of them were under 20 years of age. An estimated 130,000 children aged 0-9 contracted HIV in 2022, bringing the total number of children in this age group living with HIV to 930,000. Almost 85% of these children reside in sub-Saharan Africa. Every week, 4,000 adolescent girls and young women aged 15–24 years became infected with HIV globally in 2022. Almost 80% of these infections occurred in sub-Saharan Africa. To reduce HIV-related mortality and morbidity among these highly vulnerable populations, early testing and treatment is essential.

Two species of HIV infect humans: HIV-1 and HIV-2. HIV-1 is hypothesized to have originated in southern Cameroon after jumping from wild chimpanzees (Pan troglodytes troglodytes) to humans during the twentieth century. HIV-2 is hypothesized to have originated from the Sooty Mangabey (Cercocebus atys), an Old World monkey of Guinea-Bissau, Gabon, and Cameroon. HIV-1 is more virulent, more easily transmitted and is the cause of the majority of HIV infections globally, while HIV-2 is less easily transmitted and is largely confined to West Africa.

Specificity

The genesig®Easy Kit for Human Immunodeficiency Virus Type 2 (HIV2) is designed for the in vitro detection of Human Immunodeficiency Virus Type 2 genomes. The kit is designed to have a broad detection profile. Specifically, the primers will detect over 95% of sequences available on the Los Alamos National Laboratory database at the time of last review.

This kit is predicted to cross react with Simian immunodeficiency virus.

The dynamics of genetic variation mean that new sequence information may become available after the most recent review. If you require further information or have a specific question about the detection profile of this kit then please send an e-mail to techsupport@primerdesign.co.uk and our team will answer your question.

genesig® Easy: at a glance guide

For each RNA test

Component	Volume	Lab-in-a-box pipette	
HIV2_v2.0 primer/probe mix	5 µl		
Your RNA sample	5 µl		
oasig® OneStep Master Mix	10 µl		

For each positive control

Component	Volume	Lab-in-a-box pipette	
HIV2_v2.0 primer/probe mix	5 µl		
Positive control template	5 µl		
oasig® OneStep Master Mix	10 µl		

For each negative control

Component	Volume	Lab-in-a-box pipette	
HIV2_v2.0 primer/probe mix	5 µl		
RNase/DNase free water	5 µl		
oasig® OneStep Master Mix	10 µl		

Kit Contents

• 1x HIV2_v2.0 primer/probe mix (BROWN)

• 1x Lyophilised oasig® OneStep Master Mix (RED lid)

• 1x oasig® OneStep Master Mix resuspension buffer (BLUE lid)

• 1x HIV2_v2.0 positive control template (RED lid)

• 1x Internal extraction control RNA template (BLUE lid)

• 1x RNase/DNase free water (WHITE lid)

• 2x Template preparation buffer (YELLOW lid)

• 54x genesig® q16 reaction tubes

Reagents and equipment to be supplied by the user

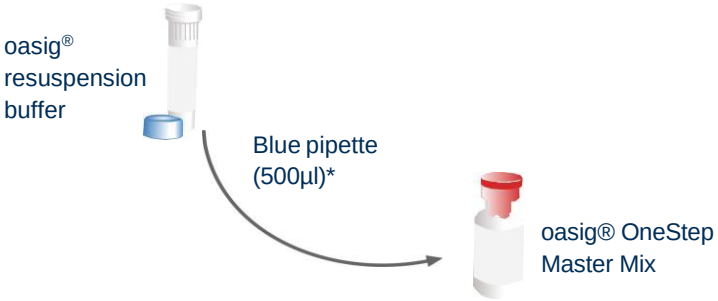
genesig® q16 instrument

genesig® Easy Extraction Kit
This kit is designed to work well with all processes that yield high quality RNA and DNA but the genesig® Easy extraction method is recommended for ease of use.

genesig® Lab-In-A-Box
The genesig® Lab-In-A-Box contains all of the pipettes, tips and racks that you will need to use a genesig® Easy kit. Alternatively, if you already have these components and equipment these can be used instead.

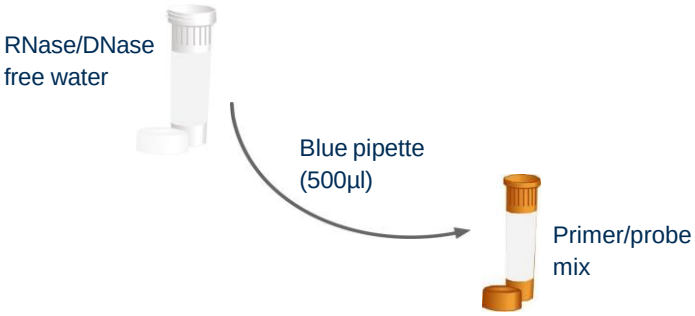
Step-by-step guide

1. Resuspend the test components



Use the blue pipette to transfer 500µl* of the oasig® OneStep Master Mix resuspension buffer into the tube of lyophilised oasig® OneStep Master Mix and mix well by gently swirling.

*Transferring 525µl of the oasig® OneStep Master Mix resuspension buffer to your oasig® OneStep Master Mix (instead of the 500µl recommended above) will enable you to take full advantage of the 50 reactions by accounting for volume losses during pipetting. In order to do so with the Lab-in-a-box fixed volume pipettes use 1x blue, 2x red and 1x grey pipettes to make the total volume. Please be assured that this will not adversely affect the efficiency of the test.



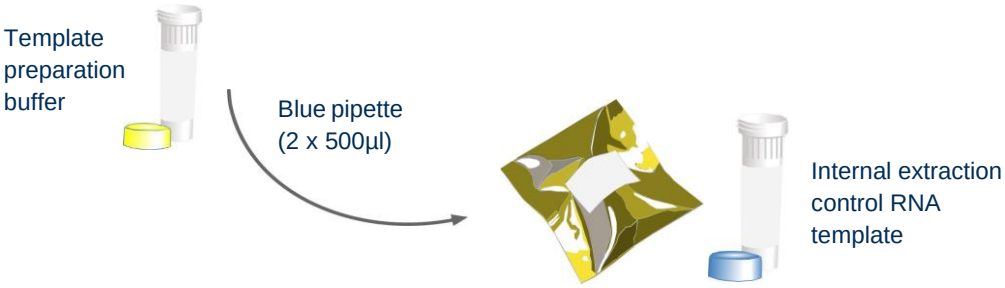
Then use the blue pipette to transfer 500µl of water into the brown tube labelled HIV2_v2.0 primer/probe mix. Cap and shake tube to mix. A thorough shake is essential to ensure that all components are resuspended. **Failure to mix well can produce poor kit performance.**

These components are now ready to use.
Store them in the freezer from hereon.

Top tip

- Ensure that the primer/probe mix is mixed thoroughly before each use by shaking and pipetting up and down 10 times.
- Once resuspended do not expose the genesig® Easy kit to temperatures above -20°C for longer than 30 minutes at a time.

2. Internal extraction control template



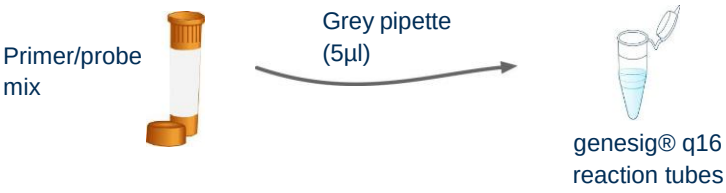
Use the blue pipette to transfer 1000µl (2 x 500µl) of template preparation buffer into the Internal Extraction Control RNA template tube. Cap and shake the tube to mix.

The Internal Extraction Control RNA template should be added to your biological sample at the beginning of the RNA extraction process. It is extracted along with the RNA from your target of interest. The q16 will detect the presence of this Internal Extraction Control RNA template at the same time as your target. This is the ideal way to show that your RNA extraction process has been successful.

If you are using an extraction kit:
Use the red pipette to transfer 10µl of Internal Extraction Control RNA template to your sample **after** the lysis buffer has been added, then follow the rest of the extraction protocol.

If using samples that have already been extracted:
Use the grey pipette to transfer 5µl of Internal Extraction Control RNA template to your extracted sample.

3. Add primer/probe mix to all reaction tubes

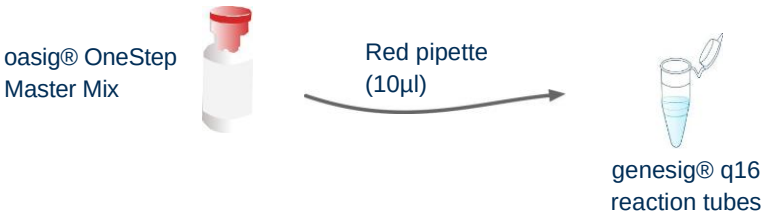


For every reaction to be run, use the grey pipette to add 5µl of your HIV2_v2.0 primers/probe mix to every genesig® q16 reaction tube.

Top tip

- Always pipette the primer/probe mix directly into the bottom of the tube.
- You can label the tube lids to aid your reaction setup but avoid labelling tube sides.

4. Add Master Mix to all reaction tubes



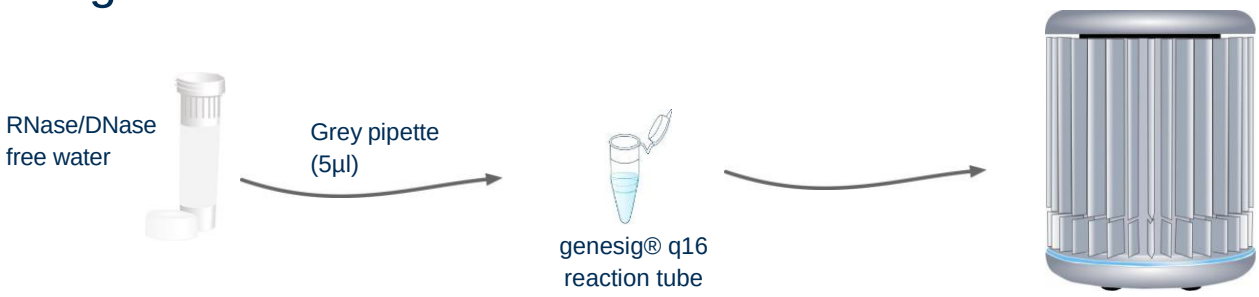
For every reaction to be run, use the red pipette to add 10µl of the oasig® OneStep Master Mix to the reaction tubes containing primer/probe mix.

Move swiftly to begin your q16 run, as any delay after the oasig® OneStep Master Mix has been added can affect the sensitivity of your test.

Top tip

- Always add the oasig® OneStep Master Mix to the side of the tube to reduce the introduction of bubbles.

5. Negative control



For each test you will require a negative control. Instead of RNA, water is used. The negative control sample should give a negative test result and thereby prove that any positive samples really are positive, and not tested positive due to contamination.

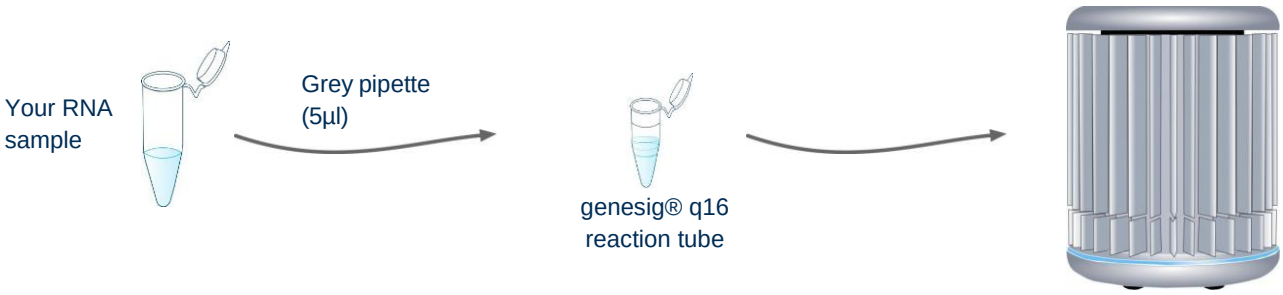
To create a negative control reaction simply use the grey pipette to add 5µl of the water to the required reaction tube (already containing primer/probe mix and oasig® OneStep Master Mix). Close this tube after adding the water.

Because some genesig® kit targets are common in the environment you may occasionally see a "late" signal in the negative control. The q16 software will take this into account accordingly.

Top tip

- Always add the water to the side of the tube to reduce the introduction of bubbles.

6. Set up a test

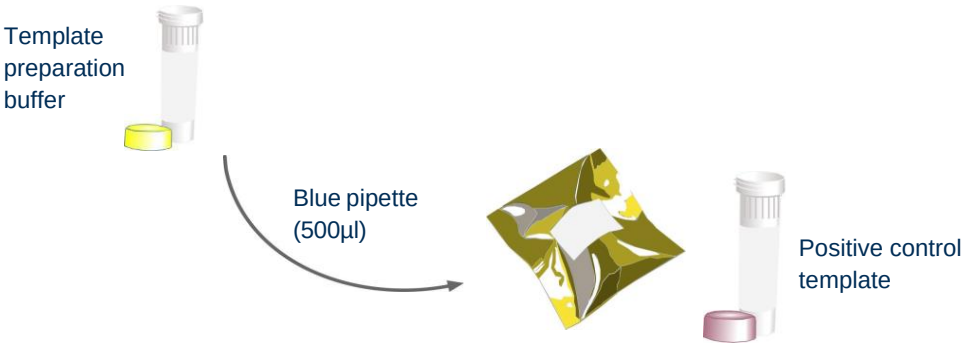


For each sample you wish to analyse, use the grey pipette to add 5µl of your RNA sample to the required reaction tube (already containing primer/probe mix and oasig® OneStep Master Mix). Close these tubes after adding the sample. Always change pipette tips between samples.

Top tip

- Always add the RNA sample to the side of the tube to reduce the introduction of bubbles.

7. Positive control

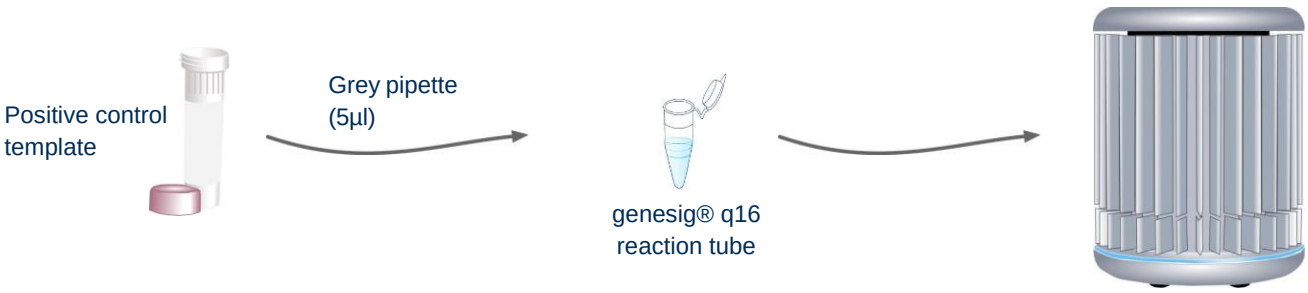


Use the blue pipette to transfer 500µl of template preparation buffer into the positive control template tube. Cap and shake tube to mix.

Each time you run a test you will require a positive control. It serves two purposes:

1. It will always test positive so it shows that everything is working as it should be.
2. The q16 software knows how many copies of the target are present in the positive control. Therefore, it can automatically compare your sample of interest with the positive control to calculate the amount of target RNA in your sample.

To create a positive control reaction simply use 5µl of the positive control template instead of your RNA sample and add this to the required reaction tube (already containing primer/probe mix and oasig® OneStep Master Mix). Close this tube after adding the positive control template.



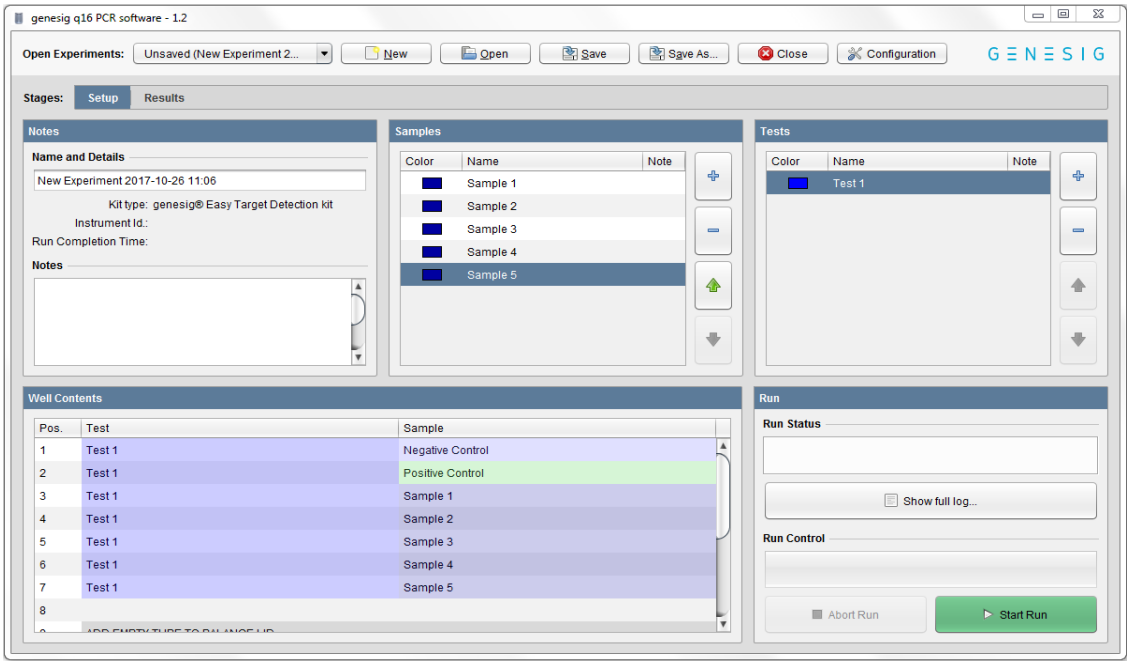
Take great care when setting up your positive control. The positive control template has the potential to give you a false positive signal in your other samples. Set positive controls up last after all other sample tubes are closed. Always change pipette tips between samples. You may even choose to set up positive controls in a separate room.

Top tip

- Always add the positive control template to the side of the tube to reduce the introduction of bubbles.

8. Running the test

Select the genesig® Easy Target Detection Kit module within the software. Place the reaction tubes into the correct positions in your q16 as defined by the software, this may include positioning of empty tubes to ensure that the q16 lid is balanced. The run can then be started.



Top tip

- Before loading tubes into the q16, check for bubbles! Flick the bottom of the tubes to remove any bubbles that may have formed during the test setup.
- Apply centrifugal force with a sharp wrist action to ensure all solution is at the bottom of the reaction tube.

What do my results mean?

Analysis of your data is carried out automatically by the genesig® q16 software. The following information is designed to help you fully understand a result or to troubleshoot:

“Positive”

Explanation

Your sample has produced a positive result. Your target of interest is present and you can use the reported quantity.

“Negative”

Explanation

Your sample has produced a negative result. The target is not present in your sample.

“Test contaminated”

Explanation

The Negative Control should be completely free of any DNA/RNA. If you see this error message it means that at some point during the setup, the Negative Control has been contaminated with DNA/RNA and has given a positive signal. This contamination has invalidated the test. The Positive Control and your test samples are both possible sources of contaminating DNA/RNA. The genesig® q16 reaction tubes from previous runs will also contain very high amounts of DNA so it is important that these are carefully disposed of after the run is completed and NEVER OPENED. It may be the case that your kits have become contaminated which will lead to the same problem occurring repeatedly.

Solutions

1. Clean your working area using a commercial DNA remover solution to ensure the area is DNA free at the start of your run and re-run the test.
2. If the problem persists, then the kit has become contaminated, and it will have to be discarded and replaced with a new kit. When you open the new kit, run a simple test to show that changing the kit has solved the problem. Prepare a test which includes only the Positive Control, the Negative Control and one ‘mock sample’. For the ‘mock sample’ add internal control template instead of any sample RNA. The result for the Negative Control and the mock sample should be negative indicating that contamination is no longer present.

Preventive action

An ideal lab set-up has a 'Clean area' where the test reagents are prepared and a 'sample area' where DNA/RNA samples and the Positive Control template are handled. The best workflow involves setting up all the test components (excluding the positive control template) in the clean area and then moving the tests to the sample area for sample and Positive Control addition. If this method is followed, then the kit components are always kept away from possible sources of contamination. For extra security the Negative Control can be completely prepared and sealed in the clean area. All work areas should be decontaminated regularly with DNA remover.

"Sample preparation failed"

Explanation

The test has failed because the quality of the sample was not high enough. The Internal Extraction Control component identifies whether the sample has been prepared correctly and is of suitable quality. This error message means that this quality control test has failed, and the sample quality is not high enough for analysis.

Solutions

1. Check the sample preparation protocol for any user errors then repeat.
2. Poor quality samples can result from overloading the sample preparation protocol with too much starting material. Try reducing the amount of starting material then repeat.
3. Failing to add the Internal Extraction Control RNA to your sample during the sample preparation protocol can also lead to a reported result of "sample preparation failed". Ensure that this step has not been overlooked or forgotten. If your samples are derived from an archive store or from a process separate from your genesig® Easy extraction kit; you must add 5µl of Internal Extraction Control RNA template into each 0.5ml of your sample to make it suitable for use on the q16.

"Positive result, poor quality sample"

Explanation

The test is positive so if you are only interested in obtaining a 'present or absent' answer for your sample then your result is reliable. However, the test contains an Internal Extraction Control component that identifies if the sample is of high quality. This quality control test has failed and the sample is therefore not of high enough quality to accurately calculate the exact copy number of RNA present. If you require quantitative information for your sample then proceed with the solutions mentioned above under "Sample preparation failed".

“Test failed”

Explanation

The test has failed because the Positive Control has not worked. The Positive Control is present to show that all aspects of the test are working correctly together. When this control test fails, the test as a whole is invalidated. This finding indicates that a problem has occurred in the reaction set-up part of the experiment and has nothing to do with sample preparation.

Solutions

1. Check the entire workflow and test set-up to look for any user errors, then repeat the test e.g., have the right colour pipettes and solutions been used with the correct tubes?
2. Ensure the positive and negative controls are inserted into the correct wells of your q16.
3. A component of the test may have ‘gone off’ due to handing errors, incorrect storage or exceeding the shelf life. When you open a new kit, run a simple test to show that changing the kit has solved the problem. Prepare a test which includes only the Positive Control, the Negative Control and one ‘mock sample’. For the ‘mock sample’ add internal control template instead of any sample RNA. If the Positive Control works, the mock sample will now be called as a negative result.

“Test failed and is contaminated”

Explanation

The Positive Control is indicating test failure, and the Negative Control is indicating test contamination. Please read the “Test Failed” and “Test contamination” sections of this technical support handbook for a further explanation.

Solution

For appropriate solutions, read both the “Test failed” and “Test contaminated” sections of this handbook.

Kit storage and stability

This kit is stable for shipping at ambient temperature but should be stored at -20°C upon arrival. Once the lyophilised components have been resuspended, they should not be exposed to temperatures above -20°C for longer than 30 minutes at a time and unnecessary repeated freeze/thawing should be avoided. The kit is stable for six months from the date of resuspension under these circumstances. Primer Design Ltd does not recommend using the kit after the expiry date stated on the pack.

Suitable sample material

This kit can be used with all types of samples from various origins. Please ensure that the extracted nucleic acid samples are suitable in terms of purity, concentration, and RNA integrity.

Dynamic range of test

Under optimal PCR conditions the kit can achieve priming efficiencies between 90-110% and detect less than 100 copies of target template.

Notices and disclaimers

This product is developed, designed and sold for research purposes only. It is not intended for human diagnostic or drug purposes or to be administered to humans unless clearly expressed for that purpose by the Food and Drug Administration in the USA or the appropriate regulatory authorities in the country of use. During the warranty period Primer Design Ltd genesig® detection kits allow precise and reproducible data recovery combined with excellent sensitivity. For data obtained by violation to the general GLP guidelines and the manufacturer's recommendations the right to claim under guarantee is expired. PCR is a proprietary technology covered by several US and foreign patents. These patents are owned by Roche Molecular Systems Inc. and have been sub-licensed by PE Corporation in certain fields. Depending on your specific application you may need a license from Roche or PE to practice PCR. Additional information on purchasing licenses to practice the PCR process may be obtained by contacting the Director of Licensing at Roche Molecular Systems, 1145 Atlantic Avenue, Alameda, CA 94501 or Applied Biosystems business group of the Applera Corporation, 850 Lincoln Centre Drive, Foster City, CA 94404. In addition, the 5' nuclease assay and other homogeneous amplification methods used in connection with the PCR process may be covered by U. S. Patents 5,210,015 and 5,487,972, owned by Roche Molecular Systems, Inc, and by U.S. Patent 5,538,848, owned by The Perkin-Elmer Corporation.

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