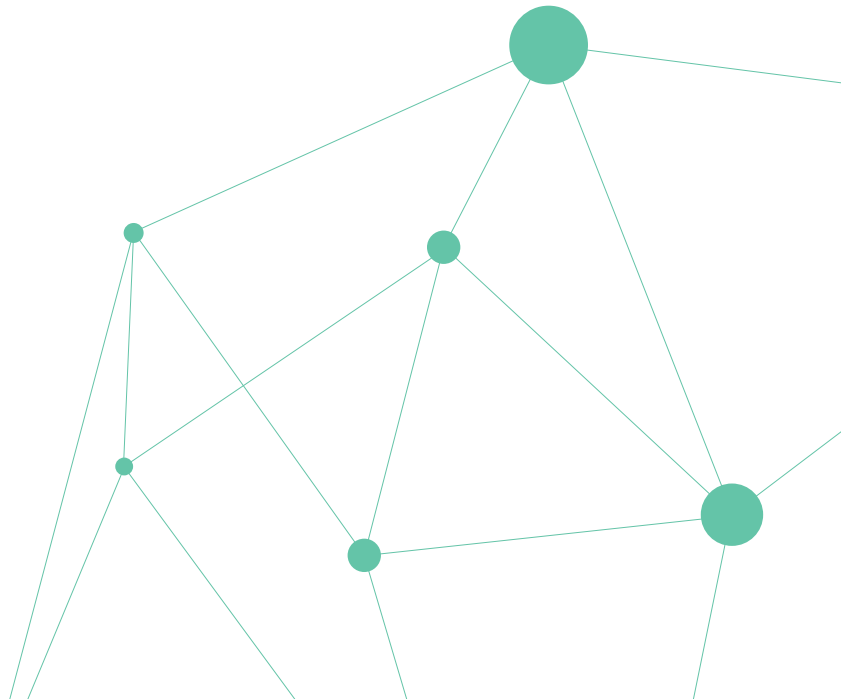
C DNA/RNA Amplification



Selection Guide

Overview

AccuPower® PreMix series is a world-renowned patented technology that allows you to experiment at an economical price and in a convenient way. RNA amplification kit for performing conventional PCR and Real-Time PCR that can synthesize cDNA through DNA amplification and reverse transcription provides total solution for life science research.

AccuPower® PreMix series is a product that is vacuum dried once by mixing the components necessary for PCR such as enzyme, dNTPs and reaction buffer. Researchers can experiment conveniently and accurately by adding only template DNA, primers and D.W.

All products of *AccuPower*® PreMix series have stabilizer added to PCR reaction mixture so that it can be stably tested at room temperature and minimize the trouble of experimenting on ice. When stored at room temperature (25℃), the activity remains stable for one month and frozen for two years. In addition, since it contains the tracking dye and specific gravity increaser necessary for electrophoresis, the reaction solution can be used as it is for agarose gel electrophoresis. Mass production with one-batch system, quality inspection by strict ISO 9001 quality standard ensures the best test result and high reproducibility.

Selection Guide of *AccuPower*® Series

○ DNA Amplification

Products	Applications								
	Standard PCR	HotStart PCR	Prevent Carryover Contamination	PCR for Gene Cloning	PCR for TA Cloning	High Fidelity PCR	Long Range PCR	GC Rich PCR	Multiplex PCR
AccuPower® PCR	√				√				
AccuPower® PCR (with UDG)	√		√		√				
AccuPower® *Taq* PCR	√				√				
AccuPower® HotStart PCR	√	√			√			√	
AccuPower® HotStart PCR (with UDG)	√	√	√		√			√	
AccuPower® *GoldHotStart Taq* PCR	√	√			√			√	
AccuPower® *PyroHotStart Taq* PCR	√	√			√			√	
AccuPower® HotStart *Pfu* PCR	√	√		√		√		√	
AccuPower® *ProFi Taq* PCR	√			√	√	√	√		
AccuPower® *Pfu* PCR	√			√		√			
AccuPower® Multiplex PCR	√	√			√				√
AccuPower® Gold Multiplex PCR	√	√			√				√

Selection Guide

RNA Amplification

cDNA Synthesis Kits

Products	Applications			
	Standard RT	High Efficiency RT	RT of Secondary Structured RNA	RT of Long kb RNA
AccuPower® RT	√			
AccuPower® *CycleScript*™ RT	√	√	√	
AccuPower® *RocketScript*™ RT	√		√	
AccuPower® *RocketScript*™ Cycle RT	√	√	√	
AccuPower® *RocketScript*™ RT (RNase H Minus)	√	√	√	√

One-step RT-PCR Kits

Products	Applications					
	Standard RT-PCR	RT-PCR of Secondary Structured RNA	High Specificity & Sensitivity RT-PCR	Multiplex RT-PCR	Prevent Carryover Contamination	RT-PCR of Long kb RNA
AccuPower® RT-PCR	√					
AccuPower® *RocketScript*™ RT-PCR	√	√				
AccuPower® *RocketScript*™ RT-PCR (RNase H Minus)	√	√				√
AccuPower® *Dual-HotStart*™ RT-PCR	√	√	√			
AccuPower® *Dual-HotStart*™ RT-PCR (with UDG)	√	√	√		√	
AccuPower® RocketPlex RT-PCR	√	√		√		

Real-Time PCR

Products	Applications				
	HotStart RT	HotStart qPCR	qPCR (Intercalating dye)	qPCR (Hydrolysis Probe)	Prevent Carryover Contamination
AccuPower® *GreenStar*™ qPCR		√	√		
AccuPower® *DualStar*™ qPCR		√		√	
AccuPower® Plus *DualStar*™ qPCR		√		√	
AccuPower® Plus *DualStar*™ qPCR (with UDG)		√		√	√
AccuPower® *GreenStar*™ RT-qPCR	√	√	√		
AccuPower® *Dual-HotStart*™ RT-qPCR	√	√		√	

Specifications of *AccuPower*® PreMix Series

PCR & One-step RT-PCR

Products	Product Size	5′ → 3′ Exonuclease	3′ → 5′ Exonuclease	Specificity	Fidelity	GC-rich	Leaves 3′-A
PCR	≤ 10 kb	No	No	●○○	●○○	●○○	Yes
PCR (with UDG)	≤ 10 kb	No	No	●○○	●○○	●○○	Yes
Taq PCR	≤ 10 kb	Yes	No	●○○	●○○	●○○	Yes
Pfu PCR	≤ 15 kb	No	Yes	●○○	●●●●○	●○○	No
ProFi Taq PCR	≤ 30 kb	Yes	Yes	●●●○	●●●●○	●○○	Yes
HotStart PCR	≤ 12 kb	No	No	●●●○	●○○	●●●○	Yes
HotStart PCR (with UDG)	≤ 12 kb	No	No	●●●○	●○○	●●●○	Yes
GoldHotStart Taq PCR	≤ 5 kb	Yes	No	●●●○	●○○	●●●●○	Yes
PyroHotStart Taq PCR	≤ 5 kb	Yes	No	●●●○	●○○	●●●○	Yes
HotStart *Pfu* PCR	≤ 5 kb	No	Yes	●●●○	●●●●○	●○○	No
Multiplex PCR	≤ 1 kb	No	No	●●●○	●○○	●○○	Yes
Gold Multiplex PCR	≤ 1 kb	No	No	●●●○	●○○	●○○	Yes
RT-PCR	≤ 5 kb	No	No	-	-	●○○	Yes
RocketScript™ RT-PCR	≤ 6 kb	No	No	-	-	●○○	Yes
RocketScript™ RT-PCR (RNase H Minus)	≤ 12.5 kb	Yes	No	-	-	●○○	Yes
Dual-HotStart™ RT-PCR	≤ 3 kb	Yes	No	●●●●○	-	●●●○	Yes
Dual-HotStart™ RT-PCR (with UDG)	≤ 3 kb	Yes	No	●●●●○	-	●●●○	Yes
RocketPlex RT-PCR	≤ 1 kb	No	No	●●●○	-	●○○	Yes

Reverse Transcription

Products	Product Size	RNase H Activity	DNase Activity	RNase Activity	GC-rich
RT	≤ 9 kb	Yes	No	No	●○○
CycleScript™ RT	≤ 9 kb	Yes	No	No	●○○
RocketScript™ RT	≤ 10 kb	Yes	No	No	●○○
RocketScript™ Cycle RT	≤ 10 kb	Yes	No	No	●○○
RocketScript™ RT (RNase H Minus)	≤ 12.5 kb	No	No	No	●●●○

qPCR & One-step RT-qPCR

Products	5′ → 3′ Exonuclease	3′ → 5′ Exonuclease	Specificity	GC-rich	Leaves 3′-A
GreenStar™ qPCR	No	No	●●●○	●●●○	Yes
DualStar™ qPCR	Yes	No	●●●○	●●●○	Yes
Plus *DualStar*™ qPCR	Yes	No	●●●○	●●●○	Yes
Plus *DualStar*™ qPCR (with UDG)	Yes	No	●●●○	●●●○	Yes
GreenStar™ RT-qPCR	Yes	No	●●●○	●●●○	Yes
Dual-HotStart™ RT-qPCR	Yes	No	●●●●○	●●●○	Yes

Selection Guide

Selection Guide of Enzymes

Products		Applications								
		PCR								
		Standard PCR	HotStart PCR	PCR for Gene Cloning	PCR for TA Cloning	High fidelity PCR	Long Range PCR	GC Rich PCR	Multiplex PCR	Micro-biome
DNA Polymerase	*Top*	√			√					
	Taq	√			√					
	Pfu	√		√		√				
	ProFi Taq	√		√	√	√	√			
	MicroBiome Assay *Taq*	√			√					√
HotStart DNA Polymerase	*Top*	√	√		√			√	√	
	Taq	√	√		√			√	√	

Products		RT			
		Standard RT	High Efficiency RT	Cyclic RT	Long range RT
Reverse Transcriptase	*M-MLV*	√			
	CycleScript™	√	√	√	
	RocketScript™	√	√	√	
	RocketScript™ RNase H Minus	√	√	√	√

Specifications of Enzymes

Products	Product Size	5′ → 3′ Exonuclease	3′ → 5′ Exonuclease	Specificity	Fidelity	GC-rich	Leaves 3'-A
Top DNA Polymerase	≤ 10 kb	No	No	●●●	●●●	●●●	Yes
Taq DNA Polymerase	≤ 10 kb	Yes	No	●●●	●●●	●●●	Yes
HotStart DNA Polymerase	≤ 12 kb	No	No	●●●●	●●●	●●●●	Yes
HotStart *Taq* DNA Polymerase	≤ 12 kb	Yes	No	●●●●	●●●	●●●●	Yes
ProFi Taq DNA Polymerase	≤ 30 kb	Yes	Yes	●●●●	●●●●	●●●●	Yes
Pfu DNA Polymerase	≤ 20 kb	No	Yes	●●●	●●●●●	●●	No
MicroBiome Assay *Taq* DNA Polymerase	≤ 8 kb	Yes	No	●●●	●●●	●●●	Yes
M-MLV Reverse Transcriptase	≤ 9 kb	-	-	-	-	●●●	-
CycleScript™ Reverse Transcriptase	≤ 9 kb	-	-	-	-	●●●	-
RocketScript™ Reverse Transcriptase	≤ 10 kb	-	-	-	-	●●●	-
RocketScript™ RTase RNase H Minus	≤ 12.5 kb	-	-	-	-	●●●	-

01. DNA Amplification

AccuPower® PCR PreMix & Master Mix

For Standard PCR, Dried-type Premix with *Top* DNA Polymerase

Description

AccuPower® PCR PreMix is Bioneer's patented technology, which is a vacuum-dried product containing the components required for PCR such as *Top* DNA polymerase, dNTPs, and reaction buffer. It is a groundbreaking product with stabilizing substances that keeps its activity stable for one month when stored at room temperature (25℃) and for two years when stored frozen.

Features and Benefits

- **Sensitivity**
  Sensitivity tests using both Lambda DNA and Human genomic DNA as template demonstrates equivalent or better sensitivity relative to competitor products.
- **Stability**
  AccuPower® PCR PreMix maintains its stability long-term storage due to Bioneer's unique stabilizer. *AccuPower*® PCR PreMix maintains full activity after treatment at 95℃ for 90 min, whereas standard solution-type will lose at least 1/2 their activity after this heat treatment. From this, stabilizers in *AccuPower*® increase the 1/2 life of the enzyme which can result in better yield in addition to significantly extending the life of the product.
- **Ease-of-use**
  All reaction components required for PCR, including DNA polymerase and dNTPs are contained within each tube in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and distilled water. Reagents necessary for loading agarose gels for electrophoresis are already present in the reaction, and there is no need to add loading dye after PCR is completed.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Conventional PCR
- Primer extension
- TA cloning
- Gene sequencing

Specifications

- Enzyme: *Top* DNA polymerase
- 5′ → 3′ exonuclease activity: No
- 3′ → 5′ exonuclease activity: No
- 3′ – A overhang: Yes
- Fragment size: ~ 10 kb

Storage Temperature

-20℃

Experimental Data

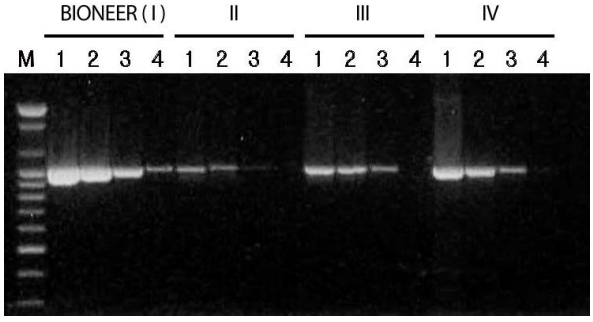


Figure 1. Comparison of sensitivity test for PCR PreMix and other companies' products using serial diluted human gDNA.

Target gene: human insulin receptor gene
I: *AccuPower*® PCR PreMix
II: A company's *Taq* DNA polymerase
III: B company's *Taq* DNA polymerase
IV: C company's PCR PreMix
Lane 1: Human gDNA 10 ng
Lane 2: Human gDNA 1 ng
Lane 3: Human gDNA 100 pg
Lane 4: Human gDNA 10 pg
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Experimental Data

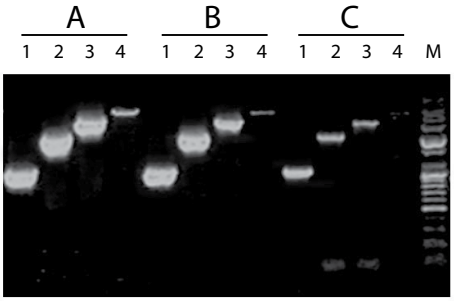


Figure 2. Comparison of processivity test for *AccuPower*® PCR PreMix and other suppliers' products using lambda DNA.

Rxn. condition: 95℃ 5 min, [94℃ 30 sec, 57℃ 30 sec] (30 cycles), 72℃ 5 min.
A: *AccuPower*® PCR PreMix
B: S company's *Taq* premix type
C: T company's *Taq* premix type
Lane 1: 1 kb fragment of Lambda DNA
Lane 2: 2 kb fragment of Lambda DNA
Lane 3: 3 kb fragment of Lambda DNA
Lane 4: 4 kb fragment of Lambda DNA
M: 100 bp Plus DNA Ladder (Cat. No. D-1035, Bioneer)

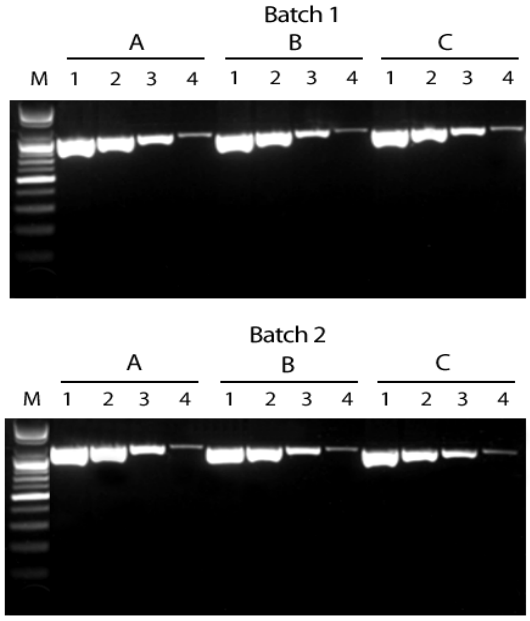


Figure 3. Comparison of thermostability of *AccuPower*® PCR PreMix.

AccuPower® PCR PreMix is incubated at 95℃ with various time.
A: 30 min, B: 60 min, C: 90 min
Lane 1: Human genomic DNA 10 ng
Lane 2: Human genomic DNA 1 ng
Lane 3: Human genomic DNA 100 pg
Lane 4: Human genomic DNA 10 pg
M: 100 bp Plus DNA Ladder (Cat. No. D-1035, Bioneer)

Ordering Information

Cat. No.	Product Description			
K-2011	*AccuPower*® PCR PreMix	0.5 ml thin-wall microtube	100 tubes	50 µl/rxn
K-2012		0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-2013				50 µl/rxn
K-2016			480 tubes	20 µl/rxn
K-2037				20 µl/rxn (-dye)
K-2017				50 µl/rxn
K-2260-1		thin-wall 96-well flat plate		10 µl/rxn
K-2260-4				20 µl/rxn
K-2260-2		thin-wall 96-well full-skirted plate		10 µl/rxn
K-2260-5				20 µl/rxn
K-2260-3		thin-wall 96-well semi-skirted plate		10 µl/rxn
K-2260-6				20 µl/rxn
K-2080-1		thin-wall 384-well full-skirted plate		5 µl/rxn
K-2080-2				10 µl/rxn
K-2080-3				20 µl/rxn
K-2018	*AccuPower*® PCR MasterMix	1 ml of 2X Master mix solution		1 ml x 1 tube
K-2018-1		10 ml of 2X Master mix solution		1 ml x 10 tubes

AccuPower® PCR PreMix (with UDG)

For Standard PCR, Dried-type Premix with *Top* DNA Polymerase/ Prevention of Carryover Contamination

Description

AccuPower® PCR PreMix (with UDG) is a product that minimizes carryover contamination that can cause serious problems in PCR reactions during clinical diagnosis or testing. PCR is one of the sensitive and rapid assays, but the problem of false positives is often caused by contamination of previously amplified PCR products. This product overcomes these problems by introducing the Uracil DNA Glycosylase system.

Features and Benefits

- **Prevention of carryover contamination**

  UDG and dUTP in the Master Mix prevent the re-amplification of carryover PCR products between reactions. dUTP ensures that any amplified DNA will contain uracil, while UDG removes uracil residues from single- or double-stranded DNA, preventing dU-containing DNA from serving as template in subsequent PCR reactions. Prior to PCR, a UDG incubation step (37℃, 2 min) cleaves uracil residues from any contaminating dU-containing DNA from previous PCR reactions. UDG is then inactivated by the high temperatures during normal PCR cycling, allowing the amplification of legitimate target sequences (Figure 1).

- **Ease-of-use**

  All reaction components required for PCR, including DNA polymerase and dNTPs are contained within each tube in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and distilled water. Reagents necessary for loading agarose gels for electrophoresis are already present in the reaction, and there is no need to add loading dye after PCR is completed.

- **Reproducibility**

  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Conventional PCR
- Primer extension
- TA cloning
- Gene sequencing
- Molecular diagnosis

Specifications

- Enzyme: *Top* DNA polymerase
- 5' → 3' exonuclease activity: No
- 3' → 5' exonuclease activity: No
- 3' – A overhang: Yes
- Fragment size: ~ 10 kb

Storage Temperature

-20℃

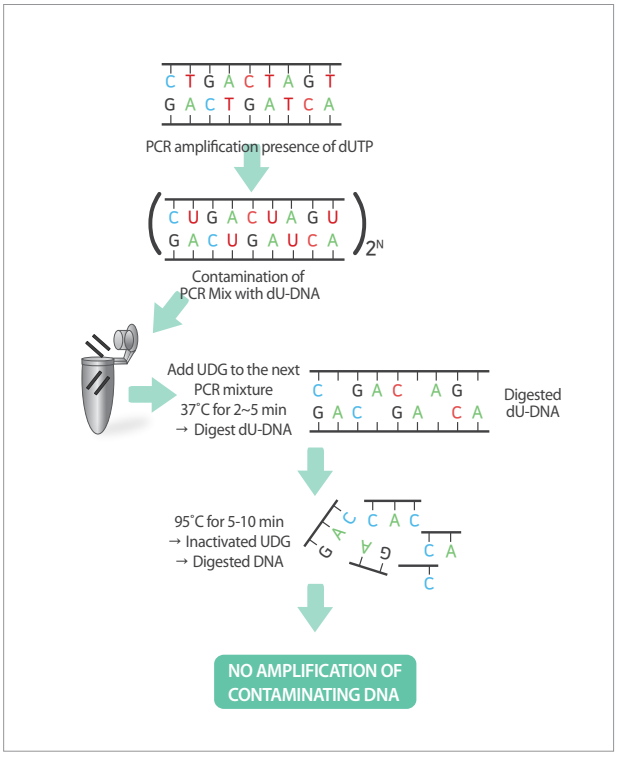


Figure 1. Prevention of carryover contamination.

Experimental Data

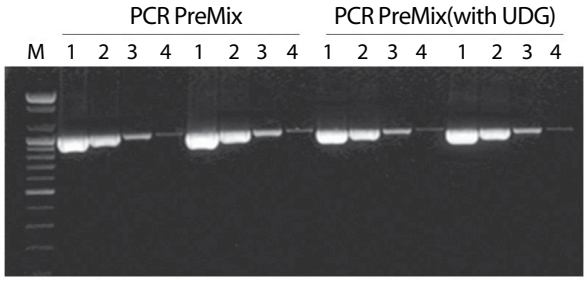


Figure 2. Comparison of sensitivity between *AccuPower*® PCR PreMix and *AccuPower*® PCR PreMix (with UDG).

Sensitivity test was operated using serial diluted human genomic DNA. Reaction mixture was incubated at 37℃ for 2 min followed by 95℃ for 5 min, 30 cycles of 20 sec at 95℃, 20 sec at 55℃, 30 sec at 72℃. *AccuPower*® PCR PreMix (with UDG) contains dUTP besides dATP, dGTP, dCTP and dTTP.
Lane 1: 10 ng of human genomic DNA
Lane 2: 1 ng of human genomic DNA
Lane 3: 100 pg of human genomic DNA
Lane 4: 10 pg of human genomic DNA
M: *AccuLadder*™ 100 bp DNA Size Marker (Cat. No. D-1030-1, Bioneer)

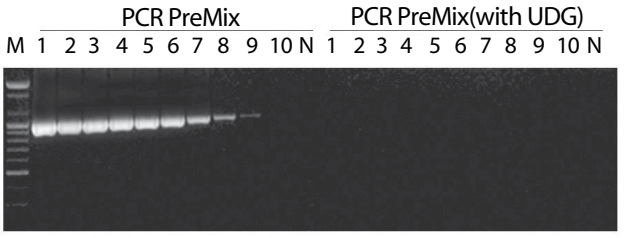


Figure 3. Efficiency of uracil DNA glycosylase using PCR products (including uracil base).

Efficiency test of uracil DNA glycosylase was operated using serial diluted PCR products including uracil base. *AccuPower*® PCR PreMix was also tested for negative control. Reaction mixture was incubated at 37℃ for 2 min, followed by 95℃ for 5 min, 30 cycles of 20 sec at 95℃, 20 sec at 55℃, 30 sec at 72℃. *AccuPower*® PCR PreMix (with UDG) contains dUTP besides dATP, dGTP, dCTP and dTTP.
Lane 1: 10^{11} copy Lane 2: 10^{10} copy Lane 3: 10^{9} copy
Lane 4: 10^{8} copy Lane 5: 10^{7} copy Lane 6: 10^{6} copy
Lane 7: 10^{5} copy Lane 8: 10^{4} copy Lane 9: 10^{3} copy
Lane 10: 10^{2} copy Lane N: No template control
M: *AccuLadder*™ 100 bp DNA Size Marker (Cat. No. D-1030-1, Bioneer)

Ordering Information

Cat. No.	Product Description		
K-2012-1	*AccuPower*® PCR PreMix (with UDG)	0.2 ml thin-wall tubes with attached cap, 20 µl/rxn	96 tubes
K-2016-1			480 tubes

AccuPower® *Taq* PCR PreMix & Master Mix

For Standard PCR, Dried-type Premix with *Taq* DNA Polymerase

Description

AccuPower® *Taq* PCR PreMix is a convenient vacuum-dried PCR master mix containing *Taq* DNA polymerase, dNTPs, reaction buffer, tracking dye, and patented stabilizer and is aliquoted into 8-strip PCR tubes (0.5 ml tubes, as well as 96 and 384 well plates are also available). The premix retains its activity for over a month at room temperature and is stable for two years in -20℃ freezer.

Features and Benefits

- **Sensitivity**
  Detects trace human gDNA targets with outstanding sensitivity and amplification efficiency.
- **Stability**
  AccuPower® *Taq* PCR PreMix is a product dried by adding a stabilizer to a PCR reaction mixture, which compensates for the disadvantages of solution type products that are less thermally stable. In addition, amplification efficiency is high even for repetitive cycles because enzyme activity is maintained stably even after heat treatment at 95℃ for 90 minutes.
- **Ease-of-use**
  All reaction components required for PCR, including DNA polymerase and dNTPs are contained within each tube in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and distilled water. Reagents necessary for loading agarose gels for electrophoresis are already present in the reaction, and there is no need to add loading dye after PCR is completed.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Conventional PCR
- Primer extension
- TA cloning
- Gene sequencing

Specifications

- Enzyme: *Taq* DNA polymerase
- 5' → 3' exonuclease activity: Yes
- 3' → 5' exonuclease activity: No
- 3' – A overhang: Yes
- Fragment size: ~ 10 kb

Storage Temperature

-20℃

Experimental Data

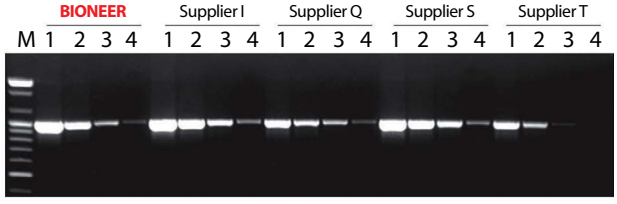


Figure 1. Comparison of PCR amplification quality between *AccuPower*® *Taq* PCR PreMix from Bioneer and other companys' *Taq* PCR master mix.

Target Gene: Human insulin receptor gene.
The cycling conditions for *AccuPower*® *Taq* PCR PreMix were 95℃ for 5 min, 30 cycles of 20 sec at 95℃, 20 sec at 55℃, and 30 sec at 72℃. PCR reactions using other companys' PCR master mix were performed according to each company's protocol.
Lane 1: 10 ng Human genomic DNA
Lane 2: 1 ng Human genomic DNA
Lane 3: 100 pg Human genomic DNA
Lane 4: 10 pg Human genomic DNA
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Experimental Data

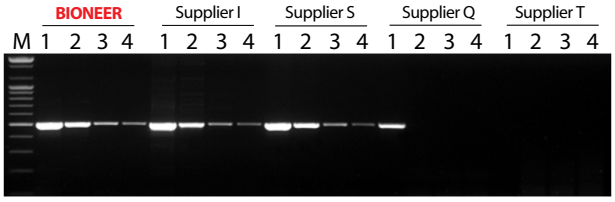


Figure 2. Comparison of amplification quality between *AccuPower*® *Taq* PCR PreMix and competitors' *Taq* PCR master mix.

Target Gene: IRGC (Immunity-related GTPase family, cinema).
Bioneer reaction mixture was followed by 95℃ for 5 min, 35 cycles of 20 sec at 95℃, 20 sec at 55℃, 30 sec at 72℃. PCR reactions using other companys' PCR master mix were performed according to each companys' protocol.
Lane 1: 10 ng human genomic DNA
Lane 2: 1 ng human genomic DNA
Lane 3: 100 pg human genomic DNA
Lane 4: 10 pg human genomic DNA
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

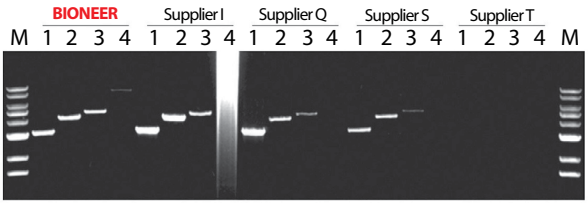


Figure 3. Comparison of long kb amplification between *AccuPower*® *Taq* PCR PreMix and competitors' *Taq* PCR master mix.

Bioneer reaction mixture was followed by 95℃ for 5 min, 30 cycles of 20 sec at 95℃, 20 sec at 65℃, 8 min at 68℃. PCR reactions using other companys' PCR master mix were performed according to each company's protocol.
Lane 1: 3 kb fragment (Human tumor protein p53 gene)
Lane 2: 4 kb fragment (Human beta globin region)
Lane 3: 4.5 kb fragment (Human DNA cross-link repair 1A gene)
Lane 4: 8 kb fragment (Human hemoglobin epsilon 1 gene)
M: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

Ordering Information

Cat. No.	Product Description			
K-2601	*AccuPower*® *Taq* PCR PreMix	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-2603				50 µl/rxn
K-2602			480 tubes	20 µl/rxn
K-2604				50 µl/rxn
K-2609	*AccuPower*® *Taq* PCR MasterMix	2.5 ml of 2X Mater mix solution	1.25 ml x 2 tubes	
K-2610		25 ml of 2X Mater mix solution	12.5 ml x 2 tubes	

AccuPower® HotStart PCR PreMix

Hostrart PCR kit for high specificity applying Bioneer's global patent technology

Description

AccuPower® HotStart PCR PreMix enhances reaction specificity and PCR amplification by applying Bioneer's patented enzyme-mediated HotStart method.

This product reduces non-specific reactions such as mis-priming and primer-dimer that can occur when *Top* DNA polymerase reacts at low temperature. Therefore, it can be used for various PCR amplification reactions such as complex gDNA or cDNA templates, low-copy targets and multiple primer pairs.

Features and Benefits

- **Specificity**
  Bioneer's patented technology (enzyme-mediated HotStart method) is applied to minimize the generation of non-specific amplification products before the zero cycle. Hydrolysis of the PCR inhibitor (PPi) generated every cycle maximizes the efficiency of PCR reactions, effectively amplifying trace amounts of template DNA (Figure 1).
- **Sensitivity**
  Detects trace human gDNA targets with superior sensitivity and amplification efficiency.
- **Stability**
  Enhanced stability for maintaining stable enzymatic activities for a long-term storage by including stabilizer and dried in the PCR reaction mixture.
- **Ease-of-use**
  All reaction components required for PCR, including DNA polymerase and dNTPs are contained within each tube in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and distilled water. Reagents necessary for loading agarose gels for electrophoresis are already present in the reaction, and there is no need to add loading dye after PCR is completed.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- High specificity PCR
- High sensitivity PCR
- gDNA template PCR
- Low-copy target PCR
- Multiple primer pairs PCR
- cDNA template PCR

Specifications

- Enzyme: *Top* DNA polymerase
- 5' → 3' exonuclease activity: No
- 3' → 5' exonuclease activity: No
- 3' – A overhang: Yes
- Fragment size: ~ 12 kb

Storage Temperature

-20℃

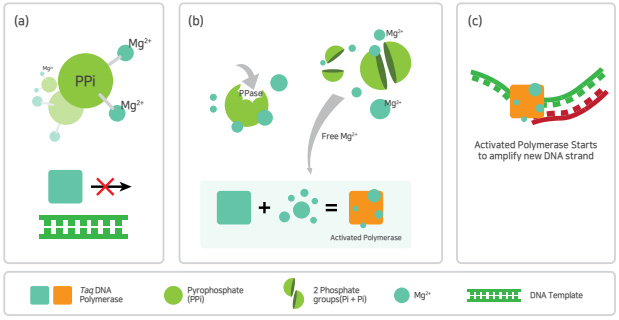


Figure 1. Enzyme-mediated HotStart PCR

Experimental Data

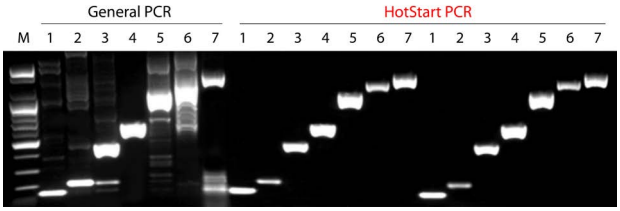


Figure 2. Specificity comparison between *AccuPower*® PCR PreMix and *AccuPower*® HotStart PCR PreMix.

Lane 1: P75/P73 primer set (139 bp)
Lane 2: P55/P53 primer set (211 bp)
Lane 3: P55/P63 primer set (447 bp)
Lane 4: P75/P83 primer set (618 bp)
Lane 5: P55/P73 primer ser (1,082 bp)
Lane 6: P65/P83 primer set (1,296 bp)
Lane 7: P55/P83 primer set (1,561 bp)

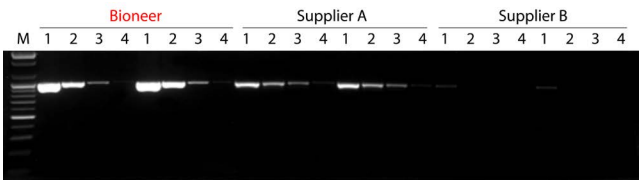


Figure 3. Comparison of PCR amplification sensitivity between *AccuPower*® HotStart PCR PreMix from Bioneer and other supplier's HotStart PCR kit.

Lane 1: Human gDNA 10 ng
Lane 2: Human gDNA 1 ng
Lane 3: Human gDNA 100 pg
Lane 4: Human gDNA 10 pg
M: 100 bp Plus DNA Ladder (Cat. No. D-1035, Bioneer)

Ordering Information

Cat. No.	Product Description			
K-5050	*AccuPower*® HotStart PCR PreMix	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-5052				50 µl/rxn
K-5051			480 tubes	20 µl/rxn
K-5057				50 µl/rxn
K-5053		0.5 ml thin-wall tubes with attached cap	100 tubes	50 µl/rxn

AccuPower® HotStart PCR PreMix (with UDG)

Minimize non-specific reactions and carryover contamination

Description

AccuPower® HotStart PCR PreMix (with UDG) is an enzyme-mediated HotStart technology that minimizes Primer-dimer formation to increase reaction specificity and PCR amplification efficiency, while solving the carryover contamination problem by applying uracil DNA glycosylase system.

Features and Benefits

- **Prevention of carryover contamination**
  UDG and dUTP in the MasterMix prevent the re-amplification of carryover PCR products between reactions. dUTP ensures that any amplified DNA will contain uracil, while UDG removes uracil residues from single- or double-stranded DNA, preventing dU-containing DNA from serving as template in subsequent PCR reactions. Prior to PCR, a UDG incubation step (37℃, 2 min) cleaves uracil residues from any contaminating dU-containing DNA from previous PCR reactions. UDG is then inactivated by the high temperatures during normal PCR cycling, allowing the amplification of legitimate target sequences (Figure 1).
- **Specificity**
  Pyrophosphate (PPi) has a very high affinity with Mg^{2+} ion required for DNA polymerases. Thus in the presence of excess PPi, DNA polymerase is not active. *AccuPower*® HotStart PCR PreMix uses excess PPi to eliminate the production of non-specific product during PCR setup. However, during the first cycle of PCR, at temperatures above 70℃, the added thermostable PPase cleaves PPi and releases the bound Mg^{2+}, thereby activating the DNA polymerase. Thus non-specific amplification is suppressed during set-up and at lower temperatures, and the polymerase is fully active after the first incubation at 95℃. In addition, the presence of thermostable PPase delays the plateau phase of PCR by removing the PPi that normally accumulates during amplification, allowing you to amplify low copy targets with confidence.
- **Stability**
  Enhanced stability for maintaining stable enzymatic activities for a long-term storage by including stabilizer and dried in the PCR reaction mixture.
- **Ease-of-use**
  All reaction components required for PCR, including DNA polymerase and dNTPs are contained within each tube in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and distilled water. Reagents necessary for loading agarose gels for electrophoresis are already present in the reaction, and there is no need to add loading dye after PCR is completed.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- gDNA template PCR
- Low-copy target PCR
- Multiple primer pairs PCR
- cDNA template PCR
- Molecular Diagnosis

Specifications

- Enzyme: *Top* DNA polymerase
- 5' → 3' exonuclease activity: No
- 3' → 5' exonuclease activity: No
- 3' – A overhang: Yes
- Fragment size: ~ 12 kb

Storage Temperature

-20℃

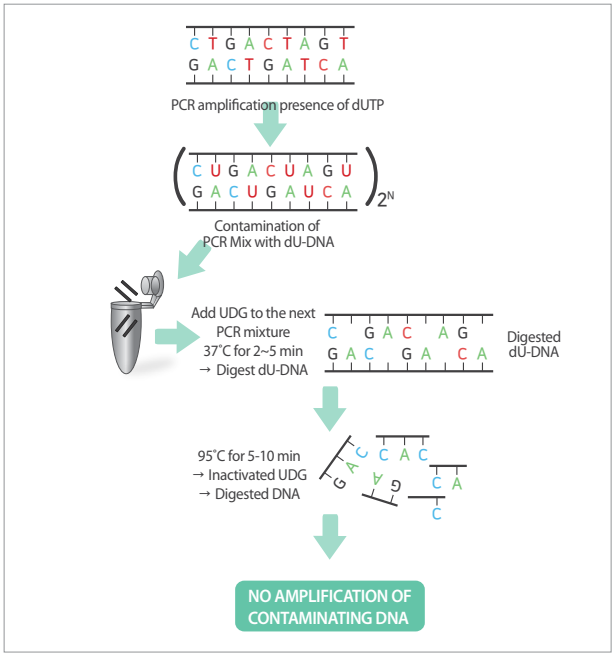


Figure 1. Prevention of carryover contamination.

AccuPower® HotStart PCR PreMix (with UDG)

Experimental Data

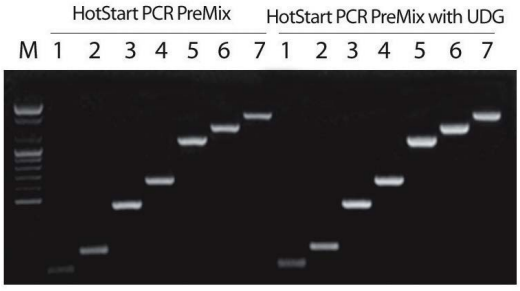


Figure 2. Comparison of specificity between *AccuPower*® HotStart PCR PreMix and HotStart PCR PreMix (with UDG).

Specificity test was operated using 7 pairs of primers targeting P53 gene. Reaction mixture was incubated at 37℃ for 2 min followed by 95℃ for 5 min, 30 cycles of 20 sec at 95℃, 40 sec at 55℃, 1 min at 72℃.
The amount of DNA (human) used to test is 10 ng.
Lane 1: 139 bp
Lane 2: 211 bp
Lane 3: 447 bp
Lane 4: 618 bp
Lane 5: 1,082 bp
Lane 6: 1,296 bp
Lane 7: 1,561 bp
M: *AccuLadder*™ 100 bp DNA Size Marker (Cat. No. D-1030-1, Bioneer)

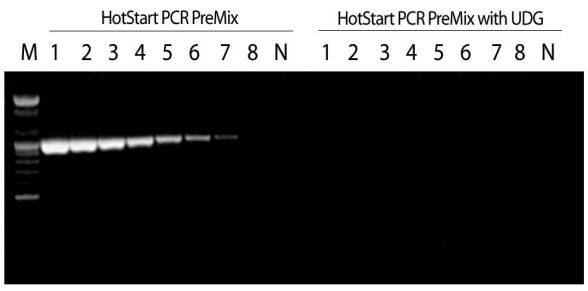


Figure 3. Efficiency of uracil DNA glycosylase using PCR product (including uracil base).

Efficiency test of uracil DNA glycosylase was operated using serial diluted PCR products including uracil base. *AccuPower*® HotStart PCR PreMix was also tested for negative control. Reaction mixture was incubated at 37℃ for 2 min followed by 95℃ for 5 min, 30 cycles of 20 sec at 95℃, 20 sec at 55℃, 30 sec at 72℃.
Lane 1: 10^{11} copy
Lane 2: 10^{10} copy
Lane 3: 10^{9} copy
Lane 4: 10^{8} copy
Lane 5: 10^{7} copy
Lane 6: 10^{6} copy
Lane 7: 10^{5} copy
Lane 8: 10^{4} copy
Lane N: No template control
M: *AccuLadder*™ 100 bp DNA Size Marker (Cat. No. D-1030-1, Bioneer)

Ordering Information

Cat. No.	Product Description		
K-5050-1	*AccuPower*® HotStart PCR PreMix (with UDG)	0.2 ml thin-wall tubes with attached cap, 20 µl/rxn	96 tubes
K-5051-1			480 tubes

AccuPower® GoldHotStart Taq PCR PreMix & Master Mix

High Specificity Kit with HotStart

Description

AccuPower® GoldHotStart Taq PCR PreMix is a convenient vacuum-dried PCR master mix containing *GoldHotstart Taq* DNA polymerase, dNTPs, reaction buffer, tracking dye, and patented stabilizer and is aliquoted in 8 strips PCR tube. *GoldHotstart Taq* DNA polymerase is inhibited at lower temperature, but is activated at during the start of PCR. This prevents the formation of misprimed products, as well as primer-dimers, during the reaction set up process resulting in improved specificity. Its Mastermix version, instead of dried format, is also available.

Features and Benefits

- **Specificity**
  GoldHotStart Taq DNA polymerase minimizes the generation of non-specific amplification products before the zero cycle. As the PCR temperature increases, the activated *GoldHotStart Taq* DNA polymerase rapidly amplifies only the correct target.
- **Sensitivity**
  Detects trace human gDNA targets with outstanding sensitivity and amplification efficiency.
- **Stability**
  Enhanced stability for maintaining stable enzymatic activities for a long-term storage by including stabilizer and dried in the PCR reaction mixture.
- **Ease-of-use**
  Simplified procedure with all necessary components and DNA polymerases added in the PCR tubes to perform the PCR reaction immediately just by adding the template DNA, primer sets, and D.W., along with tracking dye and sedimentation agents for electrophoresis without the need of sample loading buffer.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- High specificity PCR
- High sensitivity PCR
- gDNA template PCR
- Low-copy target PCR
- Multiple primer pairs PCR
- cDNA template PCR
- TA cloning

Specifications

- Enzyme: *GoldHotStart Taq* DNA polymerase
- 5' → 3' exonuclease activity: Yes
- 3' → 5' exonuclease activity: No
- 3' – A overhang: Yes
- Fragment size: ~ 5 kb (Human)

Storage Temperature

-20℃

Experimental Data

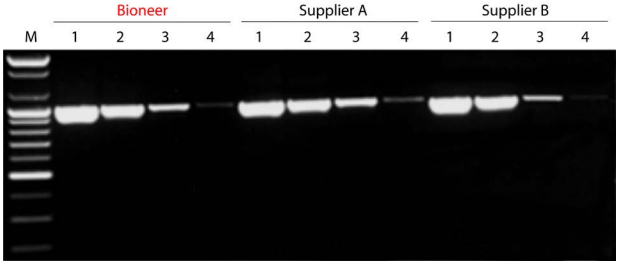


Figure 1. Comparison of PCR amplification efficiency between *AccuPower® GoldHotStart Taq* PCR PreMix from Bioneer and other suppliers' HotStart PCR master mix.

Target: Human insulin receptor gene.
The cycling conditions for *AccuPower® GoldHotStart Taq* PCR PreMix were 95℃ for 5 min, 30 cycles of 95℃ for 30 sec, 55℃ for 30 sec and 72℃ for 30 sec. PCR reactions using other suppliers' PCR master mix were performed according to each suppliers' protocol.
Lane 1: 10 ng of human gDNA
Lane 2: 1 ng of human gDNA
Lane 3: 100 pg of human gDNA
Lane 4: 10 pg of human gDNA
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Experimental Data

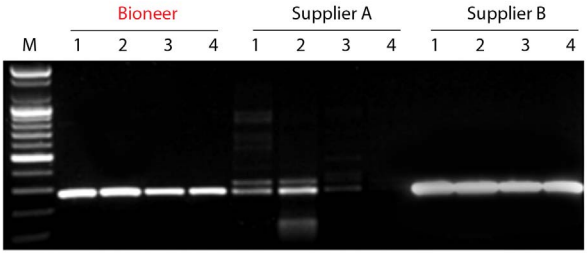


Figure 2. Comparison of PCR amplification specificity between *AccuPower® GoldHotStart Taq* PCR PreMix from Bioneer and other suppliers' HotStart PCR master mix.

Target: ApoE gene (The PCR product size is 268 bp). The cycling conditions for *AccuPower® GoldHotStart Taq* PCR PreMix were 95℃ for 5 min, 35 cycles of 95℃ for 30 sec, 57℃ for 30 sec and 72℃ for 30 sec. PCR reactions using other suppliers' PCR master mix were performed according to each supplier's protocol.
Lane 1,2: 100 ng human genomic DNA
Lane 3,4: 10 ng human genomic DNA
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

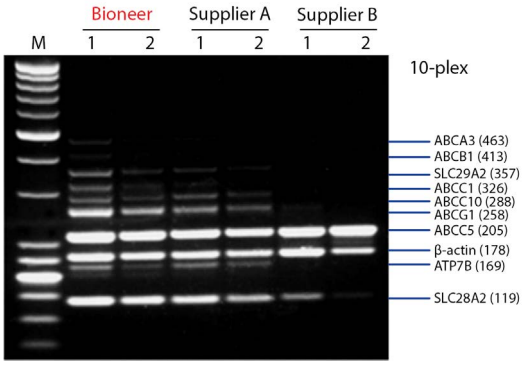


Figure 3. Comparison of PCR amplification specificity between *AccuPower® GoldHotStart Taq* PCR PreMix from Bioneer and other suppliers' HotStart PCR master mix.

The cycling conditions for *AccuPower® GoldHotStart Taq* PCR PreMix were 95℃ for 5 min, 35 cycles of 95℃ for 30 sec, 65℃ for 30 sec and 72℃ for 30 sec. PCR reactions using other suppliers' PCR master mix were performed according to each supplier's protocol.
Lane 1: 100 ng human genomic DNA
Lane 2: 10 ng human genomic DNA
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Ordering Information

Cat. No.	Product Description			
K-2621	*AccuPower® GoldHotStart Taq* PCR PreMix	0.2 ml thin-wall 8-tube strips with attached caps	96 tubes	20 µl/rxn
K-2623				50 µl/rxn
K-2622			480 tubes	20 µl/rxn
K-2624				50 µl/rxn
K-2629	*AccuPower® GoldHotStart Taq* PCR MasterMix	2.5 ml of 2X Master mix solution	1.25 ml x 2 tubes	
K-2630		25 ml of 2X Master mix solution	12.5 ml x 2 tubes	

AccuPower® PyroHotStart Taq PCR PreMix

For Hotstart PCR, Dried-type Premix with *Taq* DNA Polymerase Applied Enzyme-mediated Hotstart Technology

Description

AccuPower® PyroHotStart Taq PCR PreMix is applied with Bioneer's enzyme-mediated HotStart patent technology to enhance response specificity and PCR amplification. *Taq* DNA polymerase reduces non-specific reactions like the mis-priming and primer dimer formation that may occur at a low temperature. In addition, the components necessary for PCR such as DNA polymerases, dNTPs, reaction buffers, etc. are thoroughly mixed and vacuum-dried, each packaged with amounts sufficient for a single PCR run.

Features and Benefits

- **Specificity**
  Pyrophosphate (PPi) has high affinity for Mg^{2+}. By adding PPi to the reaction mixture, the Mg^{2+} ions necessary for normal PCR are bound, preventing DNA polymerase activity. This PPi-Mg^{2+} binding prevents non-specific before PCR (zero-cycle) product formation. Upon thermal cycling, the pyrophosphatase (PPase) that is also added to the mixture is activated (>70℃) and hydrolyzes the PPi to 2 phosphate groups and facilitates the release of Mg^{2+}, which is then available for DNA polymerase to use and resume normal activity (Figure 1).
- **Sensitivity**
  Detects trace human gDNA targets with outstanding sensitivity and amplification efficiency.
- **Stability**
  Enhanced stability for maintaining stable enzymatic activities for a long-term storage by including stabilizer and dried in the PCR reaction mixture.
- **Ease-of-use**
  All reaction components required for PCR, including DNA polymerase and dNTPs are contained within each tube in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and distilled water. Reagents necessary for loading agarose gels for electrophoresis are already present in the reaction, and there is no need to add loading dye after PCR is completed.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- High specificity PCR
- High sensitivity PCR
- gDNA template PCR
- Low-copy target PCR
- Multiple primer pairs PCR
- cDNA template PCR
- TA cloning

Specifications

- Enzyme: *Taq* DNA polymerase
- 5' → 3' exonuclease activity: Yes
- 3' → 5' exonuclease activity: No
- 3' – A overhang: Yes
- Fragment size: ~ 5 kb (Human)

Storage Temperature

-20℃

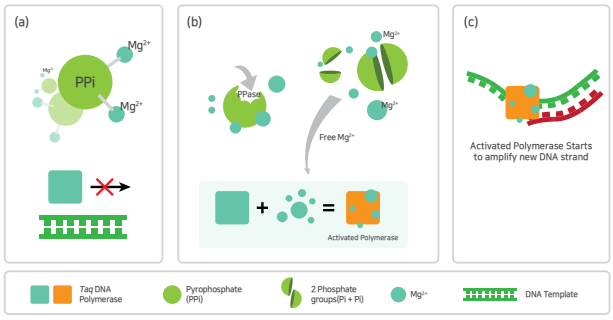


Figure 1. Enzyme-mediated HotStart PCR.

Experimental Data

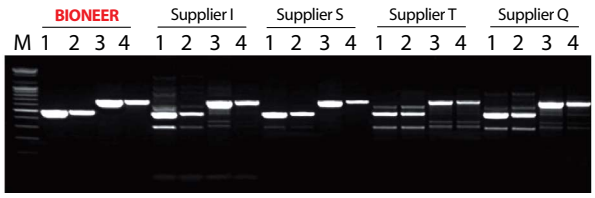


Figure 2. Comparison of PCR amplification specificity between *AccuPower® PyroHotStart Taq* PCR PreMix from Bioneer and other companys' hotstart PCR master mix.

PCR reactions were performed according to each supplier's protocol.
Target: Human Prp gene
The PrP gene was amplified from human genomic DNA with two different primer sets, separately. This data shows that *AccuPower® PyroHotStart Taq* PCR PreMix has higher amplificition efficency and specificity than other suppliers' HotStart PCR master mix.
Lane 1: 100 ng DNA PrP primer set (500 bp)
Lane 2: 10 ng DNA PrP primer set (500 bp)
Lane 3: 100 ng DNA PrP primer set (705 bp)
Lane 4: 10 ng DNA PrP primer set (705 bp)
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

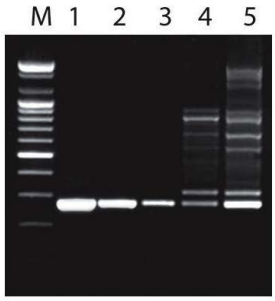


Figure 3. Comparison of PCR amplification specificity between *AccuPower® PyroHotStart Taq* PCR PreMix from Bioneer and other suppliers' HotStart PCR master mix.

The ApoE gene was amplifed from 100 ng of human genomic DNA (The PCR product size is 268 bp). This data shows that *AccuPower® PyroHotStart Taq* PCR PreMix has higher amplificition efficency and specificity than other suppliers' HotStart PCR master mix.
Lane 1: *AccuPower® PyroHotStart Taq* PCR PreMix
Lane 2: Supplier I HotStart *Taq* PCR premix
Lane 3: Supplier S HotStart *Taq* PCR master mix
Lane 4: Supplier T HotStart *Taq* PCR master mix
Lane 5: Supplier Q HotStart *Taq* PCR master mix
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

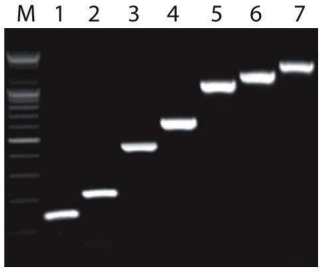


Figure 4. *AccuPower® PyroHotStart Taq* PCR PreMix has high amplification efficiency and specificity.

Specificity test was performed using 7 different sets of primers targeting the P53 gene. 10 ng of human genomic DNA was used for each PCR reaction. The cycling conditions were 95℃ for 5 min, 30 cycles of 95℃ for 20 sec, 55℃ for 40 sec, and 72℃ for 1 min, and 72℃ for 5 min for final extension.
Lane 1: P75/73 primer set (139 bp)
Lane 2: P55/53 primer set (211 bp)
Lane 3: P55/63 primer set (447 bp)
Lane 4: P75/83 primer set (618 bp)
Lane 5: P55/73 primer set (1,082 bp)
Lane 6: P65/83 primer set (1,296 bp)
Lane 7: P55/83 primer set (1,561 bp)
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Ordering Information

Cat. No.	Product Description			
K-2611	*AccuPower® PyroHotStart Taq* PCR PreMix	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-2613				50 µl/rxn
K-2612			480 tubes	20 µl/rxn
K-2614				50 µl/rxn

AccuPower® HotStart *Pfu* PCR PreMix

For Hotstart PCR and High Fidelity PCR, Dried-type Premix with *Pfu* DNA Polymerase

Description

AccuPower® HotStart *Pfu* PCR PreMix is a ready-to-use vacuum-dried mastermix containing all components for high fidelity PCR. Just addition of primers and template into the tube provides reproducible results. *AccuPower*® HotStart *Pfu* PCR PreMix uses a unique enzyme-mediated hotstart PCR method that reduces pre-PCR mis-primings, primer dimers, artifacts, and any other non-specific amplification. Besides *AccuPower*® HotStart *Pfu* PCR PreMix provides sensitivity, high specificity and proof-reading activity. So you'll get fewer errors in your PCR product.

Features and Benefits

- **High fidelity**
  High fidelity (error rate = 1.9 x 10^{-6}) with minimized mutation during DNA amplification.
- **High specificity**
  Selection of specific sequences by applying *PyroHotStart* technology to the proof-reading function of *Pfu* DNA polymerase, allowing the amplified products to be used in experiments that require accurate sequences such as cloning and mutagenesis after simple PCR purification processes.
- **Stability**
  Stable enzyme activities allowing long-term storage by including stabilizer and dried in the PCR reaction mixture.
- **Ease-of-use**
  All reaction components required for PCR, including DNA polymerase and dNTPs are contained within each tube in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and distilled water. Reagents necessary for loading agarose gels for electrophoresis are already present in the reaction, and there is no need to add loading dye after PCR is completed.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- High fidelity amplification
- Gene cloning with blunt ends
- Site-directed mutagenesis
- High specificity PCR
- cDNA template PCR

Specifications

- Enzyme: *Pfu* DNA polymerase
- 5' → 3' exonuclease activity: No
- 3' → 5' exonuclease activity: Yes
- 3' – A overhang: No
- Fragment size: ~ 5 kb

Storage Temperature

-20℃

Experimental Data

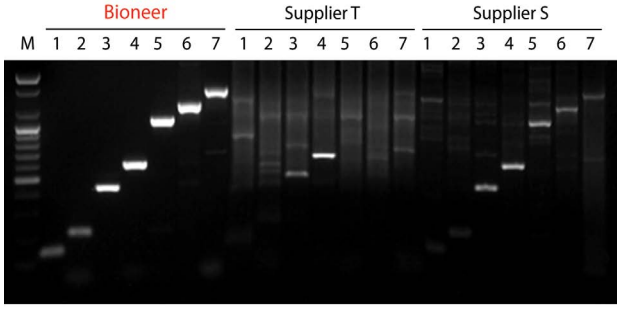


Figure 1. *AccuPower*® HotStart *Pfu* PCR PreMix shows enhanced specificity compared to competitors.

Specificity test was performed using 7 different sets of primers targeting the p53 gene. 10 ng of human genomic DNA was used for each PCR reaction. The cycling conditions were 95℃ for 5 min, 32 cycles of 95℃ for 30 sec, 62℃ for 40 sec, and 72℃ for 1 min 30 sec, and 72℃ for 5 min for final extension.
Lane 1: P75/73 primer set (139 bp)
Lane 2: P55/53 primer set (211 bp)
Lane 3: P55/63 primer set (447 bp)
Lane 4: P75/83 primer set (618 bp)
Lane 5: P55/73 primer set (1,082 bp)
Lane 6: P65/83 primer set (1,296 bp)
Lane 7: P55/83 primer set (1,561 bp)
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Experimental Data

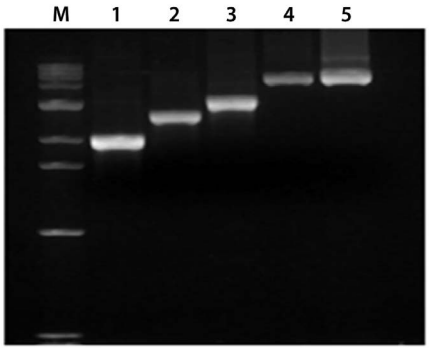


Figure 2. *AccuPower*® HotStart *Pfu* PCR PreMix has high amplification efficiency.

Template DNA: 200 ng of human genomic DNA
Bioneer reaction mixture was followed by 95℃ for 5 min, 35 cycles of 95℃ for 20 sec, 65℃ for 20 sec, and 68℃ for 15 min, and 68℃ for 5 min for final extension.
Lane 1: 2 kb fragment
Lane 2: 2.5 kb fragment
Lane 3: 3 kb fragment
Lane 4: 4.5 kb fragment
Lane 5: 5 kb fragment
M: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

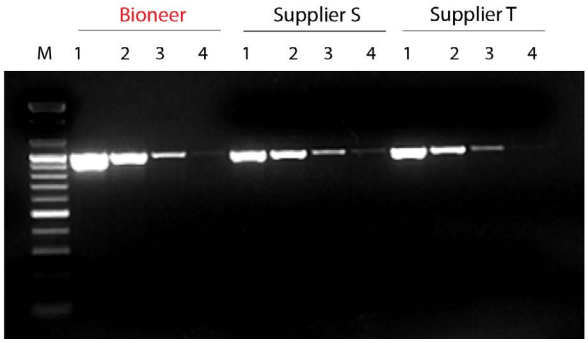


Figure 3. Comparison of PCR amplification efficiency between *AccuPower*® HotStart *Pfu* PCR PreMix from Bioneer and other suppliers' PCR master mix.

Target: human insulin receptor gene.
The cycling conditions for *AccuPower*® HotStart *Pfu* PCR PreMix were 95℃ for 5 min, 30 cycles of 95℃ for 30 sec, 55℃ for 30 sec and 72℃ for 2 min. PCR reactions using other suppliers' PCR master mix were performed according to each supplier's protocol.
Lane 1: 10 ng of human genomic DNA
Lane 2: 1 ng of human genomic DNA
Lane 3: 100 pg of human genomic DNA
Lane 4: 10 pg of human genomic DNA
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Ordering Information

Cat. No.	Product Description			
K-2301	*AccuPower*® HotStart *Pfu* PCR PreMix	0.2 ml thin-wall 8-tube strips with attached caps	96 tubes	20 µl/rxn
K-2302				50 µl/rxn
K-2303			480 tubes	20 µl/rxn
K-2304				50 µl/rxn

AccuPower® *Pfu* PCR PreMix & Master Mix

For High Fidelity PCR, Dried-type Premix with *Pfu* DNA Polymerase

Description

AccuPower® *Pfu* PCR PreMix uses *Pfu* DNA polymerase to attain highly accurate PCR products through its proof-reading function. As all components necessary for PCR such as *Pfu* DNA polymerases, dNTPs, reaction buffers, etc., are thoroughly mixed and vacuum-dried, each packaged with amounts sufficient for a single PCR run, by simply adding the template DNA and primers, a high-performance PCR product can be obtained.

Features and Benefits

- **High fidelity**
  AccuPower® *Pfu* PCR PreMix is a high fidelity (error rate = 1.9×10^{6}) enzyme that reduces errors during DNA amplification.
- **Sensitivity**
  Detects trace human gDNA targets with high sensitivity and amplification efficiency.
- **Long Range PCR**
  Targets with large DNA sizes can be effectively amplified, enabling a variety of cloning experiments, including promoter assays.
- **Stability**
  Enhanced stability allowing long-term storage with a stabilizer included and dried in the PCR reaction mixture.
- **Ease-of-use**
  All reaction components required for PCR, including DNA polymerase and dNTPs are contained within each tube in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and distilled water. Reagents necessary for loading agarose gels for electrophoresis are already present in the reaction, and there is no need to add loading dye after PCR is completed.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Gene synthesis
- Gene cloning
- Conventional PCR
- Primer extension
- Site directed mutagenesis
- High fidelity

Specifications

- Enzyme: *Pfu* DNA polymerase
- 5' → 3' exonuclease activity: No
- 3' → 5' exonuclease activity: Yes
- 3' – A overhang: No
- Fragment size: ~ 15 kb

Storage Temperature

-20℃

Experimental Data

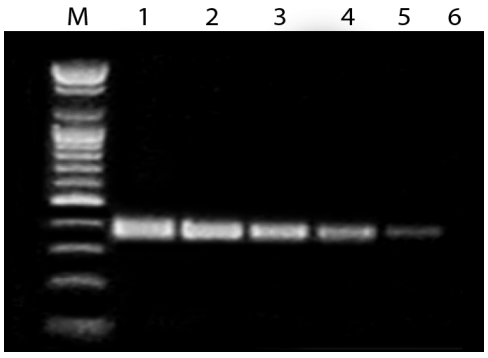


Figure 1. Template range & sensitivity of *AccuPower*® *Pfu* PCR PreMix for human DNA template.

Test of working range & sensitivity of *AccuPower*® *Pfu* PCR PreMix for human DNA template.
Lane 1: 100 ng Lane 2: 10 ng Lane 3: 1 ng
Lane 4: 100 pg Lane 5: 10 pg Lane 6: Template negative
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

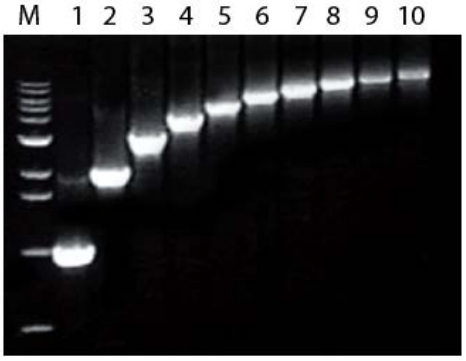


Figure 2. Amplification of lambda DNA of 1 kb to 10 kb with *AccuPower*® *Pfu* PCR PreMix.

Lane 1: 1 kb fragment Lane 2: 2 kb fragment
Lane 3: 3 kb fragment Lane 4: 4 kb fragment
Lane 5: 5 kb fragment Lane 6: 6 kb fragment
Lane 7: 7 kb fragment Lane 8: 8 kb fragment
Lane 9: 9 kb fragment Lane 10: 10 kb fragment
M: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

Ordering Information

Cat. No.	Product Description			
K-2022	*AccuPower*® *Pfu* PCR PreMix	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-2023				50 µl/rxn
K-2024			480 tubes	20 µl/rxn
K-2025				50 µl/rxn
K-2027		0.5 ml thin-wall 8-tube strips with attached cap	100 tubes	50 µl/rxn
K-2026	*AccuPower*® *Pfu* PCR Master Mix	1 ml of 2X Master mix solution		

AccuPower® ProFi Taq PCR PreMix & Master Mix

For Long PCR (up to 30 kb) and High Fidelity PCR, Dried-type Premix

Description

AccuPower® ProFi Taq PCR PreMix is a convenient vacuum-dried PCR master mix containing *ProFi Taq* DNA polymerase, reaction buffer, dNTPs, tracking dye, and a patented stabilizer. *ProFi Taq* DNA polymerase in the premix is a unique recombinant *Taq* DNA polymerase that offers enhanced amplification efficiency and higher fidelity for PCR. *AccuPower® ProFi Taq* PCR PreMix is applicable to any human template DNA, and especially effective in amplifying long genomic DNA fragments around 30 kb.

AccuPower® ProFi Taq PCR PreMix provides accurate long-range amplification of standard and amplification of low-copy target, and is highly suitable for all PCR applications.

Features and Benefits

- **Long Range PCR**
  ProFi Taq is especially effective in amplifying long human genomic DNA fragments around 21 kb and amplifying lambda DNA up to 30 kb.
- **Sensitivity**
  Guaranteed accurate PCR products with the excellent sensitivity and the best amplification efficiency.
- **Ease-of-use**
  All reaction components required for PCR, including DNA polymerase and dNTPs are contained within each tube in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and distilled water. Reagents necessary for loading agarose gels for electrophoresis are already present in the reaction, and there is no need to add loading dye after PCR is completed.
- **Stability**
  Enhanced stability allowing maintaince of stable enzymatic activities after long-term storage by including a stabilizer and dried in the PCR reaction mixture.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Applications

- Primer extension
- Long range amplification from genomic DNA
- High amplification efficiency
- Excellent performance on difficult templates
- Amplification of low-copy targets
- High yield and high sensitivity PCR

Specifications

- Enzyme: *ProFi Taq* DNA polymerase
- 5′ → 3′ exonuclease: Yes
- 3′ → 5′ exonuclease: Yes
- 3′ – A overhang: Yes
- Fragment size: ~ 30 kb

Storage Temperature

-20℃

Experimental Data

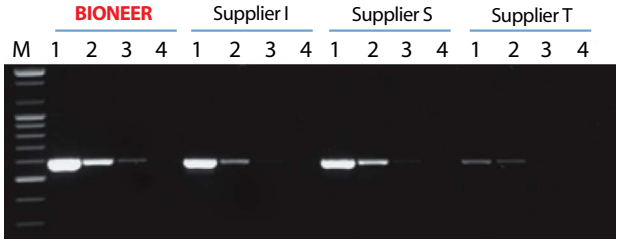


Figure 1. Comparison of PCR amplification efficiency between *AccuPower® ProFi Taq* PCR PreMix from Bioneer and other suppliers' PCR master mix.

cDNA synthesized from 10-fold serial-diluted human total RNA from 10 ng to 10 pg using *AccuPower® RocketScript™* Cycle RT PreMix (Cat. No. K-2201, Bioneer) was used as a template for PCR amplification. The cycling conditions for *AccuPower® ProFi Taq* PCR PreMix were 95℃ for 5 min, 33 cycles of 95℃ for 20 sec, 55℃ for 20 sec and 72℃ for 30 sec. PCR reactions using other suppliers' PCR master mix were performed according to each supplier's protocol.
Target: human GAPDH gene
Lane 1: 10 ng of human total cDNA
Lane 2: 1 ng of human total cDNA
Lane 3: 100 pg of human total cDNA
Lane 4: 10 pg of human total cDNA
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Experimental Data

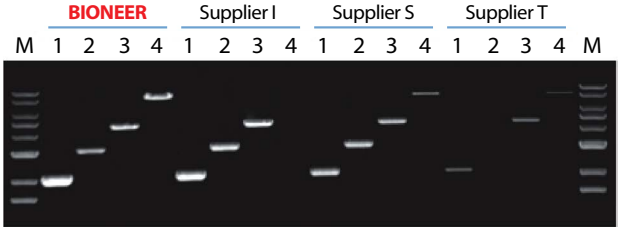


Figure 2. Comparison of PCR amplification sensitivity between *AccuPower® ProFi Taq* PCR PreMix from Bioneer and other suppliers' PCR master mix.

The cycling conditions for *AccuPower® ProFi Taq* PCR PreMix were 95℃ for 5 min, 30 cycles of 95℃ for 20 sec, 65℃ for 20 sec and 68℃ for 4 min. PCR reactions using other suppliers' PCR master mix were performed according to each supplier's protocol.
Lane 1: 2 kb fragment (human tumor protein p53 gene)
Lane 2: 3 kb fragment (human tumor protein p53 gene)
Lane 3: 4.5kb fragment (human DNA cross-link repair 1A gene)
Lane 4: 8 kb fragment (human hemoglobin epsilon 1 gene)
M: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

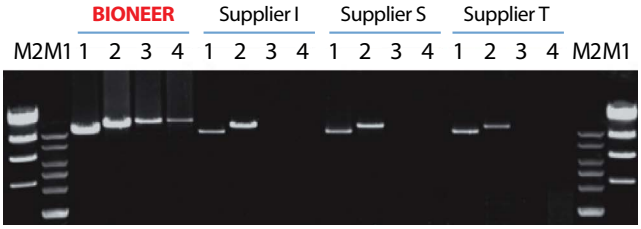


Figure 3. Comparison of PCR amplification of long targets between *AccuPower® ProFi Taq* PCR PreMix from Bioneer and other suppliers' PCR master mix.

The cycling conditions for *AccuPower® ProFi Taq* PCR PreMix were 95℃ for 5 min, 32 cycles of 95℃ for 20 sec, 65℃ for 40 sec, and 68℃ for 15 min. PCR reactions using other suppliers' PCR master mix were performed according to each supplier's protocol. Human DNA was used as a template for PCR amplification.
Lane 1: 11 kb fragment
Lane 2: 13.5 kb fragment
Lane 3: 17.6 kb fragment
Lane 4: 21.4 kb fragment
M1: Lambda/*Hin*dIII marker (Cat. No. D-1050, Bioneer)
M2: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

Ordering Information

<table>
<tr><th>Cat. No.</th><th colspan="4">Product Description</th></tr>
<tr><td>K-2631</td><td rowspan="4">*AccuPower® ProFi Taq* PCR PreMix</td><td rowspan="4">0.2 ml thin-wall 8-tube strips with attached caps</td><td rowspan="2">96 tubes</td><td>20 µl/rxn</td></tr>
<tr><td>K-2633</td><td>50 µl/rxn</td></tr>
<tr><td>K-2632</td><td rowspan="2">480 tubes</td><td>20 µl/rxn</td></tr>
<tr><td>K-2634</td><td>50 µl/rxn</td></tr>
<tr><td>K-2635</td><td>*AccuPower® ProFi Taq* PCR Master Mix</td><td colspan="3">1 ml of 2X Master mix solution</td></tr>
</table>

AccuPower® Multiplex PCR PreMix & Master Mix

For Multiplex PCR (up to 20-plex), Dried-type Premix

Description

AccuPower® Multiplex PCR PreMix allows to generate 20 multiplexed amplification products in a single tube. By applying antibody-based HotStart *Top* DNA Polymerase, it reduces non-specific reactions such as mis-priming and primer-dimer during DNA polymerase reaction at a low temperature. This product is applicable for normal and genotyping assays using multiplex PCR technology, along with semi-quantitative gene expression experiments using cDNA.

Features and Benefits

- **Multiplex PCR**
  Up to 20 different target genes from human genomic DNA can be amplified in a single tube.
- **Specificity**
  A Non-specific signal is dramatically eliminated by using hot-start Technology.
- **Stability**
  Stable at room temperature for a month and for 2 years in a -20℃ freezer.
- **Ease-of-use**
  All reaction components required for PCR, including DNA polymerase and dNTPs are contained within each tube in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and distilled water. Reagents necessary for loading agarose gels for electrophoresis are already present in the reaction, and there is no need to add loading dye after PCR is completed.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Genotyping assays
- Diagnostic assays
- RAPD
- DNA and RNA chip
- cDNA library

Specifications

- Enzyme: HotStart *Top* DNA polymerase
- 5' → 3' exonuclease: No
- 3′ → 5′ exonuclease: No
- 3′ – A overhang: Yes
- Fragment size: ~ 1 kb

Storage Temperature

-20℃

Experimetal Data

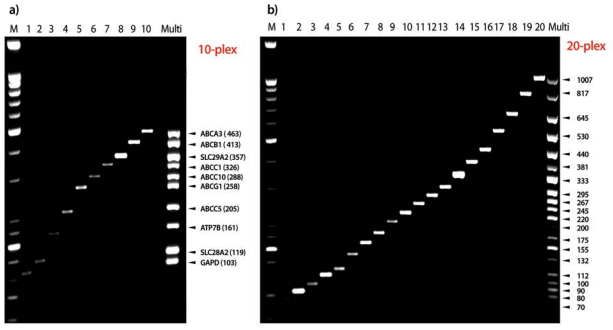


Figure 1. Single PCR and multiplex PCR using *AccuPower*® Multiplex PCR PreMix.

Each lane from left to right indicates the single and multiplex PCR product using *AccuPower*® Multiplex PCR PreMix.
a) 10-plex multiplex PCR
b) 20-plex multiplex PCR
M: 25/100 bp Mixed DNA Ladder (Cat. No. D-1020, Bioneer)

Experimetal Data

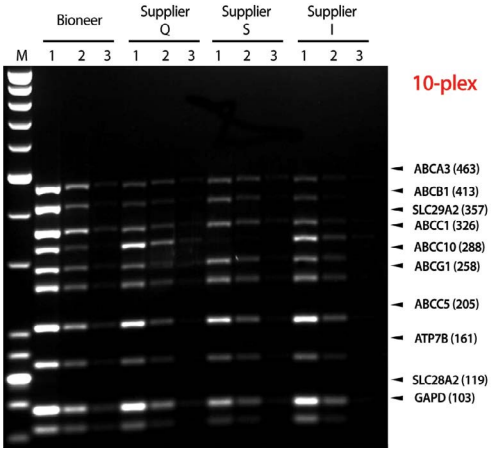


Figure 2. Comparison of amplification quality between *AccuPower*® Multiplex PCR PreMix and other suppliers' multiplex PCR kit.

10-plex primers were added into *AccuPower*® Multiplex PCR PreMix and other suppliers' multiplex PCR kit. A series of human genomic DNA diluents were tested.
Lane 1: Human genomic DNA 100 ng, Lane 2: Human genomic DNA 10 ng,
Lane 3: Human genomic DNA 1 ng
All data were obtained using *MyGenie*™ 96 Gradient Thermal Block (Cat. No. A-2040-1, Bioneer).
Supplier Q: Supplier Q's Multiplex PCR kit
Supplier S: Supplier S's Multiplex PCR kit
Supplier I: Supplier I's *Taq* DNA polymerase for multiplex PCR (0.5 U, added 2 mM $MgCl_2$)
Rxn. condition: 95℃ for 10 min, followed by 35 cycles of 30 sec at 95℃, 30 sec at 65℃, 60 sec at 72℃
M: 25/100 bp Mixed DNA Ladder (Cat. No. D-1020, Bioneer)

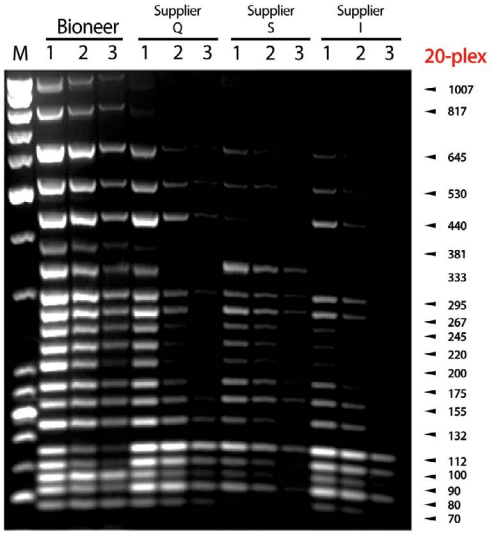


Figure 3. Comparison of amplification quality between *AccuPower*® Multiplex PCR PreMix and other suppliers' multiplex PCR kit.

20-plex primers were added into *AccuPower*® Multiplex PCR PreMix and other suppliers' multiplex PCR kit. A series of human genomic DNA diluents were tested (1~100 ng). All data were obtained using *MyGenie*™ 96 Gradient Thermal Block (Cat. No. A-2040-1, Bioneer).
Supplier Q: Multiplex PCR kit
Supplier S: Multiplex PCR kit
Supplier I: *Taq* DNA polymerase for multiplex PCR (0.5 U, added 2 mM $MgCl_2$)
Rxn. condition: 95℃ for 10 min, followed by 35 cycles of 30 sec at 95℃, 30 sec at 57℃, 60 sec at 72℃
M: 25/100 bp Mixed DNA Ladder (Cat. No. D-1020, Bioneer)

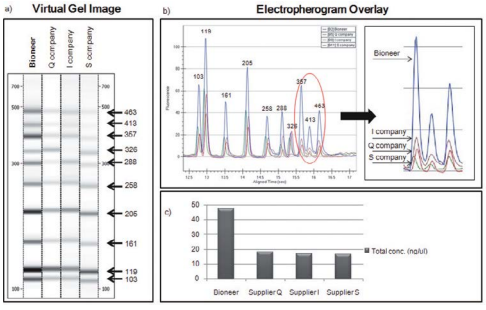


Figure 4. Comparison of amplification quality using Labchip™ between *AccuPower*® Multiplex PCR PreMix and other suppliers' multiplex PCR kit.

a) Virtual Gel Image. Gel image illustrates data reproducibility of the LabChip™ 90 system.
b) Overlay of expression level using Bioneer's Multiplex PCR PreMix and other company's multiplex PCR kit. The electropherogram displays the data between 10 PCR products yield using 10-plex primer sets to illustrate the amplification efficiency.
c) The graph shows the total concentration of PCR products between *AccuPower*® Multiplex PCR PreMix and other suppliers' multiplex PCR kit.

Ordering Information

Cat. No.	Product Description			
K-2111	*AccuPower*® Multiplex PCR PreMix	0.2 ml thin-wall tubes with attached cap	96 tubes	20 µl/rxn
K-2112				50 µl/rxn
K-2113			480 tubes	20 µl/rxn
K-2114				50 µl/rxn
K-2120	*AccuPower*® Multiplex PCR Master Mix	1 ml of 2X Master mix solution		

AccuPower® Gold Multiplex PCR PreMix

For Multiplex PCR (up to 20-plex), Dried-type Premix

Description

AccuPower® Gold Multiplex PCR PreMix can generate amplified PCR products of 20 target genes simultaneously with only one reaction and a tube. By applying Bioneer's patent technology of enzyme-mediated HotStart, chances of non-specific reactions that can occur when DNA polymerase reacts at low temperatures such as mis-priming and primer-dimer are reduced. This product is compatible with genotyping assay and genetic diagnosis that utilizes multiplex PCR technology.

Features and Benefits

- **Multiplex PCR**
  Up to 20 different target genes from human genomic DNA can be amplified in a single tube.
- **Specificity**
  Pyrophosphate (PPi) has high affinity for Mg^{2+}. By adding PPi to the reaction mixture, the Mg^{2+} ions necessary for normal PCR are bound, preventing DNA polymerase activity. This PPi-Mg^{2+} binding prevents non-specific before PCR (zero-cycle) product formation. Upon thermal cycling, the pyrophosphatase (PPase) that is also added to the mixture is activated (>70℃) and hydrolyzes the PPi to 2 phosphate groups and facilitates the release of Mg^{2+}, which is then available for DNA polymerase to use and resume normal activity. (Figure 1)
- **Ease-of-use**
  All reaction components required for PCR, including thermo-stable DNA polymerase and dNTPs are contained within each tube and in a vacuum-dried PreMix form. The user needs only to add template DNA, primers and water to perform up to 20-plex PCR. Materials necessary for loading agarose gels for electrophoresis are also added in the reaction, negating the need to add loading dye after PCR is completed.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.
- **Stability**
  Enhanced stability allowing long-term storage by including the stabilizer and drying in the PCR reaction mixture.

Application

Target	Application
Human and Animal	STR analysis for determining genetic profiles in forensic cases
	Molecular diagnostic analysis
	Genotyping assay
	Qualitative and semi-qualitative gene expression assay
	Mutant screening
	Transgenic organism analysis
Plant	STR analysis
	Detection of pathogens/ bacteria infection
	Transgenic organism analysis
	Qualitative and semi-qualitative gene expression assay

Specifications

- Enzyme: *Top* DNA polymerase
- 5' → 3' exonuclease: No
- 3' → 5' exonuclease: No
- 3' – A overhang: Yes
- Fragment size: ~ 1 kb

Storage Temperature

-20℃

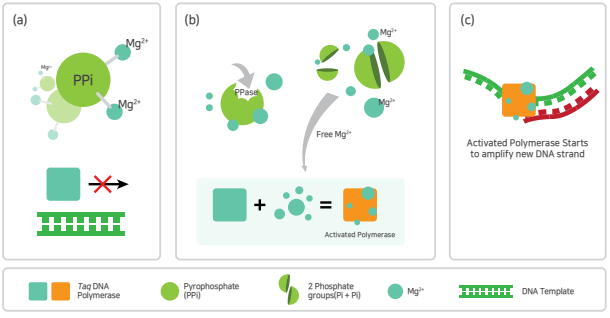


Figure 1. Enzyme-mediated HotStart PCR.

Experimental Data

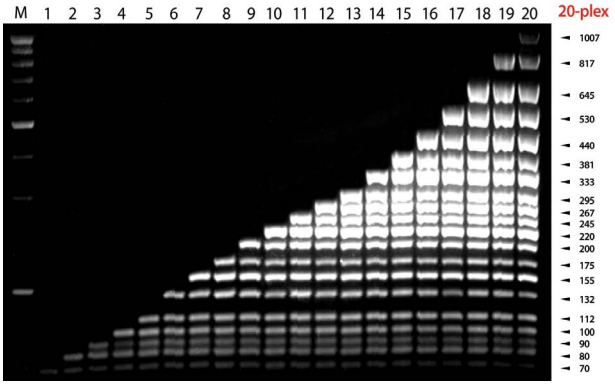


Figure 2. High specificity of *AccuPower*® Gold Multiplex PCR PreMix.

Each lane from left to right represents the progressive number of primer sets (1~20) included in *AccuPower*® Gold Multiplex PCR PreMix reactions.
Rxn. condition: 95℃ for 10 min, followed by 30 cycles (a), 35 cycles (b) of 30 sec at 95℃, 30 sec at 57℃, 60 sec at 72℃

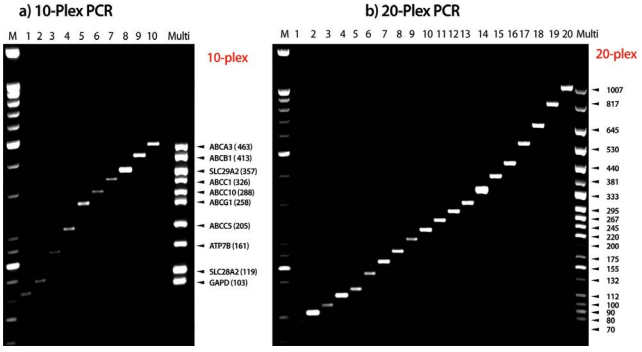


Figure 3. High specificity of *AccuPower*® Gold Multiplex PCR PreMix.

Each lane from left to right indicates the single and multiplex PCR product using *AccuPower*® Gold Multiplex PCR PreMix.
a) 10-plex multiplex PCR b) 20-plex multiplex PCR
M: 25/100 bp Mixed DNA Ladder (Cat. No. D-1020, Bioneer)
Rxn. condition: 95℃ for 10 min, followed by 30 cycles (a), 35 cycles (b) of 30 sec at 95℃, 30 sec at 57℃, 60 sec at 72℃

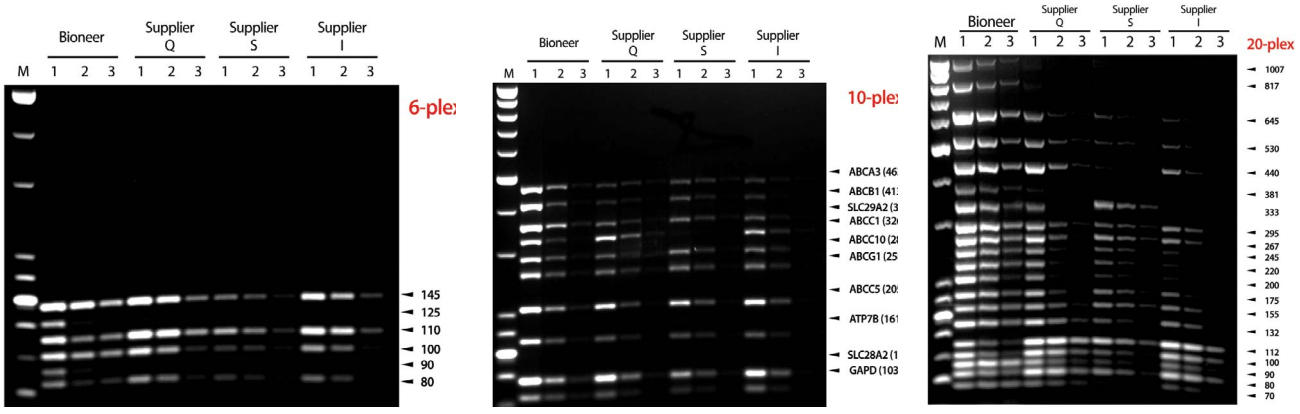


Figure 4. Comparison of amplification quality between *AccuPower*® Gold Multiplex PCR PreMix and other suppliers' multiplex PCR kit.

6-plex a), 10-plex b), 20-plex c) primers were added into *AccuPower*® Gold Multiplex PCR PreMix and other suppliers' master mixture. A series of human genomic DNA diluents were tested (Lane 1: 100 ng, Lane 2: 10 ng, Lane 3: 1 ng). All data were obtained using *MyGenie*™ 96 Gradient Thermal Block (Cat. No. A-2040-1, Bioneer).
Supplier Q: Multiplex PCR master mix
Supplier S: Multiplex PCR master mix
Supplier I: *Taq* DNA polymerase for multiplex PCR (0.5U), added 2 mM $MgCl_2$
M: 25/100 bp Mixed DNA Ladder (Cat. No. D-1020, Bioneer)
Rxn. condition: 95℃ for 10 min, followed by 35 cycles of 30 sec at 95℃, 30 sec at 60℃, 60 sec at 72℃

Ordering Information

Cat. No.	Product Description			
K-2115	*AccuPower*® Gold Multiplex PCR PreMix	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-2117				50 µl/rxn
K-2116			480 tubes	20 µl/rxn
K-2118				50 µl/rxn

Top DNA Polymerase

Universal DNA Polymerase faster than *Taq* DNA Polymerase and suitable for TA Cloning

Description

Top DNA polymerase contains a thermostable DNA polymerase having improved polymerase activity by using the recombinant DNA technology on a thermophilic polymerase gene.

Features and Benefits

- **High amplification efficiency and sensitivity**
  High efficiency and sensitivity for DNA amplification experiments using PCR methods.
- **Provide optimized buffer**
  Optimized buffer for *Top* DNA polymerase ensures stable reaction.
- **Reproducibility**
  Reproducible results with uniform quality products for each batch under the ISO 9001 quality system.

Application

- Real-Time quantification of DNA and cDNA targets using dsDNA binding dye
- Gene expression profiling
- Microbial & viral pathogen detection

Specifications

- 5' → 3' exonuclease: No
- 3' → 5' exonuclease: No
- 3' – A overhang: Yes
- Fragment size: ~ 10 kb

Reagents Supplied

- **10X Reaction buffer with (or without) $MgCl_2$:** Tris (pH 9.0), 15 mM $MgCl_2$, etc
- **1X dilution buffer:** 50% glycerol containing 50 mM Tris-HCl, 0.1 mM EDTA, 1 mM DTT, stabilizers, pH 8.0
- **10 mM dNTPs mix:** 2.5 mM of each dNTP

Concentration

500 Units (5 U/μl)

Storage Conditions

50% glycerol containing 50 mM Tris-HCl, 0.1 mM EDTA, 1 mM DTT, stabilizers, pH 8.0

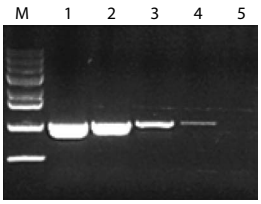
Storage Temperature

-20℃

Unit Definition

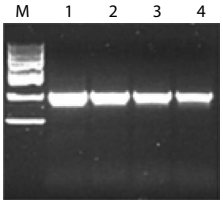
One unit is defined at the amount of enzyme that will incorporate 10 nmole of dNTP into acid-insoluble material in 30 min at 72℃.

Experimental Data



Lane 1 : 10 ng Human DNA
Lane 2 : 1 ng Human DNA
Lane 3 : 100 pg Human DNA
Lane 4 : 10 pg Human DNA
Lane 5 : Non Template
M : 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

Figure 1. Sensitivity test of *Top* DNA polymerase using Human genomic DNA. Each fragment was amplified from a template dilution series (10 ng to 10 fg DNA per reaction) using 1 U of each *Top* DNA polymerase.



Lane 1 : 1 U *Top* DNA Polymerase
Lane 2 : 0.5 U *Top* DNA Polymerase
Lane 3 : 0.33 U *Top* DNA Polymerase
Lane 4 : 0.25 U *Top* DNA Polymerase
M : 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

Figure 2. Enzyme activity test of *Top* DNA Polymerase. *Top* DNA polymerase was serially diluted and used to amplify 10 ng of each human genomic DNA.

※ The 5′ → 3′ exonuclease activity was inhibited in this *Top* DNA polymerase enzyme through point mutation to enhance the base incorporation rate. Thus, this product can be used with Real-time PCR used with dsDNA binding dyes, but not when it is used with probes. If the latter material must be used, it is highly recommended to use *AccuPower*® *Dualstar*™ qPCR PreMix.

Ordering Information

Cat. No.	Product Description				
	Top DNA Polymerase	10X Reaction Buffer	Dilution Buffer	10 mM dNTP	20 mM $MgCl_2$
E-3100	500 U	1 ml (with $MgCl_2$)	1 ml	1 ml	-
E-3100-1		1 ml (without $MgCl_2$)		1 ml	1 ml
E-3100-2		1 ml (with $MgCl_2$)		-	-
E-3100-3		1 ml (without $MgCl_2$)		-	1 ml
E-3101	2,000 U	1 ml (with $MgCl_2$)	1 ml x 4 ea	1 ml x 4 ea	-
E-3101-1		1 ml (without $MgCl_2$)		1 ml x 4 ea	1 ml x 4 ea
E-3101-2		1 ml (with $MgCl_2$)		-	-
E-3101-3		1 ml (without $MgCl_2$)		-	1 ml x 4 ea

Taq DNA Polymerase

Versatile DNA Polymerase for Routine PCR

Description

Taq DNA polymerase is a thermostable polymerase derived from the gene of *Thermus aquaticus* YT1 expressed and purified from *Escherichia coli*.

Features and Benefits

- **High yield & sensitivity**
  High amplification efficiency and high sensitivity to templates.
- **Provide optimized buffer**
  Enzyme optimized buffers for stable PCR reactions.
- **Reproducibility**
  Reproducible results with uniform quality products for each batch under the ISO 9001 quality system.

Application

- Real-Time quantification of DNA and cDNA targets using Dual probe, dsDNA binding dye
- Gene expression profiling
- Microbial & viral pathogen detection

Specifications

- 5' → 3' exonuclease activity: Yes
- 3' → 5' exonuclease activity: No
- 3' – A overhang: Yes
- Fragment size: ~ 10 kb

Components

- **10X reaction buffer with (or without) $MgCl_2$:** Tris-HCl, KCl, 15 mM $MgCl_2$, pH 9.0
- **Dilution buffer:** 20 mM Tris-HCl, 0.5 mM EDTA, 1 mM DTT, 100 mM KCl, Stablizers, 50% Glycerol, pH 8.0
- **10 mM dNTPs mix:** 2.5 mM of each dNTP

Concentration

500 units (5 U/μl)

Storage Conditions

20 mM Tris-HCl, 0.5 mM EDTA, 1 mM DTT, 100 mM KCl, Stablizers, 50% Glycerol, pH 8.0

Storage Temperature

-20℃

Definition of Unit

One unit is defined at the amount of enzyme that will incorporate 10 nmole of dNTP into acid-insoluble material in 30 min at 72℃.

Taq DNA Polymerase

Experimental Data

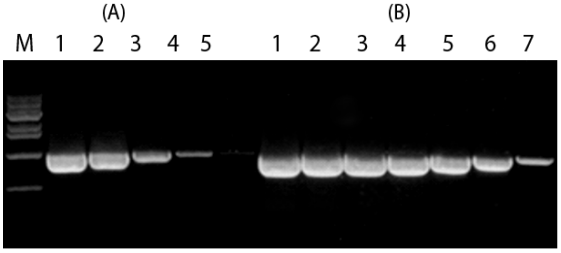


Figure 1. Using 1 unit of *Taq* DNA Polymerase, the activity of the polymerase was tested on human genomic DNA (A), lambda genomic DNA (B) as template. Each template DNA was serially diluted by ten-folds, with different ranges.

Lane 1: 100 ng Template DNA Lane 2: 10 ng Template DNA
Lane 3: 1 ng Template DNA Lane 4: 100 pg Template DNA
Lane 5: 10 pg Template DNA Lane 6: 1 pg Template DNA
Lane 7: 100 fg Template DNA
M: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

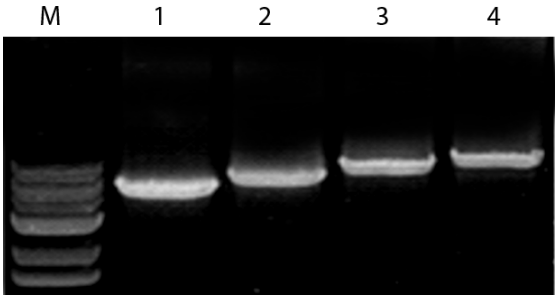


Figure 2. Amplification of fragments ranging from 5 kb to 8 kb from template Lambda DNA 20 pg with 1 units of *Taq* DNA Polymerase.

Lane 1: 5 kb PCR product Lane 2: 6 kb PCR product
Lane 3: 7 kb PCR product Lane 4: 8 kb PCR product
M: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

Ordering Information

Cat. No.	Product Description				
	Taq DNA Polymerase	10X Reaction Buffer	Dilution Buffer	10 mM dNTP	20 mM $MgCl_2$
E-2011	500 U	1 ml (with $MgCl_2$)	1 ml	1 ml	-
E-2011-1		1 ml (without $MgCl_2$)		1 ml	1 ml
E-2011-2		1 ml (with $MgCl_2$)		-	-
E-2011-3		1 ml (without $MgCl_2$)		-	1 ml
E-2013	2,000 U	1 ml (with $MgCl_2$)	1 ml x 4 ea	1 ml x 4 ea	-
E-2013-1		1 ml (without $MgCl_2$)		1 ml x 4 ea	1 ml x 4 ea
E-2013-2		1 ml (with $MgCl_2$)		-	-
E-2013-3		1 ml (without $MgCl_2$)		-	1 ml x 4 ea

Pfu DNA Polymerase

DNA polymerase with a proof-reading function optimized for experiments requiring high fidelity

Description

Pfu DNA Polymerase is derived from *Pyrococus furious* (bacteria). This product has 3' → 5' scale (proof-reading) activity with a high-fidelity reducing errors and an excellent specificity preventing formation of non-specific products.

Features and Benefits

- **High Fidelity PCR**
  Proof-reading activity with 3′ → 5′ exonuclease.
- **Terminal Transferase Activity**
  Guaranteed blunt-ended PCR product by blocking terminal transeferase activity.
- **Reproducibility**
  Reproducible results with uniform quality products for each batch under the ISO 9001 quality system.

Application

- Gene synthesis
- PCR or Primer extension requested high fidelity
- Blunt-end PCR Cloning or mutagenesis requested high fidelity

Specifications

- 5' → 3' exonuclease activity: No
- 3' → 5' exonuclease activity: Yes
- 3′ – A overhang: No
- Fragment size: ~ 20 kb

Reagents Supplied

- **10X reaction buffer:** 15 mM $MgSO_4$, Tris-HCl, KCl, $(NH_4)_2SO_4$, Acetylated BSA, pH 9.0
- **10 mM dNTPs mix:** 2.5 mM of each dNTP

Concentration

250 Units (2.5 U/μl)

Storage Condition

50 mM Tris-HCl, 0.1 mM EDTA, 1 mM DTT, Stablizers,
50 % Glycerol, pH 8.2

Storage Temperature

-20℃

Definition of Unit

One unit is defined at the amount of enzyme that will incorporate 10 nmol of dNTP into acid-insoluble material in 30 min at 72℃.

Pfu DNA Polymerase

Experimental Data

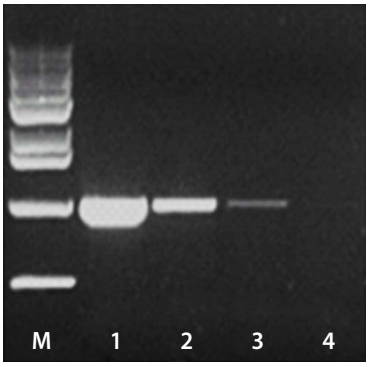


Figure 1. Human DNA was amplified using 2.5 units of enzyme in 50 µl reaction volume.
Lane 1: 20 ng Lane 2: 2 ng
Lane 3: 200 pg Lane 4: 20 pg
M: 100 bp DNA ladder (Cat. No. D-1030, Bioneer)

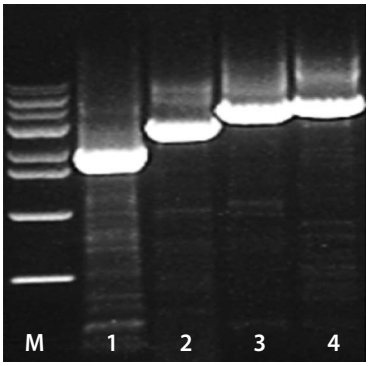


Figure 2. Amplification of fragments ranging from 2 kb to 5 kb from template Lambda DNA 100 pg with 1 units of *Pfu* DNA Polymerase.
Lane 1: 2 kb fragment
Lane 2: 3 kb fragment
Lane 3: 4 kb fragment
Lane 4: 5 kb fragment
M: 1 kb DNA ladder (Cat. No. D-1040, Bioneer)

Ordering Information

Cat. No.	Product Description		
	Pfu DNA Polymerase	10X Reaction Buffer	10 mM dNTP
E-2015	250 U	1 ml	-
E-2015-1			1 ml
E-2016	1,000 U	1 ml x 4 ea	-
E-2016-1			1 ml x 4 ea

ProFi Taq DNA Polymerase

For High Efficiency and Amplification of Long-Range PCR

Description

ProFi Taq DNA polymerase is improved from traditional *Taq* DNA polymerase with higher efficiency, making it suitable for long-range PCR. Furthermore, this enzyme is compatible with various target genes such as complex genomic DNA or cDNA templates, and low-copy targets.

Features and Benefits

- **Sensitivity**
  Higher amplification efficiency and sensitivity than other enzyme products by using lambda DNA and human gDNA as a template.
- **Long Range PCR**
  Effective amplification especially lambda DNA up to 30 kb and human gDNA up to 21 kb.
- **Reproducibility**
  Reproducible results with uniform quality products for each batch under the ISO 9001 quality system.

Applications

- Primer extension
- Long-range amplification from genomic DNA
- High amplification efficiency
- Excellent performance on difficult templates
- Amplification of low-copy targets
- High yield and high sensitivity PCR

Specifications

- 5' → 3' exonuclease: Yes
- 3′ → 5′ exonuclease: Yes
- 3′ – A overhang: Yes
- Fragment size: ~ 30 kb

Components

- **10X reaction buffer with (or without) $MgCl_2$:** Tris-HCl, KCl, 15 mM $MgCl_2$, pH 9.0
- **Dilution buffer:** 20 mM Tris-HCl, 0.5 mM EDTA, 1 mM DTT, 100 mM KCl, Stabilizers, 50 % Glycerol, pH 8.0
- **10 mM dNTPs mix:** 2.5 mM of each dNTP

Concentration

250 Units (5 U/μl)

Storage Condition

20 mM Tris-HCl, 0.5 mM EDTA, 1 mM DTT, 100 mM KCl, Stablizers, 50% Glycerol, pH 8.0

Storage Temperature

-20℃

ProFi Taq DNA Polymerase

Experimental Data

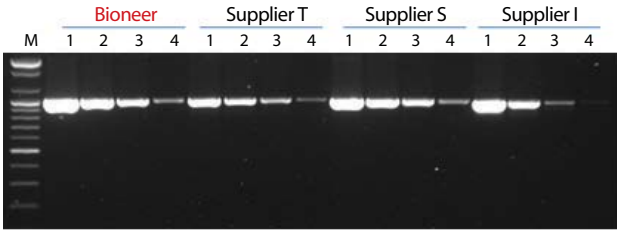


Figure 1. Comparison of PCR amplification efficiency between *ProFi Taq* DNA Polymerase from Bioneer and other suppliers' DNA polymerase.

The cycling conditions for *ProFi Taq* DNA Polymerase were 95℃ for 5 min, 30 cycles of 95℃ for 20 sec, 55℃ for 20 sec and 72℃ for 30 sec. PCR reaction using other suppliers' DNA polymerase were performed according to each supplier's protocol.
Target: human Insulin receptor gene.
Lane 1: 10 ng of human genomic DNA
Lane 2: 1 ng of human genomic DNA
Lane 3: 100 pg of human genomic DNA
Lane 4: 10 pg of human genomic DNA
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

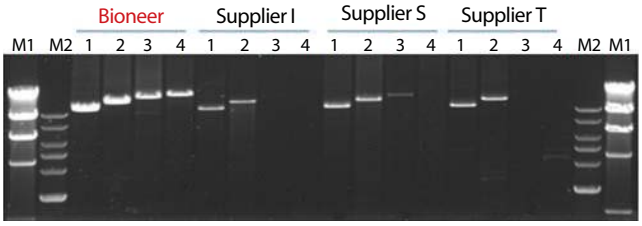


Figure 2. Comparison of PCR amplification of long targets between *ProFi Taq* DNA Polymerase from Bioneer and other suppliers' DNA polymerase.

The cycling conditions for *ProFi Taq* DNA Polymerase were 95℃ for 5 min, 32 cycles of 95℃ for 20 sec and 68℃ for 15 min. PCR reactions using other suppliers' DNA polymerase were performed according to each supplier's protocol. Human genomic DNA was used as a template for PCR amplification.
Lane 1: 11 kb fragment Lane 2: 13.5 kb fragment
Lane 3: 17.6 kb fragment Lane 4: 21.4 kb fragment
M1: Lambda DNA/*Hin*d III marker (Cat. No. D-1050, Bioneer)
M2: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

Ordering Information

Cat. No.	Product Description				
	ProFi *Taq* DNA Polymerase	10X Reaction Buffer	Dilution Buffer	10 mM dNTP	20 mM $MgCl_2$
E-2201	250 U	1 ml (with $MgCl_2$)	1 ml	1 ml	-
E-2202		1 ml (without $MgCl_2$)		1 ml	1 ml
E-2203		1 ml (with $MgCl_2$)		-	-
E-2204		1 ml (without $MgCl_2$)		-	1 ml
E-2205	1,000 U	1 ml (with $MgCl_2$)		1 ml	-
E-2206		1 ml (without $MgCl_2$)		1 ml	1 ml
E-2207		1 ml (with $MgCl_2$)		-	-
E-2208		1 ml (without $MgCl_2$)		-	1 ml

HotStart DNA Polymerase

Unique Enzyme-mediated HotStart DNA Polymerase

Description

HotStart DNA polymerase inhibits PCR by using pyrophosphate (PPi) to trap Mg^{2+} ions essential for PCR, then breaking the PPi down by using heat resistant enzyme pyrophosphatase (PPase) as the temperature increases while processing the PCR reaction.

General Equation of PCR

Template + Primer + Mg^{2+} +dNTP ⇄ Elongation + 2Pi

Among the typical PCR reaction components, Mg^{2+} plays an important role in the activity of DNA polymerase. Inhibiting the function of Mg^{2+} in the early stages of PCR using PPi, which is strongly bound to Mg^{2+}, can minimize non-specific amplification. When PPase and PPi are added to the PCR reaction solution, PPi binds to Mg^{2+} to form Mg^{2+} -PPi complex and inhibits the PCR reaction, thereby preventing non-specific reactions occurring in the early stage of PCR. After that, when the PCR reaction solution is 70℃ or higher, PPase is activated, PPi is decomposed into 2Pi, and dissociates with Mg^{2+} to proceed with normal PCR reaction. It also increases PCR reactivity by breaking down PPi, a reaction by product, and a PCR inhibitor, PPi, into 2Pi. First of all, since no antibody is used, the antibody removal step is not necessary, which has the advantage of shortening the PCR reaction time.

Features and Benefits

- **High sensitivity and specificity**
  Reduced generation of non-specific responses and primer-dimer formation during the mixing of PCR components by inhibiting DNA polymerase activity at the room temperature.
- **Improve product yields**
  Improved yield of target DNA through its high sensitivity and specificity.
- **Reproducibility**
  Reproducible results with uniform quality products for each batch under the ISO 9001 quality system.

Application

- HotStart PCR, PCR with complex genomic templates/low-copy templates/cDNA
- Multiplex PCR
- Primer extension
- SNP typing
- Real-Time PCR using dsDNA binding dye
- Multiple primer pairs and amplification of low-copy template DNA

Specifications

- 5' → 3' exonuclease activity: No
- 3' → 5' exonuclease activity: No
- 3' – A overhang: Yes
- Fragment size: ~ 12 kb

Components

- **10X reaction buffer:** Tris-HCl, KCl, Pyrophosphate, pH 9.0
- **1X dilution buffer:** 50% glycerol containing 50 mM Tris-HCl, 0.1 mM EDTA, 1 mM DTT, stabilizers, pH 8.2
- **10 mM dNTPs mix:** 2.5 mM of each dNTP
- **20 mM $MgCl_2$**

Concentration

250 Units (5 U/μl)

Storage Conditions

50% glycerol containing 20 mM Tris-HCl, 0.5 mM EDTA, 1 mM DTT, 100 mM KCl, stabilizers, pH 8.0

Storage Temperature

-20℃

Definition of Unit

One unit is defined at the amount of enzyme that will incorporate 10 nmole of dNTP into acid-insoluble material in 30 min at 72℃.

HotStart DNA Polymerase

Experimental Data

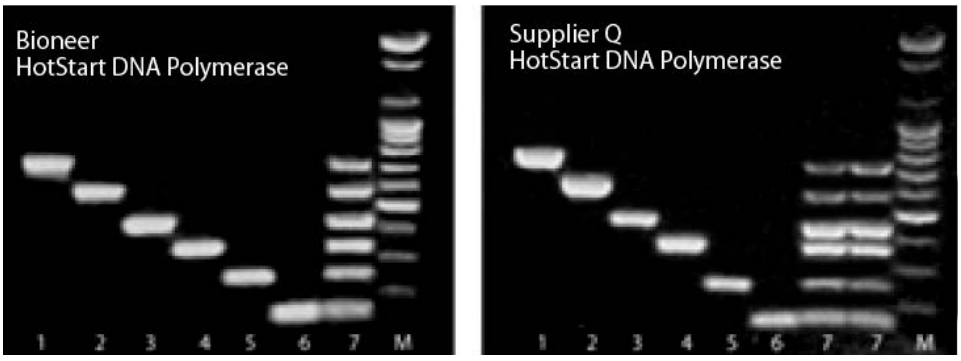


Figure 1. Multiplex PCR comparison of genomic DNA using 6 sets of primers and 2 different DNA polymerases.

Lane 1: 750 bp fragment Lane 2: 590 bp fragment Lane 3: 450 bp fragment
Lane 4: 360 bp fragment Lane 5: 260 bp fragment Lane 6: 150 bp fragment
Lane 7: Multiplex PCR with primers used for Lane 1~6
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Ordering Information

Cat. No.	Product Description				
	HotStart DNA Polymerase	10X Reaction Buffer	Dilution Buffer	10 mM dNTP	20 mM $MgCl_2$
E-3150	250 U	0.5 ml	0.5 ml	0.5 ml	0.5 ml
E-3150-1				-	0.5 ml
E-3151	1,000 U	0.5 ml x 4 ea	0.5 ml x 4 ea	0.5 ml x 4 ea	-

HotStart *Taq* DNA Polymerase

For Increased Specificity and Robust Sensitivity

Description

HotStart *Taq* DNA Polymerase prevents non-specific amplification caused by mispriming or primer-dimer formation, which may occur during the mixing of PCR reactants at the room temperature.

Features and Benefits

- **Sensitivity**
  High sensitibity capable of undergoing PCR with a small amount of template by reducing unnecessary reactions.
- **Specificity**
  Reduced generation of non-specific priming by inhibiting DNA polymerase activity at room temperature while mixing the PCR reactants.
- **Reproducibility**
  Reproducible results with uniform quality products for each batch under the ISO 9001 quality system.

Application

- Real-Time quantification of DNA and cDNA targets using dsDNA binding dye
- HotStart PCR
- Multiplex PCR
- Automated PCR

Specifications

- 5' → 3' exonuclease activity: Yes
- 3' → 5' exonuclease activity: No
- 3' – A overhang: Yes
- Fragment size: ~ 10 kb

Reagents Supplied

- **10X Reaction Buffer:** Tris-HCl, KCl, 15 mM $MgCl_2$, pH 9.0
- **Dilution Buffer:** 20 mM Tris-HCl, 0.5 mM EDTA, 1 mM DTT, 100 mM KCl, Stabilizers, 50% Glycerol of each dNTP
- **10 mM dNTPs mix:** 2.5 mM of each dNTP

Concentration

250 Units (5 U/μl)

Storage Conditions

20 mM Tris-HCl, 0.5 mM EDTA, 1 mM DTT, 100 mM KCl, Stabilizers, 50% Glycerol, pH 8.0

Storage Temperature

-20℃

Definition of Unit

One unit is defined at the amount of enzyme that will incorporate 10 nmole of dNTP into acid-insoluble material in 30 min at 72℃.

Experimental Data

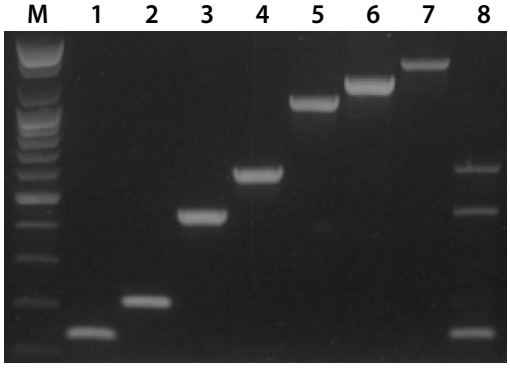


Figure 1. Specificity comparison between standard *Taq* and HotStart *Taq* DNA Polymerase. Single and Multiple PCR results in human genomic DNA p53 gene amplification.

Lane 1: 139 bp Lane 2: 211 bp
Lane 3: 447 bp Lane 4: 618 bp
Lane 5: 1,082 bp Lane 6: 1,296 bp
Lane 7: 1,561 bp
Lane 8: Multiplex PCR (139 bp, 447 bp, 618 bp)
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

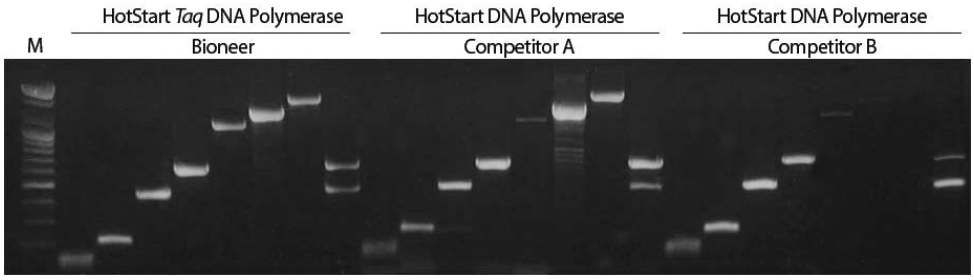


Figure 2. Specificity comparison between HotStart *Taq* polymerase and other company's products.
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Ordering Information

Cat. No.	Product Description			
	HotStart *Taq* DNA Polymerase	10X Reaction Buffer with $MgCl_2$	Dilution Buffer	10 mM dNTP
E-2017	250 U	0.5 ml		0.5 ml
E-2017-3				-
E-2017-2	500 U	0.5 ml x 2 ea		
E-2017-1	1,000 U	0.5 ml x 4 ea		0.5 ml x 4 ea
E-2017-4				-

MicroBiome Assay *Taq* DNA Polymerase

Prevention of contamination by host cell *E. coli* genomic DNA

Description

While most of the *Taq* DNA polymerase products have high chance of being contaminated by host cell *E. coli* genomic DNA, our MBA (MicroBiome Assay) *Taq* DNA has been purified with our own technology, which can minimize the host cell gDNA contamination and be effectively used for detection of micro-organisms with 16S rRNA specific primers.

Features and Benefits

- **Minimized DNA contamination**
  Reduced false positives caused by host cell DNA contamination and other errors from unwanted PCR products during microbial PCR assay.
- **High sensitivity and amplification efficiency**
  Optimized for microbial PCR assay and 16s rRNA researches by using the innovative purification technology developed by BIONEER to minimize host cell DNA contamination.
- **Reproducibility**
  Reproducible results with uniform quality products for each batch under the ISO 9001 quality system.

Application

- Routine PCR, multiplex PCR and qPCR
- Allele specific PCR
- 16S and 23S rRNA gene amplification
- Detection of bacteria in samples (e.g. blood)
- DNA labeling reaction & TA-cloning

Specifications

- 5' → 3' exonuclease activity: Yes
- 3' → 5' exonuclease activity: No
- 3' – A overhang: Yes
- Fragment size: ~ 8 kb

Components

- **10X reaction buffer without $MgCl_2$:** 200 mM Tris-HCl, 500 mM KCl Tween 20 0.1%
- **Dilution Buffer:** 20 mM Tris-HCl, 0.5 mM EDTA, 1 mM DTT, 100 mM KCl, 50% Glycerol, pH 7.4
- **10 mM dNTPs mixture:** 2.5 mM of each dNTP
- **$MgCl_2$ Solution:** 20 mM

Concentration

500 Units (5 U/μl)

Storage Conditions

20 mM Tris-HCl, 0.5 mM EDTA, 1 mM DTT, 100 mM KCl, Stabilizers, 50% Glycerol, pH 8.0

Storage Temperature

-20℃

Definition of Unit

One unit is defined at the amount of enzyme that will incorporate 10 nmole of dNTP into acid-insoluble material in 30 min at 72℃.

Experimental Data

Sensitivity and *E.coli* gDNA Low Contamination Confirm

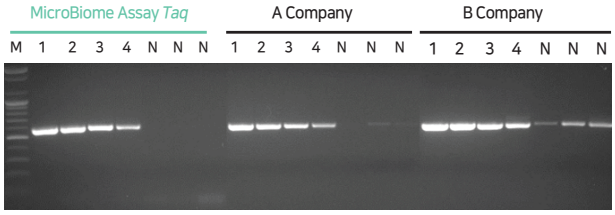


Figure 1. High sensitivity and Low Contamination DNA of MicroBiome Assay *Taq* DNA polymerase.

Lane 1: *E.coli* gDNA 100 pg
Lane 2: *E.coli* gDNA 10 pg
Lane 3: *E.coli* gDNA 1 pg
Lane 4: *E.coli* gDNA 100 fg
N: Non-Template

Ordering Information

Cat. No.	Product Description				
	MBA *Taq* DNA Polymerase	10X Reaction Buffer	Dilution Buffer	10 mM dNTP	20 mM $MgCl_2$
E-3504	500 U	1 ml (without $MgCl_2$)	1 ml	1 ml	1 ml

02. RNA Amplification

AccuPower® RT PreMix & Master Mix

For Standard cDNA Synthesis with *M-MLV* RTase

Description

AccuPower® RT PreMix contains premixed dried components essential for cDNA synthesis such as reverse transcriptase and RNase inhibitor, allowing RT reaction to simply start by just adding the RNA, primers, and D.W. Furthermore, by using the RNase H+ of *M-MLV* Reverse Transcriptase, template RNA is removed after the cDNA synthesis to minimize the effect of residual template RNA in PCR reaction.

Features and Benefits

- **Easy-of-use**
  Simplified procedures with all components essential for cDNA synthesis, including the primers, added in the kit to perform the RT reaction immediately just by adding the RNA to be amplified and D.W.
- **Stability**
  In the *AccuPower*® RT PreMix, the reaction components are premixed with a special stabilizer prior to a freeze-drying step to preserve the stability of the components and the activity of the RTase during storage.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- First-strand synthesis of cDNA from RNA molecules (RT)
- RT-PCR
- Random priming reaction
- cDNA library construction
- Probe labeling
- mRNA 5′ end mapping by primer extension analysis
- Real-Time PCR

Specifications

- Enzyme: *M-MLV* RTase
- DNase activity: No
- RNase activity: No
- Fragment size: ~ 9 kb

Storage Temperature

-20℃

Experimental Data

Specific Amplification

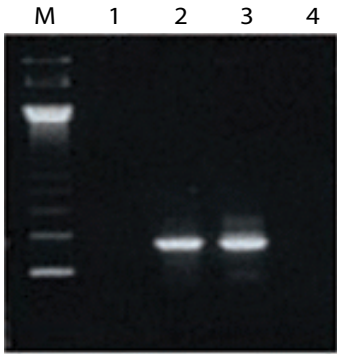


Figure 1. Specific amplification of 5′-UTR region of HCV with *AccuPower*® RT PreMix.

Lane 1: negative control
Lane 2,3: HCV positive serum
Lane 4: HCV negative serum
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Reliability and Reproducibility Test

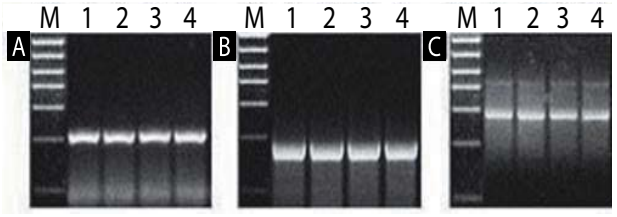


Figure 2. *AccuPower*® RT PreMix from each lot was tested to confirm reliability and reproducibility.

Human total RNA (panel A: actin, panel B: globin) and hog cholera virus RNA (panel C) were used as template. Following cDNA synthesis, *AccuPower*® PCR PreMix was used to amplify target genes.
Lane 1-4: Reliability test of each lot with *AccuPower*® RT PreMix
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Sensitivity & Reproducibility

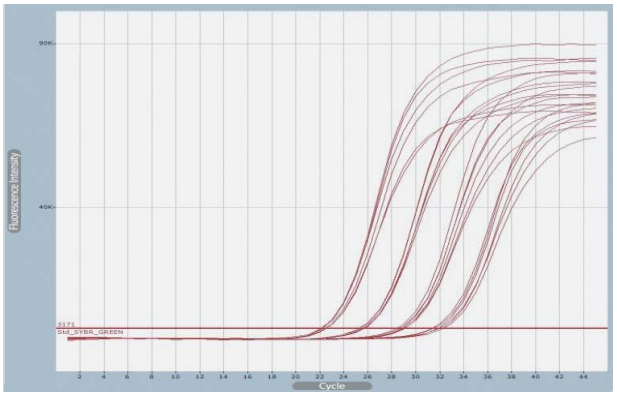


Figure 3. Amplification of GAPDH target gene was detected using human total RNA (from 10 ng to 10 pg) with *AccuPower*® RT PreMix.

Lanes 1-4; 10 ng, 1 ng, and 100 pg, 10 pg of total RNA from HeLa cells, respectively.

Ordering Information

Cat. No.	Product Description			
K-2041	*AccuPower*® RT PreMix	0.2 ml thin-wall 8-strip tubes with attached cap	96 tubes	20 µl/rxn
K-2043				50 µl/rxn (with dye)
K-2041-B			480 tubes	20 µl/rxn
K-2043-B				50 µl/rxn (with dye)
K-2040		0.5 ml thin-wall tubes with attached cap	100 tubes	20 µl/rxn (with dye)
K-2042				50 µl/rxn (with dye)
K-2261-1		thin-wall 96-well flat plate		10 µl/rxn
K-2261-4				20 µl/rxn
K-2261-2		thin-wall 96-well full-skirted plate		10 µl/rxn
K-2261-5				20 µl/rxn
K-2261-3		thin-wall 96-well semi-skirted plate		10 µl/rxn
K-2261-6				20 µl/rxn
K-2082-1		thin-wall 384-well full-skirted plate		5 µl/rxn
K-2082-2				10 µl/rxn
K-2082-3				20 µl/rxn
K-2263	*AccuPower*® RT MasterMix	1 ml of 2X Master mix solution		

* The RT series does not contain tracking dyes for eletrophoresis, with the exception of some products.

AccuPower® RT-PCR PreMix & Master Mix

For One-step RT-PCR with *M-MLV* RTase and *Top* DNA Polymerase

Description

AccuPower® RT-PCR PreMix utilizes one-step RT-PCR capable of undergoing economical sequential reactions of cDNA synthesis and two-step PCR protocols in a single tube using low-copy RNA (viral RNA) or mRNA. Furthermore, as the each tube contains all the necessary components sufficient for a single run, cross contaminations by the repetitive use of master mix can be avoided.

Features and Benefits

- **Ease-of-use**
  All the required components for cDNA synthesis and PCR, such as *M-MLV* reverse transcriptase and *Top* DNA polymerase are premixed in optimal concentrations. The user only adds the purified target RNA, primers and D.W., and the reaction is ready to start.
- **Stability**
  In the *AccuPower*® RT-PCR PreMix contains a special stabilizer to preserve the stability of the components and the activity of the RTase during storage. It is stable for 2 years at -20℃.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- First-strand synthesis of cDNA from RNA molecules (RT)
- RT-PCR
- cDNA library construction
- Gene expression analysis

Specifications

- Enzyme: *M-MLV* RTase, *Top* DNA polymerase
- 5' → 3' exonuclease: No
- 3' → 5' exonuclease: No
- 3' – A overhang: Yes
- Fragment size: ~ 5 kb

Storage Temperature

-20℃

Experimental Data

Sensitivity

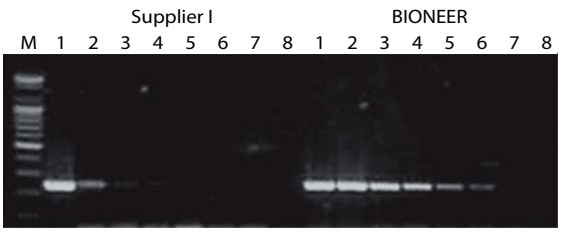


Figure 1. Sensitivity comparison between *AccuPower*® RT-PCR PreMix and Supplier I RT-PCR kit.

Each 10^9 ~ 10^3 copies of PSTVd (Potato Spindle Tber Viroid) used for RT-PCR and the same volume of each RT-PCR product was used for electrophoresis
Lane 1: 10^9 copy Lane 2: 10^8 copy Lane 3: 10^7 copy
Lane 4: 10^6 copy Lane 5: 10^5 copy Lane 6: 10^4 copy
Lane 7: 10^3 copy Lane 8: NTC
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Reproducibility

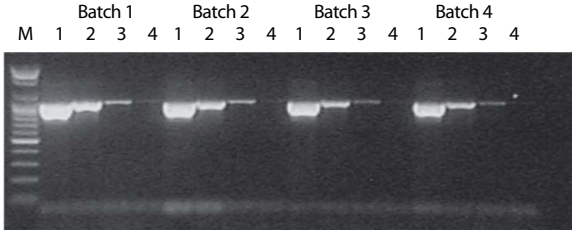


Figure 2. Comparison of reproducibility test for *AccuPower*® RT-PCR PreMix batch 1, 2, 3 and batch 4 products using serial diluted human total RNA.

Lane 1: 10 ng human total RNA from HeLa cell
Lane 2: 1 ng human total RNA from HeLa cell
Lane 3: 100 pg human total RNA from HeLa cell
Lane 4: 10 pg human total RNA from HeLa cell
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

Ordering Information

Cat. No.	Product Description			
K-2055	*AccuPower*® RT-PCR PreMix	0.2 ml thin-wall 8-strip tubes with attached cap	96 tubes	20 µl/rxn
K-2057				50 µl/rxn
K-2055-B			480 tubes	20 µl/rxn
K-2057-B				50 µl/rxn
K-2056		0.5 ml thin-wall tubes with attached cap	100 tubes	50 µl/rxn
K-2262-1		thin-wall 96-well flat plate		10 µl/rxn
K-2262-4				20 µl/rxn
K-2262-2		thin-wall 96-well full-skirted plate		10 µl/rxn
K-2262-5				20 µl/rxn
K-2262-3		thin-wall 96-well semi-skirted plate		10 µl/rxn
K-2262-6				20 µl/rxn
K-2084-1		thin-wall 384-well full-skirted plate		5 µl/rxn
K-2084-2				10 µl/rxn
K-2084-3				20 µl/rxn
K-2264	*AccuPower*® RT-PCR MasterMix	1 ml of 2X Master mix solution		

AccuPower® *CycleScript*™ RT PreMix & Master Mix

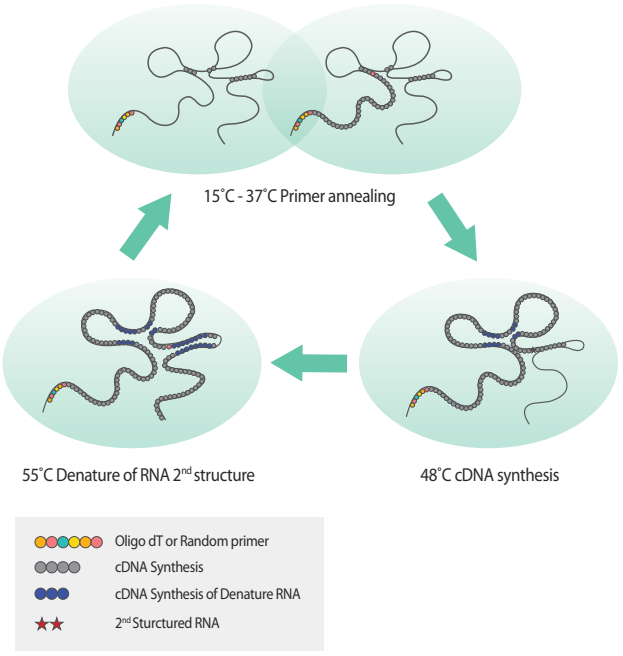
For High Performance cDNA Synthesis from rare templates with CycleScript *M-MLV* RTase

Description

AccuPower® *CycleScript*™ RT PreMix is applied with Bioneer's patent technology called Cyclic Temperature Reverse Transcription (CTRT), which not only increases the efficiency, but also is effective for full-length cDNA synthesis.
Furthermore, this product is compatible with products including oligo dT_{20}, dN_6, and dN_{12} primers and contains all the components necessary for cDNA synthesis, allowing it to conveniently start the process just by adding the template RNA and D.W.

The Fixed Temperature Reverse Transcription (FTRT) and cyclic reverse transcription reaction (CTRT) process is as follows:

- Conventional Reverse Transcription (FTRT)
  - Step 1: RNA denaturation at 65℃ for 10 min
  - Step 2: cDNA synthesis at a temperature between 37℃-55℃ for 15-60 min
- Cyclic Reverse Transcription (CTRT)
  - Step 1: Primer annealing at a temperature between 25℃ and 40℃ for 30 sec
  - Step 2: cDNA synthesis at a temperature between 42℃ and 48℃ for 4 min
  - Step 3 (optional): Denaturation of the secondary structure of the RNA template and cDNA synthesis at a temperature between 50℃ and 55℃ for 30 sec



* In the above reaction, temperature, time and number of cycles can be selectively set according to the experimental conditions.

Features and Benefits

- **Flexible Reaction Conditions**
  CTRT (Cyclic Temperature Reverse Transcription) performing a primer annealing stage at a range of low temperature from 15 to 40℃) and the release of secondary structure of template DNA by repeating the step 2 or 3 times at a range of high temperature from 50 to 55℃, allowing more efficient synthesis of cDNA with higher temperature than the traditional methods undergoing the process at 42℃.
- **Stability**
  In the *AccuPower*® CycleScript RT PreMix, the reaction components are premixed with a special stabilizer prior to a freeze-drying step to preserve the stability of the components and the activity of the RTase during storage. Stable for 2 years at -20℃.
- **Controllable Reaction Time**
  Varied reaction time depending on the number and size of copies of the gene to be amplified, with synthesis high-copy gene cDNA within 10 minutes through reverse transcription reaction.
- **Ease-of-use**
  Simplified procedures with all components essential for cDNA synthesis, including the primers, added in the kit to perform the RT reaction immediately just by adding the RNA to be amplified and D.W..

- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Sequencing single and double-strand DNA or RNA
- RT-PCR
- Random priming reaction
- cDNA library construction
- Probe labeling
- mRNA 5'-end mapping by primer extension analysis
- Real-Time PCR

Specifications

- Enzyme: *CycleScript*™ RTase
- DNase activity: No
- RNase activity: No
- Fragment size: ~ 9 kb

Storage Temperature

-20℃

Experimental Data

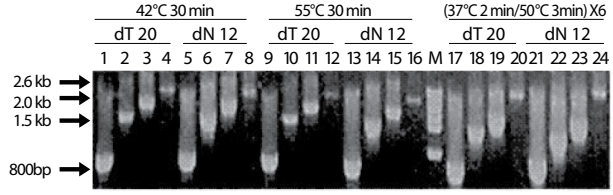


Figure 1. Reaction conditions of CTRT compared with that of conventional RT.

The conventional fixed temperature RT reactions at 42℃ and 55℃ and cyclic temperature RT reactions at 37℃ and 50℃ using HeLa cell total RNA (800 ng each) were performed 800 bp, 1.5 kb, 2.0 kb, and 2.6 kb fragments of human transferrin receptor gene were amplified with each primer. *AccuPower® CycleScript*™ RT PreMix series (dT_{20} & dN_{12}) preferably shows good results at CTRT reaction condition.

Figure 2. Gene amplification test of transferrin receptor compared with other companies.

The reaction condition was performed according to each manufacturer's recommendation. All cDNAs were reacted with *AccuPower®* PCR PreMix (Cat. No. K-2012, Bioneer).
Lane 1~5: *AccuPower® CycleScript*™ RT PreMix (dT_{20}) incubated at 55℃ for 1 hr
Lane 6~10: *AccuPower® CycleScript*™ RT PreMix (dN_{12}) incubated at 55℃ for 1 hr
Lane 11~15: C company's RT product including dT primer incubated at 42℃ for 1 hr
Lane 16~20: C company's RT product including random primer incubated at 42℃ for 1 hr
Lane 21~25: I company's RT product including dT primer incubated at 45℃ for 1 hr
Lane 26~30: I company's RT product including random primer incubated at 45℃ for 1 hr
M: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

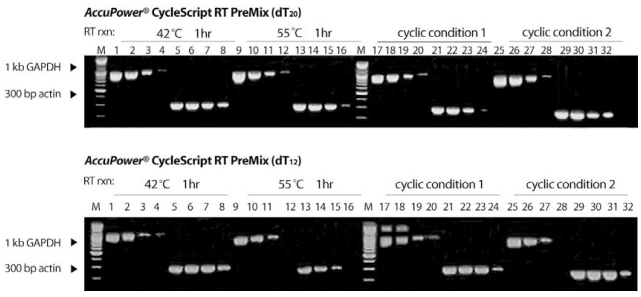


Figure 3. RT reaction at various temperature and short reaction time.

Rxn. condition: conventional 42℃ 1 hr, 55℃ 1hr & cyclic reaction 1: (37℃ 2 min/50℃ 3 min) X 12, cyclic reaction 2: (37℃ 1 min/ 47℃ 3 min/ 55℃ 1 min) X 12. This product shows thermal stability.
Target: Human GAPDH, human β-actin
Lane 1, 5, 9, 13, 17, 21, 25 & 29: HeLa cell total RNA 100 ng
Lane 2, 6, 10, 14, 18, 22, 26 & 30: HeLa cell total RNA 10 ng
Lane 3, 7, 11, 15, 19, 23, 27 & 31: HeLa cell total RNA 1 ng
Lane 4, 8, 12, 16, 20, 24, 28 & 32: HeLa cell total RNA 100 pg
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

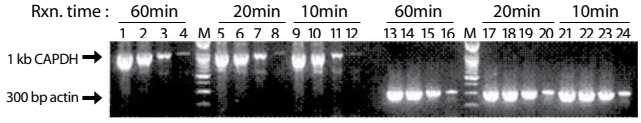


Figure 4. Amplification results at various reaction times.

CycleScript™ RT PreMix (dT_{20}) was performed cyclic temperature RT according to (37℃ 2 min/50℃ 3 min); X12, X4, X2 cycles. 10 min reaction is enough. HeLa cell total RNA templates were serially diluted such as 100 ng, 10 ng, 1 ng, 100 pg.
10 min: 2 times of 2 minutes at 37℃ and 3 minutes at 50℃
20 min: 4 times of 2 minutes at 37℃ and 3 minutes at 50℃
60 min: 12 times of 2 minutes at 37℃ and 3 minutes at 50℃
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)
Lane 1, 5, 9, 13, 17, 21: 100 ng of HeLa cell total RNA used for reaction
Lane 2, 6, 10, 14, 18, 22: 10 ng of HeLa cell total RNA used for reaction
Lane 3, 7, 11, 15, 19, 2: 1 ng of HeLa cell total RNA used for reaction
Lane 4, 8, 12, 16, 20, 24, 28, 32: 100 pg of HeLa cell total RNA used for reaction
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)

AccuPower® CycleScript™ RT PreMix & Master Mix

Ordering Information

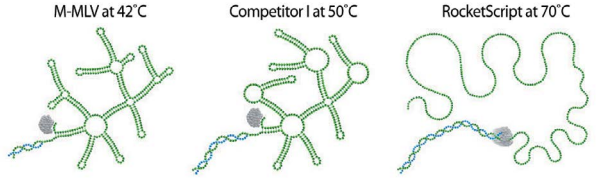
Cat. No.	Product Description				
K-2046	*AccuPower® CycleScript™* RT PreMix	0.2 ml thin-wall 8-strip tubes with attached cap	96 tubes	20 µl/rxn	dN6
K-2045					dN12
K-2044					dT20
K-2049				50 µl/rxn	dN6
K-2048					dN12
K-2047					dT20
K-2046-B			480 tubes	20 µl/rxn	dN6
K-2045-B					dN12
K-2044-B					dT20
K-2049-B				50 µl/rxn	dN6
K-2048-B					dN12
K-2047-B					dT20
K-2050-2		0.5 ml thin-wall tubes with attached cap	100 tubes	50 µl/rxn	dN6
K-2050-1					dN12
K-2050					dT20
K-2051	*AccuPower® CycleScript™* RT MasterMix	1 ml of 2X Master mix solution			

AccuPower® RocketScript™ RT PreMix & Master Mix

For High Temperature cDNA Synthesis with Thermostable *RocketScript™ M-MLV* RTase

Description

AccuPower® RocketScript™ RT PreMix, RNase H Minus uses *RocketScript™* RTase, RNase H Minus developed by Bioneer. By using our own unique genetic technology to not only eliminate RNase H activity for efficient synthesis using long target RNA, but also increase extensibility and sensitivity, capable of undergoing cDNA synthesis even at minuscule scales of 1 pg of human total RNA. Furthermore, all the components required for cDNA synthesis are premixed and vacuum-dried, allowing the RT reaction to be initiated just by adding the template RNA, the primers and D.W.



Note: Schematic representation of the 5′ UTR of a gene, with complex secondary structure, at three different temperatures. Note that *RocketScript™* RTase shows full activity at 70℃ allowing it to synthesize the complete gene sequence where *M-MLV* and other Reverse Transcriptase's fail.

Features and Benefits

- **Thermostable Activity**
  Excellent thermal resistance of *RocketScript™* RTase active even at 70℃, making it suitable for cDNA synthesis of secondary RNA structure with comprehensive selection of compatible temperature ranging from 42 to 70 ℃ depending on the required experimental condition and effective cDNA synthesis.
- **Sensitivity**
  RocketScript™ has enhanced performance to handle both high and low input RNA concentrations as well as short and long RT target sizes.
- **Ease-of-use**
  All of the required components for cDNA synthesis such as RTase, RNase inhibitor, dNTPs and reaction buffer are contained in the premix. Simply add template RNA, primer and D.W. to start your reaction.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- First-strand synthesis of cDNA from RNA molecules (RT)
- RT-PCR
- Random priming reactions
- cDNA library construction
- Probe labeling
- mRNA 5′-end mapping by primer extension analysis
- Real-Time PCR

Specifications

- Enzyme: *RocketScript™* RTase
- DNase activity: No
- RNase activity: No
- Fragment size: ~ 10 kb

Storage Temperature

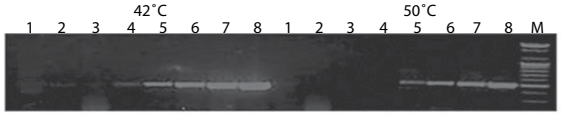
-20℃

AccuPower® RocketScript™ RT PreMix & Master Mix

Experimental Data

Thermostable Activity

A) *Supplier I Reverse Transcriptase*



B) *AccuPower® RocketScript™* RT PreMix

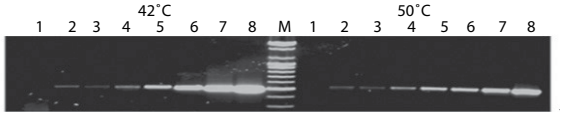
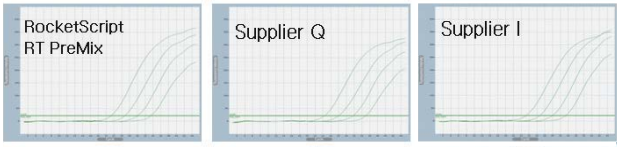


Figure 1. Sensitivity comparison between *AccuPower® RocketScript™* RT PreMix and *M-MLV* RTase.

Sensitivity results of *AccuPower® RocketScript™* RT PreMix using GAPDH compared with conventional reverse transcriptases.
Each 100 ng - 10 fg of total RNA used for RT and the same amount of RT products used for electrophoresis.
Lane 1: 10 fg human total RNA from HeLa cell
Lane 2: 100 fg human total RNA from HeLa cell
Lane 3: 1 pg human total RNA from HeLa cell
Lane 4: 10 pg human total RNA from HeLa cell
Lane 5: 100 pg human total RNA from HeLa cell
Lane 6: 1 ng human total RNA from HeLa cell
Lane 7: 10 ng human total RNA from HeLa cell
Lane 8: 100 ng human total RNA from HeLa cell

Sensitivity Test



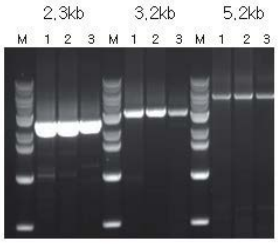
Concentration	*RocktScript™* RT PreMix	Supplier Q	Supplier I
10,000	23.91	25.63	24.43
1,000	27.33	28.92	28.03
100	30.62	32.42	30.88
10	33.63	35.43	33.95
Efficiency	104%	103%	108%
Linearity	0.99999	0.9996	0.9995

Figure 2. Sensitivity comparison between *AccuPower® RocketScript™* RT PreMix and Supplier RTases using Real-Time PCR.

Reverse transcription conditions: conventional 1 hr incubation at 60℃, deactivation at 95℃ for 5 min
All cDNAs were amplified with *AccuPower® DualStar™* qPCR PreMix (Cat. No. K-6110, Bioneer).

Enhanced Performance

A) *AccuPower® RocketScript™* RT PreMix (RT at 50℃)



B) Supplier I Reverse Transcriptase (RT at 50℃)

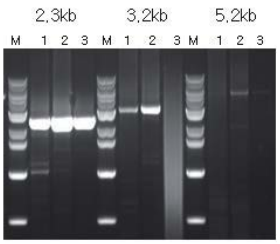


Figure 3. Comparison of amplification efficiency between *AccuPower® RocketScript™* RT PreMix (A) and competitors *M-MLV* RTase (B).

RocketScript™ is able to handle a wide range of sample concentrations and transcript lengths so your downstream applications are minimally affected by the reverse transcription step.
Lane 1-3: 1,000 ng, 100 ng and 10 ng of total RNA from HeLa cells, respectively.
Note: Competitor products show inhibition at high input concentrations of total RNA

Ordering Information

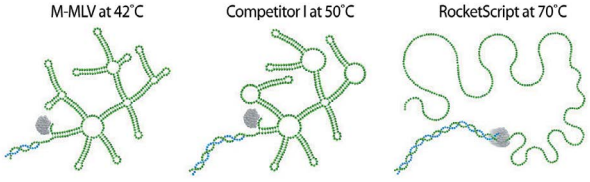
Cat. No.	Product Description			
K-2101	*AccuPower® RocketScript™* RT PreMix	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-2103				50 µl/rxn
K-2102			480 tubes	20 µl/rxn
K-2104				50 µl/rxn
K-2105	*AccuPower® RocketScript™* RT MasterMix	1 ml of 2X Master mix solution		

AccuPower® *RocketScript*™ Cycle RT PreMix & Master Mix

For High Performance/High Temperature cDNA Synthesis with Thermostable *RocketScript*™ RTase and Cyclic Temperature Reverse Transcription (CTRT)

Description

AccuPower® *RocketScript*™ Cycle RT PreMix is a next generation cDNA synthesis kit that combines technologies developed by Bioneer: Thermostable RTase (*RocketScript*™ Reverse Transcriptase) and Cyclic Temperature Reverse Transcription (CTRT). This not only allows cDNA synthesis at a low concentration of RNA, but also conveniently contains all the components necessary for the process. Furthermore, this product is compatible with products including oligo dT_{20}, dN_6, and dN_{12} primers and contains all the components necessary for cDNA synthesis, allowing it to conveniently start the process just by adding the template RNA.



Note: Schematic representation of the 5' UTR of a gene, with complex secondary structure, at three different temperatures. Note that *RocketScript*™ shows full activity at 70℃ allowing it to synthesize the complete gene sequence where *M-MLV* and other Reverse Transcriptase's fail.

Features and Benefits

- **Sensitivity & Efficiency**
  The fusion technology of the cyclic temperature reverse transcription reaction and thermostable RTase (*RocketScript*™ RTase) increases sensitivity and efficiency, making it easy to synthesize cDNA from low concentrations of RNA by controlling the number of cycles.
- **Thermostable Activity**
  The outstanding thermal stability *RocketScript*™ RTase, which is active at 70℃, is suitable for cDNA synthesis of secondary structure RNA. The cDNA synthesis temperature can be set to a variety of temperatures from 42 to 70℃, effectively cDNA synthesis.
- **Easy-of-use**
  Simplified procedure by including all components necessary for cDNA synthesis such as Thermostable Reverse Transcriptase, RNase inhibitor, primer, etc. to immediately perform the reaction just by adding RNA to be amplified and D.W.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- First-strand synthesis of cDNA from RNA molecules (RT)
- RT-PCR
- Random priming reactions
- cDNA library construction
- Probe labeling
- mRNA 5'-end mapping by primer extension analysis
- Real-Time PCR

Specifications

- Enzyme: *RocketScript*™ RTase
- DNase activity: No
- RNase activity: No
- Fragment size: ~ 10 kb

Storage Temperature

-20℃

AccuPower® RocketScript™ Cycle RT PreMix & Master Mix

Experimental Data

Thermostable Activity

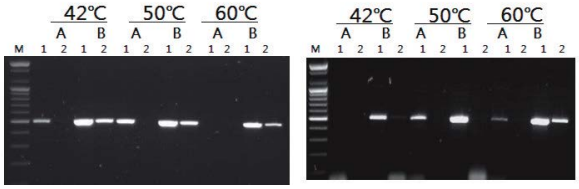


Figure 1. Complex RNA amplification results of *AccuPower® RocketScript™* Cycle RT PreMix.

Each target gene (MYC, TFRC) was amplified after performing reverse transcription with *AccuPower® RocketScript™* Cycle RT PreMix.
Rxn. conditions: Conventional 1 hr incubation at 42℃, 50℃, or 60℃, deactivation at 95℃ for 5 min
A: *M-MLV* Reverse Transcriptase
B: *AccuPower® RocketScript™* Cycle RT PreMix with Oligo (dT_{20})
Lane 1: 100 ng Human total RNA from HeLa cell
Lane 2: 10 ng Human total RNA from HeLa cell

Sensitivity & Full-length cDNA synthesis

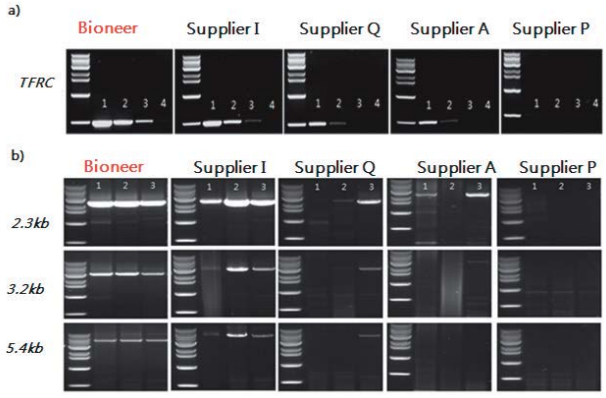
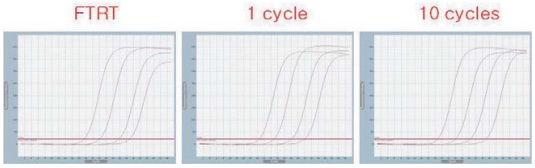


Figure 2. Comparison of amplification efficiency between *AccuPower® RocketScript™* Cycle RT PreMix and competitors' RTases.

(a) Sensitivity test
Target: Human TFRC
Lane 1: 100 ng human total RNA from HeLa cell
Lane 2: 10 ng human total RNA from HeLa cell
Lane 3: 1 ng human total RNA from HeLa cell
Lane 4: 100 pg human total RNA from HeLa cell
Lane M: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)
RT reaction condition is performed according to each manufacturer's recommendations.
(b) Full-Length cDNA synthesis test
RT reactions were performed according to each manufacturer's recommendation. All cDNAs were amplified with *AccuPower®* HotStart PCR PreMix (K-5050) from Bioneer
Note: Competitor products show inhibition at high input concentrations of total RNA.
Lane 1: 1 μg human total RNA from HeLa cell
Lane 2: 100 ng human total RNA from HeLa cell
Lane 3: 10 ng human total RNA from HeLa cell

Cyclic Temperature Reverse Transcription



Concentration (copies/rxn)	FTRT (Ct)	CTRT with 1 cycle (Ct)	CTRT with 10 cycles (Ct)
10,000	19.46	18.77	18.51
1,000	24.11	24.04	22.93
100	29.78	28.35	28.19
10	32.87	33.00	31.05

Figure 3. Low copy species enrichment by cycle.

Comparing FTRT (Fixed Temperature RT) to 1 and 10 cycle(s) of CTRT reveals progressive improvement of detection of cDNA in subsequent qPCR for CTRT as copies of template RNA decrease.
FTRT: 60 min incubation at 50℃ followed by 5 min deactivation at 95℃
CTRT: Cycles of 37℃ annealing 10 sec, 50℃ cDNA synthesis 4 min, 55℃ secondary structure melting and cDNA synthesis 30 sec
Target: Human GAPDH
Human total RNA from HeLa cells
qPCR with *AccuPower® Greenstar™* qPCR PreMix (Cat. No. K-6210, Bioneer)

Ordering Information

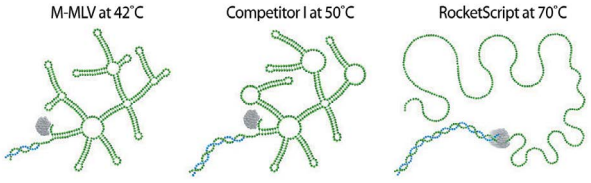
Cat. No.	Product Description				
K-2205	*AccuPower® RocketScript™* Cycle RT PreMix	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	dN6	20 µl/rxn
K-2207					50 µl/rxn
K-2208				dN12	20 µl/rxn
K-2210					50 µl/rxn
K-2201				dT20	20 µl/rxn
K-2203					50 µl/rxn
K-2206			480 tubes	dN6	20 µl/rxn
K-2209				dN12	20 µl/rxn
K-2202				dT20	20 µl/rxn
K-2204					50 µl/rxn
K-2216	*AccuPower® RocketScript™* Cycle RT MasterMix	1 ml of 2X Master mix solution			

AccuPower® *RocketScript*™ RT-PCR PreMix & Master Mix

For One-step High Temperature cDNA Synthesis and PCR with *RocketScript*™ RTase and *Top* DNA Polymerase, Dried-type Premix

Description

AccuPower® *RocketScript*™ RT-PCR PreMix is a one-step RT-PCR product that uses Thermostable RTase (*RocketScript*™ Reverse Transcriptase) and vacuum-dried ProFi *Taq* DNA polymerase, dNTP, reaction buffer, etc. By using the *RocketScript*™ Reverse Transcriptase, RT reactions can be performed at a higher temperature for obtaining template RNA with strongly bounded secondary structure. Not only it has high elongation and sensitivity, but also contains all the components necessary for cDNA synthesis and electrophoresis, including the tracking dyes, to perform RT-PCR reaction directly just by adding the RNA, primer, and D.W.



Note: Schematic representation of the 5'UTR of a gene, with complex secondary structure, at three different temperatures. Note that *RocketScript*™ shows full activity at 70℃ allowing it to synthesize the complete gene sequence where *M-MLV* and other Reverse Transcriptase's fail.

Features and Benefits

- **Thermostable Activity**
  Original *M-MLV* RTase has maximum activity at relatively low temperatures (42℃), causing several problems in reverse transcription of complex secondary structure RNA molecules. To solve this issue, Bioneer has developed a RTase activity at high temperatures (above 50℃). *RocketScript*™ has thermostable activity (42-70℃), allowing efficient cDNA synthesis from complex secondary structure RNA and give the user freedom to optimize the reverse transcription reaction based on temperature.
- **Sensitivity**
  AccuPower® *RocketScript*™ RT-PCR PreMix is a one-step RT-PCR capable of 10 pg (target: ß-actin) of human total RNA extracted from cells and tissues.
- **Long Range RT-PCR**
  With 100 ng of human total RNA, one-step RT-PCR is possible with a full-length size of 5.2 kb (target: Human TFRC) target.
- **Ease-of-use**
  Each PCR tube contains *RocketScript*™ RTase, ProFi *Taq* DNA polymerase and all components necessary for cDNA synthesis and PCR. Only one template RNA, primer set, and D.W. can be used to directly perform one-step RT-PCR reactions. It also includes a tracking dye and a settling agent for electrophoresis, so it doesn't need to add sample loading buffer so it can be used easily.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- First-strand synthesis of cDNA from RNA molecules (RT)
- RT-PCR
- cDNA library construction
- Gene expression analysis

Specifications

- Enzyme: *RocketScript*™ RTase, ProFi *Taq* DNA polymerase
- 5' → 3' exonuclease: No
- 3' → 5' exonuclease: No
- 3' – A overhang: Yes
- Fragment size: ~ 6 kb

Storage Temperature

-20℃

Experimental Data

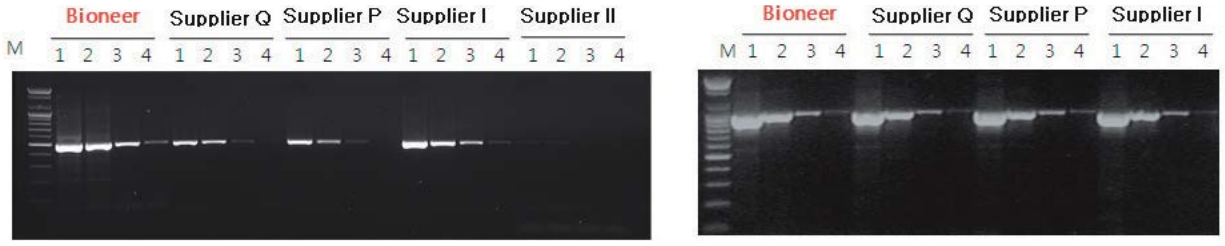


Figure 1. Performance comparison between *AccuPower® RocketScript™* RT-PCR PreMix and competitor RT-PCR kits.

Complex secondary structure RNA species amplification by *RocketScript™* is outstanding compared to the leading competitor's reverse transcriptase.
RT reactions were performed according to each manufacturer's recommendations.
Lane 1: 10 ng of total RNA from HeLa cells
Lane 2: 1 ng of total RNA from HeLa cells
Lane 3: 100 pg of total RNA from HeLa cells
Lane 4: 10 pg of total RNA from HeLa cells

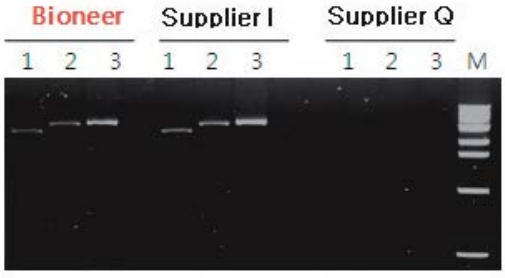


Figure 2. *AccuPower® RocketScript™* RT-PCR PreMix shows enhanced performance compared to competitors.

One-step RT-PCR reactions were performed with 100 ng total RNA from HeLa cells using regents and conditions specified in each manufacturer's protocol.
Lane 1: 3 kb Lane 2: 4.5 kb Lane 3: 5.2 kb
RT reaction condition is performed according to each manufacturer's recommendations.

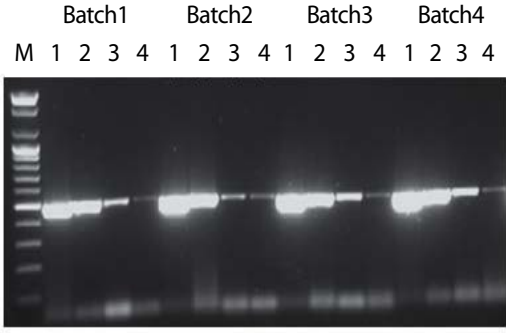


Figure 3. Highly reproducible amplifications.

Amplification of an 500 bp target gene was detected using human toal RNA (from 10 ng to 10 pg) with *AccuPower® RocketScript™* RT-PCR PreMix.
As shown in figure 3, highly reproducible amplifications were achieved within each Lot. set of triplicates
Lane 1: 10 ng of total RNA from HeLa cells
Lane 2: 1 ng of total RNA from HeLa cells
Lane 3: 100 pg of total RNA from HeLa cells
Lane 4: 10 pg of total RNA from HeLa cells

Ordering Information

Cat. No.	Product Description			
K-2501	*AccuPower® RocketScript™* RT-PCR PreMix	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-2503				50 µl/rxn
K-2502			480 tubes	20 µl/rxn
K-2504				50 µl/rxn
K-2505	*AccuPower® RocketScript™* RT-PCR MasterMix	1 ml of 2X Master mix solution		

AccuPower® RocketScript™ RT PreMix, RNase H Minus & Master Mix

For Synthesis of Full-length cDNA with *RocketScript™* RT PreMix without RNase H activity

Description

AccuPower® RocketScript™ RT PreMix, RNase H Minus contains *RocketScript™* Reverse Transciptase with RNase H Minus. Reverse transciptase with RNase H acitivity is disabled from extending its template and is prevented from synthesizing long cDNA. However, *RocketScript™* Reverse Transciptase, RNase H Minus does not have RNase H activity and is able to synthesize long cDNA. Its high processivity as well as good sensitivity allows successful cDNA synthesis even from tiny amount of template RNA, such as 10 pg human total RNA. The PreMix contains all required components for a reverse transcription reaction, including RTase, primer, RNase inghibitor and buffer. Just add template RNA and D.W. for cDNA synthesis reaction.

Features and Benefits

- **Thermostable Activity**
  RocketScript™ is able to perform reverse transcription reactions throughout a wide range of temperatures between 42℃ and 70℃, allowing efficient cDNA synthesis from secondary structure of RNA.
- **Elimination RNase H Activity**
  RocketScript™ series products are able to perform RT reaction at various temperature range of 42-70℃ to suit users' needs. However, due to RNase H activity, it is not able to synthesize long size cDNA. This product has inhibited RNase H activity via point mutation. Thus, it is able to synthesize cDNA up to 12.5 kb.
- **High Sensitivity**
  This product efficiently synthesizes cDNA from even 10 pg of human total RNA.
- **Ease-of-use**
  All of the required components for cDNA synthesis such as RTase, dNTPs, reaction buffer and primer (dT_{20}, dN_{12} or dN_6) are contained in the premix. Simply add template RNA and D.W. to start your reaction.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- First-strand synthesis of cDNA from RNA molecules (RT)
- RT-PCR
- Random priming reactions
- cDNA library construction
- Probe labeling
- mRNA 5'-end mapping by primer extension analysis
- Real-Time PCR

Specifications

- Enzyme: *RocketScript™* RTase, RNase H Minus
- DNase activity: No
- RNase activity: No
- RNase H activity: No
- Fragment size: ~ 12.5 kb

Storage Temperature

-20℃

Experimental Data

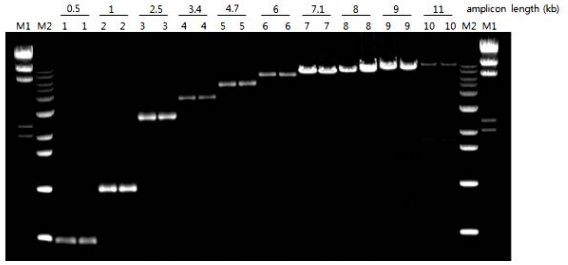


Figure 1. Performance of the *AccuPower® RocketScript™* RT PreMix, RNase H Minus in two-step RT-PCR.

Target mRNAs ranged from 500 bp to 11 kb were reverse transcribed by using *AccuPower® RocketScript™* RT PreMix, RNase H Minus. With each cDNA, PCR was performed by using *AccuPower® ProFi Taq* PCR PreMix (Cat. No. K-2631, Bioneer). Template sizes are indicated above the gel image.
M1; 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)
M2; Lambda DNA/*Hin*d III Markers (Cat. No. D-1050, Bioneer).

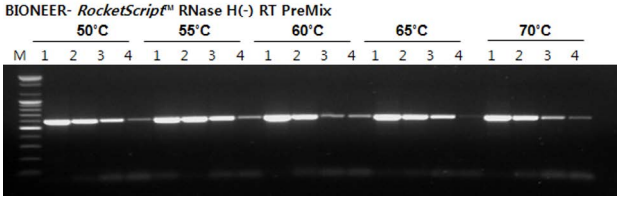


Figure 2. Thermal stability using BIONEER *AccuPower® RocketScript™* RT PreMix, RNase H Minus.

Synthesis of cDNA at 50℃-70℃ for 30 mins using 100 ng, 10 ng, 1 ng and 100 pg of 600 bp RNA transcript as a template using *RocketScript™* RNase H(-) RT PreMix. *RocketScript™* RNase H(-) RT PreMix completed synthesis of 70℃.

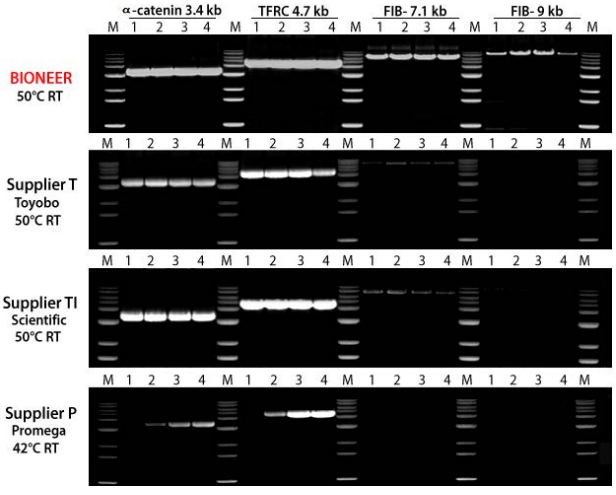
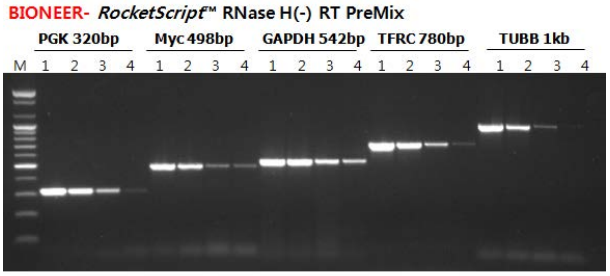


Figure 3. High synthesis rate at 50℃ using *AccuPower® RocketScript™* RT PreMix, RNase H Minus.

Synthesis of cDNA at 50℃ or 42℃ for 10, 20, 30 and 60 min using 1 μg of 9 kb RNA transcript as a template using Bioneer cDNA synthesis kit and other kits for first strand cDNA synthesis. Reaction products were resolved on a 1% alkaline agarose gel. Bioneer cDNA synthesis kit completed synthesis of 9 kb transcript in 10 min.
Lane 1: RT 10 min Lane 2: RT 20 min Lane 3: RT 30 min Lane 4: RT 60 min
M; 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)



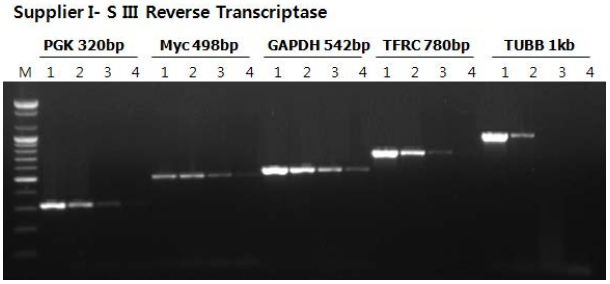
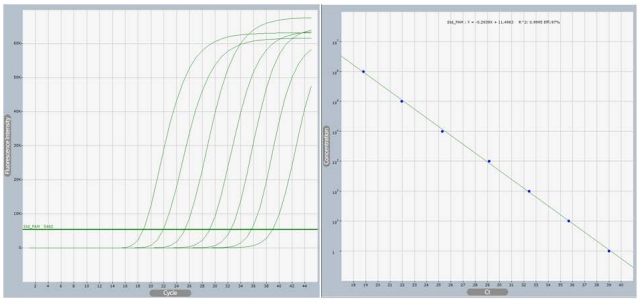


Figure 4. Sensitivity comparison of the various target.

Rxn. conditions: Conventional 30 min incubation at 50℃ deactivation at 95℃ for 5 min
Lane 1: 10 ng of total RNA from HeLa cells
Lane 2: 1 ng of total RNA from HeLa cells
Lane 3: 100 pg of total RNA from HeLa cells
Lane 4: 10 pg of total RNA from HeLa cells



Human RNA Concentration (pg)	Ct
10^6	18.81
10^5	21.96
10^4	25.29
10^3	29.16
10^2	32.43
10	35.70
1	39.01

Figure 5. Broad dynamic range of *AccuPower® RocketScript™* RT PreMix, RNase H Minus.

First-strand cDNA was generated using the *AccuPower® RocketScript™* RT PreMix, RNase H Minus. cDNA was amplified using the *AccuPower®* Plus *DualStar™* qPCR PreMix on the *Exicycler™* 96 Real-Time Quantitative Thermal Block from Bioneer. The standard curve illustrates high linearity (R^2 = 0.999) across a broad range of input RNA, suggesting that the relative representation of specific RNA transcripts is preserved in the cDNA pool regardless of the abundance of total RNA. Amplification was performed on 10-fold serial dilutions of HeLa total RNA (1 μg to 1 pg).

AccuPower® RocketScript™ RT PreMix, RNase H Minus & Master Mix

Ordering Information

Cat. No.	Product Description				
K-2221	*AccuPower® RocketScript™* RT PreMix, RNase H Minus	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	-	20 µl/rxn
K-2223					50 µl/rxn
K-2245				dN6	20 µl/rxn
K-2246					50 µl/rxn
K-2247				dN12	20 µl/rxn
K-2248					50 µl/rxn
K-2241				dT20	20 µl/rxn
K-2243					50 µl/rxn
K-2222			480 tubes	-	20 µl/rxn
K-2224					50 µl/rxn
K-2242				dT20	20 µl/rxn
K-2244					50 µl/rxn
K-2249	*AccuPower® RocketScript™* RT MasterMix, RNase H Minus	1 ml of 2X Master mix solution			

AccuPower® RocketScript™ RT-PCR PreMix, RNase H Minus & Master Mix

For One-step Synthesis of Full-length cDNA and PCR with *RocketScript™* RTase without RNase H activity and *ProFi Taq* DNA Polymerase

Description

AccuPower® RocketScript™ RT-PCR PreMix, RNase H Minus contains Bioneer's *RocketScript™* RTase, RNase H Minus and *ProFi Taq* DNA Polymerase. *RocketScript™* Reverse Transciptase, RNase H Minus is a recombinant *M-MLV* reverse transcriptase with completely eliminated RNase H activity, as well as increased thermal stability up to 70℃. It minimizes RNA degradation for invreased length of cDNA ipto 12.5 kb, with higher cDNA yields, especially at higher temperature suitable for RT reaction with complex secondary or high GC content template RNA. This PreMix contains all required components for reverse transcription and PCR reaction, such as reverse transciptase, DNA polymerase, dNTPs, reaction buffer and etc. Just add template RNA, primers and D.W. for RT-PCR reaction.

Features and Benefits

- **Elimination RNase H activity**
  Eliminated RNase H activity from *RocketScript™* RTase, with additional help from long & high-fidelity *ProFi Taq* DNA Polymerase, can be produce very long RT-PCR products up to 12.5 kb with higher yield.
- **Thermostable Activity**
  Excellent terhmal stability of *RocketScript™* RTase, RNase H Minus retaining activity at 70℃, making it suitable for cDNA synthesis of secondary structure RNA.
- **Sensitivity**
  One-step RT-PCR is possible even at 10 pg of human total RNA extracted from cells, tissues, etc.
- **Ease-of-use**
  This product contains all components for one-step RT-PCR. such as *RocketScript™* RTase, RNase H Minus, *ProFi Taq* PCR polymerase and others in a single tube. Just add RNA, primers and D.W. to perform the RT-PCR reaction. Components necessary for agarose gel electrophoresis are also contained within the product including tracking dye and a density-increasing reagent for convenience.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Low copies detection
- RNA virus detection
- Gene expression analysis

Specifications

- Enzyme: *RocketScript™* RTase, RNase H Minus
  ProFi Taq DNA polymerase
- 5' → 3' exonuclease: Yes
- 3' → 5' exonuclease: Yes
- 3' – A Overhang: Yes
- RNase H Activity: No
- Fragment size: ~ 12.5 kb

Storage Temperature

-20℃

Experimental Data

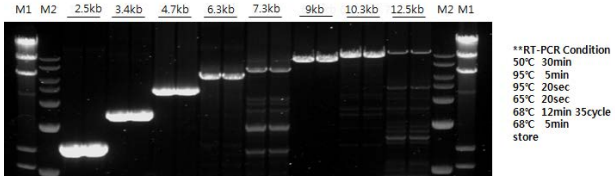


Figure 1. Performance of the *AccuPower® RocketScript™* RT-PCR PreMix, RNase H Minus.

AccuPower® RocketScript™ RT-PCR PreMix, RNase H minus was used to amplify cDNAs which size are between 2.5 kb to 12.5 kb. DNA sizes are indicated above the picture. Reactions were performed with 100 ng total RNA from HeLa cells.
M1: Lambda/ DNA *Hin*dIII markers (Cat. No. D-1050, Bioneer)
M2: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

AccuPower® RocketScript™ RT-PCR PreMix, RNase H Minus & Master Mix

Ordering Information

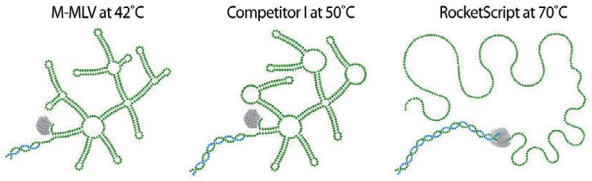
Cat. No.	Product Description			
K-2231	*AccuPower® RocketScript™* RT-PCR PreMix, RNase H Minus	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-2233				50 µl/rxn
K-2232			480 tubes	20 µl/rxn
K-2234				50 µl/rxn
K-2235	*AccuPower® RocketScript™* RT-PCR MasterMix, RNase H Minus	1 ml of 2X Master mix solution		

AccuPower® RocketPlex RT-PCR Premix & Master Mix

For One-step High Temperature cDNA Synthesis and Multiplex (up to 10-plex) with *RocketScript*™ RTase and *Top* DNA Polymerase

Description

AccuPower® RocketPlex RT-PCR PreMix is designed for continuous cDNA synthesis and PCR of two or more target genes. Maximum of 10 target RNAs can undergo one-step RT-PCR simultaneously with excellent thermal stability through the application of *RocketScript*™ RTase, making it also suitable for the cDNA synthesis of secondary RNA structures with increased reaction specificity using HotStart *Top* DNA polymerase. Furthermore, all components crucial for RT-PCR and electrophoresis, including a tracking dye and a sedimentation agent, are each packaged with amounts sufficient for a single run to prevent cross-contaminations from the repetitive use of master mix.



Note: Schematic representation of the 5′ UTR of a gene, with complex secondary structure, at three different temperatures. Note that *RocketScript*™ RTase shows full activity at 70℃ allowing it to synthesize the complete gene sequence where *M-MLV* and other reverse transcriptase's fail.

Features and Benefits

- **Multiplex RT-PCR**
  Simultaneous cDNA synthesis and amplification up to 10 target genes just by adding their primers in a single tube.
- **Thermostable Activity**
  Thermostable reverse transcription activity (up to 70℃) lets you blast through secondary structure.
- **Specificity**
  Provide highly specific PCR products by using HotStart *Top* DNA polymerase.
- **Ease-of-use**
  All components necessary for RT-PCR such as Thermostable DNA polymerase, RTase, dNTPs, etc all included, requiring only the addition of template RNA, primers and D.W.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Multiplex RT-PCR
- Low copy detection
- Gene expression analysis

Specifications

- Enzyme: *RocketScript*™ RTase, HotStart *Top* DNA polymerase
- 5' → 3' exonuclease: No
- 3' → 5' exonuclease: No
- 3′ – A overhang: Yes
- Fragment size: ~ 1 kb

Storage Temperature

-20℃

Experimental Data

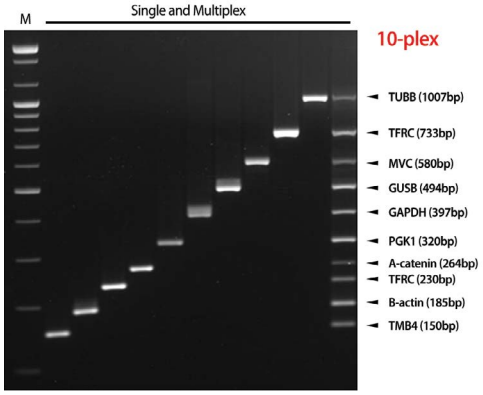


Figure 1. Single RT-PCR and multiplex RT-PCR using *AccuPower*® RocketPlex RT-PCR PreMix.

M: 25/100 bp Mixed DNA Ladder (Cat. No. D-1020, Bioneer)

AccuPower® RocketPlex RT-PCR Premix & Master Mix

Experimental Data

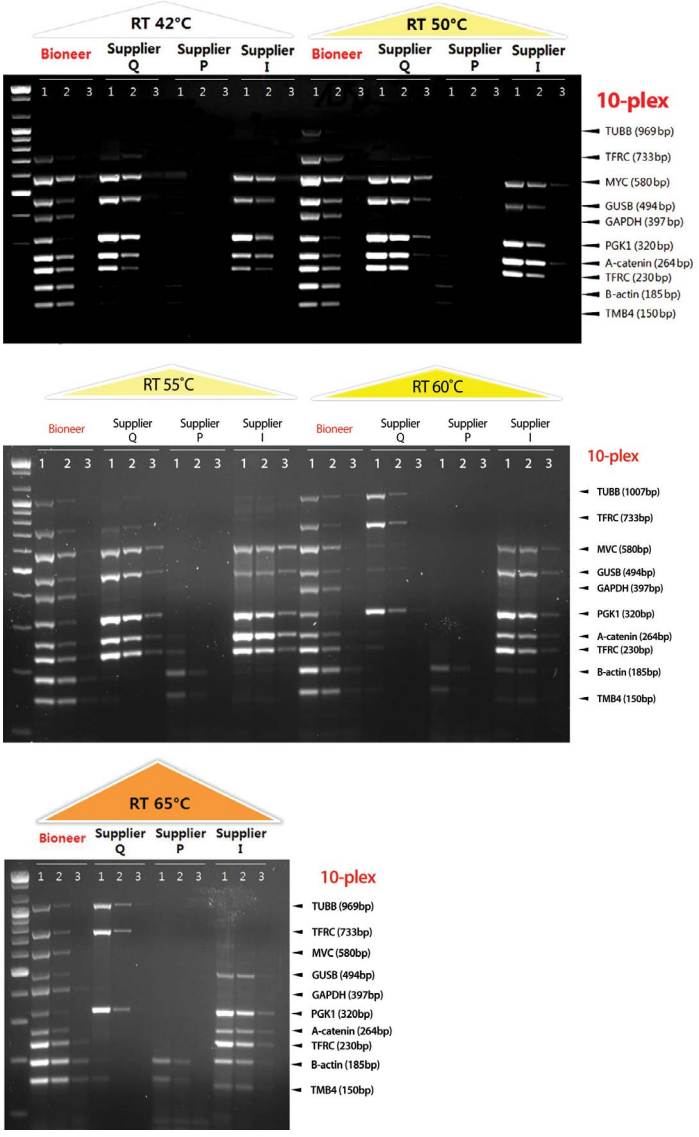


Figure 2. Comparison of amplification quality between *AccuPower*® *RocketPlex* RT-PCR PreMix and other suppliers' RT-PCR kit.

10-plex primers were added into *AccuPower*® *RocketPlex* RT-PCR PreMix and other supplier's RT-PCR kit. A series of human total RNA diluents were tested. All data were obtained using *AllInOneCycler*™ 96 Gradient Thermal Block (Cat. No. A-2040-1, Bioneer). *AccuPower*® *RocketPlex* RT-PCR PreMix is able to perform reverse transcription reactions throughout a wide range of temperatures from 42℃ to 70℃

Lane 1: Human total RNA 100 ng
Lane 2: Human total RNA 10 ng
Lane 3: Human total RNA 1 ng

Ordering Information

Cat. No.	Product Description			
K-2211	*AccuPower*® RocketPlex RT-PCR PreMix	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-2213				50 µl/rxn
K-2212			480 tubes	20 µl/rxn
K-2214				50 µl/rxn
K-2217	*AccuPower*® RocketPlex RT-PCR MasterMix	1 ml of 2X Master mix solution		

AccuPower® Dual-HotStart™ RT-PCR PreMix

For High Specificity and High Sensitivity One-step RT-PCR with *RocketScript™* RTase and HotStart *Taq* DNA Polymerase

Description

AccuPower® Dual-HotStart™ RT-PCR PreMix is a break-through product to overcome frequent problems of RT reaction by applying *Dual-HotStart™* technology in both RT and PCR. With this product, cDNA synthesis of your selective RNA will be performed with high sensitivity from a small amount of template RNA. Successive PCR amplification with cDNA synthesis. This one-step RT-PCR product is easily generated with excellent sensitivity for a wide range of applicatinos, including several types of virus tests and gene expression anlaysis experiments. This product is ready-to-use, simply add template RNA, primers and D.W. to obtain your results with great reproducibility.

Features and Benefits

- **Sensitivity**
  Detection of samples possible even at trace amounts of a target template in RNA with a high concentration that is generally difficult to detect.
- **Specificity**
  The world's first Dual Hotstart RT-PCR reaction using Pyro-Hotstart RT reaction and Hotstart PCR optimized to detect soley the target gene accurately (Figure 1).
- **Ease-of-use**
  All components necessary for RT-PCR such as Thermostable DNA polymerase, RTase, dNTPs, etc all included, requiring only the addition of template RNA, primers and D.W.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Low copy viral/bacterial pathogen load determination in an earlier stage
- Low copy mRNA amplification
- Low copy target RNA quantification
- RNA amplification for microarray and NGS

Specifications

- Enzyme: *RocketScript™* RTase, HotStart *Taq* DNA polymerase
- 5' → 3' exonuclease: Yes
- 3' → 5' exonuclease: No
- 3' – A overhang: Yes
- Fragment size: ~ 3 kb

Storage Temperature

-20℃

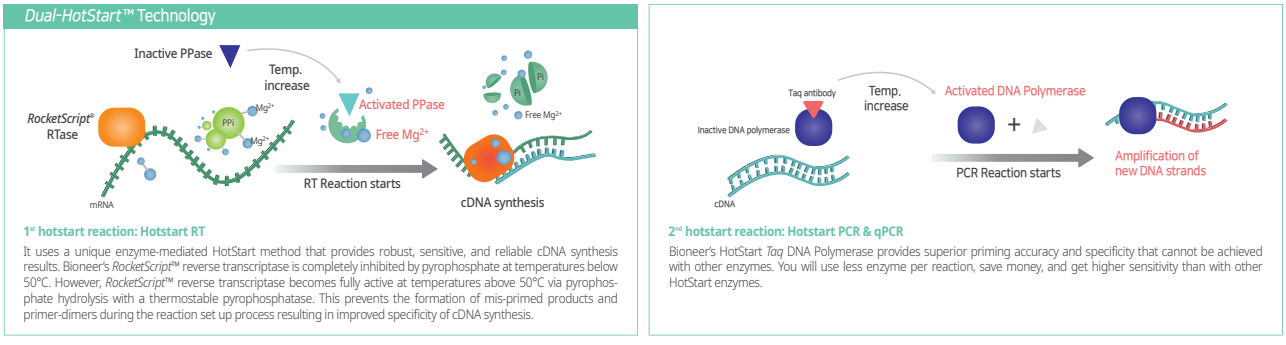


Figure 1. *Dual-HotStart™* Technology

AccuPower® Dual-HotStart™ RT-PCR PreMix

Experimental Data

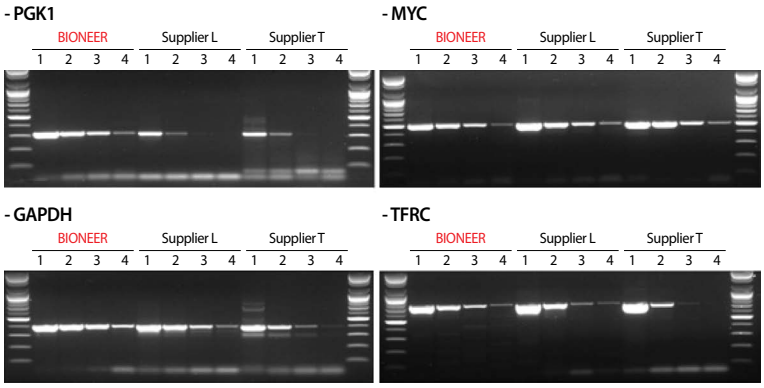


Figure 2. Comparison of PCR amplification sensitivity between *AccuPower® Dual-HotStart™* RT-PCR PreMix from Bioneer and other suppliers' HotStart RT-PCR kits.

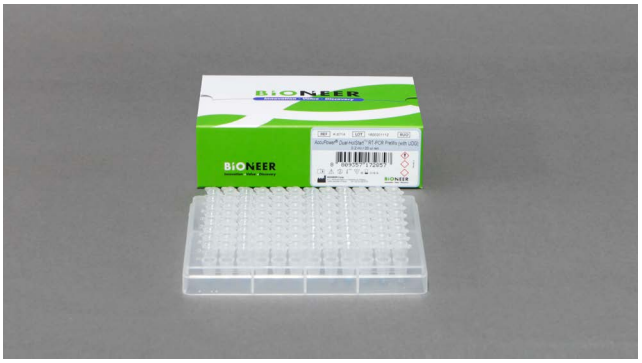
Target: human PGK1
Lane 1: 10 ng of human RNA
Lane 2: 1 ng of human RNA
Lane 3: 100 pg of human RNA
Lane 4: 10 pg of human RNA

Ordering Information

Cat. No.	Product Description			
K-6710	*AccuPower® Dual-Hotstart™* RT-PCR PreMix	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-6711				50 µl/rxn
K-6712			480 tubes	20 µl/rxn
K-6713				50 µl/rxn

AccuPower® Dual-HotStart™ RT-PCR PreMix (with UDG)

For High Specificity and High Sensitivity One-step RT-PCR / Prevention Carry-over Contamination



Description

AccuPower® Dual-HotStart™ RT-PCR PreMix (with UDG) is a one-step RT-PCR product that applied Pyro-Hotstart RT technology and Hotstart PCR technology to substantially improve the problems of non-specific reverse reaction and effectively synthesize cDNA even when the template RNA is in secondary structure or is in scarce amounts. Application of Uracil DNA glycosylase systems prevents carryover contaminations. As 1 tube contains sufficient amounts of mixture comprised with components necessary for RT-PCR , not only the process can start conveniently just by adding the template RNA, the primer, and D.W., but the tubes can also be dispensed afterwards, preventing cross-contamination caused by the repeated use of a master mix.

Features and Benefits

- **Prevention of Carryover Contamination**
  UDG and dUTP in the PreMix or in the Master Mix prevent the re-amplification of carryover PCR products between reactions. The dUTP ensures that any amplified DNA will contain uracil rather than thymine. And UDG removes uracil residues from single- or double-stranded DNA, which prevents uracil-containing DNA from serving as template in future PCRs. In PCR with *AccuPower® Dual-HotStart™* RT-PCR PreMix (with UDG) the UDG incubation step at (37°C for 2 min) destroys any uracil-contaning DNA fragments from previous reactions. UDG is inactivated by the high temperatures during normal PCR cycling, thereby allowing the amplification of genuine target sequences (Figure 1.)
- **Specificity**
  Low detection limit with the smallest amount of your target template RNA, even in highly concentrated sample.
- **Sensitivity**
  The detection limit is low enough to be detected as the minimum amount of target template RNA and up to 10 pg of total RNa extracted from cells an tissues.
- **Ease-of-use**
  All the required components for RT-PCR, such as reverse transciptase, DNA polymerase, dNTPs, reaction buffer and etc, are contained in the premix. Just add template RNA, primers and D.W. to start your reaction.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Low copy viral/bacterial pathogen load determination in an earlier stage
- Low copy mRNA amplification
- Low copy target RNA quantification
- RNA amplification for microarray and NGS

Specifications

- Enzyme: *RocketScript™* RTase, HotStart *Taq* DNA polymerase
- 5' → 3' exonuclease: Yes
- 3' → 5' exonuclease: No
- 3' – A overhang: Yes
- Fragment size: ~ 3 kb

Storage Temperature

-20℃

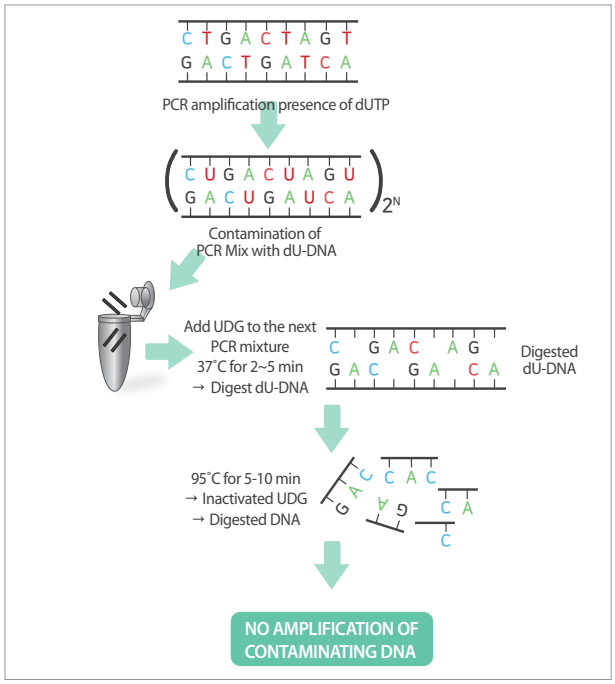
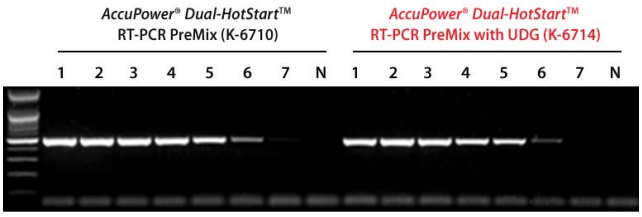


Figure 1. Prevention of carryover contamination.

AccuPower® Dual-HotStart™ RT-PCR PreMix (with UDG)

Experimental Data

RNA template (not including uracil base)



RNA template (including uracil base)

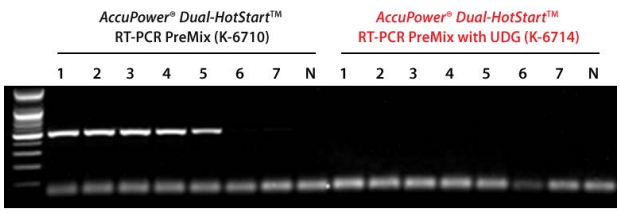


Figure 2. Comparison of amplification quality using PCR products (not including uracil base or including uracil base) between *AccuPower® Dual-HotStart™* RT-PCR PreMix and *AccuPower® Dual-HotStart™* RT- PCR PreMix (with UDG).

Lane 1: 10^8 Lane 2: 10^7 Lane 3: 10^6 Lane 4: 10^5 Lane 5: 10^4 Lane 6: 10^3 Lane 7: 10^2 Lane N: NTC

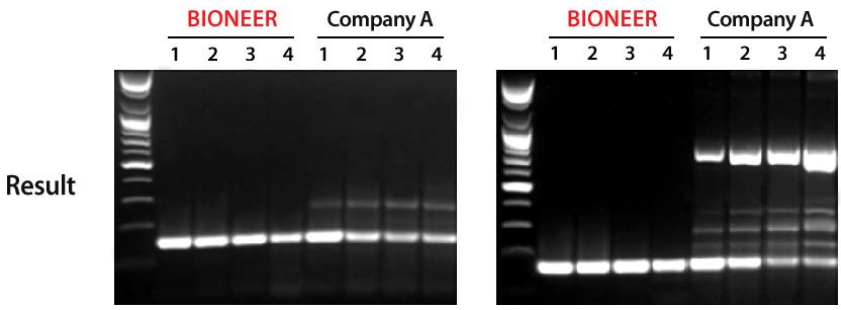


Figure 3. Comparison of PCR amplification specificity between *AccuPower® Dual-HotStart™* RT- PCR PreMix (with UDG) from Bioneer and other suppliers' Hotstart PCR master mix.

Lane 1: HCV 10^7 Lane 2: HCV 10^6 Lane 3: HCV 10^5 Lane 4: HCV 10^4

Ordering Information

Cat. No.	Product Description			
K-6714	*AccuPower® Dual-Hotstart™* RT-PCR PreMix (with UDG)	0.2 ml thin-wall 8-tube strips with attached cap	96 tubes	20 µl/rxn
K-6715				50 µl/rxn

M-MLV Reverse Transcriptase

Standard cDNA Synthesis

Description

Moloney Murine Leukemia Virus (*M-MLV*) Reverse Transcriptase is an RNA-dependent DNA polymerase capable of using an RNA molecule as a template to synthesize a double-stranded DNA. It is ideal for use of first-strand synthesis cDNA for Reverse Transcriptase PCR and qRT-PCR.

Features and Benefits

- **Optimized buffer**
  Guarenteed reliable response by providing optimized for *M-MLV* reverse transcriptase.
- **Reproducibility**
  For reproducible results, all of Bioneer's products are manufactured under strict ISO quality systems.

Application

- First strand cDNA synthesis from RNA
- RT-PCR
- qRT-PCR

Specifications

- DNase activity : No
- RNase acitivity: No
- 3'-A overhang: No
- Strand displacement: Yes
- Fragment size: ~ 9 kb

Components

- **5X Reaction buffer:** Tris-HCl, KCl, $MgCl_2$ (pH 8.1)
- **100 mM DTT**
- **10 mM dNTPs mix:** 2.5 mM of each dNTP

Concentration

10,000 Units (200 U/μl)

Storage Conditions

50% glycerol containing 20 mM Tris-HCl (pH 7.6), 150 mM NaCl, 0.1 mM EDTA, 1 mM DTT, 50 mM $(NH_4)_2SO_4$, Stabilizers.

Storage Temperature

-20℃

Definition of Unit

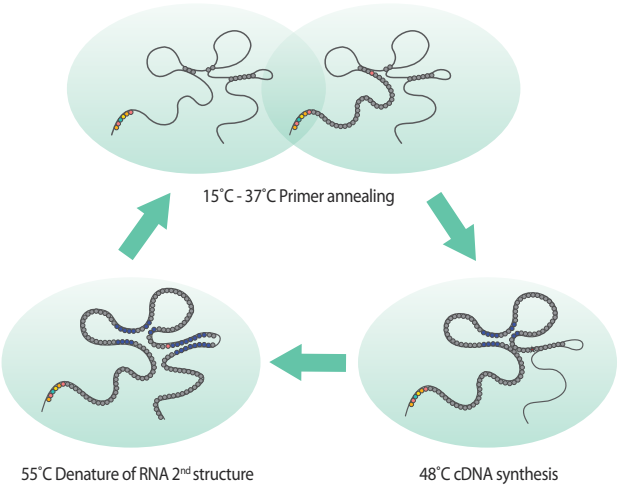
One Unit is defined as the amount of enzyme required to incorporate 1 nmole of dTTP into acid-precipitable material in 10 min at 37℃ using poly(A), oligo dT as template primer.

Ordering Information

Cat. No.	Product Description
E-3121	*M-MLV* Reverse Transcriptase, 10,000 U, 5X Reaction Buffer, 100 mM DTT, 10 mM dNTPs
E-3122	*M-MLV* Reverse Transcriptase, 50,000 U, 5X Reaction Buffer, 100 mM DTT, 10 mM dNTPs

CycleScript™ Reverse Transcriptase

High Performance cDNA Synthesis



Description

CycleScript™ Reverse Transcriptase uses a stabilizer to synthesize cDNA even at high temperature (55°C). Not only this product is capable of performing traditional fixed temperature reverse transcription (FTRT), but also cyclic reverse transcription (CRT) through sequential temperature change in 2-3 steps.

- Fixed Temperature Reverse Transcription (FTRT)
  - Step 1: RNA denaturation (60°C, 10 min)
  - Step 2: cDNA Synthesis (42°C, 15~60 min)
- Cyclic Temperature Reverse Transcription (CTRT)
  - Step 1: Primer annealing (25~40°C, 30 sec)
  - Step 2: cDNA Synthesis (42~48°C, 4 min)
  - Step 3 (optional): 2nd Structured RNA Denaturation and cDNA Synthesis (50~55°C, 30 sec)

* In the above reaction, temperature, time and cycle can be selectively set according to the customer's experimental conditions.

Bioneer's Cyclic temperature reverse transcription reaction performs primer annealing at low temperaure (15~40°C). As the secondary structure of template RNA is released through repeated application of high temperature (50~55°C), cDNA can be synthesized with more efficiency than the conventional 42°C reverse reaction. Furthermore, reverse transcription is also possible at a fixed temperature (22~55°C). In addition, DTT, *CycleScript*™ Reverse Transcriptase and reaction buffer, which are required for reverse transcription reaction, also contain a mixture of dNTPs, so no additional purchase is required.

Features and Benfits

- **Thermal stability**
  Stabilizers were added to RNase-, Dnase- & Proteinase-free pure reverse transcriptase (RTase, *M-MLV*) to enhance the thermal stability of the enzyme.
- **Flexible Reaction Conditions**
  CycleScript™ Reverse Transcriptase is a thermally stable product that can be applied to cyclic temperature reverse transcription as well as single temperature reverse transcription. It induces primer annealing in low temperature reaction, and eliminates secondary structure of RNA template at high temperature, increasing cDNA synthesis rate and enabling full length cDNA synthesis.
- **Convenience**
  When performing the cyclic reverse transcription reaction, the pre-incubation process of the primer and RNA template is omitted, thus simplifying the experimental method and reducing the reaction time.
- **Reproducibility**
  For reproducible results, all of Bioneer's products are manufactured under strict ISO quality systems.

Application

- First-strand synthesis of cDNA from RNA molecules
- RT-PCR
- Random priming reaction
- Library construction
- Probe labeling
- mRNA 5′ end mapping by primer extension analysis

CycleScript™ Reverse Transcriptase

Specifications

- DNase activity : No
- RNase acitivity: No
- 3'-A overhang: No
- Strand displacement: Yes
- Fragment size: ~ 9 kb

Components

- **5X Reaction Buffer:** Tris-HCl, KCl, $MgCl_2$ (pH 8.1)
- **100 mM DTT**
- **dNTPs mixture:** 10 mM, each dNTP 2.5 mM

Concentration

10,000 Units (200 U/μl)

Storage Conditions

50% glycerol containing 20 mM Tris-HCl (pH 7.6), 150 mM NaCl, 0.1 mM EDTA, 1 mM DTT, 50 mM $(NH_4)_2SO_4$, Stabilizers.

Storage Temperature

-20℃

Definition of Unit

One unit is defined as the amount of enzyme required to incorporates 1 nmole of dTTP into acid-precipitable material in 10 min at 37℃ using poly (A) oligo dT as template primer.

Principles

1st strand cDNA synthesis [20 uL volume]

Step 1 **Mix templtate and primer**

Total RNA (0.1~1 ug) or mRNA (5 ng ~ 100 ng)
+
add Oligo dT or Random hexamer(50~200 pmole)

* Denature RNA and primer for 10 min at 65℃.
*Immediately cool on ice
(* Note. Optional when CTRT is performed)

Step 2 **All components mix**

5X CycleScript reaction buffer	4 uL
100mMDTT	2 uL
10mM dNTP (variable volume)	2 uL
Nase inhibitor	20 units
CycleScript(200unit/ul)	1 uL
DEPC-DW	variable
Total (Step 1 + Step 1)	20 uL

[Temperature]

[Option 1: CTRT]

Temperature	Time	
15 ~ 37℃	30 sec	Repeat 12 times
42 ~ 48℃	4 min	Deactivation
95℃	5 min	Deactivation

[Option 2: CTRT]

Temperature	Time
37 ~ 55℃	1 hr
55℃(Optional)	30 sec
90℃	5 min

Since the oligo dT and random primer used in general have a low Tm value of about 15-40 ° C, it is difficult to sufficiently anneal with template RNA in the existing 42℃ reverse transcription reaction, and the template RNA secondary structure, which is a problem for cDNA synthesis, is maintained. Bioneer's patented cycle temperature reverse transcription reaction can efficiently synthesize cDNA by inducing primer annealing in a low temperature reaction (15~40 ℃) and resolving template RNA secondary structure formation in a high temperature reaction (50~55 ℃).

CycleScript™ Reverse Transcriptase

Experimental Data

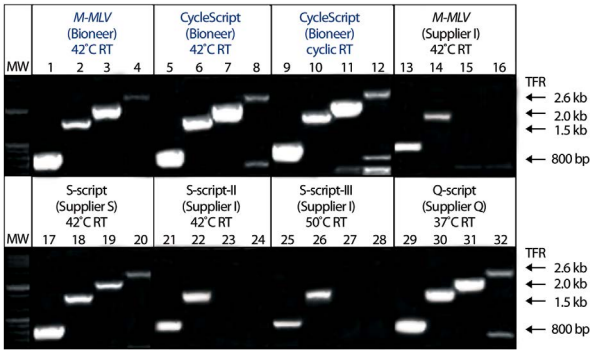


Figure 1. Comparison of transferrin receptor gene amplification with different reverse transcriptases.

700 ng of total RNA was used for reverse transcription and the same amount of amplified products were used for electrophoresis.
Lane 1 - 4: TFR (Transferrin receptor gene) amplified with *M-MLV*
Lane 5 - 8: TFR amplified with *CycleScript*™
Lane 9 - 12: TFR amplified with *CycleScript*™
Lane 13 - 16: TFR amplified with *M-MLV* from Company I
Lane 17 - 20: TFR amplified with S-script from Company S
Lane 21 - 24: TFR amplified with S-script II from Company I
Lane 25 - 28: TFR amplified with S-script III from Company I
Lane 29 - 32: TFR amplified with Q-script from Company Q
Lane MW: 100 bp Plus DNA Ladder (Cat. No. D-1035, Bioneer)

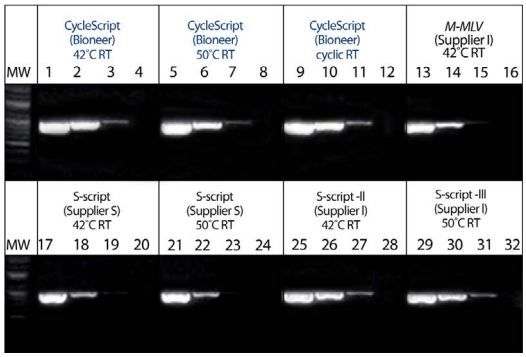


Figure 2. Comparison of GAPDH gene amplification with different reverse transcriptases.

Each 10 ng, 1 ng, 100 pg, and 10 pg of total RNA was used for reverse transcription and the same amount of amplified products were used for electrophoresis.
Lane 1 - 4: GAPDH amplified with *CycleScript*™
Lane 5 - 8: GAPDH amplified with *CycleScript*™
Lane 9 - 12: GAPDH amplified with *CycleScript*™
Lane 13 - 16: GAPDH amplified with *M-MLV* from I Company
Lane 17 - 20: GAPDH amplified with S-script from S Company
Lane 21 - 24: GAPDH amplified with S-script from S Company
Lane 25 - 28: GAPDH amplified with S-script from I Company
Lane 29 - 32: GAPDH amplified with S-script from I Company

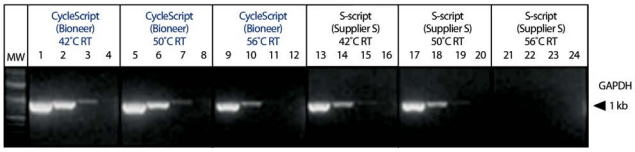


Figure 3. Working temperature comparison of different reverse transcriptases.

Each 10 ng, 1 ng, 100 pg, and 10 pg of total RNA was used for reverse transcription and the same amount of amplified products were used for electrophoresis.
Lane 1 - 4: GAPDH amplified with *CycleScript*™
Lane 5 - 8: GAPDH amplified with *CycleScript*™
Lane 9 - 12: GAPDH amplified with *CycleScript*™
Lane 13 - 16: GAPDH amplified with S-script from S company
Lane 17 - 20: GAPDH amplified with S-script from S company
Lane 21 - 24: GAPDH amplified with S-script from S company

Ordering Information

Cat. No.	Product Description
E-3131	*CycleScript*™ Reverse Transcriptase, 10,000 U, 5X Reaction Buffer, 100 mM DTT, 10 mM dNTPs
E-3132	*CycleScript*™ Reverse Transcriptase, 50,000 U, 5X Reaction Buffer, 100 mM DTT, 10 mM dNTPs

RocketScript™ Reverse Transcriptase

High Performance / High Temperature cDNA Synthesis

Description

Rocketscript™ reverse transcriptase is Bioneer's exclusive *M-MLV* based thermostable reverse transcriptase (RTase). Native *M-MLV* RTase has maximum activity at relatively low temperatures (42℃), causing several problems in reverse transcription of RNA molecules with complex secondary structure. *Rocketscript*™ has thermostable activity (42~70℃), allowing efficient cDNA synthesis from complex secondary structure RNA. Melt the stems and loops keeping you away from your results.

Features and Benefits

- **Thermostable Activity**

  Native *M-MLV* reverse transcriptase has low thermostable activity, therefore restricting reverse transcription reactions to relatively low temperatures (42℃). This attribute prevents RNA molecules containing many stems and loops (complex secondary structures) from being efficiently transcribed. To resolve this shortcoming, Bioneer has utilized synthetic biotechnology to develop a RTase that is active even at high temperatures of 60℃ and above. By removing the traditional reaction temperature limit of 42℃, you are now able to choose your reaction temperature from 42-70℃ and optimize your cDNA synthesis experiments.

- **Reproducibility**

  All products of Bioneer are produced through strict regulation of ISO quality system.

Application

- Gene synthesis
- First-strand synthesis of cDNA from RNA molecules (Reverse Transcription)
- RT-PCR
- Random priming reactions
- Library construction
- Probe labeling
- mRNA 5'-end mapping by primer extension analysis
- Real-Time PCR

Specifications

- DNase activity: No
- RNase acitivity: No
- 3'-A overhang: No
- Fragment size: ~10 kb

Components

- **5X Reaction Buffer:** Tris-HCl, KCl, $MgCl_2$, Stabilizers (pH 8.5)
- **100 mM DTT**
- **10 mM dNTPs mix:** 2.5 mM of each dNTP

Concentration

10,000 Units (200 U/μl)

Storage Conditions

50% glycerol containing 20 mM Tris-HCl (pH 7.6), 150 mM NaCl, 0.1 mM EDTA, 1 mM DTT, Stabilizers.

Storage Temperature

-20℃

Definition of Unit

One unit is defined as the amount of enzyme required to incorporates 1 nmole of dTTP into acid-precipitable material in 10 min at 37℃ using poly(A), oligo dT as template primer.

RocketScript™ Reverse Transcriptase

Experimental Data

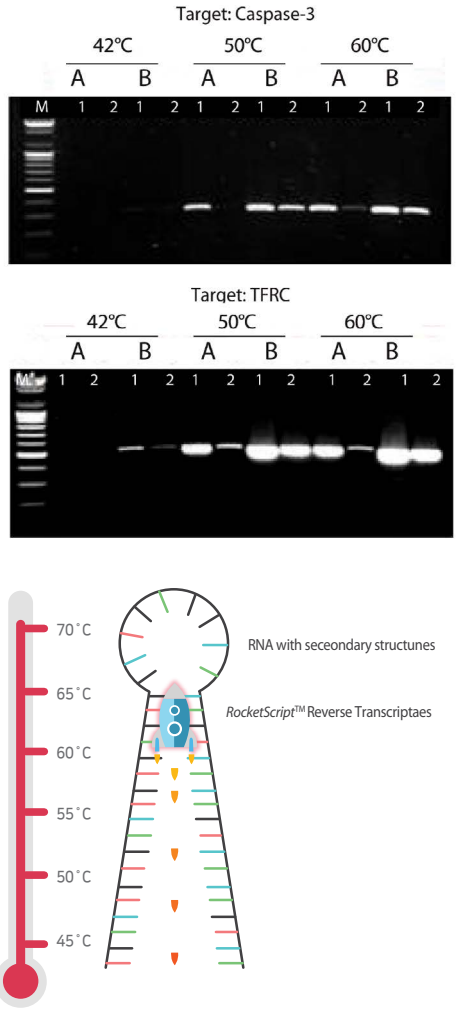


Figure 1. Complex RNA amplification.

Complex RNA amplification results of *RocketScript*™ Reverse Transcriptase compared with that of conventional RTase.
Rxn. condition: conventional 42℃ / 50℃ / 60℃ 1 hr, deactivation 95℃ 5 min, this product shows thermal stability.
Lane A: *M-MLV* Reverse Transcriptase
Lane B: *RocketScript*™ Reverse Transcriptase
Lane 1: 100 ng human total RNA from HeLa cell
Lane 2: 10 ng human total RNA from HeLa cell

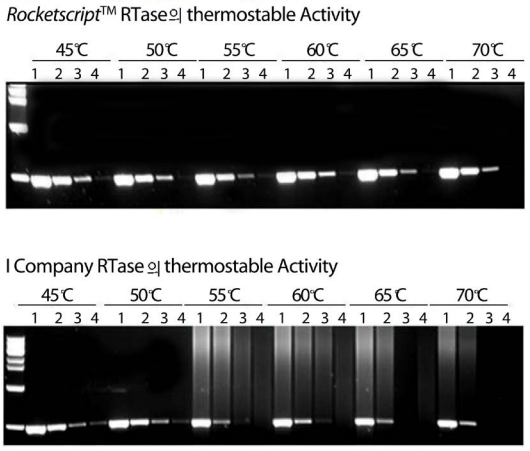


Figure 2. Thermostable stability check.

Amplification results of *RocketScript*™ Reverse Transcriptase using myc compared with supplier I Reverse transcription.
Rxn. condition: Incubation at each temperature 45℃/50℃/55℃/60℃/65℃/70℃ for 1 hr, deactivation at 95℃ for 5 min
Target: human myc 495 bp
Lane 1: 100 ng human total RNA from HeLa cell
Lane 2: 10 ng human total RNA from HeLa cell
Lane 3: 1 ng human total RNA from HeLa cell
Lane 4: 100 pg human total RNA from HeLa cell
M: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

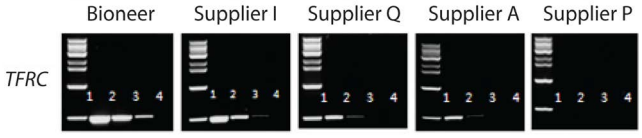


Figure 3. Comparison of amplification quality between *RocketScript*™ RTase and competitor RTases.

Target gene expression Level.
Lane 1: 100 ng human total RNA from HeLa cell
Lane 2: 10 ng human total RNA from HeLa cell
Lane 3: 1 ng human total RNA from HeLa cell
Lane 4: 100 pg human total RNA from HeLa cell
M: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)

Ordering Information

Cat. No.	Product Description
E-3141	*RocketScript*™ Reverse Transcriptase, 10,000 U (50 rxns)
E-3142	*RocketScript*™ Reverse Transcriptase, 50,000 U (250 rxns)

RocketScript™ Reverse Transcriptase, RNase H Minus

High Performance / High Temperature / Long Size cDNA Synthesis

Description

Rocketscript™ Reverse Transcriptase, RNase H Minus is product that removes the RNase H activity. However, due to RNase H activity, it is not able to synthesize long size cDNA. This product has inhibited RNase H activity via point mutation. Thus, it is able to synthesize long-sized cDNA up to 12.5 kb.

Features and Benefits

- **Elimination RNase H Activity**
  By removing the activity of RNase H, cDNA can be synthesized effectively up to 12.5 kb.
- **High Sensitivity**
  1 pg of RNA also shows excellent sensitivity to amplification.
- **Thermostable Activity**
  This product is developed based on *Rocketscript*™ Reverse Transcriptase. Therefore, it is able to perform RT reaction at various temperature range of 42~70℃ to suit users' needs. For this reason, it is able to synthesize cDNA up to 12.5 kb.
- **Reproducibility**
  All products of Bioneer are produced through strict regulation of ISO quality system.

Application

- Gene synthesis
- First-strand synthesis of cDNA from RNA molecules (Reverse Transcription)
- RT-PCR
- Random priming reactions
- Library construction
- Probe labeling
- mRNA 5′-end mapping by primer extension analysis
- Real-Time PCR

Specifications

- DNase activity : No
- RNase acitivity: No
- RNase H activity: No
- Fragment size: ~12.5 kb

Components

- **5X Reaction Buffer:** Tris-HCl, KCl, $MgCl_2$, Stabilizers (pH 8.3)
- **100 mM DTT**
- **10 mM dNTPs mix:** 2.5 mM of each dNTP

Concentration

10,000 Units (200 U/μl)

Storage Conditions

50% glycerol containing 20 mM Tris-HCl (pH 7.6), 150 mM NaCl, 0.1 mM EDTA, 1 mM DTT, Stabilizers.

Storage Temperature

-20℃

Definition of Unit

One Unit is defined as the amount of enzyme required to incorporate 1 nmole of dTTP into acid-precipitable material in 10 min at 37℃ using poly(A), oligo dT as template primer.

RocketScript™ Reverse Transcriptase, RNase H Minus

Experimental Data

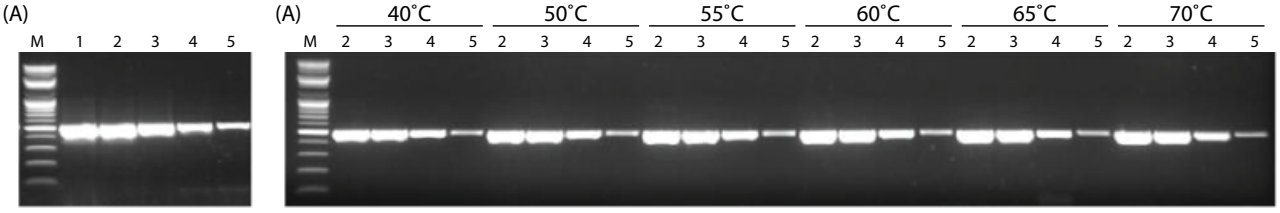


Figure 1. Amplification results of *RocketScript*™ Reverse Transcriptase, RNase H Minus. (A) Sensitivity (B) Thermostability.

M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)
Lane 1: 100 ng human total RNA from HeLa cell, Lane 2: 10 ng human total RNA from HeLa cell, Lane 3: 1 ng human total RNA from HeLa cell
Lane 4: 100 pg human total RNA from HeLa cell, Lane 5: 10 pg human total RNA from HeLa cell

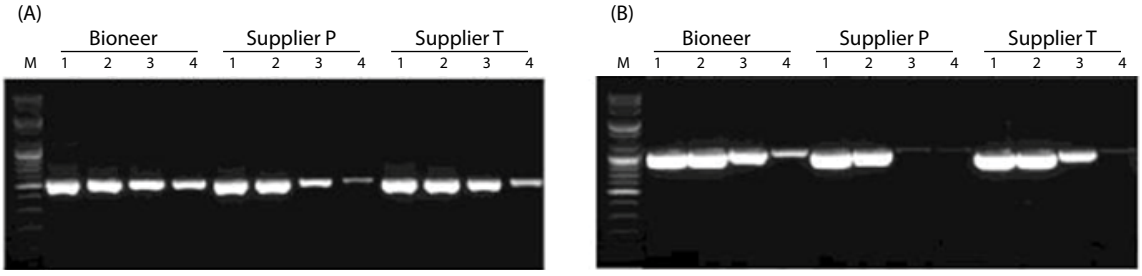


Figure 2. Comparison of amplication quality among of *RocketScript*™ Reverse Transcriptase, RNase H Minus and other company.

(A) GAPDH 0.5 kb, (B) TUBB 1 kb.
M: 100 bp DNA Ladder (Cat. No. D-1030, Bioneer)
Lane 1: 10 ng human total RNA from HeLa cell, Lane 2: 1 ng human total RNA from HeLa cell, Lane 3: 100 pg human total RNA from HeLa cell
Lane 4: 10 pg human total RNA from HeLa cell

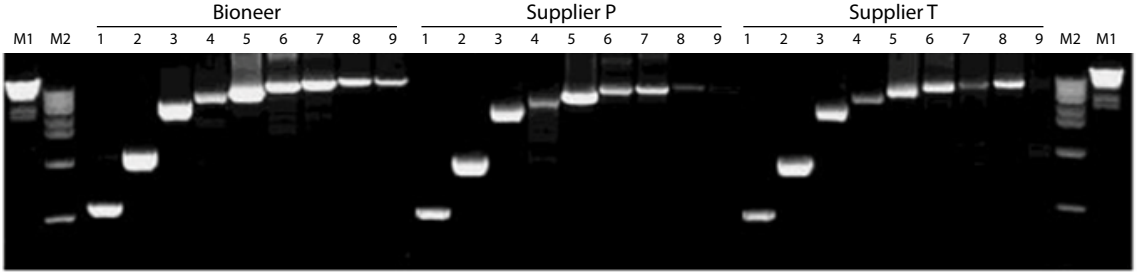


Figure 3. Comparison of long kb amplification among of *RocketScript*™ Reverse Transcriptase, RNase H Minus and other company.

M1: Lambda/*Hin*dIII marker (Cat. No. D-1050, Bioneer), M2: 1 kb DNA Ladder (Cat. No. D-1040, Bioneer)
Lane 1: 0.5 kb, Lane 2: 1 kb, Lane 3: 2.5 kb, Lane 4: 3.4 kb,
Lane 5: 4.7 kb, Lane 6: 6 kb, Lane 7: 7.1 kb, Lane 8: 8 kb, Lane 9; 9 kb

Ordering Information

Cat. No.	Product Description
E-3161	*RocketScript*™ Reverse Transcriptase, RNase H Minus, 10,000 U (50 rxns)
E-3162	*RocketScript*™ Reverse Transcriptase, RNase H Minus, 50,000 U (250 rxns)

03. Real-Time PCR

Intercalating Dye Type Kit

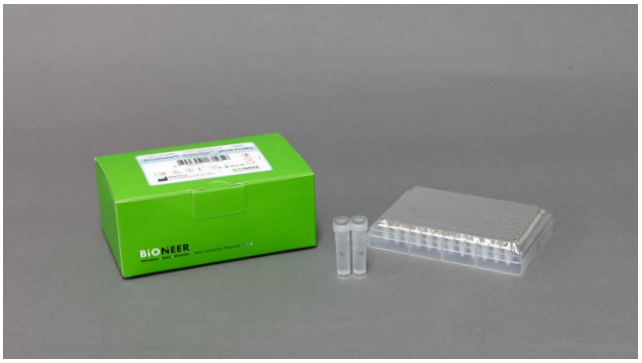
Hydrolysis Probe Type Kit

Real-Time PCR Instrument

Exicycler™ 96/384 → Go to M. Instruments & Devices

AccuPower® *GreenStar*™ qPCR PreMix

For Real-Time PCR using dsDNA binding Dye and Bioneer's Enzyme-mediated HotStart patented technology



Description

AccuPower® *GreenStar*™ qPCR PreMix uses dsDNA binding dye in real-time PCR to accurately quantify the target gene samples from various kinds of samples quickly and accurately. It is applied with Bioneer's patent enzyme-mediated HotStart technology to enhance reaction specificity and PCR amplification efficiency. Furthermore, all the essential components are vacuum dried in each tube to prevent cross-contamination.

Features and Benefits

- **Specificity**
  AccuPower® *GreenStar*™ qPCR PreMix provieds accurate Real-Time PCR results using a unique enzyme-mediated HotStart method that use thermostable pyrophosphatase and pyrophosphate (PPi).
- **Convenience**
  Simplified products as all reactants essential for real-time PCR included in each tubes to readily start by adding template DNA, probe & primer for target gene, and D.W.
- **Stability**
  Activity of this product is stable for 2 years in a -20°C freezer.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Real-Time quantification of DNA and cDNA targets
- Gene expression profiling
- Gene functional analysis
- Microbial & viral pathogen detection

Specifications

- Enzyme: *Top* DNA polymerase
- 5' → 3' exonuclease: No
- 3' → 5' exonuclease: No
- 3' – A overhang: Yes

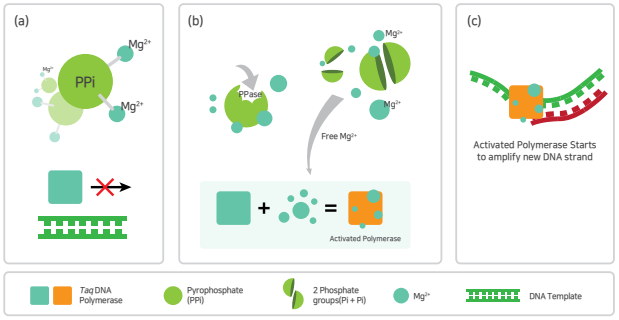


Figure 1. Enzyme-mediated HotStart PCR (*PyroHotStart* technology)

Experimental Data

High Specificity

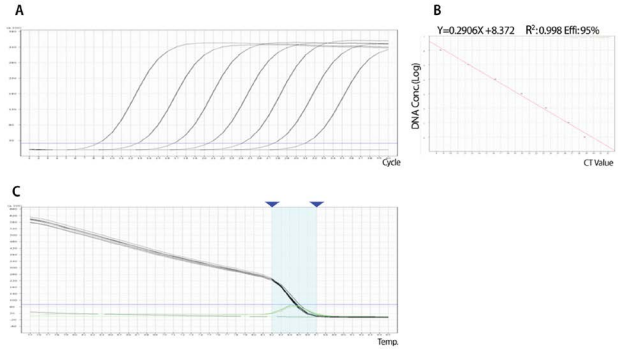


Figure 2. Real-Time PCR data of *AccuPower*® *GreenStar*™ qPCR PreMix.

AccuPower® *GreenStar*™ qPCR PreMix provides at least 7 orders of magnitude in dynamic range (10 fg ~ 10 ng /rxn).
A: Amplification curve of *AccuPower*® *GreenStar*™ qPCR PreMix.
Lambda DNA primers were added into *AccuPower*® *GreenStar*™ qPCR PreMix. A series of lambda DNA positive control diluents were tested.
B: Standard curve of *AccuPower*®*GreenStar*™ qPCR PreMix.
R^2 - 0.998, PCR efficiency - 95%
C: Melting curve analysis of *AccuPower*® *GreenStar*™ qPCR PreMix. The melting curve shows that only single amplified PCR product was obtained in all template range.
All data were obtained using *Exicycler*™ 96 Real-Time Quantitative Thermal Block (Cat. No. A-2060, Bioneer).

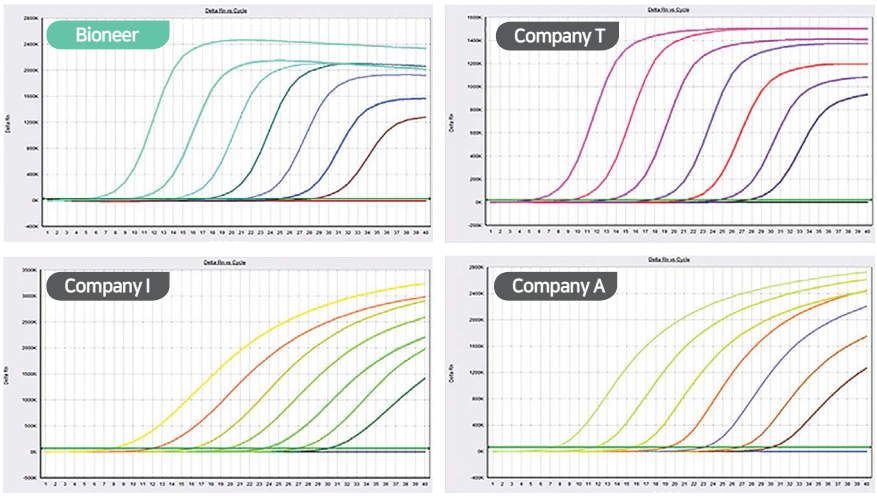


Figure 3. Comparison of amplification efficiency between *AccuPower® GreenStar™* qPCR PreMix and other suppliers' master mixture.

Amplification curve of *AccuPower® GreenStar™* qPCR PreMix and other suppliers' master mix kit.
Lambda DNA primers were added into *AccuPower® GreenStar™* qPCR PreMix and other suppliers' master mix kit. A series of Lambda DNA positive control diluents were tested. Reaction mixtures were prepared and qPCR was performed according to each suppliers' protocol.
All data were obtained using ABI7500 Fast Real-Time PCR machine (Applied Biosystems co.).

Ordering Information

Cat. No.	Product Description					
K-6210	*AccuPower® GreenStar™* qPCR PreMix	*Exicycler™*	8-well strip	Optical film included	96 rxn	20 µl/rxn
K-6200						50 µl/rxn
K-6213			96-well plate			20 µl/rxn
K-6203						50 µl/rxn
K-6211		ABI 7500	8-well strip			20 µl/rxn
K-6201						50 µl/rxn
K-6214			96-well plate			20 µl/rxn
K-6204						50 µl/rxn
K-6212		CFX96	8-well strip	-		20 µl/rxn
K-6202						50 µl/rxn

AccuPower® 2X *GreenStar*™ qPCR Master Mix

For Real-Time PCR using dsDNA binding Dye and *Taq* Antibody HotStart Method

Description

AccuPower® 2X *GreenStar*™ qPCR Master Mix is a Real-Time PCR product with improved reaction specificity and PCR amplification efficiency by applying dsDNA binding dye and *Taq* Antibody HotStart.

Features and Benefits

- **Compatibility**
  As a master mix type product, you can get optimized results for various types of Real-Time PCR equipment.
- **Dynamic Range**
  A wide range of 8 logs up to 10~10^8 copies
- **Convenience**
  Present in 2X master mix type without the need of dsDNA binding dye to minimize the error caused by the solution mixing.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Real-Time quantification of DNA and cDNA targets
- Gene expression profiling
- Gene functional analysis
- Microbial & viral pathogen detection

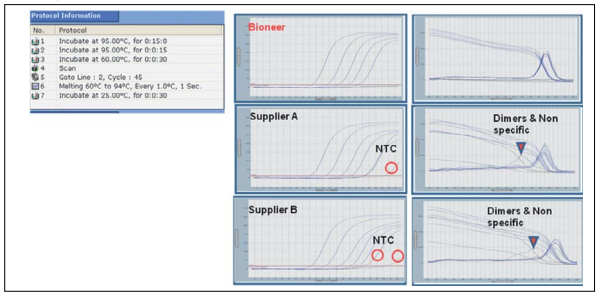
Specifications

- Enzyme: *Top* DNA polymerase
- 5' → 3' exonuclease: No
- 3' → 5' exonuclease: No
- 3' – A overhang: Yes

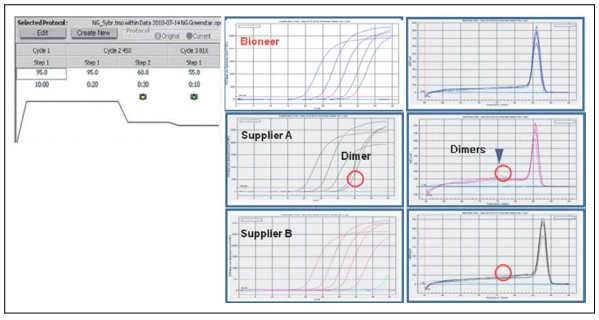
Experimental Data

Equipment Compatibility

▸ *Exicycler*™ 96 of BIONEER



▸ Using a Bio-Rad IQ5



▸ Using a ABI7500

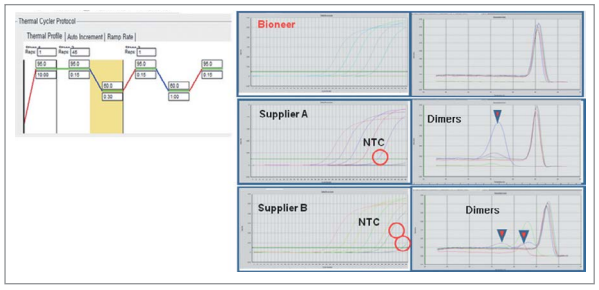
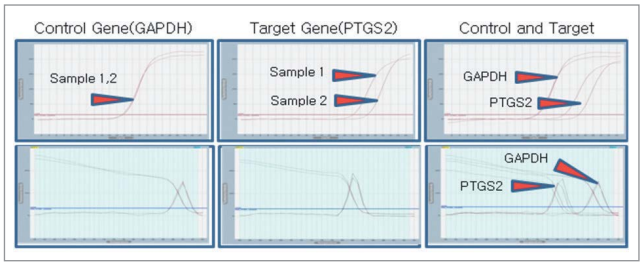


Figure 1. Comparison of the specificity of the dsDNA binding dye based Real-Time PCR.

Amplification of an 90 bp target gene was detected using serially diluted LP (Legionella Pneumoniae) genomic DNA (10^n dilution: 10^5~10 copies) with *AccuPower*® 2X *GreenStar*™ qPCR Master Mix. As shown in figure, very small amount of primer dimers was appeared in *AccuPower*® 2X *GreenStar*™ qPCR Master Mix than other kits.
All data were obtained using *Exicycler*™ 96 Real-Time Quantitative Thermal Block (Cat. No. A-2060, Bioneer).



Target Gene	hGAPDH		hPTGS2	
Sample No.	1	2	1	2
Ct Value	23.70	23.46	33.98	30.52

Figure 2. Gene expression analysis.

AccuTarget™ Validated Real-Time PCR Primer Library for human is designed by Bioneer's bioinformatics tool and targeting for human genome. cDNA was synthesized using human PTGS2 target primer of those and human total RNA identically quantified from Hela cell and blood cell with *AccuPower*® *CycleScript*™ RT PreMix (Cat. No. K-2044, Bioneer). Gene analysis was carried out both Hela cell and blood cell by operating Real-Time PCR reaction (95℃ 10 min, 1 cycle and 95℃ 10 sec, 58℃ 25 sec, 72℃ 30 sec, 41 cycles) using the cDNA, *AccuPower*® 2X *GreenStar*™ PCR Master Mix and *Exicycler*™ 96 Real-Time Thermal Block (Cat. No. A-2060, Bioneer).

Ordering Information

Cat. No.	Product Description			
K-6251	*AccuPower*® 2X *GreenStar*™ qPCR Master Mix	100 rxn	With 80X ROX Dye (0.1 ml)	50 µl/rxn
K-6253			-	
K-6252		200 rxn	With 80X ROX Dye (0.1 ml)	
K-6254			-	

AccuPower® *GreenStar*™ RT-qPCR PreMix & Master Mix

The HotStart One-step RT-qPCR Reagents for dsDNA Binding Dye

Description

AccuPower® *GreenStar*™ RT-qPCR PreMix can accurately amplify RNA in various samples by applying Thermostable RTase and HotStart PCR technology. This product has high selectivity capable of undergoing cDNA synthesis even when the target RNA is present in a small amount, making it suitable for various RNA virus tests and gene expression quantitative analysis. Moreover, master mix products are compatible with wide range of real-time PCR instruments.

Features and Benefits

- **High sensitivity**
  Amplification of target genes present in a miniscule amount of 1 pg template RNA.
- **Specificity**
  Minimized experimental errors by non-specific amplification and effective amplification of template RNA existing in a small amount through the use Hotstart *Taq* DNA polymerase, Thermostable RTase, and Hotstart PCR.
- **Use of Various Template RNAs**
  Comprehensive choice of template RNA for RT-qPCR reactions, even in a form of strong secondary structure, through the use of Thermostable *RocketScript*™ RTase, capable of performing RT reaction at high temperature.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

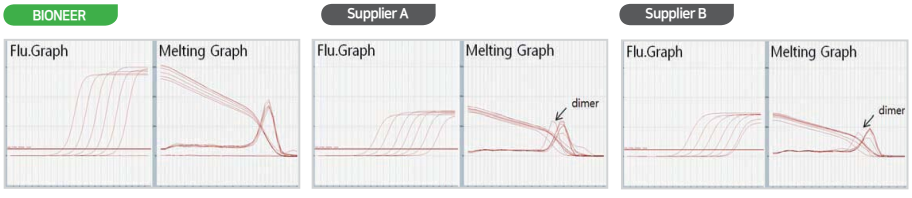
Application

- Low copy viral/bacterial pathogen load determination in an earlier stage
- Low copy mRNA amplification
- Low copy target RNA quantification
- RNA amplification for microarray and NGS

Specifications

- 5' → 3' exonuclease: Yes
- 3' → 5' exonuclease: No
- 3' – A overhang: Yes
- Fragment size: 200 bp

Experimental Data



RNA (ng)	BIONEER	Supplier A	Supplier B
100	17.79	17.38	19
10	21.46	20.82	22.67
1	25	24.67	26.17
0.1	27.31	27.45	29.85
0.01	30.34	30.34	32.82
0.001	33.28	33.58	35.58
NTC	UD	37.32	36.28

Figure 1. Comparison of specificity between *AccuPower*® *GreenStar*™ RT-qPCR PreMix and other supplier's master mixtures.

Ordering Information

Cat. No.	Product Description
K-6400	*AccuPower*® *GreenStar*™ RT-qPCR PreMix, 50 µl/rxn, 8-tube strips, 96 rxn, *Exicycler*™ 96, optical film included
K-6403	*AccuPower*® *GreenStar*™ RT-qPCR Master Mix (2X, 2.5 ml), 100 rxn

AccuPower® DualStar™ qPCR PreMix

The Hotstart Real-Time PCR Reagent applied *PyroHotStart* for Hydrolysis Probe

Description

AccuPower® DualStar™ qPCR PreMix enables accurate and rapid quantification of target genes in a wide range of samples through real-time PCR with Hydrolysis probe method. By applying Bioneer's patented enzyme-mediated HotStart technology, reaction specificity and PCR amplification efficiency have been improved, with more convienance and accuracy, having each tube packaged with premixed vacuum dried reagents essential for real-time PCR to prevent cross-contamination through the repetitive use of master mix products.

Features and Benefits

- **Specificity**
  Minimized non-specific amplification by applying PyroHotStart technology, a Bioneer's proprietary patented technology that uses of pyrophosphate and pyrophosphatase enzymes to reduce non-specific reactions during zero cycles & Maximized PCR reaction efficiency through elimination of PCR inhibitor PPi in every amplification cycle, allowing amplification of template DNA present even in a trace amount.
- **Equipment Compatibility**
  Wide choice of real-time PCR instruments for optimized results.
- **Universality of Target Gene**
  Effective quantitative PCR results from a gene regardless of its type, including DNA, cDNA and high GC template.
- **Convenience**
  Simplified procedure with all reactants essential for real-time PCR included in each tubes packaged with sufficient amounts for 1 run to readily start by adding template DNA, probe & primer for target gene, and D.W.
- **Stability**
  Enhanced stability allowing enzyme activity to stay stable for up to 2 years at -20℃ by including a stabilizer to the PCR reaction mixture.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Gene expression profiling
- Target DNA quantification
- Microbial detection
- Viral/bacterial pathogen load determination
- Evaluation of primer pair performance for probe-based Real-Time PCR

Specifications

- Enzyme: *Taq* DNA polymerase
- 5' → 3' exonuclease: Yes
- 3' → 5' exonuclease: No
- 3' – A overhang: Yes

Storage Temperature

-20℃

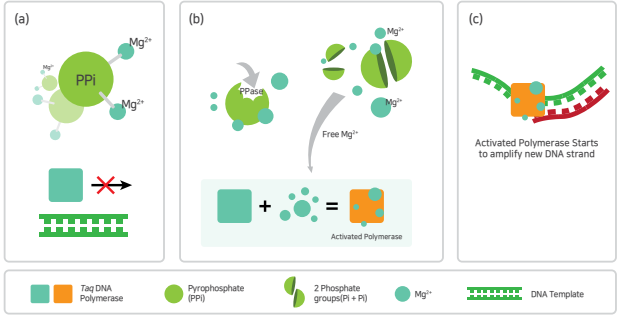


Figure 1. Enzyme-mediated HotStart PCR.

Experimental Data

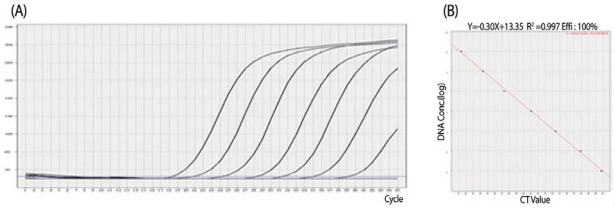


Figure 2. Real-Time PCR data of *AccuPower® DualStar™* qPCR PreMix.

AccuPower® DualStar™ qPCR PreMix provides at least 7 orders of magnitude in dynamic range (10^7 ~ 10 copies/rxn).

A: Amplification curve. West Nile Virus (WNV) primers and TaqMan-based probe were added into *AccuPower® DualStar™* qPCR PreMix. A series of WNV positive control diluents were tested.

B: Standard curve. All data were obtained using *Exicycler™* 96 Real-Time Quantitative Thermal Block (Cat. No. A-2060, Bioneer).

AccuPower® DualStar™ qPCR PreMix

Experimental Data

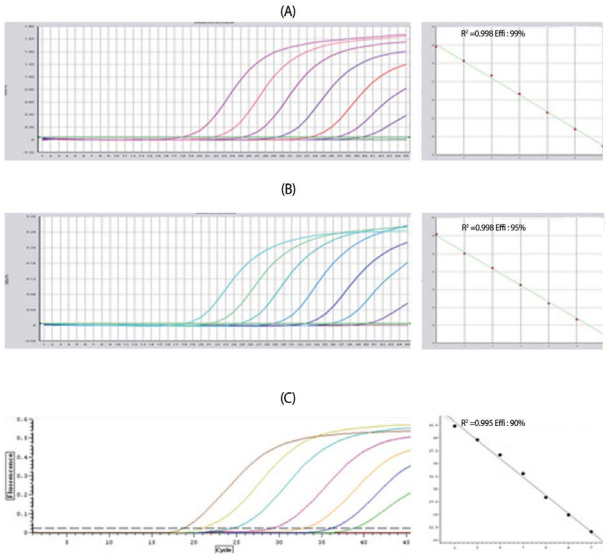


Figure 3. Data using various kinds of Real-Time PCR instruments.

AccuPower® DualStar™ qPCR PreMix is applicable to most of commercially available Real-Time quantitative PCR instruments. West Nile Virus (WNV) primers and TaqMan-based probe were added into *AccuPower® DualStar™* qPCR PreMix. A series of WNV positive control diluents were tested.
A: Amplification curve and standard curve using ABI7500 Fast Real-Time PCR machine (Applied Biosystems Co.).
B: Amplification curve and standard curve using ABI7500 Real-Time PCR machine (Applied Biosystems Co.).
C: Amplification curve and standard curve using Opticon Real-Time PCR machine (MJ Research, currently Bio-Rad Inc.).

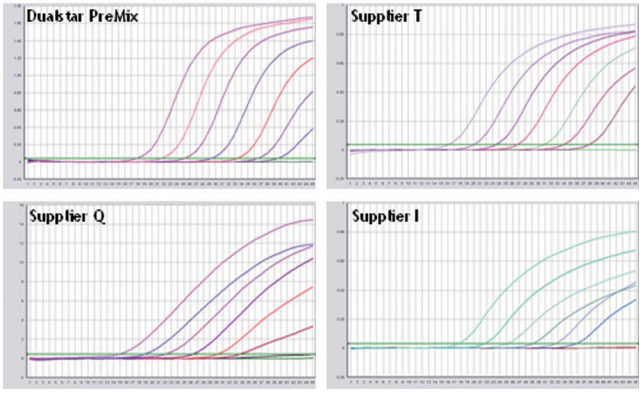


Figure 4. Comparison of detection sensitivity between *AccuPower® DualStar™* qPCR PreMix and other suppliers' master mixture.

West Nile Virus (WNV) primers and TaqMan-based probe were added into *AccuPower® DualStar™* qPCR PreMix and other suppliers' master mixture. A series of WNV positive control diluents were tested. Reaction mixtures were prepared and qPCR was performed according to each suppliers' protocol. All data were obtained using ABI7500 Fast Real-Time PCR machine (Applied Biosystems co.).

Ordering Information

Cat. No.	Product Description					
K-6100	*AccuPower® DualStar™* qPCR PreMix	*Exicycler™*	8-tube strip	Optical film included	96 rxn	20 µl/rxn
K-6110						50 µl/rxn
K-6103			96-well plate			20 µl/rxn
K-6113						50 µl/rxn
K-6101		ABI 7500	8-tube strip			20 µl/rxn
K-6111						50 µl/rxn
K-6104			96-well plate			20 µl/rxn
K-6114						50 µl/rxn
K-6102		CFX96	8-tube strip	-		20 µl/rxn
K-6112						50 µl/rxn

AccuPower® Plus *DualStar*™ qPCR PreMix & Master Mix

The HotStart Real-Time PCR Reagents for Hydrolysis Probe

Description

AccuPower® Plus *DualStar*™ qPCR PreMix uses Hydrolysis probe method to accurately quantify the target gene invarious kinds of samples. Hotstart *Taq* DNA Polymerase is used to solely amplify the dene of interest, with excellent sensitivity capable of amplifying template DNA even present in a trace amount. Moreover, this product is compatible with comprehensive types of devices, including *Exicycler*™ 96 and those from other companies, by providing optimized tube and plates, along with a 2X Master Mix type.

Features and Benefits

- **Comprehensive Range**
  A wide range of 8 logs up to 10~10^8 copies.
- **Specificity**
  Optimized amplification of target gene using Hotstart *Taq* DNA polymerase.
- **Universality of target gene**
  Effective quantitative PCR results from a gene regardless of its type, including DNA, cDNA and high GC template.
- **Convenience**
  Simplified procedure as all reactants essential for Real-Time PCR included in each tubes to readily start by adding template DNA, probe & primer for target gene, and D.W.
- **Stability**
  Enhanced stability being more stable the solution type products by including a stabilizer in the Real-Time PCR reaction mixture.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Gene expression profiling
- Target DNA quantification
- Microbial detection
- Viral/bacterial pathogen load determination
- Evaluation of primer pair performance for probe-based Real-Time PCR

Specifications

- Enzyme: HotStart *Taq* DNA polymerase
- 5' → 3' exonuclease activity: Yes
- 3' → 5' exonuclease activity: No
- 3' – A Overhang: Yes

Storage Temperature

-20℃

Experimental Data

Specificity

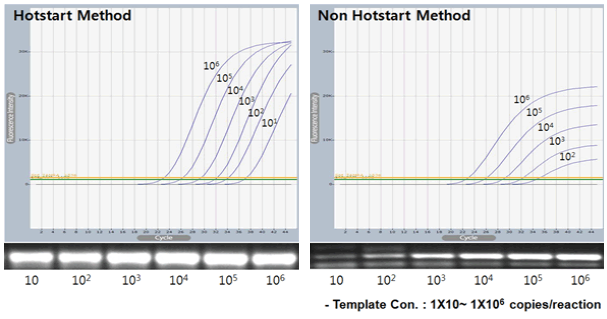
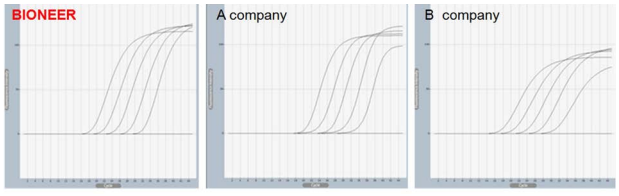


Figure 1. High specificity of *AccuPower*® Plus *DualStar*™ qPCR PreMix.

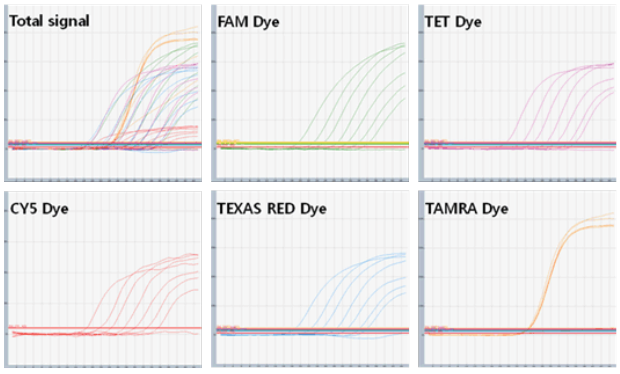
Sensitivity



Template DNA copies	Ct Value		
	BIONEER	A Company	B Company
10^3	32.60	34.72	31.28
10^4	29.18	31.31	27.75
10^5	25.66	27.61	24.44
10^6	22.43	24.48	21.99
10^7	19.22	20.98	19.99
Efficiency/linearity	99%/1	96%/1	100%/0.9999

Figure 2. Comparison of amplification quality between *AccuPower*® Plus *DualStar*™ qPCR PreMix and other suppliers' Real-Time qPCR kit.

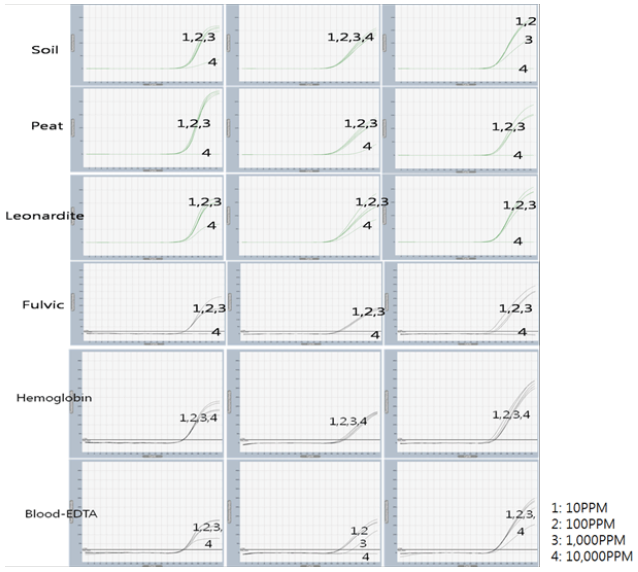
AccuPower® Plus *DualStar*™ qPCR PreMix & Master Mix



Dye	Template DNA of copies							
	1.00E+07	1.00E+06	1.00E+05	1.00E+04	1.00E+03	1.00E+02	1.00E+01	NTC
FAM	19.13	22.8	25.17	28.48	31.53	33.95	35.98	UD
TET	19.27	23.11	25.83	28.89	31.31	34.15	35.76	UD
CY5	18.48	21.52	24.33	27.35	30.02	32.86	35.45	UD
TEXAS_RED	18.19	21.56	24.21	27.8	30.42	33.39	35.19	UD
	1.00E+05	1.00E+05	1.00E+05	1.00E+05	1.00E+05	1.00E+05	1.00E+05	NTC
TAMRA (IPC)	24.65	24.75	24.51	24.41	24.66	24.73	24.83	UD

Figure 3. Five-target multiplexing on the *Exicycler*™ 96 instrument using *AccuPower*® Plus *DualStar*™ qPCR PreMix.

Figure 3 shows amplification of a 5-target multiplex assay. The dyes used were FAM, TET, Cyanine 5, Texas Red and TAMRA, respectively. The data demonstrate that over a dilution series of input template, the *AccuPower*® Plus *DualStar*™ qPCR PreMix can successfully and reliably generate up to 5-target multiplex data on the *Exicycler*™ 96.



PCR inhibitor		Bioneer	A company	B company
		Totally inhibition (PPM)		
Humic acid	Soil	10,000	*	10,000
	Peat	10,000	10,000	10,000
	Leonardite	10,000	10,000	10,000
	Fulvic	10,000	10,000	10,000
Hemoglobin		*	*	*
Blood EDTA		10,000	10,000	10,000

* : No inhibition

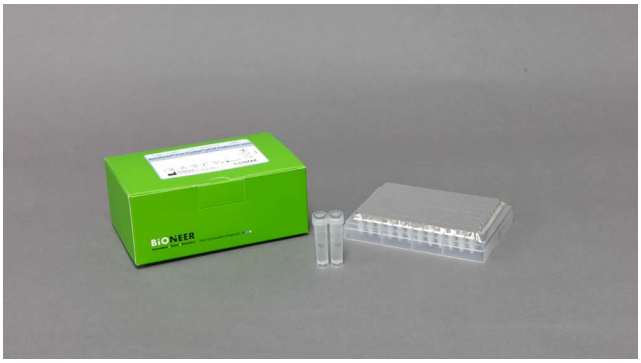
Figure 4. PCR inhibitor study using *AccuPower*® Plus *DualStar*™ qPCR PreMix.

Ordering Information

Cat. No.	Product Description			
K-6600	*AccuPower*® Plus *DualStar*™ qPCR PreMix	*Exicycler*™	8-tube strip (96 rxn) optical film included	50 µl/rxn
K-6601		ABI7500		
K-6602		CFX96		
K-6603	*AccuPower*® Plus *DualStar*™ qPCR Master Mix	2.5 ml of 2X Master mix solution		

AccuPower® Plus *DualStar*™ qPCR PreMix & Master Mix (with UDG)

The Hydrolysis Real-Time PCR Reagents for Hydrolysis Probe with No Carry-over Contamination



Description

AccuPower® Plus *DualStar*™ qPCR PreMix (with UDG) can accurately quantify the target gene of interest in a in various kinds of samples. Hotstart *Taq* DNA Polymerase is used to solely amplify the gene of interest, with excellent sensitivity capable of amplifying template DNA even present in a trace amount, with no carryover contamination through the application of DNA glycosylase system. Moreover, this product is compatible with comprehensive types of devices, including *Exicycler*™ 96 and those from other companies, by providing optimized tube and plates, along with a 2X master mix type.

Features and Benefits

- **Prevention of Carryover Contamination**
  UDG and dUTP in the PreMix or in the Master Mix prevent the re-amplification of carryover PCR products between reactions. The dUTP ensures that any amplified DNA will contain uracil rather than thymine. And UDG removes uracil residues from single- or double-stranded DNA, which prevents uracil-containing DNA from serving as template in future PCRs. In PCR with *AccuPower*® Plus *DualStar*™ qPCR PreMix (with UDG) the UDG incubation step at (37℃ for 2 min) destroys any uracil-contaning DNA fragments from previous reactions. UDG is inactivated by the high temperatures during normal PCR cycling, thereby allowing the amplification of genuine target sequences (Figure 1).
- **Comprehensive Range**
  A wide range of 8 logs up to 10~10^8 copies.
- **Specificity**
  Optimized amplification of target gene using Hotstart *Taq* DNA polymerase.
- **Universality of target gene**
  Effective quantitative PCR results from a gene regardless of its type, including DNA, cDNA and high GC template.
- **Convenience**
  Simplified procedure as all reactants essential for Real-Time PCR included in each tubes to readily start by adding template DNA, probe & primer for target gene, and D.W.
- **Stability**
  Enhanced stability being more stable the solution type prodcts by including a stabilizer in the Real-Time PCR reaction mixture.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Gene expression profiling
- Target DNA quantification
- Microbial detection
- Viral/bacterial pathogen load determination
- Evaluation of primer pair performance for probe-based Real-Time PCR

Specifications

- Enzyme: HotStart *Taq* DNA polymerase
- 5' → 3' exonuclease activity: Yes
- 3' → 5' exonuclease activity: No
- 3' – A Overhang: Yes

Storage Temperature

-20℃

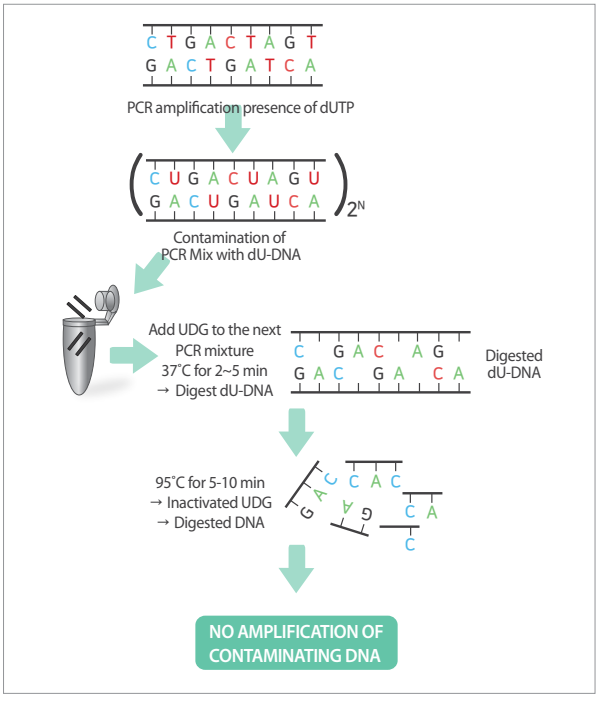
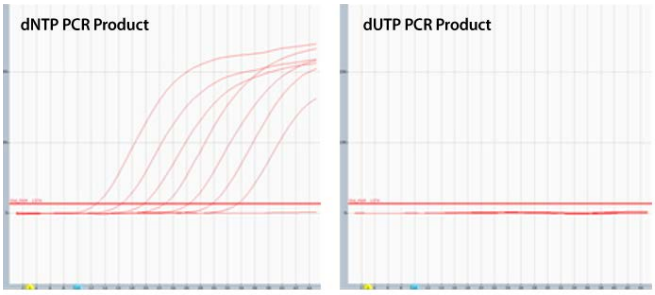


Figure 1. Prevention of carryover contamination.

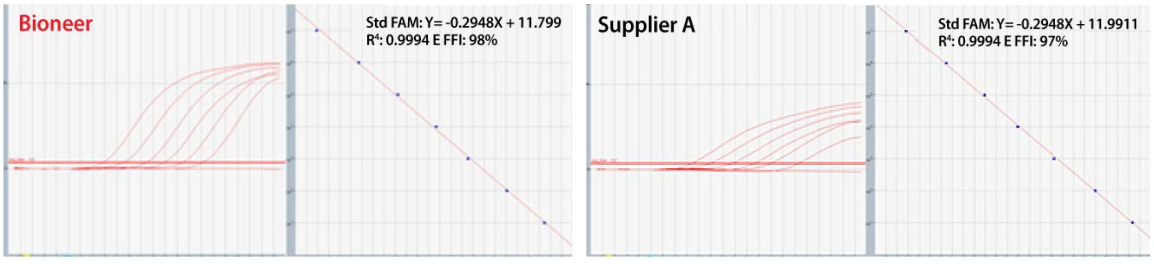
AccuPower® Plus *DualStar*™ qPCR PreMix & 2X Master Mix (with UDG)

Experimental Data



PCR product type	Linearity	Efficiency	10^8	10^7	10^6	10^5	10^4	10^3	10^2	NTC
dNTPs	0.9988	98	12.81	16.41	19.72	22.84	26.37	29.76	33.48	UD
dNTPs including dUTPs	-	-	UD	UD	UD	UD	UD	UD	UD	UD

Figure 2. Efficiency of uracil DNA glycosylase using PCR products (including dN/dU base).



Company	Ct Value								
	Linearity	Efficiency	10^7	10^6	10^5	10^4	10^3	10^2	NTC
Bioneer	0.9999	98%	15.73	19.14	22.99	25.91	28.96	33.1	UD
Supplier A	0.9994	97%	16.86	19.98	23.55	27.26	30.05	34.61	UD

Figure 3. Comparison of amplification quality between *AccuPower*® Plus *DualStar*™ qPCR PreMix (with UDG) and supplier's Real-time qPCR kit.

Ordering Information

Cat. No.	Product Description			
K-6605	*AccuPower*® Plus *DualStar*™ qPCR PreMix (with UDG)	*Exicycler*™ 96-well plate	optical film included	50 µl/rxn
K-6606		ABI7500 96-well plate		
K-6607		CFX96 8-well strip		
K-6608	*AccuPower*® Plus *DualStar*™ qPCR Master Mix (with UDG)	2.5 ml of 2X Master mix solution		

AccuPower® Dual-HotStart™ RT-qPCR PreMix & Master Mix

The One-step RT-qPCR Reagents having high sensitivity & specificity using hydrolysis probe applied with HotStart Technology

Description

AccuPower® Dual-HotStart™ RT-qPCR PreMix is an improved kit from RT reaction problem. Through this kit, you perform cDNA synthesis of your selective RNA and provide improved sensitivity from small amount of template RNA. In addition, you can get accuracy of your cDNA synthesis by performing PCR via using one-step reaction. Therefore, this is an excellent high sensitivity One-step RT-qPCR product and utilizes the several types of virus test and gene expression Real-Time analysis experiment. Furthermore, this product is ready to use. You just add Template RNA, Primer and Probe with great reproducibility. It is a single use product with one dose dispensed on each tube to prevent cross contamination cause by repeated use of the master mix product. In addition, we provide the tubes and plate that you can use not only *Exicycler™* 96 but also other similar Real-Time PCR machine. Additionally, we provide 2X Master mix type for your convenient.

Features and Benefits

- **Sensitivity**
  You can get great result with smallest amount of your target template and high concentrated RNA product. We have wide dynamic range such as 10-10^{10} copies.
- **Specificity**
  The world's first *Dual-HotStart™* RT-qPCR reaction using *PyroHotStart* RT reaction and HotStart PCR optimized to detect only the target gene precisely.
- **Multiplexing**
  It is compatible with many types of fluorescent dyes (probe) and can detect various target genes at the same time.
- **Comprehensive template RNA detection**
  RocketScript™ RTase included for undergoing RT reaction at high temperature and gaining RT-qPCR results from strong secondary template RNA structures.
- **Convenience**
  All reactants necessary for *RocketScript™* RTase, HotStart *Taq* DNA polymerase and cDNA synthesis and qPCR included in each tubes to readily start the one-step RT-qPCR by adding template DNA, probe & primer for target gene, and D.W.
- **Reproducibility**
  Mass production under ISO 9001 quality system allowing minimized deviation between lots and reproducible results even for replicates tested repeatedly under the same conditions and variables.

Application

- Gene expression profiling
- Target RNA quantification
- Microbial detection
- Viral/bacterial pathogen load determination

Specifications

- Enzyme: *RocketScript™* RTase, HotStart *Taq* DNA polymerase
- 5' → 3' exonuclease activity: Yes
- 3' → 5' exonuclease activity: No
- 3' – A Overhang: Yes

Storage Temperature

-20℃

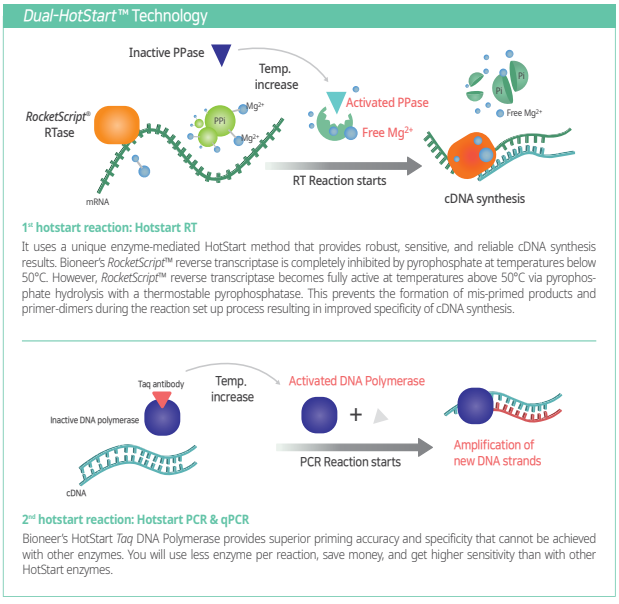


Figure 1. *Dual-HotStart™* Technology

AccuPower® Dual-HotStart™ RT-qPCR PreMix & 2X Master Mix

Experimental Data

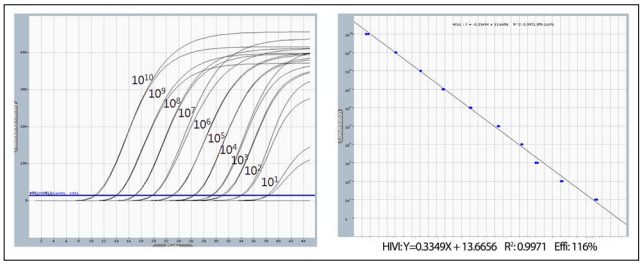


Figure 2. High sensitivity of *AccuPower® Dual-HotStart™* RT-qPCR PreMix.
Experiment with HIV target. 10-fold serial dilution of template RNA (10^{10} ~ 10 copies spiked in human total RNA).

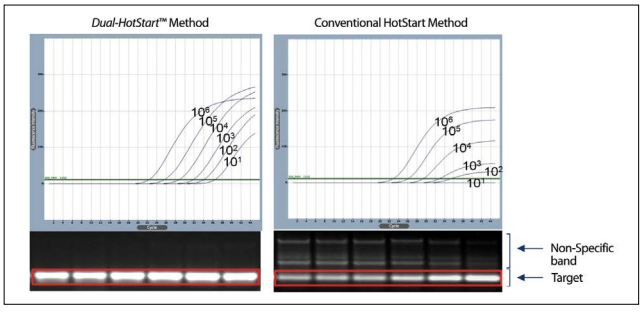


Figure 3. High specificity of *AccuPower® Dual-HotStart™* RT-qPCR PreMix.
Experiment with HCV target. 10-fold serial dilution of template RNA (10^6 ~ 10 copies spiked in human total RNA). Conventional hotstart qPCR always generates non-specific amplification at low template concentration, which deteriorate the sensitivity of qPCR. *AccuPower® Dual-HotStart™* RT-qPCR PreMix accurately amplifies target RNA without non-specific amplification, even at low concentration of template.

Ordering Information

Cat. No.	Product Description			
K-6704	*AccuPower® Dual-HotStart™* qPCR PreMix	*Exicycler™*	8-well strip (96 rxn) optical film included	50 µl/rxn
K-6705		ABI7500		
K-6706		CFX96		
K-6707	*AccuPower® Dual-HotStart™* qPCR Master Mix	2.5 ml of 2X Master mix solution		

04. Customized PCR

Customized *AccuPower*® PCR/RT/qPCR PreMix Service

Description

Customized *AccuPower*® PCR PreMix Service is a service that provides customized PCR products suitable for the PCR characteristics of customers for highly reproducible experiments of repeated PCR tests. All the requested reactants essential for the hot start PCR such as DNA polymerase, dNTPs, reaction buffers, and thermostable PPase are mixed with the ordered primer sets and vacuum-dried, each packaged with amounts sufficient for one run to start the PCR reaction conveniently just by adding the template and the D.W.

Specifications

Target	Human / Veterinary / Plant / Fish / Microorganism (Fungi, *E.coli*) etc
Instrument	*AllInOneCycler*™ 96 Gradient Thermal Block or other thermal block
Specimen	Taken from brain, cardiovascular, bone marrow, liver, lung, peritoneum, geces, septicemia, or other organs
Tests per Kit	96

Features and Benefits

- **Stability**
  Maintaince of enzyme activity for a month at room temperature, a year in a freezer through the use of a patent stabilizer.
- **Specificity**
  Simplified procedure with all components necessary for PCR reaction packaged mixed with the inquired primer set in each PCR tube for the reaction to be performed immediately by adding DNA and D.W only., along with tracking dyes and precipitants required for electrophoresis included to eliminate the need of sample loading buffer and minimize carry-over contamination by aerosol generation.
- **Reproducibility**
  Reproducible experimental results by mass production in one-batch system under ISO 9001 quality system with through QC for each batch, then supply as uniform quality product.

Ordering Information

Minimum Quantity	1,920 tubes	
Production Period	Single Custom PreMix	~10 working days
	2~3-Multiplex Custom PreMix	~12 working days
	4-Multiplex Custom PreMix	~16 working days
	5-Multiplex Custom PreMix	Inquire

✓ When the template is not provided, the production period will be longer.
✓ Client verification period is excluded form production period.
✓ The fee for oligo synthesis will be separately added to the quoted price.

How to Order

Step 1	Please send the experimental information (below) necessary for producing the custom premix to e-mail. Informations: Amplicon size, Oligo sequence, Additional reaction conditions (besides Bioneer's standard conditions), Order quantity and Product type (PCR, HotStart, RT-PCR etc).
Step 2	Our AccuPower Team will respond via email with a production period estimate and a price quote based on the information you have provided.
Step 3	If you decide to go ahead with the Custom PreMix Service, let us know via email or phone. We will immediately initiate the service, starting with oligo synthesis.

Please fill out Order Form and send it to sales@bioneer.com.