PowerResist Taq Polymerase

Cat. No.: FP1509109 | Pack size: 250 U / 1 KU / 2.5 KU / 4 × 2.5 KU | Storage: -20 °C

Overview

PowerResist Taq Polymerase is a mutant Taq enzyme obtained by site-directed mutagenesis of wild-type Taq DNA polymerase. Compared with wild-type enzyme, it has higher template affinity and stronger resistance to inhibitors, enabling amplification from challenging matrices such as whole blood, crude fecal extracts, and crude plant extracts after validation.

The enzyme is modified with two Taq monoclonal antibodies that block polymerase and 5'-3' exonuclease activity before heat activation. After heating at 95 °C for 2 min 30 sec, the antibodies dissociate and release enzyme activity, supporting hot-start qPCR, anti-interference amplification, rapid PCR, and ARMS applications.

Key Features

- Mutant Taq polymerase with strong resistance to endogenous and exogenous inhibitors
- Two-antibody hot-start modification for polymerase and exonuclease activities
- Supports direct amplification from whole blood and crude extracts after assay validation
- Fast amplification capability suitable for rapid PCR and low-template detection
- Strong single-base recognition ability for SNP and ARMS workflows

Product Specifications

Parameter	Specification	Notes
Product name	PowerResist Taq Polymerase	Antibody-modified mutant Taq enzyme
Cat. No.	FP1509109	Available pack sizes: 250 U, 1 KU, 2.5 KU, 4 × 2.5 KU
Grade & purity	Suitable for molecular biology; EnzymoPure™; for DNA and RNA applications	Supplied enzyme concentration: 5 U/µL
Bioactivity	5 U/µL	Hot-start polymerase activity
Application	PCR; qPCR; rapid PCR; ARMS	Direct and inhibitor-tolerant amplification

Parameter	Specification	Notes
Activation	95 °C for 2 min 30 sec	No special inactivation treatment required
Storage conditions	Store at -20 °C; avoid repeated freezing and thawing	Aliquot upon receipt when repeated use is expected
Stability	Store at -20 °C long term (24 months)	Avoid freeze/thaw cycles

Product Contents & Storage

Cat. No.	Component	250 U	1 KU	2.5 KU	4 × 2.5 KU	Storage
FP1509109A	PowerResist Taq Polymerase (5 U/μL)	50 μL	200 μL	500 μL	4 × 500 μL	-20 °C; avoid freeze/thaw cycles
FP1509109B	5× GN Buffer (without Mg^{2+})	1 mL	4 × 1 mL	10 × 1 mL	40 × 1 mL	-20 °C; avoid freeze/thaw cycles
FP1509109C	100 mM Mg^{2+}	100 μL	400 μL	1 mL	4 × 1 mL	-20 °C; avoid freeze/thaw cycles

Shelf life: Stable for 24 months when stored at -20 °C under recommended conditions.

Note: *Avoid repeated freeze/thaw cycles. Keep enzyme on ice during setup and protect fluorescent probes from light.*

Materials Required But Not Supplied

Item	Recommended Specification	Purpose
Template DNA	Purified DNA, whole blood, or validated crude sample	PCR/qPCR template
dNTP mix	25 mM each	DNA synthesis substrates
Forward and reverse primers	10 μM working solutions	Target amplification
Probe	10 μM working solution for probe qPCR	Fluorescence detection
ddH_2O	Nuclease-free	Reaction volume adjustment

Item	Recommended Specification	Purpose
PCR/qPCR tubes or plates	Instrument compatible	Reaction vessel
Thermal cycler or real-time PCR instrument	Compatible with assay format	Amplification and fluorescence acquisition

Preparation Before Use

1. Dissolve and mix reagents at room temperature or 4 ℃, then place on ice.
2. Scale reaction volumes proportionally to match project requirements while maintaining final concentrations.
3. Set up reactions on ice or in an ice box and protect probes from light.
4. Avoid vigorous shaking; mix gently and centrifuge briefly.

Protocol

Step 1 — qPCR Reaction Setup (50 µL)

Recommended template amounts in a 50 µL reaction: mammalian genomic DNA 0.1-1 µg; E. coli genomic DNA 10-100 ng; plasmid DNA 0.1-10 ng. Recommended Mg^{2+} range is 2-6 mM.

Component	Volume Added	Final Concentration
5× GN Buffer (without Mg^{2+})	10 µL	1×
dNTPs (25 mM each)	0.4 µL	0.2 mM
Template DNA	5-10 µL	-
Forward Primer (10 µM)	1 µL	0.2 µM
Reverse Primer (10 µM)	1 µL	0.2 µM
Probe (10 µM)	0.5 µL	0.1 µM
PowerResist Taq Polymerase (5 U/µL)	0.5 µL	2.5 U/50 µL
$MgCl_2$ (100 mM)	1 µL	2 mM
ddH_2O	To 50 µL	-
Total Volume	50 µL	-

Step 2 — Conventional Qualitative PCR Program

Step Name	Temperature	Time	Cycles
Heat Shock	95 °C	2 min 30 sec	1
Denaturation	95 °C	20 sec	30-35
Annealing	55 °C	20 sec	30-35
Extension	72 °C	40 sec	30-35
Final Extension	72 °C	7 min	1
Storage	12 °C	∞	1

Step 3 — Fluorescent Quantitative PCR Program

Step Name	Temperature	Time	Cycles
Heat Shock	95 °C	2 min 30 sec	1
Denaturation	95 °C	15 sec	35-40
Annealing + Extension	55 °C	40 sec	35-40

Step 4 — Matrix Tolerance Notes

- For PCR using whole blood as template, keep whole blood at or below 20% (v/v) of the reaction system volume.
- For fluorescent quantitative PCR using whole blood, keep whole blood at or below 5% (v/v) to avoid interference with fluorescence acquisition.
- For rapid PCR, the fastest extension starting point is approximately 15 sec per kb; extend when amplification is not satisfactory.
- Validate crude samples and inhibitor-rich matrices with appropriate positive, negative, and dilution controls.

Unit Definition

One unit (U) of activity is defined as the activity that catalyzes incorporation of 10 nmol of total nucleotides into acid-insoluble substances within 30 min at 74 °C using activated salmon sperm DNA as the template/primer.

Precautions

- For most amplification reactions, initial denaturation can be set to 95 °C for 2 min 30 sec; adjust for complex templates if needed.
- Determine extension time according to product length and template complexity.
- Use validated primers/probes and include no-template controls for qPCR runs.
- Read the current SDS before use and wear appropriate personal protective equipment.

Quality Control

QC Item	Method	Acceptable Range
Component completeness	Visual inspection on receipt	Components, labels, pack size, lot number, and expiry information match the product contents table
Enzyme concentration	Approved product specification and activity assignment	PowerResist Taq Polymerase supplied at 5 U/µL
Functional performance	PCR/qPCR amplification with qualified template	Expected amplification in positive reactions; no amplification in appropriate negative controls
Nuclease status	DNase/RNase functional testing where applicable	Meets approved specification for molecular biology applications
Storage verification	Review receipt condition and storage record	Cold-chain shipment received intact and stored at -20 °C immediately

Troubleshooting

Issue	Possible Causes	Corrective Action
No or weak amplification	• Template quantity or quality not suitable • Missing component or incorrect reaction setup • Annealing temperature or Mg^{2+} concentration not optimized • Enzyme damaged by improper storage	• Verify template integrity and amount • Check reaction setup against the table • Optimize annealing temperature and Mg^{2+} concentration • Use fresh aliquots and avoid repeated freeze/thaw cycles
Nonspecific bands or smearing	• Primer specificity is poor • Template amount too high • Annealing temperature too low • Too many cycles or excess enzyme	• Redesign primers and verify with BLAST • Reduce template input • Increase annealing temperature or use hot-start workflow • Reduce cycle number or enzyme amount after validation
Primer-dimer formation	• Complementarity at primer 3'-ends • Primer concentration too high • Room-temperature setup before hot-start activation	• Redesign primers to reduce 3'-end complementarity • Reduce primer concentration within validated range • Assemble reactions on ice and start cycling promptly
Poor qPCR baseline or fluorescence	• Probe or dye degradation • Incorrect ROX setting or acquisition step • Inhibitory template matrix	• Protect fluorescent reagents from light • Verify instrument dye/ROX settings and acquisition step • Dilute template or improve sample cleanup

Recommended Applications

Hot-start qPCR · direct whole blood amplification · inhibitor-tolerant PCR · rapid PCR · ARMS/SNP detection · crude sample amplification

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