

## PerfeCtA® qPCR ToughMix® UNG

Cat No. 95138-012      Size: 1250 x 20- $\mu$ L reactions (10 x 1.25 mL)  
 95138-05K              5000 x 20- $\mu$ L reactions (1 x 50 mL)

Store at -25°C to -15°C  
 protected from light

### Description

PerfeCtA qPCR ToughMix UNG is a 2X concentrated ready-to-use reaction cocktail for PCR amplification of DNA templates that overcomes many known inhibitors of PCR often present in crude samples extracted from environmental specimens, plant tissues, or animal tissues. It is a versatile and robust real-time qPCR reagent that provides maximum sensitivity and PCR efficiency with a variety of fluorogenic probe chemistries, including TaqMan® hydrolysis probes. PerfeCtA qPCR ToughMix UNG contains all required reaction components, except primers, probe(s), and DNA template. Inclusion of uracil DNA glycosylase (UNG), and substitution of dTTP with dUTP, prevents amplification of carry-over contamination from previous dU-containing PCRs.

A key component of PerfeCtA qPCR ToughMix UNG is an ultra pure, highly processive thermostable DNA polymerase that is combined with high avidity monoclonal antibodies. This proprietary polymerase mix is highly resistant to PCR inhibitors and provides an extremely stringent automatic hot-start allowing reaction assembly, and temporary storage, at room temperature prior to PCR amplification. PerfeCtA qPCR ToughMix UNG delivers exceptional performance with either fast or conventional PCR cycling protocols.

### Instrument Compatibility

Different real-time PCR systems employ different strategies for the normalization of fluorescent signals and correction of well-to-well optical variations. It is important to match the appropriate reference dye to each specific optical detection system. PerfeCtA qPCR ToughMix UNG does **not** contain an internal reference dye. Please consult our Product Finder selection tool at [www.quantabio.com](http://www.quantabio.com) to find the correct product for your real-time PCR system.

### Components

PerfeCtA qPCR ToughMix UNG (2X): 2X concentrated reaction buffer containing optimized concentrations of MgCl<sub>2</sub>, dNTPs (dATP, dCTP, dGTP, dUTP), hot-start DNA polymerase, uracil DNA glycosylase (UNG), and stabilizers.

### Storage and Stability

Store components in a constant temperature freezer at -25°C to -15°C protected from light upon receipt. Repeated freezing and thawing does not impair product performance. After thawing, mix thoroughly before using. For lot specific expiry date, refer to package label, Certificate of Analysis or Product Specification Form.

### Guidelines for qPCR:

- The design of highly specific primers and probes is a critical parameter for successful real-time PCR. The use of computer aided primer design programs is encouraged in order to minimize the potential for internal secondary structure and complementation at 3'-ends within each primer, the primer pair, and primer/probe combinations. For best results, amplicon size should be limited to 65 - 200 bp. Optimal results may require titration of primer concentration between 100 and 900 nM. A final concentration of 300 - 400 nM each primer and 100 to 250 nM probe is effective for most applications. Increasing the concentration of the primer that initiates synthesis of the target strand that is complementary to the probe can improve fluorescent signal for some primer/probe systems.
- Preparation of a reaction cocktail is recommended to reduce pipetting errors and maximize assay precision. Assemble the reaction cocktail with all required components except sample template (genomic DNA or cDNA) and dispense equal aliquots into each reaction tube. Add the DNA template to each reaction as the final step. Addition of samples as 2 to 5- $\mu$ L volumes will improve assay precision.
- Suggested input quantities of template are: cDNA corresponding to 1 pg to 100 ng of total RNA; 10 pg to 1  $\mu$ g genomic DNA
- After sealing each reaction, vortex gently to mix contents. Centrifuge briefly to collect components at the bottom of the reaction tube.

### Reaction Assembly

Component	Volume for 20- $\mu$ L rxn.	Final Concentration
PerfeCtA qPCR ToughMix UNG (2X)	10 $\mu$ L	1x
Forward primer	variable	100 – 900 nM
Reverse primer	variable	100 – 900 nM
Probe	variable	100 – 250 nM
Nuclease-free water	variable	
Template	<u>2 – 5 <math>\mu</math>L</u>	variable
Final Volume ( $\mu$ L)	20 $\mu$ L	



**Note:** For smaller or larger reaction volumes scale all components proportionally.



## PCR Cycling Protocol

UNG carry-over incubation – optional:

Initial denaturation:

PCR cycling (30-45 cycles):

	Fast 2-Step Cycling	Fast 3-Step Cycling	Standard Cycling
UNG carry-over incubation – optional:	45°C, 5 min ‡	45°C, 5 min ‡	45°C, 5 min ‡
Initial denaturation:	95°C, 30s *	95°C, 30s *	95°C, 2-3 min *
PCR cycling (30-45 cycles):	95°C, 3 to 5s	95°C, 3 to 5s	95°C, 10 to 15s
		55 to 65°C, 15s	
	60°C, 20 to 30s †	68 to 72°C, 10s †	60°C, 30 to 60s †

The appropriate step for fluorescent data collection varies for different probe assay formats. Data collection for 5'-nuclease probe assays (TaqMan probe) should be carried out at the end of the extension step. Use the annealing step for data collection with hybridization probe assays (HybProbe® FRET hybridization probes, Molecular Beacons, Solaris® qPCR Assays, Scorpions® primers, etc.).

End-point analysis should be carried out at a suitable temperature for your detection probe chemistry.

‡ UNG incubation is optional. Alternate protocols are acceptable. We find that a 5 minute incubation at 45°C is significantly more effective at eliminating carry-over contamination than the more typical procedure of 50°C for 2 min.

\* Full activation of the DNA polymerase occurs within 10 seconds at 95°C; however, optimal initial denaturation time is *template dependent* and will affect qPCR efficiency and sensitivity. Amplification of genomic DNA or supercoiled plasmid DNA targets may require 5 to 10 min at 95°C to fully denature and fragment the template. Short double-stranded DNA template (PCR product) or single-stranded DNA template, such as cDNA, may require as little as 1s at 95°C. Use 30s at 95°C as a general starting point.

† Extension time is dependent upon amplicon length and the minimal data collection time requirement for your qPCR instrument. Use 30s at 60°C as a general starting point. Some assay designs and/or detection chemistries may require a 3-step cycling protocol for optimal performance. Optimal annealing temperature and time may need to be empirically determined for any given primer set and real-time instrument.

## Quality Control

Kit components are free of contaminating DNase and RNase. PerfeCta qPCR ToughMix UNG is functionally tested in qPCR. Kinetic analysis must demonstrate linear resolution over six orders of dynamic range ( $R^2 > 0.990$ ) with a 2-fold discrimination of starting template and a PCR efficiency > 95%.

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