

VeraSeq[®] ULtra DNA Polymerase

Key benefits

- High-fidelity polymerase tolerant of uracil-containing primers, nucleotides and templates
- Fidelity >25× higher than Taq-B DNA polymerase
- Unmatched sensitivity among proofreading polymerases, enabling amplification from as little as 100 pg template DNA
- Fast amplification rates of 15 s/kb for shorter PCR run times
- Broad Mg²⁺ and DMSO tolerance reduces the need for complex PCR optimization
- Streamlined licensing structure, including clinical applications
- Ultra-pure formulation with no animal-derived protein additives (Figure 1)

High-fidelity amplification

PCR is routinely used for DNA amplification and serves several downstream applications, including cloning or DNA sequencing. Ensuring stringent conditions in PCR has become increasingly important, particularly in NGS technologies and molecular diagnostic applications. VeraSeq ULtra DNA Polymerase contains a dsDNA-binding domain fused to a Pyrococcus-like proofreading polymerase. The dsDNA binding domain enhances the affinity of the resulting fusion protein for dsDNA, thereby increasing the polymerase's processivity.

VeraSeq ULtra has been designed to partner proofreading activity with an ability to tolerate uracil bases in primer, template or nucleotide. The resulting protein generates PCR products optimized for methylation sequencing and supports carryover prevention when used with Uracil DNA Glycosylase (UDG). VeraSeq ULtra delivers consistently high amplification success rates across a broad range of templates, with mid-to-high fidelity exceeding that of Taq polymerase.



Figure 1

Protein gel showing the purity of VeraSeq ULtra DNA Polymerase (VS) in comparison with a competitor product (Ph). (UL: Protein size ladder).

Established quality, consistency and scalability

In addition to the listed key performance features, VeraSeq Ultra DNA Polymerase benefits from a world-renowned record of producing benchmark-quality enzyme products under ISO 13485:2003 Quality System. QIAGEN employs the same strict quality control processes and proprietary methods for maintaining purity (Figure 1) that it incorporates into all its enzyme and protein products. This ensures that our products meet the rigorous demands of global supply and are of unmatched purity in the industry. No animal-derived protein additives are included in VeraSeq Ultra DNA Polymerase.

Sensitivity

One key challenge with high-fidelity polymerase formulations is the trade-off with sensitivity. Competitor products often rely on protein additives to boost performance. In contrast, expression and purification methods from QIAGEN deliver high-purity proteins. As a result, VeraSeq Ultra DNA Polymerase ensures high sensitivity by successfully amplifying input human genomic DNA down to 100 pg (Figure 2).

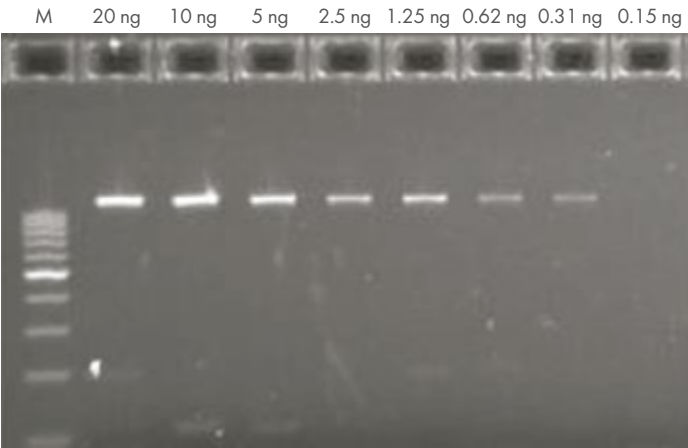


Figure 2
Successful amplification down to 300 pg of human genomic DNA. (M: Size marker).

Robust amplification across GC-rich templates

VeraSeq Ultra has been shown to yield successful amplifications across a broad range of GC-containing templates. We recommend using the included optimized buffer to minimize loss of fidelity in GC-rich DNA amplifications (Figure 3).

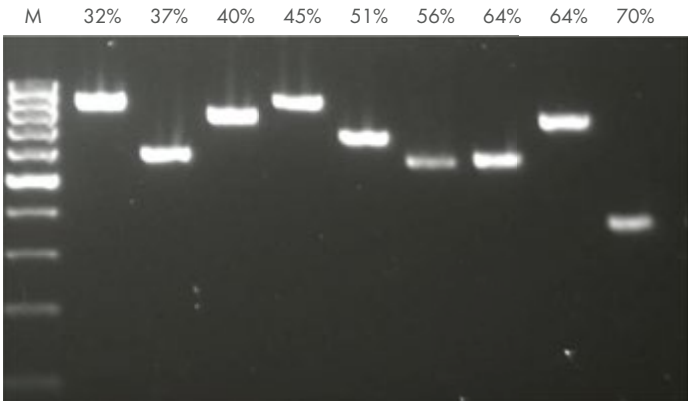


Figure 3
Successful amplification up to 70% GC-rich templates.

Fidelity

VeraSeq Ultra DNA Polymerase is a fusion of a single stranded binding (SSB) protein to a Pyrococcus-like polymerase domain, resulting in a polymerase with a fidelity at least 25 times that of Taq DNA polymerase. Two buffers are supplied, VeraSeq buffer II for regular amplifications and VeraSeq GC buffer for GC-rich templates. Fidelity measurements versus Taq DNA polymerase, performed using the industry-standard *lacI*-based assay, are shown in Table 1.

Table 1

Polymerase	Buffer	Error rate	Fold Better than Taq-B
VeraSeq 2.0	VS Buffer II	4.0×10^{-7}	61
VeraSeq 2.0	GC Buffer	4.6×10^{-7}	54
VeraSeq ULtra	VS Buffer II	1.0×10^{-6}	25
VeraSeq ULtra	GC Buffer	7.3×10^{-7}	34
Taq-B	Buffer I	2.5×10^{-5}	1

VeraSeq Ultra DNA polymerase shows >30x improvement in fidelity compared to Taq B DNA polymerase. Use of the G:C buffer increases fidelity and further improves success rate for G:C rich templates.

Rapid extension rate

The increased affinity of the SSB binding protein for DNA templates enhances processivity. VeraSeq ULtra DNA Polymerase exhibits an extension rate of 1 kb in 15 seconds (Figure 4), supporting amplifications up to 8 kb with minimized turnaround time. Combined with a high-amplification success rate, VeraSeq ULtra DNA Polymerase reduces rework time, making it one of the most effective high-fidelity Polymerase on the market today.

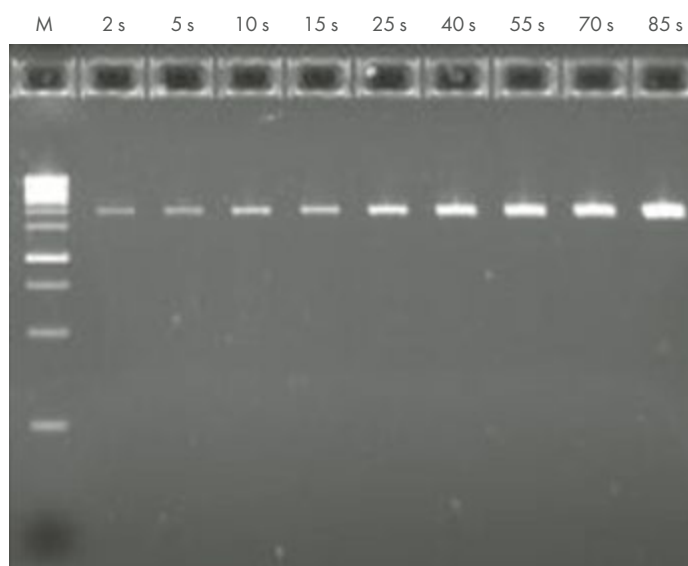


Figure 4
20 cycles of amplification at 72°C extension temperature. Clear product bands can be observed at an extension time of 2 s, with robust amplification clearly observed at a rate of 15 s/kb. (M: Size marker)

Simplified optimization

VeraSeq ULtra DNA polymerase has been developed to simplify optimization of individual PCR amplifications. The polymerase works under a broad range of Mg^{2+} concentrations (from 1.5–3.0 mM) and is tolerant to routinely used additives known to positively impact PCR success rate. For example, adding up to 9% DMSO will improve the success rate on the most challenging PCR templates (Figures 5 and 6).

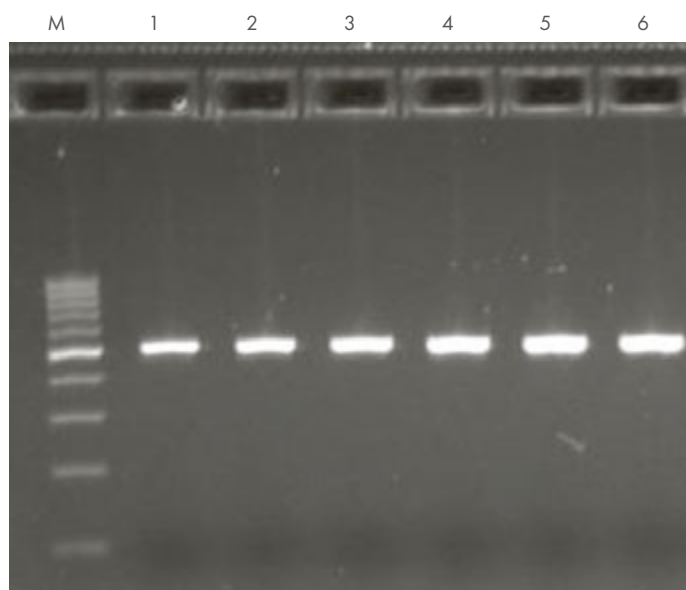


Figure 5
Titration of VeraSeq ULtra DNA polymerase units and Mg^{2+} shows successful amplification. Lanes 1–3 show amplification with 1U polymerase, lanes 4–6 show amplification using 2U. Lanes 1–3 also show increasing concentration of Mg^{2+} , starting at 1.5 mM, then increasing to 1.8 and 3.0 mM, respectively. Lanes 4–6 follow the same trend in Mg^{2+} concentration.

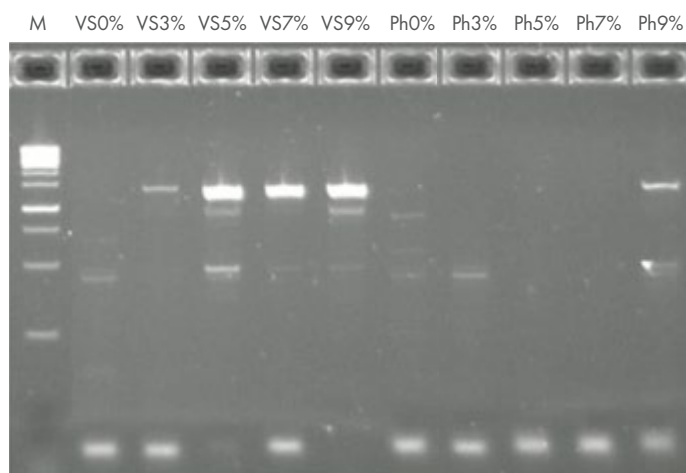


Figure 6
Addition of increasing volume of DMSO on human genomic DNA. No amplification is observed for this difficult target until larger volumes of DMSO are added. Up to 9%v/v can be added with a positive impact on amplification success rate with VeraSeq ULtra DNA Polymerase (VS) (lanes 1–5). The competitor product (Ph) failed to amplify the template (lanes 7–11). (M: Size marker).

Uracil tolerance

VeraSeq Ultra DNA Polymerase accommodates uracil bases in the template, primer and nucleoside triphosphates (Figure 7). This unique combination of high fidelity and uracil tolerance makes VeraSeq Ultra an ideal choice for methylation studies or in combination with UDG to prevent sample cross-contamination in sequencing or molecular diagnostic applications.

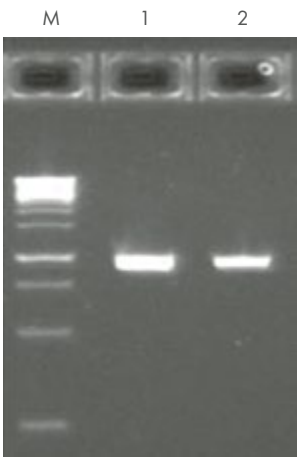


Figure 7
Successful amplification utilizing dUTP (lane 2) in place of dTTP (lane 1). (M: Size marker).

Quality and service you can count on

QIAGEN manufactures pure, superior quality enzymes and reagents for molecular biology and other applications. Our analytical grade quality products meet the most rigorous specifications. We strives to resolve customers’ challenges by providing the highest quality materials, a consistent supply chain and excellent service.

VeraSeq Ultra DNA Polymerase reflects our commitment to identifying, developing and delivering outstanding enzyme technologies. If your company requires protein products and a service partner that stands above the crowd, then we'd love to hear from you.

Ordering Information

Product	Contents	Cat. no.
VeraSeq Ultra DNA Polymerase	500 U at 2000 U/mL	P7520L



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