

Better PCR Reagents

For accuracy, sensitivity, and speed



Catalog

Smart Amplification Starts with the Right Tools

Agilent's family of PCR reagents and kits began with –Stratagene's enzyme expertise – and continues to develop, providing a wide range of high-fidelity, specialty and routine enzymes built to meet virtually every amplification need.

Agilent's PCR portfolio solution goes beyond the products, offering you an experienced technical support team for help in designing assays, optimizing protocols, and troubleshooting programs.

Better PCR



The ArchaeMaxx Polymerase-Enhancing Factor

ArchaeMaxx overcomes the stalling of proofreading enzymes when dUTP is present within the template or PCR reaction.

- Exclusively found in Agilent's high-fidelity DNA polymerases
- Functions as a dUTPase, converting poisonous dUTP into harmless dUMP
- Increases PCR yield and polymerase length amplification capability



The Importance of High-Fidelity

High-fidelity PCR enzymes are valuable for minimizing the introduction of amplification generated errors in products utilized in downstream processes.

- Ideal for cloning, sequencing, and expression studies
- Reduces the number of clones that must be sequenced, improving overall TAT to results
- Obtains a higher frequency of error free constructs and accurate consensus sequences



Fusion Technology

The processivity of Agilent's premium enzymes are dramatically increased by fusing the DNA polymerase with a high-affinity double-stranded DNA binding domain.

- Shorter extension times through faster nucleotide incorporation, so faster PCR cycling times
- Serves to better anchor the DNA polymerase
- Prevents early dissociation from the DNA template



Hot Start Formulation

Hot start formulation provides higher specificity, reduced background and enhanced yield.



Master Mix Format









Master mix format provides added convenience and allows high-throughput setup.

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DNA Polymerase Selection Guide

	PCR Enzyme	Page	Fidelity	Speed	Yield	Target Length (genomic DNA)	Sensitivity
High-Fidelity & Difficult/GC Rich PCR	<i>PfuUltra</i> II Fusion HotStart DNA Polymerase Engineered to be the highest fidelity and fastest polymerase available	6	1 error/2.5 million bp	15 sec/kb		0-19 kb	
	Herculase II Fusion DNA Polymerase High-fidelity polymerase for difficult targets. Provides superior yields over a broad range of targets. Economical enough for routine use	8	1 error/770,000 bp	15 sec/kb		*0-12kb 12-23 kb (optimized)*	
	<i>PfuUltra</i> High-Fidelity DNA Polymerase AD Engineered for high-fidelity	13	1 error/2.25 million bp	1 min/kb		19 kb (optimized)	
	<i>PfuTurbo</i> DNA Polymerase AD First high-fidelity polymerase to include the ArchaeMaxx Polymerase-Enhancing factor	13	1 error/770,000 bp	1 min/kb		19 kb (optimized)	
	Cloned Pfu DNA Polymerase AD Cloned to ensure ultrapure manufacturing of Pfu	13	1 error/770,000 bp	2 min/kb		*1 kb 5 kb (optimized)*	
	<i>Pfu</i> DNA Polymerase Stratagene introduced the first thermophilic proofreading polymerase	13	1 error/770,000 bp	2 min/kb		(up to 1 kb)	
Specialty Enzymes	<i>PfuTurbo</i> Cx HotStart DNA Polymerase The only high-fidelity polymerase that can read through dUTP in the template and extending strand	13	1 error/770,000 bp	1 min/kb		0-10 kb	
	PicoMaxx High-Fidelity PCR System Most sensitive polymerase offered	10	2x Taq	1 min/kb		0-6 kb	
Routine Enzymes	<i>Taq</i> DNA Polymerase First thermophilic PCR enzyme	-	Standard	1 min/kb		*1 kb 4 kb (optimized)*	

Blunt or 3'-A Ends	 ArchaeMaxx Advantage	Enzyme Only		 HotStart	 Master Mix	PCR Enzyme	
		100 U 1000U	500 U 5000 U	100 U 1000 U	500 U 5000 U	100 rxn 400 rxn	
Blunt				(40 rxn) 600670 (400 rxn) 600674	(200 rxn) 6 00672	600850 600852	PfuUltra II Fusion HotStart DNA Polymerase Engineered to be the highest fidelity and fastest polymerase available
Blunt		(40 rxn) 600675 (400 rxn) 600679	(200 rxn) 600677				Hercules II Fusion DNA Polymerase High-fidelity polymerase for difficult targets. Provides superior yields over a broad range of targets. Economical enough for routine use
Blunt		600385 600389	600387	600390 600394	600392	600630	PfuUltra High-Fidelity DNA Polymerase AD Engineered for high-fidelity
Blunt		600255	600257	600320 600324	600322		PfuTurbo DNA Polymerase AD First high-fidelity polymerase to include the ArchaeMaxx Polymerase-Enhancing factor
Blunt		600353 600357	600355				Cloned Pfu DNA Polymerase AD Cloned to ensure ultrapure manufacturing of Pfu
Blunt		600135					Pfu DNA Polymerase Stratagene introduced the first thermophilic proofreading polymerase
Blunt	Alternative uracil resistance (Pfu mutation)			600410 600414	600412		PfuTurbo Cx HotStart DNA Polymerase The only high-fidelity polymerase that can read through dUTP in the template and extending strand
Mixed					600422		PicoMaxx High-Fidelity PCR System Most sensitive polymerase offered
3'-A							Taq DNA Polymerase First thermophilic PCR enzyme.

High-Fidelity & Difficult/GC Rich PCR

Specialty Enzymes

Routine Enzymes

High-Fidelity & Difficult/GC-Rich PCR

PfuUltra II Fusion HotStart DNA Polymerase

Extreme accuracy – 1 error/2.5 million bp

When accuracy is critical for your downstream applications, such as cloning, protein crystallization studies, and sequencing, PfuUltra II is the industry standard for high-fidelity PCR. PfuUltra II features a unique genetically engineered mutant of Pfu DNA polymerase, the ArchaeMaxx Polymerase-Enhancing Factor, fusion technology, and hot start formulation.

- **Highest fidelity** for the most reliable, error-free PCR
- **70-80% quicker** time to results
- **Accurately amplifies** targets up to 19 kb gDNA
- **Average error rate 3x lower** than PfuTurbo & 20x lower than Taq DNA polymerase



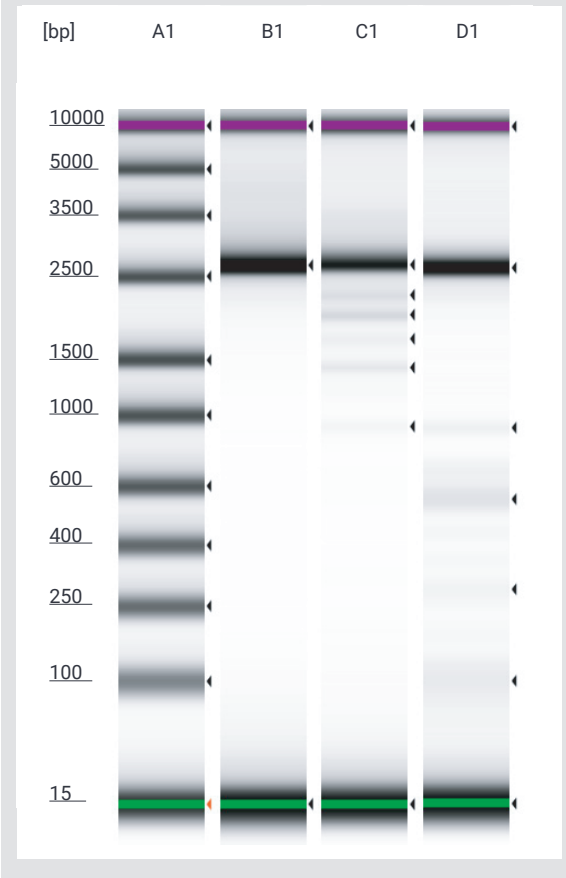
Ordering Information

Size	Agilent p.n.
40 rxn	600670
200 rxn	600672
400 rxn	600674

Agilent specialists performed a study to see how the specificity claims from both Agilent and competing brand enzymes compared to the results generated after running the thermal cycling reactions according to the manufacturer protocols. Agilent and competitor polymerases were used to PCR amplify a 2.6 kb DNA target from genomic DNA. Amplicons were then analyzed directly on the TapeStation instrument with D5000 reagents and Screen tapes.

The results indicate that the Agilent DNA Polymerases show higher specificity than competing brands.

Superior Specificity with PfuUltra II Fusion Polymerase than other HotStart DNA Polymerases



PfuUltra II Fusion exhibits increased specificity over comparative polymerases

2.6 kb target amplified according to respective enzyme conditions. Lane A1, Lane B1, Agilent PfuUltra II Fusion. Lane C1, Competitor T. Lane D1, Competitor T.

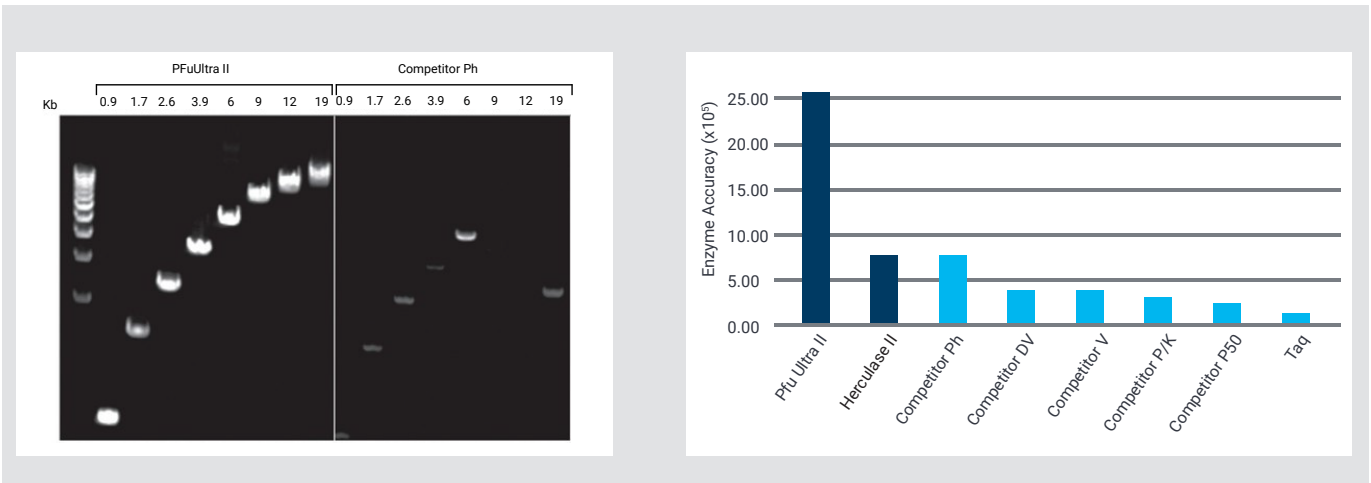
Note: Multiple arrowheads highlighting nonspecific amplification in competitor samples, lanes C1 and D1.

High Specificity Hot Start Formulation

PfuUltra II is formulated with hot start antibodies that neutralize both polymerase and exonuclease activities during reaction setup, thereby enhancing specificity and enabling automated workflows.

Convenient Master Mix Format

A High-throughput PCR reaction can be easily set up with PfuUltra II HotStart PCR Master Mix since it tolerates room temperature assembly up to 24 hours prior to thermal cycling without any impact on performance.



PfuUltra II amplifies genomic targets up to 19 kb in length under faster cycling conditions – 15 sec/kb (most fusion enzymes are limited to 6 kb target amplification).

Fidelity was measured using Agilent's validated and reference fidelity assay. (Accuracy = 1/error rate).

"High-Fidelity PCR & Difficult/GC-Rich DNA Targets?

Better PCR Solutions."

Herculase® II Fusion DNA Polymerase

Superior yield for routine PCR applications and difficult/GC-rich targets

Herculase II, with its unique formulation and exclusive ArchaeMaxx Polymerase-Enhancing Factor, addresses your need for robust yields with all sample types. For mid-length (1.7 kb) or long (6 kb) DNA fragments, Herculase II produces as much as 10x greater yield with an extension rate as fast as 15 sec/kb.

- **Superior yield** for routine PCR applications & difficult/GC-rich targets
- **Fast cycling time** with 15 sec/kb extension rate
- **Accurately amplifies** targets up to 23 kb gDNA
- **Preserves *Pfu* fidelity** 1 error/770,000 bp
- **High sensitivity** for amplification of low amounts of DNA - important for precious and archival samples



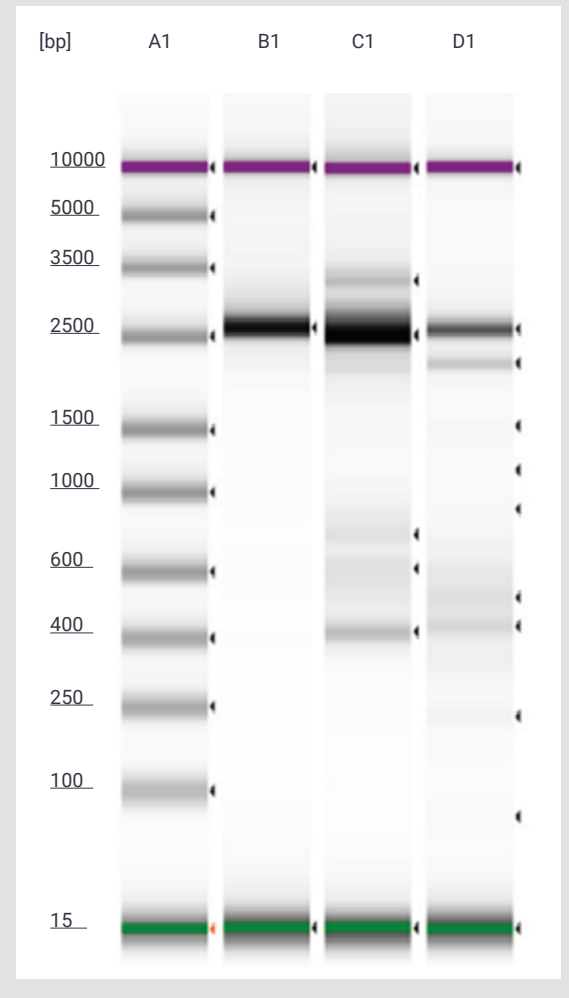
Ordering Information

Size	Agilent p.n.
40 rxn	600675
200 rxn	600677
400 rxn	600679

Agilent specialists performed a study to see how the specificity claims from both Agilent and competing brand enzymes compared to the results generated after running the thermal cycling reactions according to the manufacturer protocols. Agilent and competitor polymerases were used to PCR amplify a 2.6 kb DNA target from genomic DNA. Amplicons were then analyzed directly on the TapeStation instrument with D5000 reagents and Screen tapes.

The results indicate that the Agilent DNA Polymerases show higher specificity than competing brands.

Superior Specificity with Herculase II Fusion Polymerase than other non-HotStart DNA Polymerases



Herculase II Fusion exhibits increased specificity over comparative polymerases:
 A1AT gene, 2.6 kb target amplified according to respective enzyme conditions. Lane A1, Ladder. Lane B1, Agilent Herculase II Fusion. Lane C1, Competitor N. Lane D1, Competitor B.

Note: Multiple arrowheads highlighting nonspecific amplification in competitor samples, lanes C1 and D1.

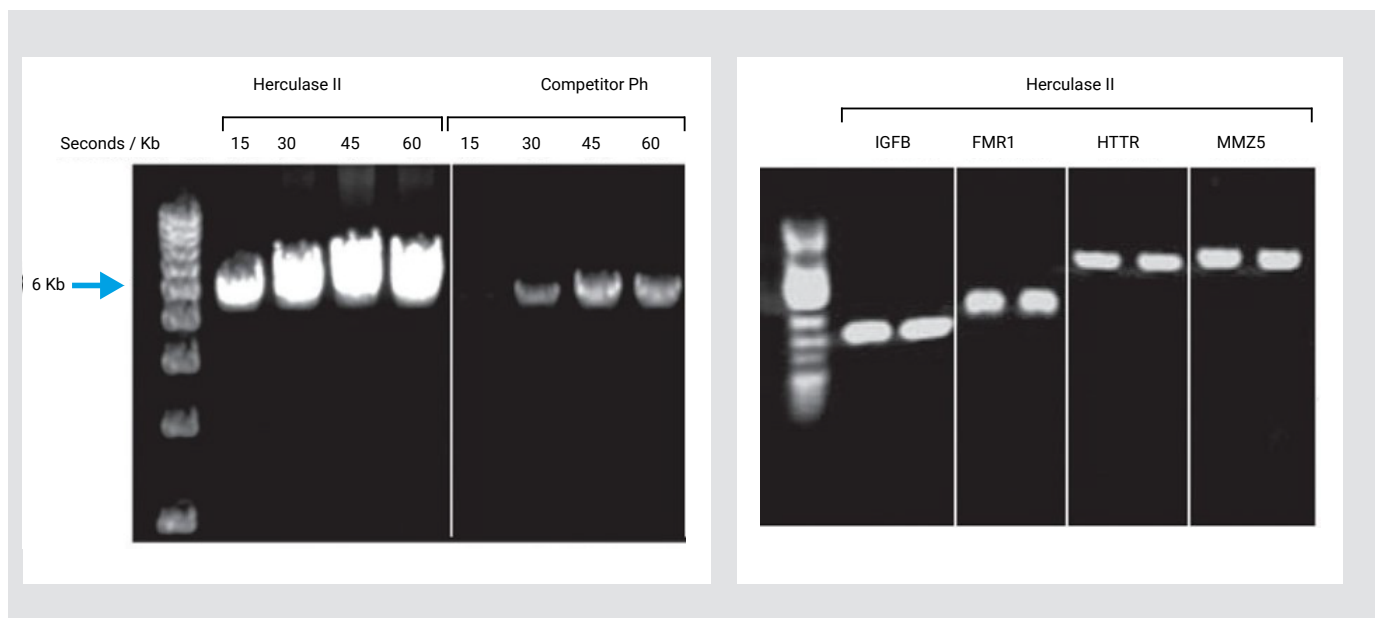
Robust Performance on Difficult and GC-Rich Targets

Amplification of templates with high GC-content often leads to the formation of secondary structures, such as hairpins, causing the DNA polymerase activities to stall and results in incomplete and non-specific amplification.

Herculase II helps you overcome challenging PCR with the combination of exclusive enzyme improvement additives and an optimized buffer system, allowing you to easily amplify targets with GC-content as high as 84%.

High Sensitivity with Low Target Abundance

Herculase II amplifies DNA fragments over a wide range of template lengths with great sensitivity, enabling you to detect limited amounts of DNA. Herculase II successfully amplifies 3.9 kb fragments of the Ha1AT gene from as little as 1 ng of template DNA.



Herculase II produced superior yields of a 6 kb fragment in amplifications employing human genomic DNA at extension rates of 15, 30, 45, and 60 sec/kb.

Herculase II easily amplified GC-rich fragments from human genomic DNA: IGFB (79% GC); FMR1 (84% GC); HTR (65% GC); MMZ5 (68% GC).

“Have you tried “Perfect Match”?

Enhance your enzymes to further increase specificity and yield See page 12”

Specialty Enzymes

PfuTurbo II Cx HotStart DNA Polymerase

Overcome uracil stalling

PfuTurbo Cx is formulated with a unique mutant of Pfu DNA polymerase that completely overcomes uracil stalling without sacrificing fidelity.

PfuTurbo Cx reads through dUTP located in both the template strand and extending strand.

- **World's only high-fidelity polymerase** that efficiently reads through dUTP
- **Great for bi-sulfite sequencing**, UNG decontamination protocols & DNA methylation studies
- **Amplifies templates 5-10 kb** or with high GC-content
- **DMSO provided separately** to assist in optimizing PCR condition



Ordering Information	
Size	Agilent p.n.
100 U	600410
500 U	600412
1000 U	600414

PfuTurbo Cx maintains fidelity

Thermostable DNA Polymerase	Error Rate number	% of mutated 1 kb PCR products
<i>PfuTurbo Cx</i> HotStart DNA Polymerase	1.3×10^{-6}	2.6
<i>PfuTurbo</i> DNA Polymerase	1.3×10^{-6}	2.6
<i>Taq</i> DNA Polymerase	8.0×10^{-6}	16

PicoMaxx High-Fidelity PCR System

Low copy number target amplification in complex samples

PicoMaxx confers the sensitivity to detect low copy number targets and the robustness to withstand the effects of PCR inhibitors without the need for extensive purification and subsequent DNA loss.

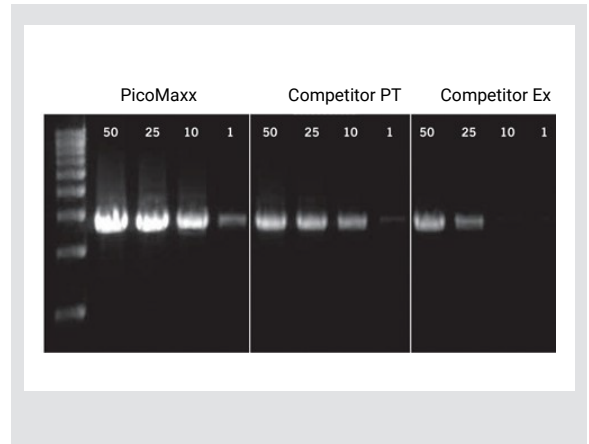
- **Robust amplification** of targets up to 10 kb gDNA
- **High-specificity hot start** increases enzyme sensitivity



Ordering Information - Various starting gDNA template qty (ng)

Size	Agilent p.n.
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500 U	600422
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Amplification of a 3.9 kb α -1 anti-trypsin at various starting gDNA template qty (ng).

Other PCR Enzymes

PfuUltra High-Fidelity DNA Polymerase

- Low error rate (1 error/2.25 million bp) without the speed and robustness of PfuUltra II



PfuTurbo DNA Polymerase

- Low error rate (1 error/770,000 bp)



Cloned *Pfu* DNA Polymerase

- Proofreading with 3'→5' exonuclease activity
- Cloned version eliminates smearing and unwanted background artifacts



PCR Enhancers

Perfect Match PCR Enhancer

- Reduces PCR artifacts by increasing specificity
- Destabilizes mismatched primer-template complexes

Taq Extender PCR Additive

- Improves length, yield and reliability of PCR with *Taq* DNA polymerase
- Enhances the efficiency of template extension by *Taq* DNA polymerase

cDNA Synthesis-Reverse Transcriptases

AccuScript High-Fidelity Reverse Transcriptase

Highest reverse transcription accuracy

AccuScript reduces errors during cDNA synthesis with 3.7x more accuracy than other commercially available RTs and 6.6x more accuracy than Avian Myeloblastosis Virus Reverse Transcriptase (AMV RT).

- **Moloney Murine Leukemia Virus Reverse Transcriptase derivative MMLV-RT** combined with proofreading 3'-5' exonuclease, reduces errors
- **High yields** of full-length cDNA up to 20 kb



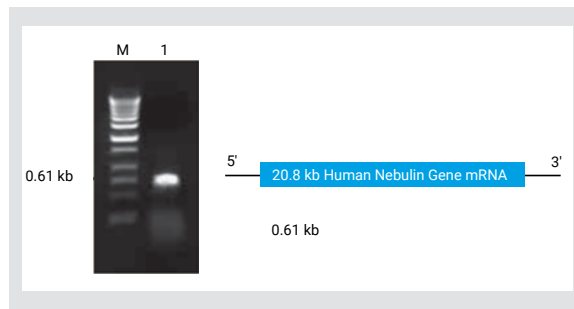
Ordering Information

Product	Size	Agilent p.n.
AccuScript Reverse Transcriptase	50 rxn	600089
AccuScript High Fidelity 1st Strand cDNA Synthesis Kit	50 rxn	200820

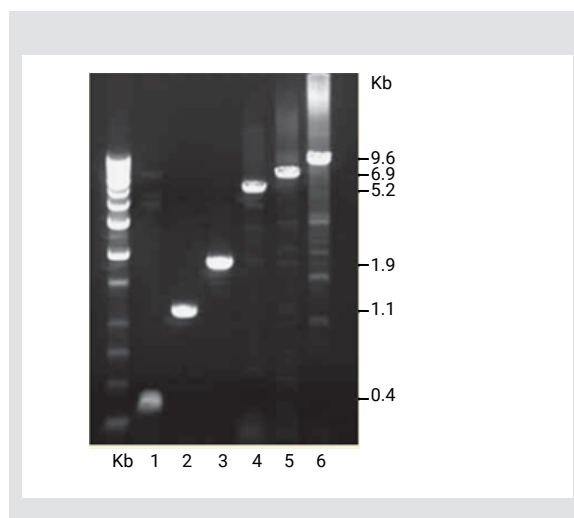
Accuracy of RT-PCR Is Affected by the Fidelity of Both RT and PCR Enzymes

In this table, we illustrate a situation where an RNA template is reverse transcribed with AccuScript™ RT or SuperScript® II RT and then a 1-kb portion is PCR amplified for 20 duplications using different PCR enzymes. We predict mutation frequencies using the equation $MF = ER \times bp \times d$, where MF is the mutation frequency, ER is the error rate, bp is the length of the target, and d is the number of template doublings (106-fold amplification equals 20 doublings). Using *PfuUltra*™ DNA polymerase, the percentage of 1 kb cDNAs that are expected to contain errors is 2.5%, where the contribution from the RT is 1.6% ($1.6 \times 10^{-5}/\text{base} \times 1000$ bases), and the contribution from *PfuUltra* enzyme is 0.9%. In contrast, if the same RT-PCR reaction was carried out with SuperScript RT II and a *Taq* DNA polymerase blend, 6.4% of 1-kb cDNAs are expected to contain RT-generated errors, and an additional 11.6% of the final clones would contain Platinum® *Taq* HiFi polymerase generated mutations. The overall MF in this case would be almost 7x higher, at 18%.

Enzymes		Error Rate ($\times 10^{-8} \pm SD$)		Predicted Percent Mutant Clones
RT	PCR Enzymes	RT ¹	PCR	RT + PCR
AccuScript™ RT	<i>PfuUltra</i> ™ DNA Polymerase	16.1 ± 3.9	0.43 ± 0.04	2.5%
AccuScript™ RT	<i>PicoMaxx</i> ™ DNA Polymerase	16.1 ± 3.9	4.0 ± 1.3	9.6%
SuperScript® RT	Platinum® <i>Taq</i> HiFi DNA Polymerase	64.1 ± 5.9	5.8 ± 0.3	18%



Full-Length cDNA up to 20kb and great RT-PCR yields. A 0.61 kb region corresponding to the 5' end of the 20.8 kb human nebulin gene was successfully amplified, indicating the complete reverse transcription of the human nebulin gene.



AccuScript™ system maximizes fidelity and yield. AccuScript™ RT-PCR kit delivers high yields across a wide range of amplicon sizes.

AffinityScript Multiple Temperature RT

Enzyme activity at a broad range of temperatures from 37-55 °C

AffinityScript ensures reverse transcription through GC-rich sequences with high cDNA yields, whether priming at room temperature with random hexamers or at stringent temperatures to enhance specificity.

- High affinity to primer/template complexes
- Detects low input RNA

Ordering Information	
Size	Agilent p.n.
50 rxn	600107
200 rxn	600109



DNA Cloning

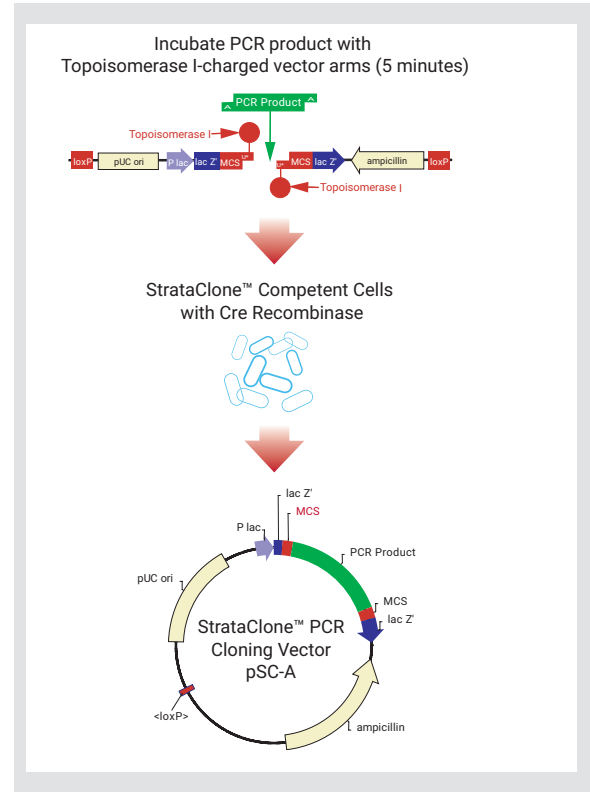
StrataClone PCR Cloning Kit

Fast and reliable cloning

The StrataClone PCR Cloning Kit allows high-efficiency, 5-minute cloning of PCR products, using the DNA rejoining activity of DNA topoisomerase I and the DNA recombination activity of Cre recombinase.

- **No PCR clean-up required**
- **Clone both long and short amplicons**
- **Available for both blunt-end and UA cloning**
- **High efficiency yields**
>95% insert positive clones with StrataClone Ultra Blunt PCR Cloning Kit

Ordering Information	
Product	Agilent p.n.
PCR Cloning	240205
Blunt PCR Cloning	240207



DNA Purification

RecoverEase DNA Isolation for genomic DNA isolation

Ordering Information	
Size	Agilent p.n.
15 rxn	720203
30 rxn	720202

StrataCoolers & Plastics

StrataCooler LP Benchtop Cooler

Provides the most protection for your enzymes whether in your freezer or on your benchtop.

- Maintains -15° C for at least 2 hours.
- Includes adapters for use with 0.5 mL tubes
- Eliminates ice chips & potential contamination



Ordering Information	
Product	Agilent p.n.
StrataCooler Cryo Preservation Module	400005
StrataCooler LP Benchtop Cooler, Blue	401349

StrataCooler Cryo Preservation Module

Enables controlled freezing (0.4-0.6° C/min) of cells to significantly increase survival rates (up to 90%).

- Convenient and controlled freezing
- Overall survival rates of 80-90%
- Avoids expense of methanol-based cooling bath



Ordering Information	
Product	Agilent p.n.
96-well plate, 25 pack	401333
Adhesive sealing films, 100-pack	410186

Agilent Custom Manufacturing Services

Produces ready-to-use highly purified DNA

Whether you need bulk packaging, custom formulations, higher-level documentation, or want to establish an OEM relationship, Agilent's dedicated team of experts will help you find the fastest, most cost-effective way to reach your goals.



Index

Product	Product Size	Catalog Number	Page Number
High-Fidelity & Difficult PCR			
<i>PfuUltra</i> II Fusion HotStart DNA Polymerase	40 rxn	600670	6
	200 rxn	600672	
	400 rxn	600674	
<i>PfuUltra</i> II HotStart Master Mix	100 rxn	600850	6
	400 rxn	600852	
Herculase II Fusion DNA Polymerase	40 rxn	600675	8
	200 rxn	600677	
	400 rxn	600679	
<i>PfuUltra</i> High-Fidelity DNA Polymerase	100 U	600380	10
	500 U	600382	
<i>PfuUltra</i> HotStart DNA Polymerase	1000 U	600394	13
<i>PfuUltra</i> High-Fidelity DNA Polymerase AD	100 U	600385	13
	500 U	600387	
	1000 U	600389	
<i>Pfu Turbo</i> DNA Polymerase	100 U	600250	13
	500 U	600252	
	1000 U	600254	
<i>Pfu Turbo</i> HotStart DNA Polymerase	500 U	600322	13
<i>Pfu Turbo</i> HotStart PCR Master Mix	100 rxn	600600	13
Cloned <i>Pfu</i> DNA Polymerase	100 U	600153	13
	500 U	600154	
	1000 U	600159	
Cloned <i>Pfu</i> DNA Polymerase AD	500 U	600355	13
<i>Pfu</i> DNA Polymerase	100 U	600135	13
	1000 U	600140	
High-Fidelity & Difficult PCR			

Product	Product Size	Catalog Number	Page Number
Specialty Enzymes			
<i>Pfu</i> Turbo Cx Hotstart DNA Polymerase	100 U	600410	10
	500 U	600412	
	1000 U	600414	
StrataClone PCR Cloning Kits	20 rxn	240205	11
StrataClone Blunt PCR Cloning kit	20 rxn	240207	11
PicoMaxx High-Fidelity PCR System	500 U	600422	11
RT-PCR			
AccuScript High-Fidelity Reverse Transcriptase	50 rxn	600089	14
AccuScript High-Fidelity 1st Strand cDNA Synthesis Kit	50 rxn	200820	–
AffinityScript One-Step RT-PCR Kit	100 rxn	600188	14
AffinityScript Multiple Temperature cDNA Synthesis Kit	50 rxn	200436	–
AffinityScript Multiple Temperature Reverse Transcriptase	50 rxn	600107	14
AffinityScript qPCR cDNA Synthesis Kit	50 rxn	600559	–
Purification			
RecoverEase Kits	15 rxn	720203	15
	30 rxn	720202	
DNA Extraction Kit	1 kit	200600	
Plastics & Labware			
StrataCooler Cryo Preservation Module	1 module	400005	16
StrataCooler LP Benchtop Cooler, Blue	1 cooler	401349	16
96-Well Plates	25 pack	401333	18
Adhesive Sealing Films	100 pieces	410186	18
Additional Products			
Perfect Match PCR Enhancer	100 U	600129	
Taq Extender PCR Additive	1000 U	600148	
Deoxynucleotide Mix, PCR Grade	400 µL	200415	
Rnase Block	4000 U	300151	
	16000 U	300152	
Absolutely RNA Miniprep Kit	50 preps	400800	
Absolutely RNA Nanoprep Kit	50 preps	400753	
Absolutely RNA Microprep Kit	50 preps	400805	
QuikChange Lightning Kit	10 rxn	210518	
IPTG	1 g	300127	
Amp Tabs Ampicillin Tablets	200 x 25 mg	300021	

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Learn more about the PCR portfolio:

[www.agilent.com/en/product/polymerase-chain-reaction-\(pcr\)](http://www.agilent.com/en/product/polymerase-chain-reaction-(pcr))

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