SIGNALCHEM DIAGNOSTICS

Catalog #	Aliquot Size
SF01-E311-100	100 U
SF01-E311-500	500 U
SF01-E311-1000	1000 U

Super Fidelity DNA Polymerase

Catalog # SF01-E311
Lot # A4647-8

Product Description

Super Fidelity DNA Polymerase is a special next generation polymerase for robust PCR with higher fidelity.

This product is manufactured in an ISO 9001 and ISO 13485 certified facility.

Components

	Component Name	100 U	500 U	1000 U
	Super Fidelity DNA Polymerase	100 µl	5 x 100U	10 x 100U
b	2X Super Fidelity DNA Polymerase Buffer	2 x 1.25ml		
c	dNTP Mix (10 mM each)	100 µl		
d	10X DNA Loading buffer	1.25 ml		

Storage and Stability

Store at -30°C to -15°C. To avoid repeated handling and multiple freeze/thaw cycles aliquot products into smaller quantities.

Scientific Background

Super Fidelity DNA polymerase has a unique extension factor, specificity-promoting factor, and plateau phase anti-inhibitor factor. These features greatly improve its long-fragment amplification ability, specificity, and PCR yield compared to conventional polymerases like Taq DNA polymerase. Super Fidelity DNA polymerase is suitable for PCR amplification using genomic DNA, cDNA, Plasmid DNA and crude samples as templates. It can efficiently amplify up to 40 kb simple templates (e.g. λDNA, plasmids), 20 kb complex templates (e.g. genomic DNA) and 10 kb cDNA. Its amplification error rate is 128-fold lower than that of conventional Taq DNA Polymerase. Additionally, Super Fidelity DNA polymerase has a good resistance to PCR inhibitors and can be used for direct PCR amplification of bacteria, fungi, plant tissues, animal tissues, and even whole blood samples.

The 2X Super Fidelity DNA Polymerase Buffer contains two types of monoclonal antibodies, inhibiting the 5'→3' polymerase activity and 3'→5' exonuclease activity at room temperature, which enable it to perform hot start PCR with great specificity. Amplification will generate blunt-ended products.

Super Fidelity DNA Polymerase

Catalog #	SF01-E311
Lot #	A4647-8
Stability	18 months from date of shipment at –30°C to –15°C
Storage & Shipping	Store all components at -30°C to -15 °C. Transport at ≤0 °C. To avoid repeated handling and multiple freeze/thaw cycles aliquot product into smaller quantities.

To place your order, please contact us by phone 1-778-326-0223 or 1-888-606-3424 (Toll free)
or by email: orders@signalchemdx.com or info@signalchemdx.com - www.signalchemdx.com

PCR Protocol

Guidelines for primer design:

1. It is recommended that the last base at the 3' end of primer should be G or C.
2. Consecutive mismatches should be avoided in the last 8 bases at the 3' end of the primer.
3. Avoid hairpin structures at the 3' end of the primer.
4. Differences in the Tm value of the forward primer and the reverse primer should be no more than 1°C and the Tm value should be adjusted to 55 ~ 65°C (Primer Premier 5 is recommended to calculate the Tm value).
5. Extra additional primer sequences that are not matched with the template, should not be included when calculating the primer Tm value.
6. Control the GC content of the primer to be 40% - 60%.
7. The overall distribution of A, G, C and T in the primer should be as even as possible. Avoid using regions with high GC or AT contents.
8. Avoid the presence of complementary sequences of 5 or more bases either within the primer or between two primers and avoid the presence of complementary sequences of 3 or more bases at the 3' end of two primers.
9. Use the NCBI BLAST function to check the specificity of the primer to prevent non-specific amplification.

Protocol:

1. General reaction mixture for PCR:

Keep all components on ice. Thaw, mix and briefly centrifuge each component before use.

Component	Volume in 50 µl system
2X Super Fidelity DNA Polymerase Buffer [a]	25 µl
dNTP Mix (10 mM each)	1 µl
Primer 1 (10 µM)	2 µl
Primer 2 (10 µM)	2 µl
Super Fidelity DNA Polymerase	1 µl
Template DNA[b]	variable
ddH2O	up to 50 µl

a. Contains Mg2+ with a final concentration of 2 mM.

b. Optimal reaction concentration varies with different templates. In a 50 µl system, the recommended template usage is as follows:

Template Type	Amount
Genomic DNA	50-400 ng
Plasmid or Virus DNA	10 pg-30 ng
cDNA	1 - 5 µl (≤1/10 of the total volume of PCR system)

Note: High quality templates should be used to ensure successful amplification and product yield.
Ensure that the primers and templates do not contain uracil. And do not use dUTP.
If necessary, increase the amount of DNA Polymerase; however, for a 50 µl reaction system, the amount of DNA Polymerase should not exceed 2 U.
The DNA Polymerase in this master mix has strong proof-reading activity. If TA cloning needs to be performed, it is recommended to purify the DNA before adding the adenine.
To prevent the degradation of primers due to the proofreading activity of the DNA Polymerase, please add the polymerase last when preparing the reaction mixture.

2. PCR Thermocycling conditions:

Standard Program

Steps	Temperature	Time	Cycle number
Initial Denaturation	95°C	3 min	
Denaturation	95°C	15 sec	25-35 cycles
Annealing [a]	56 ~ 72°C	15 sec	
Extension [b]	72°C	30 – 60 sec/kb	
Final Extension	72°C	5 min	

a. Set the annealing temperature according to the Tm value of the primers. If the Tm value of the primers is higher than 72°C, the annealing step can be removed (two-step PCR). If necessary, annealing temperature can be further optimized through setting temperature gradient. In addition, the amplification specificity depends directly on the annealing temperature. Raising annealing temperature is helpful to improve amplification specificity.

b. Longer extension time is helpful to increase the product yield.

FAQ & Troubleshooting:

	No amplification products or low yield	Unspecific products or smear bands
Primer	Optimize primer design	Optimize primer design
Annealing temperature	Set temperature gradient and find the optimal annealing temperature	Increase the annealing temperature and set temperature gradient
Primer concentration	Increase the concentration of primers	Decrease the concentration of primers
Extension time	Increase the extension time up to 30 sec/kb - 1min/kb	
Cycles	Increase the number of cycles to 36 - 40 cycles	Reduce the number of cycles to 25 - 30 cycles
PCR Program		Use two-step or Touch down PCR program
Template purity	Use templates with high purity	Use templates with high purity
Enzyme amount	Increase the amount of enzyme	Decrease the amount of enzyme

SAFETY DATA SHEET

Article 1 - Product Identification

Product Name: Super Fidelity DNA Polymerase **Catalog # SF01-E311**

This product is sold only for research use by qualified laboratory personnel, and is not to be used as a drug, medical device, food additive, cosmetic, nor household chemical. It is not to be used in diagnostic, therapeutic, consumer, agricultural, nor pesticidal applications.

Supplier of Datasheet:	SignalChem Diagnostics Inc.
Street Address:	*190-13160 Vanier Place*
City, Prov. Postal Code:	*Richmond, BC, V6V 2J2*
Country:	*Canada*
Emergency Phone:	1-888-606-3424 (Toll free) 1-778-326-0223 (local)

Article 2 - Hazard Identification

- **WHMIS Classification:** Not WHMIS controlled.
- **GHS classification:** Not GHS classified.
- **Hazard Pictograms:** No labeling applicable.
- **Signal words:** None.
- **Hazard statements:** None.
- **Precautionary statements:** Wear protective gloves/protective clothing/eye protection/ face protection. Avoid breathing dust. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- **Other hazards:** May cause eye and skin irritation. May cause respiratory and digestive tract irritation.

Article 3 – Composition/Information on Ingredients

Description: This product consists of the components listed below.

Component: Super Fidelity DNA Polymerase
Chemical Characterization: Mixture.

Common name	Chemical name	CAS-No.	Concentration
Glycerol	Glycerol	56-81-5	≤30%
Tris	Tris(hydroxymethyl)aminomethane	77-86-1	≤5%
DNA Polymerase	N/A	9012-90-2	≤5%

Component: 2X Super Fidelity DNA Polymerase Buffer

Common name	Chemical name	CAS-No.	Concentration
Tris	Tris(hydroxymethyl)aminomethane	77-86-1	≤5%
NaCl	Sodium Chloride	7647-14-5	≤5%

Component: dNTP Mix (10 mM each)

Common name	Chemical name	CAS-No.	Concentration
Water	H_2O	7732-18-5	≤90%

Component: 10X DNA Loading buffer

Common name	Chemical name	CAS-No.	Concentration
Glycerol	Glycerol	56-81-5	≤30%
Tris	Tris(hydroxymethyl)aminomethane	77-86-1	≤5%
Magnesium Chloride	$MgCl_2$	7791-18-6	≤ 0.1

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Article 4 – First-aid Measures

- **General information:** Consult a physician by providing the SDS.
- **After inhalation:** In case of irritation by inhaling this product, move affected person to fresh air and await recovery. If irritation persists, seek immediate medical attention. If casualty cannot breathe, give artificial respiration and seek immediate medical attention.
- **After skin contact:** Immediately wash with soap and plenty of water and rinse thoroughly. Consult a physician.
- **After eye contact:** Rinse opened eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do so. Consult a physician.
- **After swallowing:** Induce vomiting. If indisposition continues, seek medical attention.

Article 5 - Fire-fighting Measures

- **Suitable extinguishing media:** Use water spray, extinguishing powder, carbon dioxide, or other appropriate measure that is suitable to the environment.
- **Specific hazards arising from the substance or mixture:** None known.
- **Special protective equipment and precautions for fire-fighters:** Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Article 6 – Accidental Release Measures

- **Personal precautions, protective equipment and emergency procedures:** Apply standard laboratory practices and personal protective equipment. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation.
- **Environmental precautions:** Do not allow to enter drains. Do not discharge directly into sewers.
- **Methods and materials for containment and cleaning up:** Absorb on sand or vermiculite and place in closed containers for disposal.

Article 7 - Handling and Storage

- **Precautions for safe handling:** Wear chemical safety goggles and compatible chemical-resistant gloves. Avoid inhalation, contact with eyes, skin or clothing.
- **Conditions for safe storage:** Store according to product label instructions. Keep container upright and tightly closed.

Article 8 - Exposure Controls/Personal Protection

- **Components with limit monitoring values at workplace:**
  Glycerol (CAS-No: 56-81-5)

Values	Control parameters	Regulations
TWA	10 mg/m³ for mist	British Columbia, Canada
TWA	3 mg/m³ for respirable mist	British Columbia, Canada
TWA	10 mg/m³	Alberta, Canada
TWAEV	10 mg/m³	Ontario, Canada
TWAEV	10 mg/m³	Quebec, Canada
TWA	10 mg/m³	USA

- **Appropriate engineering controls:**
  Apply adequate ventilation including mechanical exhaust or laboratory fume hood. Follow standard laboratory practices.
- **Individual protection measures:**
  Respiratory protection:
  Use appropriate respirator if there is inadequate ventilation by following the government standards.
  Hand protection:
  Wear gloves and use proper glove removal technique to avoid skin contact. Discard gloves after use by following the applicable laboratory regulations. Wash and dry hands.
  Eye/face protection:
  Safety goggles with side-shields approved under appropriate government standards.
  Skin/body protection:
  Use appropriate clothing, footwear and any additional protection measures to protect from splashing or contamination.

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Article 9 – Physical and Chemical Properties

Component: Super Fidelity DNA Polymerase

Appearance: Colorless liquid	**Danger of explosion:** Product does not present an explosion hazard.
Odour/Odour Threshold: Not determined.	**Explosion limits:** Not determined.
pH: Not determined.	**Decomposition temperature:** Not determined.
Melting point/freezing point: Not determined.	**Vapor pressure at 20 °C:** Not determined.
Boiling point/Boiling range: Not determined.	**Density:** Not determined.
Flash point: Not determined.	**Relative density:** Not determined.
Flammability (solid, gaseous): Not determined.	**Vapor density:** Not determined.
Ignition temperature: Not determined.	**Evaporation rate:** Not determined.
Auto-igniting: Product is not self-igniting.	**Solubility in / Miscibility with Water:** Fully miscible.

Component: 2X Super Fidelity DNA Polymerase Buffer

Appearance: Colorless liquid	**Danger of explosion:** Product does not present an explosion hazard.
Odour/Odour Threshold: Not determined.	**Explosion limits:** Not determined.
pH: Not determined.	**Decomposition temperature:** Not determined.
Melting point/freezing point: Not determined.	**Vapor pressure at 20 °C:** Not determined.
Boiling point/Boiling range: Not determined.	**Density:** Not determined.
Flash point: Not determined.	**Relative density:** Not determined.
Flammability (solid, gaseous): Not determined.	**Vapor density:** Not determined.
Ignition temperature: Not determined.	**Evaporation rate:** Not determined.
Auto-igniting: Product is not self-igniting.	**Solubility in / Miscibility with Water:** Fully miscible.

Component: dNTP Mix (10 mM each)

Appearance: Colorless liquid	**Danger of explosion:** Product does not present an explosion hazard.
Odour/Odour Threshold: Not determined.	**Explosion limits:** Not determined.
pH: Not determined.	**Decomposition temperature:** Not determined.
Melting point/freezing point: Not determined.	**Vapor pressure at 20 °C:** Not determined.
Boiling point/Boiling range: Not determined.	**Density:** Not determined.
Flash point: Not determined.	**Relative density:** Not determined.
Flammability (solid, gaseous): Not determined.	**Vapor density:** Not determined.
Ignition temperature: Not determined.	**Evaporation rate:** Not determined.
Auto-igniting: Product is not self-igniting.	**Solubility in / Miscibility with Water:** Fully miscible.

Component: 10X DNA Loading buffer

Appearance: Colorless liquid	**Danger of explosion:** Product does not present an explosion hazard.
Odour/Odour Threshold: Not determined.	**Explosion limits:** Not determined.
pH: Not determined.	**Decomposition temperature:** Not determined.
Melting point/freezing point: Not determined.	**Vapor pressure at 20 °C:** Not determined.
Boiling point/Boiling range: Not determined.	**Density:** Not determined.
Flash point: Not determined.	**Relative density:** Not determined.
Flammability (solid, gaseous): Not determined.	**Vapor density:** Not determined.
Ignition temperature: Not determined.	**Evaporation rate:** Not determined.
Auto-igniting: Product is not self-igniting.	**Solubility in / Miscibility with Water:** Fully miscible.

Article 10 - Stability and Reactivity

- **Reactivity:** Stable under recommended transport and storage conditions.
- **Chemical stability:** Stable under recommended transport and storage conditions.
- **Possible hazardous reactions:** No dangerous reactions known.
- **Conditions to avoid:** Heat and moisture.
- **Incompatible materials:** Strong acids/bases, strong oxidizing agents.
- **Hazardous decomposition products:** Not determined.

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Article 11 - Toxicological Information

- **Acute toxicity:** Not available.
- **LD/LC50:** Not available.
- **Skin corrosion/irritation:** Not available.
- **Serious eye damage/eye irritation:** Not available.
- **Respiratory or skin sensitization:** Not available.
- **Germ cell mutagenicity:** Not available.
- **Carcinogenicity:** No components are listed in IARC, or NTP, or OSHA, or ACGIH.
- **Reproductive toxicity:** Not available.
- **Teratogenicity:** Not available.
- **Specific target organ toxicity - single exposure/ - repeated exposure (GHS):** Not available.
- **Aspiration hazard:** Not available.
- **Potential health effects:**
  Inhalation: No data available
  Ingestion: No data available
  Skin: No data available
  Eyes: No data available
- **Signs and Symptoms of Exposure:** No data available
- **Synergistic effects:** Not available.

Article 12 - Ecological Information

- **Eco-toxicity:** No data available.
- **Biodegradability:** Not applicable.
- **Bio-accumulative potential:** Not applicable.
- **Mobility in soil:** Not applicable.
- **PBT and vPvB assessment:** Not applicable.
- **Other adverse effects:** Not applicable.

Article 13 - Disposal Considerations

- **Disposal methods:** In accordance to applicable national, regional, or local laws and regulations. For additional handling information and protection of employees please refer to Article 7 and 8.
- **Contaminated packaging:** Disposal should be made in accordance to official regulations. Use water or cleansing agents to clean the area.

Article 14 - Transport Information

- **DOT:** Not dangerous goods.
- **IMDG:** Not dangerous goods.
- **IATA:** Not dangerous goods.

Article 15 – Regulatory Information

- **WHMIS Classification:** Non-hazardous.
- **GHS label elements:** Not applicable.
- **Signal word:** Not applicable.
- **Hazard statements:** Not applicable.

Article 16 - Other Information

The above information is believed to be correct but does not purport to be all-inclusive and shall be used only as a guide. SignalChem shall not be held liable for any damage resulting from handling or from contact with the above product. See the Technical Specification, Packing Slip, Invoice, and Product Catalog for additional terms and conditions of sale.