Loop-mediated Isothermal Amplification (LAMP & RT-LAMP)
LAMP is designed to drive a target nucleic acid without sophisticated equipment. LAMP uses 6-8 primers recognizing 4-6 distinct regions of the target DNA. A strand-displacing DNA polymerase initiates synthesis and two of the primers form loop structures to facilitate subsequent rounds of amplification. LAMP proceeds in minutes (e.g., 30-60 minutes) and reactions can be performed with limited resources (e.g., using a water bath for heating), and detection of amplified products can be performed with limited resources (e.g., using a water bath for heating). Detection of DNA targets is accomplished by simple addition of a reporter dye or by using a water bath for heating, and detection of results by eye. LAMP uses 4-6 primers recognizing 6-8 distinct regions of the target DNA. A strand-displacing DNA polymerase initiates synthesis and two of the primers form loop structures to facilitate subsequent rounds of amplification. LAMP procedures high sensitivity (e.g., 1-10 copies of target), and reactions can be performed in a test as 1-30 minutes. Additional reactions can be performed with limited resources (e.g., using a water bath for heating, and detection of results by eye). LAMP is designed to detect a target nucleic acid without sophisticated equipment. LAMP uses 4-6 primers recognizing 6-8 distinct regions of the target DNA. A strand-displacing DNA polymerase initiates synthesis and two of the primers form loop structures to facilitate subsequent rounds of amplification. LAMP procedures high sensitivity (e.g., 1-10 copies of target), and reactions can be performed in 1-30 minutes. Additional reactions can be performed with limited resources (e.g., using a water bath for heating, and detection of results by eye). LAMP is designed to detect a target nucleic acid without sophisticated equipment. LAMP uses 4-6 primers recognizing 6-8 distinct regions of the target DNA. A strand-displacing DNA polymerase initiates synthesis and two of the primers form loop structures to facilitate subsequent rounds of amplification. LAMP procedures high sensitivity (e.g., 1-10 copies of target), and reactions can be performed in 1-30 minutes. Additional reactions can be performed with limited resources (e.g., using a water bath for heating, and detection of results by eye).
What is isothermal DNA amplification?

The Polymerase Chain Reaction (PCR) is a well-known approach for amplifying a specific DNA sequence. PCR involves the repetitive cycling of a reaction cocktail between different temperatures to achieve amplification. As a result, PCR is in the molecular biology and molecular diagnostics laboratory. There are other methods of sequence-specific DNA amplification.

Interested in learning how NEB scientists are using isothermal amplification? Visit www.neb.com/isonothermal to find videos, protocols, and recent publications, including a publication from NEB scientists describing pH-sensitive isothermal detection.

### Featured Products for Isothermal Amplification from NEB

#### WarmStart® LAMP KIT (DNA & RNA)

Loop-Mediated Isothermal Amplification (LAMP) is a commonly used technique for rapid nucleic acid detection. NEB’s WarmStart LAMP products provide a simple, one-step solution for DNA or RNA targets. An inner primer mix supplied with the WarmStart LAMP Kit contains the robust and rapid Bst 2.0 WarmStart DNA Polymerase and WarmStart® RTx Reverse Transcriptase, both of which are also designed for improved performance in LAMP reactions. The kit also includes a fluorescent dye to enable real-time fluorescence measurement of LAMP. The WarmStart LAMP Kit is compatible with multiple detection methods.

**Advantages**
- Fast
- Minimal equipment required
- Robust reaction in the presence of inhibitors
- Amplified optical detection

**Optimization tips for LAMP**
- Use LAMP primer design software e.g. Primer Explorer – protocool.org
- Include 2-3 tests for each target and compare performance in a LAMP
- Include ladders for faster matching
- Use high magnesium (6–8 mM) and divalent ion (1–4 mM) concentrations for fast reactions
- Optimize for routine temperature
- Use a high magnesium (6–8 mM) or Bst 2.0/3.0
- To prevent contamination, omit betaine, unless it has demonstrated benefits

**RTx Reverse Transcriptase**
- Validated for LAMP & RT-LAMP
- Using RNA (cDNA synthesis) or single-stranded DNA as input

**Amplification reactions**

**Not sure which product will work best for your experiment?**

NEB offers a range of DNA Polymerase-based products for isothermal DNA amplification. Use the chart to determine which product will work best for your needs.

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**Did you know that many of these products can be purchased in large volumes?** Contact sales@neb.com to find out more.