

## FS-RT-007 One Step SYBR Green RT-qPCR Kit

### Description

One Step SYBR Green RT-qPCR Kit is a special kit for one-step RT-qPCR reaction by using SYBR Green I chimeric fluorescence. The kit takes RNA as the template, uses gene-specific primers, and reverse transcription and PCR reaction can be carried out continuously in the same tube without additional pipe opening and pipetting operations, greatly improving the detection flux and effectively preventing contamination. This reaction system can detect the amplification products in real time, greatly improving the detection sensitivity, and omitting the electrophoresis step after PCR reaction, which is very suitable for the detection of RNA virus and other trace RNA.

This product integrates the superiority of Reverse Transcriptase and Taq DNA Polymerase, cooperate with optimized buffer system, with high amplification efficiency and high amplification specificity, one-step RT-qPCR reaction can be stable. In addition, all the enzymes used in the reaction are made into enzyme Mix, which is easier and more convenient to operate.

**Storage:** -20°C, protect from light

### Kit Contents: 500 Reactions (20ul reaction volume)

Contents	Cat.#	Size 500 rxns
2xOne Step Sybr Green RT-qPCR Buffer*		4 X 1.25ml
One Step Enzyme Mix**	FS-RT-007	2x 200ul
50X ROX Dye Reference Dye ***		2 x 100ul
50X ROX Dye Reference II (Low Rox)***		2 x 100ul
RNase Free ddH <sub>2</sub> O		4x 1.25ml

\* contain dNTPs, Mg<sup>2+</sup>, SYBR Green, etc.

\*\* contain Reverse Transcriptase · RNase Inhibitor, Taq DNA Polymerase.

\*\*\* Use to correct the error of fluorescence signal between holes.

### Instruments:

ROX Types	qPCR Machines
No Rox	Bio-Rad iCycler serious, Roche Light Cycler serious, Qiagen/Corbett serious and others
ROX Reference Dye I	ABI 7000/7300/7700/7900, ABI StepOne/StepOnePlus, Eppendorf and others
ROX Reference Dye II	ABI 7500, ABI ViiATM7, ABI QuantaStudio serious, Stratagene serious, Corbett Rotor Gene 3000 and others

### Usage Notes

- When using 2X One Step SYBR Green RT-qPCR Buffer, please fully melt it, mix it well and then use it. Avoid direct sunlight and keep it away from light. If multiple One Step RT-qPCR reactions need to be prepared at the same time, it is recommended to allocate all groups except primers and templates to make premix, and then separate it into each reaction tube to reduce the loss of reagents.
- The One Step Enzyme Mix in the kit contains high concentration of glycerol, before using the Enzyme Mix, please mix gently and avoid foaming; Please use immediately after centrifugal. After usage please put it back -20°C refrigerator.
- The configuration and split charging of the reaction liquid must use non-polluting spear and Microtube to avoid contamination as far as possible.

4. To ensure the success of the reaction, it is recommended to use high-quality RNA templates.

5. The kit can only use specific primers, and can't use random primers or Oligo dT primers for reverse transcription reaction.

6. When the one-step RT-qPCR experiment is designed for amplification of primers, the recommended product length of 70-200 bp has the best effect.

### Protocol

#### Provision of Experiment

- 1.5 mL RNase-free EP tubes, RNase-free PCR tubes, pipettors and spears, ice or ice box.
- PCR specific primers and templates.
- Real-time PCR special tubes or plates.

#### Method of Experiment

Prepare reagents : RNA templates、primers. Please follow the instructions of different brands of fluorescence quantitative PCR instrument for experimental operation.

1. Preparation of One Step RT-qPCR reaction system  
Prepare the following reaction system on the ice.

Take the 20 ul reaction system as an example:

Components	Volume	Volume
2X One Step SYBR Green RT-qPCR Buffer	10 ul	25 ul
One Step Enzyme Mix	0.8ul	2ul
Forward primer (10 $\mu$ M) *	0.4 ul	1 ul
Reverse primer (10 $\mu$ M) *	0.4 ul	1 ul
ROX Reference Dye I (50X)	0.4 ul	1 ul
Total RNA **	2 ul	5 ul
RNase-free H <sub>2</sub> O	To 20 ul	To 50 ul

\* The final concentration of primer is usually 0.2 $\mu$ M which can get better results. When the reaction performance is poor, the primer concentration can be adjusted in the range of 0.1-1.0  $\mu$ M. The length of the amplification product is recommended to be within the range of 70-200 bp.

\*\* It is recommended to input 50 pg~300 ng Total RNA as template in 20 ul system.

#### 2. One Step RT-qPCR reaction procedure

Step	Temperature	Time	Cycles
Reverse Transcription	42°C	5 min	1
Pre-denaturation	95°C	1 min	1
Circular reaction	60°C	30~34 s *	40

Melt Curve (automatic instrument setting)

\*\* Please adjust the extension time according to the minimum time limit for data collection required by your Real Time PCR device: set it to 30 sec. when using Step One Plus;

Please set it to 31 s when using 7300; Set it to 34 s when using 7500.

Confirm the amplification curve and melting curve after the reaction, make the standard curve.

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### qPCR Response Validity Criteria

#### Linear relationship and amplification efficiency confirmation

Standard curve correlation coefficient (R<sup>2</sup>) should be more than 0.98; the slope of curve should be in the range of -3 to -3.5. The PCR amplification efficiency (E<sub>2</sub>) is in the range of 0.9 to 1.2.

#### Repetitive confirmation

The standard deviation (STD) of Ct values should be less than 0.2.

#### Specific confirmation

Melting curve of amplification product is not obvious non-specific amplification product or primer dimer complex peak (if necessary, please conduct agarose electrophoresis for confirmation).

### Common problems and solutions

#### Melt Curve Show Multiple Peaks

1. Primer design is not optimized: Redesign primers according to primers design principles.
2. Primer concentration too High: lower down the concentration of primers appropriately.
3. RNA templates carry genomic contamination: template genome contamination is removed.

#### Unusual Amplification Curves

1. Individual Amplification Curves suddenly Plunged: There are bubbles in the reaction tube, which are caused by the sudden decrease of fluorescence value detected by the instrument due to the bubble breaking after the temperature rising. Please pay attention to centrifugation during sample processing, and avoid sucking out bubbles during the sample adding process.
2. Inconsistent Amplification Curve: The template concentration is higher, and the baseline endpoint value is greater than the Ct value. Reduce baseline endpoint and reanalyze data.

#### No Amplification Curves after Reaction

1. Not Enough PCR Cycles: the PCR cycle number is usually set to be 40. It should be noted a higher cycle number may increase the background signal.
2. Primer Degradation: Use electrophoresis to confirm the Integrity of primers.
3. Confirm the Signal Collection Step: the signal collection step are usually set to be after the annealing-extending step for two-step qPCR and after extending step for three-step qPCR.
4. Template Input Too Low: Increase template concentration or add extra repetition.
5. Template Degradation: Use freshly prepared template(Use electrophoresis to confirm Integrity of template).

#### Ct Value Too Late

1. Low Amplification Efficiency: Optimize reaction condition or change primer.
2. Template Input Too Low: Increase template concentration or add extra repeat.
3. Template Degradation: Use freshly prepared template(Use electrophoresis to confirm Integrity of template).
4. Too Long PCR Products: The length of amplification products is usually in the range of 70 bp-200 bp.
5. Reaction Inhibitors: Increase the dilution of the template or prepare a new template.

#### NTC Shows Amplification

1. Contamination: Use sterile water to conduct experiment and the all operation is suggested to be done in clean room to avoid aerosol contamination.
2. Non-Specific PCR Products: analyze with melt curve.

#### Inconsistent Results

1. Inconsistent Sample Added: Use proper pipetting techniques
2. Inconsistent Temperature in qPCR Machine: ensure periodic machine calibration.
3. Template Concentration Too Low: the lower template input, the poorer qPCR result is. Increase the template concentration.

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