

TaqMan MicroRNA Assays and Arrays

Convenient, scalable solutions for microRNA quantitation, validation, and profiling

- Highly specific—quantitate only biologically active mature miRNAs
- Sensitive—minimal total RNA input requirements conserve limited samples
- Wide dynamic range—up to 9 logs—to detect high and low expressors in a single experiment
- Fast, simple, and scalable—two-step RT-qPCR assay helps to quickly provide high-quality results
- Applied Biosystems™ Megaplex™ Primer Pools—an ideal solution for human, mouse, and rat miRNA profiling
- An integrated solution—from sample preparation to miRNA data analysis on Applied Biosystems™ real-time PCR systems

MicroRNAs (miRNAs) are a class of naturally occurring noncoding RNAs that play a role in gene regulation. These transcripts are highly conserved, single-stranded RNAs (~22 nucleotides) cleaved from larger hairpin precursor transcripts. miRNAs are involved in the RNA interference pathway and affect gene regulation by cleaving or, more often, repressing the translation of their messenger RNA (mRNA) targets.



Applied Biosystems™ TaqMan™ MicroRNA Assays provide superior sensitivity and specificity in single-tube, 384-well microfluidic card, and TaqMan™ OpenArray™ Plate formats.

TaqMan MicroRNA Assays— a real-time PCR revolution

By making novel adaptations in assay design, Thermo Fisher Scientific brings the gold-standard specificity, sensitivity, and reproducibility of Applied Biosystems™ TaqMan™ Assays and quantitative real-time PCR to miRNA detection and quantitation. TaqMan MicroRNA Assays incorporate a target-specific stem-loop reverse transcription primer (Figure 1) to address a fundamental problem in miRNA quantitation: the short length of mature miRNAs (~22 nucleotides) prohibits conventional design of a random-primed RT step followed by a specific real-time assay. The stem-loop structure provides specificity for only the mature miRNA target and forms an RT primer/mature miRNA chimera that extends the 3' end of the miRNA. The resulting longer RT product presents a template amenable to standard real-time PCR using TaqMan Assays.

To help ensure accurate results, the TaqMan MicroRNA Assay design pipeline has been extensively validated using data generated from over 2,000 assays (see white paper “Design Pipeline for TaqMan™ Small RNA Assays”, available at thermofisher.com).

The flexibility to help meet your research needs

TaqMan MicroRNA Assays are available in a number of formats. Individual miRNA assays are perfect for targeted quantitation workflows, while Applied Biosystems™ TaqMan™ Array MicroRNA Cards and TaqMan™ OpenArray™ MicroRNA Panels enable profiling of hundreds of miRNAs in

a single experiment using human, mouse, or rat samples. TaqMan Array MicroRNA Cards are ideal for studies containing a limited number of samples and deliver the broad dynamic range for which TaqMan™ chemistry is known.

For larger studies requiring high sample throughput, TaqMan OpenArray MicroRNA Panels enable profiling of up to 36 samples per 8-hour working day.

Distinguish between highly homologous mature miRNAs

TaqMan MicroRNA Assays are not only specific for mature miRNAs, they can also distinguish between

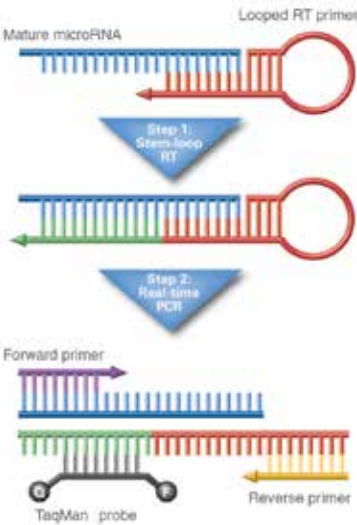


Figure 1. TaqMan MicroRNA Assay mechanism. A simple two-step mechanism brings the advantages of TaqMan real-time PCR to miRNA quantitation.

highly homologous targets. Because many miRNA family members differ in sequence by as little as one base, real-time PCR using TaqMan Assays helps provide the specificity needed for differentiation (Figure 2).

Get accurate data from minimal starting material

TaqMan MicroRNA Assays are extremely sensitive, requiring significantly less purified total RNA compared to the hundreds of nanograms needed for hybridization-based methods. Individual TaqMan MicroRNA Assays require as little as 1–10 ng of input material. The amount of sample needed is further reduced more than 300-fold when using Megaplex Primer Pools to profile hundreds of miRNAs in a single experiment.

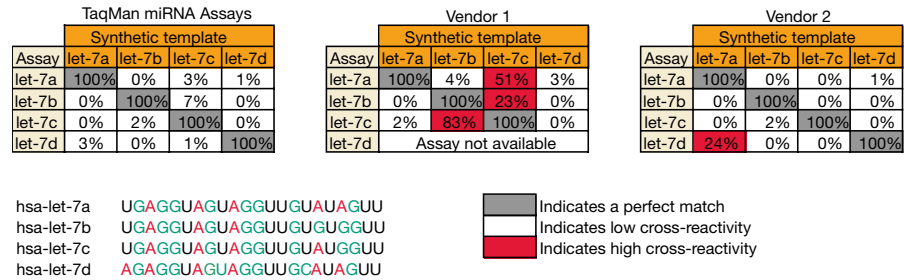


Figure 2. Single-base discrimination of individual TaqMan MicroRNA Assays compared with two vendors. Relative detection (%) is calculated based on C_t difference between perfectly matched and mismatched assays, where a relative detection of 50% is assigned for each C_t difference of 1.

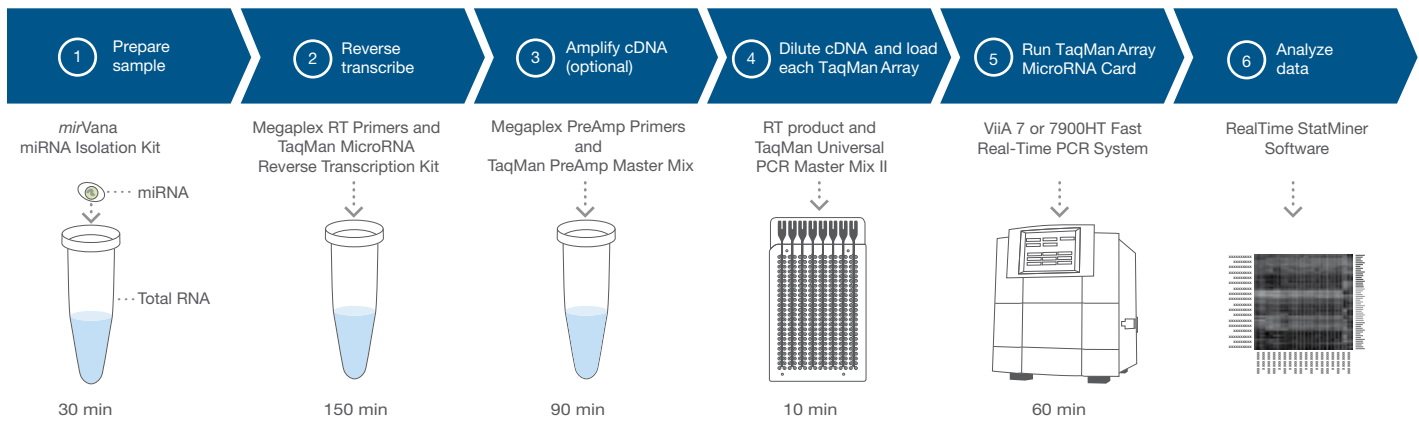


Figure 3. TaqMan Array MicroRNA Card workflow. Get a complete human or rodent miRNA profile in as little as 4 hours, and in only 5.5 hours with the optional Megaplex PreAmp Primers and Applied Biosystems™ TaqMan™ PreAmp Master Mix step.

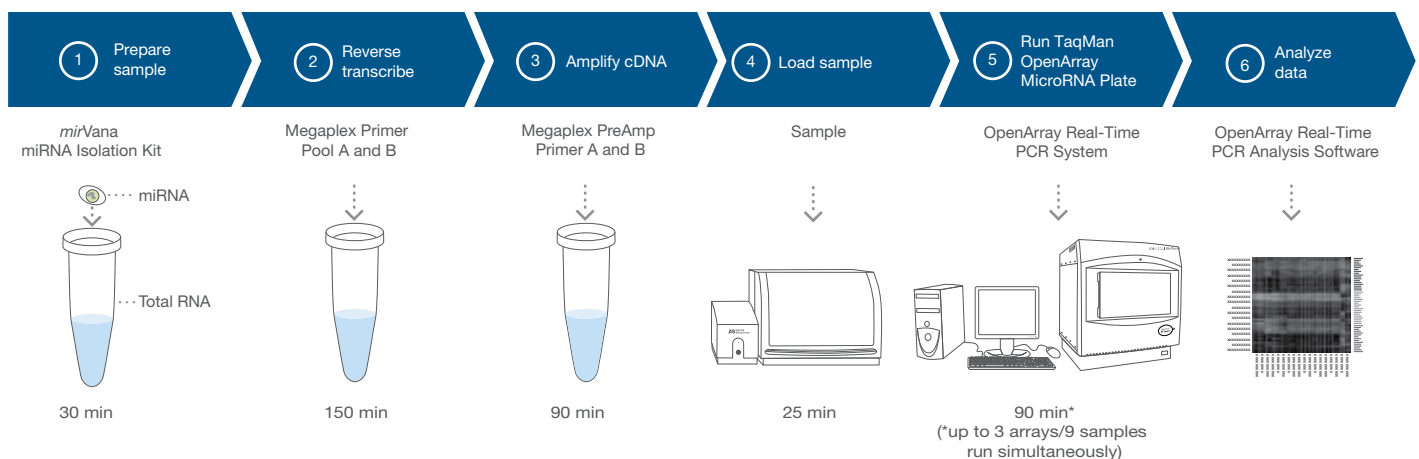


Figure 4. TaqMan OpenArray MicroRNA Panel workflow. Get a complete human or rodent miRNA profile for 9 samples in about 7 hours.

additional throughput enhancements that simplify running hundreds of assays in parallel.

An ideal choice for microRNA profiling

To identify differentially expressed miRNAs, many studies begin by generating a global miRNA expression profile. Megaplex Primer Pools, in conjunction with TaqMan Array MicroRNA Cards, are perfect for such experiments. They can be used to rapidly generate a human, mouse, or rat miRNA profile, in a single working day using as little

as 1 ng of total RNA (Figure 3). Combined with all the advantages of TaqMan Assay chemistry, this provides significant benefits over microarrays, which require several days and hundreds of nanograms of input RNA to generate data. For larger studies, where sample throughput is critical, TaqMan OpenArray MicroRNA Panels enable 3 samples per plate and 3 plates per run to be processed in parallel—a total of 9 samples per TaqMan™ OpenArray™ System run (Figure 4), and up to 36 samples per 8-hour working day.

Complete product solution

We offer the most comprehensive portfolio of innovative miRNA products and throughput solutions for your research needs. From RNA isolation kits to reagents and assays for miRNA quantitation, validation, or profiling to miRNA inhibitors and mimics for functional analysis, we offer a variety of fully validated choices to help meet your research needs.

The TaqMan MicroRNA Assays product family		Profiling	Targeted quantitation
TaqMan MicroRNA Assays are convenient, predesigned, functionally validated, and available in a variety of formats to best meet profiling and targeted quantitation research needs.			
TaqMan Array MicroRNA Cards			
Offering the advantages of TaqMan MicroRNA Assays in a convenient, preconfigured, and easy-to-use 384-well microfluidic card, TaqMan Array MicroRNA Cards are available for human, mouse, or rat miRNA profiling. A set of two cards is available for each species. The content of each card is matched to a corresponding Megaplex Primer Pool. Reducing experimental setup time and experimental variability, this solution is ideal for smaller studies where throughput is not a concern.		✓	
TaqMan OpenArray MicroRNA Panels			
Ideal for large human and rodent (mouse and rat) profiling studies, TaqMan OpenArray MicroRNA Panels offer content matched to Megaplex Primer Pools with the significant throughput enhancements offered by the OpenArray Real-Time PCR System. Run up to three samples in parallel per OpenArray Plate, up to 36 samples per 8-hour working day, maximizing sample throughput and productivity.		✓	
Megaplex Primer Pools			
Providing comprehensive coverage of the Sanger miRBase, when used with TaqMan Array MicroRNA Cards or TaqMan OpenArray MicroRNA Panels, Megaplex Primer Pools enable the ideal miRNA profiling solution: <ul style="list-style-type: none">• Megaplex RT Primers Designed to streamline experimental workflows, Megaplex RT Primers provide a single-reaction solution when preparing cDNA for hundreds of targets. Two Megaplex RT Primer pools are available for human, mouse, and rat species.• Megaplex PreAmp Primers Significantly enhance the ability to detect low-expression miRNAs. With content matched to Megaplex RT Primers, two Megaplex PreAmp Primer pools are available for human and rodent.		✓	
TaqMan MicroRNA Assays			
Single-tube TaqMan MicroRNA Assays are available for any miRNA in the Sanger miRBase Registry. Each kit includes a TaqMan Assay and a reverse transcription primer specific for the target of interest. We continually increase the number of assays in order to stay aligned with the Sanger miRBase Registry.			✓
TaqMan MicroRNA Assay Endogenous Controls			
This selection of endogenous control assays for human, mouse, rat, <i>Drosophila</i> , <i>C. elegans</i> , and <i>Arabidopsis</i> simplifies data normalization. For detailed information, refer to the application note "Endogenous Controls for Real-Time Quantitation of miRNA Using TaqMan MicroRNA Assays", available at thermofisher.com .			✓
TaqMan MicroRNA Reverse Transcription Kit			
The Applied Biosystems™ TaqMan™ MicroRNA Reverse Transcription Kit provides all the necessary components for optimal TaqMan MicroRNA Assay performance. Components of this kit are used with a single RT primer provided with each individual assay, or with Megaplex RT Primers, to convert miRNA to cDNA prior to real-time PCR quantitation.		✓	✓

Applied Biosystems real-time PCR platforms

Applied Biosystems real-time PCR systems make real-time PCR more accessible than ever before by

providing powerful solutions to fit the needs of any laboratory. Each system is easy to use with next-generation software and is backed by the unmatched track record of

performance, quality, and long-term reliability of Applied Biosystems™ instruments.

Ordering information

TaqMan MicroRNA Assay products

TaqMan MicroRNA Assays

Choose from a collection of inventoried assays for most human and rodent miRNAs, and over 6,000 made-to-order assays for all other miRNAs in the Sanger registry. Each assay provides 50 RT (15 µL) and 150 real-time PCR (20 µL) reactions. For a complete list, go to thermofisher.com/taqmanmirna

TaqMan MicroRNA Cards

Ideal for smaller studies or when sample amounts are limiting in human and rodent species. Choose the full 2-card set for comprehensive coverage or either card individually for a more focused view, depending on study needs. Each card enables up to 381 TaqMan MicroRNA Assays to be run in parallel. For a complete list, go to thermofisher.com/mirnacards

TaqMan OpenArray MicroRNA Panels

Provides TaqMan MicroRNA Assays in an OpenArray Plate for a complete human or rodent miRNA profile. Workflow enhancements make this the ideal choice for medium to large study sizes. For a complete list, go to thermofisher.com/openarray

Megaplex Primer Pools

Required for up-front reverse transcription of miRNA prior to analysis using either TaqMan Array MicroRNA Cards or TaqMan OpenArray MicroRNA Panels. Available in a variety of packaging solutions based on species and preamplification requirements. For a complete list, go to thermofisher.com/megaplex

TaqMan MicroRNA Endogenous Controls

Each endogenous control includes a 20X TaqMan Assay and a 5X reaction RT primer, providing 50 RT (15 µL) and 150 real-time PCR (20 µL) reactions. For a complete list, go to thermofisher.com/taqmanmirna

Custom TaqMan Small RNA Assays

Applying the same sophisticated *in silico* design process used for TaqMan MicroRNA Assay designs for any small RNA. To order, go to thermofisher.com/smallrna

Related products required for use with TaqMan MicroRNA Assays*

mirVana miRNA Isolation Kit

TaqMan MicroRNA Cells-to-C_T Kit

RecoverAll Total Nucleic Acid Isolation Kit for FFPE Tissues

Other related products for use with TaqMan MicroRNA Assays*

Anti-miR miRNA Molecules, Controls, and Libraries

Pre-miR miRNA Molecules, Controls, and Libraries

* Visit thermofisher.com for more information on these miRNA-related products.

Find out more at thermofisher.com/taqmanmirna

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