

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
- 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



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

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.

TaqMan® MicroRNA Assays—a real-time PCR revolution

By making novel adaptations in assay design, Life Technologies 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 *Design Pipeline for TaqMan® Small RNA Assays* for more details).

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 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 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).

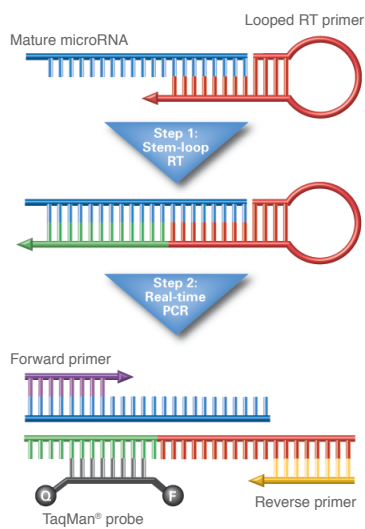


Figure 1. TaqMan® MicroRNA Assay mechanism. A simple two-step mechanism brings the advantages of TaqMan® real-time PCR to miRNA quantitation.

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.

Superior dynamic range

TaqMan® MicroRNA Assays deliver up to 9 logs of linear dynamic range. miRNA targets that vary from a few to millions of copies can be accurately quantitated in the same experiment—an important factor, given the wide range of miRNA concentrations within and across different cells, tissue types, and disease states.

Fast time-to-results

Because they use gold standard TaqMan® reagent-based technology with universal thermal cycling conditions, TaqMan®

MicroRNA Assays are fast and easy to set up. Just load your total RNA sample on any Applied Biosystems® real-time PCR system and get results in as little as 2 hours. Megaplex™ Primer Pools, used in conjunction with TaqMan® Array MicroRNA Cards or TaqMan® OpenArray® MicroRNA Panels, provide 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

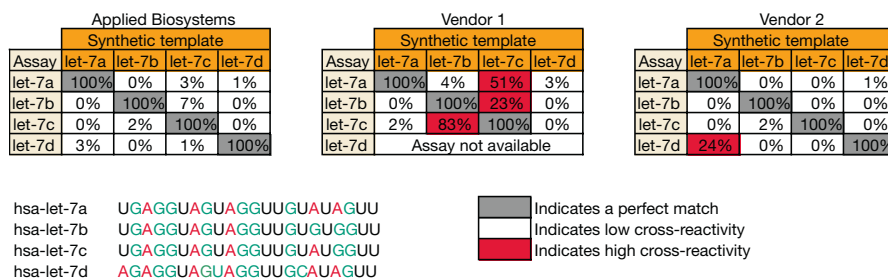


Figure 2. Single-base discrimination of individual TaqMan® MicroRNA Assays compared with two competitors. Relative detection (%) is calculated based on C_t difference between perfectly matched and mismatched assays, where a relative detection of 50% is assigned for each C_t difference of 1.

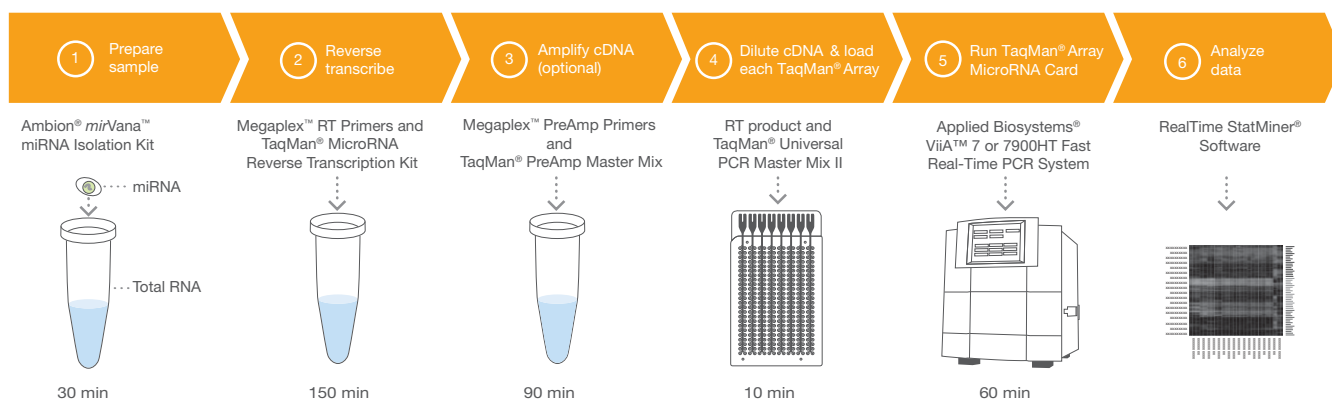


Figure 3. TaqMan® Array MicroRNA Card workflow. Get a complete human or rodent miRNA profile in as little as 4 hours, and in only 5.5 hours with the optional Megaplex™ PreAmp Primers and TaqMan® PreAmp Master Mix step.

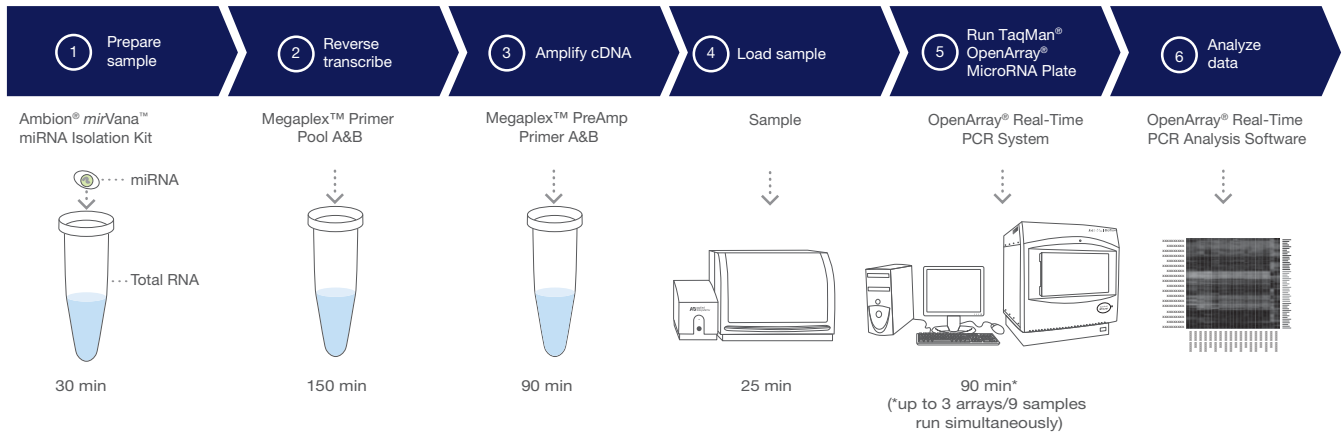


Figure 4. TaqMan® OpenArray® MicroRNA Panel workflow. Get a complete human or rodent (mouse and rat) miRNA profile for 9 samples in about 7 hours.

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 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, Life Technologies offers a variety of fully validated choices to help meet your research needs.

The TaqMan® MicroRNA Assays product family	Profiling	Targeted quantitation
<p>TaqMan® MicroRNA Assays are convenient, predesigned, functionally validated, and available in a variety of formats to best meet profiling and targeted quantitation research needs.</p> <p>TaqMan® Array MicroRNA Cards</p> <p>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.</p>	✓	
<p>TaqMan® OpenArray® MicroRNA Panels</p> <p>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.</p>	✓	
<p>Megaplex™ Primer Pools</p> <p>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:</p> <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. 	✓	
<p>TaqMan® MicroRNA Assays</p> <p>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.</p>		✓
<p>TaqMan® MicroRNA Assay Endogenous Controls</p> <p>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 <i>Endogenous Controls for Real-Time Quantitation of miRNA Using TaqMan® MicroRNA Assays</i>.</p>		✓
<p>TaqMan® MicroRNA Reverse Transcription Kit</p> <p>The TaqMan® MicroRNA RT 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.</p>	✓	✓

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 www.appliedbiosystems.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 www.appliedbiosystems.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 www.appliedbiosystems.com/mirnaopenarray.

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 www.appliedbiosystems.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 www.appliedbiosystems.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 www.appliedbiosystems.com/smallrna.

Related products required for use with TaqMan® MicroRNA Assays†

Ambion® mirVana™ miRNA Isolation Kit

TaqMan® MicroRNA Cells-to-Ct™ Kit

Ambion® RecoverAll™ Total Nucleic Acid Isolation Kit for FFPE Tissues

Other related products for use with TaqMan® MicroRNA Assays†

Ambion® Anti-miR™ miRNA Molecules, Controls, and Libraries

Ambion® Pre-miR™ miRNA Molecules, Controls, and Libraries

† Visit www.appliedbiosystems.com for more information on these miRNA-related products.



For more information and full terms of the TaqMan® Assays QPCR Guarantee, visit www.appliedbiosystems.com/taqmanguarantee.

Life Technologies offers a breadth of products DNA | RNA | PROTEIN | CELL CULTURE | INSTRUMENTS

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