TaqMan Gene Expression Assay solutions

Proven performance for fast, reliable results

applied biosystems

The leader in gene expression analysis

We are the leader in gene expression analysis, providing a wide range of high-quality research solutions for gene expression profiling, verification, and screening. For gene expression analysis by real-time PCR, we offer world-class Applied Biosystems™ technologies, including sample preparation, TaqMan™ or SYBR™ Green chemistry, and innovative real-time PCR instruments and data analysis software.

Applied Biosystems™ TaqMan™ Assay technology is the gold standard for gene expression analysis by real-time PCR, offering outstanding analytical performance, quality, and content. We provide a unique end-to-end workflow solution so you can spend your time generating results, not designing and optimizing assays. Developed using long-standing bioinformatic expertise in primer and probe design and stringent testing across applications and integrated platforms, TaqMan Assays provide you with exceptional flexibility and comprehensive real-time PCR solutions.

With over 2.8 million predesigned and preoptimized assays across a growing list of model species, a wide range of formats to scale to your needs, and a robust manufacturing quality system, we have a complete suite of research solutions that will enable you to get fast, reliable, and accurate gene expression results.

Contents

TaqMan Gene Expression Assays

Proven 5´ nuclease–based real-time PCR chemistry

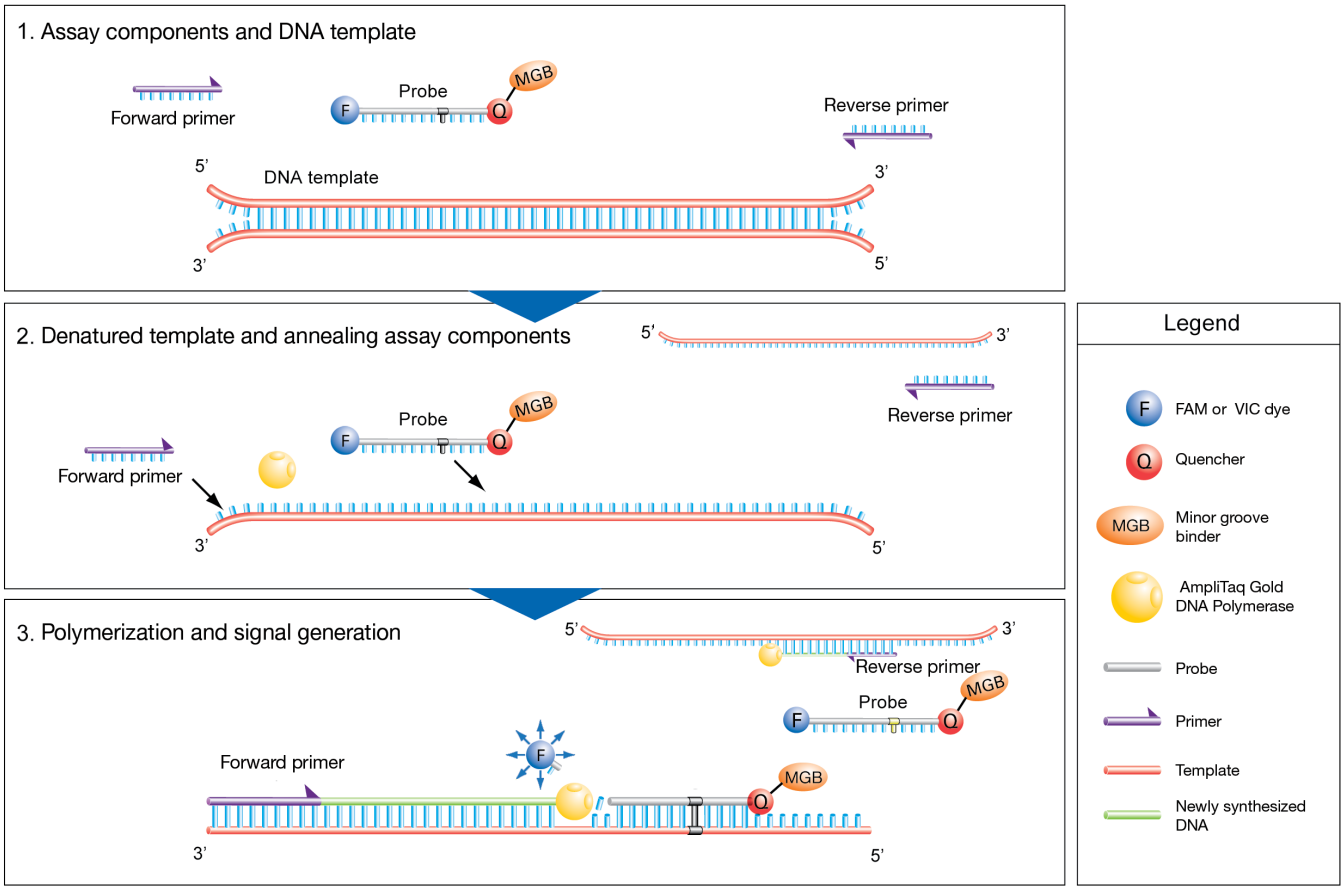
Get results you can trust

TaqMan Gene Expression Assays are referenced in tens of thousands of publications and are considered the gold standard for gene expression quantification by scientists around the world.

TaqMan Gene Expression Assays are based on 5´ nuclease chemistry, and each assay contains the primer and probe set for your target of interest. Here's how an assay works:

1. At the start of the real-time PCR reaction, the temperature is raised to denature the double-stranded cDNA. During this step, the signal from the fluorescent dye on the 5´ end of the Applied Biosystems™ TaqMan™ probe is quenched by the minor groove binder (MGB)–nonfluorescent quencher on the 3´ end of the probe.
2. In the next step, the reaction temperature is lowered to allow the primers and probe to anneal to their specific target sequences.
3. *Taq* polymerase synthesizes a complementary DNA strand using the unlabeled primers and template. When the polymerase reaches the TaqMan probe, its endogenous 5´ nuclease activity cleaves the probe, separating the dye from the quencher.

With each cycle of PCR, more dye molecules are released, resulting in an increase in fluorescence intensity proportional to the amount of amplicon synthesized.



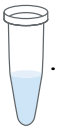
Sample qPCR workflow using TaqMan Assays and instruments

Prepare the cDNA sample

Prepare the total RNA

Perform reverse transcription

Evaluate the cDNA



Total RNA

SuperScript IV VILO Master Mix

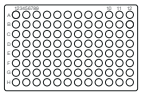
Thermal cycler or
real-time PCR instrument

Prepare the reaction mix and load the plate

Prepare the PCR reaction mix

Load the plate

TaqMan Fast Advanced Master Mix



96-well
reaction plate

Run the real-time PCR reaction

Create the plate document/experiment

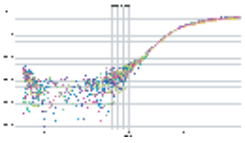
Run the plate

System software

Real-time PCR instrument

Analyze the results

Refer to the user guide for your
real-time PCR instrument



Design and Analysis 2 or
ExpressionSuite Software

The largest selection of predesigned assays

Spend time on results, not assay design and optimization

With predesigned TaqMan Assays, spend your time generating results, not designing and optimizing assays

- Detect virtually any gene product—more than 2.8 million predesigned assays, and custom design for everything else
- Assays for nearly every human, mouse, and rat gene in the RefSeq and GenBank™ databases
- Available for 34 species and growing, and some microbial pathogens
- Assays for multiple locations per transcript and across nearly every exon junction in human

Learn more and order at **thermofisher.com/taqmangex**

- Not finding what you're looking for in our predesigned assay collection? The Applied Biosystems™ Custom TaqMan™ Assay Design Tool lets you design and order a TaqMan Assay to detect any gene from any organism. Design and order your assays at **thermofisher.com/cadt**. Custom TaqMan Assays are typically shipped in 4–10 business days.
- Also, try Applied Biosystems™ TaqMan™ Endogenous Controls—a collection of TaqMan Assays targeting commonly used control gene products for sample input normalization in real-time PCR. Learn more at **thermofisher.com/endogenouscontrols**.

Predesigned TaqMan Gene Expression Assays

Species	Number of assays
Human (*H. sapiens*)	334,290
Mouse (*M. musculus*)	211,280
Rat (*R. norvegicus*)	197,597
Chinese hamster (*C. griseus*)	154,743
Naked mole-rat (*H. glaber*)	149,948
Goat (*C. hircus*)	145,371
Sheep (*O. aries*)	141,714
White-tufted-ear marmoset (*C. jacchus*)	131,567
Rabbit (*O. cuniculus*)	120,435
Horse (*E. caballus*)	120,179
Bovine (*B. taurus*)	108,346
Rhesus monkey (*M. mulatta*)	102,995
Rice (*O. sativa*)	99,822
Arabidopsis (*A. thaliana*)	97,879
Nematode (*C. elegans*)	92,688
Pig (*S. scrofa*)	90,571
Chicken (*G. gallus*)	77,539
Zebrafish (*D. rerio*)	63,713
Western clawed frog (*X. tropicalis*)	56,764
Dog (*C. familiaris*)	56,194
Fruit fly (*D. melanogaster*)	41,607
Sweet corn (*Z. mays*)	38,492
Yellow fever mosquito (*A. aegypti*)	36,538
African malaria mosquito (*A. gambiae*)	36,538
Honey bee (*A. mellifera*)	32,758
Soybean (*G. max*)	9,993
Fission yeast (*S. pombe*)	6,538
Baker's yeast (*S. cerevisiae*)	5,524
Guinea pig (*C. porcellus*)	2,108
Grape (*V. vinifera*)	965
Wheat (*T. aestivum*)	760
Bacteria	447
Artificial control	206
Virus	137
Plants and fungi	89
Invertebrates	41
Markers and reporters	19
Primates	2
Phages	1
Synthetic and chimeric	1
Summary	**2,766,399**

The TaqMan Assays qPCR guarantee

We stand behind every predesigned TaqMan Assay. We are committed to helping you achieve your research goals, and we believe our predesigned TaqMan primer and probe sets establish the benchmark for high-quality and easy-to-use real-time PCR products.

We want you to be happy with your purchase and confident in the genomic tools we provide. Therefore, we guarantee every TaqMan Assay in terms of:

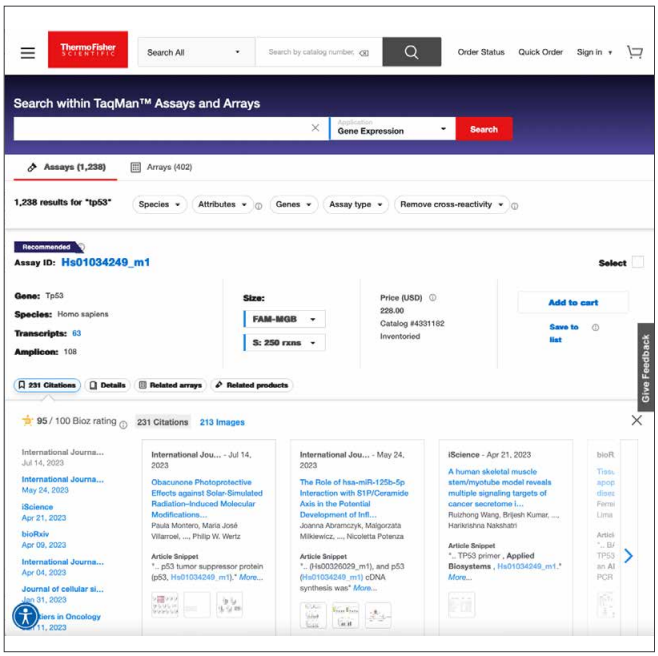
- **Quality**—high-quality manufacturing to enable reproducible results from lot to lot
- **Performance**—designed to enable superior analytical sensitivity, specificity, and accuracy; assay performance may vary depending on the type and quality of sample
- **Content**—the largest collection of primer and probe sets
- **Results**—helps you to obtain data you can trust

If you are not satisfied with the performance of a predesigned TaqMan Assay, we'll replace it at no cost or credit your account. For more information and to see the full terms and conditions of the guarantee, go to **thermofisher.com/taqmanguarantee**.

Finding assays

TaqMan Gene Expression Assays search tool

The TaqMan search experience delivers the right tools plus useful content to help advance your work. What makes our latest search tool unique? First, it's easier than ever to shop our comprehensive selection of more than 2.8 million expertly predesigned, preoptimized, performance-guaranteed TaqMan Assays. Terms apply; visit thermofisher.com/taqmanguarantee for details.



Features of the TaqMan Assay search tool:

- **Find your assays and arrays faster with a simplified search experience**—search across TaqMan Assay and array products
- **View the latest and most relevant publications for each assay**—see the latest references by assay ID

Find the right TaqMan Assays using our search tool at thermofisher.com/taqman

There are multiple assays for my gene product. How do I choose the right one?

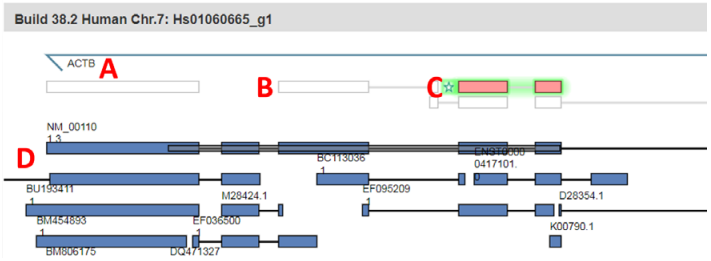
Genomic alignment maps on our website make it easy to see exactly what gene products are detected and how they align to the genomic locus. The top of the map shows the target gene. Below it, all TaqMan Gene Expression Assays for target gene products are shown relative to the genomic locus map. The known transcripts from the locus are shown below, with their RefSeq accession numbers.

A. Gene symbol.

B. Alignment of TaqMan amplicons to the gene. Hover over an assay to see its name and assay number as well as the transcripts it detects. Click on an assay to open an assay details pane for more information and to add the assay to your shopping cart.

C. Recommended assays are marked with a star symbol.

D. All RefSeq transcripts that map to the gene locus, showing exon usage.



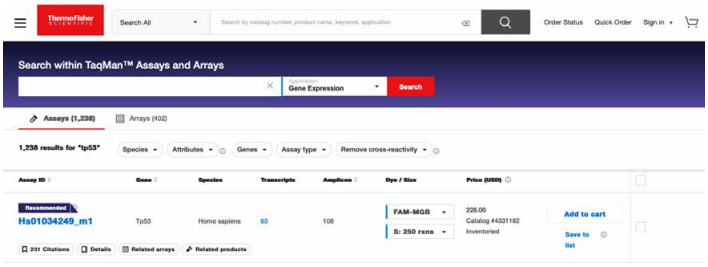
Interpreting search results

Recommended TaqMan Assays

All TaqMan Assays are designed using our industry-leading bioinformatics design process and meet all of our quality control specifications. For the target you selected, we compared all assays for that target, and we recommend this assay for standard gene expression experiments because it detects the maximum number of transcripts for your gene of interest. We also evaluated the assays based on the following criteria, and the recommended assay best meets the design criteria below. Assay design information is updated regularly, but assay suffixes are only designed once, at the time of assay design.

An assay from the search that is labeled "recommended:"

1. Does not detect gene products with similar sequence (homologs)
2. Is designed across an exon–exon junction
3. Is an inventoried product, so you get it faster
4. Has a short amplicon, giving you a more efficient PCR reaction
5. Does not detect off-target sequences, thus increasing the specificity of your reactions (off-target detection may happen when an assay hybridizes with a sequence that occurs more than once in the genome)
6. Does not map to multiple genes, thus increasing the specificity of your experiment
7. Does not target the 5′ untranslated region (UTR); the 5′ UTR of transcripts can have variable sequence between transcripts



Proven performance

Reliable reagents for confidence in your results

TaqMan MGB probes bind more tightly—shorter, more specific probes

TaqMan probes include an MGB moiety at the 3′ end that increases the T_m of the probe and stabilizes probe–target hybrids. This means that TaqMan probes can be significantly shorter than traditional probes, enabling better sequence discrimination and flexibility to accommodate more targets.

Nonfluorescent quencher (NFQ) maximizes sensitivity

TaqMan probes incorporate an NFQ to absorb (quench) signal from the dye label at the 3′ end of the probe. The properties of the NFQ, combined with the short length of MGB probes, result in lower background signal than with non-MGB/NFQ probes. Lower background noise results in increased sensitivity and precision in your data.

TaqMan probe outperforms non-MGB probe in real-time PCR

	C_t		Standard deviation	
Input	TaqMan Assay	Non-MGB assay	TaqMan Assay	Non-MGB assay
10 ng	9.72	13.35	0.02	0.15
1 ng	13.36	16.82	0.04	0.18
0.1 ng	16.76	20.23	0.07	0.13
10^{-2} ng	20.19	23.72	0.04	0.13
10^{-3} ng	23.64	27.31	0.03	0.10
10^{-4} ng	27.01	30.66	0.04	0.12
10^{-5} ng	30.24	32.82	0.13	0.19

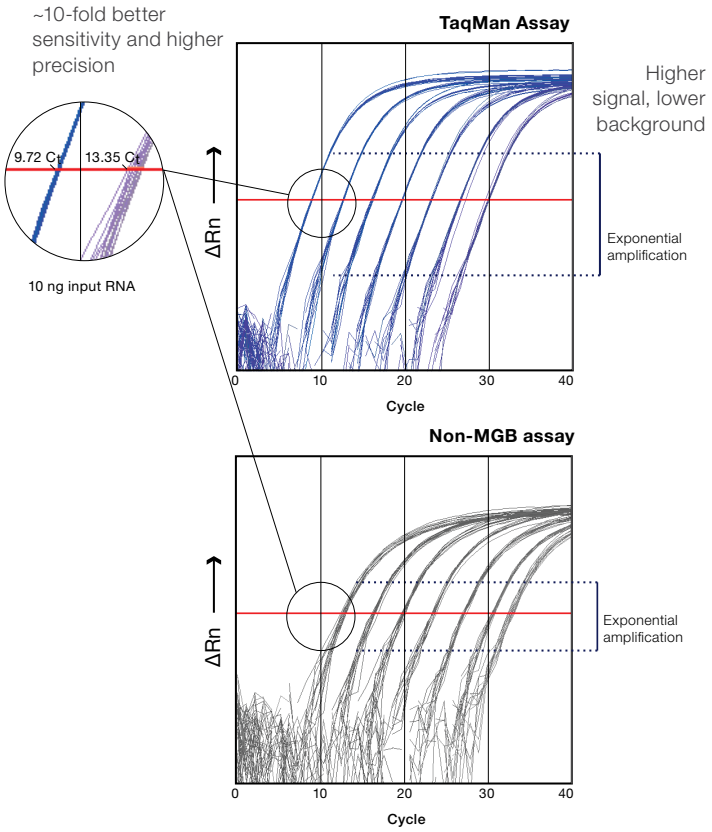


Figure 1. TaqMan probes support better sensitivity and precision. Comparison of two 5′ nuclease PCR assays for 18S rRNA. Ten-fold dilutions of Universal Human Reference RNA (10–10^{-5} ng) were prepared and analyzed in 11 replicate real-time PCR reactions using either the TaqMan Gene Expression Assay (Applied Biosystems™ FAM™ dye–labeled, with NFQ) or the non-MGB assay (FAM dye–labeled, with BHQ). Real-time PCR was run according to the respective manufacturers' recommended conditions. Across a 6-log range of input template, the TaqMan Assay displayed earlier C_t values and better reproducibility across all data points. In addition, the TaqMan Assay had higher signal and lower background, resulting in better sensitivity and higher precision.

- **Analytical specificity**—Advanced primer/probe sequence selection criteria plus MGB probe enhancement facilitate the analytical specificity and reproducibility you need for confidence in your results. Your results are generated from amplification of the intended target, not from nonspecific dye binding or amplification of closely related genes or pseudogenes.
- **Analytical sensitivity**—The NFQ on TaqMan probes minimizes background, and intelligent PCR primer and probe design maximizes amplification efficiency. Reliably detect targets present at 10 or fewer copies.
- **Reproducibility**—Designed to accurately reproduce results from well to well, day to day, and lab to lab, even across manufacturing lots.
- **Wide dynamic range**—Detect from a handful to millions of target molecules with the same reaction setup. Capture the full spectrum of expression variability in virtually any experimental scenario.
- **High amplification efficiency**—All TaqMan Gene Expression Assays have a PCR efficiency of 100% (±10%). Use the comparative C_t ($\Delta\Delta C_t$) method of quantification confidently.
- **Ease of use**—All assays use a single, universal thermal cycling profile. Run any assay combination on a single plate. Avoid instrument-programming errors.
- **Comprehensive assay information**—Genomic mapping data are provided prior to purchase.

Detect as few as 10 target molecules with high analytical sensitivity and large dynamic range

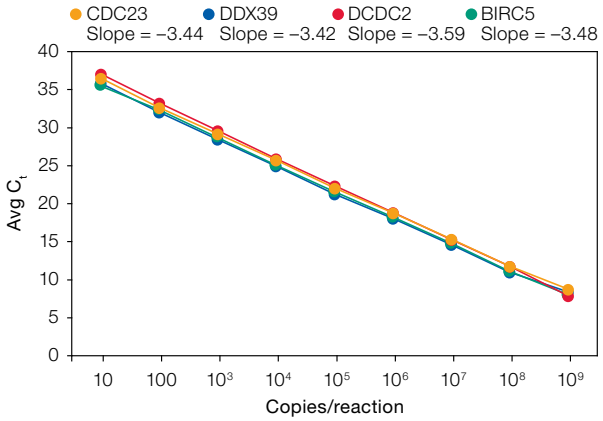


Figure 2. Analytical sensitivity and wide dynamic range. Sequential 10-fold dilutions of synthetic sense RNA corresponding to 4 gene products—CDC23, DDX39, DCDC2, and BIRC5—were added to a background of yeast RNA to evaluate the analytical sensitivity and dynamic range of TaqMan Gene Expression Assays. Samples containing 50 to 5 x 10^9 target molecules were reverse transcribed, and 20% of each reverse transcription reaction was used in quadruplicate PCR reactions using TaqMan Gene Expression Master Mix. Reactions containing as few as 10 copies were detected (C_t ~35).

Reproducible quantification with virtually 100% amplification efficiency

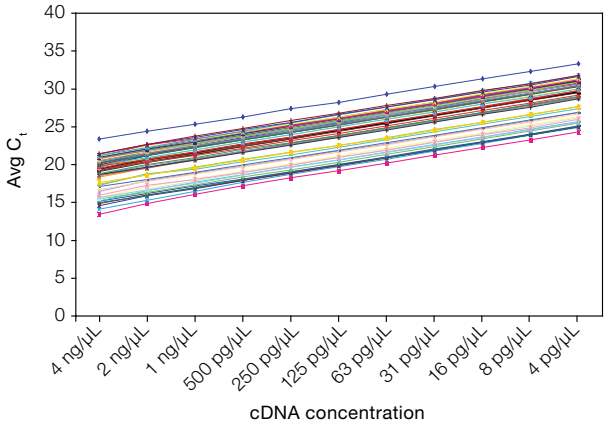


Figure 3. Reliable performance and wide dynamic range. TaqMan Gene Expression Assays were used to analyze expression of 60 targets across a 2-fold dilution series of universal reference cDNA, from 4 ng/µL to 4 pg/µL. The average slope of the lines is 1.02. TaqMan Assays exhibit virtually 100% amplification efficiency at each cycle of PCR: each target molecule is copied, doubling the fluorescence signal.

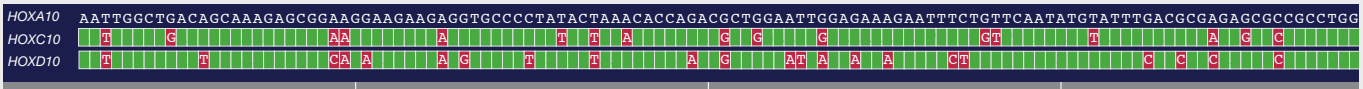
Analytical specificity for your mRNA target

TaqMan Assay design helps ensure target mRNA analytical specificity: readily distinguish even highly homologous sequences

Analytical specificity is built into the TaqMan Assay design pipeline. As a result, assays are designed to detect only their intended targets. Even TaqMan Gene Expression Assays for members of highly homologous gene families typically amplify their targets with C_t values at least 10 cycles earlier than the closest homolog, or with at least 1,000-fold discrimination if equal numbers of the two targets are present.

TaqMan Gene Expression Assays are designed to detect only their intended targets, easily discriminating among highly homologous sequences.

HOX gene family members *HOXA10*, *HOXC10*, and *HOXD10* share ~80% sequence homology



Gene	RefSeq ID	TaqMan Assay ID	Homology
HOXA10	NM_018951.3	Hs00172012_m1	—
HOXC10	NM_017409.3	Hs00213579_m1	81%
HOXD10	NM_002148.3	Hs00157974_m1	79%

Clear gene expression results for *HOX* gene family members

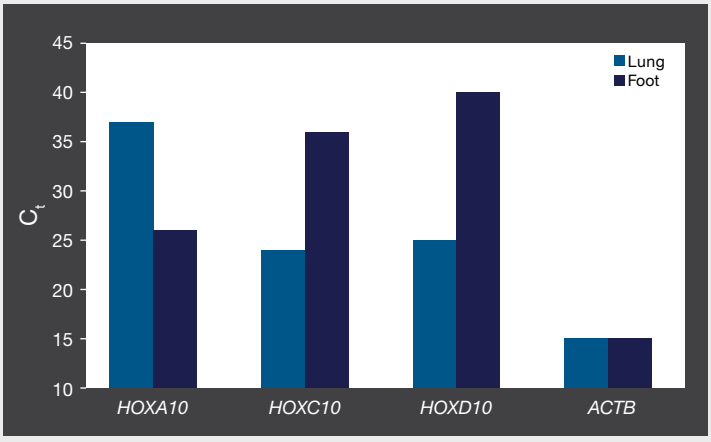


Figure 4. TaqMan Gene Expression Assays are designed to detect only their intended targets, even among the highly homologous *HOX* gene family members. In invertebrates, as in *Drosophila*, location-appropriate expression of members of the *HOX* gene family is essential for normal embryogenesis. Tissue-specific expression of 3 closely related *HOX* genes, comparable to published data, was easily detected using TaqMan Gene Expression Assays.

Advanced bioinformatics

TaqMan Gene Expression Assays are designed using our sophisticated design pipeline that has been stringently evaluated by functionally testing more than 18,000 research assays (a statistically significant subset). Since then, our customers have consistently confirmed through their own experiments that TaqMan Gene Expression Assays enable reliable, reproducible results. Our primers and probes use a tried and tested algorithm to optimize the performance of your assay. TaqMan Assays can help you answer a wide range of research questions and have been cited in more publications than any other qPCR assay product.

This process (right) is used to design all TaqMan Gene Expression Assays, including inventoried assays, made-to-order assays, and Applied Biosystems™ Custom Plus assays. We offer ~73,000 inventoried assays and over two million made-to-order assays, which are manufactured when an order is placed. Applied Biosystems™ Custom Plus TaqMan™ RNA Assays are ideal for newly identified genes and specific splice variants, and offer the same performance as predesigned TaqMan Assays.

In compliance with current MIQE guidelines, TaqMan Assays are provided with the context sequence, the probe location, and—if appropriate—the exon–exon boundary that the assay crosses. Every TaqMan Assay design has a unique assay ID number that can be used as a reference with colleagues, or in publications to replicate the design.

TaqMan Assay design and manufacture

Target selection
mRNA sequences (NCBI)

Preprocessing
– Map to genome
– Mask SNPs, repeats, and discrepancies
– Identify exon–exon junctions

Assay design
Thermodynamic and chemistry parameters
– Balance T_m for universal thermal cycling
– Avoid secondary structure, optimize GC content
– Optimize amplicon size
– Eliminate primer-dimer formation

***In silico* QC**
– Score assays for target specificity
– Score assays for genome specificity

Assay selection
High-quality TaqMan Gene Expression Assays

Perform stringent assay formulation QC

Confirm oligo identity by mass spectrometry

Online ordering

Flexible formats

A variety of formats for different research needs

Configurations to fit your research goals

Are you analyzing hundreds (or thousands) of samples, and expression from a handful of genes? Or does your research involve a few samples that need to be analyzed for a long list of mRNA targets? No matter what experiment you are performing, there is a TaqMan Gene Expression Assay format and real-time PCR instrument for your research needs.

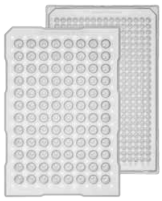
TaqMan Gene Expression Assay formats

Single tubes

- Low entry price
- Flexible
- Run on any real-time PCR instrument

384-well microfluidic cards

- Low cost per reaction
- Optimal for medium to large projects
- Run on QuantStudio 7 and 12K Flex, ViiA 7, and 7900HT Real-Time PCR Systems



96- or 384-well plates

- Optimal for small to medium projects
- Balances flexibility with streamlined reaction setup
- Run on any 96- or 384-well real-time PCR instrument

OpenArray plates

- Lowest cost for large projects
- Ultimate throughput
- Run on QuantStudio 12K Flex Real-Time PCR System

TaqMan Gene Expression Assays (single tubes)

Predesigned assays come in four different sizes so that you can order only the number of assays appropriate for your research. In addition, for made-to-order assays in small, medium, and large sizes, you can choose FAM or VIC dye labeling, and non–primer-limited or primer-limited formulation. (Extra-small assays are only available with FAM dye labels.)

Get more information at
thermofisher.com/taqmangeneexpression

Ordering information

Size	No. of reactions*	Concentration	Reporter dye	Cat. No.
TaqMan Gene Expression Assays				
Extra-small (inventoried)†	75	20X	FAM	4453320
Extra-small (made-to-order)‡	75	20X	FAM	4448892
Small (inventoried)†	250	20X	FAM	4331182
Small (made-to-order)‡	360	20X	FAM or VIC	4351372, 4448489 (VIC), 4448484 (VIC-PL**)
Medium (made-to-order)‡	750	20X	FAM or VIC	4351370, 4448490 (VIC), 4448485 (VIC-PL**)
Large (made-to-order)‡	2,900	60X	FAM or VIC	4351368, 4448491 (VIC), 4448486 (VIC-PL**)
With other dyes (such as ABY or JUN)	Email **specialty_oligos@thermofisher.com**			

* Reaction number is based on 20 µL reaction size.

** Primer-limited.

† Inventoried assays are typically shipped in 1–4 business days.

‡ Made-to-order assays are typically shipped in 4–6 business days in North America, and 6–10 business days in Europe.

Applied Biosystems™ TaqMan™ Arrays: 96-well plates or 384-well microfluidic cards

- Configure a Custom TaqMan Array containing inventoried predesigned assays, or select from our gene signature assay collections
- TaqMan Gene Expression Assays are loaded into one of two TaqMan Array formats: 96-well plates (Fast or standard) or 384-well microfluidic cards
- To include made-to-order or custom assays on your plate or card, order using the Applied Biosystems™ TaqMan™ Custom Plating Service, or contact your sales representative for other options

Custom TaqMan Array 96-well plates

- Choose any predesigned TaqMan Gene Expression Assay
- 6-plate minimum order
- Choose standard (20 µL rxn) or Fast (10 µL rxn) format
- Typically shipped in 1–2 weeks

Learn more and order at thermofisher.com/arrayplates

Ordering information

Assays + controls	Assay replicates	Samples per plate	Name	Cat. No. (standard)	Cat. No. (Fast)
TaqMan Array Fast Plates					
95 + 1*	1	1	Format 96	4391524	4413255
92 + 4**	1	1	Format 96+	4391525	4413256
47 + 1*	2	1–2	Format 48	4391526	4413257
44 + 4**	2	1–2	Format 48+	4391527	4413258
31 + 1*	3	1–3	Format 32	4391528	4413259
28 + 4**	3	1–3	Format 32+	4391529	4413260
15 + 1	6	1–6	Format 16	4413264	4413261
12 + 4	6	1–6	Format 16+	4413265	4413262
7 + 1	12	1–12	Format 8	4413266	4413263

* Available with one manufacturing control assay for 18S ribosomal RNA. These formats are required for plates with assays for rhesus, canine, or a mixture of species.

** Includes the manufacturing control assay for 18S ribosomal RNA, plus assays for 3 additional candidate endogenous control genes: *GAPDH*, *HPRT1*, and *GUSB*, appropriate for human, mouse, or rat sample analysis.

Custom TaqMan Array 384-well microfluidic cards

- Choose any predesigned TaqMan Gene Expression Assay
- 10-card minimum order
- Run on the QuantStudio 7 and 12K Flex, ViiA 7, and 7900HT Fast Real-Time PCR Systems
- No robotics required: cards have 8 sample-loading ports, each connected to 48 wells containing dried-down TaqMan Assays
- 1 µL reactions (2 µL including channel filling and overage)
- Typically shipped in 3–4 weeks

Learn more and order at thermofisher.com/arraycards

Ordering information

Assays + controls*	Assay replicates	Samples per card	Name	Cat. No.
Custom TaqMan Array Cards				
11 + 1	4	8	Format 12	4342247
15 + 1	3	8	Format 16	4346798
23 + 1	2 (or 4)	8 (or 4)	Format 24	4342249
31 + 1	3	4	Format 32	4346799
47 + 1	1 (or 2)	8 (or 4)	Format 48	4342253
63 + 1	3	2	Format 64	4346800
95 + 1	1 (or 2)	4 (or 2)	Format 96a	4342259
95 + 1	2 (or 4)	2 (or 1)	Format 96b	4342261
191 + 1	2	1	Format 192	4346802
380 + 4	1	1	Format 384	4342265

*These arrays are available with one manufacturing control assay for 18S ribosomal RNA.

Fixed- and flexible-content TaqMan array plates and cards

- Predesigned, preloaded TaqMan Assays for gene products specific to pathways, biomarkers, or disease target classes to facilitate drug discovery and disease research
- Assay layout of fixed-content panels cannot be modified; fixed panels are typically shipped in 1–2 business days
- Assay layout of flexible-content panels can be modified prior to ordering; flexible panels are typically shipped in 1–2 weeks (plates) or 2–4 weeks (cards)
- Endogenous control panels are also available to identify appropriate housekeeping gene products for your research

Here is a sampling of what's available to support your research focus:

- Apoptosis
- Endogenous controls
- Cancer
- Immune system and inflammation
- Cell cycle proliferation and regulation
- Neurology
- Development and stem cells
- Signal transduction
- Extracellular matrix and adhesion
- Toxicology and drug metabolism

See the complete collection of 96-well gene signature plates at thermofisher.com/taqmanarrays

See the collection of 384-well gene signature microfluidic cards at thermofisher.com/signaturecards

TaqMan Custom Plating Service: 96- or 384-well plates

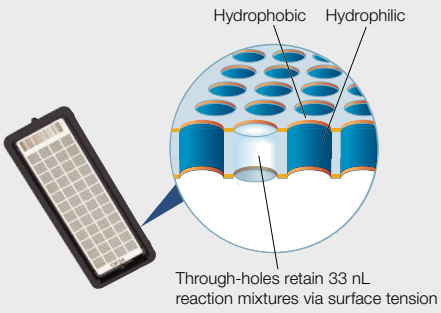
Configure 96- or 384-well plates with any TaqMan Gene Expression Assays, including custom assays designed to your target sequences and made-to-order assays.

- Set up custom configurations of any TaqMan Assays, including inventoried, made-to-order, custom, or Custom Plus gene expression assays or custom TaqMan probes and primers
- 96-well TaqMan array plates containing custom assays must go through our Custom Plating Service
- All 384-well TaqMan array plates must go through our Custom Plating Service
- Receive plates in dried-down or liquid formulation
- Plates typically ship in 2–5 weeks
- 10-plate minimum order

For more information, email specialty_plates@thermofisher.com

Ordering information

Assays + controls	Assay replicates	Samples per plate	Name	Cat. No.
TaqMan OpenArray Real-Time PCR Plates				
18	3	Up to 48	Format 18	4471124
56	1	Up to 48	Format 56	4471125
112	1	Up to 24	Format 112	4471126
168	1	Up to 16	Format 168	4471127
224	1	Up to 12	Format 224	4471128



OpenArray real-time PCR plates

- TaqMan Assays loaded and dried down into the 3,072 through-holes on Applied Biosystems™ OpenArray™ Real-Time PCR Plates
- Process up to 576 samples to obtain over 43,000 data points, with a single operator in an 8-hour day, without the use of robotics
- For use with the QuantStudio 12K Flex Real-Time System with an Applied Biosystems™ OpenArray™ block configuration and supporting reagent kits only
- OpenArray plates with inventoried assays are typically shipped in 4–5 weeks, and within 5–6 weeks for custom assays

Learn more about OpenArray technology on the QuantStudio 12K Flex system at thermofisher.com/openarray

Custom TaqMan probes and primers

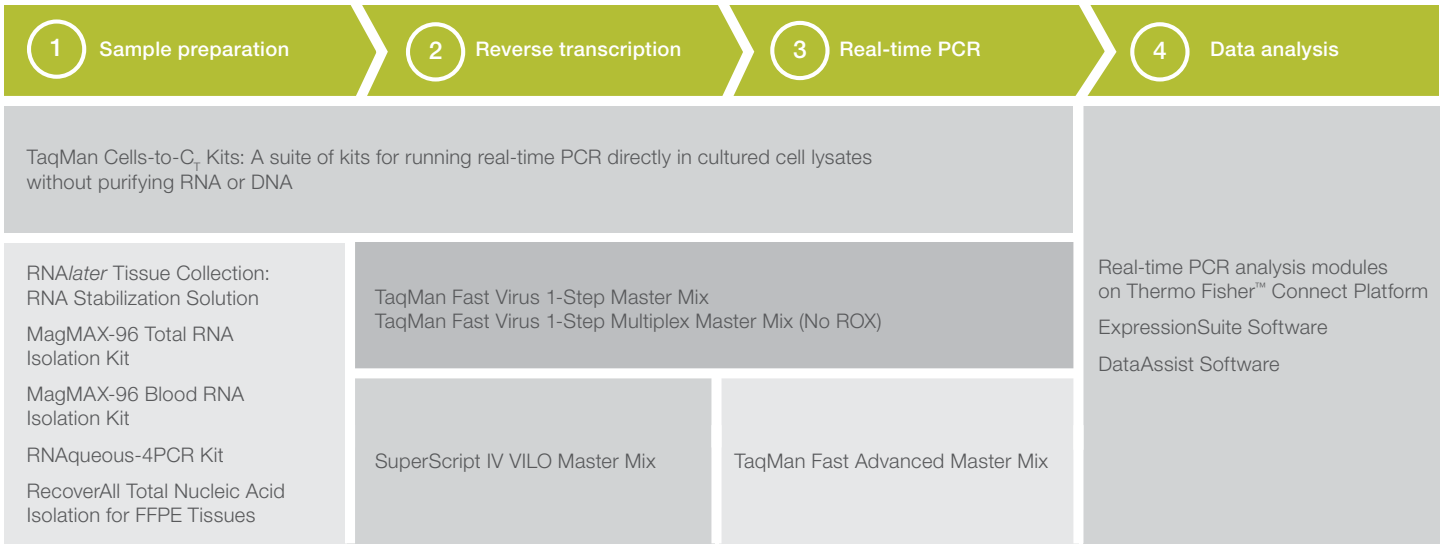
Custom TaqMan probes and primers can be ordered individually for maximal flexibility in optimizing your multiplex experiments. TaqMan QSY probes incorporate a proprietary 3´ QSY quencher to enable maximal PCR performance in a multiplex format. TaqMan QSY probes are available with FAM, VIC, and our proprietary ABY and JUN dyes, allowing amplification of up to four targets in a single reaction. All four dyes are optimized for the filter sets on Applied Biosystems™ real-time PCR instruments and work together with minimal spectral overlap for optimal performance.

Learn more about custom TaqMan probes and primers at thermofisher.com/taqman-primers-probes

Complementary reagents

Everything you need for reliable results

We provide the tools you need for real-time PCR analysis, starting with isolating RNA from virtually any sample type, to reverse transcription into cDNA, optional preamplification to stretch small samples for analysis of many gene products, and of course, real-time PCR data analysis. TaqMan Assays are optimized to work with TaqMan master mixes to help deliver high-quality results.



TaqMan Fast Advanced Master Mix

The perfect complement for TaqMan Gene Expression Assays, Applied Biosystems™ TaqMan™ Fast Advanced Master Mix delivers shorter run times (<40 minutes) than standard master mixes while enabling exceptional analytical sensitivity, accuracy, and linear dynamic range. TaqMan Fast Advanced Master Mix is also optimized for multiplexing—functionally tested to confirm duplexing with exogenous and endogenous internal positive control assays.

Learn more about real-time PCR master mixes at thermofisher.com/qpcrmm

TaqMan Fast Virus 1-Step master mixes

Applied Biosystems™ TaqMan™ Fast Virus 1-Step master mixes are designed for reliable real-time RT-PCR with high analytical sensitivity, even in the presence of common reaction inhibitors. The 4X formulation provides enhanced detection of both RNA and DNA viruses and is ideal for multiplex gene expression studies, even with low target input. For additional dye flexibility and experimental designs not requiring ROX, TaqMan Fast Virus 1-Step Multiplex Master Mix (No ROX) can accommodate four targets in a single reaction well.

TaqMan chemistry vs. SYBR Green chemistry for real-time PCR

We offer two types of chemistries to detect PCR products using real-time PCR instruments:

- TaqMan Assay chemistry (also known as “fluorogenic 5´ nuclease chemistry”)
- SYBR Green I dye chemistry

	TaqMan Assay–based detection	SYBR Green–based detection
Overview	Uses a fluorogenic probe to enable the detection of a specific PCR product as it accumulates during PCR cycles	Uses SYBR Green I dye or similar: dye binds to double-stranded DNA, to detect PCR product as it accumulates during PCR cycles
Specificity	High	Low
Sensitivity—low copies	High	Variable*
Reproducibility	High	Variable*
Multiplexing	Yes	No
Predesigned assays	Yes	No
User design and optimization	No	Yes
Cost	High	Low*
Gene expression quantitation	High	Low
DNA quantitation	Yes	Yes (pathogen detection)
Chromatin immunoprecipitation (ChIP)	Yes	Yes
SNP genotyping	Yes	No
MicroRNA	Yes	No
Copy number	Yes	No
Somatic mutation detection	Yes	No
Pathway analysis	Yes	No

*Depends on template quality and primer design/optimization.

Sample preparation for enhanced workflows

RNA extraction kits

Performance in downstream applications is often influenced by the quality of the starting nucleic acid being analyzed. We offer a broad range of kits for purifying high-quality RNA from a variety of sample types.

	Invitrogen™ TRIzol™ reagents	Invitrogen™ PureLink™ kits	Applied Biosystems™ MagMAX™ kits	Invitrogen™ Cells-to-C_T™ kits
	Process a large amount of tissue	Fast isolation of RNA from a variety of samples	High-throughput purification of RNA and DNA	Process cells for gene expression
Prep time	60 min	<20 min	45 min	10 min
Sample types	Most samples, particularly those more difficult to lyse	Bacteria, liquid, blood, cells, yeast, plants, tissue	Cells, blood, plants	Cultured cells
Starting material	100 mg of tissue or 10^7 cells	10^8 cells, 200 mg of tissue, 250 mg of plant tissue, 0.2 mL of blood, 5 x 10^8 yeast cells, 10^9 bacterial cells	100 mg of tissue or 5 x 10^6 cells	1–100,000 cells
Yield	1 x 10^6 epithelial cells: 8–15 µg, tobacco leaf: 73 µg	Up to 350 µg	Variable depending on sample	N/A
High-throughput compatible	No	Yes	Yes	Yes
Technology	Organic extraction	Silica membrane spin column/filter plate	Magnetic beads	Crude lysate

Learn more at **thermofisher.com/rnapreps**

Reverse transcriptases (RTs)

With over 50,000 citations, reviews, and publications, Invitrogen™ SuperScript™ RTs are proven to be an outstanding choice for many research applications. Our latest innovation, SuperScript™ IV RTs were developed for improved thermostability, processivity, and cDNA yields to enable superb performance with even the most challenging RNA samples. If you seek exceptional cDNA synthesis performance, trust SuperScript RTs.

Find out more at **thermofisher.com/superscript**

RNA quality and quantity

Invitrogen™ Qubit™ fluorometric quantitation comprises the easy-to-use Qubit™ 4 Fluorometer and sensitive, specific Qubit™ quantitation assays to measure RNA quality and quantity, and to quantitate ssDNA, dsDNA, and protein. Based on the detection of target-specific fluorescence, this integrated system is more sensitive than UV absorbance–based quantification, making it ideal for precious samples and demanding applications.

Find options for high-throughput nucleic acid quantitation at **thermofisher.com/platereaders**

Find out more at **thermofisher.com/qubit**

Applied Biosystems real-time PCR instruments

Need a new qPCR instrument?

The Applied Biosystems™ QuantStudio™ 6 and 7 Pro Real-Time PCR Systems provide our latest advancements in touchscreen usability, allowing you to stay connected to your data easily. They're designed for both new and experienced users who need simple and affordable real-time PCR systems without compromising on performance or quality. For other scalable system options that can take your research from targeted discovery through confirmation and screening, go to thermofisher.com/quantstudio

* With internet access and the Thermo Fisher™ Connect Platform.

Excellent support at every step of your workflow

Consistent reliability from manufacturing to follow-up

Quality manufacturing and stringent quality control

TaqMan Assays are manufactured in-house under rigorous quality processes at our ISO 13485–certified manufacturing facilities, and are never outsourced.

Comprehensive worldwide support

Whether you need help finding a TaqMan Assay for your target, deciding which format best suits your needs, placing your order through our online ordering system, or setting up your reactions, our global sales and technical support teams are here to help.

Technical support

If you have questions about how to use TaqMan Assays or how to analyze results, call or email our technical support specialists. These scientists are skilled in experimental planning and design, are experienced troubleshooters, and are familiar with a wide variety of applications that use TaqMan Assays.

Rapid order processing

We continually strive to minimize delivery time on TaqMan Assay products. To that end, we have implemented streamlined order processing systems that interface with our manufacturing facilities to help reduce delivery times.

How to reach us

Find your local support or technical support team at **thermofisher.com/contactus**

We provide the following for easier adherence to these guidelines:

- **TaqMan Assay annotation**—Information requested under the real-time PCR target, oligonucleotide, and protocol sections of the guidelines is provided in your assay shipment and on our website. All biologically relevant information is available, including assay location, transcripts detected, and amplicon size. Protocols with recommended reagents and reaction conditions are also available on our website.
- **Publications**—There are >296,000 peer-reviewed publications that cite TaqMan Assays, so including the TaqMan Assay ID in lieu of sequences is sufficient and widely accepted.
- **Instrument software**—Applied Biosystems™ instrument software reports C_t values for quantification. The C_t can be used to generate standard curves, determine slope, and derive R^2 values. To help adhere to the MIQE guidelines, the term quantification cycle (C_q) may be used directly in place of C_t.
- **Data analysis**—We offer data analysis software, including ExpressionSuite and DataAssist Software, as well as useful and simple-to-use tools for calculating relative gene expression using statistical analysis and visualization.
- **Real-time PCR analysis**—Applied Biosystems™ analysis modules are innovative, cloud-based secondary data analysis solutions that bring together multiple data sets in one convenient place. This online solution makes it easier to view, store, and analyze qPCR and Sanger sequencing data. Applied Biosystems analysis modules take advantage of cloud computing to provide highly versatile analysis tools that are flexible, fast, and easy to use.

ThermoFisher SCIENTIFIC

Educational resources for gene expression

Discover the expertise available at your fingertips for real-time PCR gene expression research by visiting our online learning center:

- Differences between TaqMan and SYBR Green chemistry
- Real-time PCR education—explore different types of learning resources on various subjects, including articles; application notes; white papers; videos; and webinars for qPCR, gene expression, miRNA, and genotyping
- Genetic analysis webinars—solutions applied to research areas such as inherited and infectious disease or oncology
- Educational videos—browse through videos on various qPCR questions and best practices

Learn more at **thermofisher.com/learngex**

Learn more at
thermofisher.com/taqmangeneexpressionassay

applied biosystems