**TaqMan® SNP Genotyping Assays**

Applied Biosystems® TaqMan® SNP Genotyping Assays provide a highly flexible technology for detection of polymorphisms within any genome. TaqMan® Assays have the simplest workflow available and are the quickest way to generate genotyping data. Based on powerful TaqMan® probe and primer chemistry and designs, and coupled to dependable Applied Biosystems® instruments and software, these made-to-order assays produce high-confidence results. TaqMan® Assays are ideal for genotyping applications including screening, association, candidate region, candidate gene, and fine-mapping studies.

Content-rich marker selection tools simplify study design and help you select from a library of human and mouse assays. This library includes over 4.5 million genome-wide human assays (of which 3.5 million are HapMap SNP-based assays, 160,000 are validated assays, and over 70,000 are coding region assays) and 10,000 mouse assays. We also offer over 2700 inventoried drug metabolism genotyping assays. Additionally, with Custom TaqMan® SNP Genotyping Assays you can confidentially submit target SNP sequences for any genome to create your own assays. Let TaqMan® SNP Genotyping Assays accelerate the pace of your discovery by eliminating time-consuming experimental design and optimization.

**Powerful, proven chemistry**

Whether your genotyping studies require targeted detection of essential SNPs, or the flexibility to choose SNPs for mapping, TaqMan® SNP Genotyping Assays are the technology of choice. Proven TaqMan® probes, which incorporate minor groove binder (MGB) technology at the 3’ end, deliver superior allelic discrimination. The MGB molecule binds to the minor groove of the DNA helix, improving hybridization-based assays by stabilizing the MGB probe–template complex. This increased binding stability permits the use of probes as short as 13 bases for improved mismatch discrimination and greater flexibility when designing assays for difficult or variable sequences. In addition to SNP detection, TaqMan® probes can be designed to detect multiple nucleotide polymorphisms (MNPs) and insertion/deletions (InDels).

Detection is achieved with proven 5’ nuclease chemistry by means of exonuclease cleavage of an allele-specific 5’ dye label, which generates the permanent assay signal [Figure 1]. All MGB probes include a nonfluorescent quencher (NFQ) that virtually eliminates the background fluorescence associated with traditional quenchers and provides a greater signal-to-noise ratio for superior assay sensitivity.


**TaqMan® SNP Genotyping Assays collection**

TaqMan® SNP Genotyping Assays are the world’s largest collection of single-tube, ready-to-use SNP assays available. The TaqMan® SNP Genotyping Assays library consists of two collections of human assays and one of mouse assays, and can be supplemented with assays designed using our Custom TaqMan® SNP Genotyping Assays Service.

**Over 4.5 million human SNP genotyping assays**

This assay group contains over 4.5 million genome-wide SNPs, providing unprecedented marker coverage. Included in this collection are 160,000 validated assays that have approximately 10 kb spacing across gene regions. These assays were subjected to an extensive minor allele frequency test in 2–4 ethnic populations (45 individual samples per ethnic group) and, as a result, offer the highest success rate. Also included are over 70,000 assays for the detection of nonsynonymous SNPs in coding regions, including many putative functional SNPs. Visit snp.appliedbiosystems.com for more information.

**Over 10,000 mouse SNP genotyping assays**

The Mouse TaqMan® Predesigned SNP Genotyping Assays collection consists of over 10,000 assays, and can be supplemented with assays designed using our Custom TaqMan® SNP Genotyping Assays Service.

**TaqMan® Drug Metabolism Genotyping Assays**

The collection of TaqMan® Drug Metabolism Genotyping Assays includes over 2700 assays that target high-value polymorphisms in more than 221 drug metabolism genes. These assays have proven performance in four different ethnic population samples, consisting of 45 individuals each. To enable easy identification, these assays have been mapped to the common public allele nomenclature websites where possible. Visit dme.appliedbiosystems.com for more information.

All TaqMan® SNP Genotyping Assays are generated using next-generation algorithms from the Applied Biosystems® bioinformatics pipeline. Bioinformatics evaluation of target SNP sequences includes the masking of adjacent SNPs and ambiguous bases so that assay design and subsequent performance is not affected by poor quality of the underlying sequence. Lastly, the assay designs are aligned to the human genome using BLAST to ensure that each assay binds uniquely to the intended polymorphism. As the Custom TaqMan® SNP Genotyping Assay Service is confidential and secure, you simply perform your own bioinformatics analysis prior to submitting your sequence for assay design.

**Free marker selection tools**

**SNPbrowser™ Software for human SNPs**

SNPbrowser™ Software provides a physical map view of the human genome. Two different genotype data sources are incorporated into the software to generate unique linkage disequilibrium (LD) maps and haplotype block information. These two sources are the public HapMap Project and the >20 million genotypes generated during the development of the 160,000 Applied Biosystems® TaqMan® Validated SNP Genotyping Assays.

The genotyping data also facilitate the use of tagging SNP methods, which allow more affordable study design by reducing the number of SNPs while conserving study statistical power (Figure 2).

SNPbrowser™ Software allows you to optimize study design based on LD patterns, minor allele frequency requirements, total...
number of cases and controls, and statistical power. Finally, the software includes a SNP density tool that prioritizes the selection of validated SNPs while supplementing with additional SNPs to fulfill the marker density requirements for your study.

When you have identified your SNPs of interest, order TaqMan® SNP Genotyping Assays by directly uploading Assay IDs from the software to the Applied Biosystems website at snp.appliedbiosystems.com.

**Mouse SNPbrowser™ Software**

Mouse SNPbrowser™ Software enables efficient and easy selection of appropriate Mouse TaqMan® SNP Genotyping Assays to discriminate between strains of interest, especially for genotype/phenotype mapping and strain verification. It visualizes informative SNPs that distinguish two selected mouse strains at a user-definable resolution. The collection consists of ~10,000 mouse SNPs from 44 of the most common strains.

Mouse SNPbrowser™ Software supports genetic monitoring, genetic mapping, and speed congenics applications by offering a variety of tools to search, view, and export SNP information, as well as purchase assays. The software displays the mouse chromosome map so you can view SNP location and obtain National Center for Biotechnology Information (NCBI) data for SNPs of interest. The software allows SNP selection for two applications: genetic monitoring and genetic mapping.

For genetic monitoring, the software selects optimal SNPs to distinguish between any number of strains. SNPs can be selected for each chromosome or across the genome. For genetic mapping, the software segments each chromosome into evenly-sized blocks based on a user-specified mapping resolution, and searches for distinguishing SNPs in each block to generate evenly spaced SNP coverage throughout the genome. Mouse SNPbrowser™ Software also features a SNP Wizard to assist in defining search criteria. A help text file is provided within the tool to familiarize you with the extensive functionality offered. You can download Mouse SNPbrowser™ Software for free at www.allsnps.com/mousesnpbrowser.

**Custom assay service for any possible SNP**

Custom TaqMan® SNP Genotyping Assays can be developed for any SNP in any organism. This service can generate assays for the detection of SNPs, MNP, or InDels of up to six bases.

Custom TaqMan® SNP Genotyping Assays provide you with a complete service that includes secure and confidential ordering, assay design and manufacturing, and quality-control testing for synthesis accuracy and formulation completeness. Additionally, custom human assays are subjected to a functional test on 20 unique DNA samples.

Use the free Custom TaqMan® Assay Design Tool to input and submit your sequence for assay design. This easy-to-use online resource lets you quickly submit your sequence information and start the ordering process securely and confidentially. Access the Custom TaqMan® Assay Design Tool at www.appliedbiosystems.com/cadt.

**Quality design and manufacturing**

Probes and primers used in TaqMan® SNP Genotyping Assays are designed using our rigorous bioinformatics pipeline. This proprietary group of algorithms has generated millions of TaqMan® Assay designs by utilizing heuristic design rules deduced from both manufacturing and assay performance data. All assays are designed to perform under universal reaction conditions, as calculated probe and primer melting temperatures are consistent and include contributions from associated probe conjugates (i.e., dyes and MGB).

After manufacturing, assay components undergo extensive laboratory testing at our state-of-the-art manufacturing facility. Quality-control testing includes mass spectrometry for sequence verification and formulation assessments of probe and primer concentrations. Additionally, all human SNP genotyping assays are functionally tested to ensure allelic discrimination.

**Simple workflow for quick results**

TaqMan® SNP Genotyping Assays constitute the simplest SNP genotyping technology available. We deliver your ready-to-use SNP genotyping assay at ambient temperature in a convenient, single-tube format. The rest is easy. Just combine the assay with TaqMan® Genotyping Master Mix or TaqMan® Universal PCR Master Mix and your purified DNA sample (Figure 3). There is no need to optimize probe, primer, or salt concentrations or temperature because all assays use universal reagent concentrations and thermal cycling conditions.

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**Figure 3. A simple workflow and reliable instruments combine to generate fast, high-confidence results.**
After thermal cycling, no transfers, washes, or additional reagents are required, and the plate remains sealed; just read the plate and analyze the genotypes (Figure 4). This reduces the chance of contamination, sample mix-up, and sample loss. The simplicity of the chemistry allows you to easily automate the reaction for massively parallel genotyping studies, readily increasing the number of assays, number of samples, or both. Additionally, the analysis software allows you to auto-call genotypes, minimizing manual intervention.

**Reliable real-time PCR platforms**

A suite of superior Applied Biosystems® instrument platforms is available for processing and analyzing TaqMan® SNP Genotyping Assays [Table 1]. These instruments, which meet all throughout needs and budgets, include the GeneAmp® PCR System 9700 and Veriti® Thermal Cyclers for endpoint PCR, Applied Biosystems® 7500, 7500 Fast, 7900HT Fast, ViiA™ 7, StepOne®, and StepOnePlus® Real-Time PCR Systems, and the high-throughput OpenArray® Real-Time PCR System. Following PCR amplification, an endpoint read can be performed on any Applied Biosystems® Real-Time PCR System. All of these dependable instruments offer the advanced multicolor detection capabilities required for highly accurate and reproducible allelic discrimination assays.

**Data analysis software**

The sophisticated SDS software package provided with all Applied Biosystems® Real-Time PCR Systems facilitates experimental setup, data collection, and assay performance analysis. The SDS software uses an advanced multicomponent algorithm to calculate the distinct signal contribution of each allele of a marker from the fluorescence measurements of each sample well during the assay plate read. The multicomponent data collected from the plate read are stored as SDS files, ready for genotype determination by the SDS software or optional Applied Biosystems® TaqMan® Genotyper Software.

TaqMan® Genotyper Software is a great resource for fast and accurate genotype calling. It is a free SNP genotyping data analysis tool for use with TaqMan® SNP Genotyping Assays performed in 48-, 96-, or 384-well microtiter plates or on OpenArray® Plates. It has a state-of-the-art genotype-calling...
algorithm, an intuitive user interface, and enhanced study-based analysis features. The software enables multi-plate data analysis for high-throughput workflows and improved accuracy in genotype calling; versatile export features and comprehensive quality-control features facilitate streamlining of the entire workflow. TaqMan® Genotyper Software can be downloaded at www.appliedbiosystems.com/taqmangenotyper.

For large-scale studies, samples can be cycled on multiple Dual 384-Well GeneAmp® 9700 or Veriti® Thermal Cyclers, or Dual Block GeneAmp® PCR 9700 Systems, and analyzed on a Viia™ 7 System or an OpenArray® Real-Time PCR System, depending on throughput needs. The Viia™ 7 System (Figure 5) facilitates high-throughput applications by allowing large sample batches (up to eighty-four 384-well plates) to be processed without manual intervention, using the optional Automation Accessory. The OpenArray® Real-Time PCR System (Figure 6) enables PCR-based SNP genotyping analysis of hundreds to thousands of samples a day across a moderate number of SNPs. Following data collection, you can accelerate and simplify high-volume data transfer and analysis with Applied Biosystems® TaqMan® Genotyper Software, which works with most Applied Biosystems® Real-Time PCR Systems.

Ordering information
Selecting and ordering TaqMan® SNP Genotyping Assays is as simple as “point and click.” Use SNPbrowser™ Software to select the most informative SNPs for your genotyping studies. As you identify SNPs of interest, simply upload your selected TaqMan® SNP Genotyping Assays to the Applied Biosystems website for ordering.

The Applied Biosystems website (Figure 7) enables you to search, select, and order from our catalog of over 4.5 million TaqMan® SNP Genotyping Assays. You can search for SNPs using any of several criteria: National Center for Biotechnology Information (NCBI) gene ID, NCBI SNP reference ID (rs#), or gene symbol. You can further refine your search by using SNP type (i.e., intragenic, 5’ or 3’ UTR, chromosome, etc.).

Figure 5. High-throughput applications with the Viia™ 7 System.

Figure 6. The Applied Biosystems® OpenArray® Real-Time PCR System.

Figure 7. The Applied Biosystems website makes ordering easy. For convenient online ordering and multiple search options for all our genotyping assays, including keyword, batch, and location searches, visit snp.appliedbiosystems.com.

Our Custom TaqMan® SNP Genotyping Assays Service is provided to supply you with SNPs that are not available from our catalog, including those from any nonhuman organism. This service designs assays for all possible SNP, MNP, and InDel targets. Our complementary Custom TaqMan® Assay Design Tool conveniently formats your target sequence for submission to our manufacturing facilities. To order custom assays, simply upload your submission file at www.appliedbiosystems.com/cadt.
## Ordering information

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<th>Assay Type</th>
<th>Human assays (P/N)</th>
<th>Nonhuman assays (P/N)</th>
<th>Number of SNPs</th>
<th>No. of 5 ( \mu )L reactions (384-well plate)</th>
<th>No. of 25 ( \mu )L reactions (96-well plate)</th>
<th>Assay mix formulation</th>
<th>Assay type</th>
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<tr>
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All assays are quality-control tested using a mass spectrometer to verify sequence and yield. All assays have a VIC® dye–labeled probe, a FAM™ dye–labeled probe, and two target-specific primers. All assays, except Custom TaqMan® Assays, undergo bioinformatics evaluation of target SNP sequences. Functional testing against 20 unique genomic DNA samples is performed on all human TaqMan® SNP Genotyping Assays. Validation testing against three populations (~45 samples/population) was performed on all validated and drug metabolism TaqMan® Assays.

* Over 10,000 mouse assays available.

For more information and full terms of the TaqMan® Assays QPCR Guarantee, visit [www.appliedbiosystems.com/taqmanguarantee](http://www.appliedbiosystems.com/taqmanguarantee).