Product overview

QuantStudio 3D rare mutation analysis solution

Sensitive and precise quantification of rare somatic cancer mutations using digital PCR

Overview

- Optimized digital PCR performance—over 100 wet lab–validated Applied Biosystems™ TaqMan™ Assays targeting key somatic mutations for the Applied Biosystems™ QuantStudio™ 3D Digital PCR System
- High sensitivity—detect and quantify rare mutant prevalence as low as 0.1%
- Cost-effective and convenient—single-tube format includes both wild type and mutant alleles, with small and large reaction options
- Streamlined analysis—advanced algorithms for better quantification of rare mutations
- Guaranteed performance—assay replaced or account credited if you are not satisfied
- Custom design support—guidance available for optimization of Applied Biosystems™ Custom TaqMan™ SNP Genotyping Assays for the QuantStudio 3D Digital PCR System that are not part of this wet lab–validated collection

Rare mutation detection has extensive implications for cancer research. The accumulation of mutations in oncogenes

Figure 1. The QuantStudio 3D Digital PCR Chip provides 20,000 partitions to enrich for rare sequences of interest and dilute the wild type background.

or tumor suppressor genes is an important aspect of tumorigenesis. Acquisition of these mutations in a tiny subset of somatic cells can be sufficient for cancer initiation or progression. Since these mutations are usually only present in a very small number of cells, they require an assay that delivers high signal-to-noise ratios and low false-positive rates.

Common SNP genotyping technologies, such as capillary electrophoresis or real-time PCR, are most effective at detecting mutant cells with prevalence no lower than about 20% (or approximately 1 in 5 cells). However, digital PCR has the capability to distinguish the mutation relative to the wild type background with higher sensitivity and precision. Based

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on dividing the sample into thousands of individual PCR replicates on a chip (Figure 1), the total number of molecules in any given reaction is greatly reduced in digital PCR, effectively enriching for the sequences of interest and diluting out the wild type background.

By combining the power of Applied Biosystems™ TaqMan™ fluorogenic 5´ nuclease chemistry with digital PCR methodology using the QuantStudio 3D Digital PCR System, researchers are now able to quantify low-frequency mutations. Custom TaqMan SNP Genotyping Assays used in digital PCR usually provide great performance, although in some instances these assays might benefit from additional optimization to seamlessly work with our QuantStudio 3D Digital PCR System and achieve the high levels of performance required to quantify mutations present at a very low frequency.

The QuantStudio 3D rare mutation analysis solution includes a collection of wet lab–validated Custom TaqMan SNP Genotyping Assays to quantify the most common cancer-related mutations. These assays were designed using the full bioinformatics power of the TaqMan Assay design pipeline and were wet lab–validated specifically for our QuantStudio 3D Digital PCR System. Researchers are now able to quantify rare mutants at a prevalence as low as 0.1% (Figure 2).

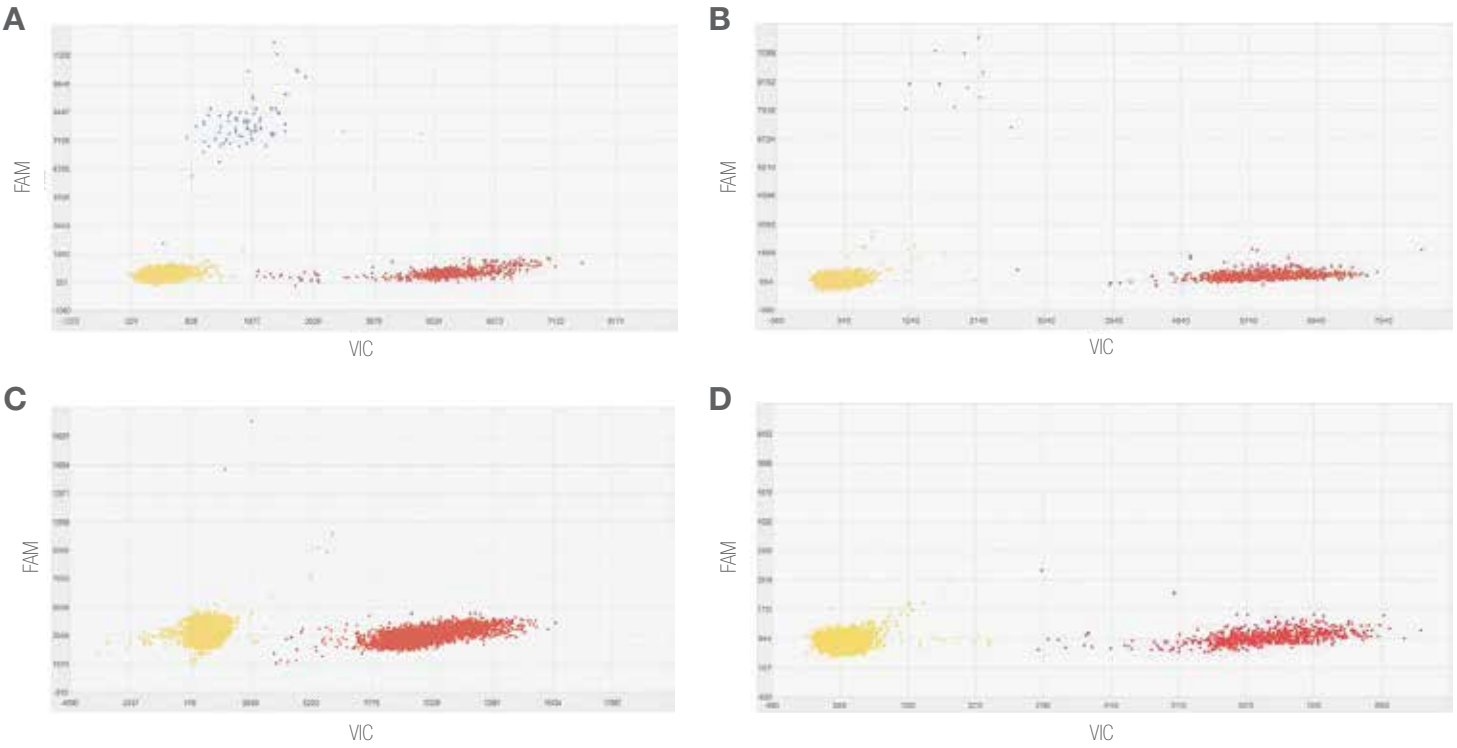

Figure 2. Example of *KRAS* rare allele quantification by digital PCR. The *KRAS* G12V mutation was detected with a Custom TaqMan SNP Genotyping Assay optimized for digital PCR on the QuantStudio 3D Digital PCR System. Each sample represents a fraction of mutant plasmid to wild type genomic DNA. The 0.1% target represents mutant genomic DNA from a mutant cell line in a wild type genomic DNA background. All samples were analyzed using Applied Biosystems™ QuantStudio™ 3D AnalysisSuite™ Cloud Software with the relative quantification module. **(A)** Targeted mutation rate of 10%. The mutation detection rate was 10.384% with a confidence interval of 8.235–13.076%. **(B)** Targeted mutation rate of 1%. The mutation detection rate was 1.393% with a confidence interval of 0.772–2.507%. **(C)** Targeted mutation rate of 0.1%. The mutation detection rate was 0.142% with a confidence interval of 0.064–0.310%. **(D)** Wild type control sample.

About the assays

Our collection of over 100 wet lab–validated Custom TaqMan SNP Genotyping Assays cover key somatic mutations identified in *EGFR*, *KRAS*, *BRAF*, *NRAS*, *PIK3CA*, *TP53*, *JAK2*, and other genes. The target selection was based on frequency of occurrence as well as targets that also exist on the Ion AmpliSeq™ Cancer Hotspot Panel. We plan to routinely add more mutation assays to cover additional cancer gene mutations. Access the most up-to-date list of available assays at **thermofisher.com/dpcr-raremutation**. The wet lab–validated SNP genotyping assays are single-tube assays that contain primers and a probe for both the wild type and mutant alleles, and are available in 12- and 450-reaction sizes (see "Ordering information").

Data analysis software

QuantStudio 3D AnalysisSuite Software allows users to quantify the percentage of mutation in their samples from the data collected on the QuantStudio 3D Digital PCR System. Advanced algorithms allow for optimal quantification of rare mutations and are available on AnalysisSuite Software.

Guaranteed performance

The wet lab–validated Custom TaqMan SNP Genotyping Assays for rare mutation analysis are covered by the TaqMan Assays QPCR Guarantee. If the assay doesn't live up to the guarantee, we'll replace the assay or credit your account.*

Additional guidance

There are many other key somatic mutations that are important in cancer research for which we may not yet have a wet lab–validated assay available for the QuantStudio 3D Digital PCR System. In these cases, we realize it is in researchers' hands to optimize assay performance. A guide is available to provide a starting point for assay optimization. If that guide does not answer all of your questions, QuantStudio 3D Digital PCR System users may post questions through our private QuantStudio PCR user community. Questions will be routed to our experts, and they will work to provide information on optimization of the assay. The private user community is available to all owners of the QuantStudio 3D Digital PCR System. Access and sign up (using the instrument serial number) for the community at **abcommunity.thermofisher.com/groups/quantstudio-3d-user-group**

How to order

- Download and review the list of wet lab–validated Custom TaqMan SNP Genotyping Assays for rare mutation analysis at **thermofisher.com/dpcr-raremutation**
- Place an order for the 12-reaction size directly with a sales representative
- Place an order for the 450-reaction size directly through our website

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Ordering information

Product	Quantity	Cat. No.
Wet lab–validated Custom TaqMan SNP Genotyping Assays, for rare mutation analysis	12 reactions (20X) 450 reactions (40X)	4383547 4332077
QuantStudio 3D Digital PCR 20K Chip Kit v2	12 chips	A26316
QuantStudio 3D Digital PCR Master Mix v2	1.5 mL	A26358

Find out more at **thermofisher.com/dpcr-raremutation**

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*Terms and conditions apply. For more information on the TaqMan Assays QPCR Guarantee, go to **thermofisher.com/taqmanguarantee**