

DNA Quality Metrics for the Agilent Automated Electrophoresis Systems

Quality control of genomic DNA

Quality control (QC) metrics are numerical values providing objective assessment of nucleic acid sample integrity, including accurate qualification, sizing, and quantification. In contrast to methods based on visual interpretation, such as gel electrophoresis, the use of quality metrics determines integrity independent of sample concentration and analyst.

Complex genomic DNA (gDNA) sample QC enables streamlined workflows and ensures high-quality results, allowing researchers to make informed decisions for success in downstream applications. [The Agilent automated electrophoresis portfolio](#) includes a broad range of instruments and reagents for robust and reliable gDNA sample analysis, optimized for various throughputs, from one to 96 samples, and reduced turnaround times.

This datasheet describes the quality metrics available with the Agilent automated electrophoresis systems for gDNA sample integrity assessment.

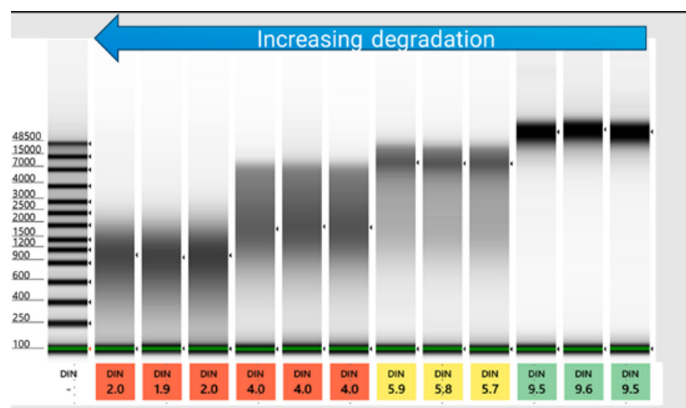
DNA Integrity Number (DIN)

Agilent developed the DIN quality metric for easy analysis of gDNA samples with the Agilent 4150 and 4200 TapeStation systems, the Agilent genomic DNA ScreenTape device (p/n 5067-5365), and Agilent genomic DNA reagents (p/n 5067-5366).

The DIN score determines the degradation of gDNA samples by evaluating signal distribution across the sample size range. It is automatically calculated by the TapeStation analysis software to provide a numeric value from one to 10. Highly intact gDNA samples migrate in a well-defined peak in the electropherogram, with size greater than 60,000 bp, and are assigned a high DIN score. Highly degraded samples show the main peak shifted towards smaller size, that is, below 2,000 bp, and are assigned a low DIN score.

DIN evaluation is available for samples with a concentration between five and 300 ng/μL, exceeding the quantitative range of the genomic DNA ScreenTape device.

The DIN quality metric can be used to assess integrity of various sample types, from intact gDNA to fresh or frozen tissue and formalin-fixed, paraffin-embedded (FFPE) samples. See Figure 1.



Genomic Quality Number (GQN)

GQN is an empirical quality metric designed to assess the integrity of gDNA. It is available in the ProSize data analysis software for the Agilent Femto Pulse and Fragment Analyzer systems.

The GQN determines the percentage of gDNA sample with a size above a user-defined threshold, on a scale of zero to 10. The GQN score allows users to assess sample integrity, enabling a flexible empirical scoring strategy based on the application.

A GQN score of zero indicates that none of the sample exceeds the user-defined threshold and a score of 10 indicates that 100% of the sample is above the user-defined threshold value. The ability to set the size threshold for GQN allows for easy quality analysis of different sized gDNA samples.

The GQN is used specifically for gDNA samples separated on the Fragment Analyzer systems with the Agilent Genomic DNA 50 kb kit (p/n DNF-467) and Agilent HS Genomic DNA 50 kb kit (p/n DNF-468), and on the Femto Pulse system with the Agilent Genomic DNA 165 kb kit (p/n FP-1002).

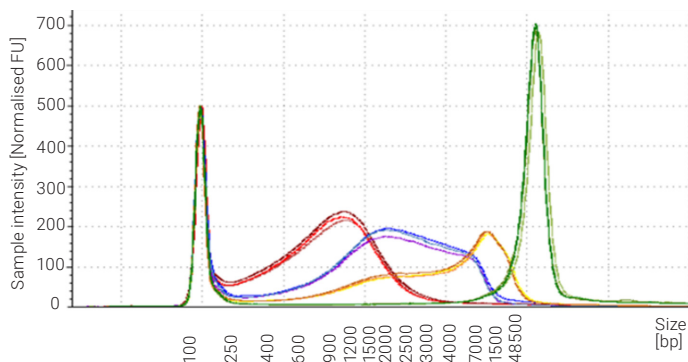


Figure 1. gDNA samples at four degradation stages were analyzed on a TapeStation system with the genomic DNA ScreenTape assay to determine DNA integrity and sample concentration. The image above shows (A) the gel image with corresponding DIN displayed below each lane, and (B) the corresponding electropherogram overlay of all the gDNA samples.

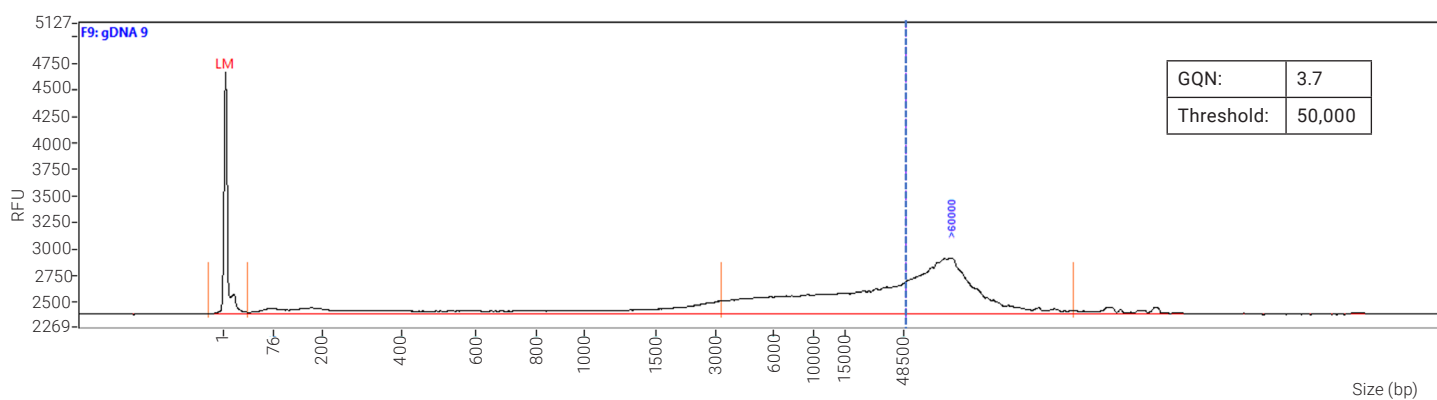
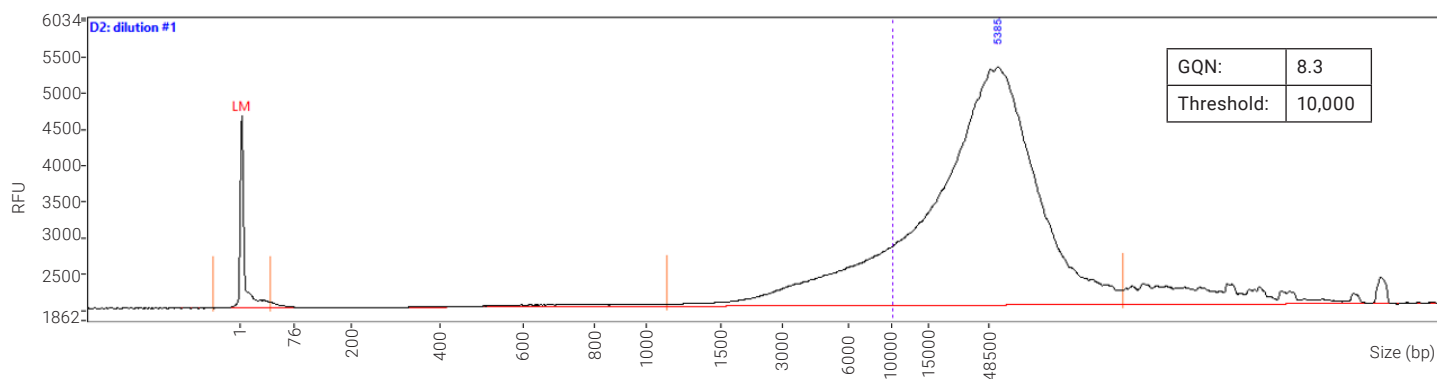


Figure 2. gDNA sample separations on the 5200 Fragment Analyzer system and analyzed in ProSize data analysis software. (A) 10,000 bp threshold and GQN = 8.3, indicating that 83% of the sample is larger than the threshold. (B) 50,000 bp threshold and GQN = 3.7, indicating that only 37% of the sample is larger than the

Conclusion

This datasheet illustrates the Agilent gDNA quality metrics available with the automated electrophoresis portfolio as follows:

- DIN can be used to assess the integrity of gDNA from a variety of samples, including FFPE tissue, from very degraded (DIN =1) to highly intact (DIN =10). DIN is automatically assigned, enabling a user-independent quality assessment and simplifying interlab sample quality comparison.
- GQN calculates the ratio of gDNA sample above the user-defined size threshold, on a scale of zero to 10. The user-defined size threshold allows for flexible quality analysis of gDNA suitable for samples with larger size variations.
- Both quality metrics can be used as a reliable QC tool for objectively determining gDNA sample integrity, ensuring consistency of downstream applications.

References

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Automated electrophoresis systems from Agilent provide a range of quality metrics. [Learn more in these videos.](#)

www.agilent.com/genomics/automated-electrophoresis

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