

Comparison of Equivalent Data

For the Agilent 2100 Bioanalyzer, TapeStation
and Fragment Analyzer Systems

Introduction

- Agilent offers a portfolio of automated electrophoresis solutions enabling genomic laboratories to easily and successfully analyze nucleic acids for a variety of applications, including the Bioanalyzer, TapeStation, and Fragment Analyzer systems
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- Both the TapeStation and Fragment Analyzer systems deliver additional, advanced quality metrics for the analysis of specialized sample types such as genomic DNA, cell-free DNA, PCR products, and IVT RNA
-
- Researchers familiar with the Agilent 2100 Bioanalyzer system are looking for a technological upgrade to their current biomolecule sample quality control solution
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- In this presentation, we share examples of performance equivalence among the different systems and explore the advantages of each solution

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Agilent TapeStation and Fragment Analyzer Systems

Equivalent performance and assay portfolio as the Bioanalyzer system

Agilent TapeStation Systems



Key benefits

- Fast analysis time
- Constant cost per sample
- Ready-to-use ScreenTape devices
- Application flexibility

The Agilent 4150 and 4200 TapeStation systems with ready-to-use ScreenTape consumables combine automated walk-away sample processing with operational simplicity.

The instruments offer consistent cost per sample and application flexibility, enabling analysis of NGS libraries, cell-free DNA, genomic DNA, and total RNA.

Agilent Fragment Analyzer Systems



Key benefits

- Broad range of DNA and RNA kits
- Seamless switching between applications
- Minimal instrument preparation
- Unattended operation

Agilent Fragment Analyzer systems offer nucleic acid quality control for a range of applications, including NGS libraries, cell-free DNA (cfDNA), and RNA QC.

Simple sample preparation, automated operation, and intuitive analysis software contribute to efficient and accurate measurement.

Introduction

Instrument options for your assay requirements and throughput needs

Instrument Options for DNA Applications



2100 Bioanalyzer System



TapeStation Systems



Fragment Analyzer Systems

DNA applications

NGS libraries	✓	✓	✓
Cell-free DNA		✓	✓
Genomic DNA/FFPE DNA		✓	✓
Large fragment DNA			✓
Plasmid DNA			✓
PCR fragments	✓	✓	✓
Restriction digest	✓	✓	✓
Microsatellites	✓		✓

Instrument Options for RNA Applications



2100 Bioanalyzer System



TapeStation Systems



Fragment Analyzer Systems

RNA applications

FFPE RNA	✓	✓	✓
IVT RNA		✓	✓
Total prokaryotic and eukaryotic RNA	✓	✓	✓
Small RNA	✓		✓
MicroRNA	✓		✓
mRNA	✓		✓
Plant RNA	✓		✓

Instrument Options by Throughput

Ultra-low throughput	Low throughput	Medium throughput	High throughput	Ultra-high throughput
 4150 TapeStation System				
	 2100 Bioanalyzer System			
	 5200 Fragment Analyzer System			
	 4200 TapeStation System			
			 5300 Fragment Analyzer System	
			 5400 Fragment Analyzer System	

Objective Sample Quality Metrics

For TapeStation and Fragment Analyzer systems



2100 Bioanalyzer System



TapeStation System



Fragment Analyzer System

RNA

RIN

RIN^e

RQN

FFPE RNA

DV₂₀₀

gDNA/FFPE DNA

DIN

GQN

cfDNA

%cfDNA

Quality metrics deliver objective quality assessment to ensure sample integrity

RQN and RIN^e are equivalent quality metrics to RIN

TapeStation and Fragment Analyzer systems provide additional quality metrics

TapeStation Systems Overview



Agilent TapeStation Systems



Agilent 4150 TapeStation System

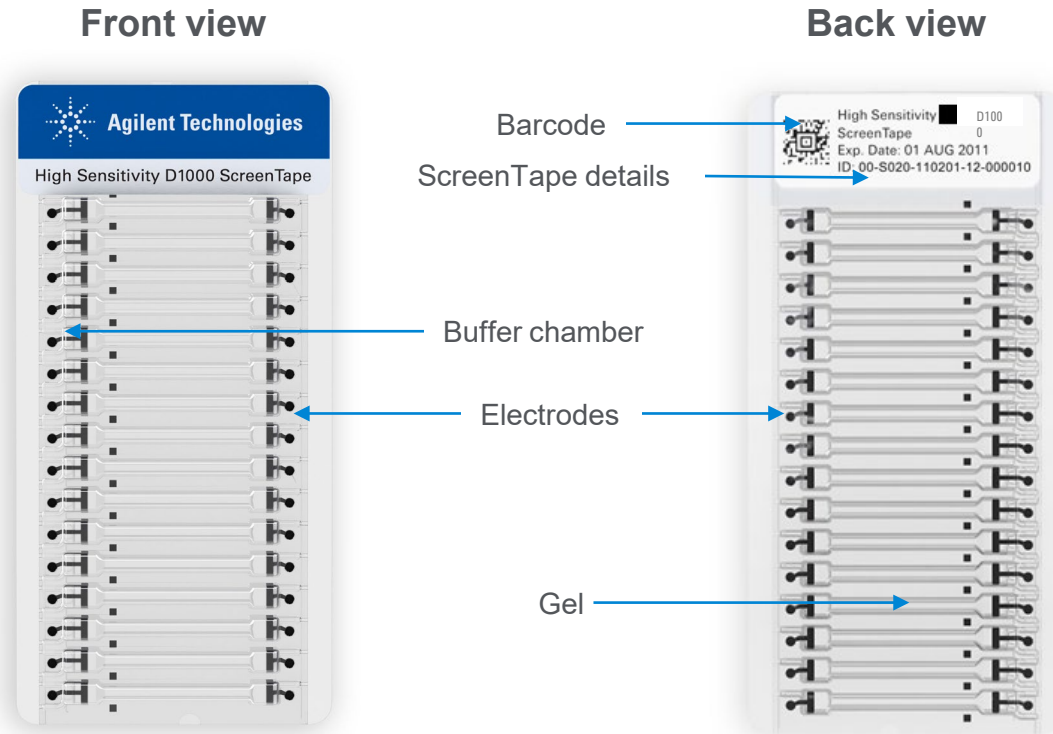
1–16 Samples (tube strips)



Agilent 4200 TapeStation System

1–96 Samples (96 well plate)

TapeStation consumables – ScreenTape device



- Ready-to-use ScreenTape technology
- Includes gel with buffer

Agilent TapeStation Systems



- Flexible throughput instruments
- Ease of use
- Robust ScreenTape technology
- Automatic ScreenTape detection and assay selection

Key Benefits

Ease of use

Key Features

Ready-to-use ScreenTape assays ensure operational simplicity, and the automated ScreenTape assay is recognition by the software

Constant cost/sample

Partially used ScreenTape devices can be re-used

Flexible

Easy to switch between assays

Scalable throughput

Any sample number per run, up to maximum capacity

Fast results

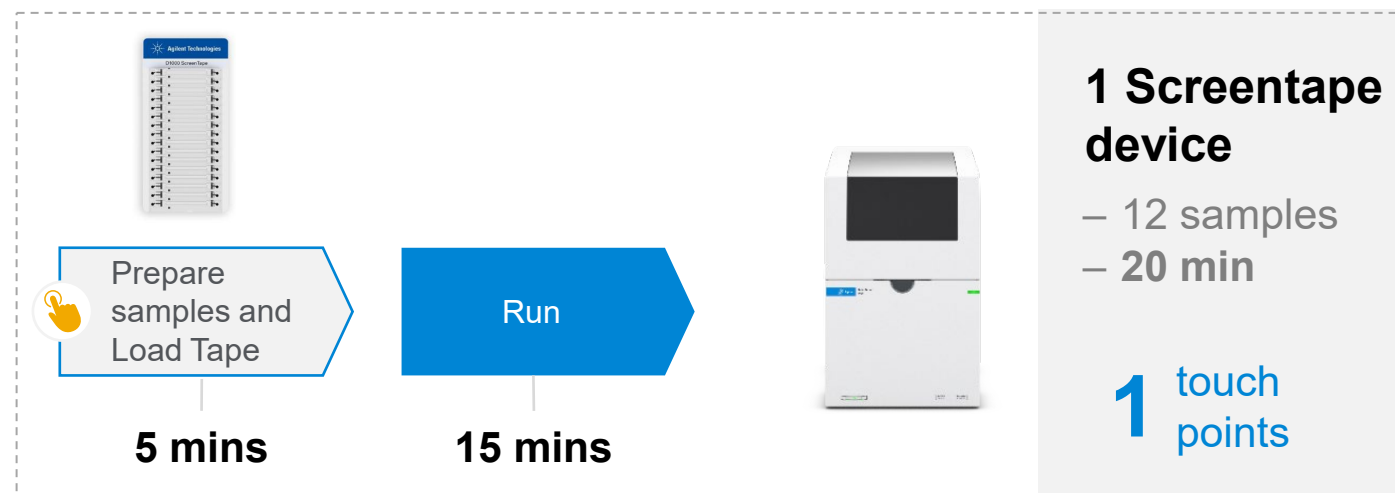
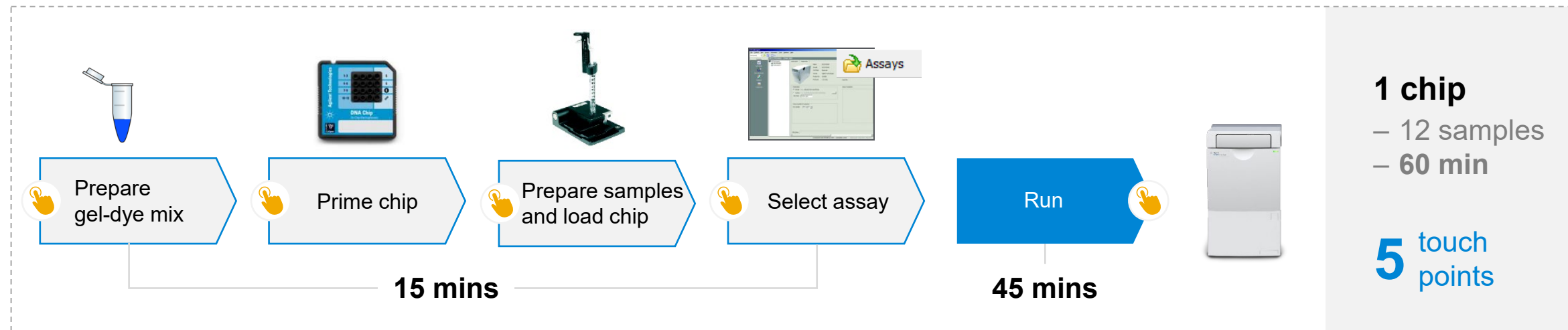
No system set up time, one sample analyzed in about one to two minutes

Application coverage

Additional and equivalent assays

Workflow Comparison

2100 Bioanalyzer and 4150 TapeStation systems



Comparison of Bioanalyzer Kit and ScreenTape Assay Portfolios



DNA Bioanalyzer kit

Agilent High Sensitivity DNA kit

Agilent DNA 1000 kit

Agilent DNA 7500 kit

Agilent DNA 12000 kit

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DNA ScreenTape Assay

Agilent High Sensitivity D1000 ScreenTape assay

Agilent High Sensitivity D5000 ScreenTape assay

Agilent D1000 ScreenTape assay

Agilent D5000 ScreenTape assay

-

Agilent Genomic DNA ScreenTape assay

Agilent Cell-free DNA ScreenTape assay

[Data Sheet](#), [Performance Characteristics](#)

[Data Sheet](#), [Performance Characteristics](#)

[Data Sheet](#), [Performance Characteristics](#)

[Data Sheet](#), [Performance Characteristics](#)

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[Data Sheet](#), [Performance Characteristics](#)

[Data Sheet](#), [Performance Characteristics](#)

[TapeStation Automated Electrophoresis for DNA Quality Control](#)

RNA Bioanalyzer kit

Agilent RNA 6000 Nano kit

Agilent RNA 6000 Pico kit

Agilent Small RNA kit

RNA ScreenTape Assay

Agilent RNA ScreenTape assay

Agilent High Sensitivity RNA ScreenTape assay

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[Data Sheet](#),
[Performance Characteristics](#)

-

[TapeStation Automated Electrophoresis for RNA Quality Control](#)

[Agilent ScreenTape Consumables and Reagents Datasheet](#)



Comparison of the 2100 Expert Software and TapeStation Software

Key Features	2100 Expert Software	TapeStation Software
Single platform for all assays	✓	✓
Data comparison functions	✓	✓
Automatic and manual integration	DNA/Protein assays	✓
Result flagging	✓	✓
Printing and reporting functions	✓	✓
Free data review software	✓	✓
Compliance features available	✓	✓*

*CFR21 part 11 compliance can be enabled by additional standard operating procedures (SOPs).

Data Sheet: Agilent TapeStation Software Security Module ([5994-5427EN](#))

Comparison of the 2100 Expert Software and TapeStation Software

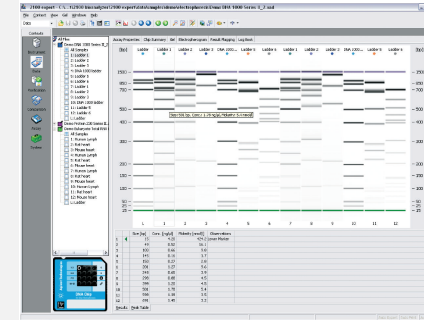
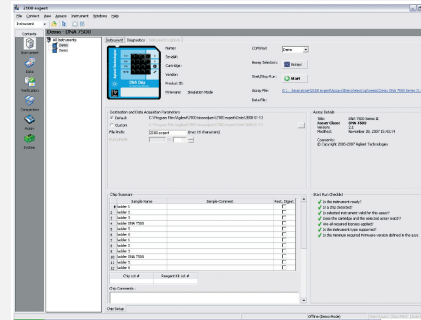
1. Set up a run

2. Analyze data

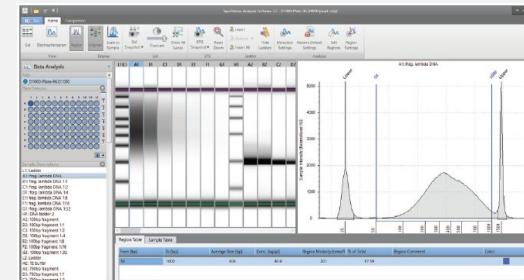
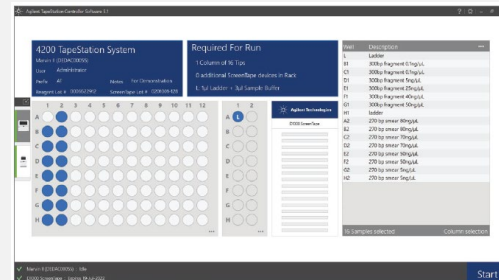
3. Print reports



Bioanalyzer System



TapeStation Systems



Automatic assay recognition

Evidence of Equivalent Performance

Bioanalyzer and TapeStation systems

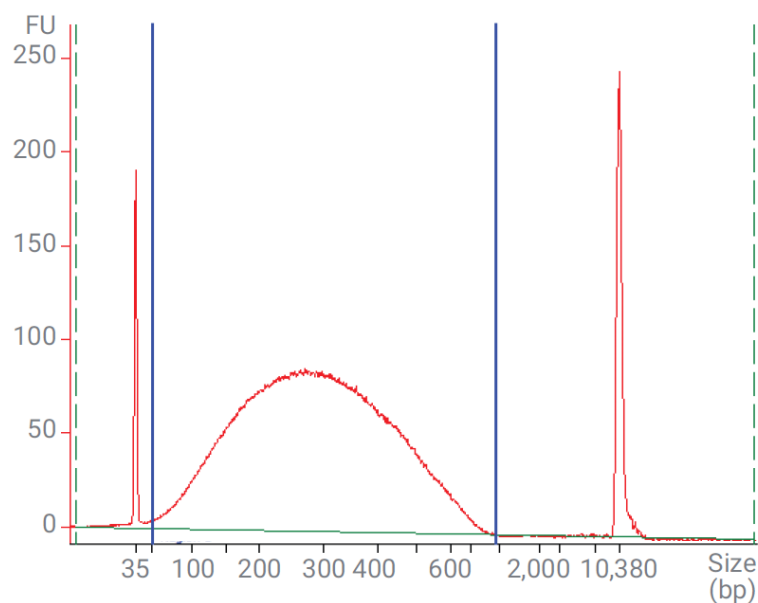


DNA Data Comparison

Sheared DNA



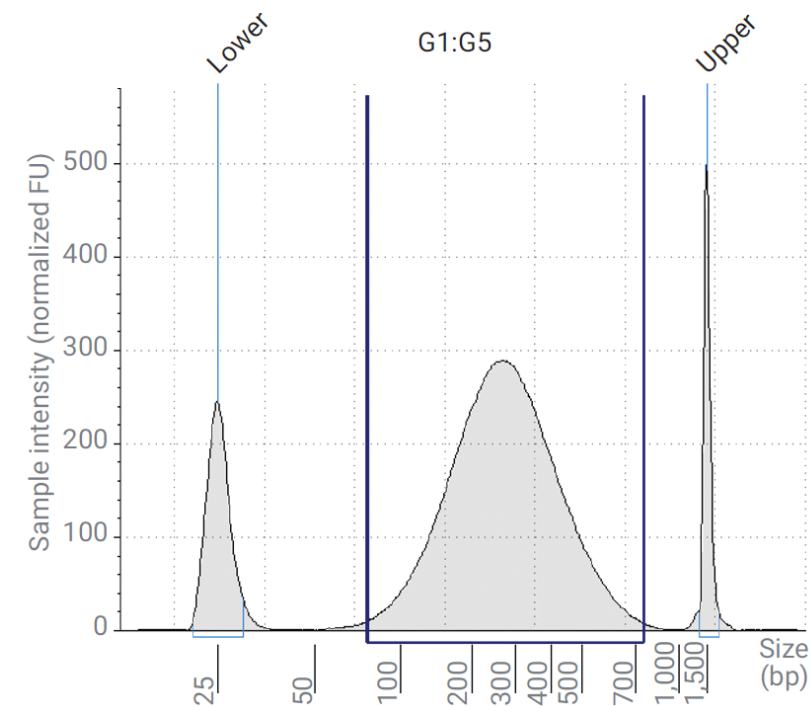
Bioanalyzer
High Sensitivity DNA kit



Comparable quantification and
sizing of DNA smears



TapeStation
High Sensitivity D1000 ScreenTape



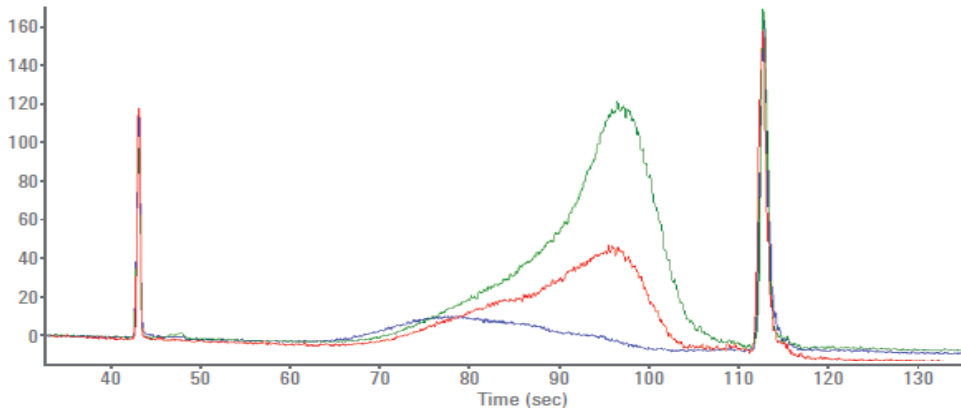
For comparison see Figure 6, [Agilent Publication number 5991-9093EN](#)

DNA Data Comparison

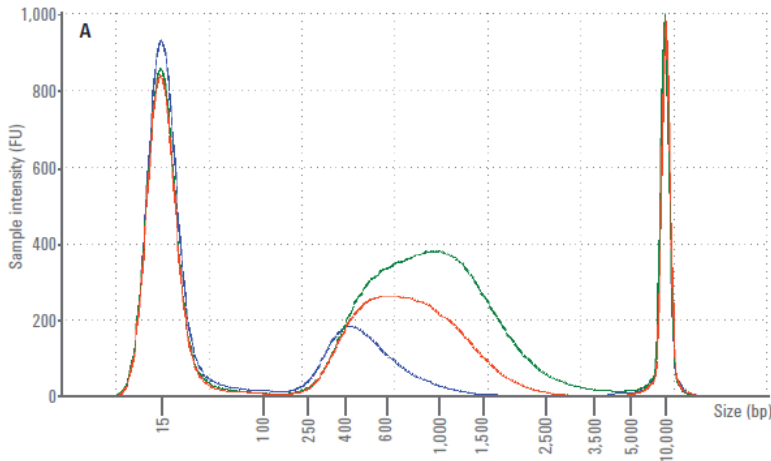
Overlay of NGS libraries generated from different input amounts gDNA



Bioanalyzer
High Sensitivity DNA kit



TapeStation
High Sensitivity D5000 ScreenTape



Average size (bp)	20 ng		50 ng		80 ng		
	mean	%CV	mean	%CV	mean	%CV	
	TapeStation	519	1.2	849	0.6	1065	3.8
	Bioanalyzer	533	2.8	868	1.4	1157	1.1

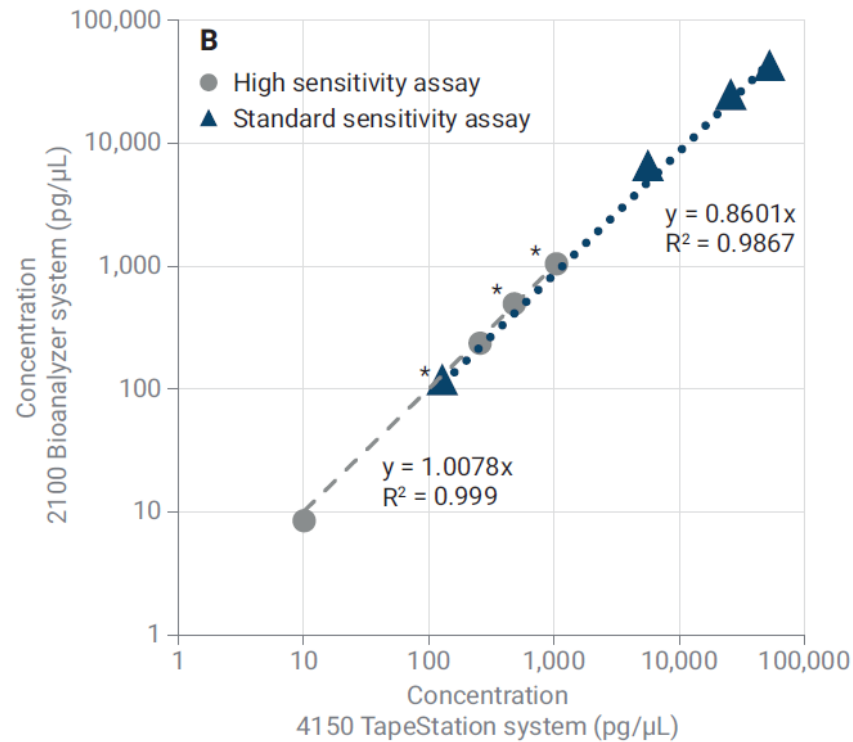
For comparison see Figure 5 and Table 1, [Agilent Publication](#) number 5991-8191EN

DNA Data Comparison

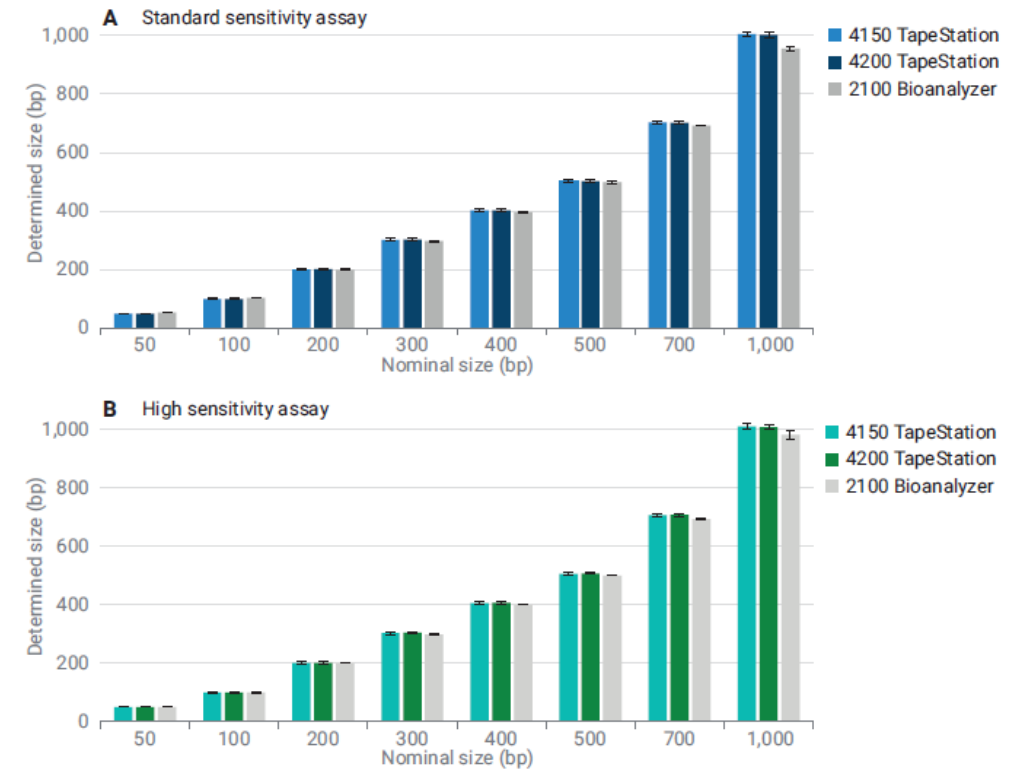
DNA fragments

Equivalent sizing and quantification performance

Quantification (300 bp DNA fragment)



Sizing (DNA fragments of D1000 ladder)



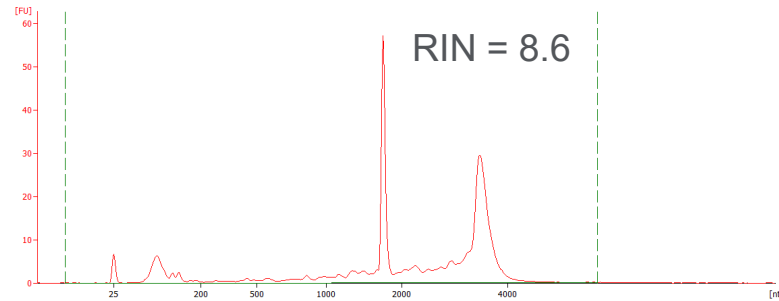
For comparison see Figures 2 and 3, [Agilent Publication](#) number 5994-0277EN

RNA Data Comparison

Total RNA



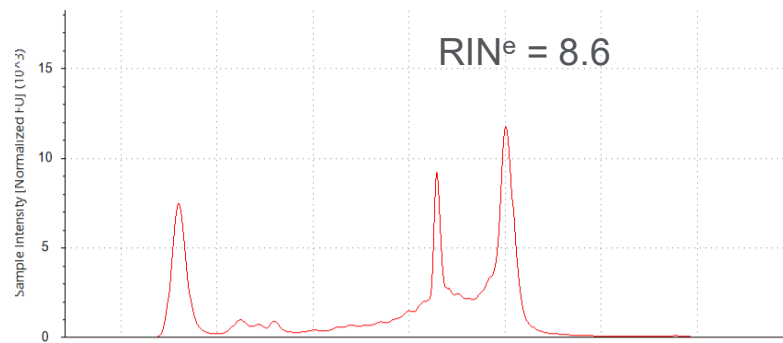
Bioanalyzer RNA 6000 Nano kit



Demo Data Expert Software

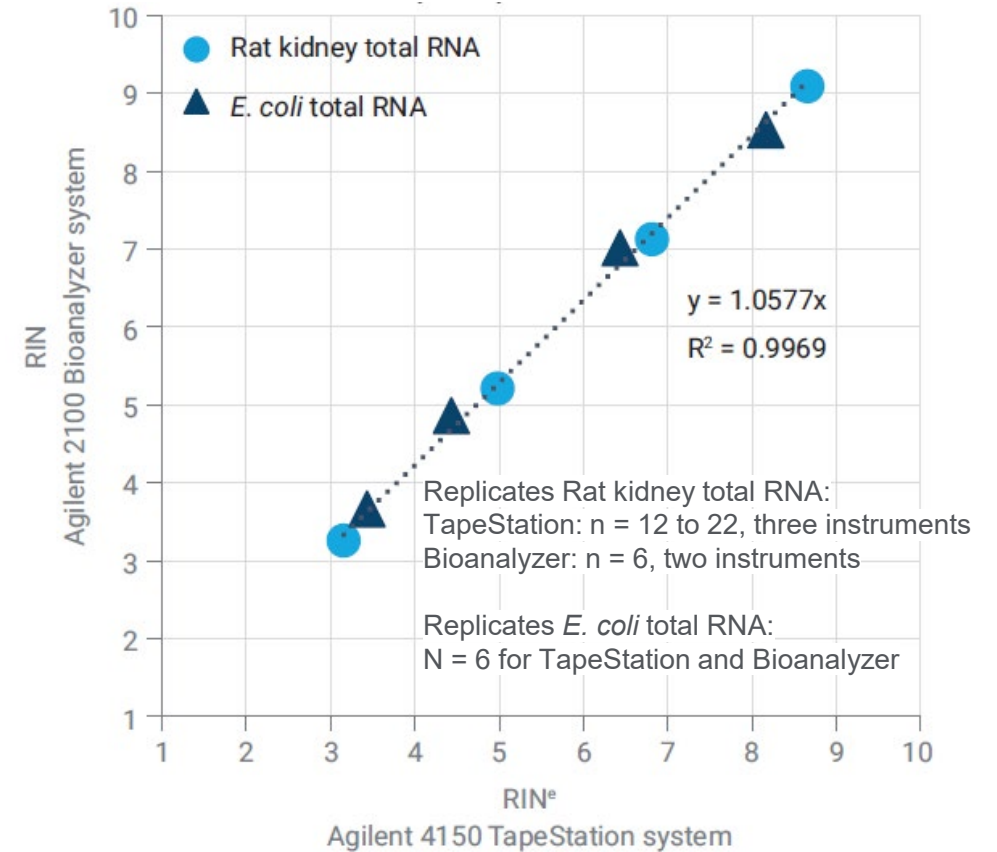


TapeStation Total RNA ScreenTape



Demo Data TapeStation Software

RIN and RIN^e: equivalent RNA quality metrics



For comparison see Figure 2A, [Agilent Publication](#) number 5994-1038EN

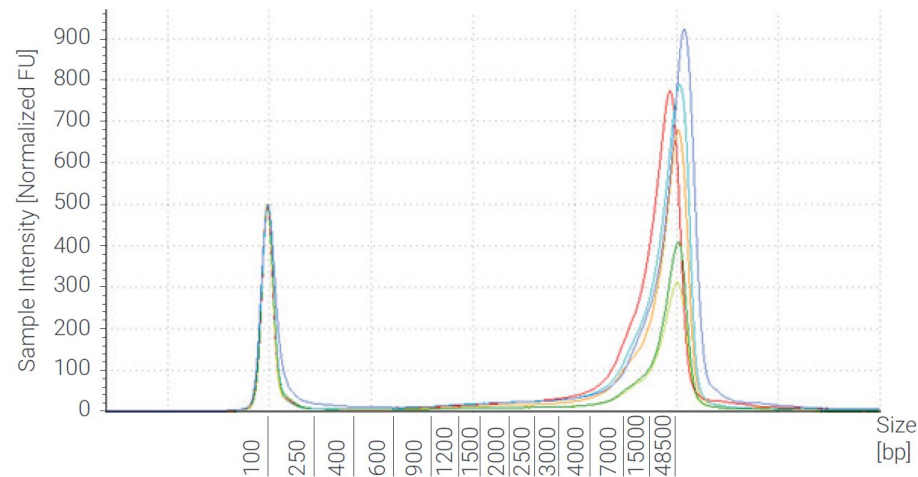
Additional Assays for the TapeStation Systems

Analysis of genomic DNA or cell-free DNA

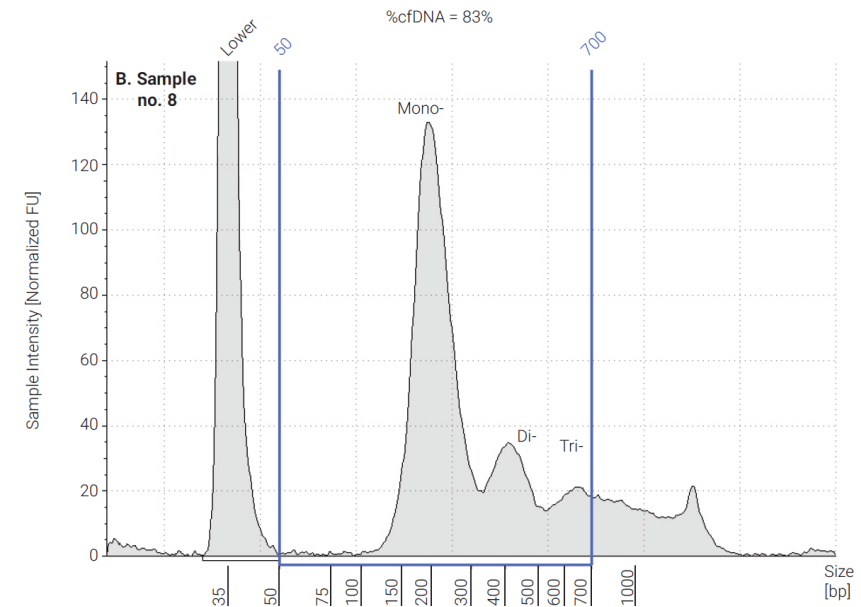
Assays tailored for gDNA and cfDNA analysis



Genomic DNA ScreenTape assay



Cell-free DNA ScreenTape assay



For comparison see Figure 2 [Agilent Publication](#) number 5991-2921EN

For comparison see Figure 1 [Agilent Publication](#) number 5994-2284EN

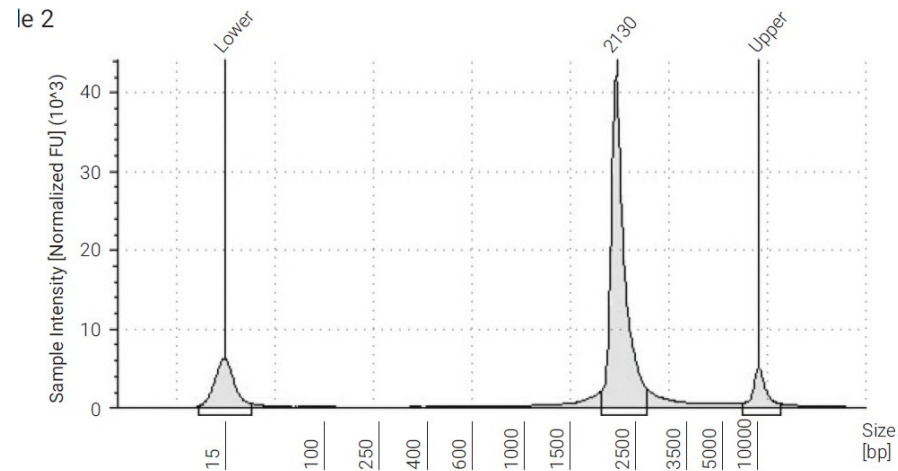
Additional Assays for the TapeStation Systems

Quality control in the IVT RNA workflow

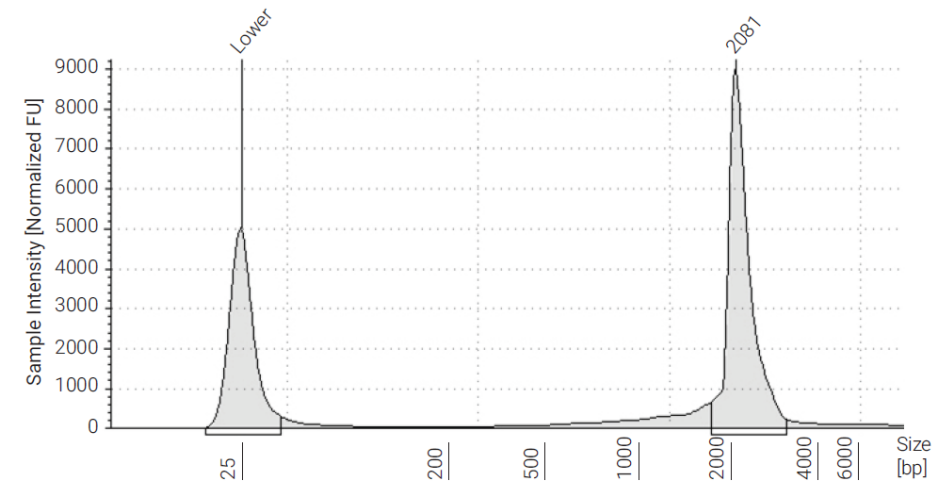
Accurate and precise sizing
of PCR Products and IVT RNA



D5000 ScreenTape assay
DNA template for the IVT workflow



RNA ScreenTape assay
IVT RNA



For comparison see Figures 2 and 3, [Agilent Publication](#) number 5994-4882EN

Fragment Analyzer Systems Overview



Agilent Fragment Analyzer Systems

Agilent 5200 Fragment Analyzer system

- 12 capillary array

Agilent 5300 Fragment Analyzer system

- 48 capillary array
- 96 capillary array

Agilent 5400 Fragment Analyzer system

- 96 capillary array
- Interface with a robotic arm
- Operational software features

Key applications: NGS libraries, cell-free DNA, genomic DNA, large fragment DNA, PCR fragments, total RNA and IVT RNA

Interchangeable
arrays with
12, 48, or 96
capillaries

Sample trays for
3x96-well plates

Automated
gel switching



Agilent Fragment Analyzer Systems



- High-resolution capillary electrophoresis
- Broad range of applications

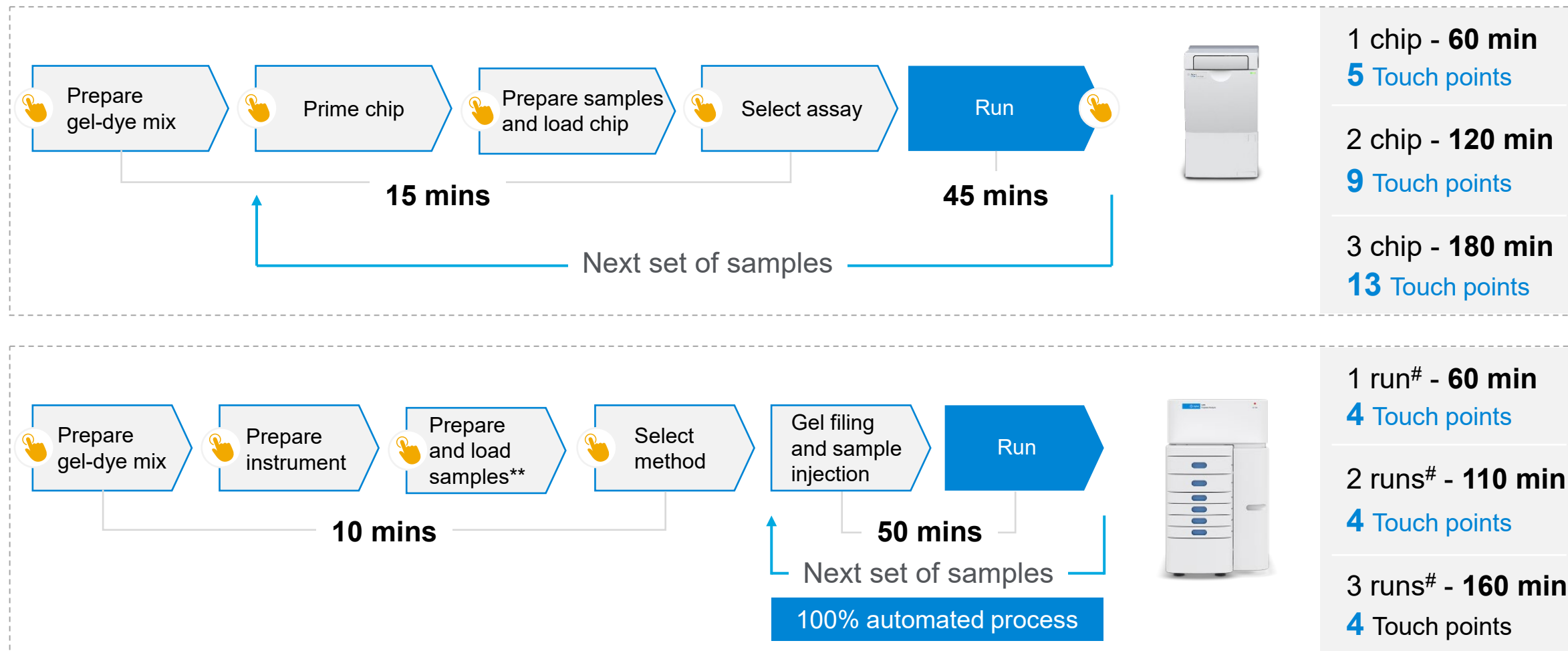
Key Benefits 5200 Fragment Analyzer System

Capacity	Parallel separation of 12 samples
Flexible operations	Change injection and run conditions, two array formats, customer choice for speed or resolution
Versatile	Broad range of applications available for nucleic acids
Sensitive	Detection of nucleic acids down to picogram range
High resolution	Achieve as low as three base pair resolution under 300 bp

[Reliable Results for Nucleic Acid Analysis](#)

Workflow Comparison

Workflow comparison: High sensitivity DNA kit and HS NGS analysis



*Does not include required time to filter the gel

**Load up to 288 samples

#One run: 12 samples in parallel (model dependent)

Comparison of the Bioanalyzer Kit and Fragment Analyzer Assay Portfolios

	DNA Bioanalyzer kit	Fragment Analyzer kit		
	Agilent High Sensitivity DNA kit	Agilent DNF-474 HS NGS Fragment kit	Data Sheet	
	Agilent DNA 1000 kit	Agilent DNF-476 Small Fragment kit	Data Sheet	
	Agilent DNA 7500 kit	Agilent DNF-473 NGS Analysis kit	Data Sheet	
	Agilent DNA 12000 kit	Agilent DNF-492 Large Fragment kit	Data Sheet	
	-	Agilent DNF-467 Genomic DNA 50 kb kit Agilent DNF-468 HS Genomic DNA 50 kb kit	Data Sheet	
		Fragment Analyzer Systems DNA Analysis Kits		
	RNA Bioanalyzer kit	Fragment Analyzer kit		
	Agilent RNA 6000 Nano kit	Agilent DNF-471 RNA (15 nt) kit	Data Sheet	
	Agilent RNA 6000 Pico kit	Agilent DNF-472 HS RNA (15 nt) kit	Data Sheet	
	Agilent Small RNA kit	Agilent DNF-470 Small RNA kit	Data Sheet	
		Fragment Analyzer Systems RNA Kits		

Additional qualitative kits are available and provide automated and accurate sizing with relative quantification of DNA fragments.

Comparison of the 2100 Expert Software and Fragment Analyzer Software

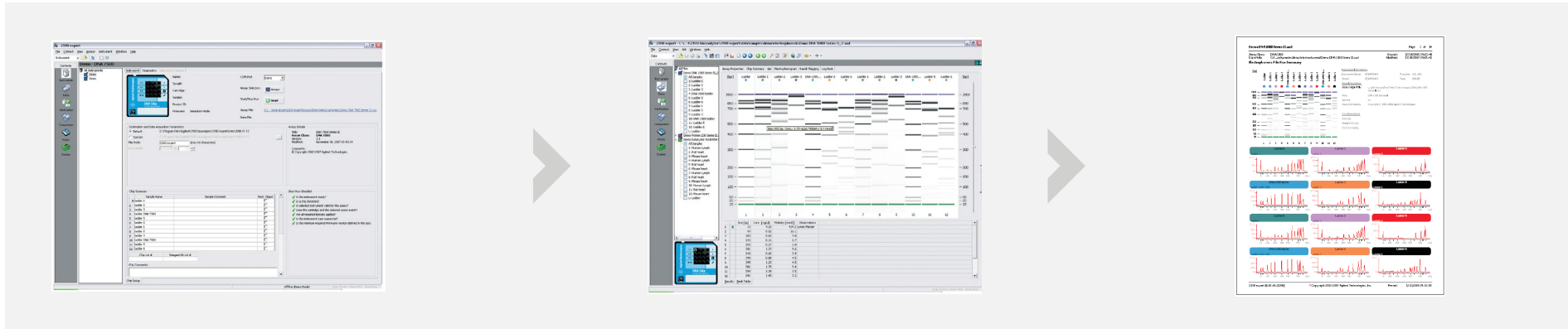
Key Features	2100 Expert Software	Fragment Analyzer Software
Single platform for all assays	✓	✓
Data comparison functions	✓	✓
Automatic and manual integration	DNA/Protein Assays	✓
Result Flagging	✓	✓
Printing and Reporting Functions	✓	✓
Free data review software	✓	✓
Compliance Features available	✓	X

Comparison of the 2100 Expert Software and Fragment Analyzer Software

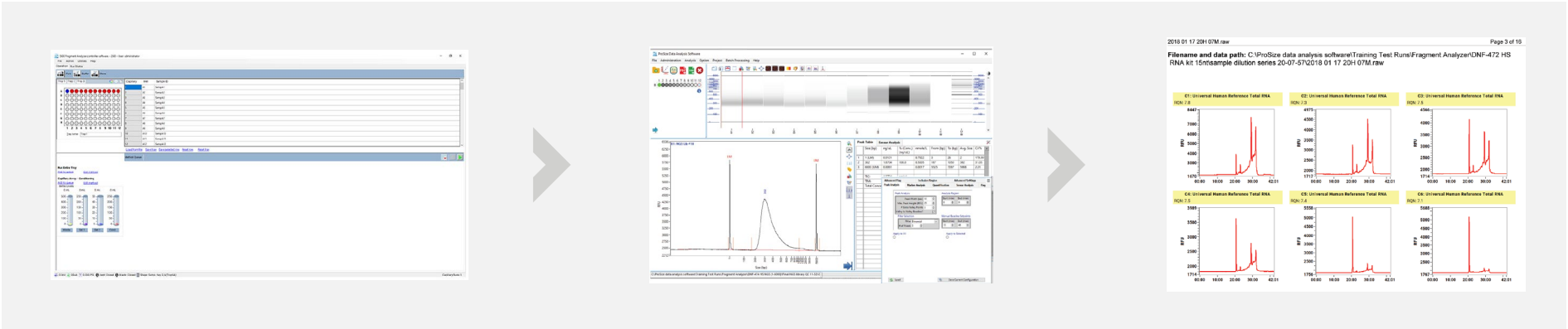
1. Set up a run
2. Analyze data
3. Print reports



Bioanalyzer system



Fragment Analyzer system



Evidence of Equivalent Performance

Bioanalyzer and Fragment Analyzer systems



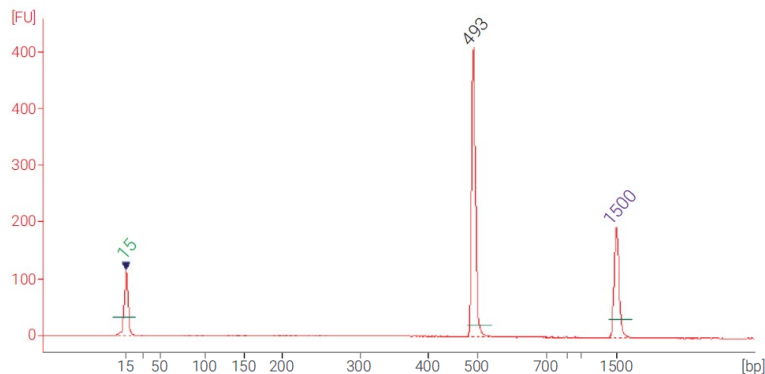
DNA Data Comparison

DNA fragments

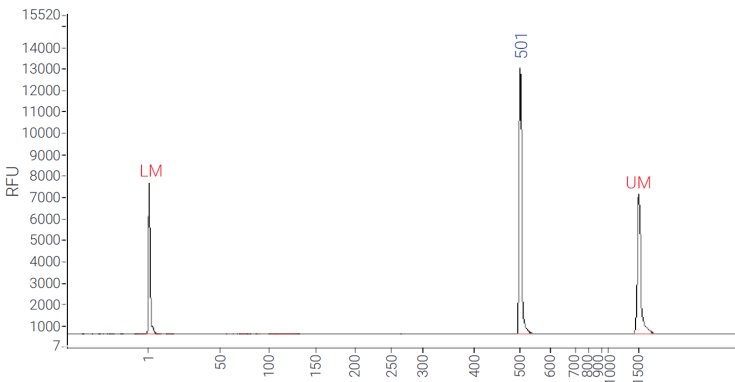
Comparable sizing and quantification results at different sample concentrations



Bioanalyzer DNA 1000 kit



Fragment Analyzer Small Fragment kit



Nominal Concentration	Average Size (bp)	
	Bioanalyzer	Fragment Analyzer
0.6 ng/μL	150	150
5 ng/μL	148	151
0.6 ng/μL	500	500
5 ng/μL	496	500

For comparison see Figure 2 [Agilent Publication](#) number 5994-5024EN

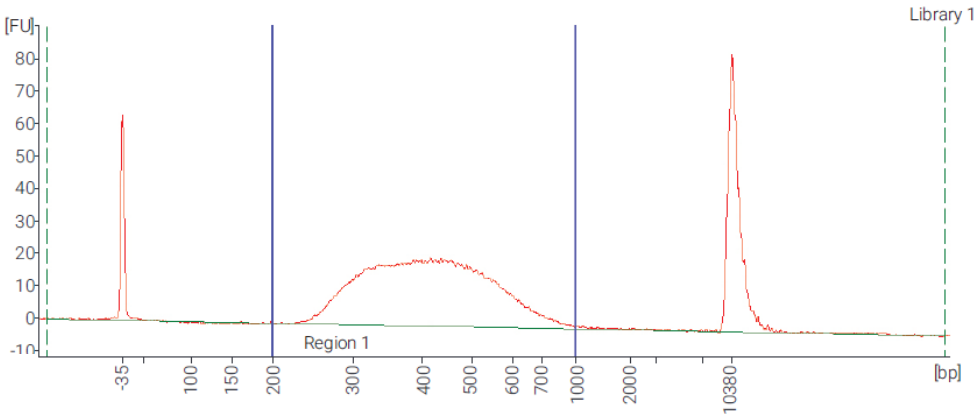
DNA Data Comparison

NGS libraries

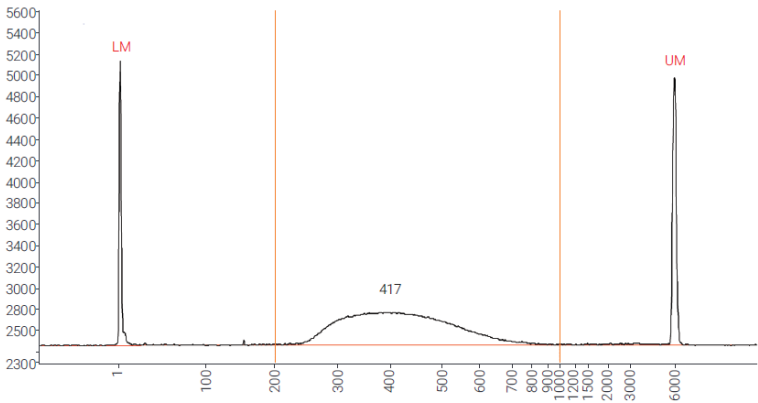
Equivalent sizing performance of DNA libraries



Bioanalyzer High Sensitivity DNA kit



Fragment Analyzer High Sensitivity (HS) NGS kit



Instrument and Kit	Average Size (bp)	
	Library 1	Library 2
Bioanalyzer High Sensitivity DNA kit	431	470
Fragment Analyzer High Sensitivity NGS kit	419	448

For comparison see Figure 1 [Agilent Publication](#) number 5994-4575EN

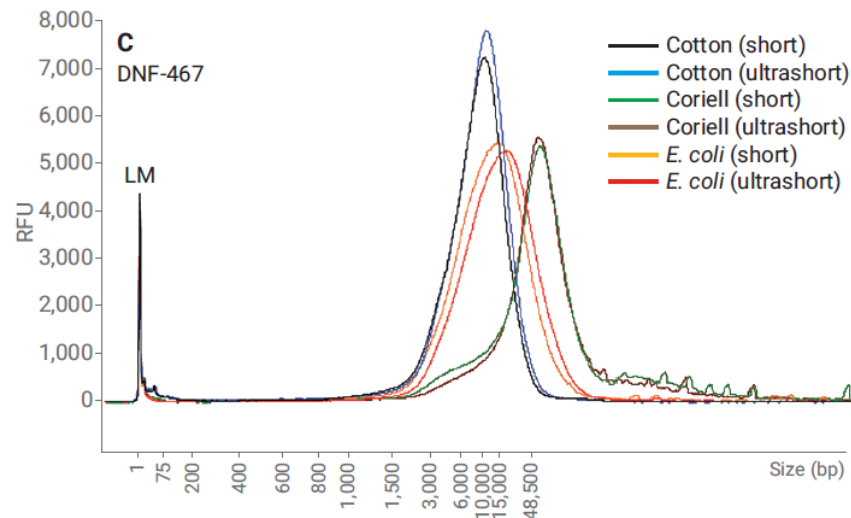
Additional DNA Assays for the Fragment Analyzer Systems

Specific assays for gDNA and cfDNA available



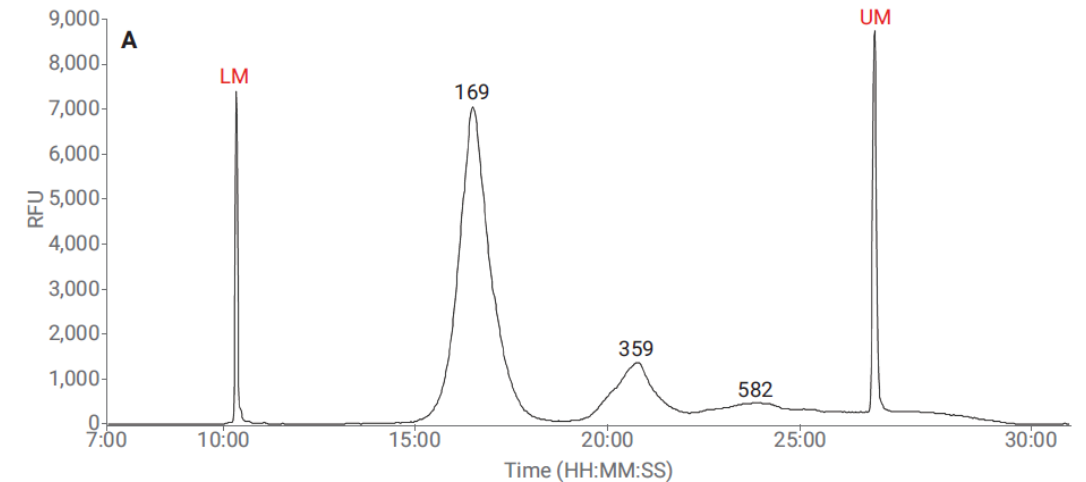
Genomic DNA (gDNA)

Genomic DNA 50 kb kit



Cell-free DNA (cfDNA)

HS Small Fragment kit



For comparison see Figure 1 [Agilent Publication](#) number 5994-0511EN

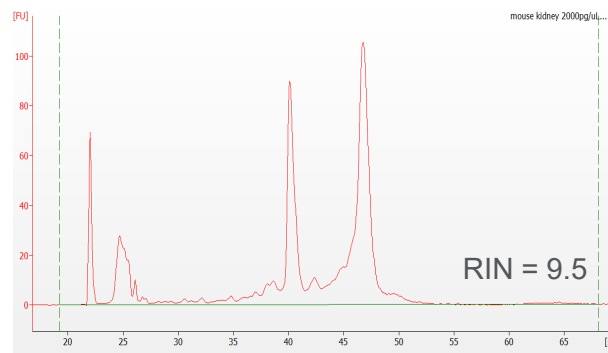
For comparison see Figure 1 [Agilent Publication](#) number 5994-0510EN

Equivalent RNA Quality Metrics

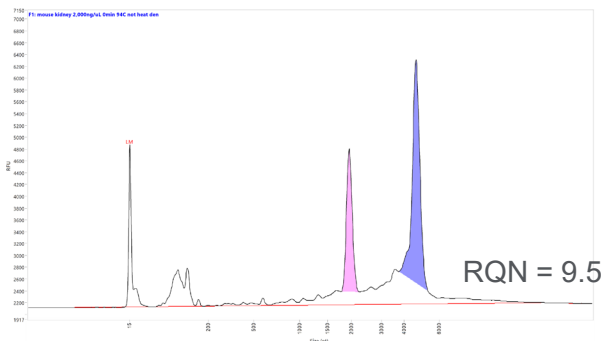
Total RNA



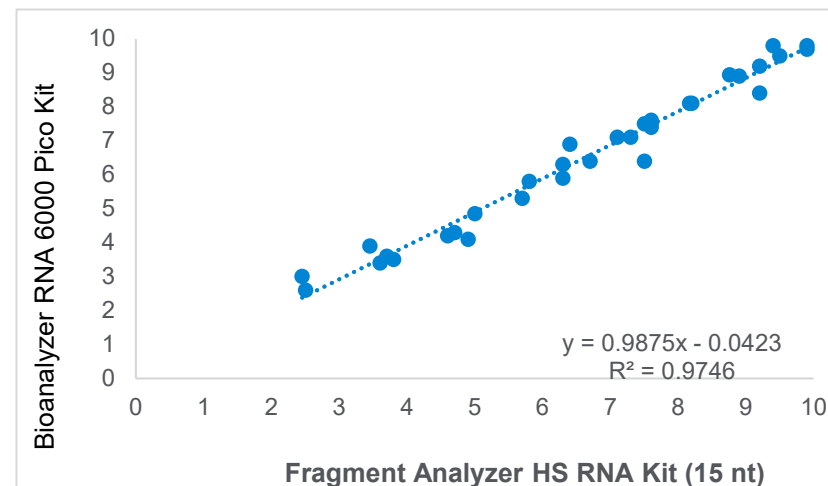
Bioanalyzer RNA 6000 Nano kit



Fragment Analyzer RNA kit (15 nt)



RIN and RQN: equivalent RNA quality metrics



→ RIN and RQN are equivalent quality metrics that can be used interchangeably for determining the quality and integrity of total RNA samples

For comparison see Figure 2 and 3 [Agilent Publication](#) number 5994-1860EN

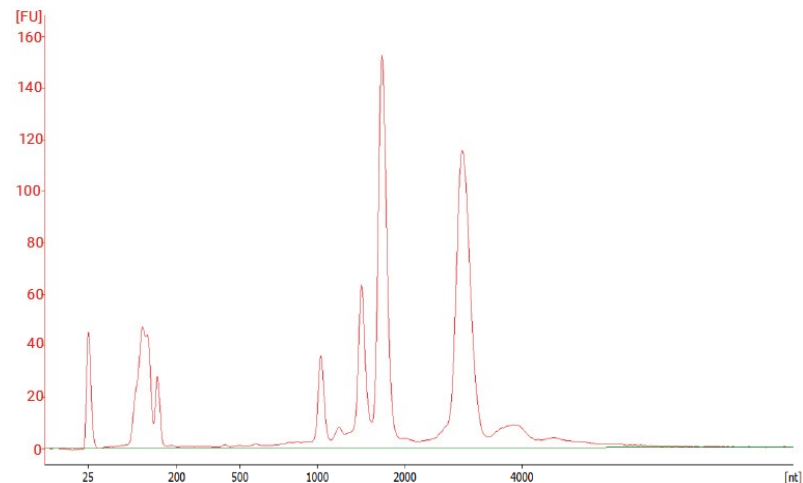
RNA Data Comparison

Total RNA

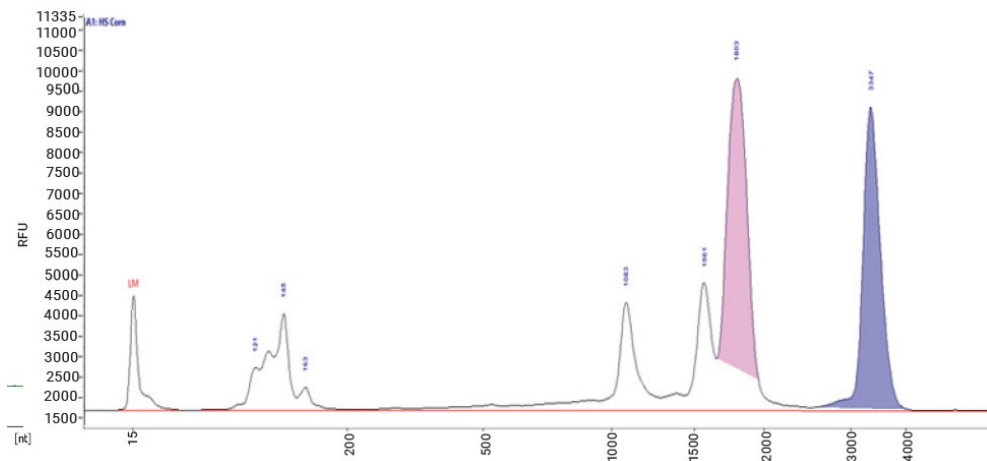
Equivalent quality scores for bacteria, plant and Insect RNA



Bioanalyzer RNA Nano kit



Fragment Analyzer RNA kit (15 nt)



	Bioanalyzer RIN	Fragment Analyzer RQN	Bioanalyzer ng/μL	Fragment Analyzer ng/μL
Average	8.63	7.83	63.67	72.40

For comparison see Figure 1, [Agilent Publication](#) number 5994-5648EN

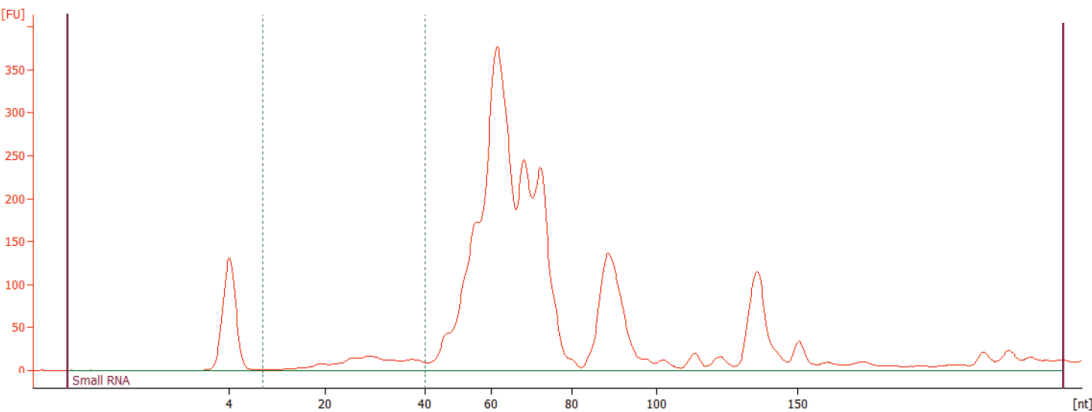
RNA Data Comparison

Small RNA

Accurate quality control of small RNA samples



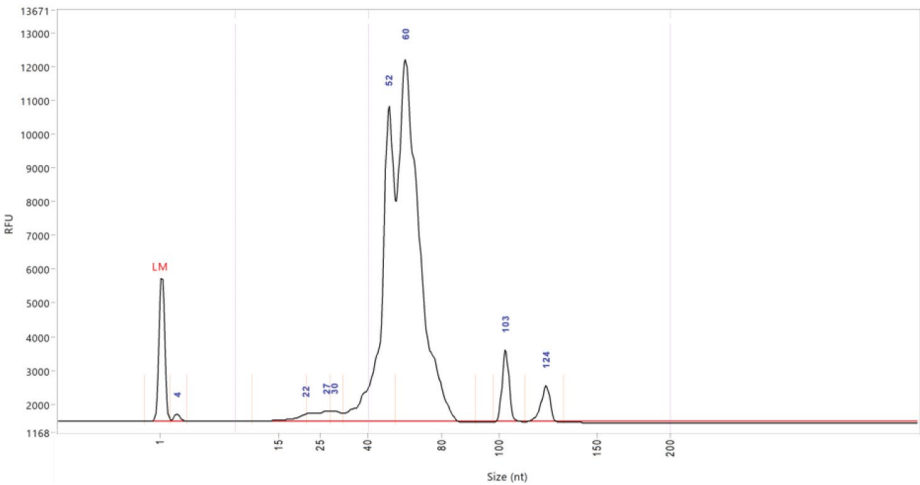
Bioanalyzer Small RNA kit



	Average	small RNA (ng/μL)	microRNA (ng/μL)	%microRNA
Bioanalyzer	Sample A	18.9	1.9	10.3
	Sample B	14.4	1.1	7.7



Fragment Analyzer Small RNA kit



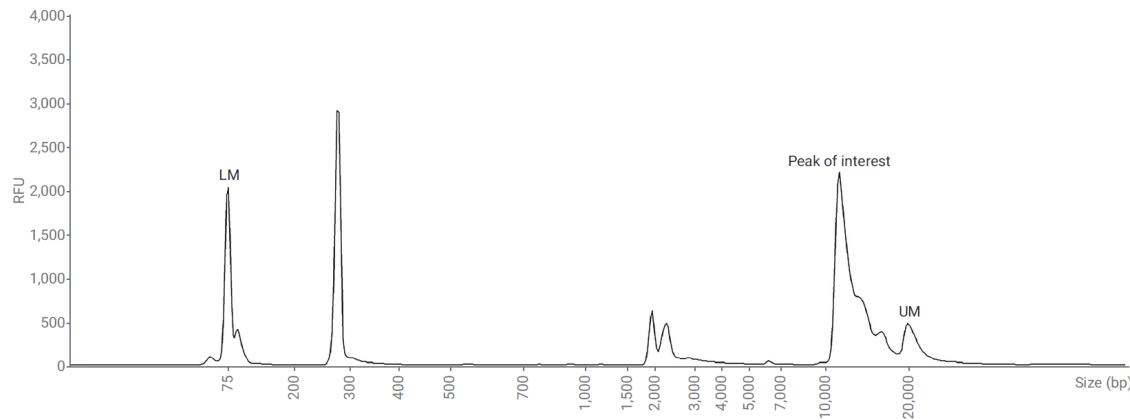
	Average	small RNA (ng/μL)	microRNA (ng/μL)	%microRNA
Fragment Analyzer	Sample A	14.3	1.2	8.2
	Sample B	9.7	0.6	6.8

For comparison see Figure 2, [Agilent Publication](#) number 5994-4860EN

Additional Assays for the Fragment Analyzer Systems

PCR Products and IVT RNA

dsDNA 930 Reagent kit (75-20000 bp)
PCR product derived from poor PCR reaction showing
multiple peaks



Sensitive and reliable quality control
analysis of the IVT RNA workflow



RNA kit (15 nt)
IVT RNA derived from Low-quality transcription showing
multiple peaks

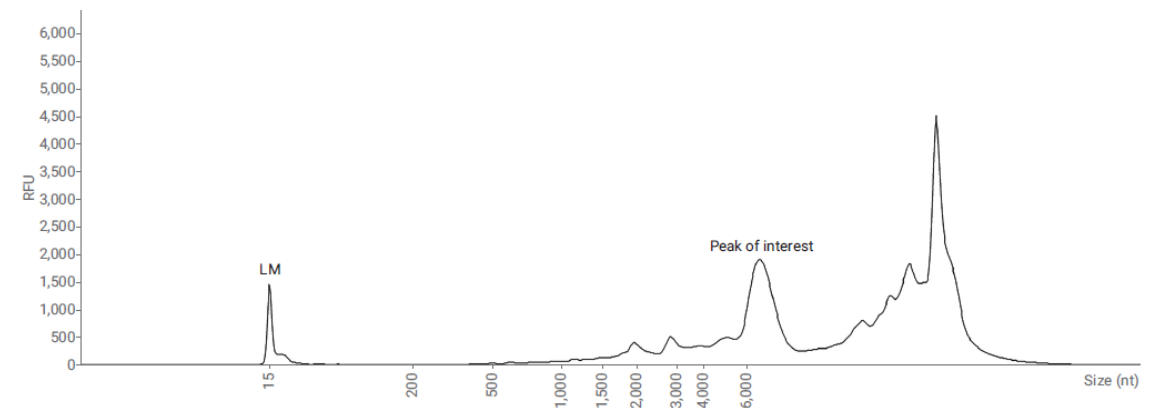


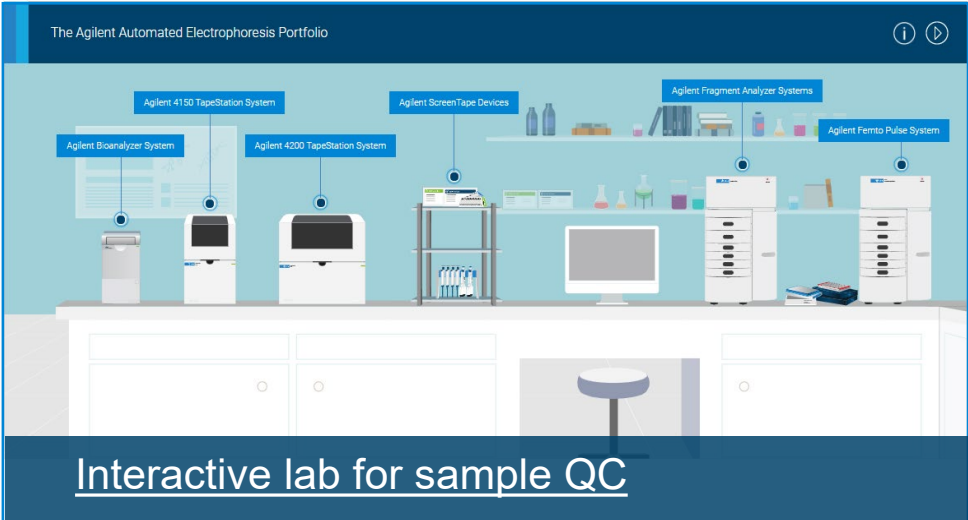
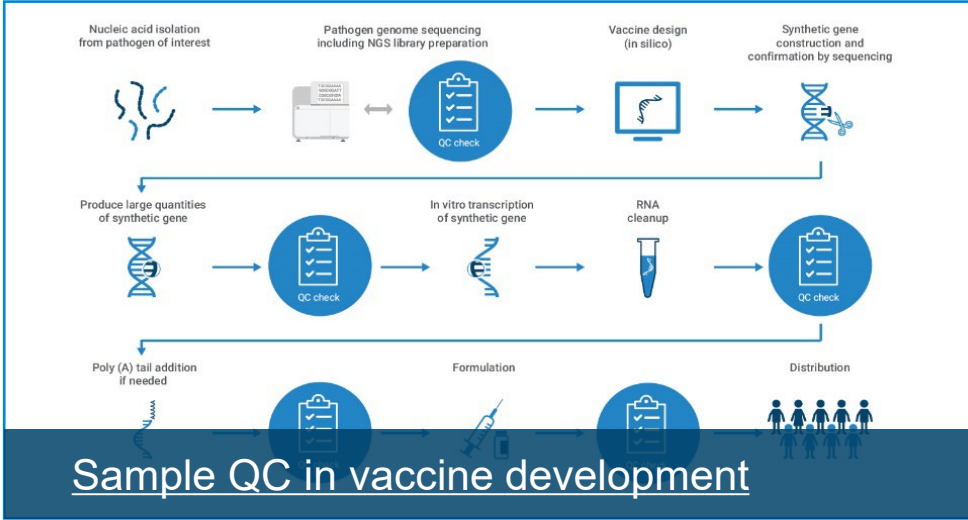
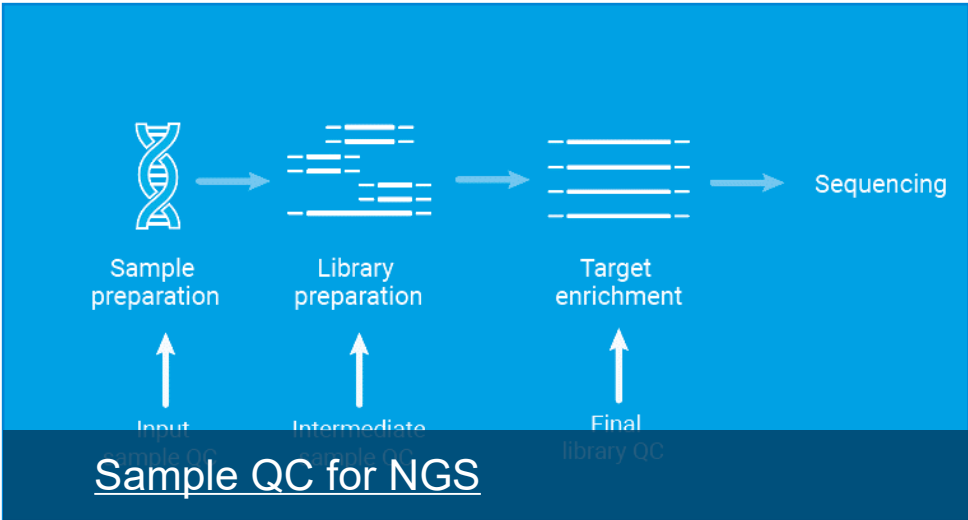
Figure 4 and 6 [Agilent Publication](#) number 5994-0512EN

For further reading see also [Agilent Publication](#) number 5994-0878EN

Additional Information

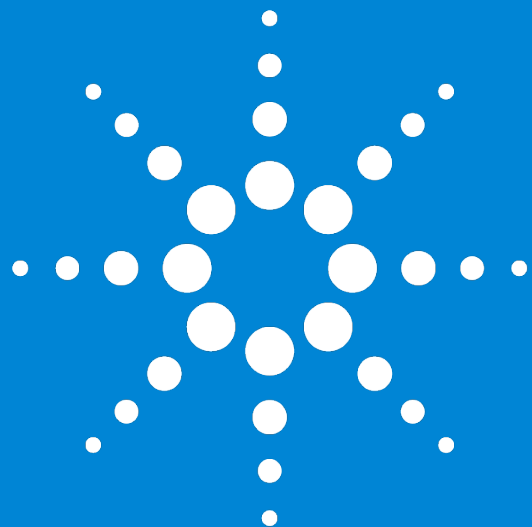
Resources

Learn More About the Agilent Sample Quality Control Solutions



Available On-demand Webinars

Importance of QC in NGS library preparation	2018	Link
Biobank sample quality control	2019	Isber2019 seminar
Monitoring nucleic acid integrity during long-term storage with automated electrophoresis	2020	Isber2020 seminar
Sample quality control in biorepositories	2020	Link
NGS success begins with input sample QC	2020	Link
Sample QC in the NGS library prep workflow	2020	Link
Scientist solutions to NGS sample challenges	2020	Link
Comparison of Different Methods to Isolate High-Molecular Weight DNA from Bacteria for Nanopore Sequencing	2021	Link
Solutions for special challenges in next-generation sequencing workflows	2021	Link
Advantages of Automated NGS Library Preparation	2021	Link
Solutions for special challenges in next-generation sequencing workflows	2022	Link
Advantages of automated next-generation sequencing library preparation and enrichment including sample QC	2022	Link



Agilent

Trusted Answers