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

- 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

- In this presentation, we share examples of performance equivalence among the different systems and explore the advantages of each solution

Table of Content

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

DNA applications	 2100 Bioanalyzer System	 TapeStation Systems	 Fragment Analyzer Systems
NGS libraries	✓	✓	✓
Cell-free DNA		✓	✓
Genomic DNA/FFPE DNA		✓	✓
Large fragment DNA			✓
Plasmid DNA			✓
PCR fragments	✓	✓	✓
Restriction digest	✓	✓	✓
Microsatellites	✓		✓

Automated Electrophoresis Instrument Portfolio

Instrument Options for RNA Applications

RNA applications	 2100 Bioanalyzer System	 TapeStation Systems	 Fragment Analyzer Systems
FFPE RNA	✓	✓	✓
IVT RNA		✓	✓
Total prokaryotic and eukaryotic RNA	✓	✓	✓
Small RNA	✓		✓
MicroRNA	✓		✓
mRNA	✓		✓
Plant RNA	✓		✓

Automated Electrophoresis Instrument Portfolio

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	

[Automated Electrophoresis Instrument Portfolio]

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	DV_{200}		
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

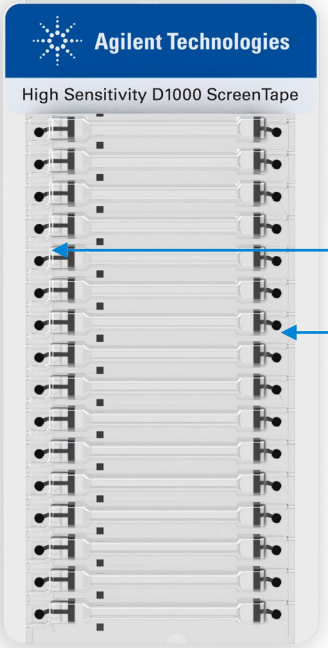
1–16 Samples (tube strips)

Agilent 4200 TapeStation System

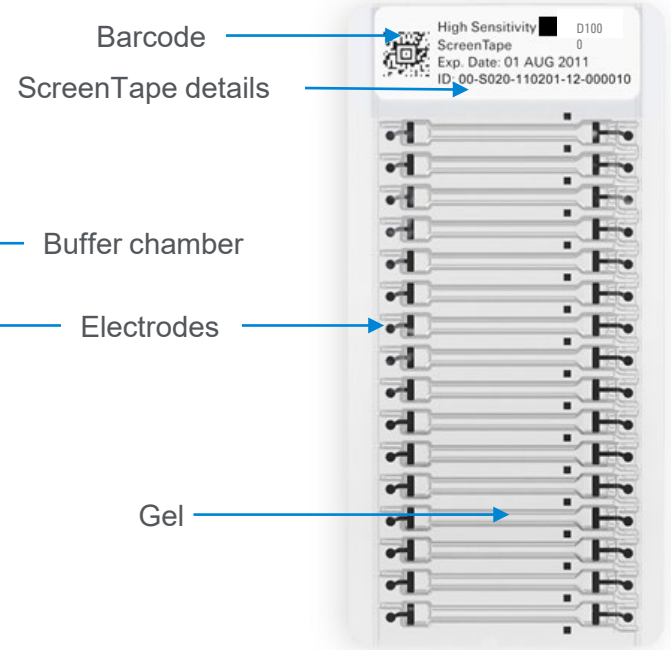
1–96 Samples (96 well plate)

TapeStation consumables – ScreenTape device

Front view



Back view



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

[TapeStation Systems – Brochure]

Agilent TapeStation Systems

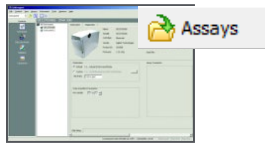
- Flexible throughput instruments
- Ease of use
- Robust ScreenTape technology
- Automatic ScreenTape detection and assay selection

Key Benefits	Key Features
Ease of use	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

[TapeStation Automated Electrophoresis for DNA & RNA Quality Control]

Workflow Comparison

Workflow comparison: DNA 1000 kit and D1000 ScreenTape



Prepare gel-dye mix → Prime chip → Prepare samples and load chip → Select assay → Run

15 mins | **45 mins**

1 chip
– 12 samples
– **60 min**

5 touch points

Prepare samples and load ScreenTape → Run

5 mins | **15 mins**

1 ScreenTape device
– 16 samples
– **20 min**

1 touch point

Comparison of Bioanalyzer Kit and ScreenTape Assay Portfolios

DNA Bioanalyzer kit	DNA ScreenTape assay	
Agilent High Sensitivity DNA kit	Agilent High Sensitivity D1000 ScreenTape assay Agilent High Sensitivity D5000 ScreenTape assay	Data Sheet, Performance Characteristics Data Sheet, Performance Characteristics
Agilent DNA 1000 kit	Agilent D1000 ScreenTape assay	Data Sheet, Performance Characteristics
Agilent DNA 7500 kit	Agilent D5000 ScreenTape assay	Data Sheet, Performance Characteristics
Agilent DNA 12000 kit	-	-
-	Agilent Genomic DNA ScreenTape assay	Data Sheet, Performance Characteristics
-	Agilent Cell-free DNA ScreenTape assay	Data Sheet, Performance Characteristics

TapeStation Automated Electrophoresis for DNA Quality Control

RNA Bioanalyzer kit	RNA ScreenTape assay	
Agilent RNA 6000 Nano kit	Agilent RNA ScreenTape assay	Data Sheet, Performance Characteristics
Agilent RNA 6000 Pico kit	Agilent High Sensitivity RNA ScreenTape assay	
Agilent Small RNA kit	-	-

TapeStation Automated Electrophoresis for RNA Quality Control

Agilent ScreenTape Consumables and Reagents Datasheet

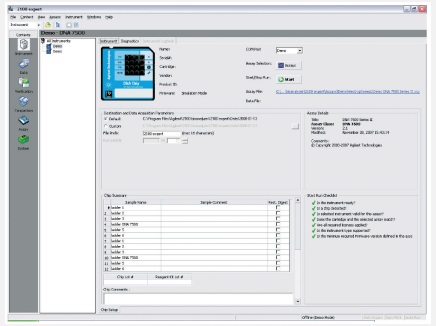
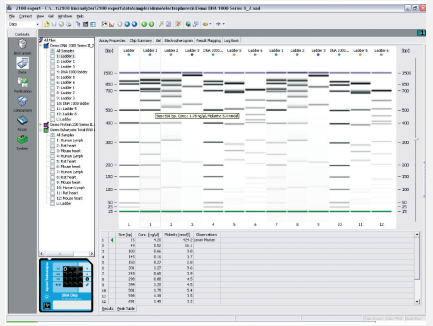
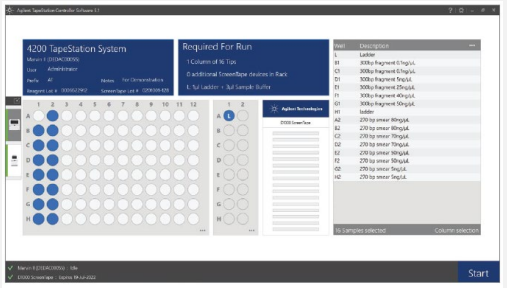
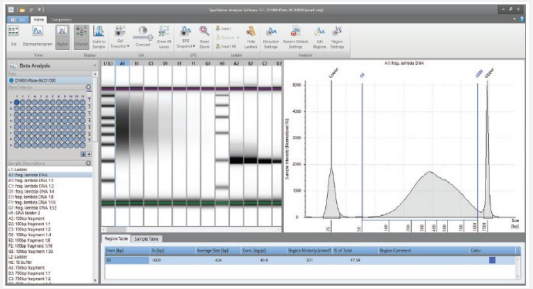
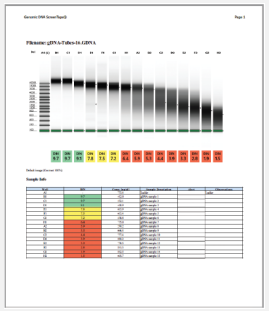
Comparison of the 2100 Expert Software and TapeStation Software

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

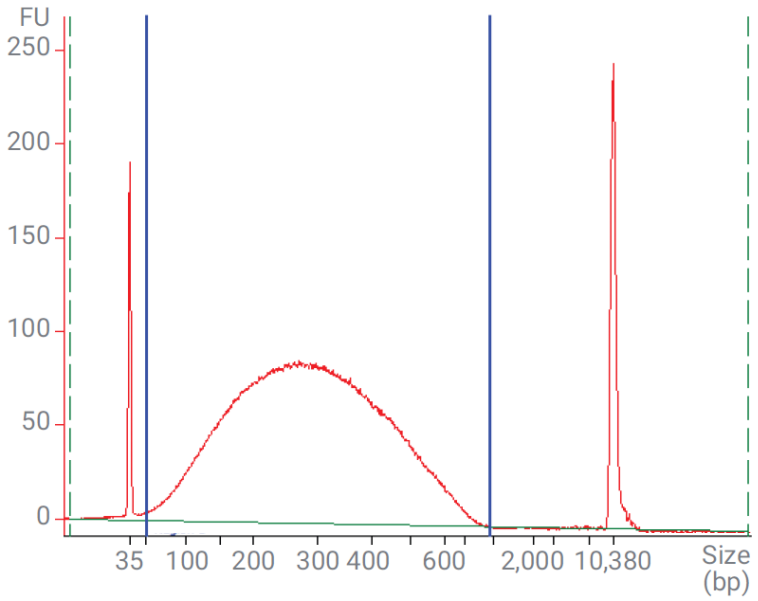
Bioanalyzer and TapeStation systems

DNA Data Comparison

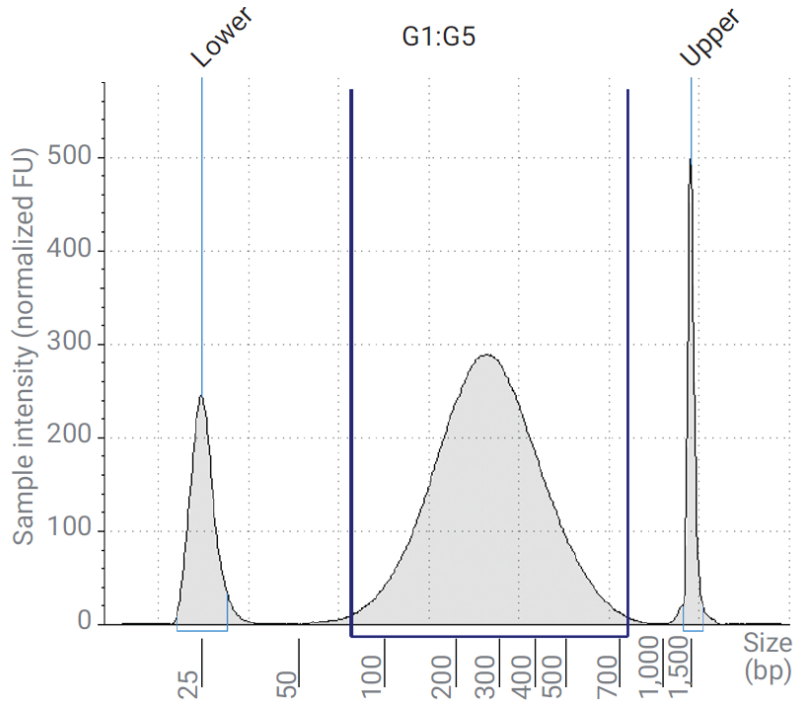
Sheared DNA

Comparable quantification and sizing of DNA smears

Bioanalyzer
High Sensitivity DNA kit



TapeStation
High Sensitivity D1000 ScreenTape



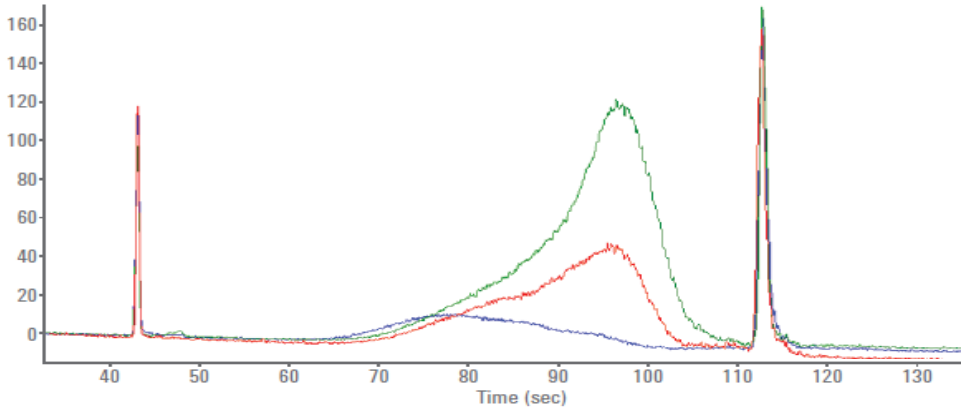
For comparison see Figure 6, Agilent Publication number 5991-9093EN

DNA Data Comparison

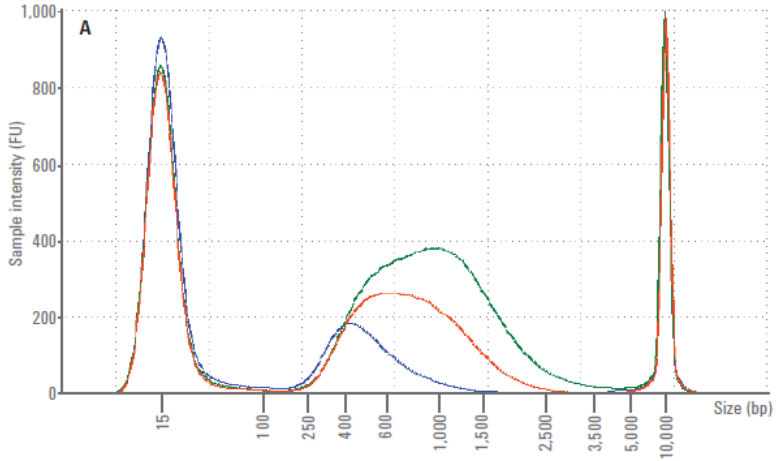
Overlay of NGS libraries generated from different input amounts gDNA

Consistent average smear size at different sample concentrations

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

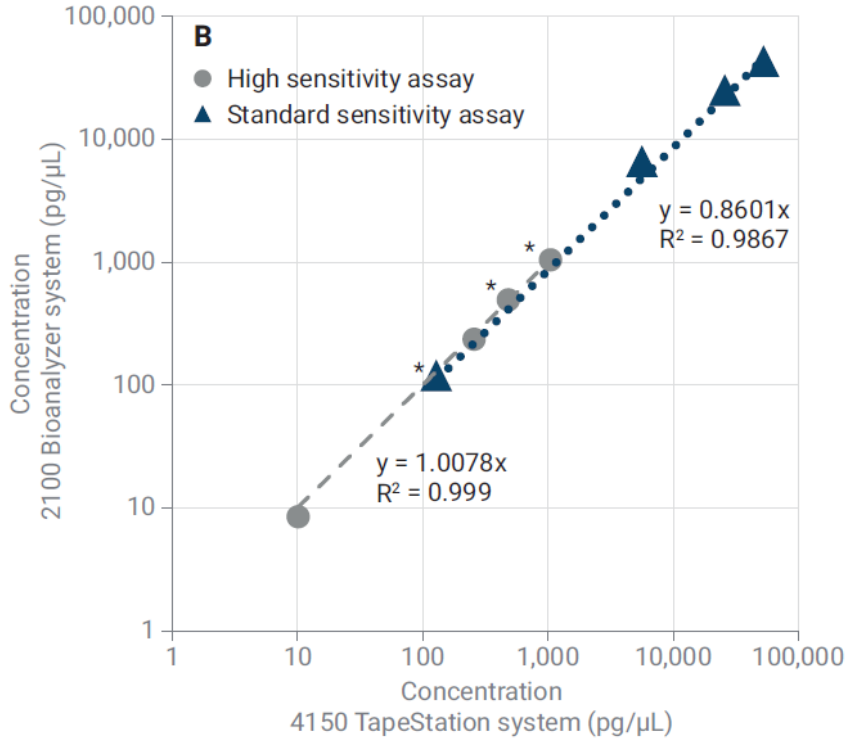
For comparison see Figure 5 and Table 1, Agilent Publication number 5991-8191EN

DNA Data Comparison

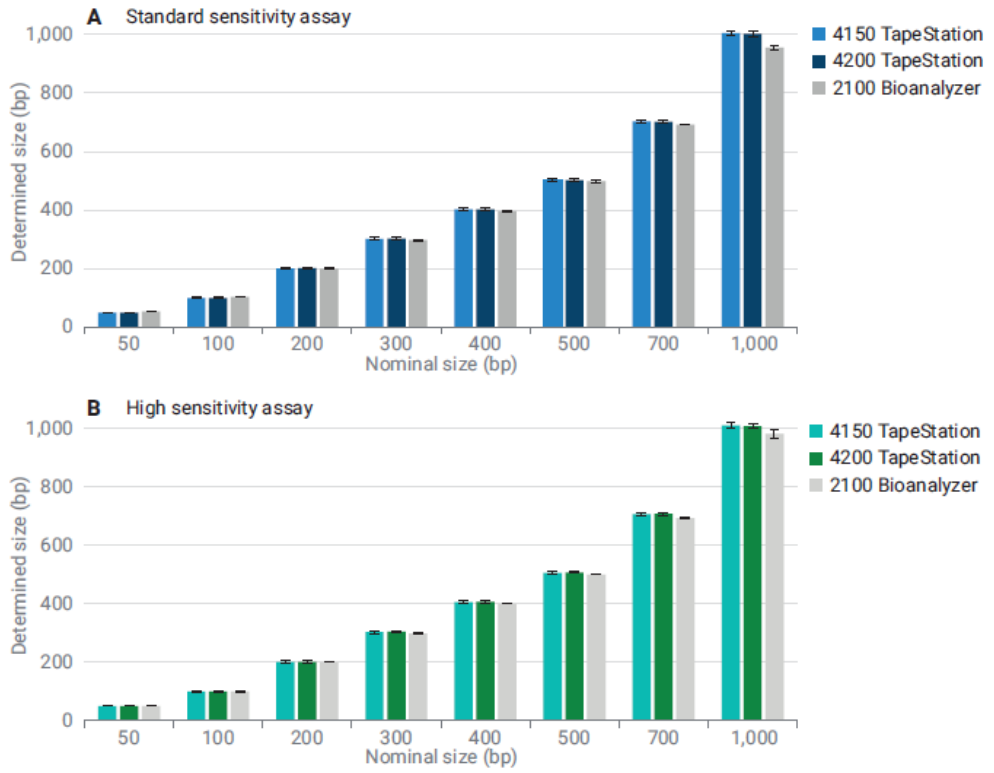
DNA fragments

Equivalent sizing and quantification performance

Quantification (300 bp DNA fragment)



Sizing (DNA fragments of D1000 ladder)



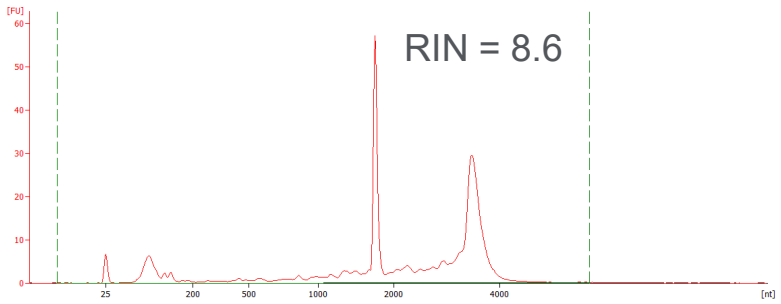
For comparison see Figures 2 and 3, Agilent Publication number 5994-0277EN

RNA Data Comparison

Total RNA

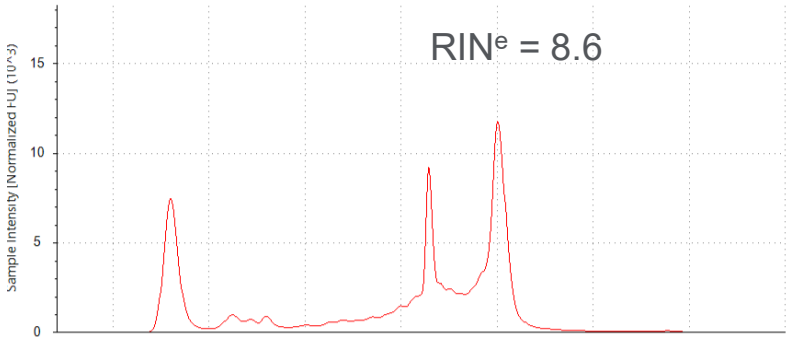
RIN and RIN^e: equivalent RNA quality metrics

Bioanalyzer RNA 6000 Nano kit

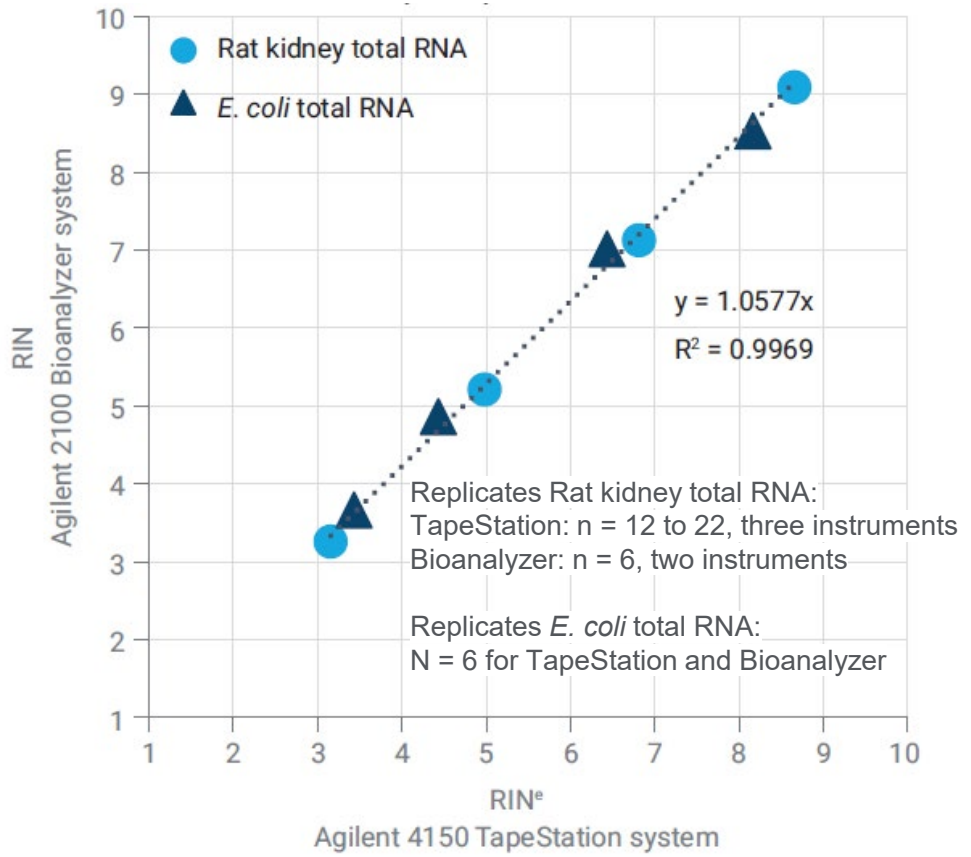


Demo Data Expert Software

TapeStation RNA ScreenTape



Demo Data TapeStation Software



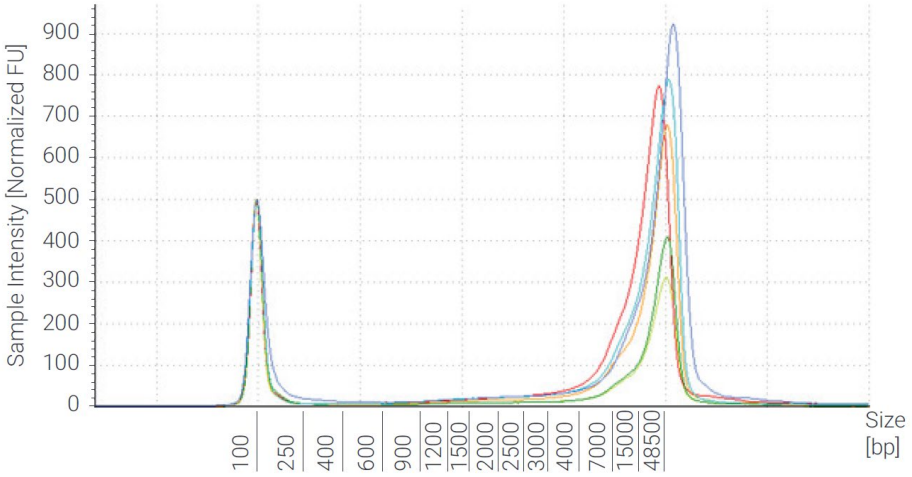
For comparison see Figure 2A, Agilent Publication number 5994-1038EN

Additional Assays for the TapeStation Systems

Analysis of genomic DNA or cell-free DNA

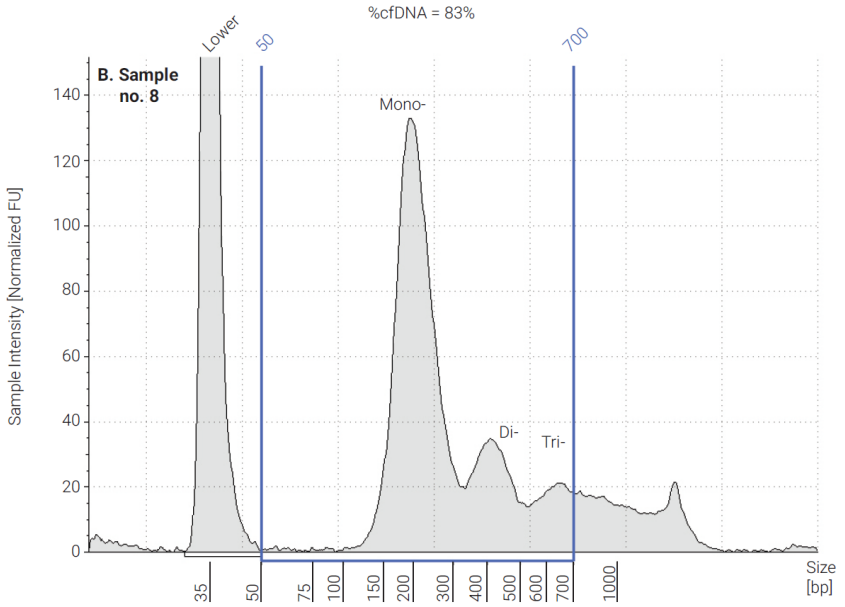
Assays tailored for gDNA and cfDNA analysis

Genomic DNA ScreenTape assay



For comparison see Figure 2 Agilent Publication number 5991-2921EN

Cell-free DNA ScreenTape assay



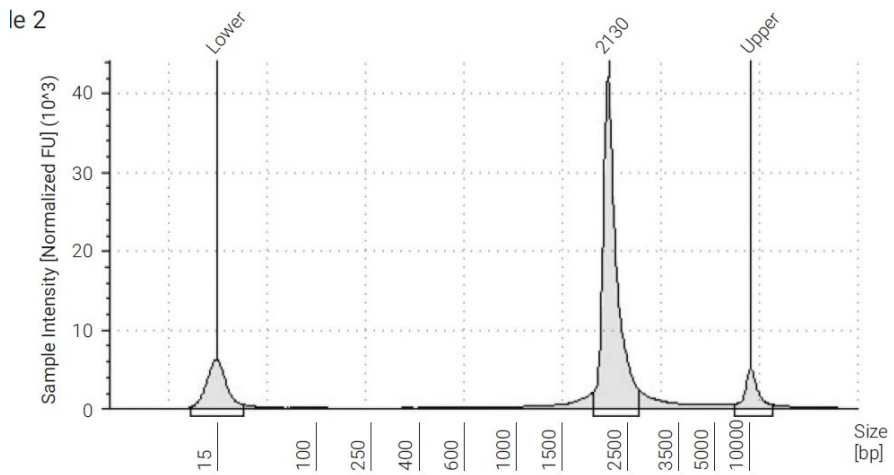
For comparison see Figure 1 Agilent Publication number 5994-2284EN

Additional Assays for the TapeStation Systems

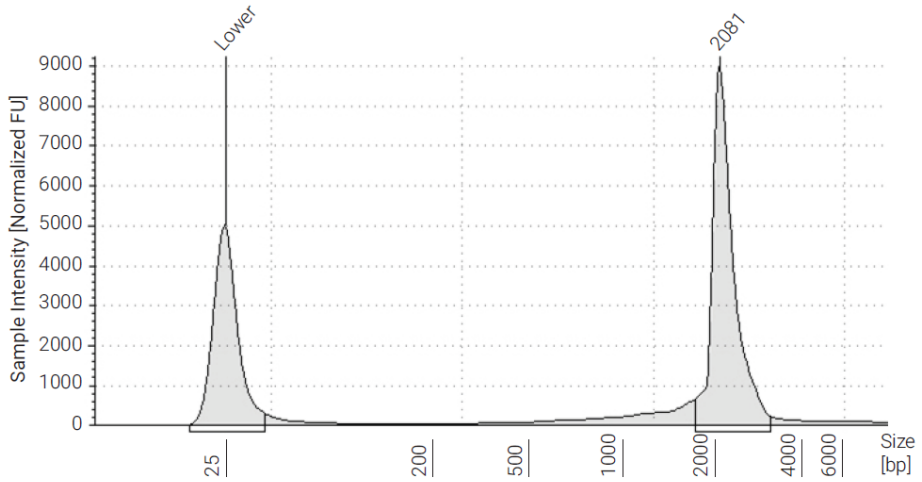
Quality control in the IVT RNA workflow

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

[Parallel CE, NGS library QC, Fragment Analyzer | Agilent]

Agilent Fragment Analyzer Systems

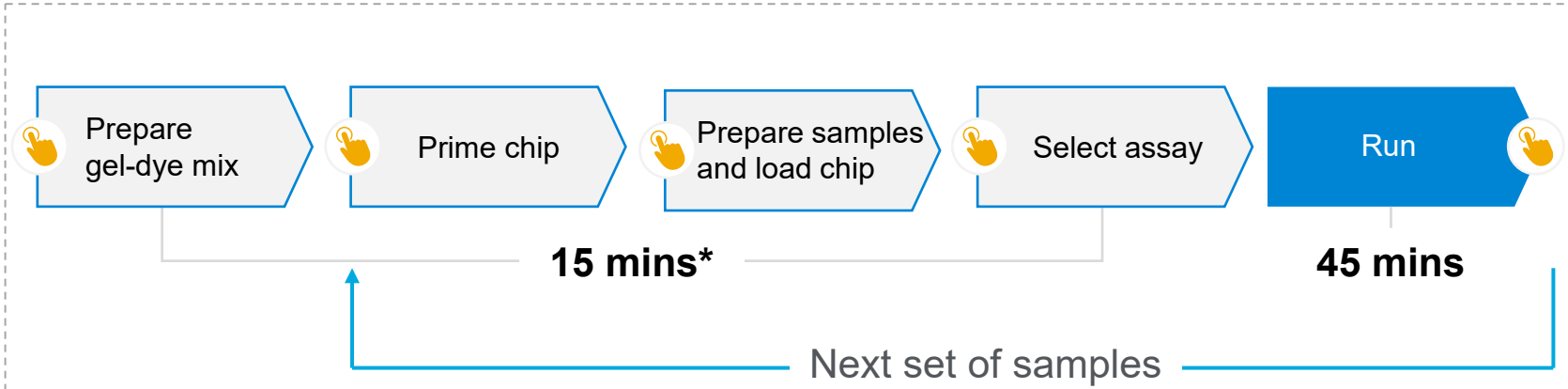
- High-resolution capillary electrophoresis
- Broad range of applications

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

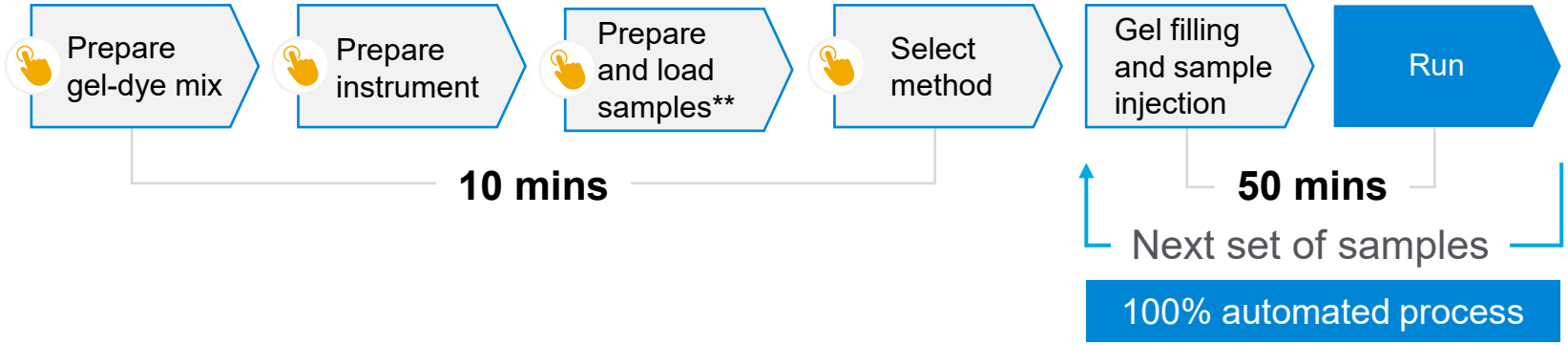
Workflow comparison: High sensitivity DNA kit and HS NGS analysis



1 chip - **60 min**
5 Touch points

2 chips - **120 min**
9 Touch points

3 chips - **180 min**
13 Touch points



1 run# - **60 min**
4 Touch points

2 runs# - **110 min**
4 Touch points

3 runs# - **160 min**
4 Touch points

*Does not include required time to filter the gel **Load up to 288 samples (Agilent 5200 Fragment Analyzer system) #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 for the Fragment Analyzer systems 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

Data Sheet: Enhanced Security Features of Fragment Analyzer Controller and ProSize Data Analysis Software (5994-5037EN)

Comparison of the 2100 Expert Software and Fragment Analyzer Software

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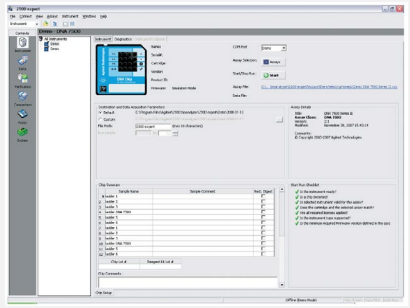
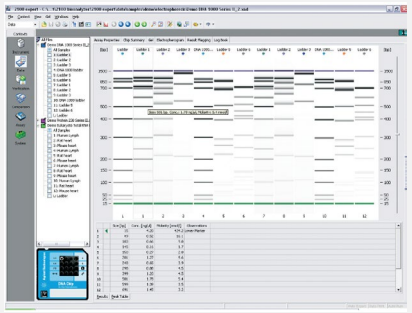
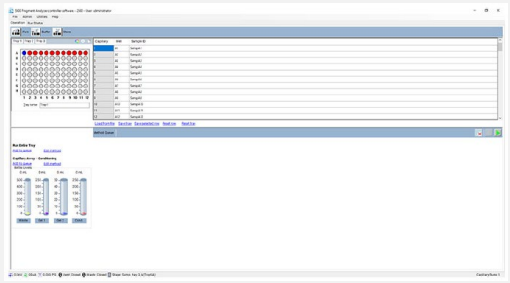
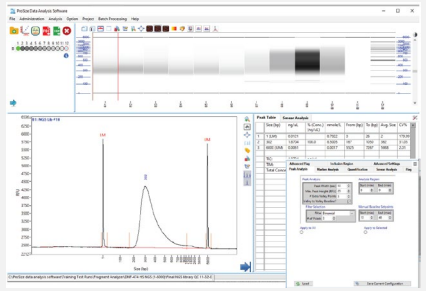
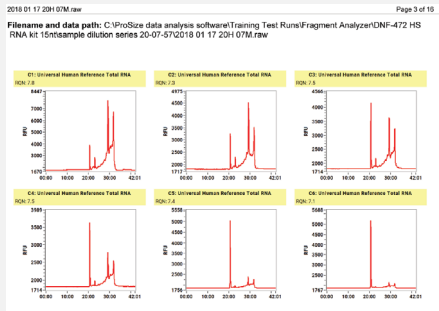
 Bioanalyzer system			
 Fragment Analyzer system			

Evidence of Equivalent Performance

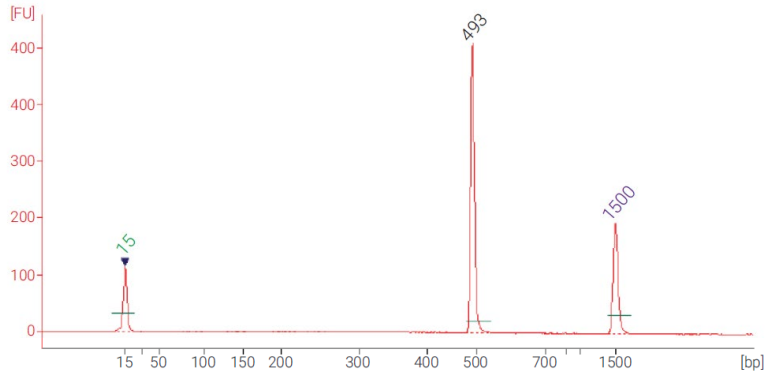
Bioanalyzer and Fragment Analyzer systems

DNA Data Comparison

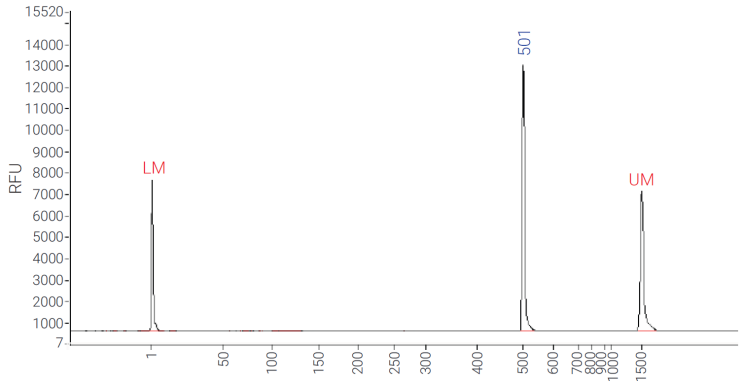
DNA fragments

Comparable sizing and quantification results at different sample concentrations

Bioanalyzer DNA 1000 kit



Fragment Analyzer Small Fragment kit



	Average Size (bp)	
Nominal Concentration	**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

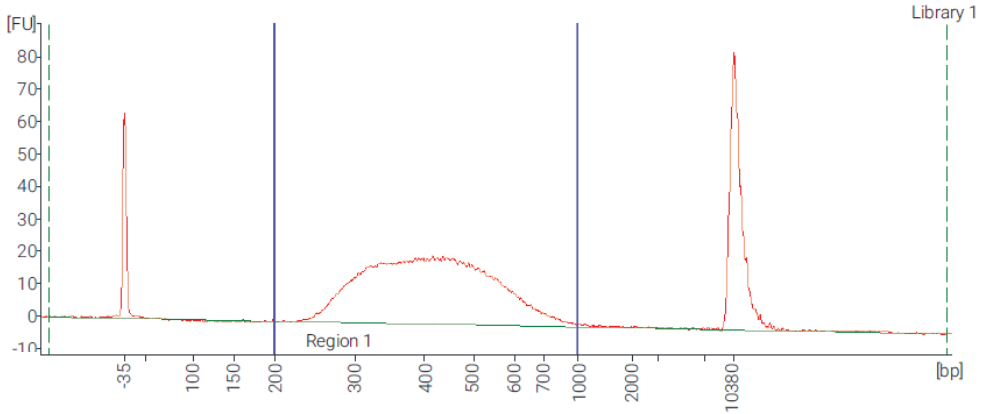
For comparison see Figure 2 Agilent Publication number 5994-5024EN

DNA Data Comparison

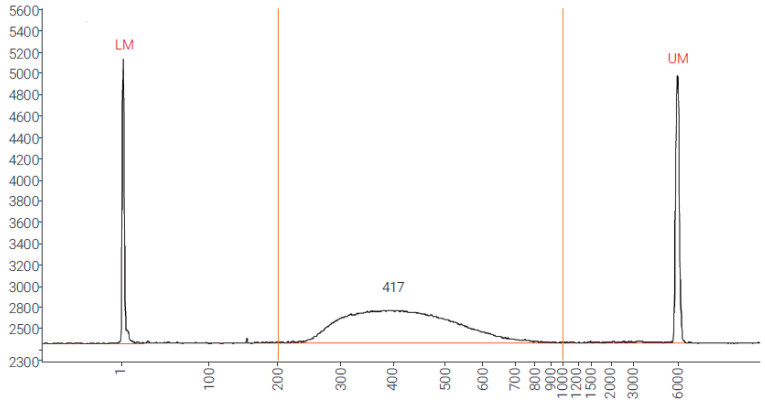
NGS libraries

Equivalent sizing performance of DNA libraries

Bioanalyzer High Sensitivity DNA kit



Fragment Analyzer High Sensitivity (HS) NGS kit



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

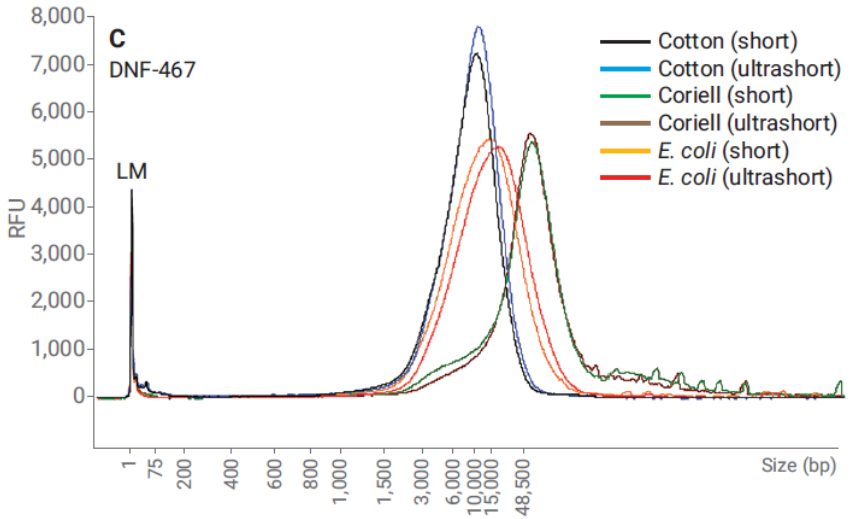
For comparison see Figure 1 Agilent Publication number 5994-4575EN

Additional DNA Assays for the Fragment Analyzer Systems

Specific assays for gDNA and cfDNA available

Genomic DNA (gDNA)

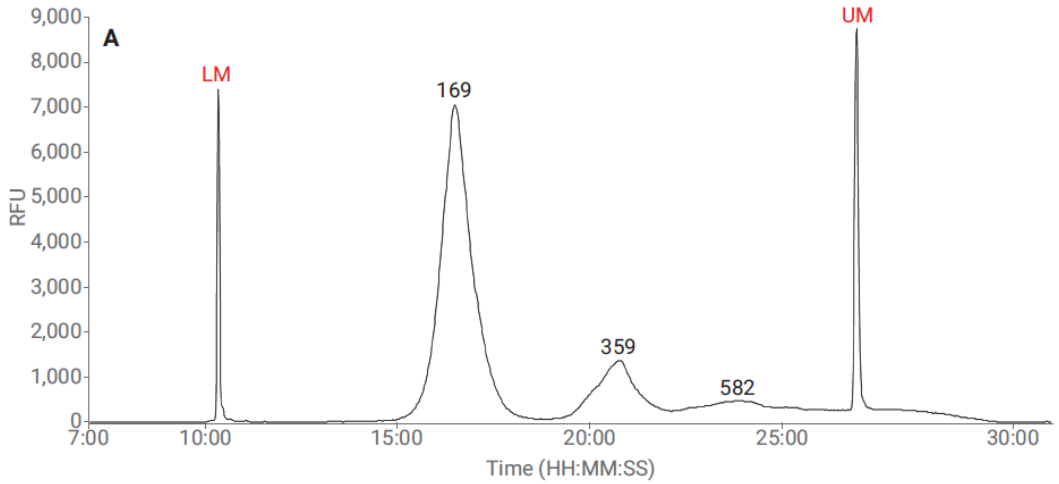
Genomic DNA 50 kb kit



For comparison see Figure 1 Agilent Publication number 5994-0511EN

Cell-free DNA (cfDNA)

HS Small Fragment kit

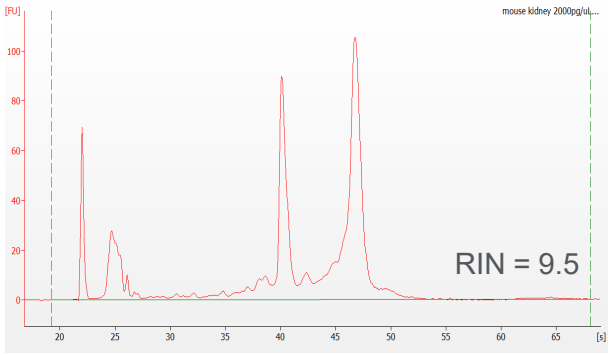


For comparison see Figure 1 Agilent Publication number 5994-0510EN

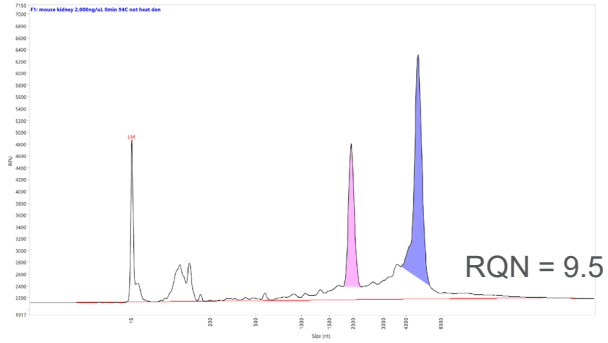
Equivalent RNA Quality Metrics

Total RNA

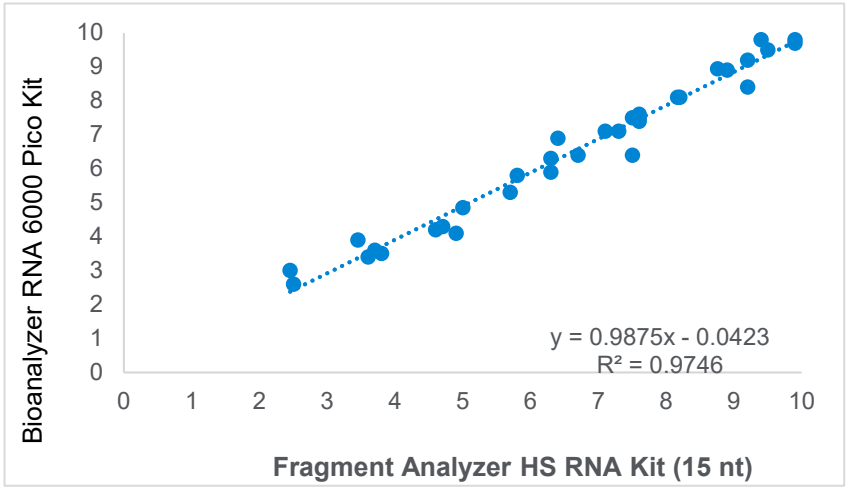
Bioanalyzer RNA 6000 Nano kit



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

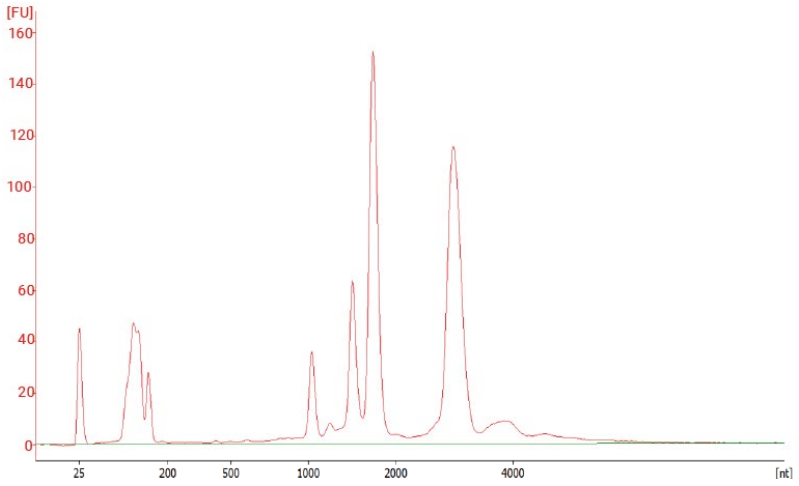
For comparison see Figure 2 and 3 Agilent Publication number 5994-1860EN

RNA Data Comparison

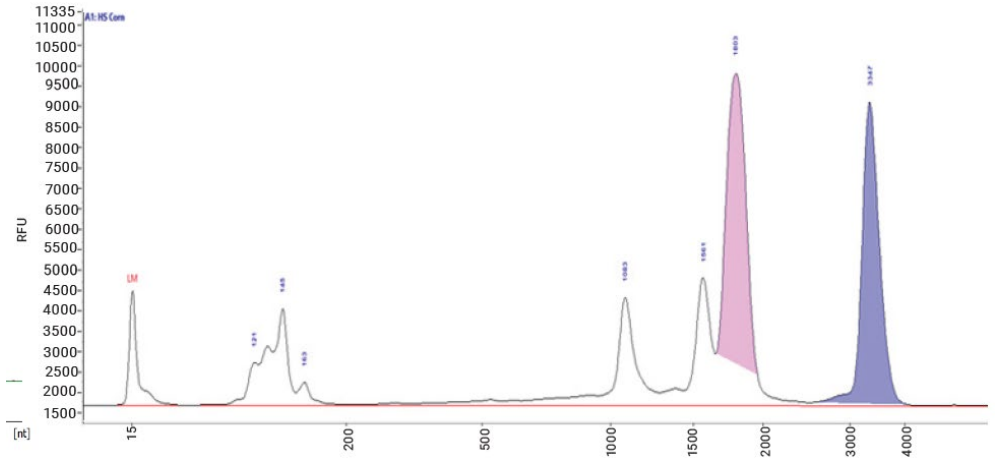
Total RNA

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

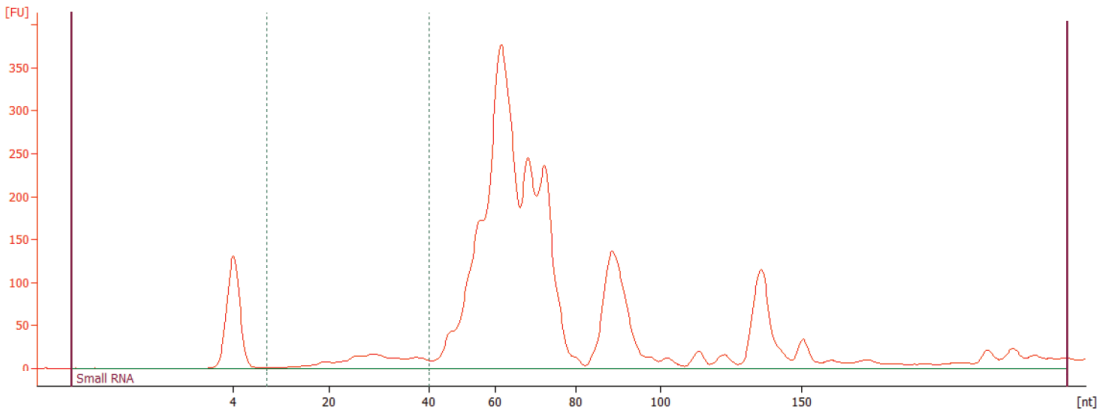
For comparison see Figure 1, Agilent Publication number 5994-5648EN

RNA Data Comparison

Small RNA

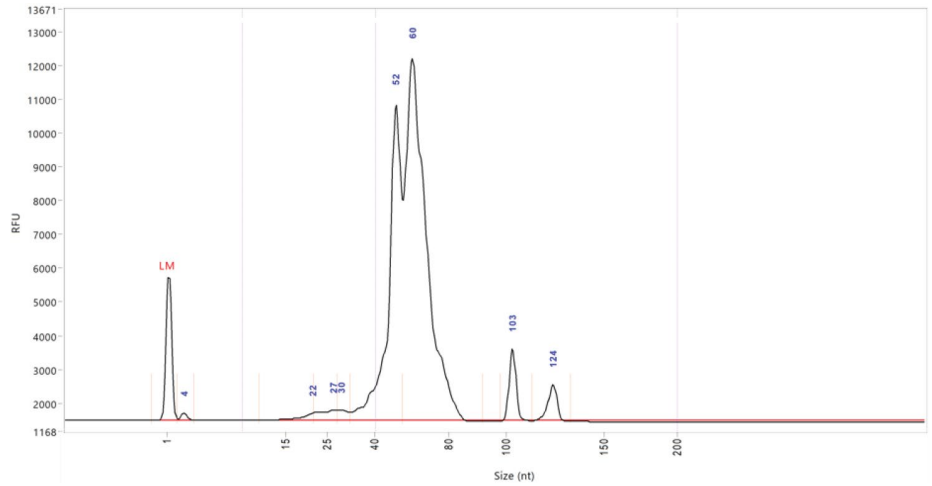
Accurate quality control of small RNA samples

Bioanalyzer Small RNA kit



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

Fragment Analyzer Small RNA kit



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

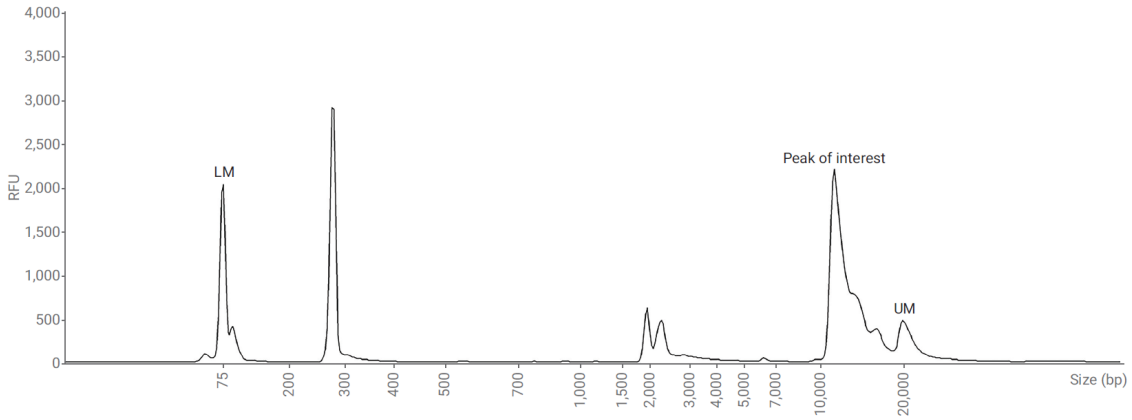
For comparison see Figure 2, Agilent Publication number 5994-4860EN

Additional Assays for the Fragment Analyzer Systems

PCR products and IVT RNA

Sensitive and reliable quality control analysis of the IVT RNA workflow

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



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

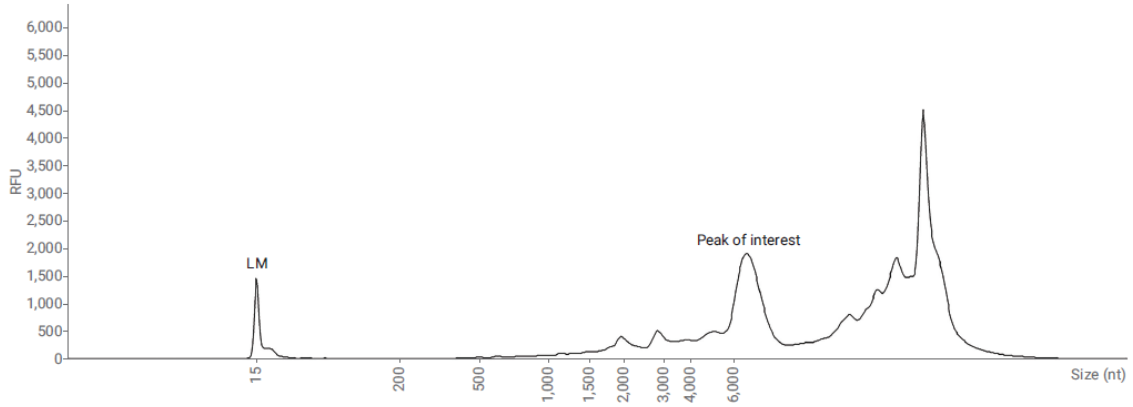


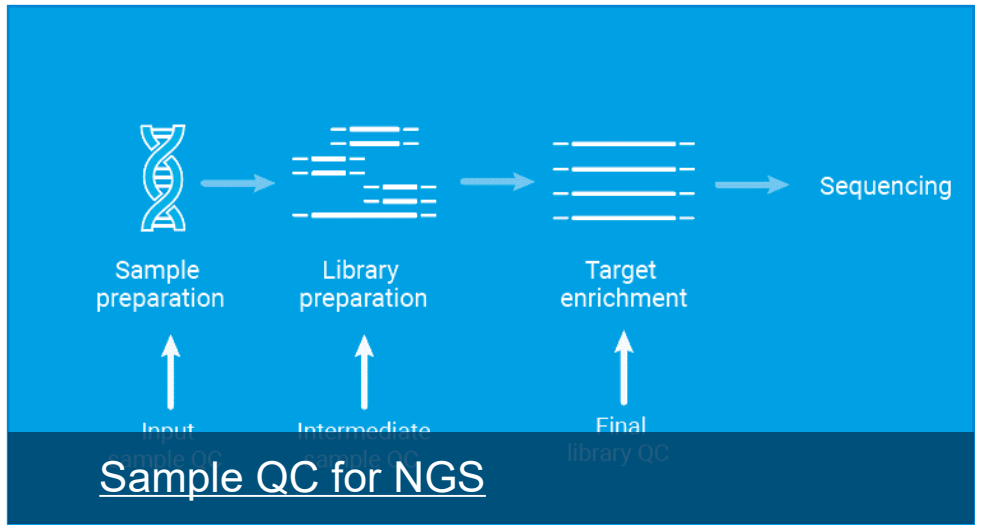
Figure 4 and 6 Agilent Publication number 5994-0512EN

For further reading see also Agilent Publication number 5994-0878EN

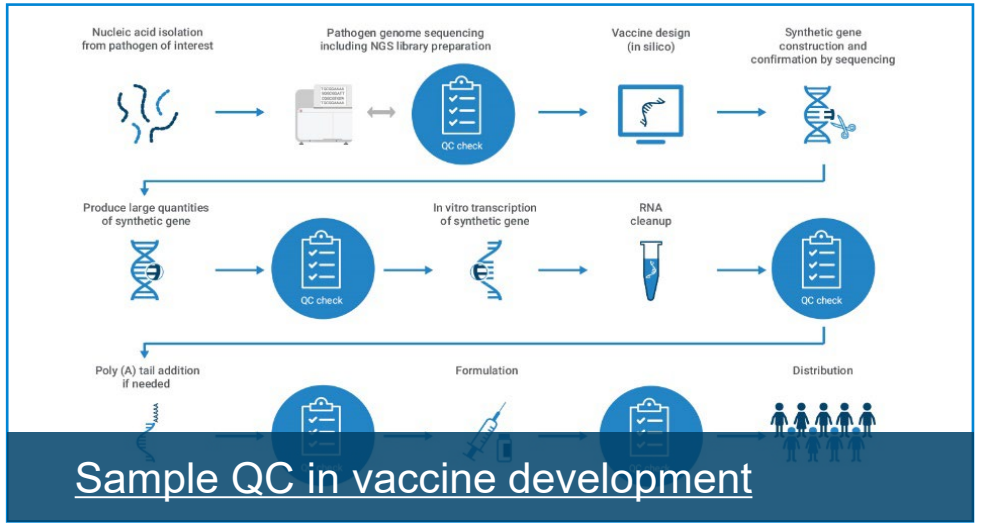
Additional Information

Resources

Learn More About the Agilent Sample Quality Control Solutions



Sample QC for NGS



Sample QC in vaccine development

Sample QC for biobanks

Interactive lab for sample QC

Available On-demand Webinars

Importance of QC in NGS library preparation	2018	Link
Biobank sample quality control	2019	Link
Monitoring nucleic acid integrity during long-term storage with automated electrophoresis	2020	Link
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

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Trusted Answers

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