



quantitate host cell DNA with **high sensitivity** and **throughput**

resDNASEQ® Host Cell DNA Quantitation Systems:
CHO, *E. coli*, Vero, NS0

Precision counts

Integrated real-time qPCR systems for quantitation of host cell DNA with manual or automated sample prep

The Life Technologies resDNASEQ® Host Cell Residual DNA Quantitation Systems (Figure 1) measure levels of residual DNA from common host cell lines used in the production of biopharmaceutical products. The systems offer:

- Optimized sample preparation for quantitative recovery from complex matrices
- High-sensitivity quantitation using proven real-time qPCR technology
- Specificity for target host cell DNA; no cross-reactivity with unrelated DNA
- Consistent performance across the expected range of DNA fragment sizes
- Accurate, reliable, and reproducible results

Assays are available for the following commonly used cell lines: Chinese hamster ovary (CHO), *E. coli*, NS0, and Vero.

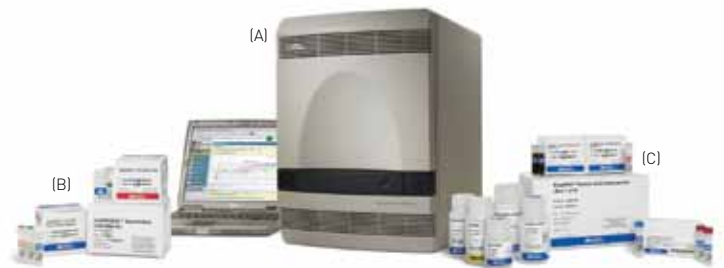


Figure 1. Components of the resDNASEQ® Host Cell Residual DNA Quantitation System. (A) 7500 FAST Real-Time Instrument, AccuSEQ™ or SDS v1.4 Software, and optional 21 CFR Part 11 Module; (B) resDNASEQ® Host Cell Residual DNA Quantitation Kit; (C) PrepSEQ™ Residual DNA Sample Preparation Kit plus Module R.

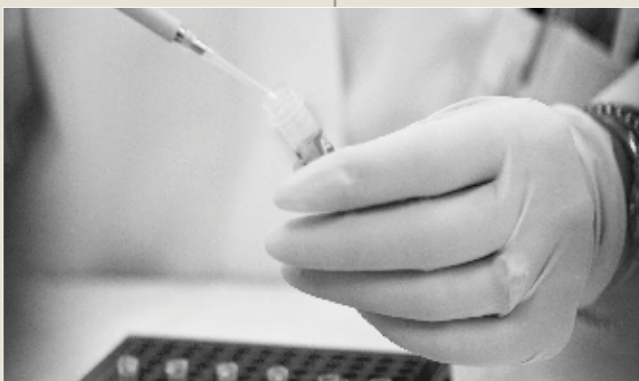
Components of the resDNASEQ® Host Cell Residual DNA Quantitation Systems include:

- TaqMan® primer and probe mix
- TaqMan® master mix
- Host cell genomic DNA standard
- Negative control

Components of the PrepSEQ™ Residual DNA Sample Preparation Kit include:

- PrepSEQ™ Core Nucleic Acid Extraction Kit
- PrepSEQ™ Residual DNA Module

Manual Sample Preparation



Sample Collection



Automated Sample Preparation

Recover DNA from complex matrices efficiently

The PrepSEQ™ Residual DNA Sample Preparation Kit and protocols are optimized to enable highly efficient DNA recovery from typical biopharmaceutical purification process samples. Consistent performance has been demonstrated across a wide variety of complex test sample matrices. We have also verified recovery of CHO DNA spiked into the following matrices:

- Acetate (20 mM) pH 3.5
- Acetate (500 mM) pH 3.5
- HCl (12 mM) pH 3.0
- Glycine (20 mM) pH 2.0
- Glycine (500 mM) pH 2.0
- Acetate/NaCl (300 mM/0.5 M) pH 4.5
- MES/NaCl (300 mM/0.5 M) pH 6.5
- Bis (300 mM) pH 6.5; MES (300 mM) pH 6.0
- Phosphate (300 mM) pH 5.0
- Tris (50 mM) pH 8.0

Table 1. DNA Recovery Using the Manual PrepSEQ™ Sample Preparation Protocol. Assay performance data from independent validation study using 10 pg CHO genomic DNA spike per sample, 2 analysts, 3 assays each, 15 test samples.

Typical Antibody Drug Substance		
	Mean recovery	Mean %CV
CHO	89%	6.8%

Achieve efficiencies through automation

Automation of the sample preparation procedure on the MagMAX™ Express-96 Magnetic Particle Processor helps to increase throughput and efficiency. Using the automated system, host cell residual DNA can be isolated from up to 24 triplicate test samples, typically in less than 2 hours.

The MagMAX™ Express-96 Magnetic Particle Processor

- Six-fold higher throughput compared to manual protocol
- Magnetic bead capture, no vacuum or centrifugation
- Scalable to process 1–96 samples
- Easier to control cross-contamination
- Less user-to-user variability



Achieve greater sensitivity of host cell DNA quantitation

The resDNASEQ® Host Cell Residual DNA Quantitation Kits exhibit a broad dynamic range and high sensitivity (Figure 2). The limit of quantitation (LOQ) of the assays is based on recovery and quantitation of standard genomic DNA recovered from a test sample matrix consisting of 50 mg/mL IgG. Typical results for these kits are:

- CHO 1.5 pg/mL
- Vero 1.5 pg/mL
- NSO 1.5 pg/mL
- *E. coli* 15 pg/mL

Maintain consistent performance even with fragmented DNA

For the most accurate quantitation of host cell residual DNA, the assay results must be unaffected by the size of the DNA molecules present in the test sample (Figure 3).

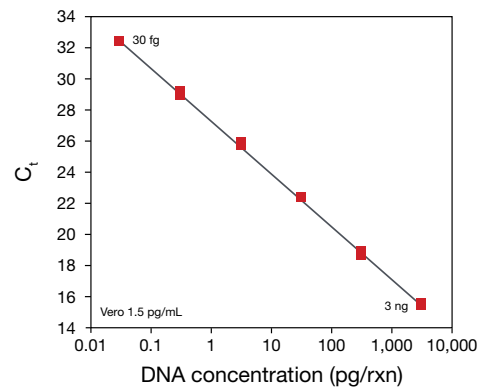
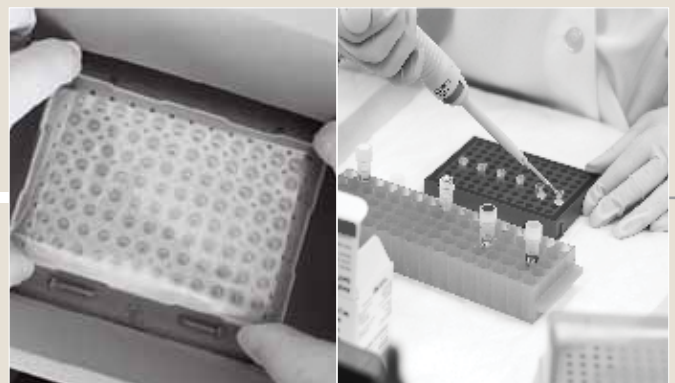


Figure 2. Standard curve generated from a 10-fold dilution series of Vero standard DNA.



Real-Time PCR



Analyze and interpret data with confidence

AccuSEQ™ Real-Time PCR Software is an intuitive easy-to-use analysis tool for data interpretation. The software guides the user through the experiment and plate setup and provides easy-to-use tools for defining and setting up standards, controls, and unknowns. For the standard curve, the user specifies the number of concentration points, the replicates, starting quantity, and serial dilution factor, and the software automatically generates the PCR curve (Figure 4). A customized template is available for each of the resDNASEQ® Host Cell Residual DNA Quantitation Kits. After the run is complete, the quantities of the unknown samples, mean quantity of replicates, and standard deviation of the replicates are provided in a table that can be exported to .pdf, .xls, and .txt formats.

Sample preparation, assay setup, instrument run, and data analysis can all be typically completed in less than 4 hours. Accurate same-day results help enable in-process testing within a regular work shift, reducing the need for outsourcing.

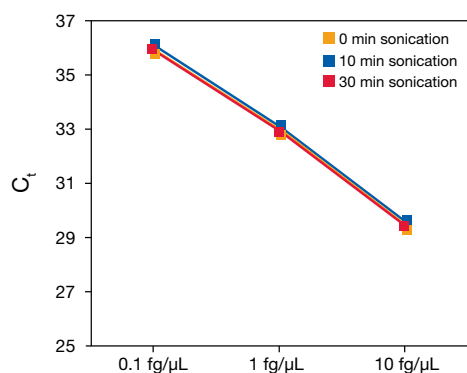


Figure 3. Analysis of fragmented DNA. Standard curve generated from high molecular weight DNA (0 min) and fragmented DNA (10 and 30 min).

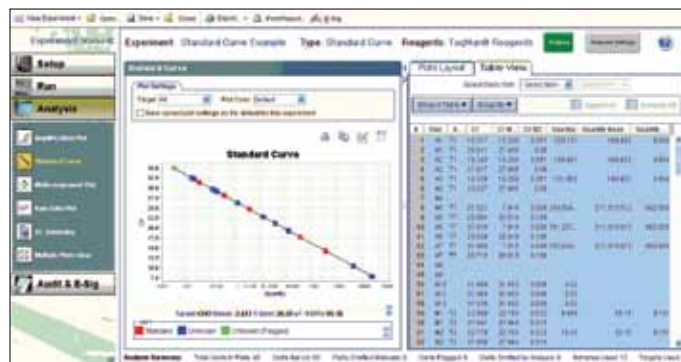


Figure 4. AccuSEQ™ software output. The software automatically generates a standard curve based on experimental parameters.

Validate quickly and efficiently

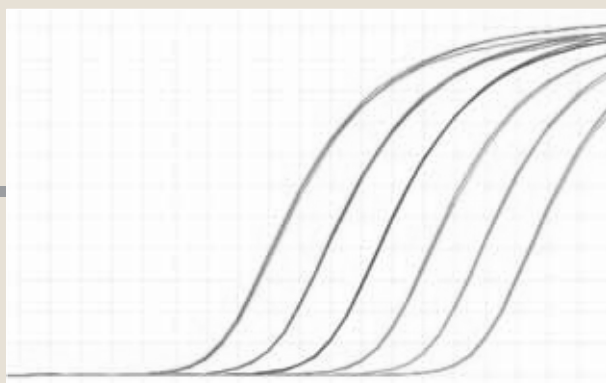
To demonstrate assay performance and provide guidance on validation study design, PrepSEQ™ and resDNASEQ® kit parameters (for the CHO kit) were tested by a biopharmaceutical contract research organization in a study designed according to ICH Q2 (R1) guidelines, Validation of Analytical Procedures. The study evaluated recovery of DNA from typical monoclonal antibody surrogate test sample matrices using the PrepSEQ™ kit, and quantitation using the resDNASEQ® kit. The PrepSEQ™ and resDNASEQ® kits met or exceeded all performance parameters tested (i.e., range, linearity, specificity, accuracy, precision, and limit of quantitation).

Benefit from expert application support

The Life Technologies distribution and service network, composed of highly trained support and application personnel, reaches 150 countries on six continents. To enable the most efficient implementation, qualification, and validation, these additional services are offered:

- IQ/OQ protocols and execution
- PQ guidance
- On-site instrument support and technical training
- Method validation guidance
- Custom assays program for a chosen host cell line

Analysis



Report

Results Summary

Sample	Target	Quantity (Mean)	Quantity (Std Dev)
Ion Exchange_1	CHO	7.36	1.01
Ion Exchange_2	CHO	8.01	0.96
Ion Exchange_3	CHO	8.13	1.23
Hydrophobic Interaction_1	CHO	7.07	0.72
Hydrophobic Interaction_2	CHO	7.18	0.27
Protein A_1	CHO	9.09	0.13
Protein A_2	CHO	8.30	.074

The removal of host cell impurities is a critical step in the purification of biopharmaceutical products.

A major challenge is the accurate and sensitive quantitation of host cell DNA impurities in both the purification process and in drug substance samples.

The ResDNASEQ® system is designed with the sensitivity to meet or exceed regulatory requirements while enabling high throughput and cost-effectiveness to enable robust process-clearance study design.

Ordering information

Description	Part Number
resDNASEQ® CHO Residual DNA Quantitation System	
resDNASEQ® Quantitative CHO DNA Kit + PrepSEQ™ Residual DNA Sample Preparation Kit with Protocol and QRC 100 rxns, with Protocol and Quick Reference Card	4415413
resDNASEQ® Quantitative CHO DNA Kit + PrepSEQ™ Residual DNA Sample Preparation Kit 100 rxns, without Protocol and Quick Reference Card	4413713
resDNASEQ® Quantitative CHO DNA Kit with Protocol and QRC 100 rxns, with Protocol and Quick Reference Card	4442731
resDNASEQ® Quantitative CHO DNA Kit 100 rxns, without Protocol and Quick Reference Card	4402085
resDNASEQ® E. coli Residual DNA Quantitation System	
resDNASEQ® Quantitative <i>E. coli</i> DNA Kit 100 rxns, without Protocol and Quick Reference Card	4458435C*
resDNASEQ® NS0 Residual DNA Quantitation System	
resDNASEQ® Quantitative NS0 DNA Kit 100 rxns, without Protocol and Quick Reference Card	4458441C*
resDNASEQ® Vero Residual DNA Quantitation System	
resDNASEQ® Quantitative Vero DNA Kit 100 rxns, without Protocol and Quick Reference Card	4458444C*
PrepSEQ™ Residual DNA Sample Preparation Kits	
PrepSEQ™ Residual DNA Sample Preparation Kit with Protocol and QRC 100 rxns, with Protocol and Quick Reference Card	4415414
PrepSEQ™ Residual DNA Sample Preparation Kit 100 rxns, without Protocol and Quick Reference Card	4413686
AccuSEQ™ Real-Time PCR Software	
AccuSEQ™ Real-Time PCR Software v1.0 Includes AccuSEQ™ Software v1.0	4443420

* To order this product, please contact us at bp@lifetech.com.

Life Technologies offers a breadth of products DNA | RNA | protein | cell culture | instruments

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