

Ion GeneStudio S5 systems and OncoPrint assays

Connecting labs everywhere with rapid
genomic profiling

Ion GeneStudio S5 systems

Oncology clinical research applications

Thermo Fisher Scientific offers complete, end-to-end next-generation sequencing (NGS) solutions on Ion GeneStudio™ S5 systems to detect relevant biomarkers in oncology with exceptional speed and accuracy.

The breadth of ready-to-use Ion Torrent™ OncoPrint™ NGS assays spans from targeted to comprehensive panels for solid tumors and hematological malignancies. OncoPrint tumor-specific panels provide additional customizable assays created from a curated inventory of pretested genes, including RNA fusions as optional targets.

These NGS assays are sensitive and easy to implement for laboratory use, and come with automation, bioinformatics, and reporting capabilities to enable sample-to-report results in a matter of days.



Simple, rapid NGS workflow with as little as 45 minutes of hands-on time

Together with Ion AmpliSeq™ technology for target selection and the Ion Chef™ System for automated library and template preparation, Ion GeneStudio S5 systems help streamline your targeted NGS workflow so you can focus on finding meaningful answers to your research questions.



Prepare

- Automated Ion AmpliSeq library preparation, template preparation, and chip loading using the Ion Chef System



Sequence

- Ion GeneStudio S5 series systems



Analyze and report

- Torrent Suite™ Software
- Ion Reporter™ Software
- Other reporting solutions*

* Reporting solutions include Ion Torrent™ OncoPrint™ Reporter, the laboratory's own software, or other third-party software.

Ion Torrent™ technology has been highly referenced in thousands of publications to date.¹ Now, you can drive research forward using this established technology with our latest innovations in a trusted benchtop sequencer.

Ion GeneStudio S5 systems

Fast, scalable NGS systems for broad applications

Ion GeneStudio S5 systems, combined with the automated library and template preparation of the Ion Chef System, enable a streamlined NGS workflow for targeted sequencing with flexibility and scalability.

Three instrument models that offer a range of sequencing speeds:

Fast



Ion GeneStudio™ S5 System

Turnaround time: 19 hours*

Flexible



Ion GeneStudio™ S5 Plus System

Turnaround time: 10 hours*

Powerful



Ion GeneStudio™ S5 Prime System

Turnaround time: 6.5 hours*

Throughput scalability and application flexibility—on the same platform. Choose the system configuration that best fits your budget and turnaround time needs.

* Sequencing and analysis time based on the Ion 540™ Chip.

Sequencing that adjusts to your laboratory's needs

Designed to optimize throughput and cost, Ion GeneStudio S5 systems use semiconductor sequencing on chips to enable flexibility for your projects. Five chip options enable a sequencing throughput range of 2 million to 130 million reads for both small and large projects.

Table 1. Ion Torrent™ sequencing chips enable a broad range of sequencing applications.



Chip type	Ion 510™ Chip	Ion 520™ Chip	Ion 530™ Chip	Ion 540™ Chip	Ion 550™ Chip
Number of reads	2–3 million	3–6 million	9–20 million	60–80 million	100–130 million

Learn more at thermofisher.com/genestudio



Solid tumor research assays

OncoPrint FFPE tissue assays for genomic profiling



Advancements in precision medicine are driving the need for NGS, as oncology research continues to explore the utility of targeted therapies and immunotherapies. NGS facilitates the simultaneous analysis of a broad range of biomarkers in one test to help maximize insights into the underlying oncogenic drivers in a timely manner.

OncoPrint NGS assays for formalin-fixed, paraffin-embedded (FFPE) tissue samples span from focused to comprehensive panels to meet your laboratory research needs, even at varying levels of NGS experience. Regardless of panel size, they offer an end-to-end solution for broad genomic profiling of solid tumors

with easy and automated workflows, fast results, and high success rates, even for challenging samples.

- **Easy**—90% less hands-on time compared to hybrid capture-based NGS assays, which require labor-intensive steps*
- **Fast**—three-day NGS results enabled by Ion Torrent technology for fast turnaround times when time matters for important insights
- **Robust**—around 94% success rate based on Ion AmpliSeq technology with low sample input requirements for more reliable results²

Table 2. OncoPrint assays for FFPE tissue genomic profiling in solid tumors.

	Ion Torrent™ OncoPrint™ Comprehensive Assay Plus	Ion Torrent™ OncoPrint™ Comprehensive Assay v3	Ion Torrent™ OncoPrint™ Focus Assay
Description	Comprehensive genomic profiling from 517 genes plus genomic signatures	Comprehensive genomic profiling from 161 genes	Broad genomic profiling from 52 genes
Sample types	Tissue	Tissue	Tissue
Number of genes	517	161	52
Alteration types	Single-nucleotide variants (SNVs), insertions and/or deletions (indels), copy number variations (CNVs), fusions	SNVs, indels, CNVs, fusions	SNVs, indels, CNVs, fusions
Genomic signatures	Homologous recombination deficiency (HRD), tumor mutational burden (TMB), microsatellite instability (MSI)	–	–
Recommended nucleic acid input amount	20 ng DNA/RNA	20 ng DNA/RNA	10 ng DNA/RNA
Turnaround time**	3 days	3 days	3 days

* One hour of hands-on time needed for the OncoPrint Comprehensive Assay Plus for library preparation and sequencing compared to competitor literature stating that 10.5 hours are needed for a manual workflow—current as of August 2025.

** Timing varies by the number of samples, sample type, and instrument used.

Note: The OncoPrint Comprehensive Assay Plus offers the latest fusion content and can be combined with other panels such as the OncoPrint Comprehensive Assay v3.



Solid tumor research assays

OncoPrint cell-free assays for liquid biopsy research

While tissue NGS is the standard for gaining insights into the biology of a tumor, liquid biopsy-based NGS is emerging as a highly sensitive method to understand resistance mechanisms as a tumor evolves. Liquid biopsies are minimally invasive and may be used as an alternative when tissue samples are not available. Moreover, liquid biopsy testing may complement tissue testing to better understand inter- and intra-tumor heterogeneity.

Ion Torrent™ OncoPrint™ cell-free assays can help lead to important insights from liquid samples, including blood, bile, cerebrospinal fluid, and urine.

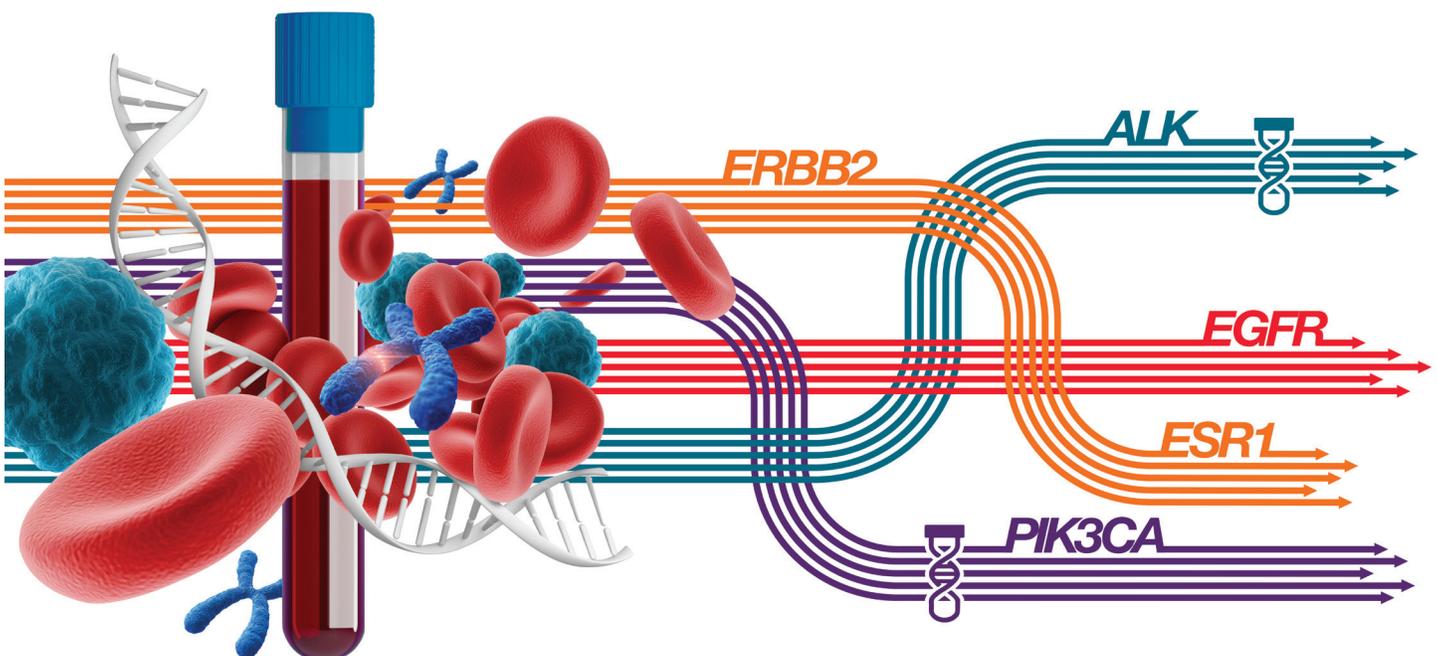
- A broad range of NGS assays for research applications across multiple solid tumor types
- Easy, fast, and automated workflows to help minimize hands-on time and maximize efficiency
- Integrated data analysis and reporting tools for easy data interpretation

Table 3. OncoPrint cell-free assays for liquid biopsy clinical research.

	Ion Torrent™ OncoPrint™ Pan-Cancer Cell-Free Assay	Ion Torrent™ OncoPrint™ Lung Cell-Free Total Nucleic Acid Research Assay	Ion Torrent™ OncoPrint™ Breast cfDNA Research Assay v2	Ion Torrent™ OncoPrint™ Colon cfDNA Assay
Description	Broad, multibiomarker NGS assay for pan-cancer analysis	Tumor-specific NGS assay focused on key genes in lung cancer	Tumor-specific NGS assay focused on key genes in breast cancer	Tumor-specific NGS assay focused on key genes in colon cancer
Number of genes	52	12	12	14
Alteration types	SNVs, indels, CNVs, fusions	SNVs, indels, CNVs, fusions	SNVs, indels, CNVs	SNVs, indels
Recommended nucleic acid input amount	20 ng cell-free total nucleic acid (cfTNA)*	20 ng cfTNA*	20 ng cell-free DNA (cfDNA)*	20 ng cfDNA*
Turnaround time**	3 days	3 days	3 days	3 days

* Input recommended to achieve 0.1% limit of detection (LOD). Lower amounts can be used.

** Timing varies by the number of samples, sample type, and instrument used.





OncoPrint assays for homologous recombination research

Homologous recombination deficiency (HRD) is a phenotype that is characterized by the inability of a cell to effectively repair DNA double-stranded breaks using the homologous recombination repair (HRR) pathway.³ HRD is becoming more relevant in research applications—especially in ovarian, breast, prostate, and pancreatic cancers—because of its sensitivity to platinum analogs and poly (adenosine diphosphate-ribose) polymerase (PARP) inhibitors, a class of anticancer agents that exhibit synthetic lethality when applied to cells defective in the HRR pathway.

OncoPrint assays provide tools for identifying both causes and consequences of HRD.

- Complete end-to-end NGS workflows for precision oncology research
- Low sample input requirements help ensure smaller samples, and thus more samples can be tested
- Highly automated with a complete bioinformatics solution, including reporting, to empower HRD assessment in your laboratory

Table 4. OncoPrint assays for HRD research.

	OncoPrint Comprehensive Assay Plus	Ion Torrent™ OncoPrint™ HRR Pathway Predesigned Panel	Ion Torrent™ OncoPrint™ BRCA Research Assay
Description	Comprehensive genomic profiling across 517 genes plus genomic signatures	HRR pathway panel relevant in ovarian, breast, prostate, and pancreatic cancers	Focused panel covering BRCA1/2 somatic and germline mutations
Sample types	Tissue	Tissue	Tissue, blood
Number of genes	517	28	2
Number of HRR genes	48	26	2
Alteration types	SNVs, indels, CNVs, fusions	SNVs, indels, CNVs	SNVs, indels, CNVs
Genomic signatures	HRD, TMB, MSI	–	–
Recommended nucleic acid input amount	20 ng DNA/RNA	20 ng DNA	20 ng DNA
Turnaround time*	3 days	3 days	3 days

* Timing varies by the number of samples, sample type, and instrument used.

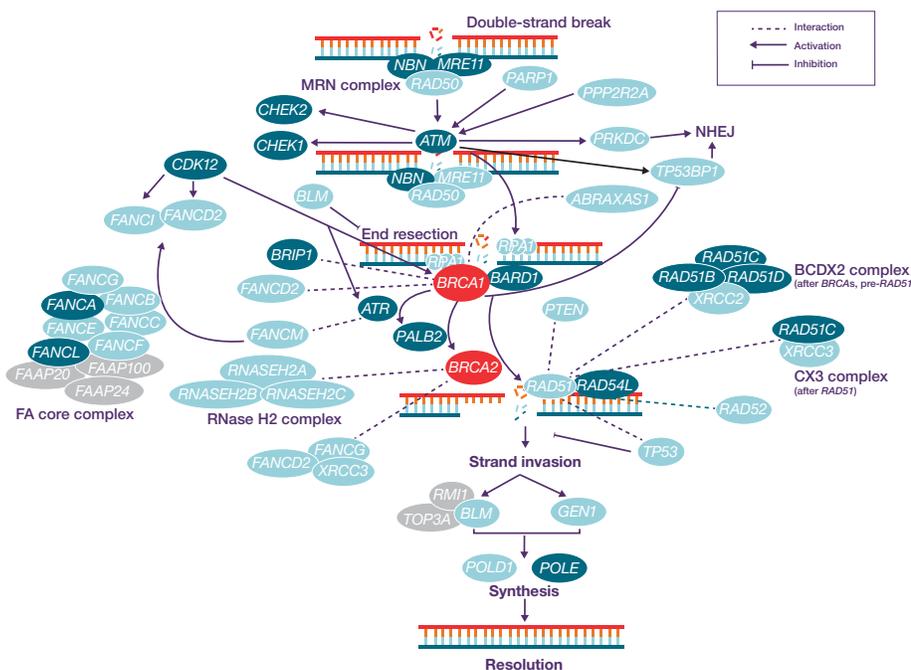


Figure 1. HRR pathway. Non-gray genes are covered by the OncoPrint Comprehensive Assay Plus. Teal genes were included in clinical trials of prostate cancer clinical research samples.



Hemato-oncology research assays

Oncomine assays for hemato-oncology research applications

Hematological malignancies are often complex and aggressive disorders, requiring fast and accurate insights. Traditional methods for studying myeloid and lymphoid malignancies are time-consuming and fragmented, involving numerous single-analyte tests and multiple technologies.

NGS streamlines this process by allowing simultaneous detection of all relevant genetic alterations across several samples at once. It offers higher sensitivity, a larger scale, and the capability to identify novel aberrations compared to traditional methods, providing a more efficient and comprehensive approach to advancing our understanding of these disorders.

Oncomine assays provide tools for genomic profiling of myeloid and lymphoid malignancies or immune repertoire analysis.

The Oncomine hemato-oncology research assay portfolio

Genomic profiling



Myeloid

- Ion Torrent™ Oncomine™ Myeloid Research Assay
- Ion Torrent™ Oncomine™ Myeloid MRD Assay (RUO)



Young adults and children

- Ion Torrent™ Oncomine™ Childhood Cancer Research Assay



Lymphoid

- Ion Torrent™ Oncomine™ Lymphoma Panel
- Ion AmpliSeq™ Liverpool Lymphoid Network Panel

Immune repertoire analysis



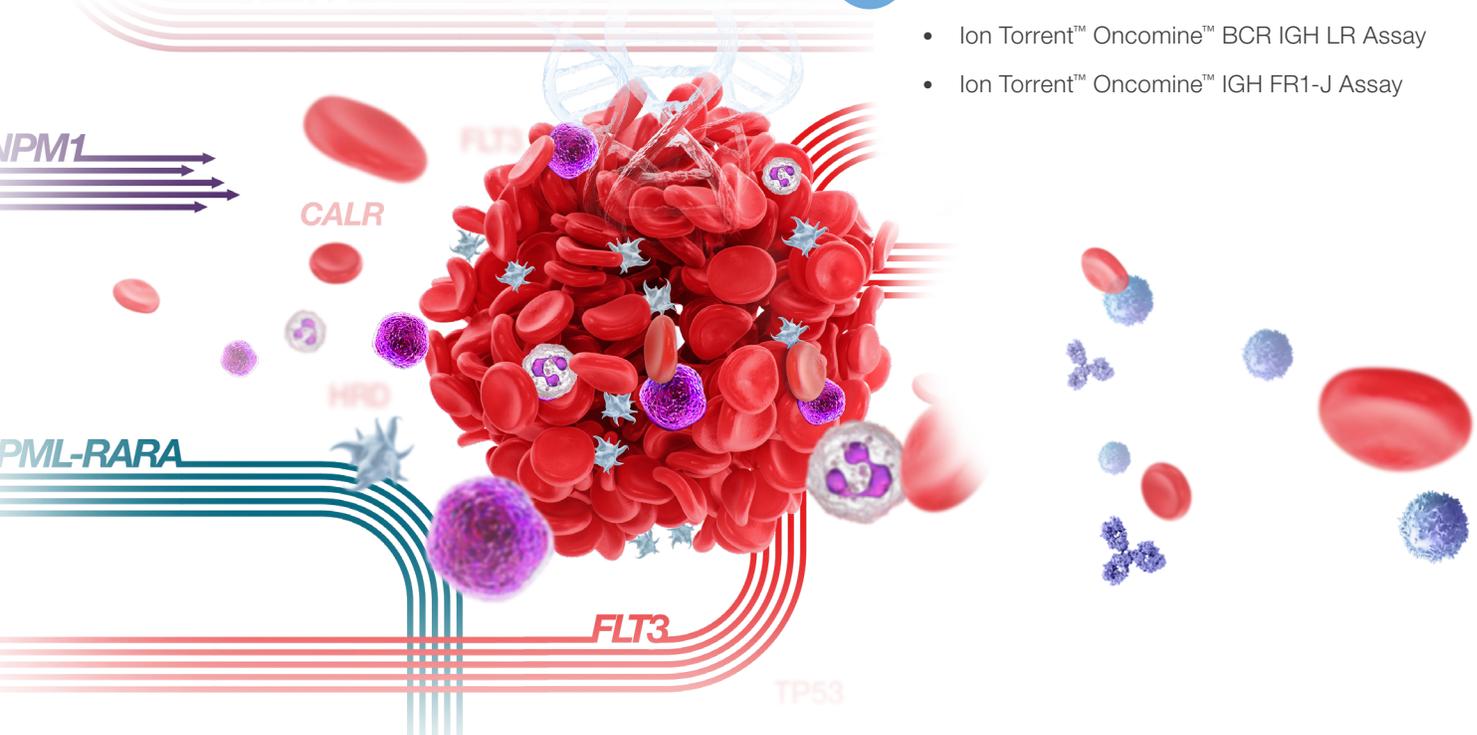
Clonality and rare clone detection

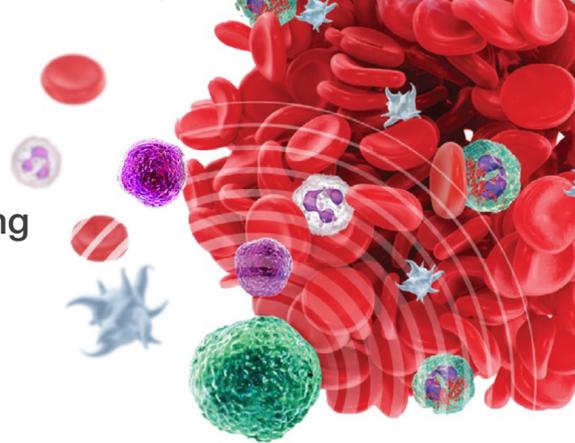
- Ion Torrent™ Oncomine™ BCR Pan-Clonality Assay
- Ion Torrent™ Oncomine™ BCR IGH SR Assay
- Ion Torrent™ Oncomine™ IGH FR3(d)-J Assay
- Ion Torrent™ Oncomine™ IGH FR2-J Assay
- Ion Torrent™ Oncomine™ TCR Pan-Clonality Assay
- Ion Torrent™ Oncomine™ TCR Beta-SR Assay
- Ion Torrent™ Oncomine™ TCR Beta-LR Assay



Somatic hypermutation

- Ion Torrent™ Oncomine™ BCR IGHV Leader-J Assay
- Ion Torrent™ Oncomine™ BCR IGH LR Assay
- Ion Torrent™ Oncomine™ IGH FR1-J Assay





OncoPrint hemato-oncology assays for genomic profiling

Explore our comprehensive portfolio of NGS testing solutions designed to enhance your understanding of hematological malignancies. Our assays support multiple research applications for the analysis of myeloid and lymphoid malignancy samples.

- **Rapid and comprehensive detection**—detect multiple relevant and novel alterations from DNA and RNA inputs, with results typically available in just 3 days
- **Efficient workflows**—easily transition from sample to annotated variant report with our integrated and automated workflows, significantly reducing hands-on time
- **An extensive assay menu**—access a broad selection of assays tailored for key hemato-oncology genomic profiling applications, meeting all the needs of your laboratory

Table 5. Ion Torrent™ OncoPrint™ and Ion AmpliSeq™ hemato-oncology research assays.

	OncoPrint Myeloid Research Assay	OncoPrint Myeloid MRD Assay	OncoPrint Lymphoma Panel	Ion AmpliSeq Liverpool Lymphoid Network Panel	OncoPrint Childhood Cancer Research Assay
Description	Genomic profiling of myeloid malignancy samples	Measurable residual disease (MRD) detection for myeloid malignancy samples	Genomic profiling of lymphoma samples	Genomic profiling of lymphoid malignancy samples	Comprehensive profiling of cancers associated with children and young adults
Sample types	Blood, bone marrow	Blood, bone marrow	Tissue, blood, bone marrow	Tissue, blood, bone marrow	Tissue, blood, bone marrow
Number of genes	40 genes (DNA), 29 fusion drivers (RNA), and 5 expression control genes	33 gene (DNA), 42 fusion drivers (RNA)	25 genes (DNA)	60 genes (DNA)	138 genes (DNA), 28 CNVs (DNA), 91 fusion drivers (RNA), 9 expression genes (RNA)
Alteration types	SNVs, indels, fusions, gene expression	SNVs, indels, fusions	SNVs, indels	SNVs, indels	SNVs, indels, fusions, CNVs, gene expression
Recommended nucleic acid input amount	10 ng DNA or RNA	10 ng RNA, 120 ng DNA	20 ng DNA	10 ng DNA	10 ng DNA or RNA
Turnaround time*	3 days	3 days	3 days	3 days	3 days

* Timing varies by the number of samples, sample type, and instrument used.



Oncomine immune repertoire research assays

Ion Torrent™ Oncomine™ immune repertoire research assays offer a robust suite of solutions for profiling the immune repertoire. They provide highly sensitive NGS capabilities to accurately assess clonality and detect biomarkers associated with MRD across various lymphoid malignancy sample types.

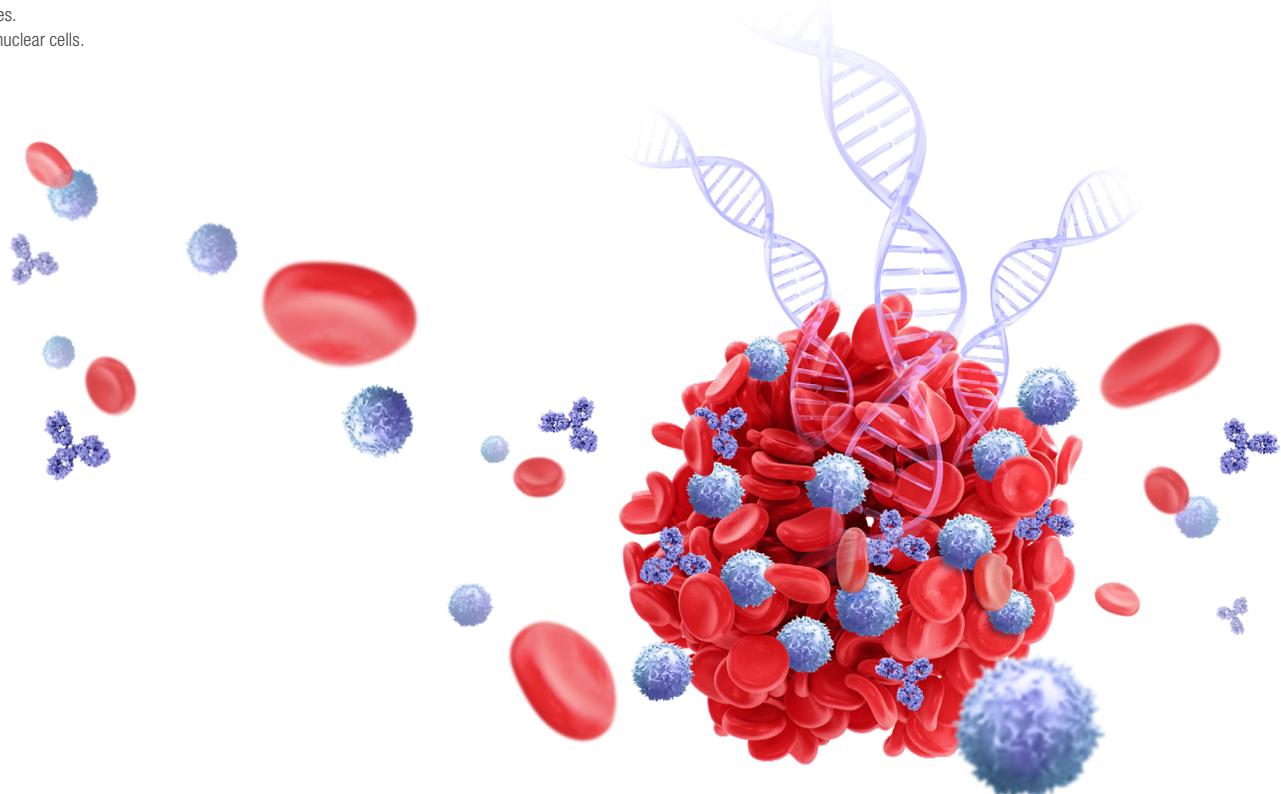
- **Maximize clone detection**—sequence multiple B cell and T cell receptor targets in a single reaction to enhance clone detection rates
- **Ultrasensitive analysis**—identify rare clones for MRD analysis with an ultralow LOD down to 10⁻⁶
- **Precise SHM measurement**—accurately measure the level of somatic hypermutation (SHM) in immunoglobulin heavy chain variable (IGHV) genes, leveraging the ultralow substitution error rate of Ion GeneStudio S5 systems

Immune repertoire assay summary

Assay	Target(s)	Nucleic acid input	Sample types	Application(s)
Oncomine BCR Pan-Clonality Assay	BCR IGH (FR3-J), IGK, IGL, KDE/C-int	gDNA	Whole blood; bone marrow; PBLs;* PBMCs;** FFPE sorted cells; fresh, frozen, and FFPE-preserved tissue samples	Clonality, MRD research
Oncomine BCR IGH SR Assay	BCR IGH (FR3-J)	gDNA, RNA		
Oncomine IGH FR3(d)-J Assay	BCR IGH (FR3(d)-J)	gDNA		
Oncomine IGH FR2-J Assay	BCR IGH (FR2-J)	gDNA		
Oncomine TCR Pan-Clonality Assay	TCRB, TCRG	gDNA		
Oncomine BCR IGHV Leader-J Assay	BCR IGH (Leader-J)	gDNA	Whole blood, bone marrow, PBLs, PBMCs, sorted cells	Somatic hypermutation research
Oncomine BCR IGH LR Assay	BCR IGHV (FR1-C)	Non-FFPE RNA	Whole blood, bone marrow, PBLs, PBMCs, fresh and frozen samples	
Oncomine IGH FR1-J Assay	BCR IGH (FR1-J)	Non-FFPE RNA		

* PBLs: peripheral blood leukocytes.

** PBMCs: peripheral blood mononuclear cells.





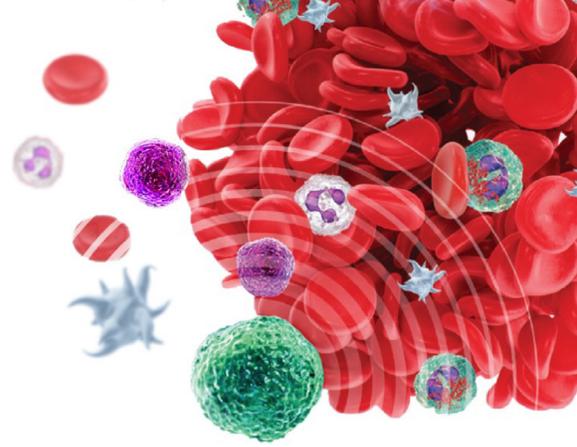
Custom assays

OncoPrint tumor-specific panels for cancer research

Ion Torrent™ OncoPrint™ tumor-specific panels (TSPs) are small, curated panels with verified performance complementing the portfolio of OncoPrint assays. They are part of an end-to-end solution for clinical cancer research on specific tumors, such as bladder, prostate, melanoma, and others, from FFPE tissue samples.

Summary of key features:

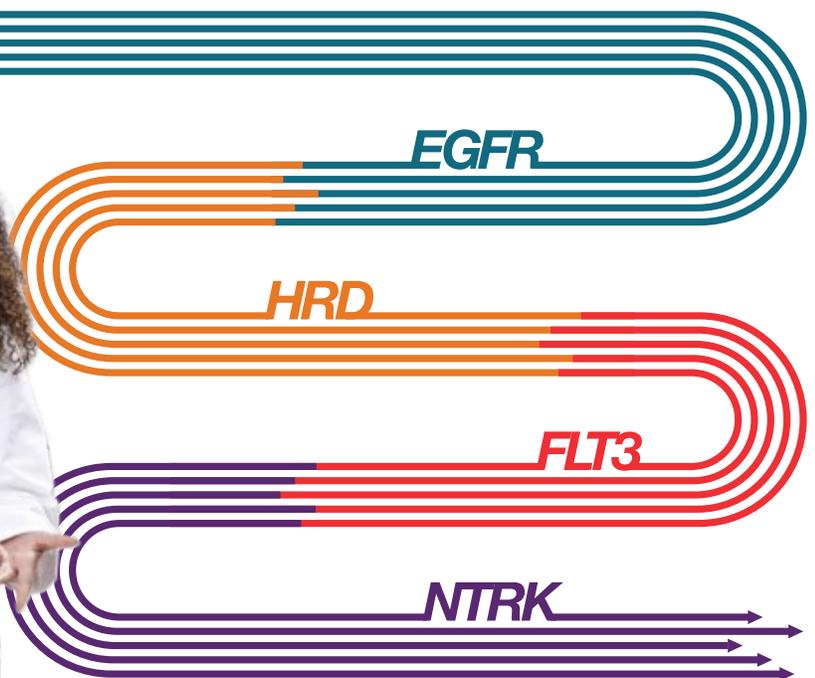
- Small, tumor-specific panels with >300 pretested genes and fusion drivers from which to select
- Low sample input requirements and robust performance from FFPE tissue samples
- An end-to-end workflow including bioinformatics and a reporting solution on Ion Reporter Software
- Specialized support team assistance for assay verification



OncoPrint TSPs are predesigned, wet-lab tested, and verified to work with Ion GeneStudio S5 systems. Select from the following panels or create your own:

- Ion Torrent™ OncoPrint™ Bladder Panel
- Ion Torrent™ OncoPrint™ BRCA Expanded Panel
- Ion Torrent™ OncoPrint™ Colorectal and Pancreatic Panel
- Ion Torrent™ OncoPrint™ Gastric and Esophageal Panel
- Ion Torrent™ OncoPrint™ Gynecological Panel
- Ion Torrent™ OncoPrint™ HRR Pathway Predesigned Panel
- Ion Torrent™ OncoPrint™ Kidney Panel
- Ion Torrent™ OncoPrint™ Liver Panel
- Ion Torrent™ OncoPrint™ Lymphoma Panel
- Ion Torrent™ OncoPrint™ Melanoma Panel
- Ion Torrent™ OncoPrint™ Prostate Panel
- Ion Torrent™ OncoPrint™ Tumor Specific RNA Panel

Learn more at thermofisher.com/ampliseq-oncoPrint



Here for every step of your NGS journey

Thermo Fisher Scientific customers benefit from excellent service and support that helps enable them to achieve success in their journey with NGS.*

Service and support for Oncomine™ Solutions users





Oncology clinical research applications for Ion GeneStudio S5 systems

Solid tumor genomic profiling assays

- Tissue assays
 - Oncomine Comprehensive Assay Plus
 - Oncomine Comprehensive Assay v3
 - Oncomine Focus Assay
 - Oncomine *BRCA* Research Assay
 - Oncomine TSPs
 - Ion Torrent™ Oncomine™ Tumor Mutation Load Assay
- Liquid biopsy assays
 - Oncomine Pan-Cancer Cell-Free Assay
 - Oncomine Lung Cell-Free Total Nucleic Acid Research Assay

- Oncomine Breast cfDNA Research Assay v2
- Oncomine Colon cfDNA Assay

Hemato-oncology research assays

- Genomic profiling assays
 - Oncomine Myeloid Research Assay
 - Oncomine Myeloid MRD Assay (RUO)
 - Oncomine Childhood Cancer Research Assay
 - Oncomine Lymphoma Panel
 - Ion AmpliSeq Liverpool Lymphoid Network Panel

- Immune repertoire assays
 - Oncomine BCR Pan-Clonality Assay
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 - Oncomine IGH FR3(d)-J Assay
 - Oncomine IGH FR2-J Assay
 - Oncomine TCR Pan-Clonality Assay
 - Oncomine TCR Beta-SR Assay
 - Oncomine TCR Beta-LR Assay
 - Oncomine BCR IGHV Leader-J Assay
 - Oncomine BCR IGH LR Assay
 - Oncomine IGH FR1-J Assay

Additional custom NGS testing solutions

Need something else? If there is not an Oncomine assay or panel available that is right for you, our custom menu services can help. Whether you are interested in just a few regions or hundreds of targets, custom Ion AmpliSeq panels can be designed to meet your NGS testing needs.

You can get help selecting the custom panel type and design strategy that best fit your needs by using the Ion AmpliSeq™ Designer online tool at ampliseq.com or by talking to one of our knowledgeable representatives.

References

1. Internal data on file.
2. Jantus-Lewintre E, Rappa A, Ruano D et al. (2025) Multicenter in-house evaluation of an amplicon-based next-generation sequencing panel for comprehensive molecular profiling. *Mol Diagn Ther* 29(2):249–261.
3. Stewart MD, Merino Vega D, Arend RC et al. (2022) Homologous recombination deficiency: Concepts, definitions, and assays. *Oncologist* 27(3):167–174.

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