iScan® System

A cutting-edge array scanner that supports rapid, sensitive, and accurate imaging of Illumina BeadChips for exceptional genetic analysis results.

Highlights

- **Exceptional Data Quality**
  Proven Infinium® assays produce high call rates and provide exceptional coverage
- **High Sample Throughput**
  Fast optical scanner dramatically reduces scan times, while optimized automation features maximize output
- **Flexible Configuration**
  Multiple formats, applications, and automation options

A Flexible, Scalable System

As Illumina array products increase in complexity, with higher densities and a greater number of features, it is important to have a scanner that keeps pace. The cutting-edge iScan System is an array scanner that supports rapid, sensitive, and accurate imaging of Infinium BeadArray™ products (Figure 1). This high-resolution scanner was designed and optimized to deliver high-quality data for a broad range of applications with the flexibility to meet a variety of throughput needs.

The iScan System supports the complete portfolio of innovative Illumina assays for genotyping, copy number variation (CNV) analysis, and DNA methylation. In addition, the scanner is compatible with the AutoLoader 2.x and liquid-handling robotics, which reduces hands-on time and enables 24 hour a day scanning (Table 1). Scanners and components are modular, creating a tunable system that can be configured to meet any level of throughput needed.

Innovative Imaging System

The iScan System uses high-performance lasers, optics, and detection systems to offer submicron resolution and unmatched throughput. The result is extremely rapid scan times without sacrificing data quality or reproducibility.

With a high signal-to-noise ratio, high sensitivity, a low limit of detection, and a broad dynamic range, the iScan System produces exceptional data quality for use in any biomarker screening or validation study. The high call rates (> 99% with the Infinium Assay) enable powerful population screening studies and high-resolution CNV analysis, accurately detecting even single copy number changes. The iScan System is ideally suited for fast, accurate screening in agrigenomics or for complex disease validation studies. With sensitive measurements and a wide dynamic range, the system also offers excellent performance for methylation profiling studies.

Figure 1: The iScan System—A fully automated system compatible with autoloading robotics and laboratory information management systems (LIMS) offers a robust, high-throughput scanning solution.

Table 1: The iScan System at a Glance

Feature	Description
Average scan time per sample (Infinium Omni2.5-8 BeadChip)	11.4 minutes
Average samples per week[a] (manual)[b] (Infinium Omni2.5-8 BeadChip)	256
Avg. samples per week (automated)[c] (Infinium Omni2.5-8 BeadChip)	608

a. Five-day work week.
b. Manual: 1 FTE, 1 iScan System, 16 BeadChips/batch, 2 batches/FTE/Tecan robot
c. Automated: 1 FTE, 1 iScan System, 2 Tecan robots, 1 AutoLoader 2.x, 24 BeadChips/batch, 2 batches/FTE/Tecan robot.

High-Throughput Readout

Recent BeadArray product density advances have increased genomic coverage for whole-genome and population genotyping studies, increased resolution for cytogenetics and CNV detection, and increased sample throughput for DNA methylation and focused genotyping products. The iScan System features advanced laser and optical components, capable of handling even the highest density multisample arrays, producing high-quality data with rapid turnaround times (Table 2).

By scanning BeadChips in minutes rather than hours, labs can process project samples in record time. This dramatic drop in analysis time translates directly into faster time to results and reduced project costs.

Table 2: Weekly Throughput of Selected Illumina BeadChips with a Single iScan System

	Approximate Scan Time (minutes) Per Sample	With AutoLoader 2.x (Samples Per Day)
Infinium Omni5-4	26	55
Infinium MethylationEPIC	4.6	313
Infinium Multi-Ethnic Global-8	11.4	126
Infinium OmniExpress-24	7.5	576
Infinium HumanCytoSNP-12	2.9	496
Infinium iSelect 24-HD	1	1440
Infinium iSelect 96-XT	0.5	2880

Fully Automation Compatible

For labs with throughput requirements that exceed the capacity of manual operation, Illumina offers optional equipment and software to automate the system. This increases the throughput of assay sample processing and supports 24 hour a day scanning.

Liquid-Handling Robot

A customized Tecan liquid-handling robot (ordered from, and supported by, Illumina) can be included with the iScan System to automate assay protocols. To reduce labor requirements and ensure consistent processing, the entire Infinium assay pre- and post-PCR workflows (after optional DNA quantitation) can be performed by the robot.

This configuration of scanner plus robot yields outstanding reproducibility and high throughput. User-to-user variability is eliminated with uniform robotic pipetting.

AutoLoader 2.x

For walk-away BeadChip loading and scanning with the iScan System, Illumina offers the AutoLoader 2.x. The AutoLoader maximizes scanner use by providing continuous, unattended operation and the ability to load 1 or 2 scanners at a time. This enables processing of thousands of samples per week, resulting in improved assay efficiency while decreasing overall cost. The AutoLoader has a minimal footprint, so that even a dual-scanner configuration easily fits on a typical lab bench (Figure 2).

LIMS Integration

Accurate sample information, workflow enforcement, and data tracking are ensured with an optional integrated Illumina Laboratory Information Management System (LIMS) designed specifically for Infinium products. Illumina LIMS features an easy-to-use custom interface, positive sample tracking (posID), and tools to manage entire projects.

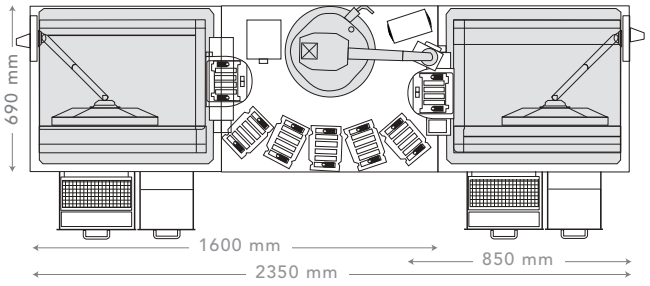

Figure 2: Dual Scanner AutoLoader 2.x Configuration Example—Two iScan Systems with an AutoLoader 2.x fit easily on typical lab benches. System height excluding monitor is 510 mm. Additional configurations of the iScan System with AutoLoaders are possible.

Samples are validated and followed throughout the workflow to ensure correct assay processing. Integrated tools support project management tasks such as managing concurrent projects, tracking progress and viewing queues, and assigning samples to a project, principal investigator, or institution. Downstream processes, such as generating and emailing notifications and reports, are performed automatically. A fully automated LIMS-controlled iScan System reduces the burden on support staff and minimizes costly errors when processing hundreds or thousands of samples per day.

Workstation and Software

The iScan System includes an instrument control computer that controls all aspects of the scanner. This automated system provides laser control, precision mechanics control (including focus motor), detection of excitation signals, image registration, image extraction, and data output (Table 3).

Illumina GenomeStudio® software supports data analysis, featuring visualization tools, advanced data manipulation attributes, and extensive reporting capabilities. GenomeStudio software consists of application-specific modules with a common framework. This modular architecture makes the iScan System a truly multipurpose instrument for wide-ranging genetic analysis, while providing a consistent user environment and tools for integrated analysis.

Installation and Support

Comprehensive installation and training are included with every scanner purchase. Field Application Scientists perform extensive on-site training for the purchased array application following installation by a Field Service Engineer. Illumina Technical Support Scientists provide ongoing technical support.

Warranty and Service

Illumina has one of the best service organizations in the industry, with a strong drive to ensure customer satisfaction. A comprehensive 12-month warranty that covers the scanner, hardware, accessories, and installed option packages is included with each system purchase. The Standard Warranty includes:

- Emergency on-site service calls during normal business hours
- One on-site preventive maintenance service
- Software upgrades for the applications purchased
- Parts, labor, and consumables for system maintenance or repairs
- Phone support and assistance

Flexible extended warranty options make sure that every system continues to operate at optimum performance.

Summary

The cutting-edge iScan System offers an accessible entry point into high-throughput array studies, with no compromises in terms of data quality or coverage levels. It also supports a wide breadth of applications. The system includes access to dedicated, expert-level support, ensuring that users get the most out of their array system for high-quality genetic analysis studies.

To learn more about Illumina genetic analysis products, visit www.illumina.com.

iScan System Specifications

Parameter	Specification
Pixel Resolution	0.53 µm
Laser Excitation	532 nm and 658 nm dual-laser excitation
Image File Output	TIFF or JPG data file output with automatic image quality analysis (uncompressed or compressed)
System Dimensions (W × H × D)	52 cm × 45 cm × 66 cm
Air Table Dimensions (W × H × D)	61 cm × 6 cm × 69 cm
Weight	65 kg

Site Requirements

Parameter	Specification
Power	Dedicated circuit, 100–120/200–240 VAC, 50/60 Hz, 360 VA, 15A for 110 V Reader/12A for 220 V Reader
Pressured Pneumatic Line	30–35 psi pressurized air for isolation table with 5 µm element filter
Environmental Conditions	• Up to 2000 m elevation • 10–30°C • 10–90% relative humidity • Overvoltage II installation category

Ordering Information

Product	Catalog No.
iScan System, 110 V/220 V	SY-101-1001
AutoLoader 2.x, Single-Scanner Configuration, 110 V/220 V	SY-202-1001
AutoLoader 2.x, Dual-Scanner Configuration, 110 V/220 V	SY-202-1002

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