

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

BeadChip	Approximate Scan Time Per Sample (minutes)		Manual Loading ¹ (Samples Per Week)		With Automation ² (Samples Per Week)	
	HiScan	iScan	HiScan	iScan	HiScan	iScan
Infinium HumanOmni5	15	26	128	128	480	272
Infinium HumanOmni2.5-8	6.5	11.4	256	256	1,088	608
Infinium HumanOmniExpress	4.1	5.0	384	384	1,728	1,440
Infinium HumanOmniExpress+	6.1	7.5	256	256	1,152	960
Infinium Methylation450K	5.0	5.0	384	384	1,440	1,440
Infinium HumanCytoSNP-12	1.8	2.9	384	384	1,728	1,728
iSelect [®] HD*	1.0	1.0	768	768	3,456	3,456
Universal-32 BeadChip for GoldenGate Genotyping	0.3	0.3	1,440	1,440	1,440	1,440

* Scan times depend on content selection.

¹ Low throughput: 1 FTE, 1 HiScan or iScan system, 16 BeadChips/batch, 2 batches/FTE.

² High throughput: 1FTE, 1 HiScan or iScan system, 2 Tecans, 1 Autoloader 2.x, 24 BeadChips/batch, 2 batches/FTE/Tecan.

High-Throughput Readout

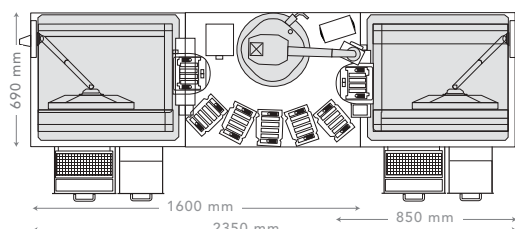
Recent BeadArray product density advancements have increased genomic coverage for whole-genome genotyping, resolution for cytogenetics and CNV detection, and sample throughput for gene expression, DNA methylation, and focused genotyping products. The HiScan and iScan systems possess the advanced laser and optics components needed to handle even the highest density multi-sample arrays, producing high-quality data with rapid turnaround times (Table 2).

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

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 per day scanning. A fully automated system under LIMS control represents the most robust and highest throughput configuration.

Figure 1: Example of a Dual Scanner-Autoloader 2.x Configuration



Two iScan systems with an AutoLoader 2.x fit easily on typical lab benches. System height excluding monitor is 510 mm. Additional configurations of iScan, HiScan, and HiScanSQ systems with AutoLoader(s) are possible. Contact your Illumina representative for measurements.

Liquid-Handling Robot

A customized Tecan liquid-handling robot (ordered from, and supported by, Illumina) can be included with either the HiScan or iScan system to automate assay protocols. The entire Infinium or GoldenGate Assay pre- and post-PCR workflows (after optional DNA quantitation) can be performed by the robot, reducing labor requirements and ensuring consistent processing.

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 walkaway BeadChip loading and scanning with either the HiScan or iScan system, Illumina offers the AutoLoader 2.x. By providing continuous, unattended operation and the ability to load one or two scanners at a time, the AutoLoader 2.x maximizes scanner use, enabling the processing of thousands of samples per week, improving assay efficiency, and decreasing overall costs. The Autoloader 2.x has a minimal footprint, so that even a dual-scanner configuration fits easily on a typical lab bench (Figure 1).

LIMS Integration

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

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, principle investigator, or institution. Downstream processes, such as generating and emailing notifications and reports, are performed automatically.

A fully automated LIMS-controlled HiScan or iScan system reduces the burden on support staff and minimizes costly errors when processing hundreds or thousands of samples per day.

Convenient Modular Design Expands Applications

The HiScan system can be easily upgraded with the SQ Module and cBot cluster generation system to enable next-generation sequencing functionality. The compact SQ Module provides all the components necessary to perform Illumina’s sequencing by synthesis (SBS) chemistry, including an integrated paired-end fluidics system for seamless second-read sequencing. This provides the HiScan system with the flexibility to take on any course of research, easily adapting to keep pace with changing research needs.

Workstation and Software

The HiScan and iScan systems include a computer workstation 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).

Data analysis is supported by Illumina’s GenomeStudio® software, 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 HiScan and iScan systems truly multi-purpose instruments for wide-ranging genetic analysis, while providing a consistent user environment and tools for integrated analysis.

Installation and Support

Comprehensive installation and training is included with every scanner purchase. Site requirements are listed in Table 4. Following installation by a Field Service Engineer, extensive on-site training is performed by an Illumina Field Applications Scientist for the purchased array application. Ongoing technical support is provided by Illumina Technical Support Scientists.

Table 4: Site Requirements

Parameter	Specification
Power	Dedicated circuit, 100–120/200–240 VAC, 50/60 Hz, 360 VA, 15A for 110V Reader/12A for 220V Reader
Pressured Pneumatic Line	30–35 psi pressurized air for isolation table with 5 µm element filter
Environmental Conditions	<ul style="list-style-type: none"> • Up to 2,000 m elevation • 10–30°C • 10–90% relative humidity • Overvoltage II installation category

Warranty and Service

Illumina has one of the industry’s best service organizations, with a strong drive to ensure customer satisfaction. A comprehensive 12-month warranty that covers the scanner, hardware and accessories, as well as installed Option Package(s), is included with each system purchase.

The Standard Warranty includes:

- Emergency on-site service calls during normal business hours
- One on-site preventative 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 ensure that every system continues to operate at optimum performance.

Summary

The HiScan and iScan systems are cutting-edge array instruments that support a wide breadth of applications. For the highest throughout, fastest time to answer, and flexibility to easily introduce next-generation sequencing into the lab, choose the HiScan

Table 3: Scanner Specifications

Parameter	HiScan	iScan
Pixel Resolution	0.375 µm	0.53 µm
Laser Excitation	532 nm and 660 nm dual-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)	TIFF or JPG data file output with automatic image quality analysis (uncompressed or compressed)
Dimensions (W x H x D)	71.9 cm x 74.5 cm x 69.9 cm	52 cm x 45 cm x 66 cm
Dimensions of Air Table (W x H x D)	N/A	61 cm x 6 cm x 69 cm
Weight	136 kg	65 kg



