

Ion Torrent Systems, Inc. - Personal Genome Machine



GENERAL DESCRIPTION:

The Ion Personal Genome Machine (PGM™) sequencer can do runs in about 2 hours, offers semiconductor scalability and is one tenth the price of other sequencers to buy and to run. A touch screen guides the user through every step of the run, making it simple to use. The PGM weighs less than 50 pounds and has a foot print that's no bigger than a desktop printer, so it can fit in any lab. The Ion Torrent Personal Genome Machine (PGM™) is simpler, more cost effective, and more scalable than any other sequencing technology. The PGM™ sequencer is a bench top system utilizing ground breaking and disruptive semiconductor technology that enables rapid and scalable sequencing experiments. Ion Torrent technology uses a massively parallel array of proprietary semiconductor sensors to perform direct real time measurement of the hydrogen ions produced during DNA replication. A high-density array of wells on the ion semiconductor chips provide millions of individual reactors while integrated fluidics allows reagents to flow over the sensor array. This unique combination of fluidics, micromachining, and semiconductor technology enable the direct translation of genetic information (DNA) to digital information (DNA sequence) rapidly generating large quantities of high quality data. The Personal Genome Machine along with Ion Torrent semiconductor chips, Ion Torrent reagent kits, and the Torrent Server /Torrent Suite software allow Ion Torrent to deliver a cutting edge sequencing solution.



TECHNICAL DESCRIPTION:

Ion Torrent combines semiconductor sequencing technology with natural biochemistry. Ion Torrent produces proprietary semiconductor chips in standard CMOS factories. Ion leverages the \$1 trillion investment that has been made in the semiconductor industry. Ion Torrent uniquely and directly benefits from four decades of exponential improvement in semiconductor technology, expressed as Moore's Law. Ion Torrent uses the simplest sequencing chemistry including natural nucleotides, no enzymatic cascade, no fluorescence, no chemiluminescence, no optics, no light. The Chip is the Machine. The Ion Chip directly detects, real-time, the natural release of the hydrogen ion as a nucleotide is incorporated into a DNA strand.

Tier Selection

Final tier assignment is based on overall product score.

● Top Tier ● Second Tier ● Third Tier
◐ Fourth Tier ● Bottom Tier

RANKINGS

	Biological	Chemical	Radiological
FIELD USE System	●	N/A	N/A
MOBILE Laboratory	●	N/A	N/A
DIAGNOSTIC Laboratory	◐	N/A	N/A
ANALYTICAL Laboratory	◐	N/A	N/A

CONTACT INFORMATION

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 A Division of Life Technologies
 7000 Shoreline Court, Suite 201
 South San Francisco, CA 94080

COST

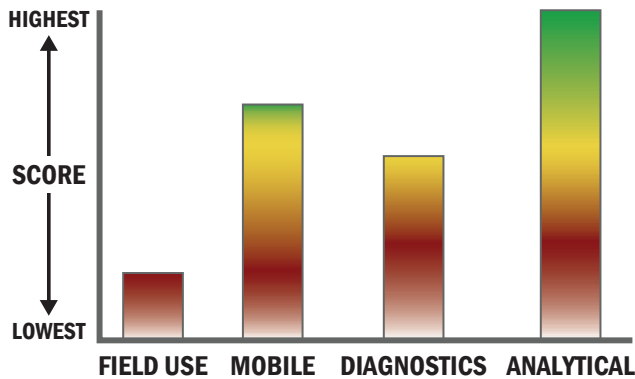
- \$66,000/system
- \$500/analysis

Survey Source

Vendor and Internet Supplied Information

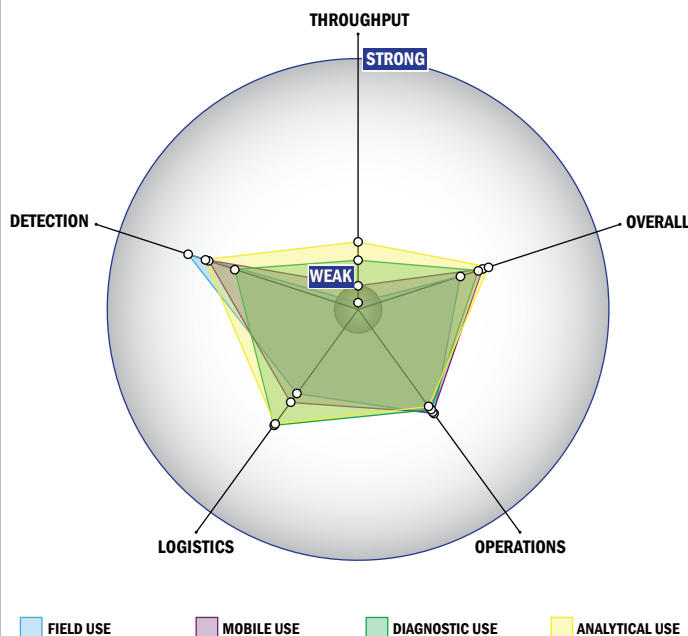
Scoring Analysis

System scores are compared across the four scenarios and ranked from highest to lowest.



Impact Chart

The Impact Chart is a spider graph representing specific categories and designed to give the reader a visual depiction of how a particular system is expected to operate across the four different scenarios. The score for each of the seven categories is presented as the percentage of the total possible score. Higher category scores extend the spokes of a graphic toward the outer edge of the chart. The area graphed for each of the four scenarios relates to how well the system performed in that scenario. Graphics for each of the four scenarios are super-imposed for ease of comparison.



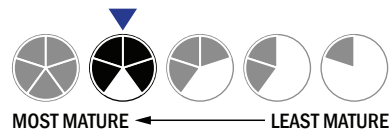
Evaluation Criteria

Throughput:

- Between 60 minutes and 8 hours for detection
- Multiple samples, multiple tests/sample per run
- Less than 32 samples every 2 hours
- The system could easily be adapted into a fully automated system
- Device or system is intended for multiple detection assays
- 5 or more solutions, buffer, eluents, and/or reagents
- 5 or more components
- Greater than 20 minutes is required for set-up
- Greater than 12 steps are required for detection

Logistics:

- A day of training and technical skills are required
- Approximately the size of a home dishwasher
- Between 25 and 50 kg
- Wired connections are available
- System or device has 110V electrical requirement



Operations:

- Can be used from 4 °C to 37 °C
- Components must be stored at 4 °C
- Device or system has peak performance at normal relative humidity conditions
- Between 6 months and 1 year shelf life
- 3-5 years expected life
- Results cannot be viewed in real-time
- The system could be adapted to a fully autonomous system with some effort
- The system software is open and available for modification
- The system hardware is open and available for modification

Detection:

- Possible the system could receive 510K clearance, no current efforts at this time
- Possible the system could receive FDA approval, no current efforts at this time
- Less than 10 µL
- Superior specificity. System has a false alarm rate approaching zero (~0%)
- 1-100 CFU per mL
- 1-100 PFU per mL
- Manual kit not integrated with the system handles spore lysis