



Company Background - October 2015

Overview

FUJIFILM Dimatix, Inc., a wholly owned subsidiary of FUJIFILM Corporation and the world's leading supplier of piezoelectric drop-on-demand inkjet products used for industrial applications, is driving a revolution in inkjet technology to support a new generation of products used for print production, industrial product decoration and materials deposition.

The company applies its innovative inkjet technologies and world-class fabrication techniques in the design and manufacture of inkjet printheads, assemblies, components and systems designed to jet a wide range of fluids in precise amounts onto all types of flexible and non-flexible surfaces.

FUJIFILM Dimatix customers include OEMs, system integrators and organizations that use the company's state of the art inkjet products and services in building cutting-edge systems or devising manufacturing processes for application in diverse markets worldwide, including graphics, electronics, flat-panel displays, the life sciences, chemistry, 3-D mechanics, optics, and photovoltaics.

FUJIFILM Dimatix invests heavily in inkjet technology, maintaining one of the most capable inkjet R&D groups in the world, with over one third of its staff actively engaged in product engineering. Over many years, the company has been awarded numerous patents and has developed multiple generations of best-in-class drop-on-demand inkjet printheads.

Founded as Spectra, Inc. in 1984, the company was renamed Dimatix in 2005 to reflect its expansion into digital materials deposition, and was acquired by FUJIFILM Corporation in 2006.

Locations

FUJIFILM Dimatix is headquartered in Santa Clara, California and maintains product development and manufacturing facilities in Santa Clara, California and Lebanon, New Hampshire. The company sells and supports its products worldwide through offices in North America, Europe, Singapore, Taiwan, Japan and China.

Technology

FUJIFILM Dimatix piezoelectric drop-on-demand inkjet printheads are recognized for their ability to sustainably jet ink and functional fluids at high frequencies without trading off drop placement accuracy. This precision at full production speed allows every jet on the printhead to operate at high throughput rates with exceptional drop placement accuracy.

Known for their high duty cycles and long service life, the company's patented printhead products also support the broadest range of ink and fluid types, enabling OEMs and systems integrators to design advanced systems that are fast, reliable and economical.

The following proprietary core technologies make FUJIFILM Dimatix piezoelectric inkjet products distinctive:

- Our **non-shared wall, shear mode actuation** of the piezoelectric material allows us to dedicate to each channel a piezoelectric actuator that is physically isolated from the fluid path. Separating the PZT actuators from often-aggressive and/or conductive jetting fluids allows our printheads to jet a wider variety of fluids. Our inherently low cross-talk enables all the jets on

FUJIFILM Dimatix printheads to be individually addressable – able to fire droplets simultaneously and at high frequencies, straight and true to their intended targets. These critical design differences enable jetting system designs that are faster, more productive and more reliable.

- Our **VersaDrop™** jetting technology enables each of several hundred nozzles in one or more printhead arrays to deliver from 2 to 150 picoliters (pL) in each drop of ink. In its simplest implementation, all the nozzles of a printhead or jet module can be programmed to fire the same size drop on every cycle, allowing a single system design to handle a wide range of common printing resolutions. VersaDrop technology also supports full grayscale capability. By programming specific channels to fire variable size drops at different times, the technology can be used to print job components requiring more tonal expression and higher saturation within the same image file while operating at the printing system's rated speed.
- Our **RediJet™** jetting technology encompasses several breakthrough innovations – such as unique nozzle plate design, special conformal and non-wetting surface coatings, enhanced on-head electronics, continuous ink recirculation at the nozzle and waveforms tailored to specific fluids – to unlock the full productive capacity of a printhead while lowering the recurring service cost. RediJet technology minimizes initial start-up and ongoing maintenance times along with reducing associated fluid consumption, especially when using faster drying and/or heavily pigmented ink formulations like those found in high-speed industrial single-pass systems.
- Our **Si-MEMS** technology uses MicroElectroMechanical Systems (MEMS) fabrication techniques to develop printhead families that are significantly smaller and more versatile. These silicon MEMS-based printhead products provide more precise control over nozzle shape, and absolute position on the silicon die permits higher drop placement accuracy over greater throw distances. The robust silicon structure lends itself to solid, reliable operation and long service life – all of which are desirable attributes for building new printer architectures and opening up new applications.

Printhead Products

FUJIFILM Dimatix pioneered industrial inkjet technology in 1984 with the inception of its first generation printhead, which was used for wide-format printing, display graphics and industrial marking and coding.

Nova and Galaxy

Nova and Galaxy printheads provide 256 inline, individually addressable nozzles with droplet sizes of 30 to 80 pL. These support a wide range of viscous fluids including hot melt, solvent-based, aqueous and UV-curable inks used in graphics, marking, textile manufacturing and other applications.

S-Class

S-Class family provides 128 inline, individually addressable nozzles with droplet sizes from 30 to 80 pL. Three different printhead designs: the SL-128 (80 pL), the SM-128 (50 pL), and the SE-128 (30 pL) are suitable for a broad range of graphics applications.

Skywalker HD

Skywalker HD 128/50 is a high performance printhead with 128 individually addressable inline nozzles producing a droplet size of 50 pL. It is designed for OEMS to develop high-speed, value priced systems for printing wide-format graphics using solvent-based inks.

Q-Class

The Q-Class is an inkjet platform around which a new family of printheads and head arrays for high speed scanning and single pass printer architectures has been built. The low crosstalk

and excellent channel-to-channel uniformity of their advanced hybrid construction allows Q-Class printheads to deliver unparalleled jetting straightness at firing frequencies up to 50kHz while supporting both binary and grayscale VersaDrop operation. Their high chemical resistance and precision enables reliable jetting of UV-curable, organic solvent and aqueous ink formulations onto a broad range of substrates.

- **Sapphire Series**

Sapphire hybrid printheads provide 256 inline, individually addressable nozzles with native droplet sizes of 10, 30 and 80 pL. Three different printhead designs – the Sapphire QS-256/80 (80 pL), Sapphire QS-256/30 (30 pL) and the Sapphire QS-256/10 (10 pL) – are suited to jetting solvent-based, UV-curable and aqueous inks across a broad range of applications. All models support multiple VersaDrop operating modes with unprecedented throughput.

- **Polaris Series**

Featuring a field-repairable design, the Polaris PQ-512/15 inkjet printhead taps Q-Class construction and combines it with VersaDrop binary jetting to deliver 15 to 85 pL native drop sizes from 512 individually addressable inkjet nozzles at continuous frequencies up to 45 kHz with exceptional straightness. Its flexible fluid interface, allowing single or two-color operation with a broad range of inks including UV-curable inks and aggressive organic solvents, make the Polaris PQ-512/15 suitable for a wide range of commercial and industrial printing applications at resolutions to 1000 dpi.

StarFire

Optimized for demanding industrial single-pass printing and decorative applications, the StarFire printhead family features an easy to integrate and repairable construction that combines superior jetting performance supporting VersaDrop and RediJet jetting technologies in a compact, self-contained design. StarFire SG-1024/M printheads offer single-color operation at resolutions up to 400 dpi from 1024 independent channels arranged in 8 rows, using a single metal nozzle plate and field proven materials to deliver long service life with consistent and reliable output. Precise mounting features allow the unit to be easily arrayed into print bars for wide width, higher resolution and multiple-color printing systems designs.

SAMBA™ Printhead Technology

Developed jointly by FUJIFILM Dimatix and FUJIFILM Corporation, SAMBA printhead technology utilizes Dimatix's proprietary silicon MEMS fabrication methods, VersaDrop multi-pulsing jetting capability and RediJet jetting technology. Collectively, these technologies and other innovations enable printhead nozzles to be arranged in a matrix array with improved meniscus formation and ink recirculation to provide unparalleled stability, uniformity, maintainability and scalability in a compact package.

SAMBA printhead technology delivers the breakthrough quality, speed and scalability required for wide-width single pass production inkjet printing and materials deposition applications. The first implementation of SAMBA inkjet technology is in a parallelogram-shaped "printhead on a chip" that measures a mere 45 mm deep, packs 2048 jets per module at 1200 dot-per-inch spacing, and is capable of pulsing fluids in industry-first native drop volume of 2 picoliters at up to 100 kHz – the highest jetting frequencies yet developed.

Materials Deposition Products

FUJIFILM Dimatix also offers precision printhead products and systems for micro-jetting picoliter-sized droplets of a broad range of functional fluids – from liquid silver to organic "inks" – onto all types of surfaces, from flat panel displays and flexible electronic circuits to DNA arrays for the biosciences.

The **Dimatix Materials Printer (DMP)** is a materials deposition system designed for micro-precision jetting of a variety of functional fluids onto virtually any surface. It employs single-use cartridges that researchers can fill with their own fluid materials to minimize waste of expensive fluid materials and reduce the cost and complexity associated with traditional product development and prototyping.

The **DMP-2831** is a turnkey bench-top materials deposition system designed to facilitate developing and testing manufacturing processes as well as product prototypes. It features micro-precision jetting of a variety of functional fluids onto virtually any surface including plastic, glass, ceramics, and silicon, as well as flexible substrates from membranes, gels and thin films to paper products. The DMP-2831 can build and define patterns over an area of 200 x 300 mm and on substrates up to 25 mm thick.

The **Dimatix Materials Cartridge** is a cartridge-based inkjet printhead used with the Dimatix Materials Printer and available in 1 pL and 10 pL drop volumes. Based on FUJIFILM Dimatix's proprietary Si-MEMS technology, the 16-jet Dimatix Materials Cartridge is designed for high-resolution, non-contact jetting of functional fluids. The industry-first 1 pL cartridge can deposit features as small as 20 µm to fabricate products such as organic thin-film transistors (TFTs) and printed circuits. In biotechnology, the Dimatix Materials Cartridge allows researchers to closely pack large numbers of elements in DNA arrays, to permit more accurate and efficient analyses.

The **SX3 Printhead** is a highly compact and lightweight hybrid jetting assembly designed specifically for micro-fluid deposition. The SX3 delivers a precise 10 pL drop size through 128 inline jets that can be individually tuned. A silicon nozzle plate with a non-wetting coating is compatible with the aggressive fluids used in electronics and other fabrication applications.

The **SE3 Printhead**, similar to the SX3, is a compact and lightweight hybrid jetting assembly designed for precise drop placement of a slightly larger drop. The SE3 delivers a 35 pL calibrated drop size through 128 inline jets that can be individually tuned. The silicon nozzle plate has a non-wetting coating and is compatible with the aggressive fluids used in electronics and other fabrication applications.

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About Fujifilm

FUJIFILM Dimatix, Inc., the world's leading supplier of drop-on-demand inkjet printheads for industrial applications, is driving a revolution in inkjet technology to support a new generation of products for printing, industrial product decoration and materials deposition. The company's innovative inkjet technology and world-class fabrication techniques enable OEMs, system integrators and manufacturers to build cutting-edge systems and manufacturing processes for high-performance, precision printing of traditional inks and deposition of functional fluids on all types of surfaces, including flexible substrates.

A wholly owned subsidiary of FUJIFILM Corporation, FUJIFILM Dimatix, Inc. is headquartered in Santa Clara, California and maintains U.S. product development and manufacturing operations in California and New Hampshire. The company sells and supports its products worldwide through offices in the United States, Europe, Japan, Korea, China, Taiwan and Singapore. For more information, visit www.dimatix.com.

FUJIFILM Holdings Corporation, Tokyo, Japan brings continuous innovation and leading-edge products to a broad spectrum of industries, including: healthcare, with medical systems, pharmaceuticals and cosmetics; graphic systems; highly functional materials, such as flat panel display materials; optical devices, such as broadcast and cinema lenses; digital imaging; and document products. These are based on a vast portfolio of chemical, mechanical, optical, electronic, software and production technologies. In the year ended March 31, 2015, the company had global revenues of \$20.8 billion, at an exchange rate of 120 yen to the dollar. Fujifilm is committed to environmental stewardship and good corporate citizenship. For more information, please visit www.fujifilmholdings.com.

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