

Large Area Amorphous Silicon Sensor Arrays

a-Si

X-ray Imaging Solutions by

*dpix*<sup>®</sup>

dpiX amorphous silicon sensor technology transcends the limits of conventional imaging and is the foundation for innovative solutions in medical, industrial, military and security use. Creative designers are incorporating our sensor arrays into innovative products for an exciting new generation of cost-effective, high-reliability imaging applications.



### **dpiX imaging**

Let dpiX show you the new world of high resolution digital image detection for medical x-ray imaging, nondestructive testing and security screening. dpiX will show you how to turn some of your most innovative product concepts into profitable reality with engineering, development, design and marketing programs from the global technology leader.

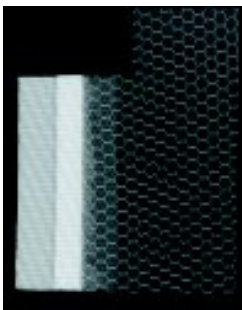
dpiX (pronounced “depicts”) has provided high-resolution imaging solutions to some of the world’s most demanding medical, industrial and military markets — clients on the cutting edge of digital imaging. Clients who want to see things that have never been seen before. Clients like you.

Our unique amorphous silicon technology transcends the limits of conventional imaging. dpiX arrays have been the foundation for innovative solutions that have been specially crafted for discerning clients and demanding customers. We offer custom solutions for medical, nondestructive testing and security screening products, as well as standard a-Si solutions for broad-based applications.

**dpiX**<sup>®</sup>



Medical imaging



#### Inside a-Si

In addition to medical imaging (top) dpiX arrays enable the realization of advanced digital x-ray applications such as structural inspection of air conditioning liners.



dpiX arrays give researchers a closer look inside tiny animals, like this image of a small fish.

## dpiX Amorphous-Silicon X-ray Image Sensor Array Technology

dpiX proprietary amorphous-silicon thin-film transistor (TFT) technology, combined with advanced n-i-p photo detector technology, is backed by over 85 patents. Our technology enables digital x-ray sensors to produce film-like resolution in lightweight, compact packaging. Our a-Si arrays are compatible with indirect detection techniques, including scintillating materials such as cesium-iodide, lead-iodide and others, as well as direct detection techniques using direct photoconductors.

Each dpiX image sensor contains an array of minute TFTs, one for each pixel. These products are similar to very large integrated circuits, except they are manufactured onto sheets of glass, instead of purified silicon wafers. In the indirect detector, the pixel structure has an additional light-sensitive photodiode in each pixel.

The fabrication of the pixel-addressing matrix for a large-format image sensor array is essentially the same as that used for the active matrix liquid crystal display (AMLCD). Like an AMLCD, a matrix of TFTs are used to address each pixel location.

In the structure of a TFT-based large-format image sensor array, data signals are “read out” from the array rather than “written into” it creating a digital file that represents the two-dimensional image. Instead of using voltage levels to adjust the light throughput in a display pixel, each sensor pixel senses a charge and converts it to an electrical signal.

dpiX technology provides arrays that have:

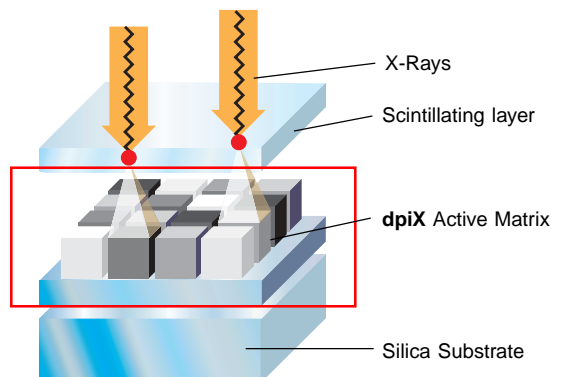
- High fill factor
- High quantum efficiency
- High charge transfer efficiency
- Low lag
- Low trapped charge
- Low line capacitance/resistance

## Custom Array Design Solutions

Our advanced designs create revolutionary a-Si sensor arrays to address a variety of digital imaging applications. Our custom arrays are optimized to meet unique customer requirements for size, resolution, sensitivity, dynamic range and speed. This is achieved in part by continuous research and development of advanced sensor processes and related products, and using our high volume world class manufacturing facility. We work closely with our customers to create exciting products that meet their corporate goals.

#### Anatomy of a Pixel

dpiX technology uses an active matrix composed of embedded TFT switches and photodiodes arranged along a grid of data lines. These microscopic components convert x-ray images to digital form for viewing, storage or transmission.

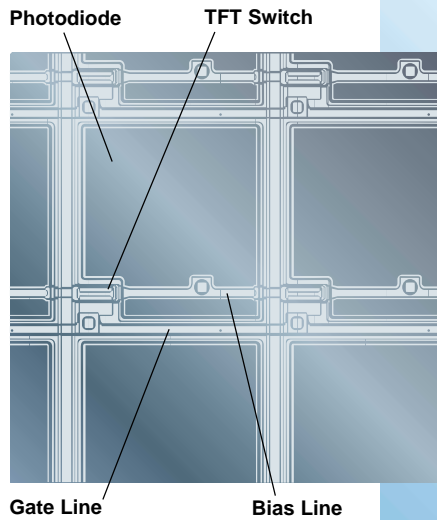


# Inside the dpiX a-Si Active Matrix Layer

## Anatomy of a Display

The dpiX Active Matrix uses advanced n-i-p photo detector technology to achieve film-like resolution and immediate response time.

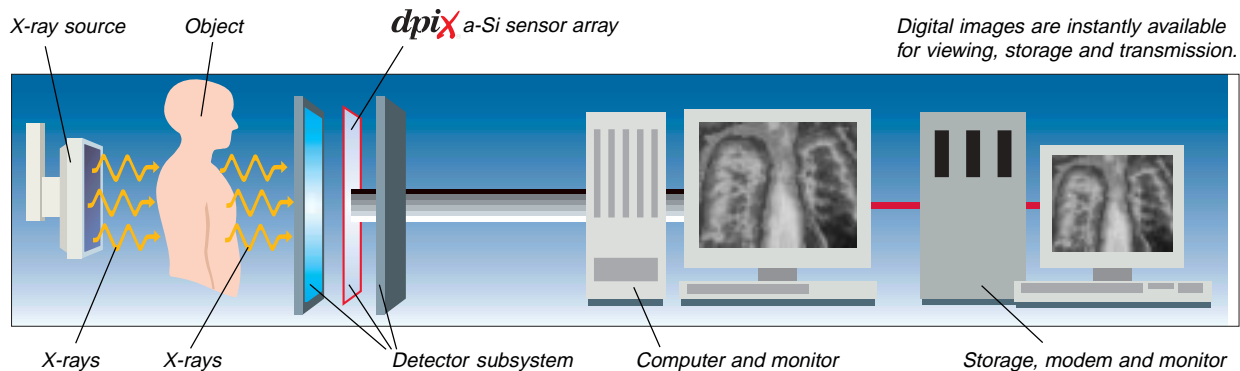
**dpiX Active Matrix** layer receives and digitizes x-ray images for immediate viewing, transmission or storage. (Simulated representation)



Scintillator

Glass Substrate

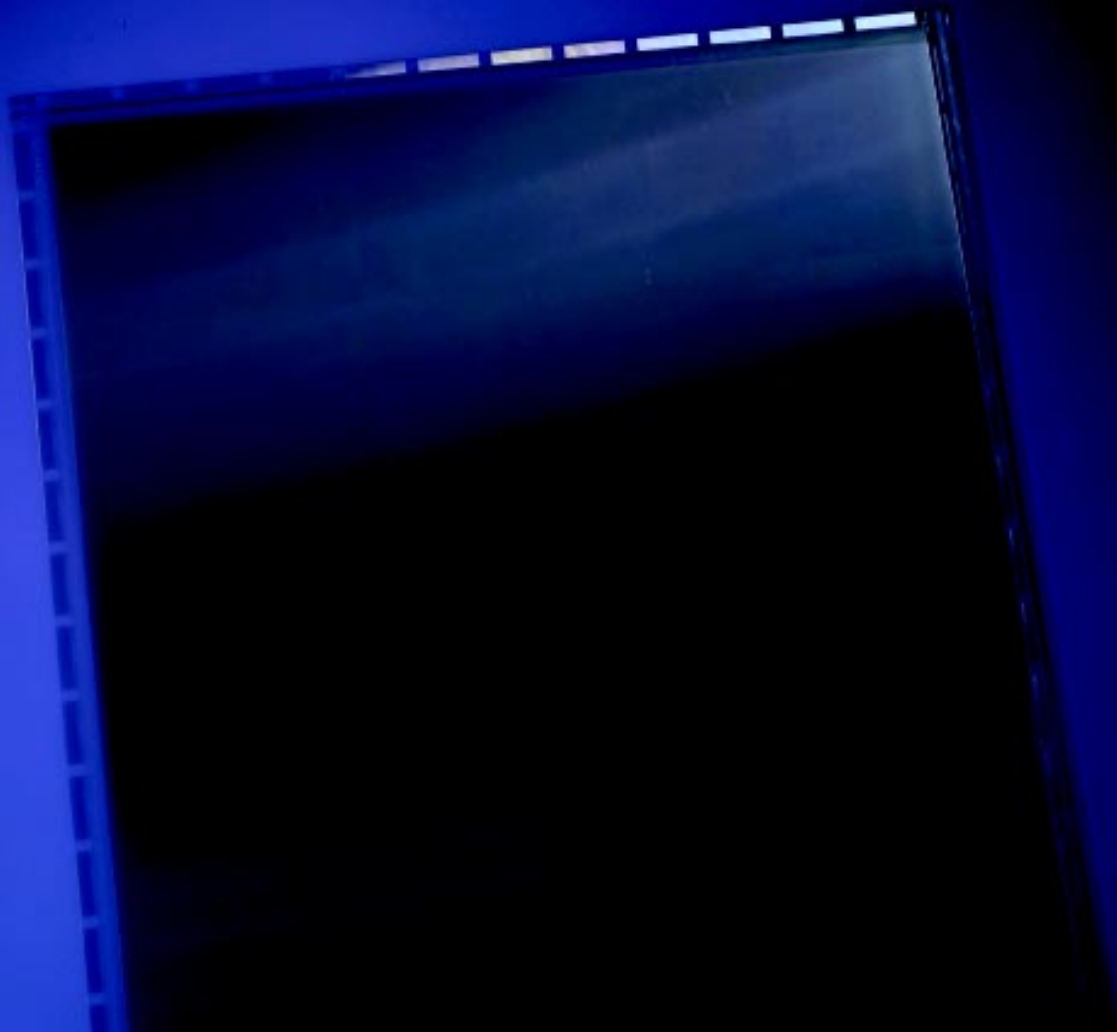
Our clients are using dpiX arrays in innovative ways to capture digital images which are instantly available for review on standard computer platforms for transmission to remote locations for analysis.



# The technology leaders of advanced imaging science

## Large area a-Si arrays

dpiX sensor arrays, like the PB2.0 array shown here, deliver unprecedented clarity and detail.



## Real time motion images

The unique TFT and photodiode structure of dpiX a-Si arrays allow real-time x-ray image capture at greater than 30 frames per second. This high speed capability is an invaluable tool for medical or industrial process observation and evaluation. Processing and transmission speeds of digital images are limited only by the computing speeds of the supporting electronics.



# A legacy of innovation in amorphous silicon imaging

## Foundation of Innovation

dpiX is the world leader in high-resolution imaging for medical, industrial and security use. Our technology is founded upon the legendary Xerox PARC research program, established in 1970 to create the “office of the future” and the “architecture of information.” In the mid-1980s PARC scientists developed page size amorphous silicon (a-Si) image sensor arrays for high speed digital copiers. In the early 1990s PARC scientists developed the first high resolution color active matrix liquid crystal display (AMLCD). dpiX produced high definition LCDs for state-of-the-art military cockpit applications until 2001. By the mid-1990s PARC scientists had produced x-ray sensors using amorphous silicon. Shipments of large area amorphous silicon sensor arrays for industrial use began in 1997. Further developments of these synergistic technologies have evolved into today’s high resolution, large area amorphous silicon sensors.

## Extensive Uses in Medical Imaging

dpiX has provided sensors to systems integrators for use in medical applications since 1998. Our sensors are used in image subsystems for radiography, fluoroscopy, cardiology and portal imaging. Doctors and clinicians have benefited from the significant improvements

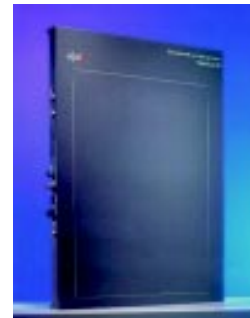


in the versatility and productivity of real-time x-ray images. They have been able to do on-the-spot adjustments while viewing live x-ray images in real time. Another advantage has been the ability to share visual data in real-time with colleagues in remote locations for immediate analysis and consultation. Patients have benefited by a reduction

of the x-ray dose required to capture an image. Economic benefits of dpiX products have been derived from a reduction in storage costs, zero degradation of stored images and virtually eliminating the need for retakes. Production of images without the chemical requirements for film processing are added cost and timesaving benefits.

## The Masters of Imaging

dpiX is taking digital image detection into the 21st century with new and unprecedented advances in image quality, resolution, clarity and speed. Whether you are developing high-resolution medical imaging equipment, nondestructive testing applications or a new generation of products for security screening, dpiX sensor arrays can meet or exceed your standards. You’ll see things you’ve never seen before.



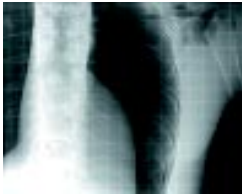
### dpiX a-Si arrays

Our arrays are available in a variety of standard sizes or as custom designs for your specific applications. dpiX engineers will work with you to ensure complete system compatibility and functional reliability for your medical, industrial, security or research application.

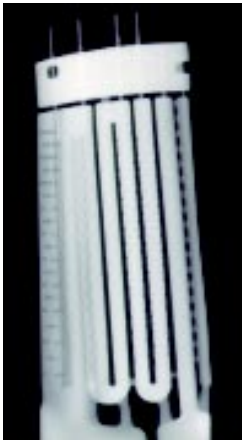


Using custom imaging software, users have instant access to digital x-ray images of medical and industrial subjects.

# Apply dpiX image-ination to your imaging products



Portal imaging  
(image courtesy of Varian  
Medical Systems)



Nondestructive testing



Botanical, biological  
inspection



Medical imaging for local  
or remote analysis

## Applications

*dpiX solutions are ideal for medical, nondestructive testing and security applications.*

### Medical

Digital radiographic and real-time images enhance throughput, information sharing and data storage, and can dramatically reduce a patient's exposure to radiation.

- Radiography/Fluoroscopy
  - General x-ray
  - Tomography, vascular studies, angiography, urology
- Oncology
  - Cancer care, portal imaging treatment, simulation and verification
- Cardiology
  - Heart studies, pacemakers, angioplasty, stent placements, valve replacements
- Bone densitometry

### NDT (nondestructive testing)

dpiX arrays provide large area formats with improved detail and acquisition speed, thus increasing productivity and reliability.

- Large area applications
  - Large castings or assemblies
- High precision applications
  - Aircraft inspection
  - Electronic inspection
- High volume applications
  - Casting, automotive, food processing and electronic parts inspection
- High magnification applications
  - Continuous miniaturization of products
- Hard-to-reach components
  - Turbine blades inside a jet engine's air intake duct
- Portable applications
  - In-field inspections including pipelines, welds

What's on your drawing board?  
Whether it's a medical imaging or  
manufacturing test application or a  
breakthrough in scientific research,  
dpiX has the tools, the experience  
and the expertise to turn your  
project into a profitable reality.

### Security

The convenience of digital image capture includes immediate processing, portability, light weight, thin profile, short setup time and the safety of distance.

- In-facility use
  - Biometric detectors
  - Luggage inspection
- In-field use
  - Transportation inspection including truck, rail and vessel applications
  - Explosive ordnance detection
  - Portable and remote inspection with robotics

## dpiX arrays for medical, NDT, security and research

### Customer OEM and Off-the-Shelf Arrays for Advanced Imaging Applications

dpiX has off-the-shelf products available for a wide range of applications. We can also work with you to design products optimized to your market and engineering needs. After careful evaluation of your digital x-ray imaging requirements, we will recommend the most cost-effective solution, based upon our dedicated experience and production capabilities. Our a-Si arrays are ideal solutions for rapidly emerging medical, NDT and security applications.

### Medical Imaging

As the replacement for film-based systems, dpiX arrays provide a safer, more efficient means of capturing high-quality images for radiographic, fluoroscopic, cardiological and portal imaging. dpiX technology produces distortion-free images that can be adjusted for clarity and image enhancement, virtually eliminating the need for retakes. For the business of daily clinical, hospital and lab use, dpiX a-Si technology enables higher patient throughput and significant savings in image storage, retrieval and transmission.

### Nondestructive Testing

The ability to get immediate x-ray images for detection, review, analysis, remote evaluation and decision making is an invaluable tool for hundreds of industrial applications. Casting or electronic component inspection, high volume manufacturing inspection, component operation, structural integrity or process analysis are only a few examples of industrial applications that may be improved with dpiX a-Si sensor technology.

### Security Imaging

dpiX technology provides fast, convenient and mobile ways to take real-time images for use by airport, law enforcement and military personnel. Biometric detection, vehicle or luggage inspection, portable and remote analysis and other security applications all benefit from the light weight, compact size and real-time speeds of dpiX arrays. The speed of digital imaging with dpiX arrays helps enable 100% package scanning and automated data processing. The ability to quickly view a clear digital “snapshot” or moving image of an object – which can be transmitted electronically for evaluation to associated security offices – is an essential tool for security and protection services. Moreover, the economy of digital image storage and near-zero processing costs are especially attractive to security agencies in industry and government.

### Research

dpiX technology has been used in a rapidly growing number of research sites. Our products are ideal tools for high-speed research imaging, studying internal components and materials for shock dynamics, shaped charge research, ballistic studies, cineradiography and other advanced applications. In addition to the inexpensive storage and transmission characteristics inherent in digital image files, real-time image acquisition is invaluable for file retrieval and sharing among research partners worldwide.



Tool inspection and testing



High-speed ballistics test



Security inspection



Component testing



Medical imaging

## **Class 1 Fab, Test and Engineering**

At dpiX, your arrays will be designed and fabricated using the very latest automation, test and engineering equipment and facilities. We carefully take every measure to ensure the highest standards of quality and reliability for your x-ray imaging products.



*When your work points to a promising product, contact dpiX to specify an a-Si sensor array matched to your needs. For applications requiring highly specialized electronics, you can specify a custom array solution. dpiX engineers will assist your entire product development and debug process, backing you up with years of experience and know-how. We're dedicated to your success.*

## **Engineering Strength**

dpiX will engineer custom designs to meet your exact requirements. Our Integration Engineering group will spearhead the development of core processes and materials development. Our Process Engineering team will perform manufacturing optimization and continuous process improvement. All of our Engineering, Manufacturing and Test teams will work closely to ensure your design, quality and reliability requirements are realized through the entire product lifecycle.

## **Design Capability**

dpiX has successfully designed and implemented many different medical imaging array product designs optimized for different applications. This experience has allowed us to accurately translate pixel design parameters into system performance criteria such as capacitance, characterization, defect map analysis, lag, leakage, memory, offset, pixel noise, sensitivity and signal-to-noise ratio.

## **Product Specific Process Optimization**

Our extensive research and development background includes ongoing partnerships with government, industry and university leaders to explore new a-Si array materials and technologies. If your application requires new baseline process architecture, we can provide custom processing solutions to meet your specifications.

## **World Class Manufacturing and Test Capabilities**

Our Fab Manufacturing services offer sensor process technology using Class 1 fabrication environments. We employ robotics, automated handlers and automated testers throughout our clean room fab and test facility. Redundant processes and backup systems help ensure manufacturing reliability and throughput.

## **dpiX Growth and Expansion**

dpiX has been pioneering and developing advanced imaging products for medical, NDT and security markets for over 15 years and we continually work to improve quality, yield and capacity. We are dedicated to producing the world's highest quality arrays to help you deliver the breakthrough products you envision.

Call dpiX at 1-650-842-9600 today.



The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry, no matter how small, should be recorded to ensure the integrity of the financial data. This includes not only sales and purchases but also expenses, income, and transfers between accounts.

The second part of the document provides a detailed breakdown of the accounting process. It starts with the identification of the accounting period, followed by the collection and classification of transactions. The next steps involve the recording of these transactions in the journal, followed by the posting to the ledger. The document then explains how to calculate the balances for each account and how to prepare the trial balance to ensure that the debits equal the credits.

The third part of the document discusses the preparation of financial statements. It outlines the steps for creating the income statement, the balance sheet, and the statement of cash flows. It also provides examples of how these statements are prepared and how they are used to analyze the financial performance of the business.

The final part of the document discusses the importance of internal controls and the role of the accountant in ensuring the accuracy and reliability of the financial information. It highlights the need for a strong system of checks and balances to prevent errors and fraud, and the importance of regular audits to verify the accuracy of the records.



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