Flat Display Systems for Medical Imaging
TOTOKU offers reliable medical image display system backed by experience and expertise

TOTOKU’s high performance and highly reliable medical imaging displays are backed by its unique technology and decades of solid experience in the display industry.

Since 1972, TOTOKU has supplied displays for diagnostic imaging, factories, broadcast, engineering, and many other applications, and has earned high marks in the most demanding of work environments, yours.

Performance and reliability through experience

**ME & CCL Series**

Medical imaging displays are required to have much higher levels of accuracy, luminance stability, longer backlight life, reduced leakage current, and many other features.

Regulations and standards on display quality control for medical image displays are being established around the world. The ability to easily control and maintain display accuracy has become a necessity.

TOTOKU offers comprehensive reliable solutions with the combination of medical displays and a quality control series software, the Medivisor series.
The i model series includes a wide line up of medical imaging displays designed under a unified concept.

### Lineup

#### 5 Megapixel

**ME551i2**
- 5 Megapixel
- 21.3" Monochrome Display
- Best suited for mammography applications, the ME551i2 is FDA 510(k) cleared for use of FFDM (Full Field Digital Mammography).

#### 3 Megapixel

**ME355i2**
- 3 Megapixel
- 20.8" Monochrome Display
- Monochrome 3MP display, best suited for chest X-rays. The high luminance, high contrast LCD panel achieves excellent grayscale rendering.

**CCL354i2**
- 3 Megapixel
- 21.3" Color Display
- The high luminance, high contrast color LCD panel displays excellent grayscale images as well. This is capable of displaying both color and monochrome images in one screen.

#### 2 Megapixel

**ME253i2**
- 2 Megapixel
- 21.3" Monochrome Display
- 2MP display with ultra high luminance, best suited for CT images. The hardware pivot function enables fast drawing even in portrait orientation.

**CCL254i2**
- 2 Megapixel
- 21.3" Color Display
- The high luminance, high contrast color LCD panel displays excellent grayscale images as well. This is capable of displaying both color and monochrome images in one screen.

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### Higher Image Quality and Total Management

**DICOM Conformance**

The i model series is the realization of high-quality images through high-performance LCD panel, unique LCD drive technology and luminance stabilizing system. Combined with the Medvisor series software to monitor and maintain display performance, display quality control is made easy and accurate.
Luminance stabilizing system λ-Sentinel II

λ-Sentinel II consists of a luminance sensor and a luminance control circuit. The luminance sensor in integrated into the front bezel, directly against the screen, and constantly monitors and accurately stabilizes luminance on the screen surface by sending feedback instantaneously to the control circuit.

- With luminance fluctuation caused by the LCD module taken into account, highly accurate luminance control is achieved.
- Actual luminance measurements including intermediate luminance are taken on the screen surface.

Auto remote grayscale conformance evaluation

Combined with TOTOKU’s performance monitoring software PM Medivisor, grayscale conformance to DICOM according to AAPM TG18 can be checked automatically and remotely.

- PM Medivisor’s scheduling function activates periodic auto-evaluation.
- The test runs as a background process. Thus it can be carried out even when the display is in use.
- Results are available graphically for easy review and are centrally managed by PM Medivisor.

Remote calibration capability *

The remote calibration feature is added to reduce the burden on system administrators. Calibration of remote displays can be accomplished from a management terminal.

- Execution of calibration using the built-in luminance sensor.
- Results are centrally managed by PM Medivisor.

* Remote calibration is available when ME551I2, ME355I2, ME253I2, CCL352I2 or CCL252I2 is used along with PM Medivisor Ver. 4.0 and above.

Collective support for display quality control

The Medivisor Series is a series of software to collectively support display quality control from acceptance and periodic constancy testing to constant monitoring, to calibration.

- Performance monitoring software
- Acceptance and constancy testing software
- Calibration software

* See pages 12 and 13 for a full-blown explanation on the Medivisor series software.
TOTOKU’s unique LCD drive technology realizes superior image quality, remarkable display accuracy, and user-friendly functions.

Medical imaging displays are expected to have enough resolution to accurately render microscopic detail and the gradation display capability to faithfully reproduce subtle changes in density. In addition, a fast processing speed is a must for stress-free operations in dealing with enormous amount of image data, and the capability to display both color and monochrome images in one screen is a very important factor.

The i-model series displays, loaded with the high-performance LCD panel based upon unique technologies cultivated from years of expertise, provide highly-developed display capabilities and ease of use through its user-centered design.

High image quality with high precision

- Uniformity congruence built in to achieve highly accurate luminance uniformity across the screen. Luminance nonuniformity is minimized in the final tune-up prior to shipping.

Simultaneous display of 2048 shades of gray

Combined with a viewer software, 2048 shades of gray (11 bit) can be simultaneously displayed. It realizes smooth grayscale display required for medical image displays.

- A viewer software that supports TOTOKU’s multi-shade display system is required for 11 bit simultaneous display.
- Images shown are for illustrative purposes only.
- Color models display 256 shades of gray (8 bit) out of 4096 shades of gray.

Calibration function

Is built-in to adjust gamma, and luminance levels to achieve DICOM GSDF compliant grayscale presentation.

Supported models: All ME,i2 Series models except ME183L and CCL192 plus

Note: An optional calibration kit is required. For color displays, color temperature can be adjusted as well.

High speed drawing technology to realize stress-free operation

Dual Link input

The dual-link input feature provides smooth display of motion pictures.

*Supported models: ME253i2, ME353i2, ME551i2

Hardware-based pivot function for fast drawing in portrait orientation

With the highest in-class luminance and contrast and a wide viewing angle, TOTOKU’s LCD drive technology maximizes the display’s performance for the best image quality. Color models have a wide dynamic range enabling crisp and clear grayscale display, which is challenging for conventional displays. They are also capable of displaying both color and monochrome images in one screen.

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Supported models: All ME,i2 Series models except ME183L and CCL192 plus

Note: An optional calibration kit is required. For color displays, color temperature can be adjusted as well.

User-friendly functions

User-selectable display configurations

Luminance/gamma settings are selectable from three preset levels according to the needs.

Gamma check

18 points of luminance values are measured and plotted into a graph.

Ambient light and display luminance measurement

The built-in illuminance and illuminance sensors measure display luminance and ambient illuminance.

Enhanced convenience with utility software

- Advanced power saving
- User-selectable display configurations
- Gamma check
- Ambient light and display luminance measurement

Dual Link input

The dual-link input feature provides smooth display of motion pictures.

*Supported models: ME253i2, ME353i2, ME551i2

Hardware-based pivot function for fast drawing in portrait orientation

TOTOKU’s hardware pivot function is directly implemented in display hardware. Therefore, hardware pivoting is much faster and less noise. Unlike other pivoting functions that are dependent on graphics card or special software.

- Images shown are for illustrative purposes only.
- color models display 256 shades of gray (8 bit) out of 4096 shades of gray.

High luminance, high contrast, and wide viewing angle

The backlight dims as the screensaver starts, reducing power consumption and preventing unnecessary deterioration of the backlight.

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Medical image displays are required to have a much higher level of reliability than general-use displays. Backed up with its over 30 years of manufacturing experience, TOTOKU offers a wide range of products and services that meet the expectations of medical facilities.

TOTOKU considers quality as the foundation for building trust with our customers. Thus, we have acquired the ISO 9001 and ISO 13485 certifications in order to promote quality improvement activities throughout the design and production phases and to enhance customer satisfaction.

About TOTOKU

TOTOKU, founded in 1940 and headquartered in Tokyo, Japan, is a leading manufacturer of high-end medical image displays. Since its launch on the display business in 1972, TOTOKU has supplied displays for various fields and has earned high marks for its product reliability under harsh conditions and post-installation support, not to mention specialized technologies that are required for the respective fields. TOTOKU’s products and services are available via the US, EU, and Asia offices and distribution throughout the world.

Quality management system

TOTOKU considers quality as the foundation for building trust with our customers. Thus, we have acquired the ISO 9001 and ISO 13485 certifications in order to promote quality improvement activities throughout the design and production phases and to enhance customer satisfaction.

Worldwide medical safety and EMI standards

TOTOKU’s medical image displays comply with various stringent worldwide medical standards. They ensure safety and reliability required for use in medical facilities.

Pairing service to match display colors (optional)

Due to the variation in colors among cold cathode fluorescent lamps (CCFL) used as backlights, slight differences in color tone between displays are unavoidable. TOTOKU offers a display pairing service to match color tones of two displays using a high-definition spectrophotometer before shipping.

* Consult your dealer for more information about the pairing service.

High reliance and a full range of services provide confidence.

Flat Display Systems for Medical Imaging

**ME & CCL Series**
Acceptance and constancy testing software

QA Medivisor supports acceptance and constancy tests according to the following standards:
- AAPM TG18 - American Association of Physicists in Medicine
- DIN 6868-57V - Deutsches Institut für Normung
- JESRA X-0093-2005 - Japan Engineering Standard of Radiation Apparatus

Testing made easy and accurate. Just follow the on-screen instructions.

Test report generation

Test procedures according to respective standards are embedded and their results can be output in PDF format. QA Medivisor also manages the generated reports.

Centralized control of test results

Test results are sent to PM Medivisor for centralized control of display performance.

Calibration software

Medivisor provides accurate calibration required for medical image displays.

Acceptance and constancy tests are essential to providing and maintaining the image quality of medical image displays. QA Medivisor supports acceptance and constancy tests according to the following standards:

- AAPM TG18 - American Association of Physicists in Medicine
- DIN 6868-57V - Deutsches Institut für Normung
- JESRA X-0093-2005 - Japan Engineering Standard of Radiation Apparatus

Graphical presentation of calibration results

Calibration results are shown not only numerically but also graphically providing quick and easy visual summaries.

User-friendly calibration

Attaching a calibration sensor, luminance, gamma, and color temperature (for color models only) can be simply but accurately calibrated. All that’s required is to follow Medivisor’s instructions. In addition, a built-in front sensor provided with i2 models enables even simpler calibration without attaching the calibration sensor. Periodic calibration of the front sensor is recommended. It can be performed automatically by calibration using a built-in front sensor.

Calibration history control features

Combined with PM Medivisor, calibration results saved in each display by Medivisor can be sent to a management terminal within the network, and controlled centrally by PM Medivisor with other test results.
With the calibration function loaded, dual analog/digital interface, high definition LCDs are suited for modalities such as a CT and MR.

Multiple interfaces and internal power supply: perfect solution for many modalities.

2 Megapixel

ME201L /r
2 Megapixel 20.1" Monochrome Display
20.1" 700 600:1 Calibrated LUT 10Bit LUT Built-in Power supply

CCL206
2 Megapixel 20.1" Color Display
20.1" 300 600:1 Calibrated LUT 10Bit LUT Built-in Power supply

1.3 Megapixel

ME181L /r
1.3 Megapixel 18.1" Monochrome Display
18.1" 700 600:1 Calibrated LUT 10Bit LUT Built-in Power supply

CCL182 /r
1.3 Megapixel 18.1" Color Display
18.1" 400-1 600:1 Calibrated LUT 10Bit LUT Built-in Power supply

1.3 Megapixel

ME183L
1.3 Megapixel 18.1" Monochrome Display
18.1" 700 600:1 Calibrated LUT 10Bit LUT Built-in Power supply

CCL192 plus
1.3 Megapixel 19" Color Display
19" 450 600:1 Calibrated LUT 10Bit LUT Built-in Power supply
These specifications are as of May 2008. They are subject to change without notice.

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Despite the hardware requirements for this graphics card, some computers or software and/or a combination of both may prevent the proper installation of this graphics card.

Please check with your dealer before you purchase it.

ME551i2

Landscape Portrait

ME355i2

Landscape Portrait

CCL354i2

Landscape Portrait

ME253i2

Landscape Portrait

Graphics Cards

TOKU’s lineup of PCI Express graphics cards enable smooth transfer of images whose size can be expected to grow even bigger in the future. (Optional.)
These specifications are as of May 2008. They are subject to change without notice.

Do not expose the product to dust, moisture, steam or oily smoke. It could cause fire, electric shock, or a failure.

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<th>ME201L</th>
<th>CCL206</th>
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**Medical safety standards**

TOTO® medical imaging displays are certified under various medical safety standards in North America and EU countries while each model equipment are subject to significantly more stringent requirements than general IT devices, ensuring safety and reliability for use in medical facilities.

UL (Underwriters Laboratories, Inc.) is an independent, 3rd party testing and certification organization. Products that bear the UL Listing Marking are listed by UL and meet the UL safety, performance and reliability standards. The UL Listing Marking indicates that the products meet the requirements for safety, performance and reliability.

CE Marking is provided for products sold in European countries to indicate that the products conform to the EU Directives. Produces that do not comply with the EU Directives are not marketed in Europe.

FDA 510(k), also known as Premarket Notification, refers to applications submitted to the Food and Drug Administration (FDA). It is an FDA regulatory standard that requires a determination of the safety, effectiveness, and substantial equivalence of a device to be approved to market in the US. The 510(k) premarket notification is required for Class II medical devices. This process requires the company to provide the FDA with information demonstrating that the device is safe and effective."