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.

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

Higher Image Quality and Total Management — DICOM Conformance —
Medical imaging displays need to be impervious to temperature changes and color changes associated with age degradation. In response, the implementation of guidelines such as AAPM, DIN and JESRA is spreading and the demand for simple and easy quality control in accordance with such guidelines is growing.

The i model series boasts excellent stability provided by its built-in luminance stabilizing system -Sentinel II. When coupled with Medivisor, comprehensive support becomes available such as periodic evaluation against the results of the installation acceptance test, monitoring and adjustment of displays that are currently in use. The i model and the software combined together provide highly accurate and stable display of medical images and realize cost reduction on display quality control.

Luminance stabilizing system -Sentinel II

-Sentinel II consists of a luminance sensor and a luminance control circuit. The luminance sensor is 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 Medvisor Ver. 4.0 and above.

Medivisor Series (Optional software)

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.

* See pages 12 and 13 for a full-blown exploration on the Medivisor series software.
The dual-link input feature provides smooth display of motion pictures.

*Supported models: ME551i2, ME355i2, CCL354i2

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 cards or special software.

TOTOKU’s lineup of PCI Express graphics cards, the fastest graphics card ever, enable smooth transfer of image data, the size of which can be expected to grow even bigger in the future.

High image quality with high precision

It is built in to achieve highly accurate luminance and color uniformity across the screen.

* Usage condition: the product is equipped with color monitors only.

Simultaneous display of 2048 shades of gray

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

* Images shown are for illustrative purposes only.

* Color uniformity equalizer is built in color models only.

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: ME551i2, ME355i2, CCL354i2

High-speed graphics card (optional)

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 cards or special software.

High-speed graphics card (optional)

TOTOKU’s lineup of PCI Express graphics cards, the fastest graphics card ever, enable smooth transfer of image data, the size of which can be expected to grow even bigger in the future.

User-friendly functions

Clear Base / Blue Base LCD panels

The LCD panels are available in both clear and blue base colors.

*Implemented on ME551i2, ME355i2

Color Management function

The built-in LUT (Look-up table) converts the RGB input into a monochrome output, realizing sharp monochrome images on color systems. And multi-display setups with both color and monochrome displays can be achieved.

* This function is equipped on monochrome models.

Computer Information

With a push of a button, the display’s current status can be checked such as the display model, total operating time, actual measurement of luminance, and calibration settings.

OSD Information Display

A glance at the LED indicator tells you the display’s current operating status.

* This feature may not be available, depending on the specifications of the graphics card used.

Enhanced convenience with utility software

* Advanced power saving

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

* This feature may not be available, depending on the specifications of the graphics card used.

User-selectable display configurations

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

Gammar 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.
High reliance and a full range of services provide confidence.

Medical image displays are required to have a much higher level of reliance 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.

About TOTOKU

TOTOKU, founded in 1940 and headquartered in Tokyo, Japan, is a leading manufacturer of high-end medical image displays and touch panels. 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 distributors throughout the world.
Collective support for display quality control

**Medivisor Series**

(Optional software)

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

**Acceptance and constancy testing software**

Acceptance and constancy tests are essential to providing and maintaining the image quality of medical image displays. QA Medvisor 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-008-2005 - Japan Engineering Standard of Radiation Apparatus

**Performance monitoring software**

PM Medivisor enables the system administrator to manage a wide range of information such as calibration history and general information of each display including operating hours.

**Centralized control of display information**

PM Medivisor provides a centralized control of test results to the management terminal. Test results sent to PM Medivisor for centralized control of display performance.

**Remote grayscale check and remote calibration functions**

Conformance testing to DICOM GSDF and calibration can be remotely accomplished. Medivisor provides accurate calibration required for medical image displays.

**Display operational status monitoring**

The system administrator will be notified of various information including changes in luminance, configuration change such as changes of resolution, the addition or deletion of displays and workstations from the network.

**Other functions**

- E-mail auto-delivery of alert information and other notifications
- Report generation in PDF format

**Calibration software**

Medivisor provides accurate calibration required for medical image displays.

**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 and accurately calibrated. All that’s required is to follow Medivisor’s instructions. Medivisor’s instructions.

**Calibration to DICOM GSDF**

It goes without saying that maintaining grayscale accuracy is of significant importance for monochrome medical image displays. Periodic calibration provides accuracy control that conforms to the GSDF according to DICOM Part 14.

**Test report generation**

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

**Centralized control of test results**

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

**Package contents**

- Calibration kit CAL010
- Medivisor for i2 Series
- User-friendly calibration
- Calibration to DICOM GSDF

**QA Medvisor**

QA Medvisor also manages the generated reports.
With the calibration function loaded, dual analog/digital interface, high definition LCDs are suited for modalities such as CT and MR.

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution</th>
<th>Display Type</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME201L/r</td>
<td>1.3 Megapixel</td>
<td>Monochrome</td>
<td>20.1”</td>
</tr>
<tr>
<td>CCL208</td>
<td>1.3 Megapixel</td>
<td>Color</td>
<td>20.1”</td>
</tr>
<tr>
<td>ME181L/r</td>
<td>2 Megapixel</td>
<td>Monochrome</td>
<td>18.1”</td>
</tr>
<tr>
<td>CCL182/r</td>
<td>2 Megapixel</td>
<td>Color</td>
<td>18.1”</td>
</tr>
</tbody>
</table>

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

**NEW**

**Special AR Coating**

- TOTOKU’s new special AR coating technology addresses properties of focus, noise reduction, contrast, and viewing angle, achieving film-like black and accurate reproduction of images. (Patent pending)
- All ME/CCL Series models except ME183L and CCL192plus

**Picture-in-Picture**

- The Picture-in-Picture feature allows you to have two screens (a TV signal and computer data) simultaneously.
- All ME/CCL Series models except CCL192plus

**Worldwide medical safety and EMI standards**

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

**Medvisor Series software (Optional)**

- TOTOKU offers a display pairing service that matches colors of two displays using a high-definition spectrophotometer before shipping.
- Consult your dealer for more information about the pairing service.

**Internal power supply**

- The internal power supply unit eliminates the need for an external AC adapter and frees more desk space.

**Built-in overdrive circuit for smooth illustration of motion pictures**

- The overdrive circuit realizes a 12ms response time, while minimizing afterimage effects. (Implemented on CCL192plus)

**DICOM gamma preset**

- 6 gamma presets, including DICOM-compliant gamma, are available to cover various applications.

**Worldwide medical safety and EMI standards**

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

#### TOTOKU'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.)

<table>
<thead>
<tr>
<th>Model Name</th>
<th>LV22E4-N1</th>
<th>LV22E4-N16</th>
<th>LV52P1</th>
<th>LV55i2</th>
<th>LV355i2</th>
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<td>1 (Component)</td>
<td>1 (Component)</td>
<td>1 (Component)</td>
<td>1 (Component)</td>
<td>1 (Component)</td>
<td>1 (Component)</td>
<td>1 (Component)</td>
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<tr>
<td><strong>Digital Output</strong></td>
<td>1 (Component)</td>
<td>1 (Component)</td>
<td>1 (Component)</td>
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#### Photos

![Image 1](image1.jpg)

**LV22E4-N1**

- **Model Name**: LV22E4-N1
- **Display**: LCD Panel
- **Compatible models**: Vista/XP/2000
- **LV22E4-N16**: Vista/XP/2000

![Image 2](image2.jpg)

**LV52P1**

- **Model Name**: LV52P1
- **Display**: LCD Panel
- **Compatible models**: Vista/XP/2000
- **LV55i2**: Vista/XP/2000

![Image 3](image3.jpg)

**LV355i2**

- **Model Name**: LV355i2
- **Display**: LCD Panel
- **Compatible models**: Vista/XP/2000
- **LV355i2-M16**: Vista/XP/2000

### Graphics Cards

**TOTOKU’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.)**

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<td>1 (Component)</td>
</tr>
</tbody>
</table>

#### Photos

![Image 4](image4.jpg)

**LV22E4-N1**

- **Model Name**: LV22E4-N1
- **Display**: LCD Panel
- **Compatible models**: Vista/XP/2000
- **LV22E4-N16**: Vista/XP/2000

![Image 5](image5.jpg)

**LV52P1**

- **Model Name**: LV52P1
- **Display**: LCD Panel
- **Compatible models**: Vista/XP/2000
- **LV55i2**: Vista/XP/2000

![Image 6](image6.jpg)

**LV355i2**

- **Model Name**: LV355i2
- **Display**: LCD Panel
- **Compatible models**: Vista/XP/2000
- **LV355i2-M16**: Vista/XP/2000

### Graphics Cards

**TOTOKU’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.)**
**2 Megapixel**

### Characteristics

**Power Supply**
- Input AC adapter 100V ~ 240V (-10%, +6%) 50/60Hz
- Input 100V ~ 240V (±10%) 50/60Hz

**Input Signal**
- DVI, VGA, Video, S-Video, Component Video

**Features**
- DDC2B compliant
- 10bit(1024) grayscale to 8bit(256) grayscale

**Physical Characteristics**
- Display Area: 408mm X 306mm
- Display Area: 353mm X 287mm

**Maintenance**
- LCD backlight: 2 years
- Cover: 5 years

**Approvals**
- UL2601-1, CSA C22.2 No.601.1, MDD/CE, FDA510 (k), BSMI, FCC-B, VCCI-B

**Product**
- ME201L /r
- CCL208

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**3.5 Megapixel**

### Characteristics

**Power Supply**
- Input AC adapter 100V ~ 240V (-10%, +6%) 50/60Hz
- Input 100V ~ 240V (±10%) 50/60Hz

**Input Signal**
- DVI, VGA, Video, S-Video, Component Video

**Physical Characteristics**
- Display Area: 467mm X 359mm
- Display Area: 353mm X 289mm

**Approvals**
- UL2601-1, CSA C22.2 No.601.1, MDD/CE, FDA510 (k), BSMI, FCC-B, VCCI-B

**Product**
- ME201L /r
- CCL208

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### Medical Safety Standards

TOTOKU medical imaging displays are certified under various medical safety standards. In the United States and EU countries, where more stringent medical equipment safety standards are required, the products conform to the EU Système Harmonié. Products conform to the EU Système Harmonié are labeled with the CE Marking and conform to the Medical Device Directive (MDD) and are also labeled with the CE Marking.

**UL**
- UL (Underwriters Laboratories, Inc.) is an independent, nonprofit testing and certification organization established in the United States. TOTOKU medical imaging displays are certified under UL60601-1, CSA 22.2 No.601.1. The MDD is based on the UL Listing Mark.

**CE Marking**
- CE Marking is provided for products sold in EU countries to indicate that the products conform to the EU Système Harmonié. Products conform to the EU Système Harmonié are labeled with the CE Marking.

**FDA 510(k)**
- FDA 510(k), also known as Premarket Notification, refers to an application submitted to the Food and Drug Administration (FDA). It is an FDA safety standard to show a determination of the safety, effectiveness, and substantial equivalence of a device to a device already legally on the US market in the past or present. It includes evaluation clauses not only the safety and effectiveness of the device, but also proper labeling, including advertisements.

**Environmental Regulations**

**RoHS**
- TOTOKU displays and graphics cards are compliant with the European Union Directive 2002/95/EC for the Restriction of the use of the hazardous Substances in Electrical and Electronic Equipment (RoHS).

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**Safety Precautions**

Please read the user’s manual for safe and proper use.

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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*These specifications are as of March 2010. They are subject to change without notice.*