Sun's 18.1-inch Flat-panel Display

Just the Facts

Sun microsystems

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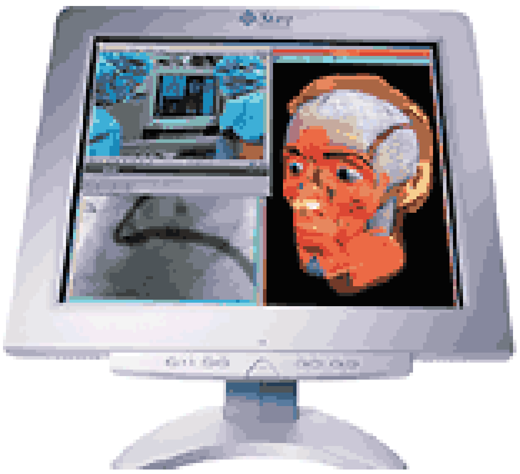
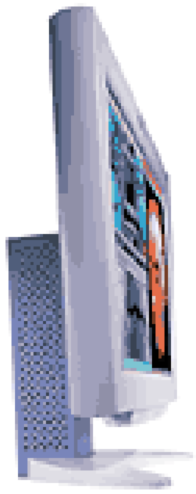
Positioning





Sun 18.1-inch TFT-LCD Monitor

Sun Microsystems, a leading vendor of high-performance workstations and servers, recognizes the advantages of flat-panel technology. Sun is introducing a high-quality, 18.1-inch, color, thin-film transistor (TFT) liquid crystal display (LCD) monitor, which is available as a monitor X-option for Sun™ systems.

Large-screen, flat-panel displays are becoming more widely available for the desktop market. Sun's 18.1-inch flat-panel display offers distinct advantages over large-screen CRT equivalents. Most notably, its slim, lightweight design conserves valuable desktop space, and it consumes significantly less power. At the same time, Sun's flat-panel monitor provides excellent picture quality, with a viewing area similar to Sun's 20- or 21-inch CRT displays. Based on TFT-LCD technology, Sun's flat-panel monitor provides an affordable alternative to CRT monitors for space-conscious customers.

Key Messages

There is an increasing trend towards flat-panel technology in the technical desktop market. Because of the complexity of information being displayed, many technical and corporate computing users require high image quality and large screen sizes on the desktop, similar to what is available with traditional full-size color CRT displays. These customers typically select 19-inch, 21-inch, or even 24-inch color CRTs for desktop applications. In some cases, a single user's desktop may contain multiple CRT monitors, allowing a great deal of information to be communicated visually. For example, multiple monitors are often used on a financial trader's desktop to quickly convey market information and track investment prices. In many environments, it is difficult to accommodate the bulk of one—much less two—19-inch or 21-inch high-resolution color CRT displays. For this reason, many users seek the thin footprint, low weight, low power, and excellent picture quality advantages of flat-panel technology.

Availability

General Availability is scheduled for November 2, 1999.

Target Users

Flat-panel technology is appealing to an increasing number of Sun's typical customers. Any customer with space efficiency, weight, or power concerns may be interested in using flat-panel alternatives to traditional CRT monitors. Some examples include the following:

- Military users—Flat-panel monitors are often purchased by defense and government agencies for use in naval, avionics, or military ground vehicles. Flat-panel displays save space, and reduce the weight and power requirements for on-board equipment.
- Trading floor and brokerage applications—Multiple monitors typically sit on traders' desktops. Flat-panel technology reduces the footprint in these crowded conditions, while offering excellent picture quality.
- Publishing applications—Multiple monitors are often used to display layouts for two adjacent pages. Flat-panel monitors reduce the desk space consumed by two large-screen CRT displays.
- Corporate visit centers—Wall-mounted flat-panel technology can make a positive first impression on customers and investors.
- Hospitals and radiology clinics—Magnetic interference can be a problem for traditional CRTs used in medical imaging applications. MR scanners in these environments produce strong magnetic fields, which can permanently distort CRT displays. Many flat-panel technologies, including TFT-LCDs, are not subject to magnetic interference.

These are just a few of the common uses of flat-panel monitors. Because this technology is becoming increasingly affordable, many customers, particularly those concerned with conserving valuable desktop space, are becoming more interested in using flat-panel color monitors. Flat-panel monitors also use less power than traditional CRTs, further reducing day-to-day operating expenses.

Target Markets

Technical Markets

- Software Engineering—CASE, expert/knowledge systems, and algorithmic research
- M/AEC / MCAD—Mechanical MCAD, 2-D, and 3-D design and drafting, 3-D wireframe, and civil engineering design
- M/AEC / MCAE—Finite elements modeling and analysis, mechanical MCAE, and civil engineering, structural analysis solid modeling
- EDA—Electrical/electronics tasks, including schematic capture, logic synthesis, circuit simulation, and PCB routing
- Scientific Research and R&D—nuclear physics, computational fluid dynamics, scientific visualization, thermodynamics, wind-tunnel testing, and scientific signal analysis
- Animation—Digital content creation, commercial animation, advertising, product styling, and industrial design
- Geoscience and Geo-engineering—seismic analysis, oil services, atmosphere modeling, geosignal analysis, mapping, and image processing
- Simulation—Factory, flight, nautical, nuclear, and robotic simulation, and computer-aided instruction (CAI)
- Classified Defense—Classified defense applications, defense research, C3I (command, control, communication, and intelligence), and surveillance and signal processing
- Measurement and Control—Measurement analysis and automated test equipment (ATE)
- Industrial Process Analysis—Process analysis, production data analysis, and process and factory simulation
- Biological and Chemical Engineering—Molecular modeling, computational chemistry, genetic and biological engineering, and biological and chemical analysis
- Imaging—Terrain modeling and remote-sensed data analysis

Commercial Markets

- Economic and Financial Modeling—Trading floors, banking tellers, portfolio management, economic forecasting, and financial analysis
- Database Management—Relational database, SQL packages, such as Oracle, Informix, and Ingres
- Management and Support—Technical publishing, system/network management, configuration management, network management, and project management
- Other Commercial—Data analysis, office automation, word processing, desktop publishing, accounting, payroll, inventory, and customer service

Key Features

Sun's flat-panel color monitor has the following features which make Sun's flat-panel monitor an attractive alternative to traditional desktop CRT monitors:

- Thin-film-transistor (TFT) liquid crystal display (LCD) technology, an industry-proven flat-panel technology
- A slim, lightweight design, ideal for customers with space and weight constraints
- An actual 18.1-inch diagonal size, offering a large viewable screen area similar to that of 20- or 21-inch CRT displays
- Exceptional picture quality, with perfect focus in all parts of the screen without geometric distortion
- 24-bit color display capability, resulting in over 16.7 million colors (or 256 shades of gray) for realistic rendering in applications
- Fast pixel response times, enabling smooth animation and video streaming without ghosting or other artifacts
- Viewing at wide angles, providing a consistent, uniform display in all directions even with head movement
- Excellent readability in environments with very high ambient light
- Low power consumption for high energy efficiency
- No magnetic field generation or susceptibility, enabling its use in environments where there are strong magnetic fields
- An analog interface for compatibility with Sun's graphics accelerators and system framebuffers, enabling this monitor to interchange easily with other Sun monitors
- Compatibility with the VESA 100-mm mechanical mounting standard, allowing third party interface kits to be used for wall-mounting, rackmounting, and so on. The display stand is easily removable to accommodate other mounting alternatives.

Selling Highlights

Market Value Proposition

Flat-panel monitors offer customers several advantages over traditional displays.

- Reduced size and lower weight allow for more efficient use of space and more equipment on desktop
- Lower power requirements and less heat generation result in lower utility bills and reduced facility load
- Reduced eye strain and fatigue improve productivity in the workplace
- Small footprint allows for more flexible work areas, layouts, and configurations

Applications

- Portfolio management, economic forecasting, and financial analysis
- Classified defense applications, defense research, C3I (command, control, communication and intelligence), and surveillance and signal
- Animation including digital content creation, commercial animation, industrial design, product styling, and advertising
- MCAD/ECAD
- Scientific Research including space shuttle launch processing and scientific visualization

Compatibility

Sun's 18.1-inch flat-panel monitor is fully backward and forward compatible with all existing and legacy workstation platforms and frame buffer boards.

Sun recommends that the Sun 18.1-inch flat-panel monitor be run at 1280 x 1024 @ 60 Hz (VESA timing), if possible, to provide optimal video performance. The Sun timing 1280 x 1024 @ 76 Hz should be used if 1280 x 1024 @ 60 Hz is not available.

Technically, it is possible to run other resolutions on the flat-panel monitor; however, optimal screen performance is not guaranteed. When resolutions are displayed that are lower than the pixel count of the LCD, text may appear choppy or lines may appear to be bold. This is typical and necessary for all current flat-panel technologies when displaying non-native resolutions full screen. In flat-panel technologies, each dot on the screen is actually one pixel, so to expand resolutions to full screen, an interpolation of the resolution is performed. When the interpolated resolution is not an exact multiple of the native resolution, the mathematical interpolation may cause some lines to appear thicker than others.

Wall-mounting Solutions

Sun will not offer any wall-mounting solutions for the 18.1-inch flat-panel monitor. Since the Sun 18.1-inch flat-panel monitor meets VESA standard for wall mountings, it allows users to connect the Sun 18.1-inch flat-panel monitor to any VESA standard third-party mounting arm or bracket.

Customers may purchase the mounting solutions directly from Ergotron, Inc. Their contact information is as follows:

Ergotron, Inc., 181 Trapp Road, St. Paul, MN 55112, USA; Phone: (800) 888-8458 or (612) 681-7600; FAX: (612) 6817715; web site: `http://www.ergotron.com`

Enabling Technology

LCD Technology Overview

Liquid crystal displays (LCDs) have the highest momentum. A well-established technology, LCDs are produced in large volumes and are prominent in the computer laptop market. One reason LCD technology has assumed a leadership role in the laptop market is its low power requirements, which puts less demand on laptop battery life.

LCD panels consist of a layer of cells of liquid crystal material, with an electrode driving structure on one or both sides.

There are two fundamental types of LCD panels—passive-matrix (PM) and active-matrix (AM)—terms that refer to the type of addressing used to activate each pixel. With passive-matrix displays, rows and columns of electrodes surround the liquid crystal layer. To display an image, voltage is applied to each row, and the corresponding column driver activates the appropriate pixel locations in the row. Because the voltage degrades as a function of distance across the row, passive-matrix LCDs (PM LCDs) can often suffer from performance variations, especially with larger screen sizes. The most common PM LCDs, used in everyday items like phones or calculators, are twisted-nematic LCDs (TN-LCDs). The name refers to a characteristic of the liquid crystal (nematic), and how the polarized light twists 90 degrees within the liquid crystal material. In super-twisted nematic LCDs (STN-LCDs), the amount of twist is more pronounced, usually 180 to 270 degrees, resulting in a higher contrast ratio.

With active-matrix LCDs (AM-LCDs), an individual transistor acts as a switch for activating each pixel, providing a consistent voltage at every location. This results in uniform quality across the display, especially in comparison to PM LCDs. The most common AM LCDs use a type of transistor called a thin-film transistor, hence the acronym TFT-LCD.

LCDs are either reflective or transmissive devices—they either reflect ambient light from the environment, or a light mechanism is housed behind the display that transmits light through it. Transmissive LCDs—those which have “backlight” structures—result in bright, high-luminance displays. Sun’s flat-panel monitor is transmissive, achieving a very bright, high luminance display through the use of a cold cathode fluorescent (CCFL) tube, which provides long life for the backlight assembly.

When compared to other flat-panel technologies, TFT-LCD display was chosen by Sun primarily because of its thin footprint, high-quality imaging, wide availability, and reasonable price point. In addition, TFT-LCD technology is very energy-efficient, consuming less power than many other types of flat-panels. Sun’s flat-panel monitor offers high resolution (1280 x 1024) with a large viewing area similar to Sun’s 21-inch color CRT monitor. In the desktop market, the momentum is clearly behind TFT-LCD technology—no other flat-panel technology provides a suitable alternative for large-screen desktop CRTs.

Flat-panel Interfaces—Digital Versus Analog

Digital and analog interfaces offer distinct advantages for interfacing a monitor to a system. The advantage of a digital interface is that the framebuffer does not need to convert the digital signal to analog before transmitting it to the display. With a digital interface, the signal remains digital through the entire transmission process, preventing a possible loss of integrity or distortion in the timing information.

Analog interfaces, on the other hand, offer a compatibility advantage. Since most desktop monitor interfaces are analog, an analog interface allows a flat-panel display to be easily interchanged with existing desktop monitors. For this reason, and because there is no clear digital interface standard today, Sun is offering an analog interface on its 18.1-inch flat-panel monitor.

Once a clear digital interface standard emerges, analog's compatibility advantage will go away. There are three competing efforts underway to define a digital standard:

- VESA's Plug and Display defines a single connector for analog and digital video data
- VICI's OpenLDI is defining a standard for consumer as well as very high resolution displays
- DFP Group's DFP is defining a standard for a single connector and a protocol to support mid- to high-resolution displays

Until a single digital-interface standard predominates, an analog interface offers better compatibility, providing a more flexible solution for current and legacy Sun platforms.

Specifications

Description	Specifications
Screen Size	18.1-inch diagonal (20-inch/21-inch CRT equivalent)
Pixel Pitch	0.28mm
Screen Type	Color thin-film transistor (TFT) liquid crystal display (LCD)
Resolution	1280 x 1024 pixels at 60Hz or 76Hz
Display Colors	16.7 million (24-bit true color, no dithering) ~ 256 levels of gray scale
Viewing Angle	Horizontal: 160 degree Vertical: 160 degree
Response Time	50 ms
Luminance	150 cd/m2 (minimum)
Contrast Ratio	150:1 (minimum full screen)
Monitor Interface	Analog interface
Video Input Type	Standard 13W3 video cable and HD15-pin video connector
Power Consumption	50 watts, <5W (Suspend and Stand-by, Off)
Weight	19.3 lbs. with base unit
Environmental Specifications	Operating temperature: 5˚C to 40˚C Operating humidity: 20-80% non-condensing Operating altitude: 3 km maximum
Thickness	< 9 inches with footprint
Mounting Options	Desktop: Tilt Adjustment Optional: Wall mount (compatible with VESA 4-hole mechanical mounting standard)
Safety Regulations	Compliant to all worldwide regulations FCC Part 15 Subpart B CSA C 108.8 Class B VCCI Class 2 UL listed (UL 1950) CSA certified (CSA, 22.2 No.950) TUV (EN60950) GS Mark CE Mark CB scheme report (safety) EPA Energy Star compliant MPR 1990:10

MTBF

- 50,000 hours minimum for the entire monitor assembly and all of its parts
- 25,000 hours minimum for the source backlight

Ordering Information

Sun's high-quality, 18.1-inch, color flat-panel monitor, is available as an X-option for Sun™ workstation platforms and frame buffer boards such as TurboGXplus™, PGX32™, Sun Creator3D Graphics, and Sun Elite3D graphics series.

Monitor X-Options

Order Number	Option Description
X7127A	Standard Version 18.1-inch TFT-LCD Monitor ~ 0.28mm pixel pitch • Standard 13W3 video cable and HD15-pin video input connector • 1280 x 1024 @ 60Hz, 76Hz • Analog interface • Wide viewing angle ~ Horizontal: 160 degree / Vertical: 160 degree
X7127A-O	Logoless version 18.1-inch TFT-LCD Monitor ~ 0.28mm pixel pitch • Standard 13W3 video cable and HD15-pin video input connector • 1280 x 1024 @ 60Hz, 76Hz • Analog interface • Wide viewing angle ~ Horizontal: 160 degree / Vertical: 160 degree

Upgrade Ordering

Order Number	Title and Description
UG-MON-FP	Upgrade to FP from any older Sun monitors
UG-FFB3-SB-V-FP	Upgrade to Sun Creator series 3 frame buffer, vertical form factor [1]
UG-FFB3-DB-V-FP	Upgrade to Sun Creator3D series 3 frame buffer,vertical form factor [1]
UG-FFB3-DB-H-FP	Upgrade to Sun Creator3D series 3 frame buffer, horizontal form factor [1]

[1] Customers who have a down-rev board must upgrade in order to have compatibility with the new flat-panel display.
Customers who want to find out if they have a FFB2+ rev 6 or later in their system can type “ffbconfig -prconf” at their system prompt to identify the frame buffer.
In the PROM information section, it will list ffb2p.fth 2.9. 2.9 is the rev 6 PROM.

Video Connector Adapter

A video connector adapter (15-pin Male connector to 13W3 Female connector) is required for Ultra™ 5 workstations and JavaStation™ systems with built-in HD15-pin graphics.

- X-option: X470A
- Spare: F530-2357-01

Service and Support

The SunSpectrum℠ program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris™ Operating Environment software, and telephone support for Sun™ software packages. The majority of Sun's customers today take advantage of the SunSpectrum program, underscoring the value that it represents. Customers should check with their local Sun Enterprise Services representatives for program and feature availability in their areas.

FEATURE	SUNSPECTRUM PLATINUM℠ Mission-critical Support	SUNSPECTRUM GOLD℠ Business-critical Support	SUNSPECTRUM SILVER℠ Systems Support	SUNSPECTRUM BRONZE℠ Self Support
Systems Features				
Systems approach coverage	Yes	Yes	Yes	Yes
System availability guarantee	Customized	No	No	No
Account Support Features				
Service account management team	Yes	No	No	No
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart™ installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	No	No
Site activity log	Yes	Yes	No	No
Coverage / Response Time				
Standard telephone coverage hours	7 day/24 hour	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday
Standard on-site coverage hours	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday	N/A
7-day/24-hour telephone coverage	Yes	Yes	Option	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No

FEATURE	SUNSPECTRUM PLATINUM℠ Mission-critical Support	SUNSPECTRUM GOLD℠ Business-critical Support	SUNSPECTRUM SILVER℠ Systems Support	SUNSPECTRUM BRONZE℠ Self Support
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• Urgent (phone/on-site)	Live transfer/ 2 hour	Live transfer/ 4 hour	Live transfer/ 4 hour	4 hour / N/A
• Serious (phone/on-site)	Live transfer/ 4 hour	2 hour/next day	2 hour/next day	4 hour / N/A
• Not critical (phone/on-site)	Live transfer/ customer convenience	4 hour/ customer convenience	4 hour/ customer convenience	4 hour / N/A
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
Sun Vendor Integration Program (SunVIP℠)	Yes	Yes	No	No
Software patch management assistance	Yes	No	No	No
Field change order (FCO) management assistance	Yes	No	No	No
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
Remote Systems Diagnostics				
Remote dial-in analysis	Yes	Yes	Yes	Yes
Remote systems monitoring	Yes	Yes	No	No
Remote predictive failure reporting	Yes	Yes	No	No
Software Enhancements and Maintenance Releases				
Solaris enhancement releases	Yes	Yes	Yes	Yes
Patches and maintenance releases	Yes	Yes	Yes	Yes
Sun unbundled software enhancements	Option	Option	Option	Option
Internet and CD-ROM Support Tools				
SunSolve™ license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier℠ Service	Yes	Yes	Yes	Yes

Warranty

- 1-year warranty on parts and labor
- 1-year warranty on backlight

Glossary

Active-matrix LCD	Fundamental type of LCD display. With active-matrix LCDs, each cell is activated individually by a transistor.
Backlight	In transmissive LCDs, a light mechanism is housed behind the display and used to transmit light through it, resulting in a high-luminance display.
CRT	Cathode ray tube. Technology used most commonly for desktop displays. Color CRTs contain a large vacuum tube with three electron guns that scan the image onto the screen's phosphor layer.
Contrast ratio	The range between white and black reproduction, measured according to the VESA Flat-panel Display Measurements (FPDM) standard.
Coplanar electrodes	A technology used in Sun's flat-panel monitor that improves viewing angles.
EL	Electroluminescent display. A type of flat-panel display technology. ELs contain a phosphor layer surrounded by two layers of electrodes that are driven in a matrix fashion
FED	Field emission display. A type of flat-panel display technology. FEDs use a very thin vacuum tube and many tiny emitters to activate phosphor locations.
LCD	Liquid crystal display. The highest volume flat-panel display technology. LCDs consist of liquid crystal material surrounded on one or both sides by an electrode driving structure and polarizing layers.
Luminance	Often called brightness, measured in candelas per square meter as defined by the VESA Flat-panel Display Measurements (FPDM) standard.
Passive-matrix LCDs	Fundamental type of LCD display. With passive-matrix LCDs, voltage is applied to each row, and the corresponding column driver activates the electrodes at the appropriate locations.
Pixel pitch	The space between pixels.
PDP	Plasma display panel. A type of flat-panel display technology. PDPs contain gas that fluoresces in response to an electric charge.
Reflective display device	Device which reflects ambient light from the environment rather than producing or transmitting light (see transmissive display device).
Refresh rate	The rate at which the full screen is updated.
Response time	How fast a pixel can turn on and then off, as defined by the VESA Flat-panel Display Measurements (FPDM) standard.

Screen size	The size of the display, measured along the diagonal according to the VESA Flat-panel Display Measurements (FPDM) standard.
Security lock slot	Feature which enables theft protection. Also known as a “Kensington” security lock slot.
STN-LCD	Super twisted-nematic liquid crystal display. Type of passive-matrix LCD.
TFT-LCD	Thin-film-transistor liquid crystal display. The most common active-matrix LCDs, particularly for high-end laptop and desktop monitors. TFT-LCDs use a matrix of transistors to activate individual cells of liquid crystal material.
Transmissive	Device that transmits light. Transmissive include a backlight structure for this purpose.
TN-LCD	Twisted-nematic liquid crystal display. Type of passive-matrix LCD.
VESA	Video Electronic Standards Association. VESA is an organization devoted to developing display and display interface standards. There are three VESA standards that are particularly relevant to the discussion of Sun’s flat-panel monitor.

Material Abstract

All materials are available on SunWIN, except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack – *Sun's 18.1-inch Flat-panel Display—Just The Facts, 11/99*	Just The Facts	Sales Tool Training	SunWIN, Reseller Web	110088
Product Literature – *Flat Panel Data Sheet, 11/99*	Data Sheet	Sales Tool	SunWIN, Reseller Web	95570
External Web Site – *Monitor Information Site*	`http://www.sun.com/products-n-solutions/hw/peripherals/monitors.html`			