SHARP

LCD Modules for Industrial Appliance

May 2007

Sharp LCD for Comprehensive Use

http://sharp-world.com/products/device/

History

Where will LCDs demonstrate their potential next?

1973

HR-TFT LCD

1997

Advanced TFT-LCD

1999

Advanced Super V LCD

2001

System LCD

2002

3D LCD

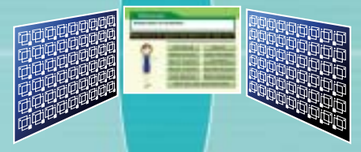
Super Mobile LCD

2003

Sharp Dual Directional Viewing LCD

2005

Switchable viewing-angle LCD



2006

2008

HR-TFT LCD

Thin and lightweight requiring no backlight.

Advanced TFT-LCD

Accommodates almost any application.
Bright and clear whether indoors or outdoors.

Advanced Super V LCD

Excellent image quality with a wide viewing angle.
Images are sharp and clear from edge to edge.

System LCD

LCD panels with integrated circuitry for a thinner profile and lower power consumption.

3D LCD

Vivid, lifelike 3D images without the need for special goggles.

Super Mobile LCD

Extensively applying LCD TV AQUOS technology.

Sharp Dual Directional Viewing LCD

View two different images on one screen simultaneously.

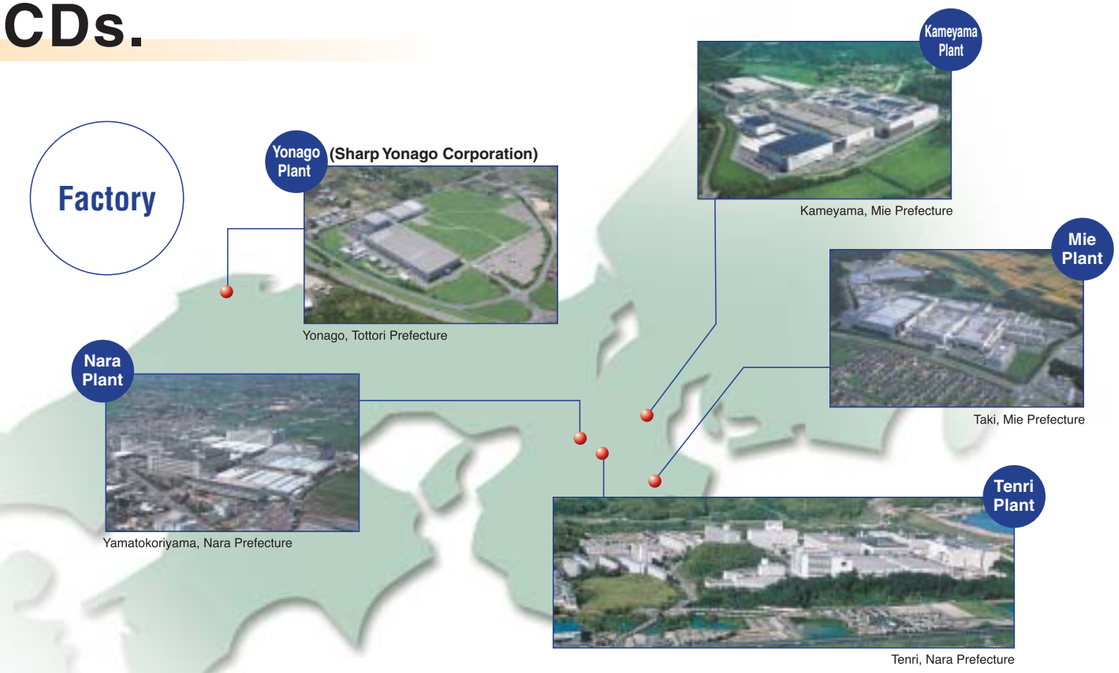
Switchable viewing-angle LCD

Restrict visibility from the left or right by switching the viewing angle.

Sharp continues to write the history of LCDs.

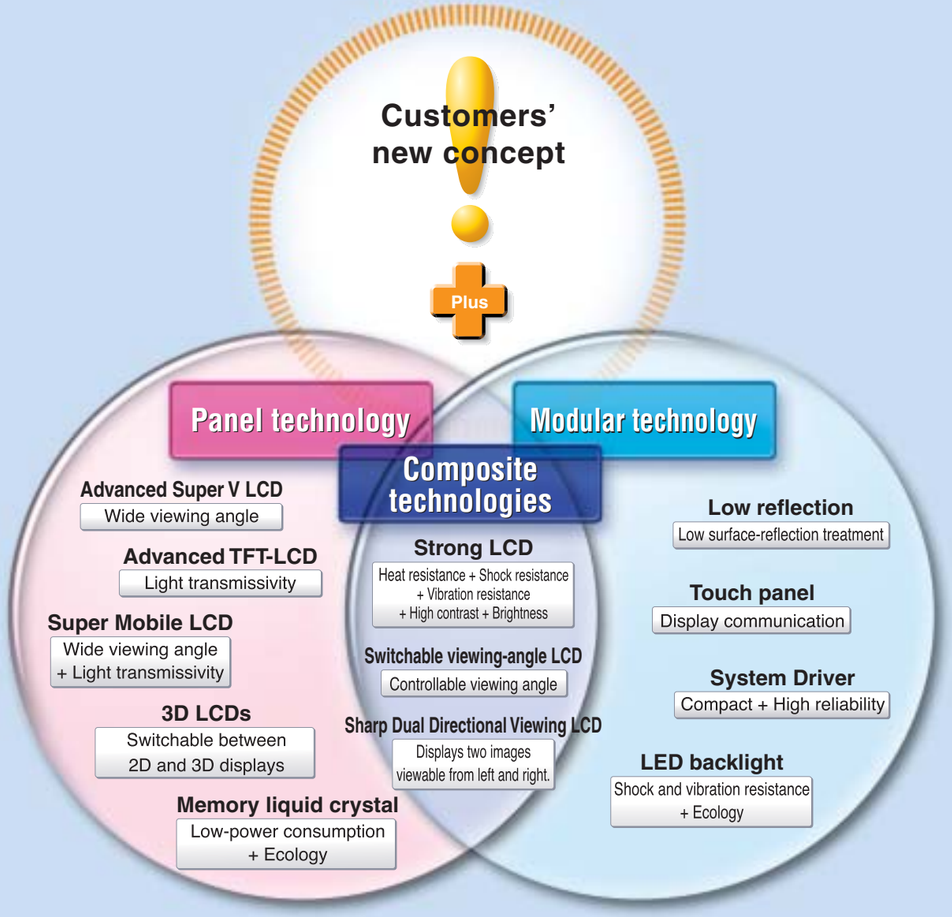
Industrial Liquid-Crystal Modules

First appearing as displays for electronic calculators in 1973,
LCDs continue to make a difference in all aspects of people's lives today.
From continual technological development to the creation of new applications
defines Sharp's ongoing endeavor to take on new challenges.
Sharp is continually building high-efficiency production systems
for use in all of our plants to ensure high quality.
Through this focused research and development of one-of-a-kind technology,
we will continue to expand the potential of LCDs.



Creating one-of-a-kind technology as our customers' partner for innovation.

For example, if a customer's new product concept requires superior LCD technology, we focus our resources to meet that need. That is because we are driven by our long years of experience and success to develop unique LCD technology and create LCD products required by the next generation.
We have a desire to advance with our customers as their innovation partner while looking at their needs from their viewpoint and sometimes beyond. We at Sharp continually strive to create together with our partners.



Contents

Technical Overview

Advanced Super V LCD

With a wide viewing angle of up to 176° vertically and horizontally, the superior image quality further expands the potential of LCD monitors.

The Advanced Super V LCD is a type of high-image quality LCD panel employing advanced technology developed exclusively by Sharp. For LCD TV screens, Advanced Super V LCD achieves a wide viewing angle of 176˚ from the top, bottom, left, and right by optimizing the alignment of the liquid crystal molecules.

Advanced Super V LCD

Wide viewing angle for bright, clear images from any direction

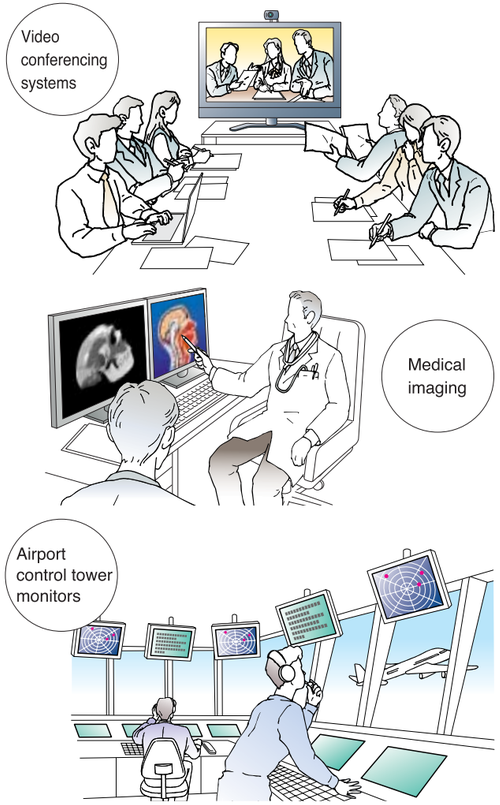
The Advanced Super V LCD delivers a wide viewing angle of 176˚ from the top, bottom, left, and right which makes it ideal for all sorts of applications and usage configurations. There is very little color shift with viewing angle changes and no gray scale inversion, so the picture looks bright and sharp from any direction.

Conceptual illustration of viewing angle characteristics

TN

Advanced Super V

Applications



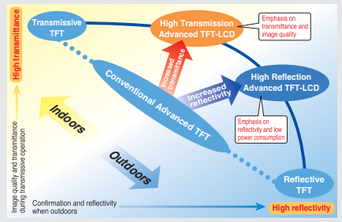
A third type of liquid crystal display that combines the advantages of transmissive and reflective LCDs.

Super Mobile HR-TFT LCDs provide brilliant, vivid images outdoors where it is bright, but their visibility is poor indoors, where ambient light levels are lower. Sharp solves this problem by developing a multi-location display, the Advanced TFT-LCD. It combines the performance of an HR-TFT LCD in brightly lit locations with the functionality of a backlit transmissive LCD in dimmer environments. The Advanced TFT-LCD has been further refined to produce the High Transmission Advanced TFT-LCD and the High Reflection Advanced TFT-LCD. This enables users to choose the best possible panel for their particular application.

Advanced TFT-LCD

The High Transmission Advanced TFT-LCD and High Reflection Advanced TFT-LCD—two types of panels optimized for different applications.

Advanced TFT-LCDs feature a display panel that is divided into reflective and transmissive sections. Since the ratio of the two parts can be changed freely, it is possible to design display panels that are ideally suited to specific applications. The present selection of Advanced TFT-LCDs includes the High Transmission Advanced TFT-LCD, which is optimized for superior image quality, and the High Reflection Advanced TFT-LCD, which is designed for low power consumption.

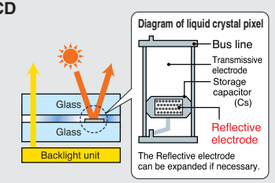


Positioning of High Transmission Advanced TFT-LCD and High Reflection Advanced TFT-LCD

Excellent visibility and image quality under outdoor light

High Transmission Advanced TFT-LCD

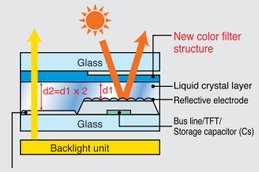
The transmissive part of the display panel is left as is and only the area that is not used for transmissive display is made reflective. Thus, though the display panel is transflective, it provides high transmittance and excellent image quality on a par with conventional transmissive TFT-LCDs. At the same time, the panel provides good visibility under bright light, such as that outdoors. The High Transmission Advanced TFT-LCD is suitable for applications where indoor use is of primary importance but outdoor use is occasionally necessary.



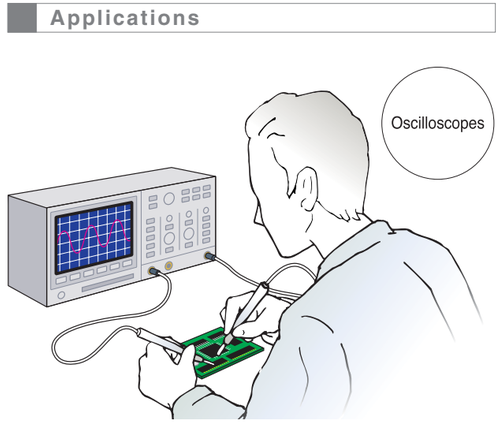
Reflectivity rivaling reflective TFT-LCDs for excellent visibility and low power consumption

High Reflection Advanced TFT-LCD

The rate of external light used to illuminate the display is increased by boosting the ratio of reflective display space and using reflective electrodes in parts other than the transmissive display area. This produces reflectivity nearly equal to that of a conventional reflective TFT-LCD. It is thus possible to reduce the amount of time the backlight needs to be used and even retain excellent visibility with the backlight turned off. The High Reflection Advanced TFT-LCD is suitable for applications where outdoor use is emphasized and low power consumption is necessary.



Applications

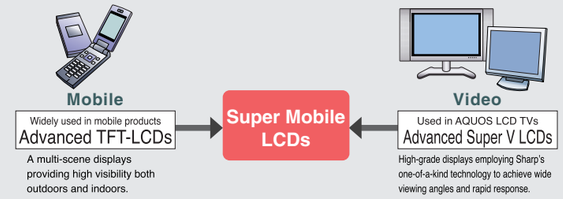


A unique technology combining mobility with superior image quality for a wide range of applications that demand high image quality.

Sharp's Advanced TFT-LCDs provide excellent legibility to an array of mobile products in both bright outdoor conditions and dim indoor settings. Our Advanced Super V LCDs achieve a wide viewing angle by aligning the liquid crystal molecules in a uniform manner. They are used in AQUOS LCD TVs.
Super Mobile LCDs are a new type of LCDs combining Advanced TFT-LCD technology with Advanced Super V LCD technology. In addition to application in mobile devices, we are also targeting application to mid- and large-size devices.

Super Mobile LCD

A new LCD combining Advanced TFT-LCD technology and Advanced Super V LCD technology



Clear, Wide Viewing Angles from Any Direction

The viewing angle is very wide—160˚ from the top, bottom, left, and right —and there is minimal color shift when changing the angle. Since there is no problem with gray scale inversion you get a clear picture no matter what direction from which you look at the screen.

Conceptual Representation of Field of View

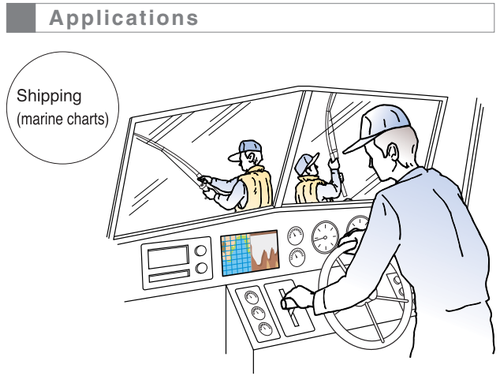
Excellent Legibility both Outdoors and Indoors

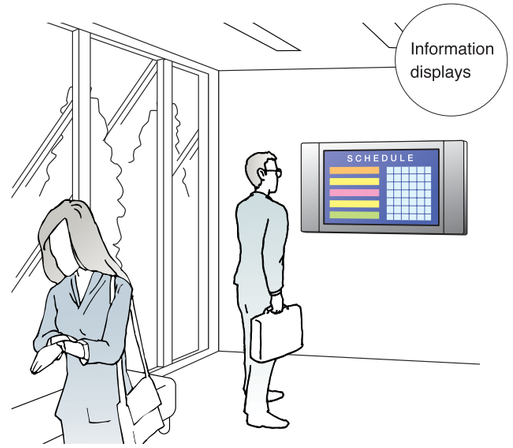
The display consists of portions that are highly transmissive under low-light conditions and portions that are reflective in brightly lit environments. By changing the proportions of those sections it is possible to obtain optimal display visibility under any conditions.

Clear Images and High Contrast

The contrast ratio is 400 : 1, a level previously unattainable in displays for mobile products.

Applications





Superior reliability and resistance to temperature extremes, shocks, and vibrations make these display panels ideal for applications in manufacturing and distribution businesses.

In locations such as factories, resistance to physical shock and heat is a highly important issue for display devices. There is enormous demand for compact LCDs, but it can be difficult to overcome the requirements imposed by harsh environments, such as resistance to vibration or temperature extremes. Sharp's Strong LCDs employ a new reinforcement mechanism design, liquid crystal capable of withstanding a wide range of temperatures, and high-luminance backlights. These TFT-LCDs are capable of standing up to physical shocks, vibrations, and variations in temperature. They provide a high degree of reliability in punishing environments, such as applications in manufacturing to distribution.

Strong LCD

Innovation of LCD materials for enhanced reliability under extreme temperatures

LCDs can be used reliably in extreme temperatures through the use of newly developed liquid crystal and optimization of heat dissipation treatment.

	Conventional LCD	Strong LCD1	Strong LCD2
Operating temperature range	0 to +50 °C	**-10 to +65 °C**	**-30 to +80 °C**
Storage temperature range	-25 to +60 °C	**-30 to +70 °C**	**-30 to +80 °C**

Elemental technology LCD material for use in wide-ranging temperatures

Compared to conventional LCDs, this LCD material can be used under low to high temperature extremes and in various outdoor applications.

High reliability with regard to vibration and shock

By reinforcing the module structure, we have developed a module significantly more resistant to shock and vibration than conventional modules.

	Conventional LCD	Strong LCD1	Strong LCD2
Vibration resistance	57 to 500 Hz Acceleration 1 G	**57 to 500 Hz Acceleration 1 G**	**57 to 500 Hz Acceleration 1.5 to 2 G**
Shock resistance	50 G 11 ms	**50 G 11 ms**	**60 to 70 G 11 ms**

Elemental technology Reinforced structural design and components

Pursuing a structural design able to withstand vibration and shock, we've also redesigned the components for enhanced reliability.

Brightness

Brightness is greatly enhanced by improving the transmissivity of the panel and developing a bright backlight system.

	Conventional LCD	Strong LCD1	Strong LCD2
Brightness	300 cd/m^2	**Greater than 300 cd/m^2**	**Greater than 400 cd/m^2**

Elemental technology High transmissivity panel + bright backlight

We've realized a bright LCD with superior image quality compared to conventional LCDs.

High contrast

By suppressing brightness when displaying black and adopting a new drive system, we've been able to enhance contrast.

	Conventional LCD	Strong LCD1	Strong LCD2
Contrast	350 : 1	**350 : 1**	**600 : 1**

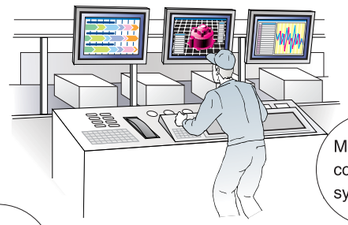
Elemental technology High contrast

Deeper blacks help to realize more vivid images compared to conventional LCDs.

Applications

High pressure testing equipment

Shock Resistance



Monitoring control systems

Gas station POS terminals

High Brightness, High Contrast

Allowing for a narrow viewing angle to restrict viewing by others, this display will allow strict handling of confidential information.

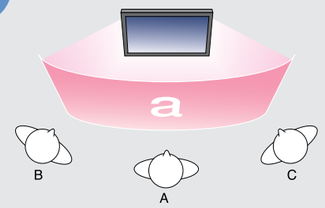
In corporations where the strict handling of confidential information is required, there is an increasing need to protect the information displayed on screens located in open places.
The switchable viewing-angle LCD can be switched between a normal wide viewing angle and a narrow viewing angle that restricts viewing from the sides. This LCD, for which we anticipate a growing demand, will make it possible to protect information according to the surrounding conditions.

Switchable viewing-angle LCD

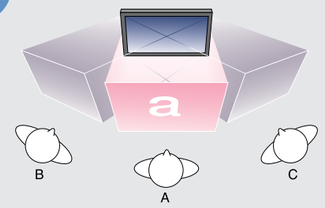
A peek-proof LCD screen displaying images that are virtually unviewable from the side

Normally, the switchable viewing-angle LCD screen has the same wide viewing angle as ordinary LCD panels. But a flick of a switch converts it to a narrow viewing angle that prevents unwanted viewing from either side.

Wide-viewing-angle display Everyone sees image a.

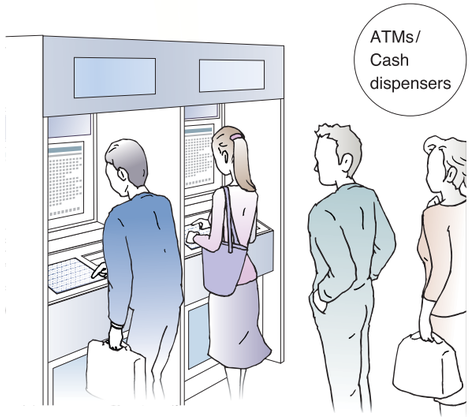


Narrow-viewing-angle display Only A sees image a.



Applications

Convenience store terminals



ATMs/ Cash dispensers

Sharp Dual Directional Viewing LCD

View two different high-definition images on the same screen simultaneously. This technology will open up new applications for liquid crystal displays.

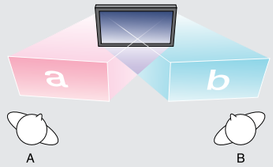
The Sharp Dual Directional Viewing LCD separates light left and right so that different images can be viewed on one screen simultaneously. Possible applications include information displays near gates where people are entering and leaving facilities, screens that display TV broadcasts while someone surfs the Internet, and screens for two-player games. Displaying two different types of information viewable on the same screen from the left side and right side will enhance customer service. We are working to develop this whole new category of products utilizing liquid crystal technology available only from Sharp.

Sharp Dual Directional Viewing LCD

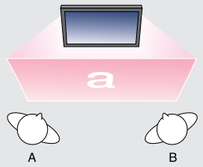
Beautiful simultaneous display allows one panel to show two different screens

The Sharp Dual Directional Viewing LCD panel displays different information depending on whether it is viewed from the left or from the right. The panel simultaneously displays two crystal-clear, high-quality images with no intermingling. Moreover, by displaying the same image on both sides, it can also function as a normal display, allowing everyone to view the same image.

In dual-screen modea A sees only image a.
B sees only image b.



In single-screen mode Both A and B see image a.

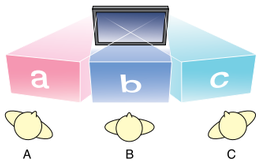


Sharp Triple Directional Viewing LCD (Under development)

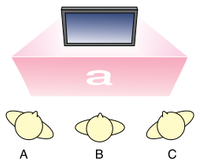
Sharp Triple Directional Viewing LCD takes this controlled viewing-angle technology a step further. Using a proprietary parallax barrier on a standard TFT LCD, the screen splits light in three directions—left, right, and center—and displays three separate images on the same screen at the same time.

Sharp is meeting consumer needs by expanding its lineup and developing new and convenient uses for controlled viewing-angle LCDs.

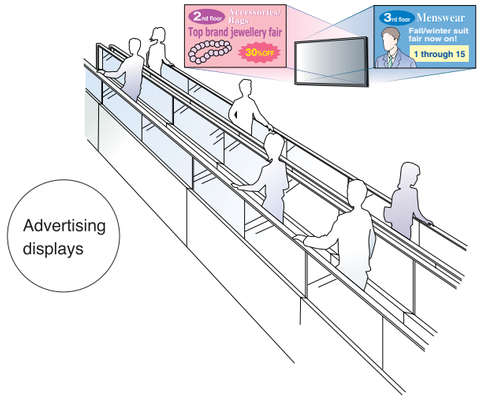
In triple-screen mode A sees only image a.
B sees only image b.
C sees only image c.



In single-screen mode Everyone sees image a.



Applications



3D LCD

No special goggles are needed to achieve realistic three-dimensional display. Plus, switching between 2D and 3D modes can be done electronically.

No special goggles are needed for 3D display, and switching between 2D and 3D modes can be done electronically. The display can be used not only with new 3D products, but in existing products that employ LCDs, so that a wider range of application and function can be enjoyed. In game machines, the game can be played in a 2D mode, with the display switching to an expressive 3D demo screen the moment the goal is reached. Or as a medical monitor, the display can be switched back and forth as needed to provide patients with easy-to-understand explanations, enhancing the quality of medical care.

3D LCD

3D graphics with no special goggles

In the past it has been necessary to wear special goggles in order to view 3D graphics. The 3D LCD, however, uses a parallax barrier system implemented using a specially developed switching liquid crystal to deliver three-dimensional images that can be viewed without special goggles.

Simple panel structure for easy control

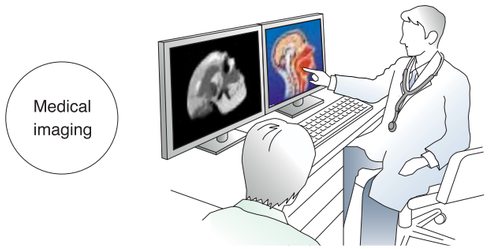
The ease of controlling the display makes it possible to use 3D LCDs for a wide range of applications. Its simple structure helps lower costs and provides excellent reliability.

Switchable between 2D and 3D display modes

The switching liquid crystal enables the parallax barrier to be controlled electrically. Switching between the flat (2D) and three-dimensional (3D) display modes can be accomplished at the touch of a button. This means the most appropriate display mode can be selected to match the application.

* The 3D display shown above is a conceptual image and differs from actual display.

Applications



Our proprietary direct bonding technology realizes high readability under direct sunlight and shock resistance.

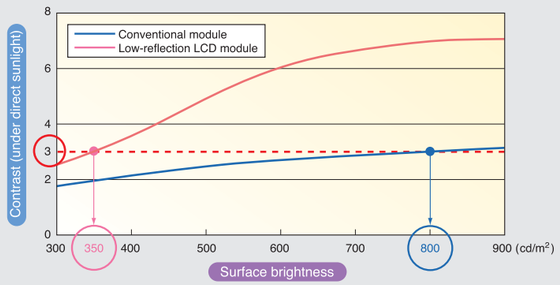
Solutions for outdoor applications that utilize LCD modules demand high shock resistance and consistently high readability under direct sunlight.
In order to meet such demand, Sharp has added a protective glass layer to the surface of liquid crystal modules using a special direct bonding technology. This not only reduces the reflection of sunlight to improve readability, but also successfully enhances shock resistance.
We will continue to actively expand outdoor LCD applications.

Low-reflection LCD module

Comparison of contrast characteristics

In the past, in order to improve readability under direct sunlight (CR ≧ 3.0), it was necessary to raise surface brightness above 800 cd/m^2. Using direct bonding technology, however, we have been able to achieve the same characteristic in liquid crystal module bases with a brightness of only 350 cd/m^2.

Contrast characteristics under direct sunlight



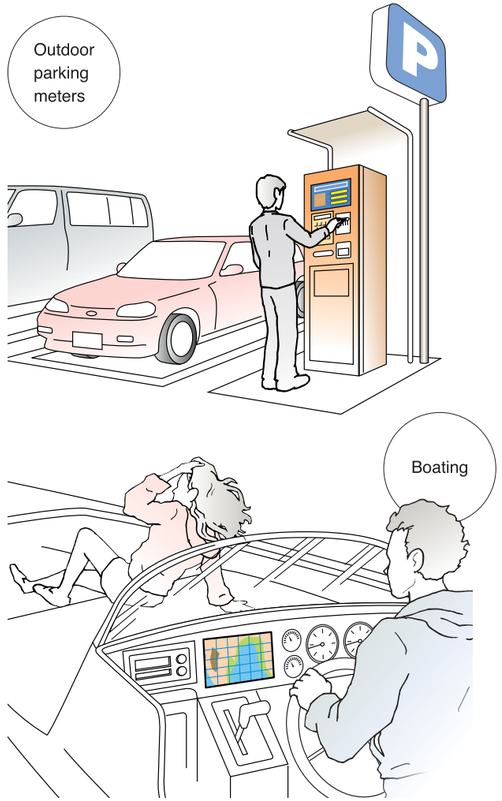
Applicable to a wide variety of devices

The ability to maintain the brightness of the base module expands its potential for a wide range of new applications.

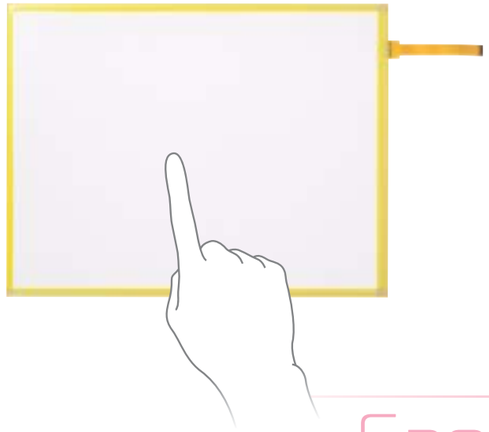
High shock resistance

Adding a liquid crystal module protective glass layer offers high shock resistance.

Applications



Man-machine interfaces of the future will offer high image quality coupled with high durability.

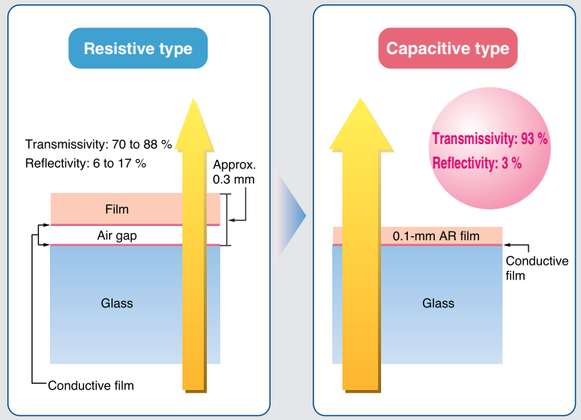


Compared to conventional resistive type touch panels, capacitive touch panels have a much simpler structure with only one sheet of glass making up the touch panel. These panels offer clear, clean images with no distortion, very low reflection, and very little burn-in or loss. By greatly increasing the hardness of the surface, we've been able to improve both durability and image quality. The high-hardness surface and simple structure provide for stable usage over long periods under severe use conditions, and the adoption of dedicated controller ICs developed by Sharp make these panels the flexible solution for various applications such as displays in automobiles, IA applications, and mobile devices.

Capacitive touch panel

Clear images uncharacteristic of a touch panel display

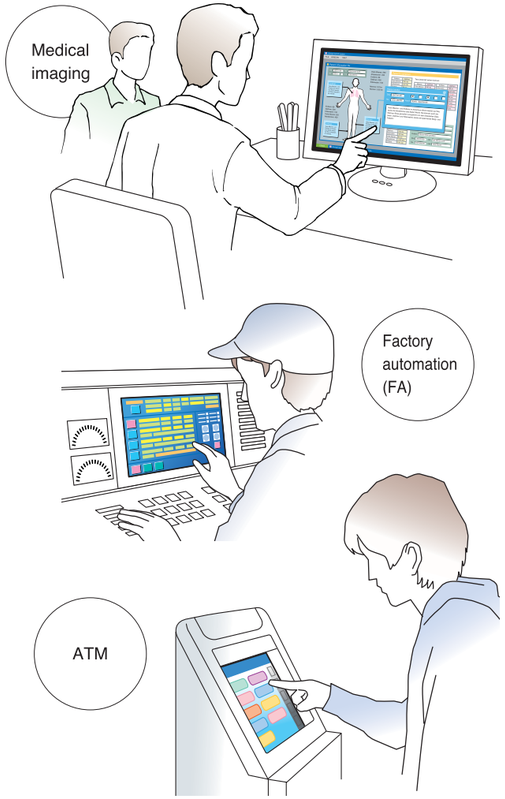
This capacitive system realizes a single-glass sheet touch panel. There is no image distortion caused by a complicated structure such as that used in resistive-type panels. Because the transmissivity is substantially suppressed, products that use this technology do not appear to use a touch panel.



Offering LCD-enhanced solutions

Sharp also develops its own touch panel control ICs. By merging touch panels with our liquid crystal displays backed by years of development experience, we are able to answer our customers' needs precisely with touch panel-integrated liquid crystal display systems.

Applications



Requiring no power except when changing the display content, this new LCD is ideal for applications such as price tags where the information does not change.

This LCD utilizes memory display elements that require no power except when changing the display content. It is ideal for price tags in supermarkets, etc., where the information displayed does not change for a period of time. The display can easily be changed with a personal computer for efficient management and color variation. This is truly an “electronic paper” that eliminates the need for rewriting or replacement. This new LCD promises a wide range of applications considering its solution.

Memory liquid crystal

Low power consumption and requires no power except when changing the display content

The use of memory display elements eliminates the need for power except when changing the display content, thus realizing an environmentally-friendly liquid crystal display.

Clear display with no secondary images (shadows)

This LCD requires no reflective plate and therefore characters and other images do not cast a shadow for a clearer, sharper display.

Easy-to-read wide viewing angle

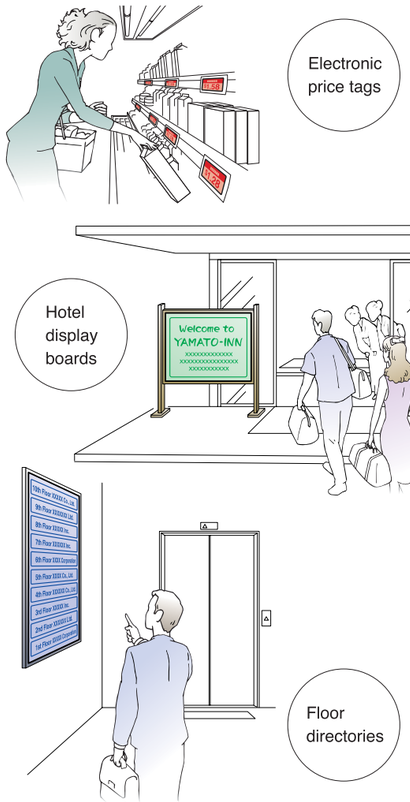
The wide 135˚ viewing angle expands the range of possible applications.

Many color variations

Various colors can be achieved by combining with a background color. The display color of characters and images and the background color can also be switched.

Color variations (background)

Applications



A revolutionary driver from Sharp enables lighter weight, greater compactness and higher reliability.

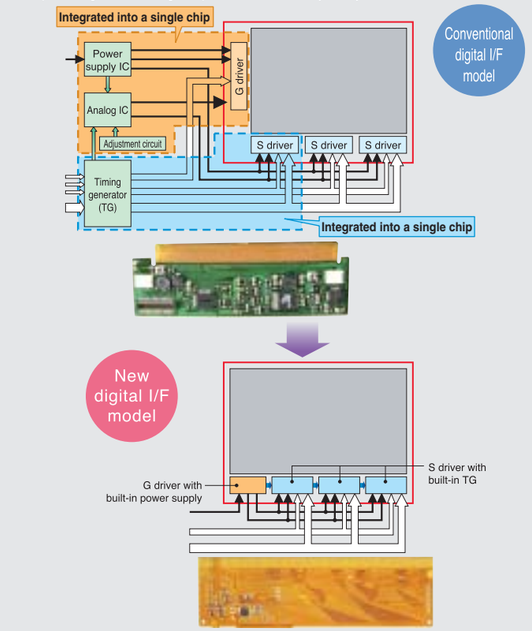
Driver design is optimized based on panel load simulation and gamma simulation technologies Sharp has nurtured over many years, thereby incorporating peripheral circuits into the driver, and achieving lower power consumption and space savings. Weight and size can be reduced by using applications. Ideal for Sharp LCD displays, this driver could only be developed by Sharp.

System Driver

Space savings and higher reliability are achieved by integrating a timing generator (TG), analog IC and power supply IC into a conventional on-panel driver IC.

High reliability with no mechanical stress and improved adjustment precision are achieved via automatic flicker adjustment using an electronic volume control.

Conceptual diagrams showing components eliminated by the system driver



Applications

Applying Sharp's total resources to opening up new potential in diverse industrial applications.

Liquid crystal modules for industrial devices are required to satisfy a diverse range of needs. In order to offer our customers products with superior performance and high reliability, we have dedicated Sharp's best resources to developing and designing products aimed at satisfying those needs.

Marketing

Complete product lineup aimed at contributing to market expansion

Our high reliability incorporated in panel design has been proven by many successful products. Our extensive product lineup can precisely answer needs for high image quality, size, low power consumption, brightness, temperature, and other environmental considerations.

Technology

Offering the one-of-a-kind technology at exactly the right time

Sharp is able to offer customers the precise LCD technology that will satisfy their needs when they need it. These include Advanced Super V, Super Mobile, Advanced TFT, Strong, Switchable viewing-angle, Sharp Dual Directional Viewing LCD and other technologies.

Sharp's development and design style for industrial-use liquid crystal display modules

Usability

Easy maintenance and extended support

Our products are compatible with various input signals and are easy to maintain. Input signals, mechanical structure and other basic specifications are carried over into new products and our total parts supply system ensures the long-term supply of parts.

Environment

From material procurement to power saving design and recycling

We've adopted an environment technology design in compliance with LCA*, and we are contributing to reduced load on the environmental through products that are 100% in compliance with the RoHS directive initiated in July 2006.

*LCA: Life Cycle Assessment

Areas of Application

Application		Technology										
		Advanced Super V LCD	Advanced TFT-LCD	Super Mobile LCD	Strong LCD	Low-reflection LCD module	Capacitive touch panel	Sharp Dual Directional Viewing LCD	Switchable viewing-angle LCD	Memory liquid crystal	System Driver	LED backlight
Programmable displays					●		●					
ATMs/CDs			●	●	●	●	●	●				
POS/portable data terminals			●				●		●			
Medical	Image displays	●										●
	Data displays	●										
Maritime	Fish finders	●		●	●	●						
	Marine charts	●		●	●	●						
Copiers		●					●				●	
Testers (measuring instruments)			●		●	●						●
Airlines	Cockpits	●		●	●	●						
	Control towers	●		●								
	Passenger lounges				●	●	●					
Door intercoms		●									●	●
Game machines							●		●			
IP telephones		●					●					
Photo frames		●										
Video conference systems		●				●						
Display boards		●		●	●	●			●	●		
Electronic price tags										●		

Product Map

Display Size (inch)	Resolution										Technology						
	QSXGA	4M	UXGA	SXGA	XGA	SVGA	WVGA	VGA	HVGA	QVGA	Advanced Super V LCD	Super Mobile LCD	Strong LCD2	Low-reflection LCD module	Switchable viewing-angle LCD	System Driver	LED backlight
28.3	LQ283G1TW11										●						
28.1		LQ281L1LW11									●						
		LQ281L1LW14									●						
23.1			LQ231U1LW01								●						
			LQ231U1LW21								●						
20.1			LQ201U1LW11Z								●						
			LQ201U1LW21								●						
19.0				LQ190E1LW01							●						
				LQ190E1LW41							●						
15.0					LQ150X1LGB1												
					LQ150X1LGN2A												
					LQ150X1LGN2E												
					LQ150X1LW71N						●						
					LQ150X1LW72						●						
					LQ150X1LGB2										●		
12.1						LQ121S1DG41											
						LQ121S1DG61							●				
						LQ121S1LG41											
						LQ121S1LG61							●				
						LQ121S1LG64								●			
						LQ121S1LW01					●						
						LQ121S7LY01						●					
						LQ121S7LY11						●					
10.4						LQ104S1DG21											
						LQ104S1DG31											
						LQ104S1DG61							●				
						LQ104S1LG21											
						LQ104S1LG31											
						LQ104S1LG61							●				
								LQ104V1DG21									
								LQ104V1DG51									
								LQ104V1DG61					●				
								LQ104V1DG64						●			
								LQ104V1LG61					●				
								LQ104V1DW02			●						
8.0" class									LM089HB1T04								
							LQ085Y3DG03									●	
							LQ085Y3DG04									●	
							LM085YB1T01										
						LQ084S3DG01											
						LQ084S3LG01							●				
								LQ084V3DG01					●				
								LQ084V1DG21									
									LM081HB1T01B								
7.0" class								LM077VS1T01									
								LQ075V3DG01					●				
6.0" class								LQ064V3DG01									
								LQ064V3DG04									
5.0" class								LQ057V3DG01					●			●	
										LQ057Q3DC12							
										LM32019T/P							
										LQ050Q5DR01							
										LM050QC1T01							
Less than 5.0"										LM046QB1S02							
										LQ038Q3DC01							●
										LQ035Q3DH01						●	●

Product Specifications (28.3 to 10.4 inches)

Display size (inch)	Model No.	Dot format H x V (dot)	Dot pitch H x V (mm)	Display colors	Brightness (cd/m²)	Contrast	Viewing angle* H/V (CR ≧ 10)	Response time (ms)	Operating temperature (°C)	Storage temperature (°C)	Input signal	Power supply (V)	Power consumption (W)	Screen treatment	Dimensions H x V x T (mm)	Weight (g)	Backlight	Remarks
28.3	LQ283G1TW11	2 560 x RGB x 2 048	0.219 x 0.219	16.77 M	225	400 : 1	170/170 (CR ≧ 10)	25	0 to +40 (ambient)	-25 to +60	4ch TMDS	12.0	103.2	AG	640.0 x 530.0 x 60.0	Max. 15 000	18CCFT	Built-in inverter
28.1	LQ281L1LW11	2 048 x RGB x 2 048	0.246 x 0.246	16.77 M	225	450 : 1	170/170 (CR ≧ 10)	25	0 to +40 (ambient)	-25 to +60	4ch LVDS	12.0	96.0	AG	594.0 x 594.0 x 83.0	15 000	18CCFT	Built-in inverter
	☆ LQ281L1LW14					1 000 : 1				-20 to +60			TBD					
23.1	LQ231U1LW01	1 600 x RGB x 1 200	0.294 x 0.294	16.77 M	250	500 : 1	160/160 (CR ≧ 10)	30	0 to +45 (ambient)	-20 to +60	LDI	5.0, 12.0	54.9	AG	530.0 x 432.8 x 32.5	Max. 5 500	6CCFT	Built-in inverter
	LQ231U1LW21																	Expanded backlight adjustment area
20.1	LQ201U1LW11Z	1 600 x XYZ x 1 200	0.255 x 0.255	256 (gray scales)	700	1 000 : 1	170/170 (CR ≧ 10)	25	0 to +50 (ambient)	-25 to +60	2ch LVDS 8-bit XYZ	12.0	32.9	AG	436.0 x 335.0 x 27.5	Max. 3 800	6CCFT	
	LQ201U1LW21	1 600 x RGB x 1 200		16.77 M	250	500 : 1	176/176 (CR ≧ 10)	20			2ch LVDS 8-bit RGB		33.8		432.0 x 331.5 x 25.0	3 200		
19.0	LQ190E1LW01	1 280 x RGB x 1 024	0.294 x 0.294	16.77 M	300	700 : 1	170/170 (CR ≧ 10)	16	0 to +55 (panel surface)	-20 to +60	2ch LVDS 8-bit RGB	5.0	25.5	AG	404.2 x 330.0 x 20.0	Max. 2 800	4CCFT	
	LQ190E1LW41				450	900 : 1	178/178 (CR ≧ 10)	12	0 to +50 (panel surface)				38.3		404.2 x 330.0 x 22.0	Max. 3 200	6CCFT	
15.0	LQ150X1LGB1	1 024 x RGB x 768	0.297 x 0.297	16 M	600	350 : 1	120/100 (CR ≧ 10)	30	0 to +60 (panel surface)	-30 to +70	LVDS 6 bit + 2FRC RGB	3.3	16.0	AG	331.6 x 254.76 x 12.5	1 200 ±50	4CCFT	
	LQ150X1LGN2A				260			25		-25 to +60			9.8		326.0 x 252.0 x 11.5	Max. 1 100	2CCFT	
	LQ150X1LGN2E				350					-20 to +60			10.4					
	LQ150X1LW71N				250	400 : 1	170/170 (CR ≧ 10)			-25 to +60			18.1		331.6 x 254.76 x 12.5	Max. 1 300	4CCFT	Advanced Super V
	LQ150X1LW72				350	600 : 1								AGLR		Max. 1 350		
	☆ LQ150X1LGB2				(200)	(350 : 1)	(120/100) (CR ≧ 10)	30		-30 to +70			TBD	AG	(331.6 x 254.76 x 16.0)	(Max. 1 400)	2CCFT	Switchable viewing-angle
12.1	LQ121S1DG41	800 x RGB x 600	0.3075 x 0.3075	260 K	370	450 : 1	140/110 (CR > 10)	35	-10 to +65 (ambient)	-30 to +70	Digital 6-bit RGB	3.3/5.0	8.3	AG	276.0 x 209.0 x 11.0	Max. 660	2CCFT	
	LQ121S1DG61				450	600 : 1			-30 to +80 (panel surface)	-30 to +80						Max. 800		Strong LCD2
	LQ121S1LG41				370	450 : 1			-10 to +65 (ambient)	-30 to +70	LVDS 6-bit RGB					Max. 660		
	LQ121S1LG61				450	600 : 1			-30 to +80 (panel surface)	-30 to +80						Max. 800		Strong LCD2
	☆ LQ121S1LG64				(450)	(600 : 1)			-30 to +60	-30 to +60			(8.3)	AR	276.0 x 209.0 x 14.5	(1 200)		Low-reflection LCD module
	LQ121S1LW01				250	800 : 1	170/170 (CR > 10)	29	0 to +50 (ambient)	-25 to +60			8.5	AG	276.0 x 209.0 x 11.0	Max. 800		Advanced Super V
	☆ LQ121S7LY01				(200)	(400 : 1)	(160/160) (CR > 10)	(25)	-30 to +80 (panel surface)	-30 to +80				LR		(Max. 800)		Super Mobile LCD
	☆ LQ121S7LY11				(300)								15.5		276.0 x 216.0 x 16.0	(Max. 900)	4CCFT	
10.4	LQ104S1DG21	800 x RGB x 600	0.264 x 0.264	260 K	350	300 : 1	140/110 (CR > 10)	35	-10 to +65 (ambient)	-30 to +70	Digital 6-bit RGB	3.3/5.0	6.5	AG	246.5 x 179.4 x 15.5	Max. 620	2CCFT	
	LQ104S1DG31					500 : 1			-30 to +80 (panel surface)	-30 to +80			6.6		243.0 x 183.8 x 11.5	Max. 600		
	☆ LQ104S1DG61				420	(600 : 1)							(6.3)		246.5 x 179.4 x 13.7	Max. 620		Strong LCD2
	LQ104S1LG21				350	300 : 1			-10 to +65 (ambient)	-30 to +70	LVDS 6-bit RGB	3.3	6.6		246.5 x 179.4 x 15.5			
	☆ LQ104S1LG31					500 : 1			-30 to +80 (panel surface)	-30 to +80		3.3/5.0			243.0 x 183.8 x 11.5	(600)		
	☆ LQ104S1LG61				420	(600 : 1)							(6.3)		246.5 x 179.4 x 13.7	Max. 620		Strong LCD2
	LQ104V1DG21	640 x RGB x 480	0.330 x 0.330		350	300 : 1			-10 to +65 (ambient)	-30 to +70	Digital 6-bit RGB		6.4		265.0 x 195.0 x 11.5	Max. 700		
	LQ104V1DG51														246.5 x 179.4 x 15.5	Max. 620		
	LQ104V1DG61				450	600 : 1			-30 to +80 (panel surface)	-30 to +80			6.3		246.5 x 179.4 x 13.7			Strong LCD2
	☆ LQ104V1DG64							TBD	-30 to +60	-30 to +60				AR	(246.5 x 179.4 x 17.2)	Max. 1 000		Low-reflection LCD module
	LQ104V1LG61					(600 : 1)		35	-30 to +80 (panel surface)	-30 to +80	LVDS 6-bit RGB			AG	246.5 x 179.4 x 13.7	Max. 620		Strong LCD2
	LQ104V1DW02				380	450 : 1	160/160 (CR > 10)	25	0 to +70 (panel surface)	-20 to +70	Digital 6-bit RGB				246.5 x 179.4 x 15.5			Advanced Super V

TFT STN ☆ New model/under development

Product Specifications (Less than 10.0 inches)

Display size (inch)	Model No.	Dot format H x V (dot)	Dot pitch H x V (mm)	Display colors	Brightness (cd/m²)	Contrast	Viewing angle* H/V (CR ≧ 10)	Response time (ms)	Operating temperature (°C)	Storage temperature (°C)	Input signal	Power supply (V)	Power consumption (W)	Screen treatment	Dimensions H x V x T (mm)	Weight (g)	Backlight	Remarks
8.0” class	LM089HB1T04	640 x 240	0.330 x 0.330	Blue and white	250	4.5 : 1	60/45 (CR ≧ 1.5)	600	0 to +50 (ambient)	-25 to +60	8-bit parallel	3.3/5.0	2.3	Clear	258.8 x 109.8 x 10.0	320	1CCFT	
	☆ LQ085Y3DG03	800 x RGB x 480	0.231 x 0.231	260 K	(Min. 130)	(250 : 1)	110/100 (CR ≧ 10)	30	0 to +75 (panel surface)	-25 to +75	Digital 6-bit RGB	3.3	TBD	AG	222.7 x 135.4 x 12.5	TBD		Wide
	☆ LQ085Y3DG04				(250)	250 : 1	100/110 (CR ≧ 10)								(212.0 x 134.0 x 12.5)			
	LM085YB1T01	800 x 480		Black and white	200	14 : 1	60/45 (CR ＞ 4)	660	0 to +50 (ambient)	-25 to +60	8-bit parallel		2.4	Clear	222.7 x 134.0 x 8.5	300		
	LQ084S3DG01	800 x RGB x 600	0.213 x 0.213	260 K	350	320 : 1	160/125 (CR ≧ 5)	30	-30 to +80 (panel surface)	-30 to +80	Digital 6-bit RGB		3.7	AG	199.5 x 149.5 x 11.6	Max. 405	2CCFT	
	☆ LQ084S3LG01	800 x RGB x 480		16 M	(400)	(600 : 1)	(120/120) (CR ≧ 10)	(30)			LVDS 6-bit + 2FRC RGB		TBD			TBD		Strong LCD2
	☆ LQ084V3DG01	640 x RGB x 480	0.270 x 0.270	260 K	400	600 : 1	140/110 (CR ≧ 10)	TBD			Digital 6-bit RGB				199.5 x 149.5 x 12.05			
	LQ084V1DG21		0.267 x 0.270		300	250 : 1	110/95 (CR ≧ 10)	60	0 to +63 (panel surface)	-25 to +70		3.3/5.0	5.5		216.0 x 152.4 x 12.0	Max. 430	1CCFT	
	LM081HB1T01B	640 x 240	0.300 x 0.300	Black and white	150	8 : 1	60/55 (CR ≧ 2)	600	0 to +50 (ambient)	-20 to +60	4-bit parallel	3.3	1.6	Clear	249.0 x 99.4 x 8.5	260		
7.0” class	LM077VS1T01	640 x RGB x 480	0.246 x 0.246	— (C-STN)	150	30 : 1	60/50 (CR ≧ 5)	(580)	0 to +50 (ambient)	-25 to +60	8-bit parallel	5.0	2.5	Clear	195.2 x 137.5 x 8.0	TBD	2CCFT	
	☆ LQ075V3DG01		0.237 x 0.237	260 K	400	600 : 1	140/125 (CR ≧ 10)	26	-30 to +80 (panel surface)	-30 to +80	Digital 6-bit RGB	3.3	5.7	AG	179.0 x 139.5 x 12.7		1CCFT	Strong LCD2
6.0” class	LQ064V3DG01	640 x RGB x 480	0.204 x 0.204	260 K	350	350 : 1	140/110 (CR ≧ 5)	29	-30 to +80 (panel surface)	-30 to +80	Digital 6-bit RGB	3.3/5.0	4.7	AG	161.3 x 117.0 x 12.0	Max. 280	2CCFT	
	☆ LQ064V3DG04				290		110/120 (CR ≧ 5)	31										Best Viewing Angle : 3 o'clock direction Ideal for vertical use
5.0” class	☆ LQ057V3DG01	640 x RGB x 480	0.180 x 0.180	260 K	(430)	(600 : 1)	(130/105) (CR ≧ 5)	(29)	-30 to +80 (panel surface)	-30 to +80	Digital 6-bit RGB	3.3	TBD	AG	144.0 x 104.6 x 12.3	TBD	1CCFT	Strong LCD2
	LQ057Q3DC12	320 x RGB x 240	0.360 x 0.360		500	350 : 1	130/105 (CR ≧ 5)	29	-10 to +70 (panel surface)				3.9	Clear	144.0 x 104.6 x 13.0	Max. 240		
	LM32019T	320 x 240	0.36 x 0.36	Blue and white	70	10 : 1	50/45 (CR ≧ 4)	520	0 to +45 (ambient)	-25 to +60	4-bit parallel	5.0	1.2	AG	166.0 x 109.0 x 7.5	160		
	LM32019P			Black and white	100	6 : 1	80/65 (CR ≧ 2)	400						Clear				
	LQ050Q5DR01	320 x RGB x 240	0.3165 x 0.3115	260 K	380	Min. 100 : 1	130/120 (CR ≧ 5)	80	-30 to +85 (panel surface)	-40 to +95	Digital 6-bit RGB	3.3	4.2	AGLR	119.4 x 89.1 x 12.7	Max. 170		
	LM050QC1T01		0.315 x 0.315	— (C-STN)	100	30 : 1	70/40 (CR ≧ 5)	350	0 to +40 (ambient)	-20 to +60	8-bit parallel		1.7	Clear	134.0 x 100.0 x 8.5	145		
Less than 5.0”	LM046QB1S02	320 x 240	0.295 x 0.295	Black and white	100	Transmissive 4 : 1 Reflective 5 : 1	60/60 (CR ≧ (2))	450	0 to +40 (ambient)	-20 to +60	4-bit parallel	3.3	0.9	Clear	134.0 x 100.0 x 8.5	140	1CCFT	
	LQ038Q3DC01	320 x RGB x 240	0.240 x 0.240	260 K	240	450 : 1	140/130 (CR ≧ 5)	28	-30 to +60 (panel surface)	-30 to +80	Digital 6-bit RGB		0.7		90.6 x 79.9 x 9.9	Max. 105	LED	LED backlight
	☆ LQ035Q3DH01		0.2205 x 0.2205		TBD	350 : 1	80/40 (CR ≧ 10)	TBD	0 to +50 (panel surface)	-20 to +60			TBD		76.9 x 63.9 x TBD	TBD		

TFT STN ☆ New model/under development

SHARP CORPORATION

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■Specifications are subject to change without notice.
■All screen images are simulated.

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The following facilities of Sharp Corporation have been certified under the ISO 14001 international standard for environmental management systems. In our products and manufacturing processes, we are actively engaged in environmental preservation efforts.

Facility	Certificate No.	Registration Date
Headquarters and Associated Companies Group	EC97J1037	June 24, 1997
Katsuragi Works	EC99J2006	June 25, 1996
Large-Scale IC Group (Fukuyama)	EC99J2016	September 24, 1996
Nara Plant	EC99J2021	September 24, 1996
Advanced Development and Planning Center	EC99J2038	December 3, 1996
Mie Factory	EC99J2051	January 28, 1997
Electronic Components (Elecom Group) Mihara Plant	EC03J0180	November 17, 2003
AVC Liquid Crystal Display Group	EC04J0284	October 12, 2004
Communication Systems Group Hiroshima Plant	JQA-EM5312	April 14, 2006
Appliance Systems Group	JQA-EM5554	November 10, 2006
Audio-Visual Systems Group Tochigi Plant	JQA-EM0339	February 26, 1999

The following facilities of Sharp Corporation have been certified under the ISO 9001:2000 international standard for quality management systems.

Certifying organization: Japan Quality Assurance Organization (JAQ) [JAB certified]

Facility	Certificate No.
Mobile Liquid Crystal Display Group	JQA-QM3776

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