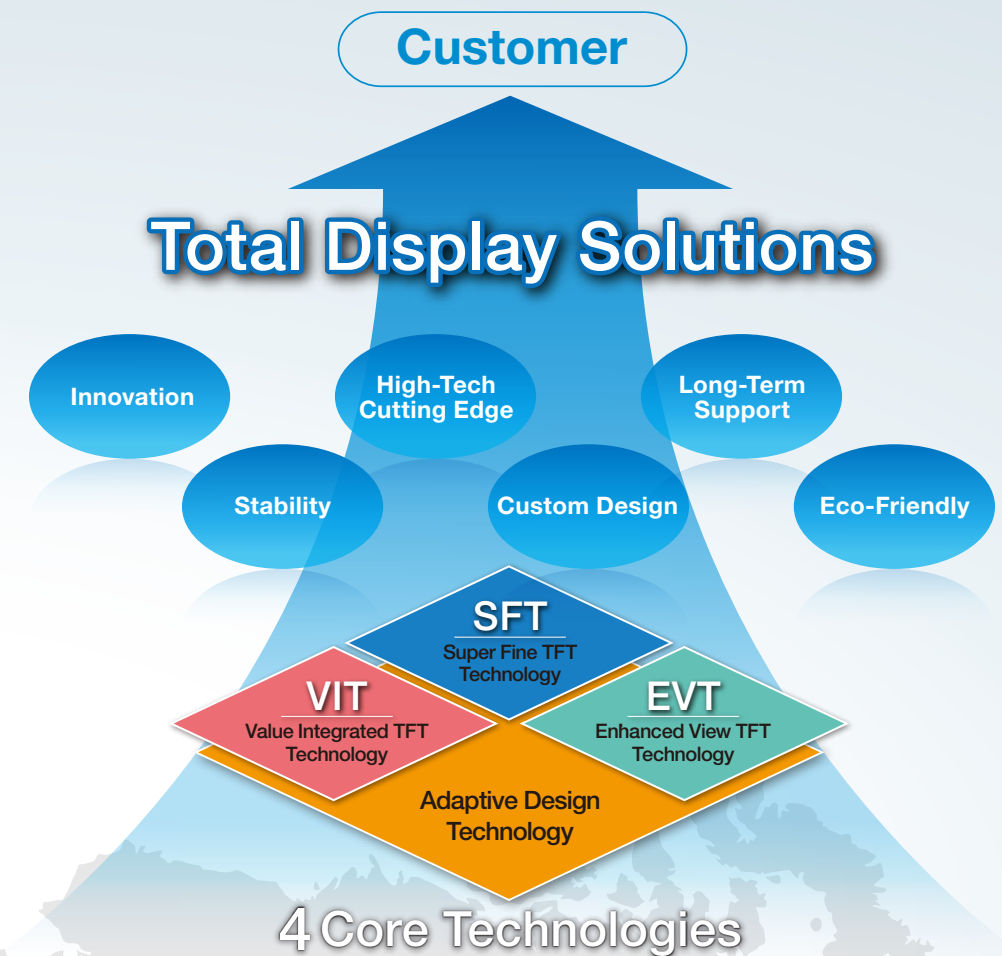# LCD NEWS
LCD Modules Products Guide
Oct. 2015 vol.22

Superior Display Solutions
For Customers

NLT Technoloiges, a member of Tianma Micro-electronics Group, has been supplying a variety of high quality display products to customers around the world. In 1991, NLT Technologies released the first color TFT LCD for laptops in the world. Since then, as a leading manufacturer of industrial displays, our objective remains the same - to pursue the best possible display solution for our customers. Keys to our success have been our cutting-edge technologies based upon our four proprietary core technologies and the abundant LCD solutions offered through our global network.

Together with our customers, we create new solutions for new and emerging markets.

Customer

Total Display Solutions

- Innovation
- High-Tech Cutting Edge
- Long-Term Support
- Stability
- Custom Design
- Eco-Friendly

SFT Super Fine TFT Technology

VIT Value Integrated TFT Technology

EVT Enhanced View TFT Technology

Adaptive Design Technology

4 Core Technologies

NLT QUALITY

NLT Technologies' quality results in superior display solutions

Technology

ONE TO ONE TECHNOLOGY FOR OPTIMAL SOLUTIONS

The reliability of NLT's LCD technologies coupled with expertise developed over many years as an LCD supplier, NLT provides optimal LCD solutions to customers. Even post sales, NLT continues to strive to improve the products by carefully reviewing and responding to each technical inquiry they receive.

Support

Small-lot production | Mounting compatibility | Q&A

Long-term supply | Interface compatibility | Updated Information

Customer's Application

APPROPRIATE SUPPORT FOR CUSTOMER SUCCESS

NLT Technologies offers a reliable support system, from the design stage to after-sales service. NLT Technologies responds to various demands required for industrial devices and contributes to the successful deployment of customer's projects.

Possibility

Customer's demand | Product

Sales and marketing | Technology

WIDE RANGE OF PRODUCTS FOR GREATER POSSIBILITIES

NLT Technologies continues to enhance its technology through research and development while exploring new display applications with customers. As a result of these activities, various LCD products have been launched. NLT Technologies introduces LCD products that fulfill customers' demand, for a wide range of products in various environments.
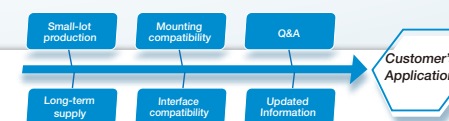
Four Core Technologies

Super Fine TFT Technology

Continual innovation toward higher image quality.

Outstanding LCD display is characterized by numerous factors: ultra-wide viewing angle, high contrast, high luminance, wide color gamut, high definition. SFT technology improves those factors and enables displays to be viewed from almost any angle.

■ **Proprietary In-Plane Switching Mode**
NLT Technologies' improved IPS with unique technology reduces variance in brightness and color when the display is viewed from various angles.

■ **High luminance and wide color gamut**
Achieves a wide color gamut that exceeds 70% color gamut of NTSC without sacrificing luminance.

● SFT Liquid Crystal Display   ● TN Liquid Crystal Display

＊The above images are samples.

For higher image quality — Super Fine TFT2 development

SFT2 is a new wide viewing angle technology which achieves high aperture ratio of LCD panels developed by NLT Technologies.
By thinning wires on the glass substrate, SFT2 improves aperture ratio over 20% greater than the conventional models. This new technology will be applied to achieve higher LCD performance including lower power consumption, higher density, expansion of color gamut, and so on.

● Comparison of aperture ratio

SFT2   Conventional technology
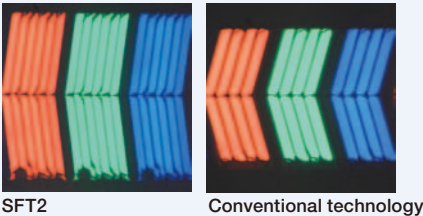
SFT is an abbreviation for Super Fine TFT.
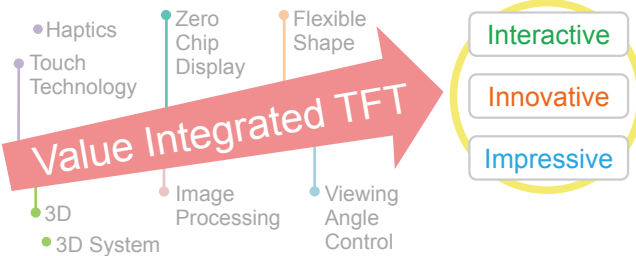SFT2 is an abbreviation for Super Fine TFT2.

Value Integrated TFT Technology

Higher value-added LCDs open the door to new possibilities.

The role of the display in today's society is gaining more and more importance. Interactive displays for human machine interface, innovative displays that allows new application designs, impressive displays to catch the eyes …
At NLT Technologies, various technologies related to displays have been developed through extensive product research and development. VIT technology offers novel display options by combining various emerging technologies.

● Image of VIT technology

Haptics
Touch Technology
Zero Chip Display
Flexible Shape
3D
Image Processing
Viewing Angle Control
3D System

Value Integrated TFT

Interactive
Innovative
Impressive

● High value-added TFT achieved by VIT

PCAP
Quality all-in-one touch panel [P.8]

ColorXcell Technology
Eco-friendly
color reproduction [P.7]

ColorXcell Technology

Application Shaped Display
Novel shape of displays [P.7]

HxDP®
Auto-stereoscopic 3D/2D display simultaneously [P.6]

VIT is an abbreviation for Value Integrated TFT.
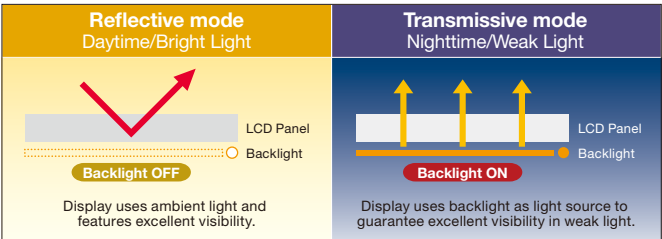
Enhanced View TFT Technology

Clear images in any ambient light environment : two technologies available.

Reflective - Enhanced View TFT
Guarantees high-visibility in any ambient light environment.

• In high ambient light the display can be used in reflective mode with the backlight off and uses ambient light as the light source.
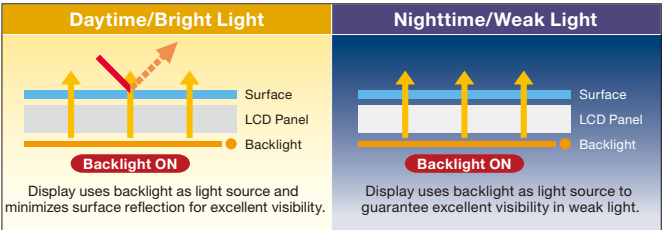• In low-light conditions the display can be used in transmissive mode with the backlight as light source.
LCDs based on R-EVT are appropriate for use in battery operated applications, used either indoors or outdoors.

Reflective mode
Daytime/Bright Light

LCD Panel
Backlight
Backlight OFF
Display uses ambient light and features excellent visibility.

Transmissive mode
Nighttime/Weak Light

LCD Panel
Backlight
Backlight ON
Display uses backlight as light source to guarantee excellent visibility in weak light.

Transmissive - Enhanced View TFT
Achieves clear and bright displays even in sunlight.

T-EVT technology uses the backlight as a light source while minimizing the surface reflection of ambient light. LCDs based on T-EVT produce high-contrast images even in bright outdoor light are therefore ideal for use in bright sunlight.
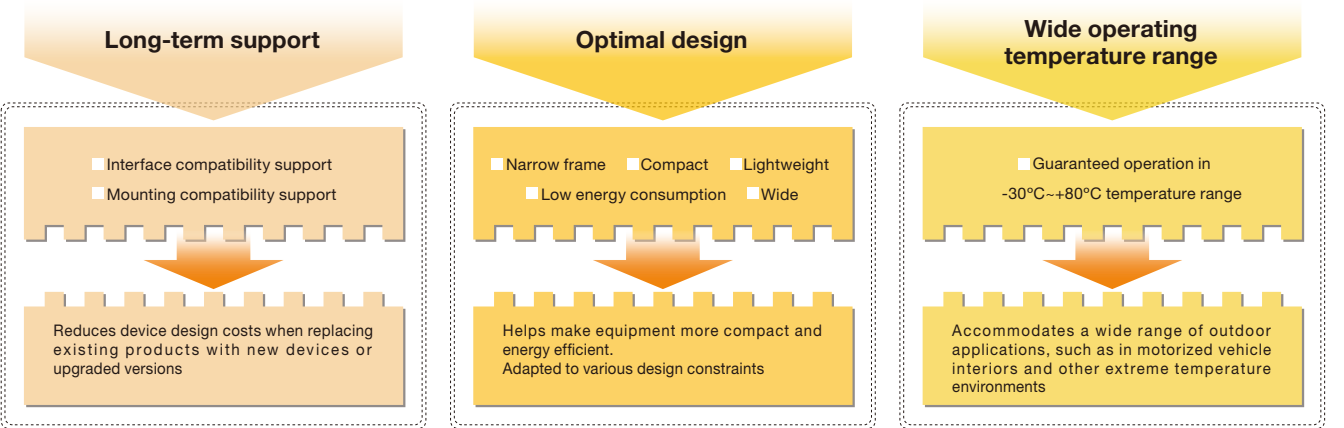
Daytime/Bright Light

Surface
LCD Panel
Backlight
Backlight ON
Display uses backlight as light source and minimizes surface reflection for excellent visibility.

Nighttime/Weak Light

Surface
LCD Panel
Backlight
Backlight ON
Display uses backlight as light source to guarantee excellent visibility in weak light.

R-EVT is an abbreviation for Reflective-Enhanced View TFT.
T-EVT is an abbreviation for Transmissive-Enhanced View TFT.

Adaptive Design Technology

Ensures our LCDs will meet a wide variety of customer needs.

Industrial LCDs must meet a wide variety of detailed requirements such as module size, interface, power consumption and other factors related to the display's application, usage environment, temperature range and other circumstances unique to the piece of equipment. Adaptive Design technology maximizes image quality and usability in a wide range of applications.

Long-term support
☐ Interface compatibility support
☐ Mounting compatibility support
Reduces device design costs when replacing existing products with new devices or upgraded versions

Optimal design
☐ Narrow frame ☐ Compact ☐ Lightweight
☐ Low energy consumption ☐ Wide
Helps make equipment more compact and energy efficient.
Adapted to various design constraints

Wide operating temperature range
☐ Guaranteed operation in
-30°C~+80°C temperature range
Accommodates a wide range of outdoor applications, such as in motorized vehicle interiors and other extreme temperature environments

High Density 3D Display Technology

HxDP® Horizontally x times Density Pixels
Multi-view, High density, Auto-stereoscopic

HxDP is a unique 3D display technology, developed by NLT Technologies, that achieves high-quality 3D viewing without the use of special glasses. Furthermore, HxDP is a multi-viewable auto-stereoscopic display technology that uses a unique pixel alignment to achieve crisp high density 3D images.

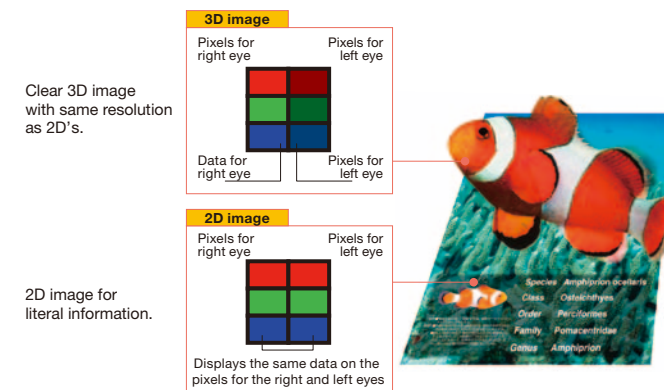#### Horizontally aligned pixels achieve high image quality

With this technology, pixels are distributed horizontally and divided in plural number(x) as perceptible data for right eye and left eye. As a result, it is possible to provide excellent 3D images without decreasing the resolution.
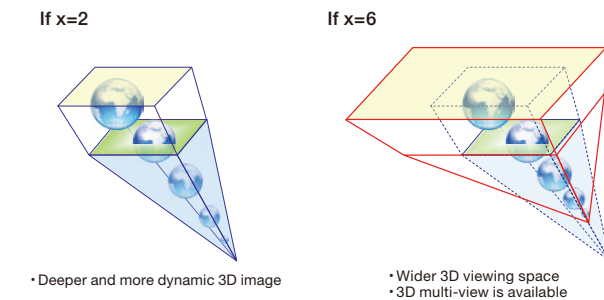
3D/2D displayed simultaneously

Another significant feature of HxDP technology is its capability to display 3D and 2D images simultaneously on the same screen. With HxDP, more flexible image construction can be achieved because brilliant 3D images and 2D images are displayed simultaneously on the same screen by changing the image-data input.

Note: NLT Technologies introduced their proprietary HxDP technology at SID2011

● Image of 3D/2D display with HxDP (If x=2)

3D image
Pixels for right eye | Pixels for left eye
Clear 3D image with same resolution as 2D's.
Data for right eye | Pixels for left eye

2D image
Pixels for right eye | Pixels for left eye
2D image for literal information.
Displays the same data on the pixels for the right and left eyes

● Number of view and viewing space

If x=2
・Deeper and more dynamic 3D image

If x=6
・Wider 3D viewing space
・3D multi-view is available

Caution: If you feel eyestrain or discomfort, please stop using the modules.
＊HxDP：Horizontally x times Density Pixels

Innovative Technology

Tactile Display

With NLT Technologies' tactile display, users can perceive displayed information on the display by dragging the surface with fingers. It allows Multiple-touch so that users can feel different textures such as "rough" or "bumpy" sensations at same time on same display.

Tactile displays are the next-generation interface for displays expanding the possible uses of touch displays in a variety of applications.

Feel textures!
Home
Bumpy
Rough
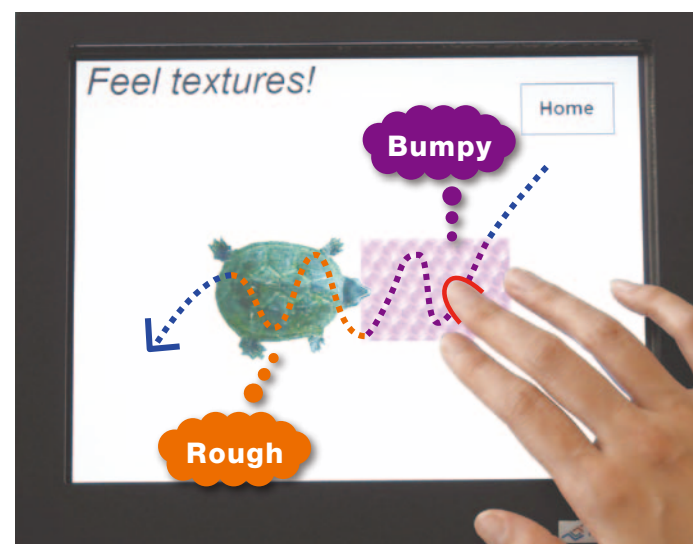
ColorXcell Technology

ColorXcell Technology
#### Achieves high color reproduction with low power

NLT Technologies' proprietary ColorXcell technology enables the reproduction of images that are comparable in color intensity to the original video source without increasing power consumption.

Compared to typical industrial models of NLT Technologies' LCD products, with NLT's ColorXcell technology it is possible to reduce power consumption approximately 30%＊1 without loss of image quality. ColorXcell technology is ideal for battery operated portable devices.

ColorXcell technology makes the display more eco-friendly.

＊1 Estimate data based on NLT's product 10.4-inch SVGA model.

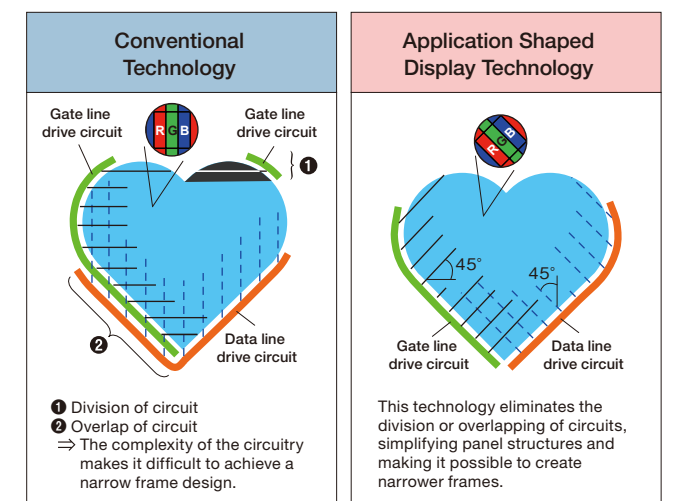● An image of color reproduction with ColorXcell technology

Original Image | Displayed Image

Industrial LCDs
Faded appearance

ColorXcell Technology

LCDs with ColorXcell technology
Vivid color reproduction
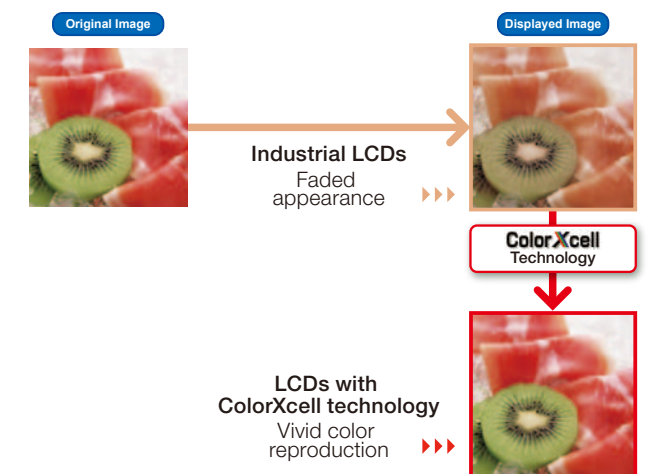
## Application Shaped Display Technology

Custom shaped LCD displays
Dramatically reduces limitations of display shape design

Application Shaped Display technology allows LCD modules to be designed in a wider range of shapes than traditional rectangular LCD modules. The technology minimizes overlaps between gate and data lines, enabling optimal configuration of the pixel array and driver circuitry, allowing flexible display designs for embedded applications.

Conventional Technology
Gate line drive circuit | Gate line drive circuit ❶
❷ | Data line drive circuit
❶ Division of circuit
❷ Overlap of circuit
⇒ The complexity of the circuitry makes it difficult to achieve a narrow frame design.

Application Shaped Display Technology
45° | 45°
Gate line drive circuit | Data line drive circuit
This technology eliminates the division or overlapping of circuits, simplifying panel structures and making it possible to create narrower frames.

● Various shaped TFT LCD achieved by using Application Shaped Display technology

● Example of feasible shape
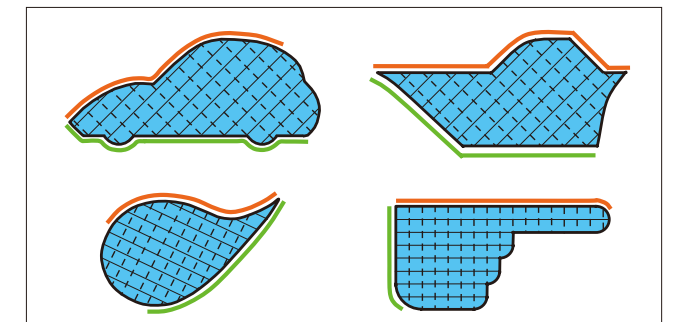
Projected Capacitive Touch Panel

View, Touch, and Convey

PCAP by NLT Technologies

■ One-stop solution

NLT Technologies provides factory installed touch panels with touch panel controller included. Thanks to our in-house design and manufacturing capabilities, we are able to offer high quality, integrated PCAP products direct from the factory – a one stop solution with factory warranty.

■ Total support

We provide factory tuned PCAP products, drivers and offer special tuning software as part of NLT Technologies' total PCAP solutions, in order to better support customer needs and help ease adoption of our PCAP based modules.

■ Size line-up

NLT Technologies provides LCDs for industrial use in a wide variety of sizes and configurations, with PCAP touch sensors that are designed to specifically and ideally match the base LCD. This includes PCAP products for use in both indoor and outdoor applications.

■ Standard component integration

An LCD module and a touch panel are attached with adhesive via a perimeter bond. The addition of a cover panel on top of the PCAP sensor glass is optically bonded, using an optically clear resin.

■ Optional component integration

NLT Technologies' PCAP touch panels offer valuable component and structural options.

• Surface film

The most requested surface treatments offered in conjunction with NLT Technologies' PCAP products are anti-reflective, anti-glare, anti-finger print, and shattering proof.

• Optical bonding

To adhere an LCD panel and sensor glass, we offer optical bonding as an option. Optical bonding uses an optically clear resin adhesive to fill up the air gap between the LCD and sensor glass. This improves readability in outdoor and other high ambient light environments, as well as providing additional strength to the overall structure of the LCD module.

■ Custom cover glass component

In addition to standard cover glass, NLT Technologies offers customized cover glass options such as chemically strengthened, etching, coating, custom shape, or decorated glass.
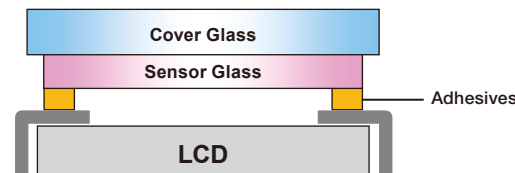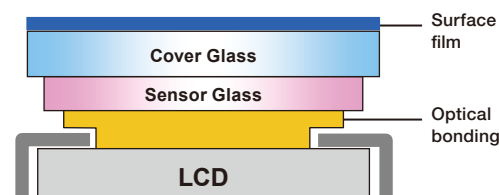
What's PCAP?

Projected Capacitive

Electrodes are aligned in a grid pattern on the sensor side of touch panel. The grid detects the touch point by sensing the change of electrical charges that occur when a finger touches the surface of the touch panel. The PCAP touch technology has the added advantage of durability because it has no degradation to the surface of the display or the performance of the touch sensor.
The PCAP touch panel has no air gap inside the touch panel unit, making it ideal for applications used in bright ambient light.

● Standard component

Cover Glass

Sensor Glass

— Adhesives

LCD

● Option component

Cover Glass

Sensor Glass

LCD

— Surface film

— Optical bonding

■ PCAP model products main specifications

LCD Screen Size	Resolution	Part Number	Luminance	T/P Surface	Remarks
6.5 inch	640 × 480	NEW NL6448BC20-30JF	950cd/㎡	Clear + AFP	Optical bonding
	1024 × 768	NEW NL10276BC13-01JA	480cd/㎡	Clear	Optical bonding
7.0 inch Wide	800 × 480	NEW NL8048AC19-13BD	430cd/㎡	AG + AFP	CG t0.7
8.4 inch	800 × 600	NL8060BC21-11KG	750cd/㎡	AR	CG t0.7, Optical bonding
10.4 inch	1024 × 768	NEW NL10276BC20-18BD	350cd/㎡	AG + AFP	CG t0.7
		NEW NL10276BC20-18KD	380cd/㎡	AG + AFP	CG t0.7, Optical bonding
	800 × 600	NL8060BC26-35BA	350cd/㎡	Clear	CG t0.7
		NEW NL8060BC26-35BD	350cd/㎡	AG + AFP	CG t0.7
10.6 inch Wide	1280 × 768	NEW NL12876AC18-07DC	250cd/㎡	AR	CG Dragontrail* t1.1
12.1 inch Wide	1280 × 800	NEW NL12880BC20-05BA	400cd/㎡	Clear	CG t0.7
		NL12880BC20-05BD	400cd/㎡	AG + AFP	CG t0.7
15.0 inch	1024 × 768	NL10276KC30-43DD	450cd/㎡	AG + AFP	CG t1.8 Soda lime+Chem.
15.3 inch Wide	1280 × 768	NEW NL12876BC26-33NA	470cd/㎡	Clear	CG t1.1 Soda lime+Chem., Optical bondig

Please see the Data Sheet for detailed specifications.
＊Dragontrail is a registered trade mark of Asahi Glass Co., Ltd.

■ PCAP controller board

Part Number	I/F	Connector
PTPW04	USB	Wire to Board Connector (Molex 53261)
PTPW05	I²C	

■ PCAP driver software supported OS

	OS	CPU	I/F	Status
Windows®	Windows 7 / 8 / 8.1	x86	USB	Microsoft®supported
	Windows Embedded Standard 7	x86	USB	Microsoft®supported
	Windows Embedded 8 / 8.1	x86	USB	Microsoft®supported
	Windows Embedded Compact 7	x86 ARMv5, 6, 7	USB	NLT Technologies supported*
			I²C	IC maker supported*
	Windows Embedded Compact 2013	x86 ARMv7	USB	NLT Technologies supported*
			I²C	IC maker supported*
Linux®	Ubuntu Rev.12.10 / Kernel 3.5.7	x86 ARMv7	USB	NLT Technologies supported*
	Ubuntu Rev.12.04 / Kernel 3.2.14			
	Ubuntu Rev.11.10 / Kernel 3.2.1		I²C	IC maker supported*
	Android 4.3 / Kernel 3.10.2			

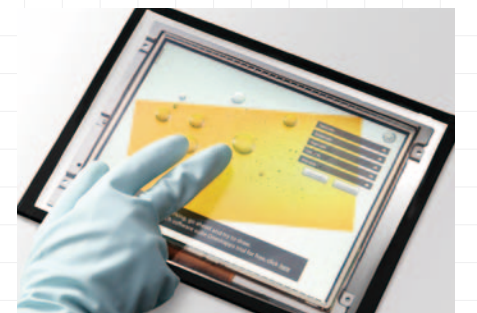＊ For details, contact our sales offices or agents.
Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
Linux is a registered trademark of Linus Torvalds.

PCAP Generation2

Wet & Glove Technology

Wet & Glove PCAP models are able to be operated even when the screen is wet and the operator is wearing gloves. Furthermore, by tuning the controller, the touch screen can be operated when the operator is using various medical gels on the surface of the screen, or when the operator is wearing thicker, industrial gloves.
With this technology, PCAP touch panels will be available to support high end display devices used in special conditions such as construction, marine or medical equipment.

PCAP Generation2

Product Map

Please see the Data Sheet for detailed specifications. All values are typical values (excluding the depth for module size). Values in brackets are tentative.
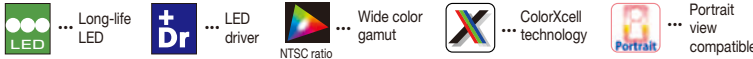Mounting compatibility: Module size (except depth), position of mounting holes, and relative position of mounting holes to screen center.

21.3 inch

Color model	Monochrome model

QSXGA
2560×2048
(5M pixels)

NEW
NL256204AM16-02A
SFT2 LED +Dr 10 bit
(2000)cd/m², (1400):1
Mass production in 2016

QXGA
2048×1536
(3M pixels)

NL204153AC21-17
SFT LED +Dr 10 bit 72%
800cd/m², 1400:1, 40ms

NEW
NL204153AC21-25
SFT LED +Dr 72%
800cd/m², 1400:1, 40ms

NL204153AM21-18A
SFT LED +Dr MONO 10 bit
1700cd/m², 1400:1, 40ms

UXGA
1600×1200
(2M pixels)

NL160120AC27-32
SFT LED +Dr 72%
900cd/m², 1400:1, 40ms

NL160120AM27-33A
SFT LED +Dr MONO
1900cd/m², 1400:1, 40ms

Mounting Compatibility

Product Specifications

LED ··· Long-life LED   +Dr ··· LED driver   MONO ··· Monochrome model   Multi-bit driver   NTSC ratio ··· Wide color gamut

Screen Size	21.3 inch		
Part Number	NL204153AM21-18A	NL204153AC21-17	NL204153AC21-25 **NEW**
Resolution	2048 × 1536	2048 × 1536	2048 × 1536
Display Area (mm)	433.152 × 324.864	433.152 × 324.864	433.152 × 324.864
Display Color	3072 gray scales/pixel 1024 gray scales/sub-pixel	1073M	16.77M
Pixel Pitch (mm)	0.2115 × 0.2115	0.2115 × 0.2115	0.2115 × 0.2115
Luminance	1700cd/m²	800cd/m²	800cd/m²
Contrast	1400：1	1400：1	1400：1
Viewing Angle (U/D/L/R) Contrast ≧ 10：1	88°, 88°, 88°, 88°	88°, 88°, 88°, 88°	88°, 88°, 88°, 88°
Response Time*1	40ms	40ms	40ms
Interface	4port LVDS LCR 10 bits	4port LVDS RGB 10 bits	4port LVDS RGB 8 bits
Power Supply Voltage	Signal：12.0V Backlight：12.0V	Signal：12.0V Backlight：12.0V	Signal：12.0V Backlight：12.0V／18.0V
Power Consumption	37.0W	58.0W	58.2W
Operating Temperature	0°C ～ +60°C	0°C ～ +60°C	0°C ～ +60°C
Storage Temperature	−20°C ～ +60°C	−20°C ～ +60°C	−20°C ～ +60°C
Polarizer Surface	AG	AG	AG
Module Size W × H × D(mm) (D：max)	457.0 × 350.0 × 23.0	457.0 × 350.0 × 23.0	457.0 × 350.0 × 23.0
Weight	2700g	2700g	2700g
LED driver board	Built in	Built in	Built in
Remarks	SFT LED +Dr MONO 10 bit	SFT LED +Dr 10 bit 72%	SFT LED +Dr 72%

Screen Size	21.3 inch	
Part Number	NL160120AM27-33A	NL160120AC27-32
Resolution	1600 × 1200	1600 × 1200
Display Area (mm)	432.0 × 324.0	432.0 × 324.0
Display Color	766 gray scales/pixel 256 gray scales/sub-pixel	16.77M
Pixel Pitch (mm)	0.270 × 0.270	0.270 × 0.270
Luminance	1900cd/m²	900cd/m²
Contrast	1400：1	1400：1
Viewing Angle (U/D/L/R) Contrast ≧ 10：1	88°, 88°, 88°, 88°	88°, 88°, 88°, 88°
Response Time*1	40ms	40ms
Interface	2port LVDS LCR 8 bits	2port LVDS RGB 8 bits
Power Supply Voltage	Signal：12.0V Backlight：12.0V	Signal：12.0V Backlight：12.0V
Power Consumption	36.0W	52.8W
Operating Temperature	0°C ～ +60°C	0°C ～ +60°C
Storage Temperature	−20°C ～ +60°C	−20°C ～ +60°C
Polarizer Surface	AG	AG
Module Size W × H × D(mm) (D：max)	457.0 × 350.0 × 23.0	457.0 × 350.0 × 23.0
Weight	2700g	2800g
LED driver board	Built in	Built in
Remarks	SFT LED +Dr MONO	SFT LED +Dr 72%

＊1 Values equal Ton + Toff (10%←→90%). ◆ SFT : Super Fine TFT, SFT2 : Super Fine TFT2
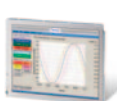
Product Map

Please see the Data Sheet for detailed specifications. All values are typical values. Values in brackets are tentative.
Mounting compatibility: Module size (except depth), position of mounting holes, and relative position of mounting holes to screen center.
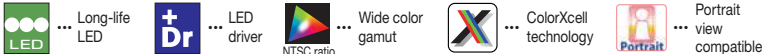Interface compatibility: Interface connector and pin assignment.

LED ··· Long-life LED
+Dr ··· LED driver
··· Wide color gamut NTSC ratio
X ··· ColorXcell technology
Portrait ··· Portrait view compatible

		19.0 inch	17.0 inch	15.0 inch	12.1 inch	10.4 inch	8.4 inch	6.5 inch	5.7 inch
SXGA 1280×1024	LVDS / Super Fine TFT	NL128102AC29-17 SFT 800cd/m² LED +Dr 72%	NL128102AC26-01 (400) cd/m² +Dr — Mass production in 2016						
XGA 1024×768	LVDS / Super Fine TFT			XGA Interface Compatibility (LVDS)*1 — NL10276AC30-48D SFT (350) cd/m² +Dr — Mass production in 2016; NL10276BC30-39 SFT 330cd/m² LED 72%	XGA Interface Compatibility (LVDS)*2	NL10276BC20-47 SFT 300cd/m² LED	NL10276BC16-06/06D SFT 600cd/m² LED 72%	
	LVDS / Enhanced View TFT			NL10276AC30-42C*3 T-EVT 600cd/m² LED +Dr; NL10276AC30-45D*3 400cd/m² LED +Dr; NL10276BC30-34R 400cd/m² LED; NL10276BC30-34D 500cd/m² LED	NL10276BC24-21F 800cd/m² LED; NL10276BC24-21 450cd/m² LED; NL10276BC24-21L*4 450cd/m² LED Portrait	NL10276BC20-18C T-EVT 800cd/m² LED; NL10276BC20-18F 800cd/m² LED; NL10276BC20-18/18D 400cd/m² LED		NL10276BC13-01C T-EVT 650cd/m²; NL10276BC13-01 500cd/m²
					NL10276BC24-19D*5 650cd/m²	NL10276BC20-12*5 150cd/m²			
SVGA 800×600	LVDS / Enhanced View TFT			SVGA Interface Compatibility (LVDS)*2 — NL8060BC31-51C T-EVT 900cd/m² LED X; NL8060BC31-47/47D 450cd/m² LED	NL8060BC26-35C T-EVT 800cd/m² LED X; NL8060BC26-35F 800cd/m² LED X; NL8060BC26-35/35D 400cd/m² LED X; NL8060BC26-35E*4 400cd/m² LED X Portrait; NL8060AC26-54D 450cd/m² LED +Dr; NL8060AC26-52D 400cd/m² LED +Dr X	NL8060BC21-11C T-EVT 800cd/m² LED X; NL8060BC21-11F 800cd/m² LED X; NL8060BC21-11/11D 400cd/m² LED X; NL8060AC21-21D 400cd/m² LED +Dr X		
	CMOS			NL8060BC31-50F 900cd/m²				
VGA 640×480	LVDS / Enhanced View TFT			VGA Interface Compatibility (LVDS)*2	NL6448BC33-71C T-EVT 900cd/m² LED X; NL6448BC33-71F 900cd/m² LED X; NL6448BC33-71/71D 450cd/m² LED X	NL6448BC26-27C T-EVT 900cd/m² LED X; NL6448BC26-27F 900cd/m² LED X; NL6448BC26-27/27D 500cd/m² LED X	NL6448BC20-30C T-EVT 1000cd/m² LED X; NL6448BC20-30F 1000cd/m² LED; NL6448BC20-30/30D 600cd/m² LED X	NL6448AC18-11D 550cd/m² +Dr
	CMOS			VGA Interface Compatibility (CMOS)*6	NL6448BC33-70C T-EVT 900cd/m² LED; NL6448BC33-70F 900cd/m² LED; NL6448BC33-70/70D 450cd/m² LED	NL6448BC26-26C T-EVT 900cd/m² LED; NL6448BC26-26F 900cd/m² LED; NL6448BC26-26/26D 500cd/m² LED	NL6448BC20-35C T-EVT 1000cd/m² LED; NL6448BC20-35F 1000cd/m² LED; NL6448BC20-35/35D 600cd/m² LED	VGA Interface Compatibility (CMOS)*6 — NL6448AC18-12F*4 800cd/m² +Dr Portrait; NL6448AC18-08F 800cd/m² +Dr; NL6448AC18-08D 550cd/m² +Dr; NL6448BC18-07 300cd/m²
QVGA 320×240	CMOS								QVGA Interface Compatibility (CMOS) — NL3224AC36-01F 800cd/m² +Dr; NL3224AC36-01D 500cd/m² +Dr

Mounting Compatibility

◆ SFT : Super Fine TFT, T-EVT : Transmissive-Enhanced View TFT

*1 LVDS interface of 15.0-inch and larger size is not compatible with 12.1-inch and smaller size. *2 Connector types and connector pin alignments are compatible. Control signal is upwardly compatible. *3 Only interface connector is compatible with other displays in same size.
*4 Portrait view signals are to be prepared by a customer. *5 LVDS interface of NL10276BC24-19D and NL10276BC20-12 is not compatible with other displays. *6 CMOS interface of 5.7-inch and smaller size displays is not compatible with 6.5-inch and larger size displays.
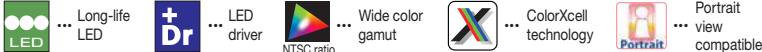
Product Specifications

Long-life LED ・・・LED ｜ +Dr ・・・LED driver ｜ Wide color gamut NTSC ratio ｜ X ・・・ColorXcell technology ｜ Portrait view compatible

Screen Size	19.0 inch	15.0 inch					12.1 inch		Screen Size
Part Number	NL128102AC29-17	NL10276AC30-42C	NL10276AC30-45D	NL10276BC30-39	NL10276BC30-34R	NL10276BC30-34D	NL10276BC24-21L*3	NL10276BC24-21F	Part Number
Resolution	1280 × 1024	1024 × 768	1024 × 768	1024 × 768	1024 × 768	1024 × 768	1024 × 768	1024 × 768	Resolution
Display Area (mm)	376.32 × 301.056	304.128 × 228.096	304.128 × 228.096	304.128 × 228.096	304.128 × 228.096	304.128 × 228.096	245.76 × 184.32	245.76 × 184.32	Display Area (mm)
Display Color	16.77M	16.77M / 262K	16.77M / 262K	16.77M	262K	16.77M	16.77M / 262K	16.77M / 262K	Display Color
Pixel Pitch (mm)	0.294 × 0.294	0.297 × 0.297	0.297 × 0.297	0.297 × 0.297	0.297 × 0.297	0.297 × 0.297	0.24 × 0.24	0.24 × 0.24	Pixel Pitch (mm)
Luminance	800cd/m²	600cd/m²	400cd/m²	330cd/m²	400cd/m²	500cd/m²	450cd/m²	800cd/m²	Luminance
Contrast	1000 : 1	600 : 1	600 : 1	900 : 1	600 : 1	600 : 1	900 : 1	900 : 1	Contrast
Viewing Angle (U/D/L/R) Contrast ≧10 : 1	88°, 88°, 88°, 88°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	88°, 88°, 88°, 88°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	Viewing Angle (U/D/L/R) Contrast ≧10 : 1
Response Time*1	25ms	8ms	8ms	25ms	18ms	18ms	18ms	18ms	Response Time*1
Interface	2port LVDS RGB 8 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits	LVDS RGB 6 bits	LVDS RGB 8 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	Interface
Power Supply Voltage	Signal：5.0V／Backlight：12.0V	Signal：3.3V／Backlight：12.0V	Signal：3.3V／Backlight：12.0V	3.3V	3.3V	3.3V	3.3V	3.3V	Power Supply Voltage
Power Consumption	45.0W	11.9W	7.8W	9.8W*2	9.8W*2	9.8W*2	5.2W*2	7.5W*2	Power Consumption
Operating Temperature	−20°C ～ +70°C	−20°C ～ +70°C	−20°C ～ +70°C	−20°C ～ +70°C	−20°C ～ +70°C	−20°C ～ +70°C	−30°C ～ +80°C	−30°C ～ +80°C	Operating Temperature
Storage Temperature	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−20°C ～ +80°C	−20°C ～ +80°C	−20°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	Storage Temperature
Polarizer Surface	AG	Clear＋AR	AG	AG	AG	AG	Clear	Clear	Polarizer Surface
Module Size W×H×D(mm) (D : max)	396.0 × 324.0 × 18.5	326.5 × 253.5 × 12.1	326.5 × 253.5 × 12.1	326.5 × 253.5 × 12.2	326.5 × 253.5 × 12.0	326.5 × 253.5 × 12.0	260.5 × 203.0 × 9.2	260.5 × 203.0 × 9.2	Module Size W×H×D(mm) (D : max)
Weight	2100g	1050g	1050g	970g	970g	970g	490g	490g	Weight
Reverse Scan	—	—	—	—	○	○	○	○	Reverse Scan
Recommended LED driver board <Suitable cable>	Built in	Built in	Built in	150PW02F <150CBL02>	150PW02F <150CBL02>	150PW02F <150CBL02>	104PW03F <121CBL02>	104PW03F <121CBL03>	Recommended LED driver board <Suitable cable>
Remarks	SFT / LED / +Dr / 72%	T-EVT / LED / +Dr	LED / +Dr	SFT / LED / 72%	LED	LED	LED / Portrait	LED	Remarks

Screen Size	12.1 inch				10.4 inch			Screen Size
Part Number	NL10276BC24-21	NL10276BC24-19D	NL8060BC31-47/47D	NL8060BC31-51C (NEW)	NL8060BC31-50F	NL10276BC20-47 (NEW)	NL10276BC20-18C/18F	NL10276BC20-18/18D	Part Number
Resolution	1024 × 768	1024 × 768	800 × 600	800 × 600	800 × 600	1024 × 768	1024 × 768	1024 × 768	Resolution
Display Area (mm)	245.76 × 184.32	245.76 × 184.32	246.0 × 184.5	246.0 × 184.5	246.0 × 184.5	210.432 × 157.824	210.432×157.824	210.432 × 157.824	Display Area (mm)
Display Color	16.77M / 262K	262K	16.77M / 262K	16.77M / 262K	262K	262K	16.77M / 262K	16.77M / 262K	Display Color
Pixel Pitch (mm)	0.24 × 0.24	0.24 × 0.24	0.3075 × 0.3075	0.3075 × 0.3075	0.3075 × 0.3075	0.2055 × 0.2055	0.2055 × 0.2055	0.2055 × 0.2055	Pixel Pitch (mm)
Luminance	450cd/m²	650cd/m²	450cd/m²	900cd/m²	900cd/m²	300cd/m²	800cd/m²	400cd/m²	Luminance
Contrast	900 : 1	600 : 1	900 : 1	1000 : 1	1000 : 1	700:1	900 : 1	900 : 1	Contrast
Viewing Angle (U/D/L/R) Contrast ≧10 : 1	80°, 80°, 80°, 80°	60°, 60°, 70°, 70°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	88°, 88°, 88°, 88°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	Viewing Angle (U/D/L/R) Contrast ≧10 : 1
Response Time*1	18ms	25ms	18ms	18ms	18ms	25ms	18ms	18ms	Response Time*1
Interface	LVDS RGB 8 bits／6 bits	LVDS RGB 6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	CMOS RGB 6 bits	LVDS RGB 6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	Interface
Power Supply Voltage	3.3V	3.3V	3.3V	3.3V	3.3V／5.0V	3.3V	3.3V	3.3V	Power Supply Voltage
Power Consumption	5.2W*2	4.3W*2	4.9W*2	TBD	7.1W*2	3.9W*2	7.5W*2	4.8W*2	Power Consumption
Operating Temperature	−30°C ～ +80°C	−20°C ～ +60°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	0°C ～ +55°C	−30°C ～ +80°C	−30°C ～ +80°C	Operating Temperature
Storage Temperature	−30°C ～ +80°C	−20°C ～ +60°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−20°C ～ +60°C	−30°C ～ +80°C	−30°C ～ +80°C	Storage Temperature
Polarizer Surface	Clear	AG	-47 : Clear / -47D : AG	Clear+AR	Clear	Clear	-18C : Clear+AR / -18F : Clear	-18 : Clear / -18D : AG	Polarizer Surface
Module Size W×H×D(mm) (D : max)	260.5 × 203.0 × 9.2	260.0 × 200.0 × 7.4	280.0 × 210.0 × 9.6	260.5 × 203.0 × 9.2	260.5 × 203.0 × 9.2	227.0 × 175.4 × 9.2	228.0 × 178.5 × 9.2	228.0 × 178.5 × 9.2	Module Size W×H×D(mm) (D : max)
Weight	490g	305g	580g	490g	490g	360g	380g	380g	Weight
Reverse Scan	○	○	○	○	○	○	○	○	Reverse Scan
Recommended LED driver board <Suitable cable>	104PW03F <121CBL02>	Not provided	121PW02F <121CBL02>	104PW03F <121CBL02>	104PW03F <121CBL03>	Not provided	104PW03F <121CBL03>	104PW02F <104CBL01>	Recommended LED driver board <Suitable cable>
Remarks	LED	—	LED	T-EVT / LED / X	LED	SFT / LED	T-EVT (-18C) / LED	LED	Remarks

Please see the Data Sheet for detailed specifications. All values are typical values (excluding the depth for module size). Values in brackets are tentative.

※1 Values equal Ton + Toff (10%←→90%). ※2 Values do not include LED driver board power dissipation. ※3 Portrait view signals are to be prepared by a customer.
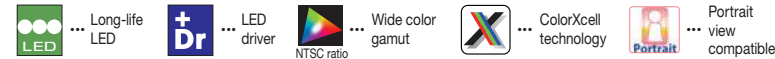◆ SFT : Super Fine TFT, T-EVT : Transmissive-Enhanced View TFT

Product Specifications

Icons (top right): Long-life LED (LED) · LED driver (+Dr) · Wide color gamut (NTSC ratio) · ColorXcell technology (X) · Portrait view compatible (Portrait)

Screen Size	10.4 inch								Screen Size
Part Number	NL10276BC20-12	NL8060AC26-54D [NEW]	NL8060AC26-52D [NEW]	NL8060BC26-35C/35F	NL8060BC26-35/35D	NL8060BC26-35E*3	NL6448BC33-71C/71F	NL6448BC33-71/71D	Part Number
Resolution	1024 × 768	800 × 600	800 × 600	800 × 600	800 × 600	800 × 600	640 × 480	640 × 480	Resolution
Display Area (mm)	210.432 × 157.824	211.2 × 158.4	211.2 × 158.4	211.2 × 158.4	211.2 × 158.4	211.2 × 158.4	211.2 × 158.4	211.2 × 158.4	Display Area (mm)
Display Color	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	Display Color
Pixel Pitch (mm)	0.2055 × 0.2055	0.264 × 0.264	0.264 × 0.264	0.264 × 0.264	0.264 × 0.264	0.264 × 0.264	0.33 × 0.33	0.33 × 0.33	Pixel Pitch (mm)
Luminance	150cd/m²	450cd/m²	400cd/m²	800cd/m²	400cd/m²	400cd/m²	900cd/m²	450cd/m²	Luminance
Contrast	400 : 1	900 : 1	900 : 1	900 : 1	900 : 1	900 : 1	900 : 1	900 : 1	Contrast
Viewing Angle (U/D/L/R) Contrast ≧10 : 1	40°, 20°, 45°, 45°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	Viewing Angle (U/D/L/R) Contrast ≧10 : 1
Response Time*1	18ms	18ms	18ms	18ms	18ms	18ms	18ms	18ms	Response Time*1
Interface	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	Interface
Power Supply Voltage	3.3V	Signal : 3.3V／Backlight : 12.0V	Signal : 3.3V／Backlight : 12.0V	3.3V	3.3V	3.3V	3.3V	3.3V	Power Supply Voltage
Power Consumption	3.4W*2	5.1W	4.7W	6.3W*2	3.6W*2	3.6 W*2	6.2W*2	3.5W*2	Power Consumption
Operating Temperature	−20°C ～ +70°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	Operating Temperature
Storage Temperature	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	Storage Temperature
Polarizer Surface	Clear	AG	AG	-35C : Clear+AR / -35F : Clear	-35 : Clear / -35D : AG	Clear	-71C : Clear+AR/ -71F : Clear	-71 : Clear / -71D : AG	Polarizer Surface
Module Size W×H×D(mm) (D : max)	231.2 × 174.6 × 5.8	227.3 × 177.5 × 9.8	243.0 × 185.1 × 11.0	243.0 × 185.1 × 11.0	243.0 × 185.1 × 11.0	243.0 × 185.1 × 11.0	243.0 × 185.1 × 11.0	243.0 × 185.1 × 11.0	Module Size W×H×D(mm) (D : max)
Weight	160g	375g	430g	475g	475g	475g	475g	475g	Weight
Reverse Scan	○	○	○	○	○	○	○	○	Reverse Scan
Recommended LED driver board <Suitable cable>	Not provided	Built in	Built in	104PW01F <121CBL02>	104PW03F <121CBL02>	104PW03F <121CBL02>	104PW01F <121CBL02>	104PW03F <121CBL02>	Recommended LED driver board <Suitable cable>
Remarks	—	LED +Dr	LED +Dr X	T-EVT (-35C) LED X	LED X	LED X Portrait	T-EVT (-71C) LED X	LED X	Remarks

Screen Size	10.4 inch		8.4 inch						Screen Size
Part Number	NL6448BC33-70C/70F	NL6448BC33-70/70D	NL10276BC16-06/06D	NL8060AC21-21D [NEW]	NL8060BC21-11C/11F	NL8060BC21-11/11D	NL6448BC26-27C/27F	NL6448BC26-27/27D	Part Number
Resolution	640 × 480	640 × 480	1024 × 768	800 × 600	800 × 600	800 × 600	640 × 480	640 × 480	Resolution
Display Area (mm)	211.2 × 158.4	211.2 × 158.4	170.496 × 127.872	170.4 × 127.8	170.4 × 127.8	170.4 × 127.8	170.88 × 128.16	170.88 × 128.16	Display Area (mm)
Display Color	262K	262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	Display Color
Pixel Pitch (mm)	0.33 × 0.33	0.33 × 0.33	0.1665 × 0.1665	0.213 × 0.213	0.213 × 0.213	0.213 × 0.213	0.267 × 0.267	0.267 × 0.267	Pixel Pitch (mm)
Luminance	900cd/m²	450cd/m²	600cd/m²	400cd/m²	800cd/m²	400cd/m²	900cd/m²	500cd/m²	Luminance
Contrast	900 : 1	900 : 1	1000 : 1	800 : 1	800 : 1	800 : 1	1000 : 1	1000 : 1	Contrast
Viewing Angle (U/D/L/R) Contrast ≧10 : 1	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	88°,88°, 88°, 88°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	Viewing Angle (U/D/L/R) Contrast ≧10 : 1
Response Time*1	18ms	18ms	25ms	18ms	18ms	18ms	18ms	18ms	Response Time*1
Interface	CMOS RGB 6 bits	CMOS RGB 6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	Interface
Power Supply Voltage	3.3V／5.0V	3.3V／5.0V	3.3V	Signal : 3.3V／Backlight : 12.0V	3.3V	3.3V	3.3V	3.3V	Power Supply Voltage
Power Consumption	6.4W*2	3.7W*2	5.6W*2	3.3W	5.0W*2	3.0W*2	5.0W*2	3.1W*2	Power Consumption
Operating Temperature	−30°C ～ +80°C	−30°C ～ +80°C	−20°C ～ +70°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	Operating Temperature
Storage Temperature	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	Storage Temperature
Polarizer Surface	-70C : Clear+AR / -70F : Clear	-70 : Clear / -70D : AG	06 : Clear / 06D : AG	AG	-11C : Clear+AR / -11F : Clear	-11 : Clear / -11D : AG	-27C : Clear+AR / -27F : Clear	-27 : Clear / -27D : AG	Polarizer Surface
Module Size W×H×D(mm) (D : max)	243.0 × 185.1 × 11.0	243.0 × 185.1 × 11.0	200.0 × 152.0 × 8.7	200.0 × 152.0 × 8.7	200.0 × 152.0 × 8.7	200.0 × 152.0 × 8.7	200.0 × 152.0 × 8.7	200.0 × 152.0 × 8.7	Module Size W×H×D(mm) (D : max)
Weight	475g	475g	260g	260g	260g	260g	260g	260g	Weight
Reverse Scan	○	○	○	○	○	○	○	○	Reverse Scan
Recommended LED driver board <Suitable cable>	104PW01F <121CBL02>	104PW03F <121CBL02>	104PW03F <121CBL02>	Built in	104PW03F <121CBL02>	104PW03F <121CBL02>	104PW03F <121CBL02>	104PW03F <121CBL02>	Recommended LED driver board <Suitable cable>
Remarks	T-EVT (-70C) LED	LED	SFT LED 72%	LED +Dr X	T-EVT (-11C) LED X	LED X	T-EVT (-27C) LED X	LED X	Remarks

Please see the Data Sheet for detailed specifications. All values are typical values (excluding the depth for module size). Values in brackets are tentative.

*1 Values equal Ton + Toff (10%←→90%).　*2 Values do not include LED driver board power dissipation.　*3 Portrait view signals are to be prepared by a customer.
◆ SFT : Super Fine TFT, T-EVT : Transmissive-Enhanced View TFT

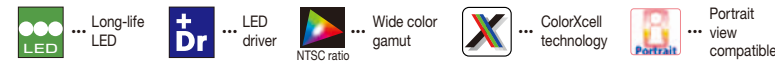Long-life LED ･･･ Long-life LED | +Dr ･･･ LED driver (NTSC ratio) | Wide color gamut | X ･･･ ColorXcell technology | Portrait ･･･ Portrait view compatible

Screen Size	8.4 inch		6.5 inch						Screen Size
Part Number	NL6448BC26-26C/26F	NL6448BC26-26/26D	NL10276BC13-01C	NL10276BC13-01	NL6448BC20-30C/30F	NL6448BC20-30/30D	NL6448BC20-35C/35F	NL6448BC20-35/35D	Part Number
Resolution	640 × 480	640 × 480	1024 × 768	1024 × 768	640 × 480	640 × 480	640 × 480	640 × 480	Resolution
Display Area (mm)	170.88 × 128.16	170.88 × 128.16	132.096 × 99.072	132.096 × 99.072	132.48 × 99.36	132.48 × 99.36	132.48 × 99.36	132.48 × 99.36	Display Area (mm)
Display Color	262K	262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	262K	262K	Display Color
Pixel Pitch (mm)	0.267 × 0.267	0.267 × 0.267	0.129 × 0.129	0.129 × 0.129	0.207 × 0.207	0.207 × 0.207	0.207 × 0.207	0.207 × 0.207	Pixel Pitch (mm)
Luminance	900cd/m²	500cd/m²	650cd/m²	500cd/m²	1000cd/m²	600cd/m²	1000cd/m²	600cd/m²	Luminance
Contrast	1000 : 1	1000 : 1	500 : 1	500 : 1	800 : 1	800 : 1	800 : 1	800 : 1	Contrast
Viewing Angle (U/D/L/R) Contrast ≧10 : 1	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 60°, 80°, 80°	80°, 60°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	Viewing Angle (U/D/L/R) Contrast ≧10 : 1
Response Time[1]	18ms	18ms	25ms	25ms	18ms	18ms	18ms	18ms	Response Time[1]
Interface	CMOS RGB 6 bits	CMOS RGB 6 bits	LVDS RGB 8 bits ／ 6 bits	LVDS RGB 8 bits ／ 6 bits	LVDS RGB 8 bits ／ 6 bits	LVDS RGB 8 bits ／ 6 bits	CMOS RGB 6 bits	CMOS RGB 6 bits	Interface
Power Supply Voltage	3.3V／5.0V	3.3V／5.0V	3.3V	3.3V	3.3V	3.3V	3.3V／5.0V	3.3V／5.0V	Power Supply Voltage
Power Consumption	5.1W[2]	3.2W[2]	3.9W[2]	3.9W[2]	3.8W[2]	2.6W[2]	3.9W[2]	2.7W[2]	Power Consumption
Operating Temperature	−30°C ～ +80°C	−30°C ～ +80°C	−20°C ～ +70°C	−20°C ～ +70°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	Operating Temperature
Storage Temperature	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	Storage Temperature
Polarizer Surface	-26C : Clear+AR/ -26F : Clear	-26 : Clear / -26D : AG	Clear + AR	Clear	-30C : Clear+AR / -30F : Clear	-30 : Clear / -30D : AG	-35C : Clear+AR / -35F : Clear	-35 : Clear / -35D : AG	Polarizer Surface
Module Size W×H×D(mm) (D : max)	200.0 × 152.0 × 8.7	200.0 × 152.0 × 8.7	153.0 × 118.0 × 9.5	153.0 × 118.0 × 9.5	153.0 × 118.0 × 8.7	153.0 × 118.0 × 8.7	153.0 × 118.0 × 8.7	153.0 × 118.0 × 8.7	Module Size W×H×D(mm) (D : max)
Weight	260g	260g	170g	165g	-30C : 155g / -30F : 150g	150g	-35C : 155g / -35F : 150g	150g	Weight
Reverse Scan	○	○	○	○	○	○	○	○	Reverse Scan
Recommended LED driver board <Suitable cable>	104PW03F <121CBL02>	104PW03F <121CBL02>	Not provided	Not provided	104PW03F <121CBL02>	65PW01F <121CBL02>	104PW03F <121CBL02>	65PW01F <121CBL02>	Recommended LED driver board <Suitable cable>
Remarks	T-EVT (-26C) LED	LED	T-EVT	—	T-EVT (-30C) LED X	LED X	T-EVT (-35C) LED	LED	Remarks

Screen Size	5.7 inch							Screen Size
Part Number	NL6448AC18-11D [NEW]	NL6448AC18-12F[3] [NEW]	NL6448AC18-08F [NEW]	NL6448AC18-08D [NEW]	NL6448BC18-07	NL3224AC36-01F [NEW]	NL3224AC36-01D [NEW]	Part Number
Resolution	640 × 480	640 × 480	640 × 480	640 × 480	640 × 480	320 × 240	320 × 240	Resolution
Display Area (mm)	115.2 × 86.4	115.2 × 86.4	115.2 × 86.4	115.2 × 86.4	115.2 × 86.4	115.2 × 86.4	115.2 × 86.4	Display Area (mm)
Display Color	262K	262K	262K	262K	262K	262K	262K	Display Color
Pixel Pitch (mm)	0.18 × 0.18	0.18 × 0.18	0.18 × 0.18	0.18 × 0.18	0.180 × 0.180	0.36 × 0.36	0.36 × 0.36	Pixel Pitch (mm)
Luminance	550cd/m²	800cd/m²	800cd/m²	550cd/m²	300cd/m²	800cd/m²	500cd/m²	Luminance
Contrast	900 : 1	900 : 1	900 : 1	900 : 1	900 : 1	900 : 1	900 : 1	Contrast
Viewing Angle (U/D/L/R) Contrast ≧10 : 1	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	Viewing Angle (U/D/L/R) Contrast ≧10 : 1
Response Time[1]	18ms	18ms	18ms	18ms	18ms	18ms	18ms	Response Time[1]
Interface	LVDS RGB 6 bits	CMOS RGB 6 bits	CMOS RGB 6 bits	CMOS RGB 6 bits	CMOS RGB 6 bits	CMOS RGB 6 bits	CMOS RGB 6 bits	Interface
Power Supply Voltage	Signal : 3.3V／Backlight : 12.0V	Signal : 3.3V／Backlight : 12.0V	Signal : 3.3V／Backlight : 12.0V	Signal : 3.3V／Backlight : 12.0V	3.3V	Signal : 3.3V／Backlight : 12.0V	Signal : 3.3V／Backlight : 12.0V	Power Supply Voltage
Power Consumption	TBD	TBD	TBD	TBD	1.4W[2]	TBD	TBD	Power Consumption
Operating Temperature	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−20°C ～ +70°C	−30°C ～ +80°C	−30°C ～ +80°C	Operating Temperature
Storage Temperature	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	−30°C ～ +80°C	Storage Temperature
Polarizer Surface	AG	AG	AG	AG	Clear	AG	AG	Polarizer Surface
Module Size W×H×D(mm) (D : max)	144.0 × 104.6 × 12.3	144.0 × 104.6 × 12.3	144.0 × 104.6 × 12.3	144.0 × 104.6 × 12.3	127.2 × 100.4 × 6.1	144.0 × 104.6 × 12.3	144.0 × 104.6 × 12.3	Module Size W×H×D(mm) (D : max)
Weight	150g	150g	150g	150g	110g	150g	150g	Weight
Reverse Scan	○	○	○	○	○	○	○	Reverse Scan
Recommended LED driver board <Suitable cable>	Built in	Built in	Built in	Built in	Not provided	Built in	Built in	Recommended LED driver board <Suitable cable>
Remarks	+Dr	+Dr Portrait	+Dr	+Dr	—	+Dr	+Dr	Remarks

Please see the Data Sheet for detailed specifications. All values are typical values (excluding the depth for module size). Values in brackets are tentative.

[1] Values equal Ton + Toff (10%←→90%).   [2] Values do not include LED driver board power dissipation.   [3] Portrait view signals are to be prepared by a customer.
◆ T-EVT : Transmissive-Enhanced View TFT

Product Map

Please see the Data Sheet for detailed specifications. All values are typical values (excluding the depth for module size). Values in brackets are tentative.
Mounting compatibility: Module size (except depth), position of mounting holes, and relative position of mounting holes to screen center.
Interface compatibility: Interface connector and pin assignment.

LED ... Long-life LED
+Dr ... LED driver
NTSC ratio
Wide color gamut
X ... ColorXcell technology
Portrait ... Portrait view compatible

			15 inch Wide	12.1 inch Wide	10.6 inch Wide	9.0 inch Wide	8.0 inch Wide	7.0 inch Wide			
Full HD 1920×1080 (16:9)	eDP	Super Fine TFT	NEW 15.6 inch Wide NL192108AC18-01D SFT 400cd/m² +Dr 72% Mass production in 2016						Super Fine TFT	eDP	Full HD 1920×1080 (16:9)
	LVDS	Super Fine TFT				NL192108AC10-01D SFT 400cd/m² LED +Dr 72%			Super Fine TFT	LVDS	
WXGA 1366×768 (16:9)	LVDS		NEW 15.6 inch Wide NL13676BC25-03F 1100cd/m² LED; 15.6 inch Wide NL13676AC25-01D 400cd/m² LED +Dr							LVDS	WXGA 1366×768 (16:9)
1280×800 (16:10)	LVDS			NL12880BC20-07F 1800cd/m² X; NEW NL12880AC20-14D (450)cd/m² LED +Dr X Mass production in 2016						LVDS	1280×800 (16:10)
1280×768 (15:9)	LVDS	Super Fine TFT	15.3 inch Wide NL12876BC26-32D SFT 470cd/m² LED X	NL12880BC20-05/05D SFT 450cd/m² LED X	NL12876AC18-03/03D SFT 300cd/m² +Dr X				Super Fine TFT	LVDS	1280×768 (15:9)
WVGA 800×480 (15:9)	LVDS	Super Fine TFT				WVGA Interface Compatibility(LVDS)*1 NL8048BC24-09/09D SFT 400cd/m² LED			Super Fine TFT	LVDS	WVGA 800×480 (15:9)
		Enhanced View TFT						NL8048BC19-02C T-EVT 550cd/m²	Enhanced View TFT		
						NL8048BC24-12/12D 450cd/m² LED	NL8048AC21-01F*3 1000cd/m² LED +Dr 70%	NL8048AC19-14F*3 1000cd/m² LED +Dr; NL8048AC19-13*3 500cd/m² LED +Dr; NL8048BC19-02 400cd/m²; NL8048BC19-03*2 400cd/m² Portrait			

SFT : Super Fine TFT, T-EVT : Transmissive-Enhanced View TFT

*1 Connector types and connector pin alignments are compatible. Control signal is upwardly compatible. *2 Portrait view signals are to be prepared by a customer. *3 Interface is compatible only with 6bits.

Product Specifications

Legend (top right): LED — Long-life LED ／ +Dr — LED driver ／ NTSC ratio — Wide color gamut ／ X — ColorXcell technology ／ Portrait — Portrait view compatible

Table 1

Screen Size	15.6 inch Wide		15.3 inch Wide	12.1 inch Wide		10.6 inch Wide	9.0 inch Wide		Screen Size
Part Number	NL13676BC25-03F (NEW)	NL13676AC25-01D	NL12876BC26-32D	NL12880BC20-07F	NL12880BC20-05/05D	NL12876AC18-03/03D	NL192108AC10-01D	NL8048BC24-12/12D	Part Number
Resolution	1366 × 768	1366 × 768	1280 × 768	1280 × 800	1280 × 800	1280 × 768	1920 × 1080	800 × 480	Resolution
Display Area (mm)	344.232 × 193.536	344.232 × 193.536	334.08 × 200.45	261.12 × 163.2	261.12 × 163.2	230.4 × 138.24	198.72 × 111.78	196.8 × 118.08	Display Area (mm)
Display Color	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	Display Color
Pixel Pitch (mm)	0.252 × 0.252	0.252 × 0.252	0.261 × 0.261	0.204 × 0.204	0.204 × 0.204	0.18 × 0.18	0.1035 × 0.1035	0.246 × 0.246	Pixel Pitch (mm)
Luminance	1100cd/m²	400cd/m²	470cd/m²	1800cd/m²	450cd/m²	300cd/m²	400cd/m²	450cd/m²	Luminance
Contrast	900 : 1	900 : 1	700 : 1	800 : 1	1000 : 1	1000 : 1	700 : 1	900 : 1	Contrast
Viewing Angle (U/D/L/R) Contrast ≧10 : 1	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	88°, 88°, 88°, 88°	80°, 80°, 80°, 80°	88°, 88°, 88°, 88°	88°, 88°, 88°, 88°	88°, 88°, 88°, 88°	80°, 80°, 80°, 80°	Viewing Angle (U/D/L/R) Contrast ≧10 : 1
Response Time*1	18ms	18ms	25ms	15ms	25ms	25ms	25ms	18ms	Response Time*1
Interface	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	2port LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	Interface
Power Supply Voltage	3.3V	Signal : 3.3V Backlight : 12.0V	3.3V	3.3V	3.3V	Signal : 3.3V Backlight : 5.0〜12.0V	Signal : 3.3V Backlight : 12.0V	3.3V	Power Supply Voltage
Power Consumption	16W*2	10.6W	9.8W*2	16.7 W*2	6.5W*2	3.3W	11.4W	4.1W*2	Power Consumption
Operating Temperature	−20℃〜+70℃	−20℃〜+70℃	−20℃〜+70℃	−20℃〜+70℃	−20℃〜+70℃	−20℃〜+70℃	−20℃〜+70℃	−20℃〜+70℃	Operating Temperature
Storage Temperature	−30℃〜+80℃	−20℃〜+80℃	−20℃〜+80℃	−30℃〜+80℃	−30℃〜+80℃	−30℃〜+80℃	−30℃〜+80℃	−30℃〜+80℃	Storage Temperature
Polarizer Surface	AG	AG	AG	AG	-05 : Clear / -05D : AG	-03 : Clear / -03D : AG	AG	-12 : Clear / -12D : AG	Polarizer Surface
Module Size W×H×D(mm) (D : max)	363.8 × 215.9 × 13.1	363.8 × 215.9 × 10.8	358.0 × 226.0 × 14.8	277.7 × 180.6 × 9.2	277.7 × 180.6 × 9.2	248.8 × 155.8 × 7.0	214.6 × 130.0 × 9.6	220.5 × 136.5 × 8.7	Module Size W×H×D(mm) (D : max)
Weight	1070g	800g	1100g	470g	460g	270g	270g	275g	Weight
Reverse Scan	—	—	—	○	○	○	—	○	Reverse Scan
Recommended LED driver board <Suitable cable>	Not provided	Built in	Not provided	Not provided	104PW03F <121CBL02>	Built in	Built in	104PW03F <121CBL02>	Recommended LED driver board <Suitable cable>
Remarks	LED	LED +Dr	SFT LED X	X	SFT LED X	SFT +Dr X	SFT LED +Dr 72%	LED	Remarks

Table 2

Screen Size	9.0 inch Wide	8.0 inch Wide	7.0 inch Wide					Screen Size
Part Number	NL8048BC24-09/09D	NL8048AC21-01F	NL8048AC19-14F	NL8048AC19-13	NL8048AC19-02C	NL8048BC19-02	NL8048BC19-03*3	Part Number
Resolution	800 × 480	800 × 480	800 × 480	800 × 480	800 × 480	800 × 480	800 × 480	Resolution
Display Area (mm)	196.8 × 118.08	174.0 × 104.4	152.4 × 91.44	152.4 × 91.44	152.4 × 91.44	152.4 × 91.44	152.4 × 91.44	Display Area (mm)
Display Color	16.77M / 262K	262K	262K	262K	16.77M / 262K	16.77M / 262K	16.77M / 262K	Display Color
Pixel Pitch (mm)	0.246 × 0.246	0.2175 × 0.2175	0.1905 × 0.1905	0.1905 × 0.1905	0.1905 × 0.1905	0.1905 × 0.1905	0.1905 × 0.1905	Pixel Pitch (mm)
Luminance	400cd/m²	1000cd/m²	1000cd/m²	500cd/m²	550cd/m²	400cd/m²	400cd/m²	Luminance
Contrast	800 : 1	800 : 1	800 : 1	800 : 1	800 : 1	1000 : 1	1000 : 1	Contrast
Viewing Angle (U/D/L/R) Contrast ≧10 : 1	88°, 88°, 88°, 88°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	80°, 80°, 80°, 80°	Viewing Angle (U/D/L/R) Contrast ≧10 : 1
Response Time*1	25ms	8ms	8ms	8ms	18ms	18ms	18ms	Response Time*1
Interface	LVDS RGB 8 bits／6 bits	LVDS RGB 6 bits	LVDS RGB 6 bits	LVDS RGB 6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	LVDS RGB 8 bits／6 bits	Interface
Power Supply Voltage	3.3V	Signal : 3.3V Backlight : 12.0V	Signal : 3.3V Backlight : 12.0V	Signal : 3.3V Backlight : 12.0V	3.3V	3.3V	3.3V	Power Supply Voltage
Power Consumption	4.4W*2	5.7W	5.4W	3.0W	3.4W*2	3.4W*2	3.4W*2	Power Consumption
Operating Temperature	−20℃〜+70℃	−30℃〜+80℃	−30℃〜+80℃	−30℃〜+80℃	−20℃〜+70℃	−20℃〜+70℃	−20℃〜+70℃	Operating Temperature
Storage Temperature	−30℃〜+80℃	−40℃〜+80℃	−40℃〜+80℃	−40℃〜+80℃	−30℃〜+80℃	−30℃〜+80℃	−30℃〜+80℃	Storage Temperature
Polarizer Surface	-09 : Clear / -09D : AG	AG	AG	Clear	Clear+AR	Clear	Clear	Polarizer Surface
Module Size W×H×D(mm) (D : max)	220.5 × 136.5 × 8.7	192.0 × 122.0 × 9.4	170.0 × 111.0 × 9.0	170.0 × 111.0 × 9.0	170.0 × 111.0 × 9.0	170.0 × 111.0 × 9.0	170.0 × 111.0 × 9.0	Module Size W×H×D(mm) (D : max)
Weight	275g	230g	185g	185g	170g	165g	165g	Weight
Reverse Scan	○	○	○	○	○	○	○	Reverse Scan
Recommended LED driver board <Suitable cable>	104PW03F <121CBL02>	Built in	Built in	Built in	Not provided	Not provided	Not provided	Recommended LED driver board <Suitable cable>
Remarks	SFT LED	LED +Dr 70%	LED +Dr	LED +Dr	T-EVT	—	Portrait	Remarks

Please see the Data Sheet for detailed specifications. All values are typical values (excluding the depth for module size). Values in brackets are tentative.

*1 Values equal Ton + Toff (10%←→90%). *2 Values do not include LED driver board power dissipation. *3 Portrait view signals are to be prepared by a customer.
◆ SFT : Super Fine TFT, T-EVT : Transmissive-Enhanced View TFT

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