NEC LCD Technologies, Ltd.

TFT COLOR LCD MODULE

NL6448BC20-30F

17cm (6.5 Type)
VGA

EXTENDED SPECIFICATION

(1st edition, November 2010)

1. DEFECT CRITERIA

1.1 Display specifications

(Note1)

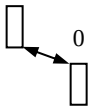
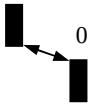
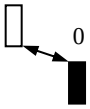
Defect pattern	Condition				Criteria
Line defect	Display of black , white, red, green, blue				0 line
Bright dots Note2, Note3	Red + Green + Blue				≤ 2 dots
	Close defect dots Note5	0mm < **D** ≤15mm Note7		Same color and different color	0 set
	Linked defect dots Note6	**D**= 0mm Note7	2 defect dots	Same color	0 set
				Different color	≤ 1 set
Dark dots Note2, Note4	Red + Green + Blue				≤ 3 dots
	Close defect dots Note5	0mm < **D** ≤ 15mm Note7		Same color and different color	0 set
	Linked defect dots Note6	**D**= 0mm Note7	2 defect dots	Same color and different color	0 set
			3 defect dots or more	Same color and different color	
Between Bright dots and Dark dots	Close defect dots Note5	0mm < **D** ≤ 15mm Note7		Same color and different color	Allowed
	Linked defect dots Note6	**D**= 0mm Note7	2 defect dots	Same color and different color	Allowed
			3 defect dots or more	Same color and different color	0 set
Total	Bright dots + Dark dots				≤ 5 dots

Note1: Inspection conditions are as follows.

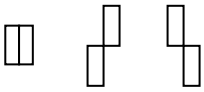
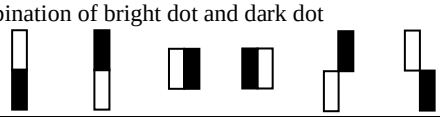
Temperature	25 ± 5 °C
Inspection viewing distance	20 cm (The distance between the inspector's eye and screen.)
Inspection direction	0° ≤ θR ≤ 20°, 0° ≤ θL ≤ 20°
	0° ≤ θU ≤ 20°
Inspection illumination	60 lx (at a display surface)

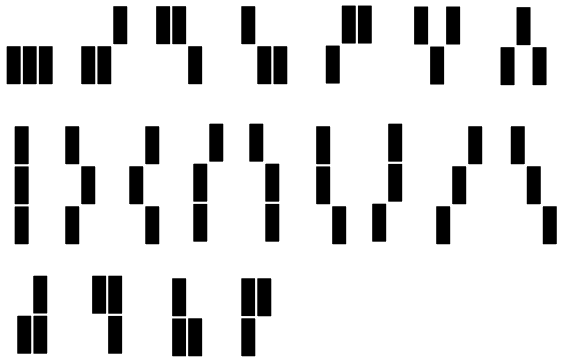
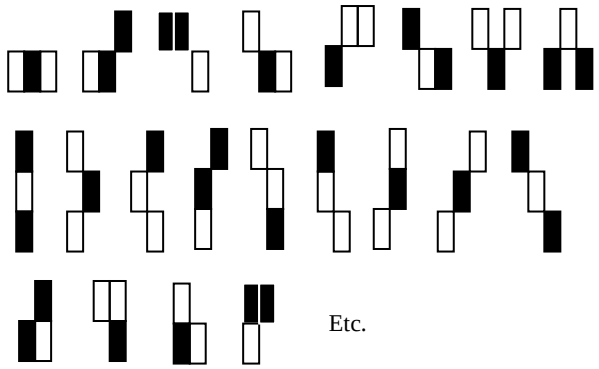
Note2: Regardless of bright or intermittent bright, 1/3 or larger defect of a dot area is counted as a defect dot.
Note3: Bright dots are counted while the display is black.
Note4: Dark dots are counted while the display is illuminated with Red, Green or Blue.
Note5: See "**1.2 Close defect dots**".
Note6: See "**1.3 Linked defect dots**".
Note7: **D** is the distance between defect dots.

1.2 Close defect dots

Defect pattern	: Bright dot : Dark dot	Criteria
Bright dots	Same color and different color  0 mm < **D** ≤ 15mm	0 set
Dark dots	Same color and different color  0 mm < **D** ≤ 15mm	
Combination of bright dot and dark dot	 0 mm < **D** ≤ 15mm	Allowed

1.3 Linked defect dots

Defect pattern	: Bright dot : Dark dot	Criteria
2 defect dots	Same color 	0 set
	Different color 	≤ 1 set
	Same color and different color 	0 set
	Combination of bright dot and dark dot 	Allowed

Defect pattern	: Bright dot : Dark dot	Criteria
3 defect dots	Dark dots 	0 set
	Combination of bright dot and dark dot  Etc.	

1.4 Appearance specifications

(Note1, Note2, Note3)

Defect pattern		Condition		Criteria
Impure ingredient Stains Dust	Dot shape	d < 0.2 mm		Allowed
		0.2 mm ≤ d < 0.3 mm		≤ 10 points
		0.3 mm ≤ d ≤ 0.5 mm		≤ 3 points
		d > 0.5 mm		0 point
	Line shape	W < 0.05 mm		Allowed
		0.05 mm ≤ W ≤ 0.1 mm	L < 0.7 mm	
			0.7 mm ≤ L ≤ 1.0 mm	≤ 4 points
			L > 1.0 mm	0 point
		W > 0.1 mm		
Bubbles, Wrinkles, Dent		d ≤ 0.2 mm		Allowed
		0.2 mm < d ≤ 0.5 mm		≤ 2 points
		d > 0.5 mm		0 point
Scratch (Surface of polarizer)		S ≤ 0.2 mm^2		Allowed
		S > 0.2 mm^2		0 point

Note1: Definition of symbols is as follows.

d: Average diameter

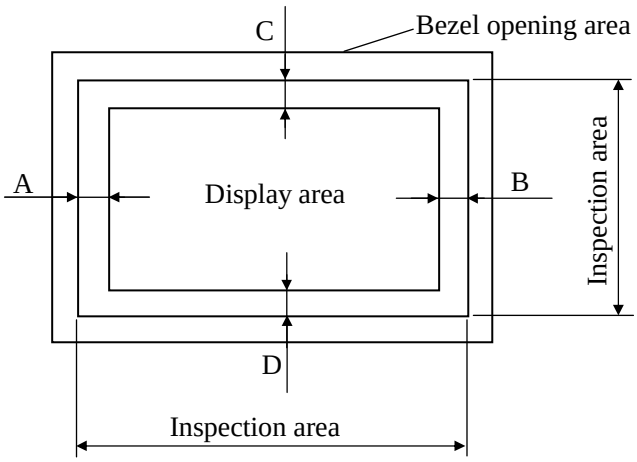
(This diameter is the average length of a long axis and a short axis in each defect pattern.)

W: Width, L: Length, S: Area

Note2: Inspection conditions are as follows.

Temperature	25 ± 5 °C
Inspection viewing distance	20cm (The distance between the inspector's eye and screen.)
Inspection direction	0° ≤ θR ≤ 45°, 0° ≤ θL ≤ 45°
	0° ≤ θU ≤ 45°, 0° ≤ θD ≤ 45°
Illumination	700 lx (at an inspection desk surface)

Note3: Inspection area



A= 1.0mm
B= 1.0mm
C= 1.0mm
D= 1.0mm

2. ESTIMATED LUMINANCE LIFETIME

The luminance lifetime is the time from initial luminance to half-luminance.

This lifetime is the estimated value, and is not guarantee value.

Condition		Estimated luminance lifetime (Life time expectancy) Note1, Note2, Note3	Unit
LED elementary substance	25°C (Ambient temperature of the product) Continuous operation, IL=50mA/One circuit	70,000	h
	80°C (Surface temperature at screen) Continuous operation, IL=50mA/One circuit	60,000	

Note1: Life time expectancy is mean time to half-luminance.
Note2: Estimated luminance lifetime is not the value for an LCD module but the value for LED elementary substance.
Note3: By ambient temperature, the lifetime changes particularly. Especially, in case the product works under high temperature environment, the lifetime becomes short.

3. PRODUCT INSPECTIONS

The following inspections are carried out for products, before shipment.

(1) 100% inspection
- Power supply current
- Display
- Appearance

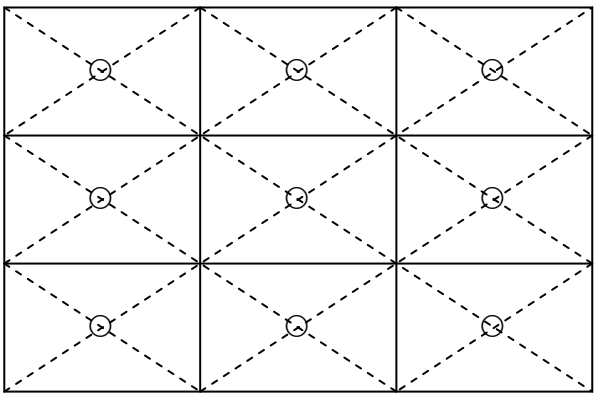
(2) Sampling inspection
- White luminance
- Contrast ratio
- Luminance uniformity

4. RELIABILITY TESTS

Test item	Condition	Judgment Note1
High temperature and humidity (Operation)	① 60 ± 2°C, RH= 90%, 240hours ② Display data is black.	No display malfunctions
High temperature (Operation)	① 80 ± 3°C, 240hours ② Display data is black.	
Heat cycle (Operation)	① -30 ± 3°C…1hour 80 ± 3°C…1hour ② 50cycles, 4 hours/cycle ③ Display data is black.	
Thermal shock (Non operation)	① -30 ± 3°C…30minutes 80 ± 3°C…30minutes ② 100cycles, 1hour/cycle ③ Temperature transition time is within 5 minutes.	
ESD (Operation)	① 150pF, 150Ω, ±10kV ② 9 places on a panel surface Note2 ③ 10 times each places at 1 sec interval	
Dust (Operation)	① Sample dust: No. 15 (by JIS-Z8901) ② 15 seconds stir ③ 8 times repeat at 1 hour interval	
Vibration (Non operation)	① 5 to 100Hz, 19.6m/s^2 ② 1 minute/cycle ③ X, Y, Z directions ④ 120 times each directions	No display malfunctions No physical damages
Mechanical shock (Non operation)	① 539m/ s^2, 11ms ② ±X, ±Y, ±Z directions ③ 5 times each directions	

Note1: Display and appearance are checked under environmental conditions equivalent to the inspection conditions of defect criteria.

Note2: See the following figure for discharge points.

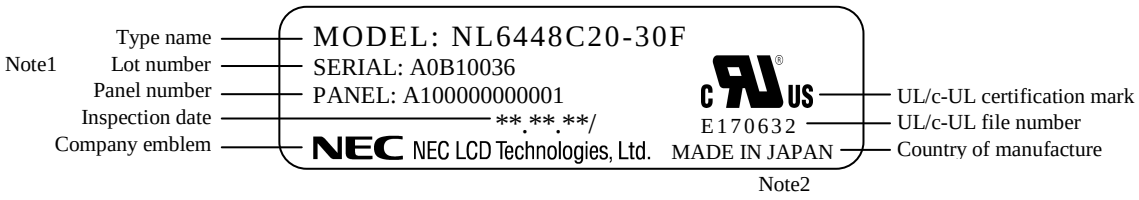


5. MARKINGS

The various markings are attached to this product. See **"OUTLINE DRAWINGS"** for attachment positions.

5.1 NAMEPLATE LABEL

Nameplate label



Note1: The meaning of lot number

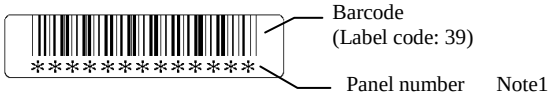
- Example: A0B10036

A	0	B	10036
Revision 1 letter (Alphabet)	**Manufacturing year** 1 figure of the A.D. end numbers (e.g.: A.D 2010 is 0)	**Manufacturing month** 1 letter Jan. to Sep.: Number of month October: A November: B December: C	**Production number** Multi-letter

Note2: **Do not attach anything like another label on the nameplate label!** In case of repairing the product, NEC needs the contents of nameplate such as the lot number, inspection date and so on, to identify the warranty period with individual product. If NEC cannot decipher the contents of nameplate, repairing shall be charged. NEC also may give a new lot number to repaired products.

5.2 BARCODE LABEL

Barcode label



Note1: The same panel number is given to barcode label and nameplate label.

6. PACKING, TRANSPORTATION AND DELIVERY

NEC will pack products to deliver to customer in accordance with NEC's packing specifications, and will deliver products to customer in such a condition that products will not suffer from a damage during transportation. The delivery conditions are as follows.

6.1 INNER PACKING BOX

10 products are packed as the maximum in an inner packing box (See "**9.6 OUTLINE FIGURE FOR PACKING**"). The type name and quantity are shown on outside of the inner packing box, either labeling or printing. In case the inner packing box with products is dropped from a height of 60cm or more, there is a risk of damage to products.

In case of shipping the product out of Japan, the product must not be transported only with the inner box, because there is a high risk of damage. Be sure to use an outer packing box which is shown below!

6.2 OUTER PACKING BOX

The inner box with products is packed in an outer packing box A, B, C or D (See "**9.6 OUTLINE FIGURE FOR PACKING**"). The type name and quantity are shown on outside of the outer packing box, either labeling or printing. In case the outer packing box with products is dropped from a height of 60cm or more, there is a risk of damage to products.

Outer packing box is used only when shipping the product out of Japan.

6.3 INSPECTION RECORD SHEET

Inspection record sheets are included in an inner packing box with products. It is summarized to a number of products for pass/fail assessment.

6.4 TRANSPORTATION

The product is transported by vehicle, aircraft or ship.

6.5 SIZE AND WEIGHT FOR PACKING BOXES

Parameter	Inner packing box	Unit
Size	194(W) × 238(H) × 369(D) (typ.)	mm
Weight	0.5 (typ.)	kg
Total weight	2.0 (typ.) (with 10 products)	kg

Parameter	Outer packing box A	Unit
Size	215(W) × 280(H) × 390(D) (typ.)	mm
Weight	0.5 (typ.)	kg
Total weight	2.5 (typ.) (with an inner packing box and 10 products)	kg

Parameter	Outer packing box B	Outer packing box C	Outer packing box D	Unit
Size	390(W) × 280(H) × 414(D) (typ.)	220(W) × 290(H) × 395(D) (typ.)	395(W) × 290(H) × 419(D) (typ.)	mm
Weight	0.9 (typ.)	0.5 (typ.)	0.9 (typ.)	kg
Total weight	4.8 (typ.) (with 2 inner packing boxes and 20 products)	2.5 (typ.) (with an inner packing box and 10 products)	4.8 (typ.) (with 2 inner packing boxes and 20 products)	kg

6.6 OUTLINE FIGURE FOR PACKING