NEC

TFT COLOR LCD MODULE

NL6448BC33-46

26 cm (10.4 inches), 640 × 480 pixels, 262,144 colors, Incorporated two-lamp/Edge-light type backlight Wide viewing angle

DESCRIPTION

NL6448BC33-46 is a TFT (thin film transistor) active matrix color liquid crystal display (LCD) comprising amorphous silicon TFT attached to each signal electrode, a driving circuit and a backlight. NL6448BC33-46 has a built-in backlight. Backlight includes long-life-lamps and the lamps are replaceable.

The 26 cm (10.4 inches) diagonal display area contains 640 × 480 pixels and can display 262,144 colors simultaneously.

NL6448BC33-46 is suitable for industrial application use because of the wide viewing angle and the high luminance. Also, the viewing direction is selectable either upper or lower side by changing scan direction.

FEATURES

- Wide viewing angle (with Retardation Film)
- Wide temperature range (storage: −20 to +80°C, operation: 0 to +65°C)
- Smooth polarizer surface (No antiglare treatment)
- High luminance (350 cd/m^2, typ.: saturated value, at room temp.)
- 6-bit digital RGB signals

- Data enable function
- Backlight with two long-life-time lamps (one lamp holder)
- Lamp holder replaceable (Type No.: 104LHS35)
- Reversible scan direction (with DPS pin)
- Easy to attach a touch panel

APPLICATIONS

- Display terminals for control system
- Monitors for process controller
- Industrial PCs

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STRUCTURE AND FUNCTIONS

A color TFT (thin film transistor) LCD module is comprised of a TFT liquid crystal panel structure, LSIs for driving the TFT array, and a backlight assembly. The TFT panel structure is created by sandwiching liquid crystal material in the narrow gap between a TFT array glass substrate and a color filter glass substrate. After the driver LSIs are connected to the panel, the backlight assembly is attached to the backside of the panel.

RGB (red, green, blue) data signals from a source system is modulated into a form suitable for active matrix addressing by the onboard signal processor and sent to the driver LSIs which in turn addresses the individual TFT cells.

Acting as an electro-optical switch, each TFT cell regulates light transmission from the backlight assembly when activated by the data source. By regulating the amount of light passing through the array of red, green, and blue dots, color images are created with clarity.

OUTLINE OF CHARACTERISTICS (at room temperature)

Display area	211.2 (H) × 158.4 (V) mm
Drive system	a-Si TFT active matrix
Display colors	262,144 colors
Number of pixels	640 × 480 pixels
Pixel arrangement	RGB vertical stripe
Pixel pitch	0.33 (H) × 0.33 (V) mm
Module size	243.0 (H) × 185.1 (V) × 11.0 typ. (D) mm
Weight	530 g (typ.)
Contrast ratio	300 : 1 (typ.)
Viewing angle (more than the contrast ratio of 10 : 1)	
	Horizontal : 70° (typ., left side, right side)
	Vertical : 45° (typ., up side), 55° (typ, down side)
Designed viewing direction	Wider viewing angle without image reversal : up side (12 o'clock normal scan)
	down side (6 o'clock reverse scan)
	Wider viewing angle with contrast ratio : down side (6 o'clock normal scan)
	up side (12 o'clock reverse scan)
	Optimum grayscale (γ = 2.2) : perpendicular
Polarizer pencil-hardness	2H (Min., at JIS K5400)
Color gamut	43% (typ. at center, to NTSC)
Response time	8 ms (typ.), white to black
Luminance	350 cd/m^2 (TYP)
Signal system	6-bit digital signals for each of RGB primary colors, synchronous signals (Hsync, Vsync), dot clock (CLK)
Supply voltages	3.3 V [5.0 V] (Logic, LCD driving)
Backlight	Edge light type, two cold cathode fluorescent lamps (cold cathode type) [Replaceable parts] Lamp holder: type No.104LHS35
Power consumption	6.2 W (TYP., at 3.3 V, I$_L$ = 5.0 × 2 mArms)

BLOCK DIAGRAM
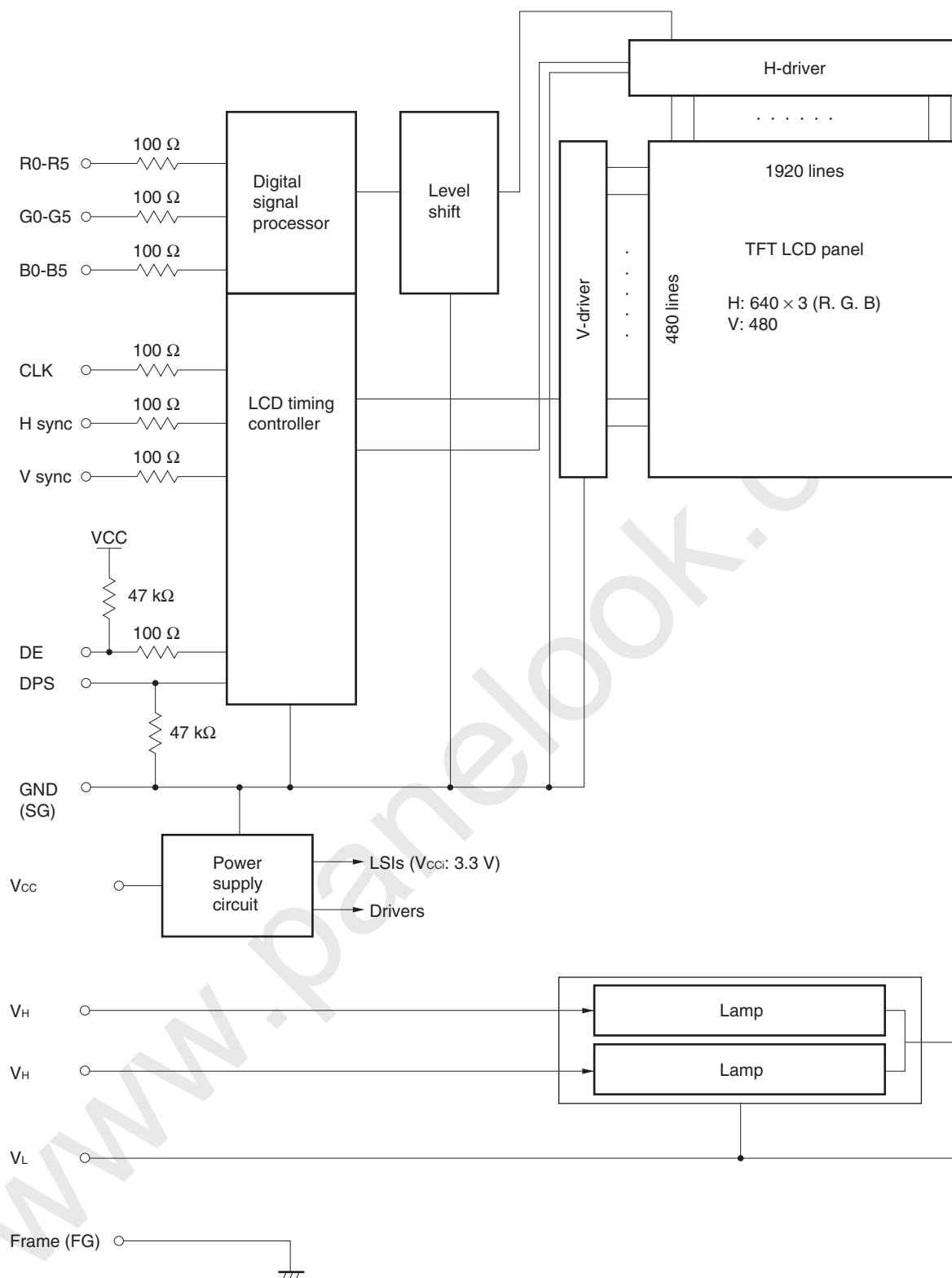
note 1: Frame GND is not connected to the lamp holder
note 2: Lamp holder is connected the V_L

GENERAL SPECIFICATIONS

Items	Specifications	Unit
Module size	243.0 ± 0.5 (H) × 185.1 ± 0.5 (V) × 11.5 max. (D)	mm
Display area	211.2 (H) × 158.4 (V)	mm
Number of dots	640 × 3 (H) × 480 (V)	dot
Number of pixels	640 (H) × 480 (V)	pixel
Dot pitch	0.11 (H) × 0.33 (V)	mm
Pixel pitch	0.33 (H) × 0.33 (V)	mm
Pixel arrangement	RGB (Red, Green, Blue) vertical stripe	–
Display colors	262,144	color
Weight	550 (max.)	g

ABSOLUTE MAXIMUM RATINGS

Parameters	Symbols	Ratings	Unit	Remarks	
Supply voltage	V_{CC}	–0.3 to 6.5	V	$T_a = 25°C$	
Input voltage	V_I	–0.3 to V_{CC} +0.3	V		
Lamp voltage	V_L	1500	V_{rms}	–	
Storage temp.	T_{ST}	–20 to 80	°C		
Operating temp.	T_{OP}	0 to 65	°C	Module surface **Note**	
Humidity (no condensation)	RH	≤ 95% relative humidity	–	$T_a \leq 40°C$	No condensation
		≤ 85% relative humidity	–	$40 < T_a \leq 50°C$	
		Absolute humidity shall not exceed $T_a = 50°C$, 85% relative humidity level.	–	$T_a > 50°C$	

Note Measured at the display area

ELECTRICAL CHARACTERISTICS

(1) Logic, LCD driving

Ta = 25°C

Parameters	Symbols	MIN.	TYP.	MAX.	Unit	Remarks
Supply voltage	V_{CC}	3.0 (4.75)	3.3 (5.0)	3.6 (5.25)	V	V_{CC} = 3.3 V (V_{CC} = 5.0 V)
Logic input Low voltage	V_{IL}	0	–	$V_{CC} \times 0.3$	mV	CMOS level
Logic input High voltage	V_{IH}	$V_{CC} \times 0.7$	–	V_{CC}	V	
Supply current	I_{CC}	– –	280 (200)	400 (280)	mA	V_{CC} = 3.3 V (V_{CC} = 5.0 V)

Note Checkered flag pattern (in EIAJ ED-2522)

(2) Backlight

Ta = 25°C

Parameters	Symbols	MIN.	TYP.	MAX.	Unit	Remarks
Lamp current	I_L	2.0	5.0	5.5	mArms	with one lamp
Lamp voltage	V_L	–	520	–	Vrms	–
Lamp turn on voltage	V_S	850	–	–	Vrms	Ta = 25°C
		1100	–	–		Ta = 0°C
Oscillator frequency	F_t	50	54	58	kHz	**Note**

Note Recommended value of "F_t".
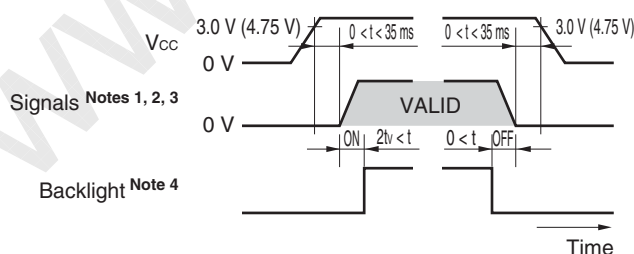
- F_t is within the specification.

and

- $F_t = \dfrac{1}{4th} \times (2n - 1)$ th: Hsync period
  n : a natural number (1, 2, 3, ·····)

If F_t is out of the recommended value, interference between F_t frequency and Hsync frequency may cause beat on the display.

SUPPLY VOLTAGE SEQUENCE

Notes 1. Signals: CLK, Hsync, Vsync, DE, DATA (R0-R5, G0-G5, B0-B5)

2. The supply voltage for input signals should be the same as V_{CC}.

3. Apply $V_{DD}B$ within the LCD operation period. When the backlight turns on before LCD operation or the LCD operation turns off before the backlight turns off, the display may momentarily become white.

4. While the power is off, please keep whole signals at low level or high impedance.

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INTERFACE PIN CONNECTIONS

(1) Interface signals, power supply

Module side connector   Mating connector

CN1 ··· DF9C-31P-1V (No.1 to 30)   DF9-31S-1V   ..... (1)

IL-310-T31S-VF   ..... (2)

Supplier: (1) HIROSE ELECTRIC CO., LTD., (2) Japan Aviation Electronics Industry Limited (JAE)

Pin No.	Symbols	Functions	Pin No.	Symbols	Functions
1	GND	Ground	19	GND	Ground
2	CLK	Dot clock	20	B0	Blue data (LSB)
3	Hsync	Horizontal sync.	21	B1	Blue data
4	Vsync	Vertical sync.	22	B2	Blue data
5	GND	Ground	23	B3	Blue data
6	R0	Red data (LSB)	24	B4	Blue data
7	R1	Red data	25	B5	Blue data (MSB)
8	R2	Red data	26	GND	Ground
9	R3	Red data	27	DE	Data enable
10	R4	Red data	28	V_{CC}	Power supply
11	R5	Red data (MSB)	29	V_{CC}	Power supply
12	GND	Ground	30	N.C	Non connection
13	G0	Green data (LSB)	31	DPS	Scan direction select
14	G1	Green data			
15	G2	Green data			
16	G3	Green data			
17	G4	Green data			
18	G5	Green data (MSB)			

LSB : Least Significant Bit

MSB : Most Significant Bit

Notes 1. V_{CC}: All V_{CC} terminals should be connected to 3.3V or 5.0 V.

2. DE: DE/Fixed mode select is as follows.

Data enable signal = DE mode

V_{CC} or Open = Fixed mode

3. DPS: DPS changes display scan direction.

GND or Open = Normal scan

V_{CC} = Reverse scan

4. GND is not connected the frame of the LCD module.

(2) Backlight

- Lamp side connector　　　　　Mating connector

　　CN2 ··· BHR-03VS-1　　　　　SM03 (4.0)B-BHS-TB

　　　　　Supplier:　J.S.T TRADING COMPANY, LTD.

Pin No.	Symbols	Functions
1	V_L	Power supply (low)
2	V_H	Power supply (high)
3	V_H	Power supply (high)

(3) Connector locations

<Connector locations>

<Pin arrangement of CN2>

<Pin arrangement of CN1>
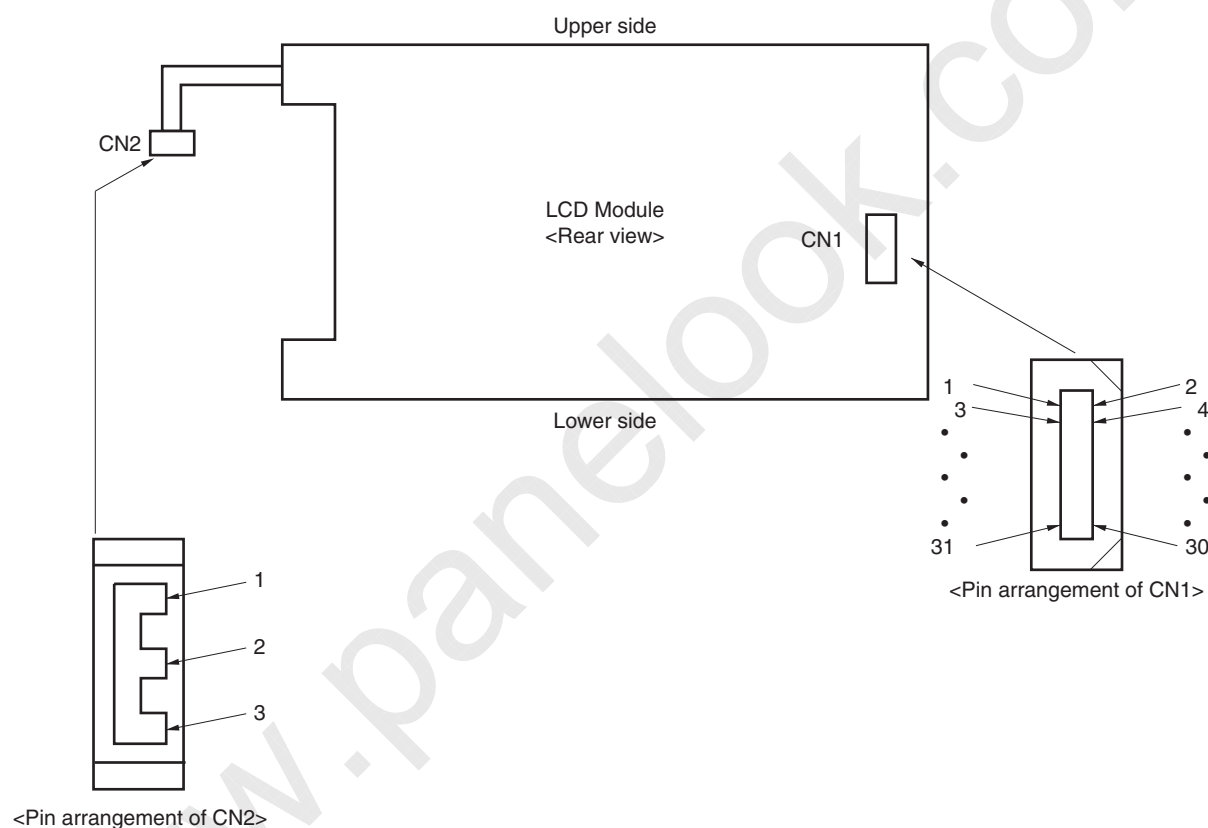
DISPLAY COLORS vs. INPUT DATA SIGNALS

Display colors		Data signal (0: Low level, 1: High level)																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red grayscale	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	dark	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑				⏐						⏐						⏐		
	↓				⏐						⏐						⏐		
	bright	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green grayscale	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	dark	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	↑				⏐						⏐						⏐		
	↓				⏐						⏐						⏐		
	bright	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
		0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue grayscale	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	↑				⏐						⏐						⏐		
	↓				⏐						⏐						⏐		
	bright	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
		0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

Note   The combination of 6-bit signals (64 grayscale level) results in 262144 (64 × 64 × 64) colors.

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INPUT SIGNAL TIMINGS

(1) Input signal specifications (DE mode is default.)

	Parameters	Symbols	MIN.	TYP.	MAX.	Unit	Remarks
CLK	Frequency	1/t$_C$	21.0	25.175	29.0	MHz	39.72 ns (typ.)
	Duty	tch/t$_C$	0.4	0.5	0.6	–	–
	Rise, fall	tcrf	–	–	10	ns	–
Hsync	Period	th	30.0	31.778	33.6	μs	31.468 kHz (typ.)
			–	800	–	CLK	
	Display period	thd		640		CLK	–
	Front-porch	thf		16		CLK	Fixed mode
			2	16	–		DE mode
	Pulse width	thp	10	96	–	CLK	Fixed mode
			10	96	–		DE mode
	Back-porch	thb	–	48	134	CLK	Fixed mode
			4	48	–		DE mode
	thp + thb			144		CLK	Fixed mode
			14	144	–		adjustable range by DE signal
	CLK-Hsync timing	thch	12	–	–	ns	–
	Hsync-CLK timing	thcs	8	–	–	ns	–
	Hsync-Vsync timing	tvh	1	–	–	CLK	–
	Vsync-Hsync timing	tvs	30	–	–	ns	–
	Rise, fall	thrf	–	–	10	ns	–
Vsync	Period	tv	16.1	16.683	17.2	ms	59.94 Hz (typ.)
			–	525	–	H	
	Display period	tvd		480		H	–
	Front-porch	tvf		12		H	Fixed mode
			0	12	–		DE mode
	Pulse width	tvp	1	2	–	H	Fixed mode
			1	2	–		DE mode
	Back-porch	tvb	–	31	32	H	Fixed mode
			4	31	–		DE mode
	tvp + tvb			33		H	Fixed mode
			5	33	–		DE mode
	Rise, fall	tvrf	–	–	10	ns	–
DATA R0-R5 G0-G5 B0-B5	CLK-DATA timing	tds	8	–	–	ns	–
	DATA-CLK timing	tdh	12	–	–	ns	–
	Rise, fall	tdrf	–	–	10	ns	–
DE	DE-CLK timing	tes	8	–	–	ns	DE mode
	CLK-DE timing	teh	12	–	–	ns	
	Rise, fall	terf	–	–	10	ns	

Note   All parameters should be kept within the specified range.

(2) Definition of input signal timings

<Vertical>

<Horizontal>
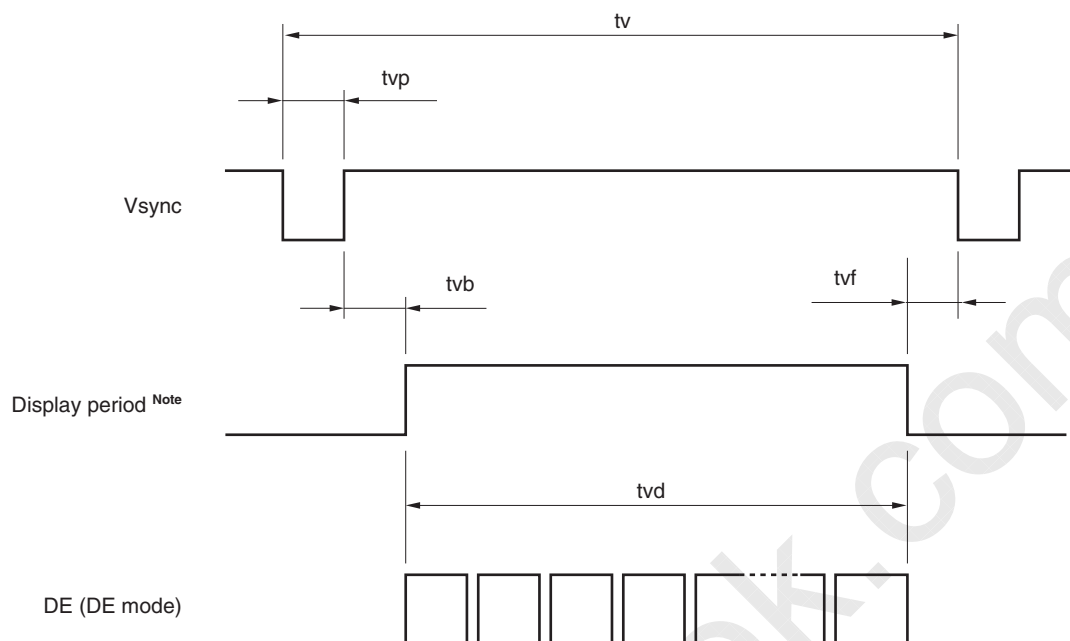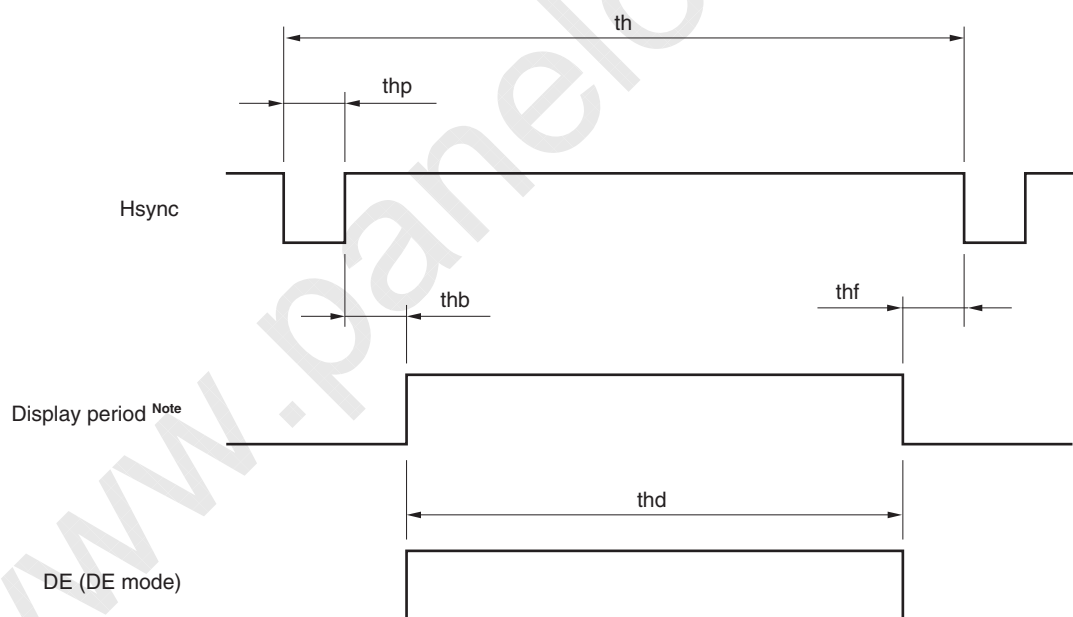
Notes **1.** These do not exist as signals.

　　　　2. Keep thp + thb and tvp + tvb within the value shown in the table of input signal timing, otherwise display position is shifted to right or left side, or to up or down side.
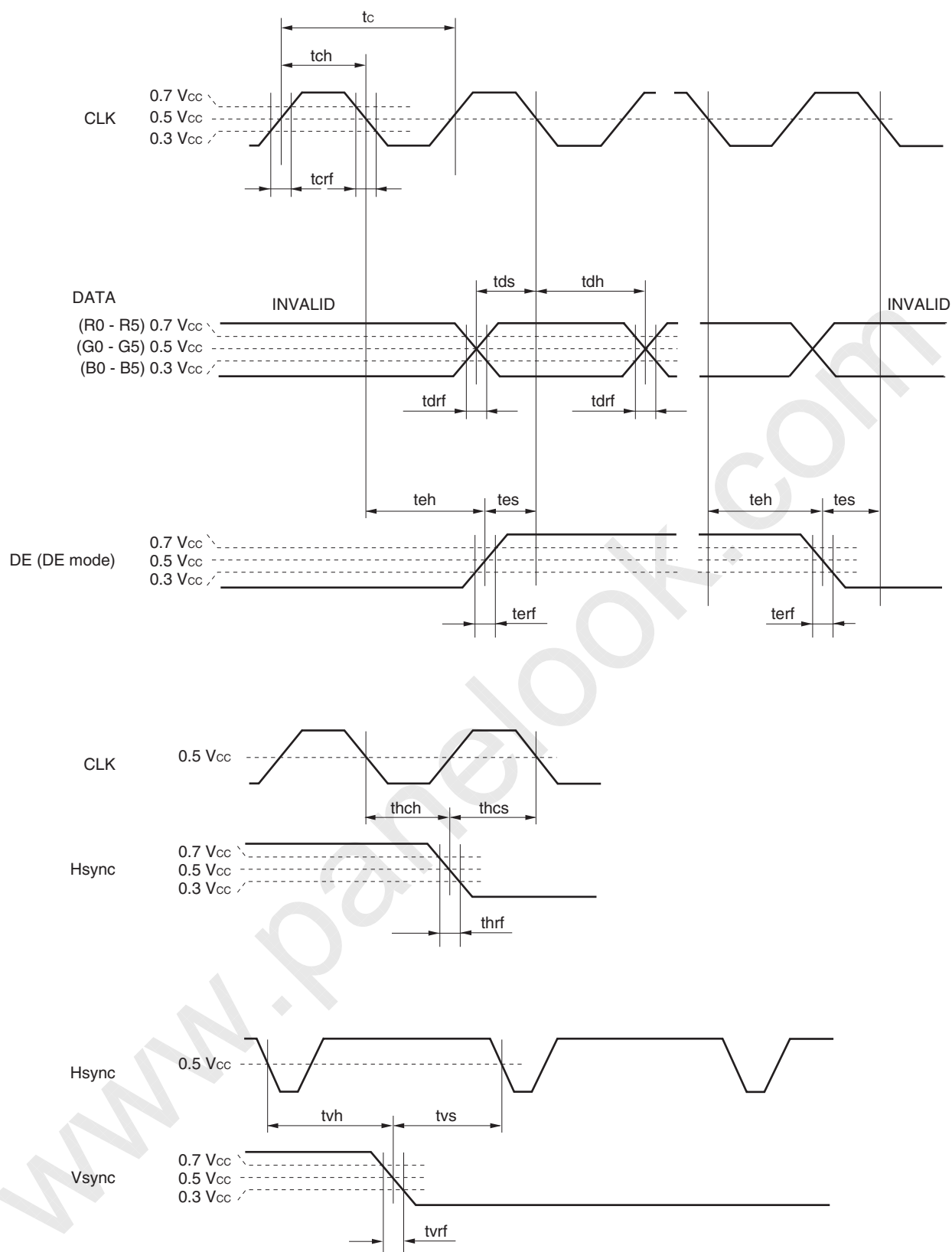
(3) Input signal timing chart

(a) Fixed mode
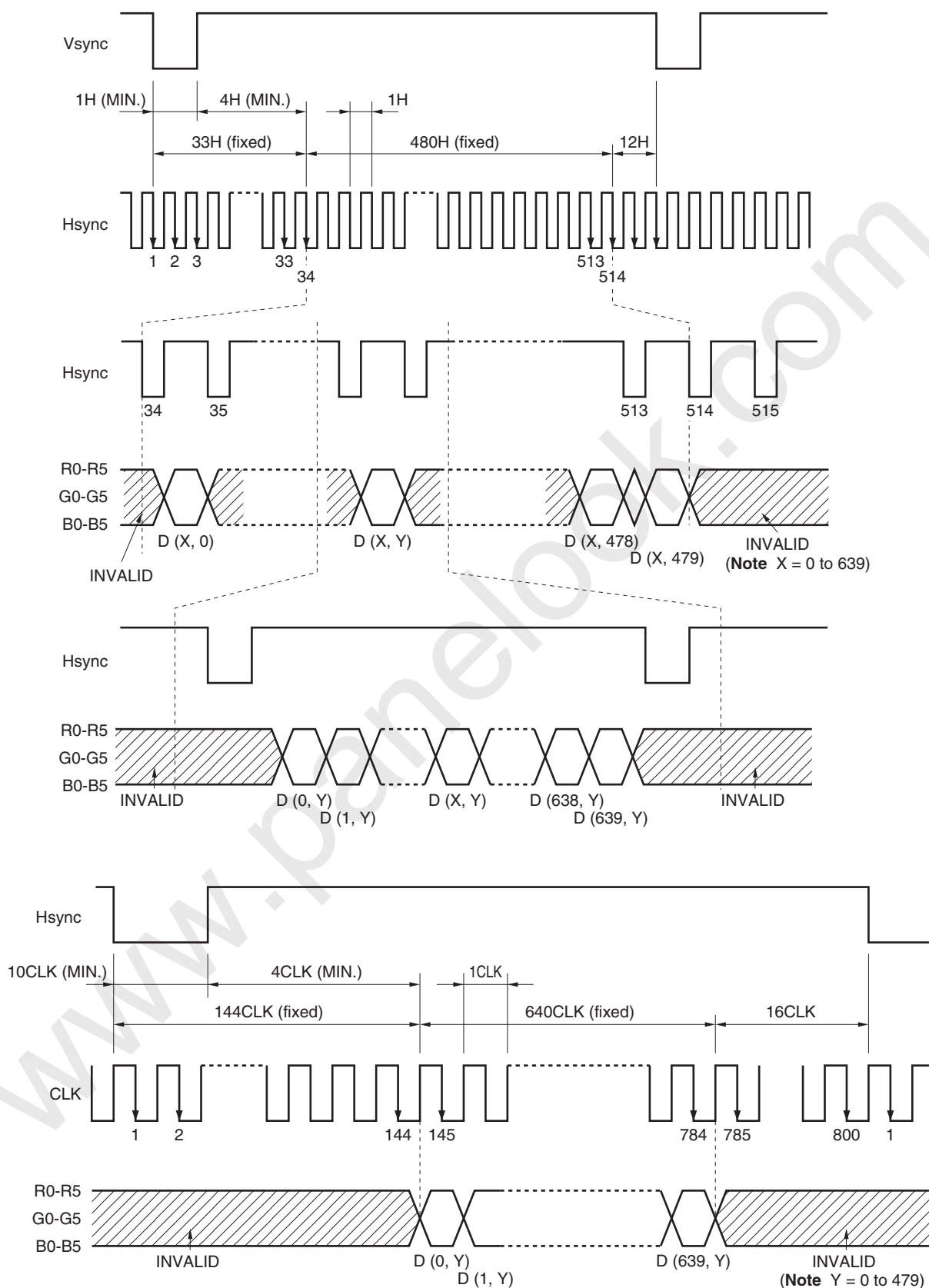
(b) DE mode
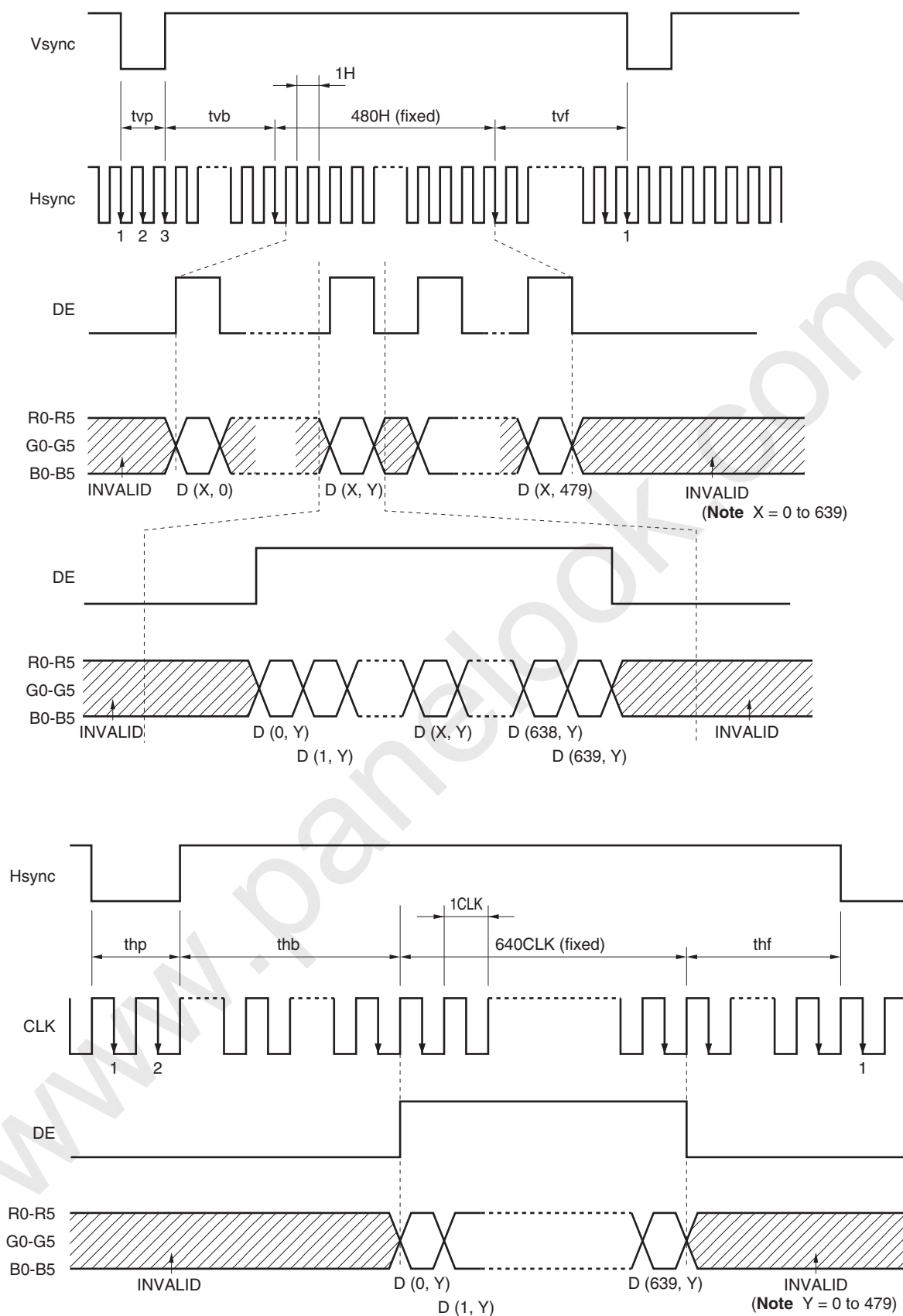
(4)　Display position of input data

Normal scan (DPS = "Low" or "Open")

D (0, 0)	D (1, 0)	---	D (X, 0)	---	D (638, 0)	D (639, 0)
D (0, 1)	D (1, 1)	---	D (X, 1)	---	D (638, 1)	D (639, 1)
D (0, Y)	D (1, Y)	---	D (X, Y)	---	D (638, Y)	D (639, Y)
D (0, 478)	D (1, 478)	---	D (X, 478)	---	D (638, 478)	D (639, 478)
D (0, 479)	D (1, 479)	---	D (X, 479)	---	D (638, 479)	D (639, 479)

Reverse scan (DPS = "High")

D (639, 479)	D (638, 479)	---	D (X, 479)	---	D (1, 479)	D (0, 479)
D (639, 478)	D (638, 478)	---	D (X, 478)	---	D (1, 478)	D (0, 478)
D (639, Y)	D (638, Y)	---	D (X, Y)	---	D (1, Y)	D (0, Y)
D (639, 1)	D (638, 1)	---	D (X, 1)	---	D (1, 1)	D (0, 1)
D (639, 0)	D (638, 0)	---	D (X, 0)	---	D (1, 0)	D (0, 0)

Remark: Below drawings show relations between the scan direction and the viewing direction.

(5)　Scanning directions

The following figures are seen from a front view.　Also, the arrow shows the direction of scan.
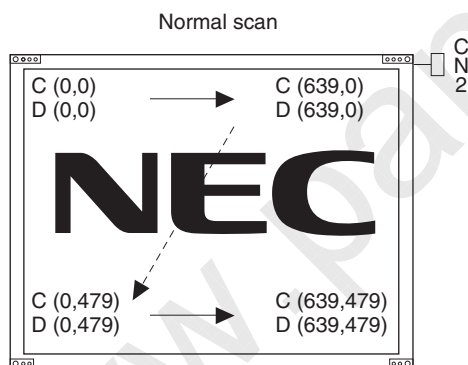
Figure 1. DPS: "Low" or "Open".
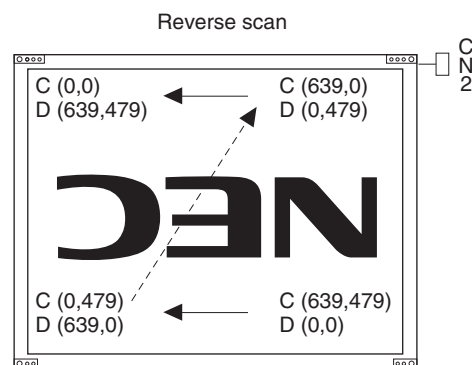
Figure 2. DSP: "High".

Remark: Meaning of C (X, Y) and D (X, Y)

C (X, Y):　The coordinates on the display domain

D (X, Y):　The data number for input signal (See (4) Display position of input data)

OPTICAL CHARACTERISTICS

$T_a = 25 \pm 5°C$, $V_{CC} = 3.3$ V $I_L = 5.0 \times 2$ mA, at normal scan

Parameters	Symbols	Conditions	MIN.	TYP.	MAX.	Unit	Remarks
Contrast ratio	CR	$\theta X = \pm0°$, $\theta Y = \pm0°$, at center	150	300	–	–	**Note 1**
Luminance	L VMAX	$\theta X = \pm0°$, $\theta Y = \pm0°$, at center	280	350	–	cd/m²	**Note 2**
Luminance uniformity	–	max. /min.	–	1.25	1.40	–	**Note 3**

Reference data

Parameters		Symbols	Conditions	MIN.	TYP.	MAX.	Unit	Remarks
Viewing angle range	Horizontal	$\theta X+$	CR > 10, $\theta Y = \pm0°$	60 –	70 (60)	– –	deg.	**Note 4**
		$\theta X-$	CR > 10, $\theta Y = \pm0°$	60 –	70 (60)	– –	deg.	
	Vertical	$\theta Y+$	CR > 10, $\theta X = \pm0°$	35 –	45 (50)	– –	deg.	
		$\theta Y-$	CR > 10, $\theta X = \pm0°$	45 –	55 (55)	– –	deg.	
Response time		ton	White to black	–	8	40	ms	**Note 5**
		toff	Black to white	–	44	85	ms	
Color gamut		C	At center. to NTSC	35	43	–	%	–

Notes 1. The contrast ratio is calculated by using the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance with all pixels in white}}{\text{Luminance with all pixels in black}}$$

The Luminance is measured in darkroom.

2. The luminance is measured after 20 minutes from the module works, with all pixels in white. Typical value is measured after luminance saturation.

Photodetector
(TOPCON BM-5A)

1°

LCD   50 cm
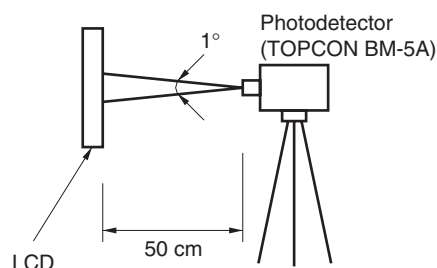
3. The luminance uniformity is calculated by using following formula.

$$\text{Luminance uniformity} = \frac{\text{Maximum luminance}}{\text{Minimum luminance}}$$

The luminance is measured at near the five points shown below.

Column　106　　　320　　　533

			Line
1		2	— 80
	3		— 240
4		5	— 400
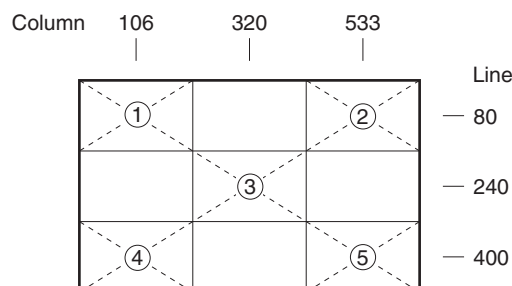
4. Definitions of viewing angle are as follows.
    The viewing angles are reference.

Normal

$\theta X-$　$\theta Y+$　12 o'clock

Left　$\theta Y-$　$\theta X+$　Upper

Down　Right
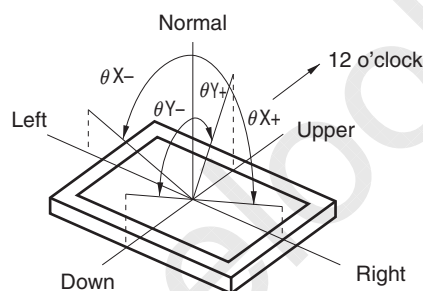
5. Definition of response time is as follows.
    Photodetector output signal is measured when the luminance changes "White" to "Black" . Response time (ton) is the time between 10% and 100% of the photodetector output amplitude. Response time (toff) is the time between 0% and 90% of the output amplitude.

Data　　On / Off

100 %　White

90 %

Luminance　Display color

10 %　Black
0 %　Time

ton　　toff

Data Sheet EN0536EJ1V0DS
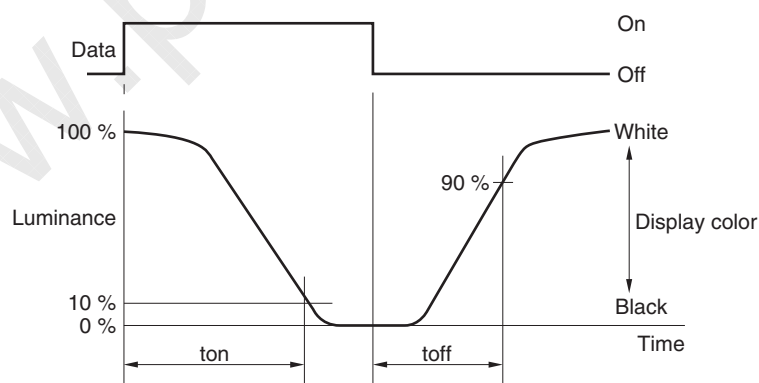
RELIABILITY TEST

Test items	Test conditions
High temperature/humidity (operation) **Note 1**	55 ± 2°C, 85% relative humidity 240 hours Display data is black.
High temperature operation	65 ± 2°C ··· 240 hours Display data is black.
Heat cycle (operation) **Note 1**	<1> 0°C ± 3°C ··· 1 hour 　　　65°C ± 3°C ··· 1 hour <2> 50 cycles,　4 hours/cycle <3> Display data is black.
Thermal shock (non-operation) **Note 1**	<1> –20°C ± 3°C ··· 30 minutes 　　　80°C ± 3°C ··· 30 minutes <2> 100 cycles <3> Temperature transition time within 5 minutes
Vibration (non-operation) **Notes 1, 2**	<1> 5 - 100 Hz, 19.6 m/s^2 　　　1 minute/cycle 　　　X, Y, Z direction <2> 120 times each direction
Mechanical shock (non-operation) **Notes 1, 2**	<1> 539 m/s^2, 11 ms 　　　X, Y, Z direction <2> 5 times each direction
ESD (operation) **Notes 1, 3**	150 pF, 150 Ω, ±10 kV 9 places on a panel 10 times each place at one-second intervals
Dust (operation) **Note 1**	15 kinds of dust (JIS Z 8901) Hourly 15 seconds stir, 8 times repeat

Notes **1.** Display function is checked under the same condition as LCD module out-going inspection.

　　　2. Physical damage.

　　　3. Discharge points "O" are shown in the figure.
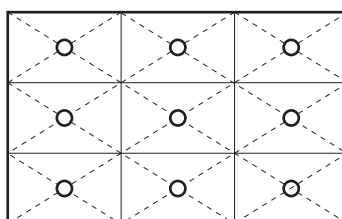
GENERAL CAUTIONS

The figures and statements are very important. Please be sure you understand their contents completely.

⚠	CAUTION	This mark indicates that you will get hurt and/or the module will be damaged if you make a mistake in operation.

⚡	This figure indicates that you will get an electric shock if you make a mistake in operation.

☞	This figure indicates that you will get hurt if you make a mistake in operation.

⚠ **CAUTION**

(1) Caution when removing the module

<1> Pick up the pouch only, when removing the module from a carrier box.

(2) Cautions for handling the module

<1> As the electrostatic discharges may break the LCD module, handle the LCD module with care against electrostatic discharges.

<2> ☞ As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.

<3> As the surface of polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.

<4> Do not pull the interface connectors in or out while the LCD module is operating.

<5> Put the module display side down on a flat horizontal plane.

<6> Handle connectors and cables with care.

<7> When the module is operating, do not lose CLK, Hsync, or Vsync signal. If any one of these signals is lost, the LCD panel would be damaged.

<8> The torque for mounting screw should never exceed 0.294 N·m (3 kgf·cm).

<9> Don't push or rub the surface of LCD module please. If you do, the scratches or the marks like rubbing marks may be left on the surface of the module.

(3) Cautions regarding atmosphere

<1> Dew-drop atmosphere must be avoided.

<2> Do not store and/or operate the LCD module in high-temperature and/or high-humidity atmosphere. Storage in an electro-conductive polymer packing pouch and in a relatively low-temperature atmosphere is recommended.

<3> This module uses cold cathod fluorescent lamps. The lifetime of lamps is shortened conspicuously at low temperatures.

<4> Do not operate the LCD module in high magnetic field.

(4) Cautions about the module characteristics

<1> Do not apply any fixed-pattern data signals to the LCD module at product aging. Applying a fixed pattern for a long time may cause image sticking.

<2> This module has retardation film, which may cause variation of the color hue at different viewing angles. The non-uniformity may appear on the screen during high-temperature operation.

<3> A light vertical stripe may be observed, depending on the display pattern. This is not a defect or a malfunction.
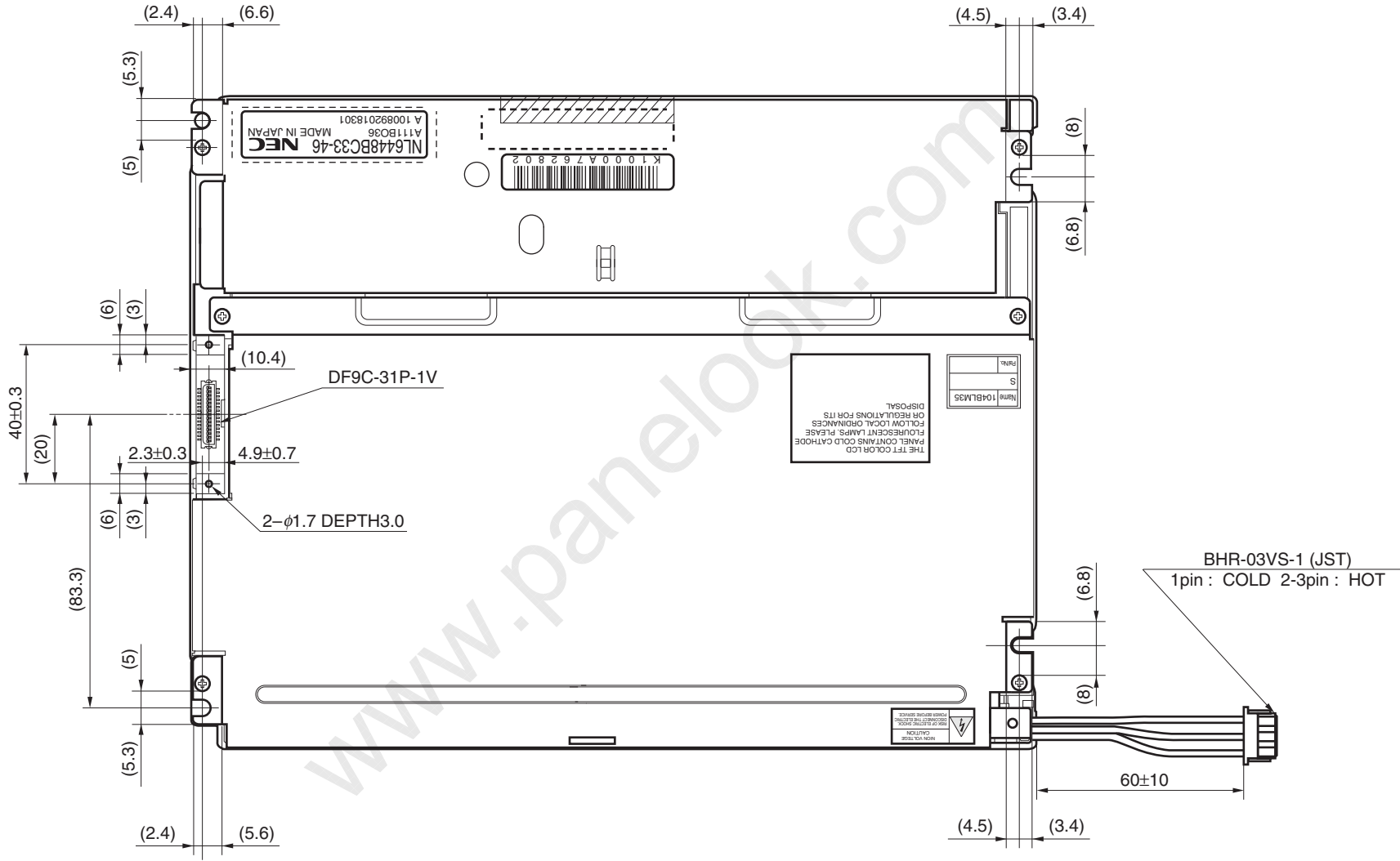
18   Data Sheet EN0536EJ1V0DS

(5) Other cautions

<1> Do not disassemble and/or reassemble the LCD module.

<2> Do not readjust variable resistors or switches, etc.

<3> When returning the module for repair, etc., please pack the module properly so as to avoid damages. We recommend using the original shipping packages.

<4> If a scan converter is used to convert the VGA signal to NTSC, it is recommended to use the framememory type, not the linememory.

The liquid crystal display has the following specific characteristics. There are not defects or malfunctions.

- The display condition of the LCD module may be affected by the ambient temperature.

- The LCD module uses cold cathode tube for backlighting. Optical characteristics, like luminance or uniformity, will change during time.

- Uneven brightness and/or small spots may be observed, depending on different display patterns.

NEC

OUTLINE DRAWING: Front View (Unit: mm)

NL6448BC33-46

11.5MAX.

11.5MAX.

243±0.5
235±0.3
(215.4) (Bezel opening)
(211.2) (Active area)
(4.8)
7.2±0.3
(9.3)

(2.8)   (4)   (29.4)   14.6±0.3   (12.9)   (2.9)   (3.9)
(5.7)
(5.1)
17±0.3

2–R1.75

(8.1)

(4.7)

(1.8)
Module center
(3.15)
Active area center

132.6±0.3 (Active area)
(158.4) (Bezel opening)
(161.8) (Bezel opening)

11.5MAX.

2.75±0.2
5.25±0.3

(7.2)
(3.7)
(6.3)
(7.2)

185.1±0.5
166.6±0.3

4–CPIMS × M2 × L4
2– φ 3.5

(4.7)

(5.1)
(5.7)
(2.8)   (4)

2.75±0.2
5.25±0.3

2.75±0.2
5.25±0.3

2.75±0.2
5.25±0.3
10.5TYP

10.5TYP

(8.1)

(2.9)   (3.9)

10.5TYP

NEC

OUTLINE DRAWING: Rear View (Unit: mm)

NL6448BC33-46

DF9C-31P-1V

2−φ1.7 DEPTH3.0

BHR-03VS-1 (JST)
1pin : COLD 2-3pin : HOT

[MEMO]

[MEMO]

DE0202