| SPEC. NO.	TQ3C-8EAF0-E1DDG02-00
DATE	July 2, 2004

S P E C

F O R : _____

TYPE : TCT104VG2AA-A00

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Issued
Date: JUL.06.2004
KYOCERA
Hayato LCD Division
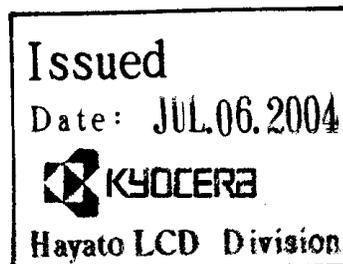
KYOCERA CORPORATION
KAGOSHIMA HAYATO PLANT
LCD DIVISION

This specification is subject to change without notice.
Consult Kyocera before ordering.

Original	Designed by : Engineering Dept.			Confirmed by : QA Dept.	
Issue Data	Prepared	Checked	Approved	Checked	Approved
July 2, 2004	T. Onodera	M. Fujitani	H. OHNO	y. yoshida	S. Hayashi

Caution

1. This Kyocera LCD module has been specifically designed for use only in electronic devices in the areas of audio control, office automation, industrial control, home appliances, etc.   The modules should not be used in applications where module failure could result in physical harm or loss of life, and Kyocera expressly disclaims any and all liability relating in any way to the use of the module in such applications.

2. Customer agrees to indemnify, defend and hold Kyocera harmless from and against any and all actions, claims, losses, damages, liabilities, awards, costs, and expenses, including legal fees, resulting from or arising out of Customer's use, or sale for use, of Kyocera modules in applications.

3. Kyocera shall have the right, which Customer hereby acknowledges, to immediately scrap or destroy tooling for Kyocera modules for which no Purchase Orders have been received from the Customer in a two-year period.

Revision　Record

Date	Designed by: Engineering Dept.			Confirmed by: QA Dept.	
	Prepared	Checked	Approved	Checked	Approved

Rev. No.	Date	Page	Descriptions

| | Designed by: Engineering Dept. | | | Confirmed by: QA Dept. | |

1．Application

This data sheet defines the specification for a (640×R.G.B)×480 dot, amorphous silicon TFT transmissive color dot matrix type Liquid Crystal Display with CFL backlight.

2．Construction and Outline
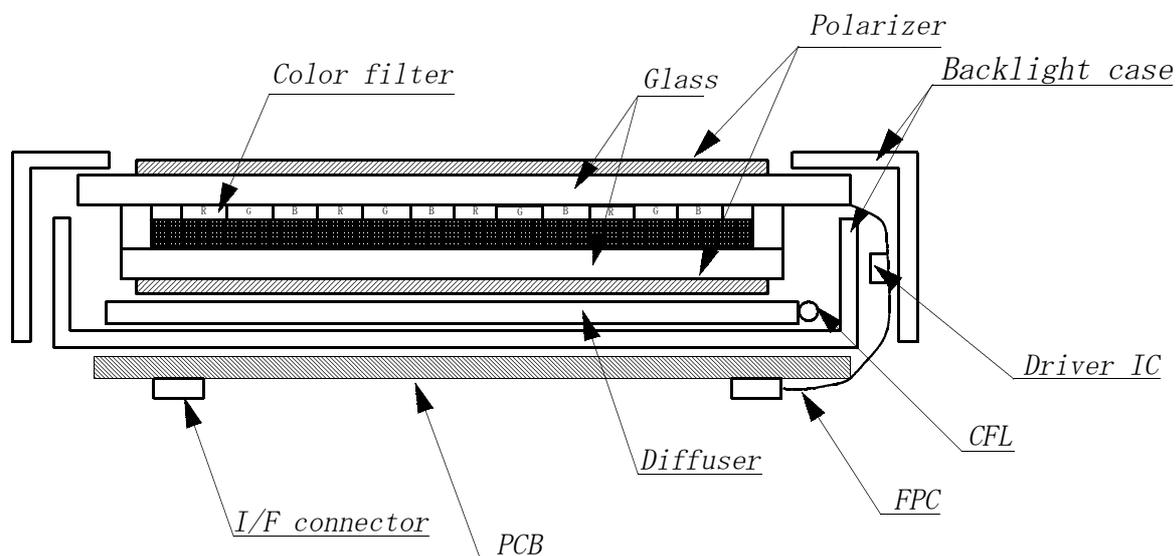
(640×R.G.B)×480 dots, TAB type LCD with CFL backlight.

Backlight system   : Side-edge type CFL (2 tubes).

Inverter   : Option.
                      Recommended Inverter : (TBD)

Polarizer   : Anti-glare treatment.

Additional circuits : Timing controller, Power supply (3.3V/5.0V input)

This drawing is showing conception only.

3．Mechanical Specifications

ITEM	SPECIFICATION	UNIT
Outline dimensions	243.0 (W) × 181.6 (H) × 12.2 (D)	mm
Viewing area	211.2 (W) × 158.4 (H)	mm
Dot number	(640×R.G.B) (W) × 480 (H)	Dots
Dot pitch	0.11 (W) × 0.33 (H)	mm
Display mode *1	Normally white	—
Mass	540	g

*1 Due to the characteristics of the LCD material, the color vary with environmental temperature.

4．Absolute Maximum Ratings

4-1. Electrical absolute maximum ratings

ITEM	SYMBOL	MIN	MAX	UNIT
Power input voltage	VDD	−0.3	6.5	V
Input signal voltage　*1	Vin	0	6.5	V
Lamp Voltage	VL	0	1500	Vrms
Lamp Current	IL	0	10.0	mArms

*1　Input signals　:　CK, R0～R5, G0～G5, B0～B5, Hsync, Vsync, ENAB, SC

4-2. Environmental absolute maximum ratings

ITEM	SYMBOL	MIN	MAX	UNIT
Operating temperature　*1	Top	0	60	℃
Storage temperature　*2	Tsto	−20	70	℃
Operating humidity　*3	Hop	10	*4	%RH
Storage humidity　*3	Hsto	10	*4	%RH
Vibration	─	*5	*5	─
Shock	─	*6	*6	─

*1 Operating temperature means a temperature which operation shall be guaranteed.
Since display performance is evaluated at 25℃,   another temperature range should be confirmed.

*2 Temp. = −20 ℃ < 48 h , Temp = 70 ℃ < 168 h
Store LCD panel at normal temperature/humidity.
Keep it free from vibration and shock.
LCD panel that is kept at low or high temperature for a long time can be defective due to
the other conditions, even if the temperature satisfies standard.
(Please refers to 13. Precautions for use as detail).

*3　Non-condensation.

*4　Temp. ≦ 40℃, 90%RH Max.
Temp. ＞ 40℃, Absolute Humidity shall be less than 90% RH at 40℃.

	ITEM	CONDITIONS
*5	VIBRATION (NON-OPERATION)	Vibration level:9.8m/s^2 (1.0G) Waveform:sinusoidal Frequency range:5 to 500Hz Frequency sweep rate:0.5 octave/min Duration:one sweep from 5 to 500Hz in each of three mutually perpendicular axis (total 3 hours)
*6	SHOCK (NON-OPERATION)	Shock level:1470m/s^2 (150G) Waveform:half sinusoidal, 2ms Number of shocks:one shock input in each direction of three mutually perpendicular axis for a total of six shock inputs

5. Electrical Characteristics

ITEM		SYMBOL	MIN	TYP	MAX	UNIT
Power input voltage *1	VDD=3.3V	VDD	3.0	3.3	3.6	V
	VDD=5.0V	VDD	4.75	5.00	5.25	V
Current consumption *2	VDD=3.3V	IDD	–	300	450	mA
	VDD=5.0V	IDD	–	200	300	mA
Permissive input ripple voltage (VDD=3.3/5.0v)		VRP	—	—	100	mVp-p
Input signal voltage (Low) *3		VIL	0	—	0.8	V
Input signal voltage (High) *3		VIH	2.0	—	5.25	V

*1 VDD-turn-on conditions
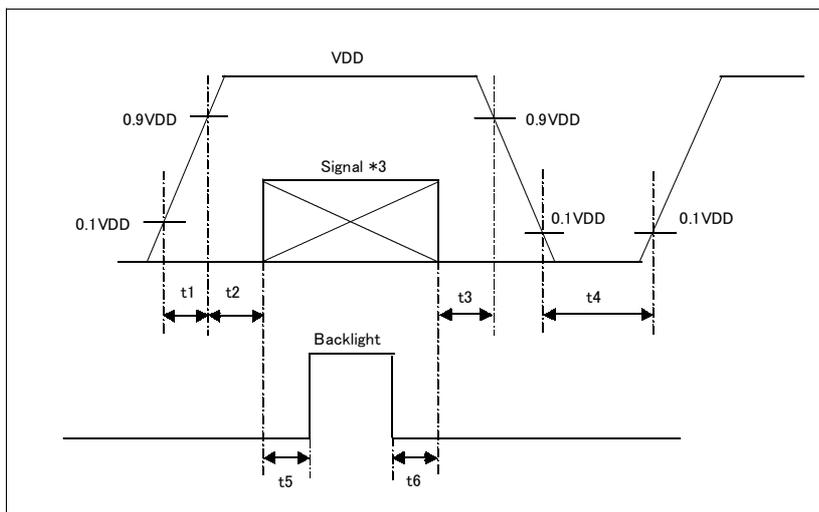
$t1 \leqq 10ms$ $400ms \leqq t4$

$0 < t2 \leqq 50ms$ $200ms \leqq t5$

$0 < t3 \leqq 50ms$ $0 \leqq t6$

RGB DATA, DCLK, HD, VD, DENA

VDD-dip conditions:
    (a)3.3V powered
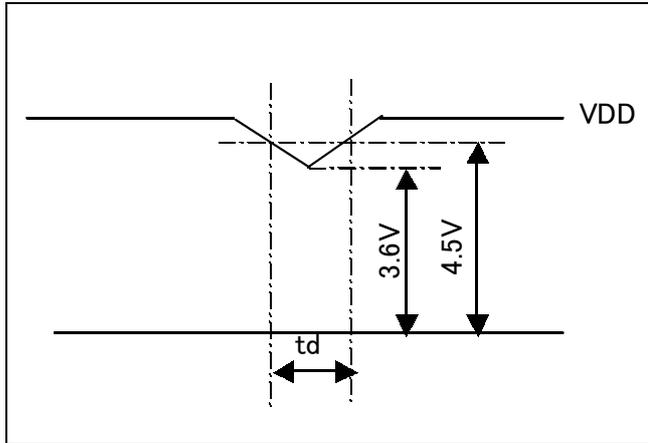   1) When $2.4V \leqq VDD < 3.0V$, $td \leqq 10ms$
        2) When $VDD < 2.4V$

VDD-dip conditions should also follow the power and signals sequence.
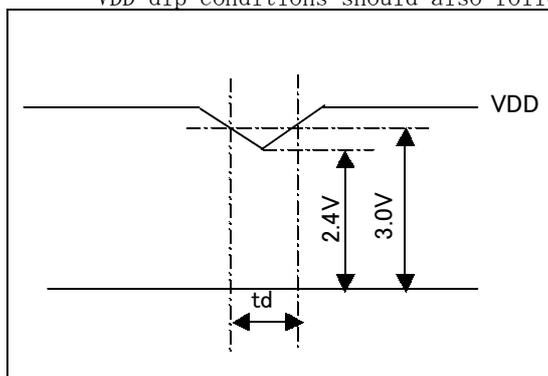
(b) 5.0V powered
　　　　1) When 3.6V ≦ VDD < 4.5V, td ≦ 10ms
　　　　2) When VDD < 3.6V

　　　VDD-dip condition should also follow the power and signals sequence.

*2　Power consumption
　　　64-gray-bar-pattern
　　　480 line mode
　　　VDD=+3.3V/5.0V, FH=31.5kHz, FV=60Hz, Fc=25MHz

*3　Input signals :　CK, R0〜R5, G0〜G5, B0〜B5, Hsync, Vsync, ENAB, SC

6. Optical characteristics

Measuring pot = ϕ6.0mm , Temp. = 25℃

ITEM		SYMBOL	CONDITION		MIN	TYP	MAX	UNIT
Response time	Rise	τr	$\theta=\phi=0°$		—	10	—	ms
	Down	τd	$\theta=\phi=0°$		—	30	—	ms
Viewing angle range *1	θ		CR≧10	+y	—	45	—	deg.
				−y	—	55	—	
	ϕ			−x	—	60	—	
				+x	—	60	—	
Contrast ratio		CR	$\theta=\phi=0°$		350	500	—	—
Brightness		L	IL=6.0mA		300	380	—	cd/㎡
Chromaticity coordinate	Red	x	$\theta=\phi=0°$		0.555	0.585	0.615	—
		y			0.304	0.334	0.364	
	Green	x	$\theta=\phi=0°$		0.300	0.330	0.360	
		y			0.506	0.536	0.566	
	Blue	x	$\theta=\phi=0°$		0.138	0.168	0.198	
		y			0.143	0.173	0.203	
	White	x	$\theta=\phi=0°$		0.300	0.330	0.360	
		y			0.312	0.342	0.372	

These item are measured using CS1000(MINOLTA) for color coordinate, EZContrast (ELDIM) for viewing angle and CS1000 or BM-5A(TOPCON) for others under the dark room condition (no ambient light) after more than 30 minutes from turning on the lamp unless noted.
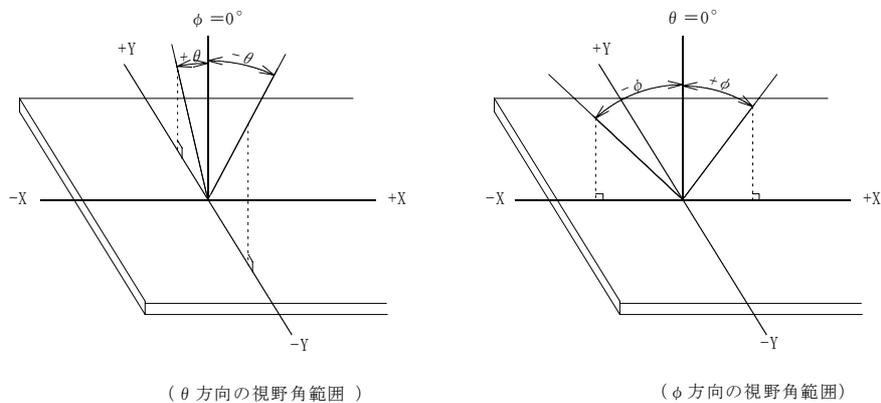
Condtition : IL = 6.0mArms, Inverter frquency : 55 kHz
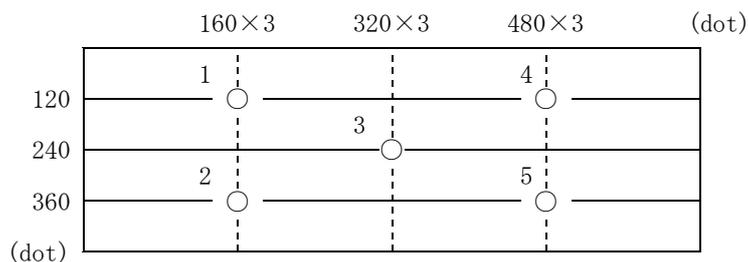
*1 SC : GND or Open

6-1. Definition pf contrast Ratio

$$C R \text{ (Contrast ratio)} = \frac{\text{Brightness at all pixels "White"}}{\text{Brightness at all pixels "Black"}}$$

6-2. Definition of viewing angle

（θ方向の視野角範囲 ）　　　　　　　　　（φ方向の視野角範囲）

6-3. Measuring points.

1. Rating is defined as the average brightness inside the viewing area.
2. 30 minutes after CFL lamp is turned on . (Ambient Temp. = 25℃)
3. The inverter should meet the eccentric conditions; -Sine, symmetric waveform without spike in positive and negative.

7. Interface signals

CN1(Interface signals)
```
LCD side connector                 : DF9B-31P-1V  (HIROSE)
Recommended matching connector     : DF9-31S-1V   (HIROSE)
```

7-1. LCD

PIN NO.	SYMBOL	DESCRIPTION	I/O	Note
1	GND	GND	–	
2	CK	Clock signal for sampling each data signal	I	
3	Hsync	Horizontal synchronous signal (negative)	I	
4	Vsync	Vertical synchronous signal (negative)	I	
5	GND	GND	–	
6	R0	Red data signal (LSB)	I	
7	R1	Red data signal	I	
8	R2	Red data signal	I	
9	R3	Red data signal	I	
10	R4	Red data signal	I	
11	R5	Red data signal (MSB)	I	
12	GND	GND	–	
13	G0	Green data signal (LSB)	I	
14	G1	Green data signal	I	
15	G2	Green data signal	I	
16	G3	Green data signal	I	
17	G4	Green data signal	I	
18	G5	Green data signal (MSB)	I	
19	GND	GND	–	
20	B0	Blue data signal (LSB)	I	
21	B1	Blue data signal	I	
22	B2	Blue data signal	I	
23	B3	Blue data signal	I	
24	B4	Blue data signal	I	
25	B5	Blue data signal (MSB)	I	
26	GND	GND	–	
27	ENAB	Signal to settle the horizontal display position (positive)	I	
28	VDD	3.3V/5.0V power supply	–	
29	VDD	3.3V/5.0V power supply	–	
30	TEST	This pin should be open. Test signal output for only internal test use.	NO CONNECT	*1
31	SC	Scan direction control (GND or Open:Normal, High:Reverse)		*2

```
*  The shielding case is connected with GND.
*1 Do not input any signal at Pin No. 30 (Open state).
   It might happen LCD has a trouble.
*2 Scanning direction
     SC: GND or Open                        SC: High
```
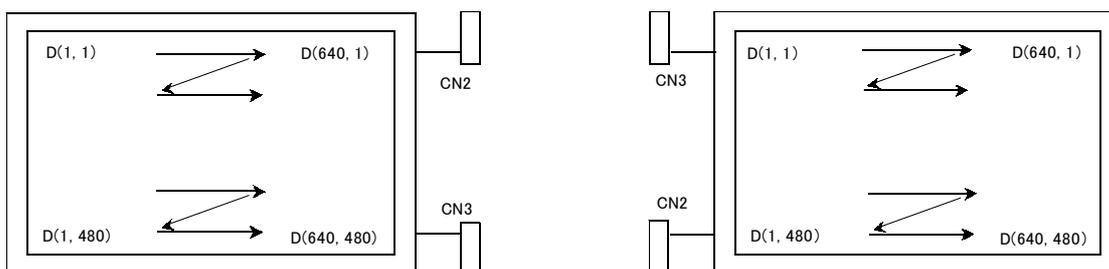


```
CN2,3 (Backlight)
LCD side connector                 : BHR-02(8.0)VS-1N (JST)
Recommended matching connector     : SM02-(8.0)B-BHS  (JST)
```
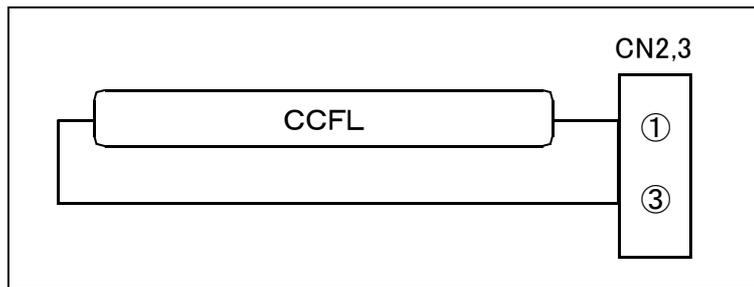
7-2. C F L

PIN NO.	SYMBOL	DESCRIPTION
1	HOT	Inverter output high voltage side
3	COLD	Inverter output low voltage side

```
* Please be careful NOT to connect inversely an inverter-output high voltage side to the CFL
  low voltage side. It may result in damage or electric shock.
```

8. Block diagram
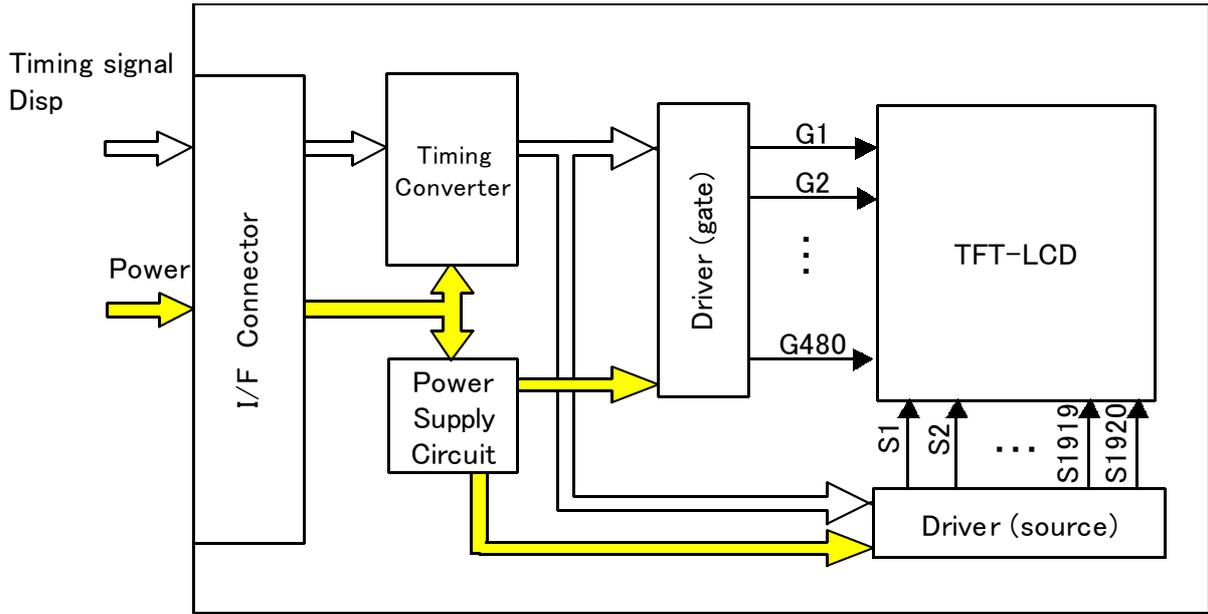
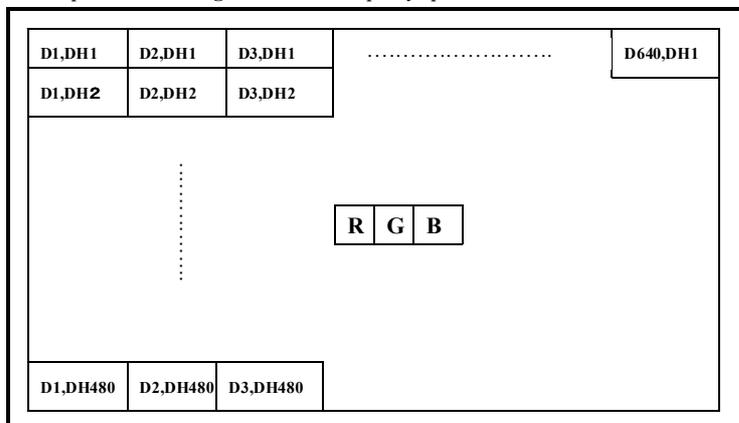Backlight

9. Timing characteristics of input signals

9-1. Timing characteristics

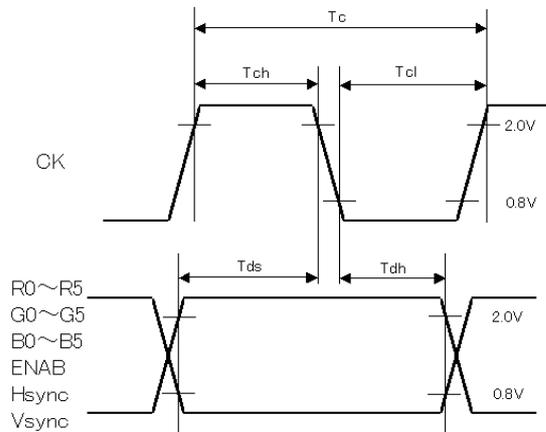| ITEM		SYMBOL	MIN	TYP	MAX	UNIT
Clock CK *2, *5	Frequency *1	Fc	—	25	29	MHz
	Period	Tc	34.5	40	–	ns
	Low width	Tcl	12	–	–	ns
	High width	Tch	12	–	–	ns
DATA *2 (R, G, B, ENAB Hsync, Vsync)	Set up time	Tds	5	—	—	ns
	Hold time	Tdh	5	—	—	ns
Enable signal ENAB *4	Horizontal active time	THd	640	640	640	Tc
	Horizontal front porch	THfp	10	16	–	Tc
	Horizontal back porch	THbp	2	138	–	Tc
	Vertical active time	TVd	480	480	480	TH
	Vertical front porch	TVfp	1	13	–	TH
	Vertical back porch	TVbp	2	33	–	TH
Horizontal sync. signal Hsync *3, *5	Frequency	FH	27.0	31.5	38.0	kHz
	Period	TH	26.3	31.7	37.0	μs
	Low width	THp	5	96	–	Tc
Vertcal sync. signal Vsync *3	Frequency	FV	55	60	70	Hz
	Period	TV	14.3	16.7	18.2	ms
	Low width	TVp	3	–	–	TH

[Note]
*1 In case of low frequency, the deterioration of the display quality, flicker etc., may occur.
*2 DATA is latched at fall edge of CK in this specification.
*3 Polarities of Hsync and Vsync are negative in this specification.
*4 ENAB should always be positive polarity as shoen in the timing specification.
*5 CK should appear during all invalid period, and Hsync should be appear during invalid
    period of frame cycle.

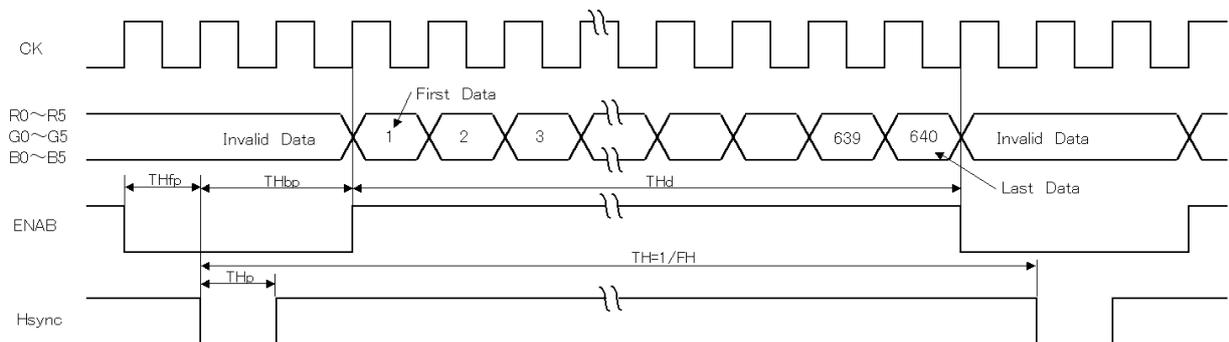## 9-2. Input data signal and display position on the screen.

D1,DH1	D2,DH1	D3,DH1	………………………	D640,DH1
D1,DH2	D2,DH2	D3,DH2		

R G B

| D1,DH480 | D2,DH480 | D3,DH480 |

9-3. Input timing characteristics

a. Pixel timing chart

b. Horizontal timing chart

c. Vertical timing chart
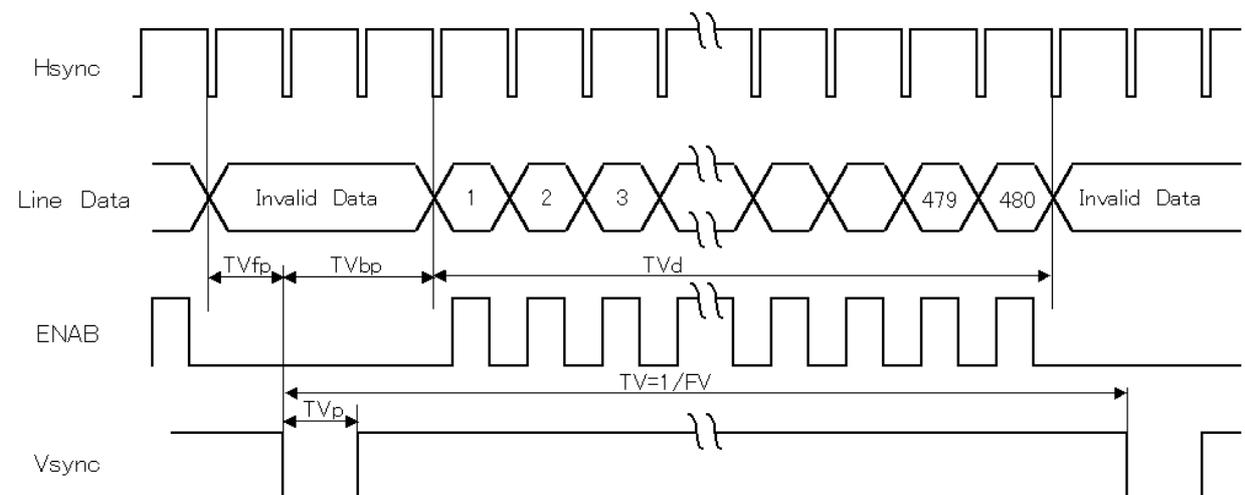
１０．Backlight Characteristics

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Starting discharge voltage *1	VS	—	—	1170	Vrms	0 ℃
		—	—	930	Vrms	25 ℃
Discharge tube current *2	IL	3.0	6.0	7.0	mArms	
Discharge tube voltage	VL	—	480	—	Vrms	
Operating life (IL=6.0mArms.) *3	T	50000	—	—	h	
Operating frequency *4	F	40	—	80	KHz	

*1 The Non-load output voltage (VS) of the inverter should be designed to have some margin,
   because VS may increase due to the leak current which may be caused by wiring of CFL cables.
   (Reference value : 1521 Vrms Min.)

*2 We recommend that you should set the discharging tube current at lower than typical value
   so as to prevent the heat accumulation of CFL tube from deteriorating a performance of the LCD.

*3 End of life is defined as when the illuminance or quantity of light has decreased to 50% of the
    initial value. Illuminance of light will drastically decrease when LCD is operated at lower
    temperature for long hours.

*4 The driving frequency of the CFL may interfere with the horizontal synch signal ,leaving
    interference stripes on the display. So please evaluate LCD panels beforehand.
    To avoid interference stripes, we recommend to separate as far as possible the CFL frequency
    from the horizontal synchronous signal and its high harmonic frequency.

*   There may be cases where interface noise on LCD PCB, generated by high-voltage products such as
    inverters, may leave stripes on the display. Please be careful when designing a mold to take
    into consideration that the inverter shall be located as far as possible from PCB. Shield
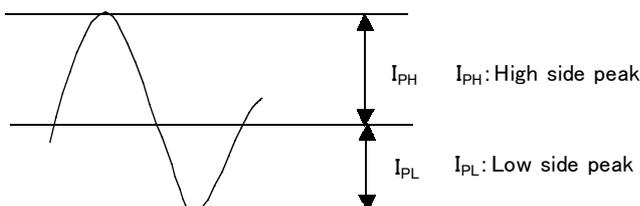   protection may be effective.

* CFL arrangement figure

* Lamp Current measurement method(The current meter is inserted in low voltage line.)
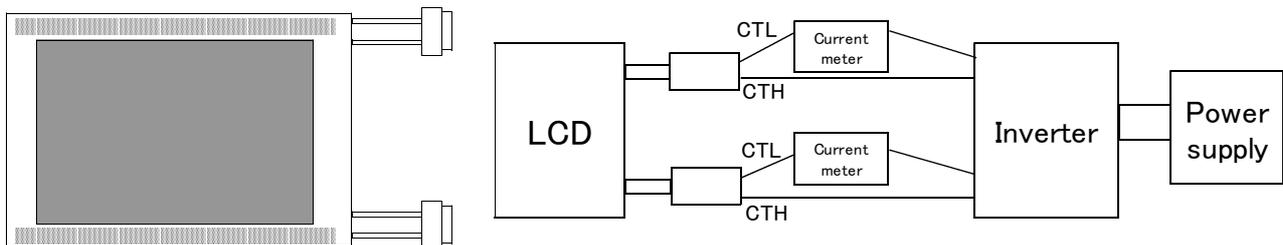
* Please use the inverter which has symmetrical current wave form as follows,
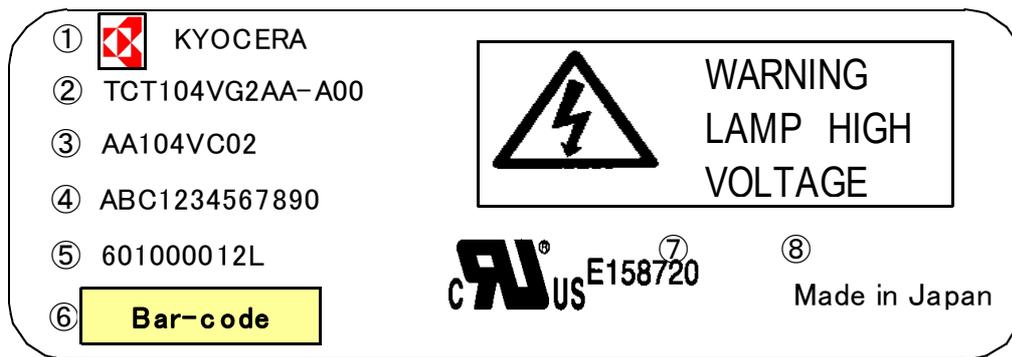   The degree of unbalance : less than 10%
    The ration of wave height : less than$\sqrt{2}$ ±10%

I_{PH}:High side peak

I_{PL}:Low side peak

The degree of unbalance= $|I_{PH}-I_{PL}|$ /Irms×100(%)

The ratio of wave height=I_{PH}(or I_{PL})/Irms

１１．Lot number identification

Products number label is constructed as below.

```
┌─────────────────────────────────────────────────────────────┐
│  ① [KYOCERA logo] KYOCERA    ┌──────────────────────────┐    │
│  ② TCT104VG2AA-A00           │ [⚡ warning]  WARNING     │    │
│  ③ AA104VC02                 │              LAMP  HIGH  │    │
│  ④ ABC1234567890             │              VOLTAGE     │    │
│  ⑤ 601000012L                └──────────────────────────┘    │
│                         c[UL]US  E158720    ⑧                │
│  ⑥ [Bar-code]                      ⑦      Made in Japan      │
└─────────────────────────────────────────────────────────────┘
```
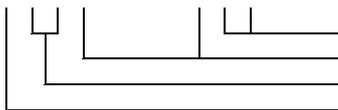
①Brand Name, Symbol

②Products Name

③Version number

④Production key number (ID number for production control

⑤Data code (Serial number, Factory sign)

```
□ □ □ □ □ □ □ □ □ □
1 2 3 4 5 6 7 8 9 10
```

Kyocera lot number
Serial number on every production week (00001～99999)
Production week number (1～53)
Production year number (Last 1 digit of AD year number)

Data code is constructed by 9 digital as below.

1st digit	:	Production year number (Last 1 digit of AD year number)
2nd～3rd digit	:	Production week number in a year
		(A year is divided to 53 weeks from Monday to Saturday)
4th～8th digit	:	Serial number on every production weeks. (00001～99999)
		These are numbered in order according to production name.
9th digit	:	Kyocera lot number

⑥Bar-code (Data code)
Bar-code line for computer reading data code mentioned as above.

⑦UL file No.
E158720

⑧Production country
Made in Japan

１２．Warranty

12-1. Incoming inspection
Please inspect the LCD within one month after your receipt.

12-2. Production Warranty

Kyocera warrants its LCDs for a period of 12 months after receipt by the purchaser, and within the limits specified. Kyocera shall, by mutual agreement, replace or rework defective LCDs that are shown to be Kyocera's responsibility.

１３．Precaution for use

13-1. Installation of the LCD

1. LCD hole(right side) are not connected with GND, but the LCD is structured to have GND connection available to protect against noise. We recommend to connect customer's frame GND to LCD frame in order to stabilize the display performance.
2. Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted.
   Approximately 1.0mm of the clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.
3. When some parts, such as, FPC cable and ferrite plate, are installed underneath the LCD module, still sufficient clearance is required, such as 0.5mm. This clearance is, especially, to be reconsidered when the additional parts are implemented for EMI countermeasure.
4. Keep sufficient clearance between LCD module and the other parts, such as inverter and speaker so as not to interface the LCD module. Approximately 1.0mm of the clearance in the design is recommended.
5. The LCD shall be installed so that there is no pressure on the LSI chips.
6. The LCD shall be installed flat, without twisting or bending.
7. The display window size should be the same as the effective viewing area.
8. In case you use outside frame of effective viewing area as outward appearance of your product, unevenness of its outward appearance is out of guarantee.
9. A transparent protection sheet is attached to the polarizer. Please remove the protection film slowly before use, paying attention to static electricity.
10. Please do not push or scratch LCD panel surface with anything hard. And do not soil LCD panel surface
    by touching with bare hands. (Polarizer film, surface of LCD panel is easy to be flawed.)
11. Be sure to connect the cables and the connectors correctly.
12. Please do not touch metal frame with bare hands and soiled groves. A color change of the metal frames can happen during a long preservation of soiled LCD module.
13. Please handle metal frame carefully to avoid getting hurt because edge of metal frame is very sharp.

13-2. Static electricity

1. Since CMOS ICs are mounted directly onto the LCD glass, protection from static electricity is required. Operator should wear ground straps.

13-3. LCD operation

1. The LCD shall be operated within the limits specified. Operation at values outside of these limits may shorten life, and/or harm display images.
2. Operation of the LCD at temperature below the limit specified may cause image degradation and/or bubbles. It may also change the characteristics of the liquid crystal.
   This phenomenon may not recover. The LCD shall be operated within the temperature limits specified.
3. Please be sure to turn off the power supply before connecting and disconnecting signal input cable.
4. Please do not change variable resistance setting in LCD module. They are adjusted to the most suitable value. If they are changed, it might happen LCD dose not satisfy the characteristics specification.
5. LCD backlight takes longer time to become stable of radiation characteristics in low temperature than in room temperature.
6. The interface signal speed is very high Please pay attention to transmission line design and other high speed signal precautions to satisfy signal specification.

13-4. Storage

1. The LCD shall be stored within normal temperature and humidity. Store in a dark area, and protected the LCD from direct sunlight or fluorescent light.
2. The LCD should be packaged to prevent damage.

13-5. Screen surface

1. DO NOT store in a high humidity environment for extended periods. Image degradation, bubbles, and/or peeling off of polarizer may result.
2. The front polarizer is easily scratched or damaged. Prevent touching it with any hard material, and from being pushed or rubbed.
3. A strong incident light into LCD panel might cause display characteristics changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight and strong UV rays.
4. The LCD screen may be cleaned with a soft cloth or cotton pad. Methanol, or Isopropyl Alcohol may be used, but insure that all solvent residue is removed.
5. Water may cause damage or discoloration of the polarizer. Clean any condensation or moisture from any source immediately.
6. Always keep the LCD free from condensation during testing. Condensation may permanently spot or stain the polarizers.
7. Do not pull the CFL lead wires and do not bend the root of the wires. Housing should be designed to protect CFL lead wires from external stress.
8. This Kyocera LCD module has been specifically designed for use in general electronic devices, but not for use in a special environment such as usage in an active gas. Hence, when the LCD is supposed to be used in a special environment, evaluate the LCD thoroughly beforehand and do not expose the LCD to chemicals such as an active gas.
9. Do not disassemble LCD module because it will result in damage.
10. Please do not use solid-base image pattern for long hours because a temporary afterimage may appear. We recommend to use screen saver etc. in cases where a solid-base image pattern must be used.
11. Packaging box and inner case for LCD are designed to protect the LCDs from damage or scratching during transportation. Please do not open except picking LCDs up from the box.
12. Please do not pile them more than 5 boxes. (They are not designed so.) And please do not turn over.
13. Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
14. Packaging box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)
15. When you waste damaged or unnecessary LCDs, it is recommended to crush LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.
16. If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.
17. Be sure to turn off the power supply when inserting or disconnecting the cable.
18. Inverter should be designed carefully so as not to keep working in case of detecting over current or open circuit on the lamp.

１４．Reliability data / Environmental test

| Test Item	Condition
High Temp. Humidity Operation	40℃, 90%RH, 240h
High Temp. Atmosphere	70℃, 240h
Low Temp. Atmosphere	-20℃, 240h
Thermal shock (Non-operation)	-20℃(1h) ～70℃(1h) 5 Cycle

＊ Judgement standard

　The judgement of the above tests should be made as follows

　　Pass　　：　Normal display image with no obvious non-uniformity and no line defect.
　　　　　　　　Partial transformation of the module parts should be ignore.

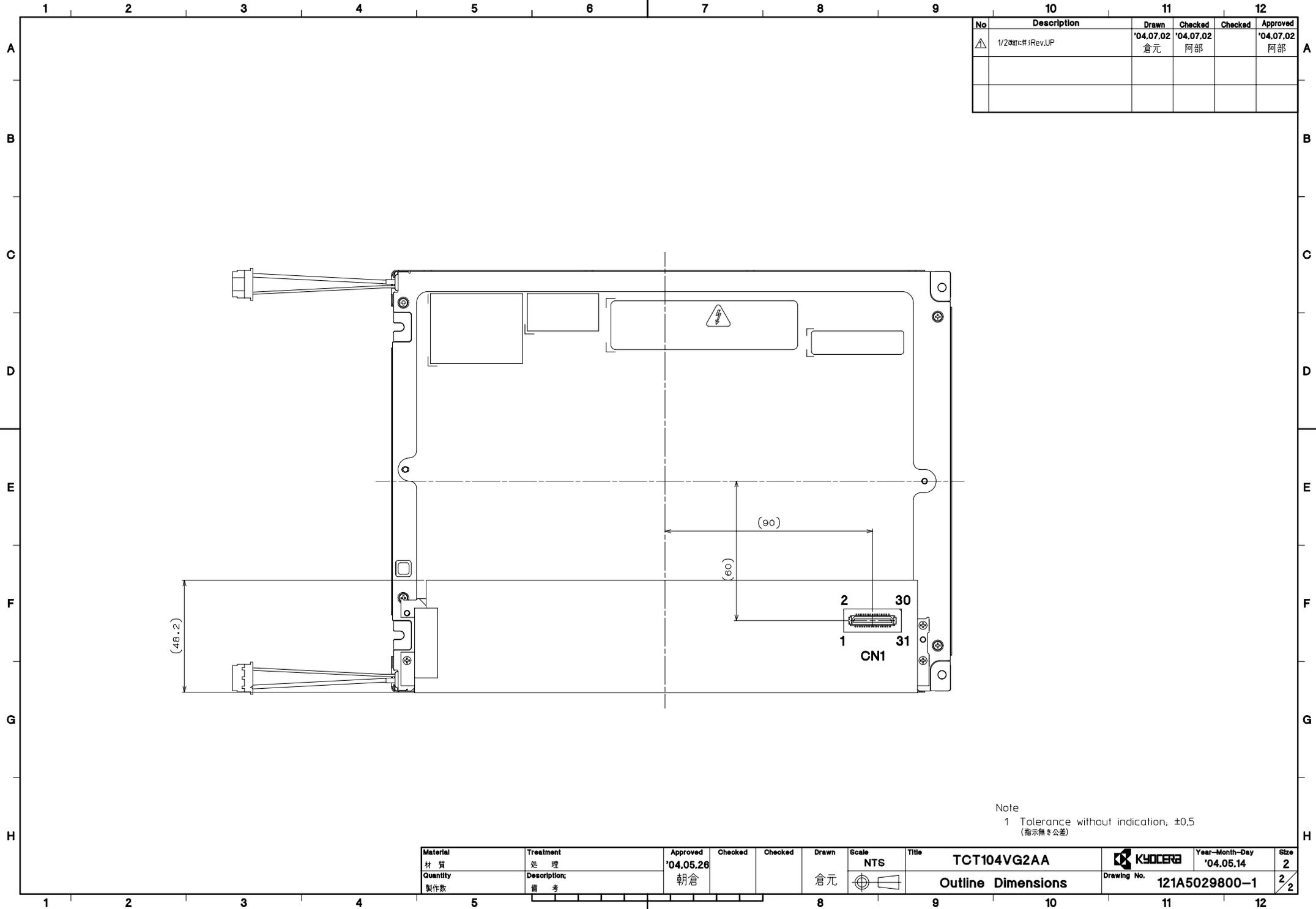　　Fail　　：　No display image, obvious non-uniformity, or line defect

＊ Each test item uses a test LCD only once. The tested LCD is not used in any other tests.

＊ The LCD is tested in circumstances in which there is no condensation.

＊ The tested LCD is inspected after 24 hours of storage at room temperature and room humidity
　after each test is finished.

＊ The reliability test is not an out-going inspection.

＊ The results of the reliability test are for your reference purpose only.
　The reliability test is conducted only to examine the LCD's capability.
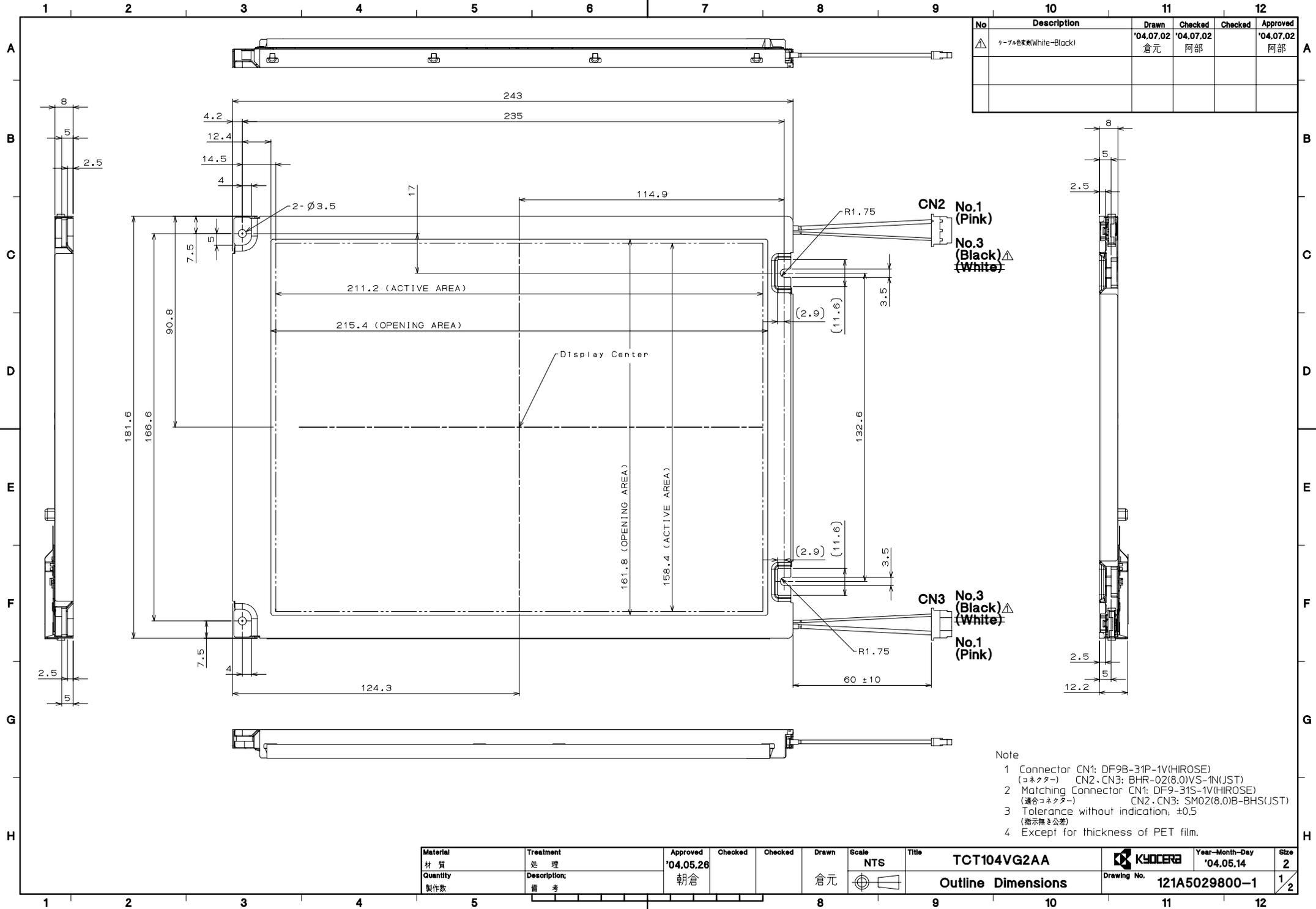
No	Description	Drawn	Checked	Checked	Approved
⚠	ケーブル色変更(White→Black)	'04.07.02 倉元	'04.07.02 阿部		'04.07.02 阿部

243

235

4.2

12.4

14.5

4

2-Ø3.5

114.9

17

R1.75

CN2 No.1 (Pink)

No.3 (Black)⚠ (White)

211.2 (ACTIVE AREA)

215.4 (OPENING AREA)

(2.9)

(11.6)

3.5

Display Center

132.6

7.5

5

90.8

166.6

181.6

161.8 (OPENING AREA)

158.4 (ACTIVE AREA)

(2.9)

(11.6)

3.5

CN3 No.3 (Black)⚠ (White)

No.1 (Pink)

R1.75

7.5

4

124.3

60 ±10

8

5

2.5

8

5

2.5

2.5

5

12.2

2.5

5

Note
1 Connector CN1: DF9B-31P-1V(HIROSE)
   (コネクター)   CN2、CN3: BHR-02(8.0)VS-1N(JST)
2 Matching Connector CN1: DF9-31S-1V(HIROSE)
   (適合コネクター)   CN2、CN3: SM02(8.0)B-BHS(JST)
3 Tolerance without indication; ±0.5
   (指示無き公差)
4 Except for thickness of PET film.

Material 材質	Treatment 処理	Approved '04.05.26 朝倉	Checked	Checked	Drawn 倉元	Scale NTS	Title	TCT104VG2AA	KYOCERA	Year-Month-Day '04.05.14	Size 2
Quantity 製作数	Description; 備考							Outline Dimensions	Drawing No.	121A5029800-1	1/2

(90)

(60)

(48.2)

2　30

1　31

CN1

Note
1　Tolerance without indication；±0.5
　（指示無き公差）

FOR: _____

KYOCERA INSPECTION STANDARD

TYPE : TCT104VG2AA-A00

Original	Designed by :Engineering Dept.			Confirmed by :QA Dept.	
Issue Data	Prepared	Checked	Approved	Checked	Approved
July 2, 2004	T. Onodera	M.Fujitani	H.OHNO	J.Yoshida	M.Hayashi

Revision　Record

Date	Designed by: Engineering Dept.			Confirmed by: QA Dept.	
	Prepared	Checked	Approved	Checked	Approved

Rev. No.	Date	Page	Descriptions

Note

	Note
General	1. Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and Kyocera. 2. Inspection Conditions Luminance : 500 Lux min. Inspection distance : 300 mm Temperature : 25 ± 5 ℃ Direction : directly above

Dot defect		Judgement standard	
Definition of Inspection item	Linear scratches	$0.01mm < W \leqq 0.05mm$ $L \leqq 10mm$	$N \leqq 4$
		$0.01mm \leqq W$ $10mm < L$	$N = 0$
		$0.05mm < W$	$N = 0$
	Circular scratches	$0.2mm < \phi \leqq 0.4mm$	$N \leqq 4$
		$0.4mm < \phi$	$N = 0$
	Black foreign particles, bubbles, White dot	$0.2mm < \phi \leqq 0.4mm$	$N \leqq 5$
		$0.4mm < \phi$	$N = 0$
	Fiber particles	$L \leqq 3mm$ $W \leqq 0.1mm$	$N \leqq 4$
		$3mm < L$ $W \leqq 0.1mm$	$N = 0$
		$0.1mm < W$	Apply the standard "black foreign particles"
Dot defect *1	Bright dot	$N \leqq 5$	
	Black dot	$N \leqq 5$	
	Total Amount of defect	$N \leqq 8$	
	Two dots join Bright dot	$\leqq 2PAIRS$	
	Black dot	$\leqq 2PAIRS$	
	three dots join	NG	
	Line defect	NG	

＊ W: Width , L: Length, φ: Diameter, N: Acceptable number

*1 Inspect dot defects by 5% ND filter.

＊ Definition of contiguous dots

R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B

⬜ Dot defect

🟨 Coutiguous dot