SPEC. NO.	TQ3C-8EAC0-E1FGWC125-00
DATE	April 15, 1999

S P E C

FOR : KICC

TYPE:KCS057QV1AJ-G20

C O N T E N T S

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
April 15, 1999	H.Tokumori	R.Jojo	N.Nishino	S.Hayaashi	Y.Yoshida

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

Rev. No.	Date	Page	Descriptions

1. Application

This data sheet defines the specification for a (320×3)×240 dot, STN color dot matrix type Liquid Crystal Display with CFL backlight.

2. Construction and Outline

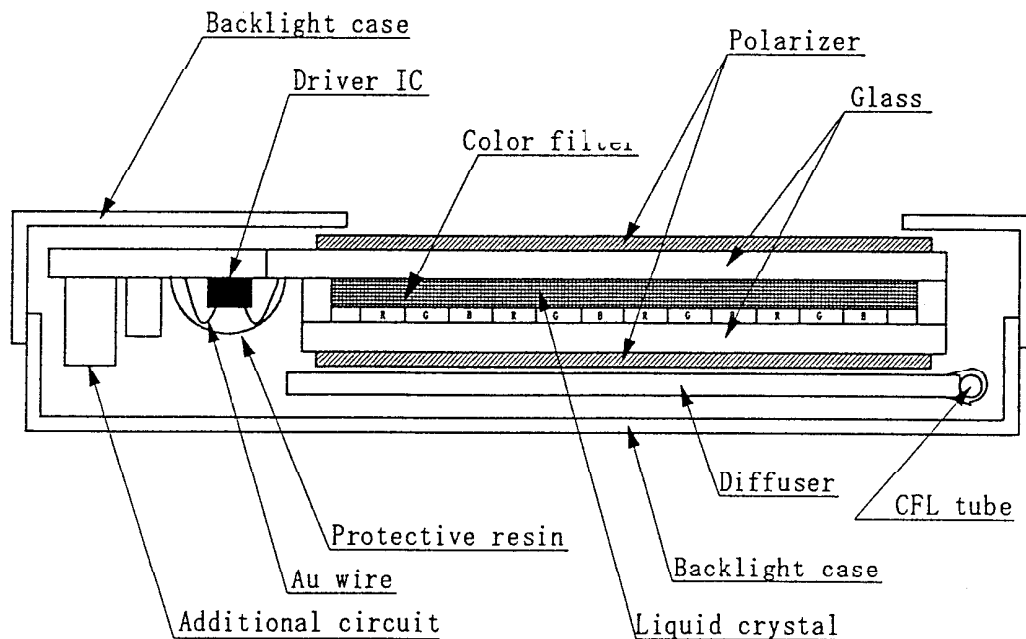(320×3)×240 dots, COB type LCD with CFL backlight.

Backlight system	: Side-edge type CFL (1 tube).
Inverter／	: Option.
	Recommended Inverter : PH-BLC08-K3 (HITACHI MEDIA ELECTRONICS) or equivalent.
Polarizer	: Glare treatment.
Additional circuit	: Bias voltage circuit, Randomizing circuit.

3. Mechanical Specifications

ITEM	SPECIFICATION	UNIT
Outline dimensions	154.6 (W) × 114.8 (H) × 8.5 (D)	mm
Effective viewing area	118.18 (W) × 89.38 (H)	mm
Dot number	(320×3) (W) × 240 (H)	Dots
Dot size	0.10 (W) × 0.34 (H)	mm
Dot pitch	0.12 (W) × 0.36 (H)	mm
Display color *1	White *2	—
Base color *1	Black *2	—
Weight	200	g

*1 Due to the characteristics of the LC material, the color vary with environmental temperature.
*2 Negative-type display

Display data "H" :R,G,B Dots ON : White
Display data "L" :R,G,B Dots OFF : Black

4. Absolute Maximum Ratings

4-1 Electrical absolute maximum ratings

Temp. − 25 ℃

ITEM	SYMBOL	MIN.	MAX.	UNIT
Supply voltage for logic	VDD	0	7.0	V
Supply voltage for LCD driving	VEE	0	44.0	V
Input voltage	Vin	0	VDD	V

ITEM		SYMBOL	MIN	MAX	UNIT
Operating temperature	*1	Top	0	60	℃
Storage temperature	*2	T_{STO}	-20	60	℃
Operating humidity	*3	Hop	10	*4	%RH
Storage humidity	*3	H_{STO}	10	*4	%RH
Vibration		—	*5	*5	—
Shock		—	*6	*6	—

*1 LCD's display quality shall not be guaranteed at the temperature range of : below 0℃ and upper 40℃.

*2 Temp. = -20℃ < 24Hr. , Temp = 60℃ < 24Hr.
No vibration and shock.

*3 Non-condensation.

*4 Temp. ≦ 40℃, 85% RH Max.
Temp. > 40℃, Absolute Humidity shall be less than 85%RH at 40℃.

*5

Frequency	10~55 Hz	Converted to acceleration value : (0.03~0.91G)
Vibration width	0.15 mm	
Interval	10-55-10 Hz 1 minute	

2 hours in each direction X/Y/Z (6 hours as total)
EIAJ ED-2531

*6 Acceleration: 50 G
Pulse width : 11 msec
3 times in each direction : ±X/±Y/±Z.
EIAJ ED-2531

5. Electrical Characteristics

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply voltage for logic	VDD	—	4.75	5.00	5.25	V
LCD driving voltage *1	Vop=	0 ℃	—	(TBD)	—	V
	VEE	25 ℃	(24.1)	(25.1)	(26.1)	V
		40 ℃	—	(TBD)	—	V
Input voltage	Vin	"H" level	0.8VDD	—	VDD	V
		"L" level	0	—	0.2VDD	V
Clock frequency	f cp		2.02	2.16	12.0	MHz
Frame frequency *2	f FRM		70	75	80	Hz
Current consumption for logic	IDD	*3	—	(3.0)	(4.5)	mA
Current consumption for LCD driving	IEE		—	(7.5)	(11.3)	mA
Power consumption	Pdisp		—	(180)	(282)	mW

*1   Maximum contrast ratio is obtained by adjusting the LCD supply voltage
     (Vop= VEE) for driving LCD.

*2   In consideration of display quality, it is recommended that frame frequency is
     set in the range of 70-80Hz. When you have to use higher frame and clock
     frequencies, confirm the LCD's performance and quality prior to finalizing the
     frequency values: Generally, as frame and clock frequencies become higher,
     current consumption will get bigger and display quality will be degraded.

*3   Display high frequency pattern, (see below).
     VDD = 5.0V , Vop = VEE , f FRM = 75 Hz , fcp = 2.16MHz
     Pattern:

Temp. = 25℃

ITEM		SYMBOL	CONDITION			MIN.	TYP.	MAX.	UNIT
Response time	Rise	Tr	$\theta = \phi = 0°$			—	(220)	(320)	ms
	Down	Td	$\theta = \phi = 0°$			—	(110)	(210)	ms
Viewing angle range	θ		CR≧2	$\phi = 0$		(-30)	—	(30)	deg.
	ϕ			$\theta = 0°$		(-50)	—	(50)	deg.
Contrast ratio		CR	$\theta = \phi = 0°$			(20.0)	(40.0)	—	—
Chromaticity coordinates	Red	x	$\theta = \phi = 0°$			(TBD)	(TBD)	(TBD)	
		y				(TBD)	(TBD)	(TBD)	
	Green	x	$\theta = \phi = 0°$			(TBD)	(TBD)	(TBD)	
		y				(TBD)	(TBD)	(TBD)	
	Blue	x	$\theta = \phi = 0°$			(TBD)	(TBD)	(TBD)	—
		y				(TBD)	(TBD)	(TBD)	
	White	x	$\theta = \phi = 0°$			(TBD)	(TBD)	(TBD)	
		y				(TBD)	(TBD)	(TBD)	
	Black	x	$\theta = \phi = 0°$			(TBD)	(TBD)	(TBD)	
		y				(TBD)	(TBD)	(TBD)	

Optimum contrast is obtained by adjusting the LCD driving voltage(Vop)
while at the viewing angle of $\theta = \phi = 0°$

6-1 Contrast ratio is defined as follows:

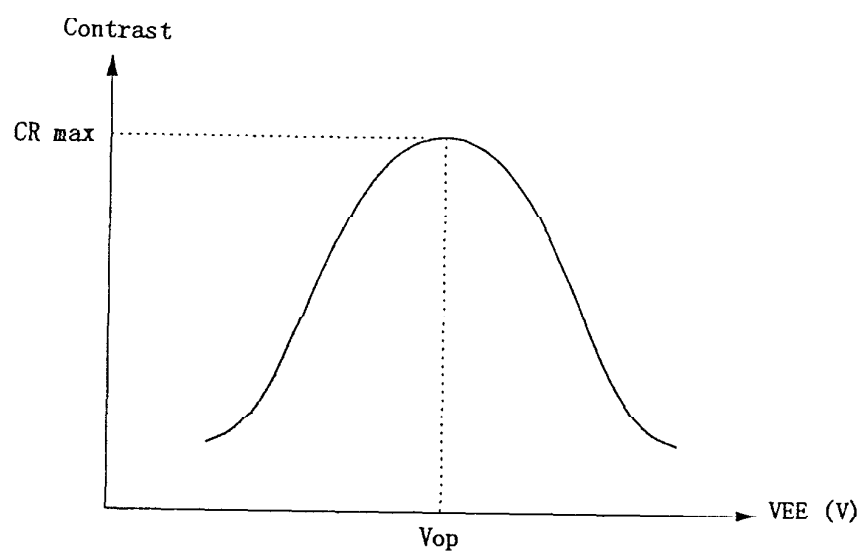$$CR = \frac{\text{Brightness all pixels "White"}}{\text{Brightness all pixels "Black"}}$$
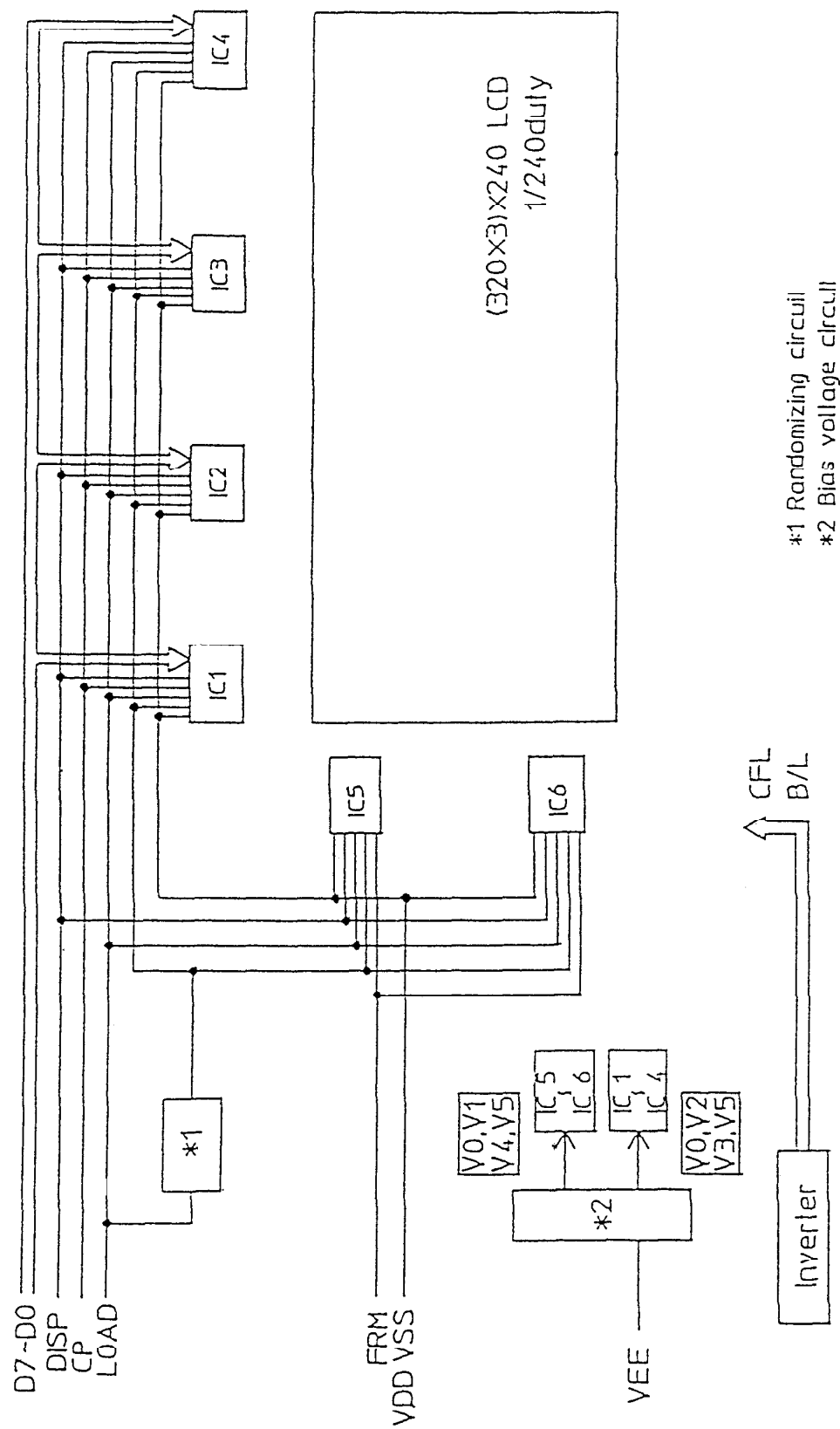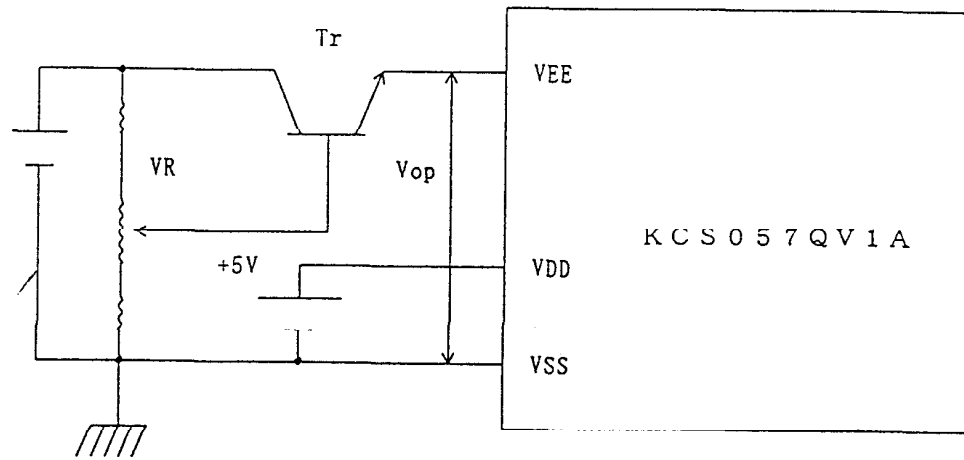
6-2. Definition of viewing angle

(θ direction)

(ϕ direction)
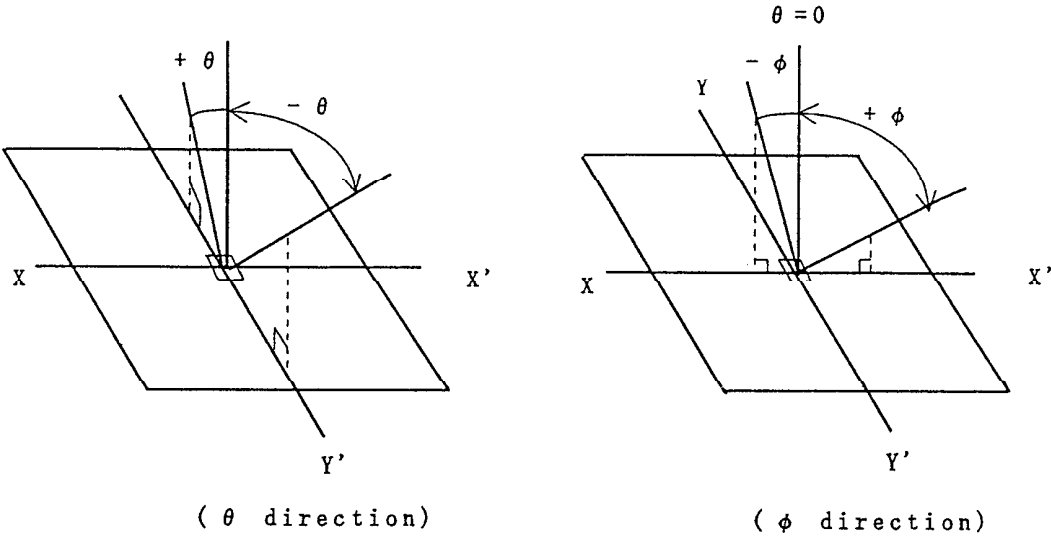
6-3. Definition of response time
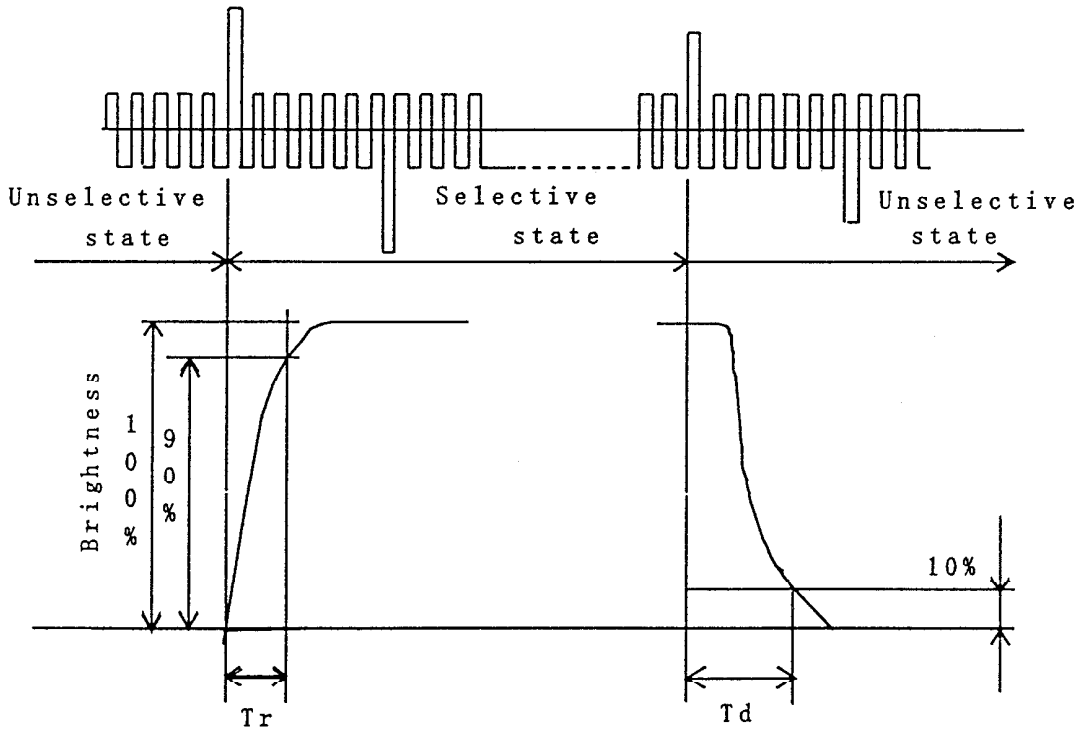
6-4. Definition of Vop

Contrast

CR max ···········

Vop

VEE (V)

7. Circuit Block Diagram

*1 Randomizing circuit
*2 Bias voltage circuit

7-1 Power Supply

8. Interface signals

8-1. LCD

CN1 : 53261-1510 (Molex)

PIN NO.	SYMBOL	DESCRIPTION	LEVEL
1	FRM	Synchronous signal for driving scanning line	H
2	LOAD	Data signal latch clock	H → L
3	CP	Data signal shift clock	H → L
4	DISP	Display control signal	H(ON),L(OFF)
5	VDD	Power supply for logic	—
6	VSS	GND	—
7	VEE	Power supply for LCD	—
8	D7	Display data	H(ON),L(OFF)
9	D6		
10	D5		
11	D4		
12	D3		
13	D2		
14	D1		
15	D0		

Recommended matching connector   : 51021-1500 (Molex)

NOTE) This pin assignment is the reverse of what Molex defined.
Remember that for your designing.

8-2. CFL

PIN No	SYMBOL	DESCRIPTION	LEVEL
1	HV	Power supply for CFL	AC
2	NC	—	—
3	GND	Ground line(from inverter)	—

LCD side connector   : BHR-03VS-1   (JST)
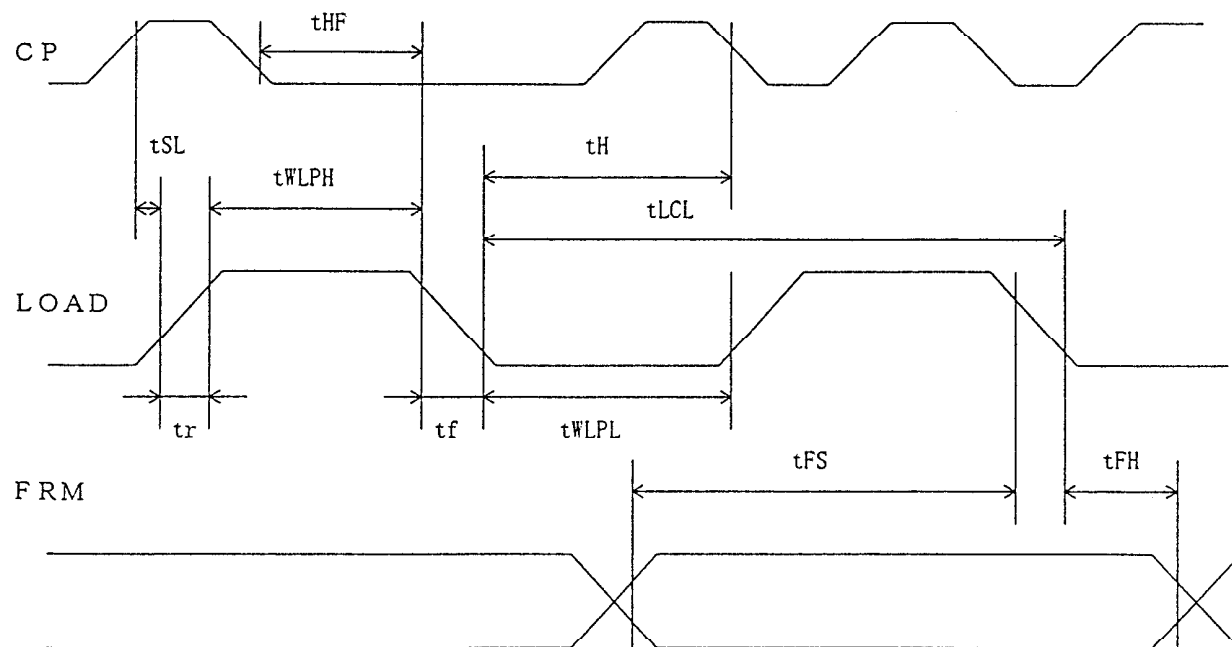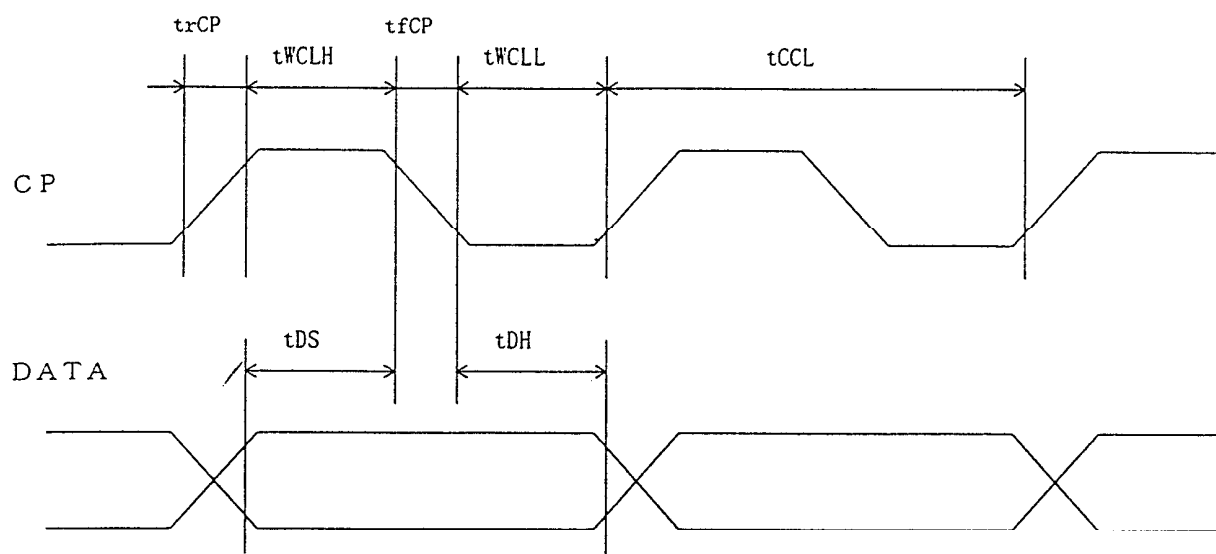Recommended matching connector : SM02-(8.0)B-BHS-1 (JST)
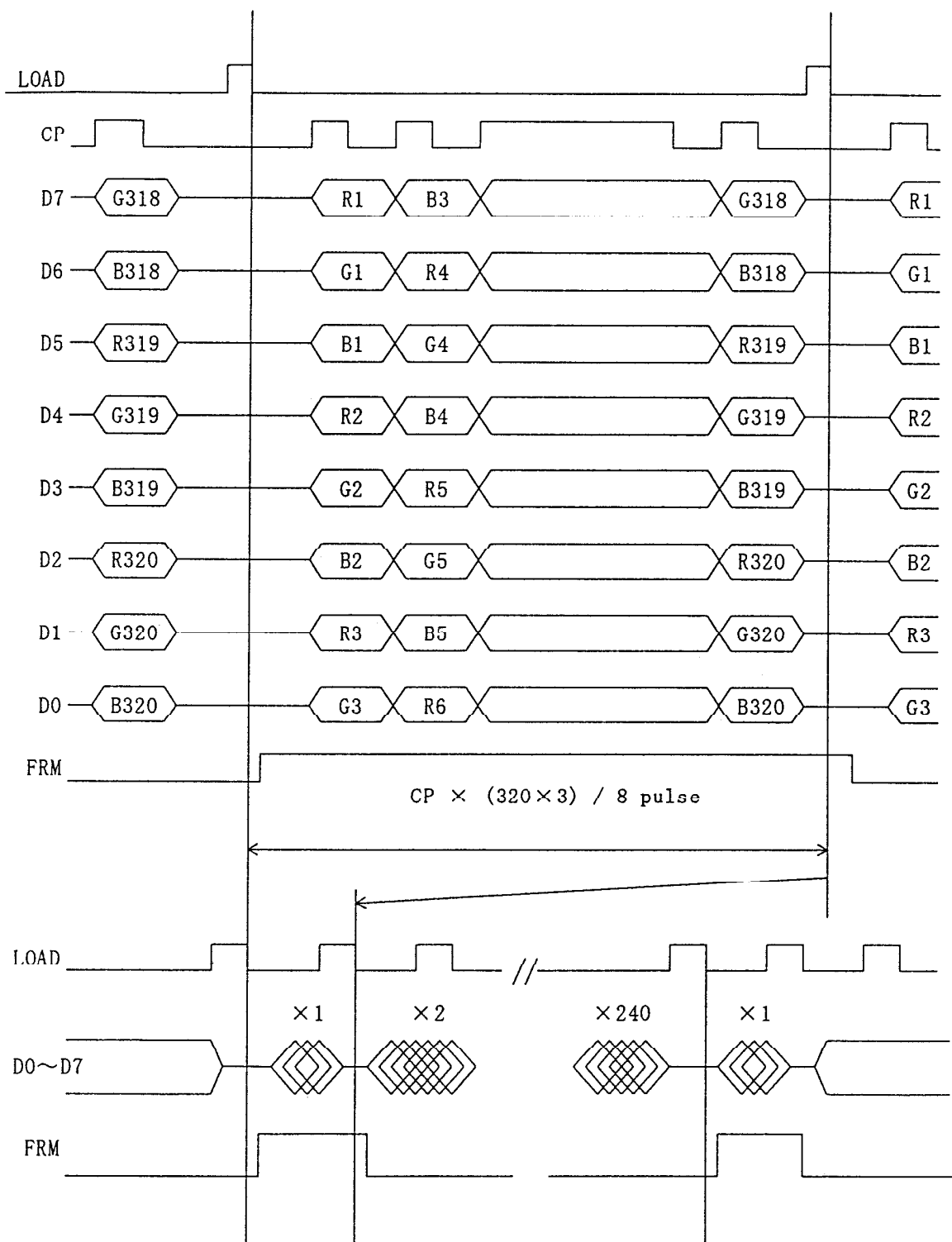
LOAD

CP

D7 — G318 | R1 | B3 | G318 | R1

D6 — B318 | G1 | R4 | B318 | G1

D5 — R319 | B1 | G4 | R319 | B1

D4 — G319 | R2 | B4 | G319 | R2

D3 — B319 | G2 | R5 | B319 | G2

D2 — R320 | B2 | G5 | R320 | B2

D1 — G320 | R3 | B5 | G320 | R3

D0 — B320 | G3 | R6 | B320 | G3

FRM

CP × (320×3) / 8 pulse

LOAD

×1   ×2   ×240   ×1

D0〜D7

FRM

1 0. Data and Screen

CHIP AREA

CHIP AREA	X1	Y1			Y2			Y3					Y320		
		D7 R1	D6 G1	D5 B1	D4 R2	D3 G2	D2 B2	D1 R3	D0 G3	D7 B3	D6 R4	——	D2 R320	D1 G320	D0 B320
	X240														
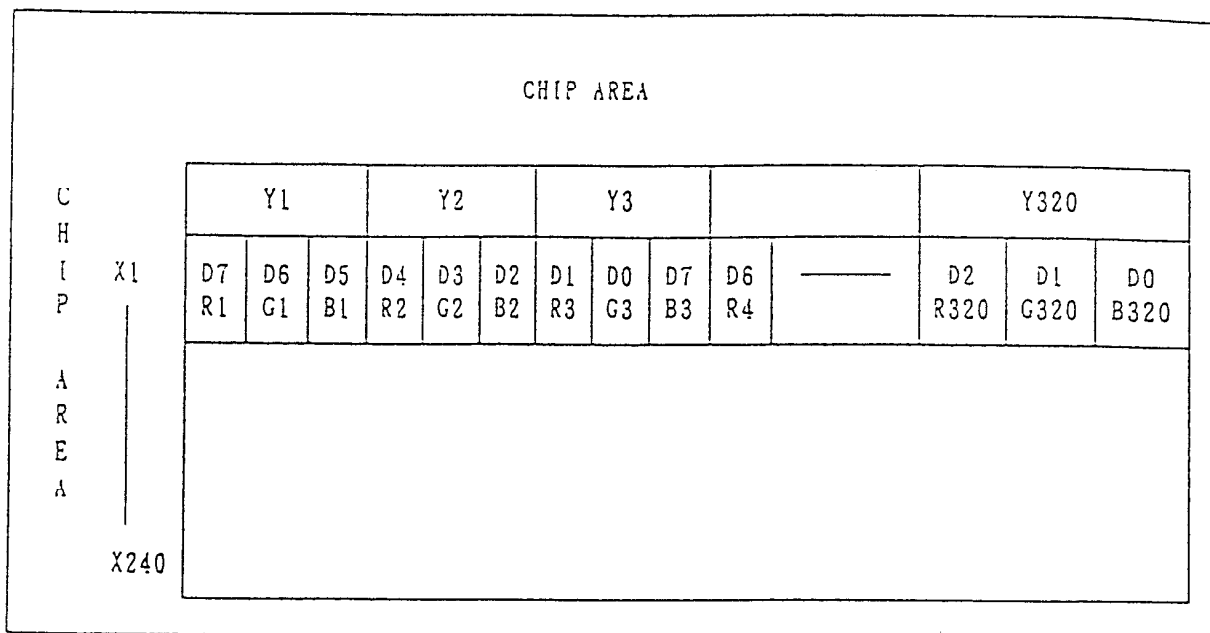
Input characteristics ; VDD = +5.0V ± 5%   Temp. = 25℃

ITEM	SYMBOL	MIN.	MAX.	UNIT
CP Cycle *1	tCCL	82	—	ns
CP "H" Pulse Width	tWCLH	28	—	ns
CP "L" Pulse Width	tWCLL	28	—	ns
CP Rise Up Time	trCP	—	30	ns
CP Fall Down Time	tfCP	—	30	ns
Data Set Up Time	tDS	28	—	ns
Data Hold Time	tDH	20	—	ns
Load "H" Pulse Width	tWLPH	55	—	ns
Load "L" Pulse Width	tWLPL	370	—	ns
LOAD Cycle	tLCL	400	—	ns
LOAD Signal Hold Time	tHF	25	—	ns
Data Strobe Set Up Time	tSL	0	—	ns
Data Strobe Hold Time	tH	0	—	ns
Input Signal Rise Up Time *2	tr	—	30	ns
Input Signal Fall Down Time *2	tf	—	30	ns
FRM Data Set Up Time	tFS	200	—	ns
FRM Data Hold Time	tFH	30	—	ns

*1 CP Cycle is adjust so that FRM signal is 75Hz.
*2 The formula of condition
　　　① tr, tf < {tCCL − (tWCLH + tWCLL)} / 2
　　　② tr, tf ≦ 50(ns)
　Please use on condition that ①, ② are filled.

1 2. Supply Voltage Sequence Condition

DO NOT apply DC voltage to the LCD panel. DC voltage induce irreversible
electrochemical reactions and reduce LCD life. Always follow the power supply
ON/OFF sequence of VDD first, input signal second, VEE third and finally DISP.
This will prevent DC driving of the LCD or CMOS LSI latch up as shown below.
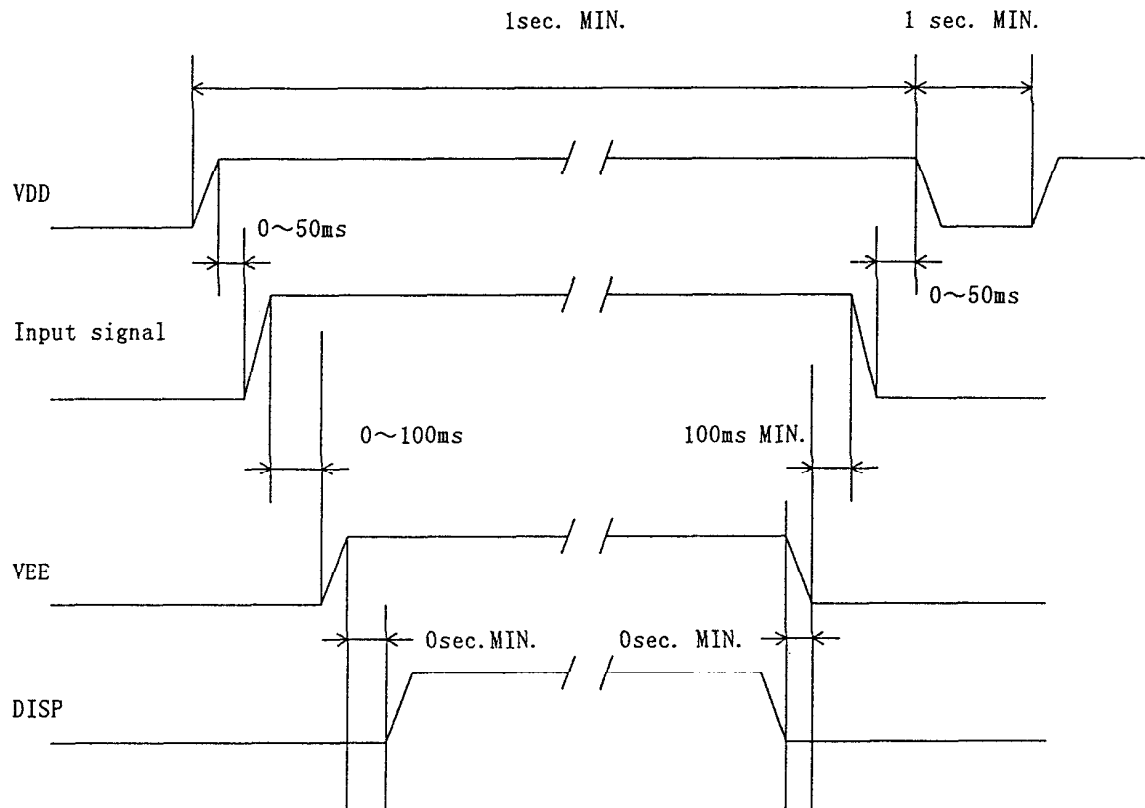
13-1. CFL ratings

Measuring Inverter:PH-BLC08-K3 (HITACHI MEDIA ELECTRONICS)   Temp.= 25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	NOTE
Starting discharge Voltage *1	VS	—	—	(770) Vrms.	0 ℃
		—	—	(510) Vrms.	25 ℃
Discharging tube current	IL	2.0 mArms.	5.0 mArms.	6.0 mArms.	—
Discharging tube voltage	VL	—	(315) Vrms.	—	—
Operating life *2 (IL=5.0 mArms.)	T	25,000Hr	40,000 Hr.	—	—
Operating frequency	F	30 kHz	—	100 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: 920 Vrms MIN.)
*2 When the illuminance or quantity of light has decreased to 50 % of the initial
   value.

13-2. Surface Brightness of LCD (IL = 5.0 mArms.)   Temp.=25℃

ITEM	MIN.	TYP.	MAX.	UNIT
Brightness	(140)	(200)	—	cd/m²

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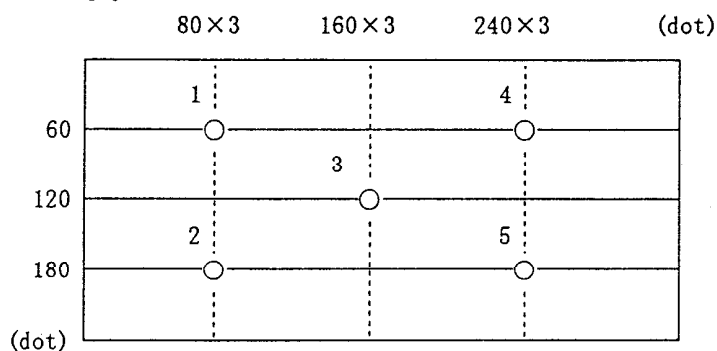
1) Rating is defined as the average brightness inside the viewing area.
2) 30 minutes after CFL is turned on. (Ambient Temp.=25℃)
3) The inverter should meet the eccentric conditions;
   -Sine, symmetric waveform without spike in positive and negative.

14. Lot Number Identification

The lot number shall be indicated on the back of the backlight case of each LCD.

K C S 0 5 7 Q V 1 A J − G 2 0 − □ □−□ □

- DATE
- MONTH
- YEAR

YEAR	1998	1999	2000	2001	2002	2003
CODE	8	9	0	1	2	3

MONTH	JAN.	FEB.	MAR.	APR.	MAY	JUN.
CODE	1	2	3	4	5	6

MONTH	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
CODE	7	8	9	X	Y	Z

15. Warranty

15-1. Incoming inspection

Please inspect the LCD within one month after your receipt.

15-2. 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.

1 6. Precautions for use

16-1. Installation of the LCD

1. Please ground either of the mounting (screw) holes located at each corner of an LCD module, in order to stabilize brightness and display quality.

2. A transparent protection plate shall be added to protect the LCD and its polarizers.

3. The LCD shall be installed so that there is no pressure on the LSI chips.

4. The LCD shall be installed flat, without twisting or bending.

5. The display window size should be the same as the effective viewing area.

6. 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.

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.

16-2. Static Electricity

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

16-3. 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. Vop must be adjusted to optimize viewing angle and contrast.

3. 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.

16-4. Storage

1. The LCD shall be stored within the temperature and humidity limits specified. Store in a dark area, and protected the LCD from direct sunlight or fluorescent light.

2. The LCD should be packaged to prevent damage.

16-5. Screen Surface

1. <u>DO NOT</u> 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. 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.

4. Water may cause damage or discoloration of the polarizer. Clean any condensation or moisture from any source immediately.

5. Always keep the LCD free from condensation during testing. Condensation may permanently spot or stain the polarizers.

TEST ITEM	TEST CONDITION	TEST TIME	RESULT
High Temp. Atmosphere	70℃	240 Hr.	Display Quality : No defect Display Function : No defect Current Consumption : No defect
Low Temp. Atmosphere	-20℃	240 Hr.	Low Temp. Bubble : None Solid Crystallization of Liquid Crystal : None Display Quality : No defect Display Function : No defect Current Consumption : No defect
High Temp. Humidity Atmosphere	40℃ 90%RH	240 Hr.	Display Quality : No defect Display Function : No defect Peel-off of Organic Sealing : None Current Consumption : No defect
Temp. Cycle	-20℃ 0.5 Hr. R.T. 0.5 Hr. 70℃ 0.5 Hr.	10cycles	Display Quality : No defect Display Function : No defect Peel-off of Organic Sealing : None Bubble on Cell : None
High Temp. Operation	60℃ Vop	500 Hr.	Display Quality : No defect Current Consumption : No defect

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

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

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

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

᠄ The result of the reliability test are for your reference purpose only. The reliability test is conducted only to examine the LCD's capability.

insert direction →

connector

SECTION A-A

PCB

1.3

2.5 ±0.3
3

3.5 ±0.3 (Bezel)
6.3 ±0.3 (Bezel)

114.8
106.8
83.5
53.4 ±0.3

4

4

2- 4 min

2- 4 min

No 01
CN 1
No 15

A
A

2.51

2.51

L-R0.5

2-Φ3.2 ±0.05 HOLE
3

81 ±0.2

154.6

148.6 ±0.3

3

△ 65
±1.0

Bezel Opening Center

Active Area (115.18×86.38)
Viewing Area (118.18×89.38)
Bezel Opening (120.20±0.3×91.40±0.3)

320(H)(R.G.B)*240(V) dots

2- 4 min

2- 4 min
2- 3.2 ±0.15

73
81 ±0.3

Replaceable Lamp Unit

No.1(Blue)
No.3(white)
CN2

2.5 ±0.3
3

8.5

DOT SIZE

P0.36
0.34
0.12
0.10

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

0.34
P0.36

Note
1. connectors CN1. 53261-1510 (MOLEX)
   CN2. BHR-03VS-1(JST)
2. Matching Connector : 51021-1500 (MOLEX)
   : SM02-(8.0)B-BHS-1(JST)
3. The drawing seen from the front, information is displayed
   on the screen in the direction of from the upper hand
   left corner to the right
4. Tolerance without indication. ±0.5

	Approved	Checked	Drawn	Scale	Title
	99-04-08	99-04-08		1/1	

KCS057QV1AJ
Outline Dimensions

KYOCERA

Drawing No.
121A0088500-1

Year-Month-Day
99-04-08

Size
3

Rev	No		Description	Drwn	Chk	App
1	△		Change dimension (wire)	99-04-21	97-04-21	97-04-21

FOR: KICC

KYOCERA INSPECTION STANDARD

TYPE : KCS057QV1AJ-G20

KYOCERA CORPORATION
KAGOSHIMA HAYATO PLANT
LCD DIVISION

Original	Designed by :Engineering Dept.			Confirmed by :QA Dept.	
Issue Data	Prepared	Checked	Approved	Checked	Approved
April 15, 1999	H. Tokumori	K. Yoga	A. Nishio	S. Hayashi	Y. Yoshida
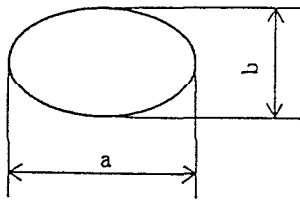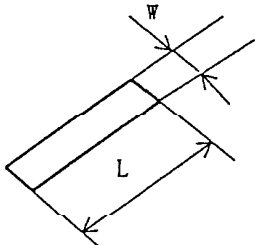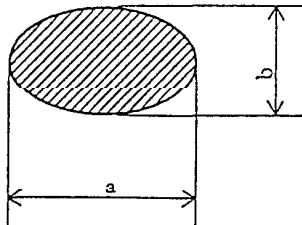
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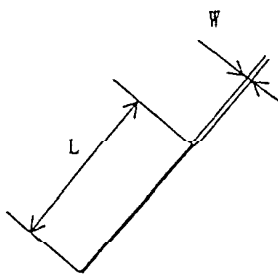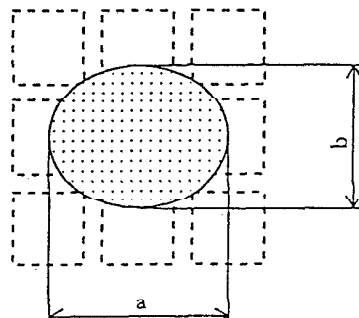
Visuals specification

1)Note

Item	Note	
General	1. When defects specified in this Inspection Standards are inspected, operating voltage(Vop) shall be set at the level where optimized contrast is available. Display quality is applied up to effective viewing area. (Bi-Level INSPECTION) 2. This inspection standard about the image quality shall be applied to any defect within the effective viewing area and shall not be applicable to outside of the area. 3. Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and Kyocera. 4. Inspection conditions Luminance : 500 Lux minimum Inspection distance : 300 mm (from the sample) Temperature : 25 = 5 ℃ Direction : right above	
Definition of Inspection item	Pinhole, Bright spot Black spot, Scratch Foreign particle	The color of a small area is different from the remainder. The phenomenon does not change with voltage.
	Contrast variation	The color of a small area is different from the remainder. The phenomenon changes with voltage.
	Polarizer (Scratch, Bubble, Dent)	Scratch, Bubble and Dent in the polarizer which can be observed in on / off state.

2) Standard

Inspection item	Judgement standard
Pinhole, Bright spot Black spot, Foreign particle	 $d = (a + b) / 2$ 	Category	Size (mm)	Acceptable number
---	---	---
A	$d \leqq 0.2$	neglected
B	$0.2 < d \leqq 0.3$	5
C	$0.3 < d \leqq 0.5$	3
D	$0.5 < d$	0	
Scratch, Foreign particle	 |	Width (mm)	Length (mm)	Acceptable No.
---	---	---	---
A	$W \leqq 0.03$	—	neglected
B		$L \leqq 2.0$	neglected
C	$0.03 < W \leqq 0.1$	$2.0 < L \leqq 4.0$	3
D		$4.0 < L$	0
E	$0.1 < W$	—	According to Circular	
Contrast variation	 $d = (a + b) / 2$ 	Category	Size (mm)	Acceptable number
---	---	---
A	$d \leqq 0.5$	neglected
B	$0.5 < d \leqq 0.7$	3
C	$0.7 < d$	0	

Inspection item	Judgement standard

Polarizer (Scratch, Bubble, Dent)

(1) Scratch

	Width (mm)	Length (mm)	Acceptable No.
A	$W \leqq 0.1$	—	neglected
B	$0.1 < W \leqq 0.3$	$L \leqq 5.0$	neglected
C		$5.0 < L$	0
D	$0.3 < W$	—	0

(2) Bubble (dent)

$$d = (a + b) / 2$$

Category	Size (mm)	Acceptable number
A	$d \leqq 0.2$	neglected
B	$0.2 < d \leqq 0.3$	5
C	$0.3 < d \leqq 0.5$	3
D	$0.5 < d$	0