SPECIFICATION

KHS038AA1AJ-G93

APPROVED BY : _____
(NAME PRINTED/TITLE)

SIGNATURE : _____

DATE : _____

Issued
Date: AUG. 08.2000
KYOCERA
Hayato LCD Divisio
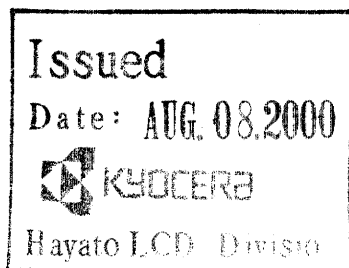
KYOCERA CORPORATION
KAGOSHIMA HAYATO PLANT
LCD DIVISION

Designed by :Engineering Dept.		
Prepared	Checked	Approved
T. Yamaguchi	Y. Matsumoto	Y. Matsumura

SPEC.NO.	TQ3C-8EAC0-E1CWN10-00
DATE	July 31,2000

S P E C

FOR: _____

TYPE:KHS038AA1AJ-G93

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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 31,2000	T. Yamaguchi	Y. Matsumoto	Y. Matsunami	S. Hayashi	J. yoshida

Revision Record

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

Rev. No.	Date	Page	Descriptions

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 medical 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 medical 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 medical 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.

1. Application

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

2. Construction and Outline

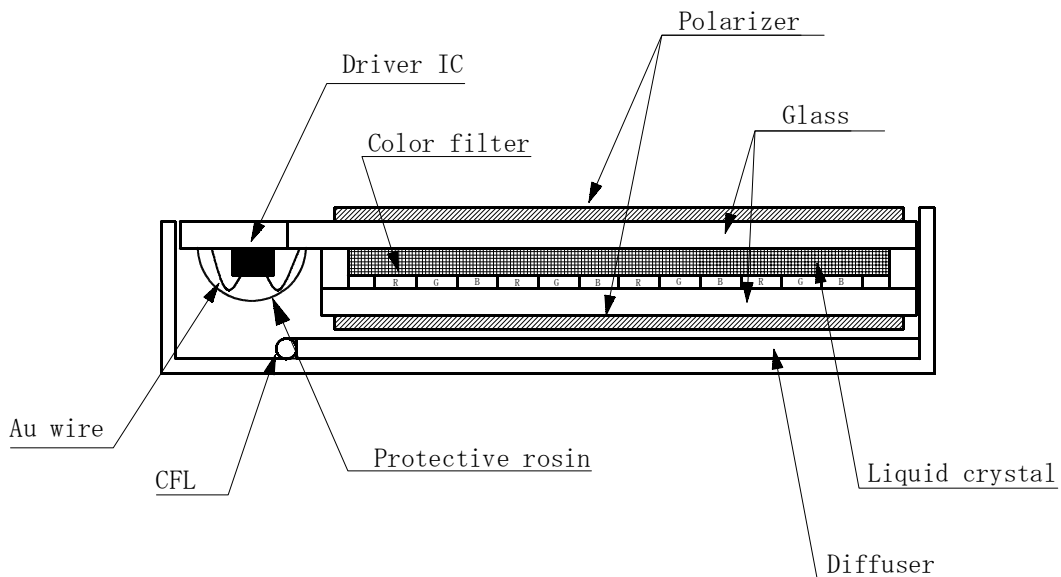   (240×3)×320 dots, COB type LCD with CFL backlight.

   Backlight system   : Side-edge type CFL (1 tube).

   Inverter   :   None

   Polarizer   : Glare treatment.

   Additional circuit : None

This drawing is showing Consult conception only.

3．Mechanical Specifications

ITEM	SPECIFICATION	UNIT
Outline dimensions	73.0 (W) × 94.0 (H) × 6.7 (D)	mm
Effective viewing area	59.6 (W) × 78.8 (H)	mm
Dot number	(240×3) (W) × 320 (H)	Dots
Dot size	0.06 (W) × 0.22 (H)	mm
Dot pitch	0.08 (W) × 0.24 (H)	mm
Display color *1	White *2	―
Base color *1	Black *2	―
Mass	(65)	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

ITEM	SYMBOL	MIN.	MAX.	UNIT
Supply voltage for logic	VDD	0	7.0	V
Supply voltage for LCD driving *1	V0-V5	0	38.0	V
Input signal voltage *2	Vin	0	VDD	V

*1 V0 ≧ V1 ≧ V2 ≧ V3 ≧ V4 ≧ V5 = 0(V)
*2 Input signal : CP,LOAD,FRM,DF,DISP,D0～D7

4-2 Environmental absolute maximum ratings

ITEM	SYMBOL	MIN	MAX	UNIT
Operating temperature *1	Top	-20	70	℃
Storage temperature *2	T_{STO}	-30	80	℃
Operating humidity *3	Hop	10	*4	%RH
Storage humidity *3	H_{STO}	10	*4	%RH
Vibration	—	*5	*5	—
Shock	—	*6	*6	—

*1 Kyocera warrants its LCD operates functionally in operating temp.
    from -20℃ to +70℃. On the other hand, it is required to examine
    display quality on your side beforehand.

*2 Temp. = -30℃ < 24 h. , Temp = 80℃ < 24 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.

*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 : $(0.3～9m/s^2)$
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: $490m/s^2$
    Pulse width : 11 msec
    3 times in each direction : ±X/±Y/±Z.
    EIAJ ED-2531.
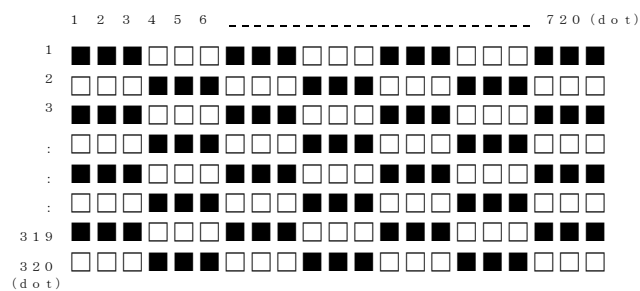
5. Electrical Characteristics

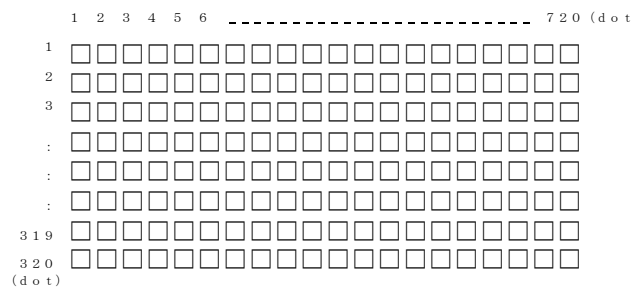| ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply voltage for logic	VDD	—	3.0	3.3	3.6	V
LCD driving voltage　*1	Vop =V0-V5	0 ℃	(30.4)	(31.4)	(32.4)	V
		25 ℃	(29.2)	(30.2)	(31.2)	V
		50 ℃	(28.6)	(29.6)	(30.6)	V
Input voltage	Vin	"H" level	0.8VDD	—	VDD	V
		"L" level	0	—	0.2VDD	V
Clock frequency	f cp	—	2.02	2.16	10.0	MHz
Frame frequency　*2	f_{FRM}	—	70	75	80	Hz
Randomizing frequency *3	f_{DF}		300	—	800	Hz
Current consumption for logic	IDD	*5	—	(0.8)	(1.0)	mA
		*6	—	(0.6)	(0.8)	mA
Current consumption for LCD driving　*4	IEE	*5	—	(2.4)	(3.1)	mA
		*6	—	(1.1)	(1.4)	mA
Power consumption　*4	Pdisp	*5	—	(75)	(100)	mW
		*6	—	(36)	(46)	mW

*1　Maximum contrast ratio is obtained by adjusting the LCD supply voltage
　　(Vop= V0-V5) 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　It is recommended that randomizing frequency be set in the range of 300-800Hz.
　　At finalizing the frequency ,confirm with actual tests that phenomena like
　　flickering and/or horizontal lines do not appear on screen.

*4　Include recommended circuit. Refer 18.recommended additional circuit.

*5 Display high frequency pattern, (see below).
    VDD = 3.3V , Vop = V0-V5 , f_{FRM} = 75 Hz , fcp = 2.16MHz
    Pattern:

```
        1 2 3 4 5 6 ----------------------- 7 2 0 (dot)
     1  ■■■□□□■■■□□□■■■□□□■■■
     2  □□□■■■□□□■■■□□□■■■□□□
     3  ■■■□□□■■■□□□■■■□□□■■■
     :  □□□■■■□□□■■■□□□■■■□□□
     :  ■■■□□□■■■□□□■■■□□□■■■
     :  □□□■■■□□□■■■□□□■■■□□□
   319  ■■■□□□■■■□□□■■■□□□■■■
   320  □□□■■■□□□■■■□□□■■■□□□
  (dot)
```

*6 Display high frequency pattern, (see below).
    VDD = 3.3V , Vop = V0-V5 , f_{FRM} = 75 Hz , fcp = 2.16MHz
    Pattern:

```
        1 2 3 4 5 6 ----------------------- 7 2 0 (dot
     1  □□□□□□□□□□□□□□□□□□□□
     2  □□□□□□□□□□□□□□□□□□□□
     3  □□□□□□□□□□□□□□□□□□□□
     :  □□□□□□□□□□□□□□□□□□□□
     :  □□□□□□□□□□□□□□□□□□□□
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   320  □□□□□□□□□□□□□□□□□□□□
  (dot)
```

6．Optical Characteristics

6-1. Reflective mode

<div align="right">Measuring Spot = φ6mm ， Temp. = 25℃</div>

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Response time	Rise	Tr	$\theta=\phi=0°$	—	(250)	(350)	ms
	Down	Td	$\theta=\phi=0°$	—	(150)	(250)	ms
Contrast ratio		CR	$\theta=\phi=0°$	(2.5)	(5.0)	—	—
Reflectance		ρ	—	(4.0)	(6.0)	—	%

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

＊ Definition of Reflectance：

$$\rho\ (\text{Reflectance}) = \frac{\text{Measured Reflection Brightness}}{\text{Reflection Brightness against Standard White Board}}$$

＊ Definition of Contrast

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

6．Optical Characteristics

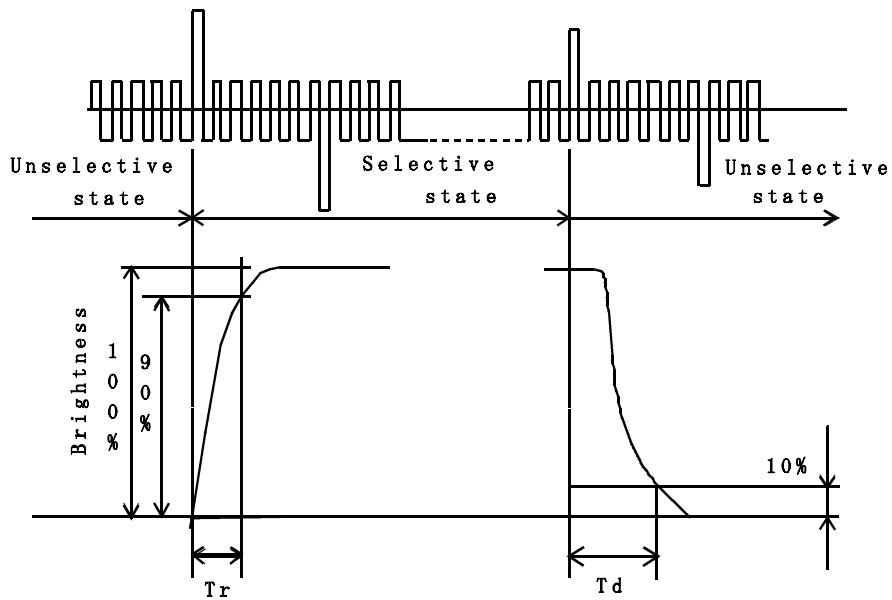### 6-2. Transmissive mode

Measuring Spot = φ6mm ， Temp. = 25℃

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Response time	Rise	Tr	θ=φ= 0°	−20℃	—	(6810)	(8510)	ms
				25℃	—	(250)	(350)	
				70℃	—	(150)	(250)	
	Down	Td	θ=φ= 0°	−20℃	—	(3300)	(4120)	ms
				25℃	—	(150)	(250)	
				70℃	—	(40)	(140)	
Viewing angle range		θ	CR≧2	φ=0°	(−20)	—	(30)	deg.
		φ		θ=0°	(−50)	—	(45)	deg.
Contrast ratio		CR	θ=φ= 0°	−20℃	(5.0)	(10.0)	—	—
				25℃	(7.5)	(15.0)	—	
				70℃	(2.0)	(3.0)	—	
Brightness(I1=4mA)		L	—		(15)	(25)	—	cd/m2
Chromaticity coordinates	Red	x	θ=φ=0°		(0.32)	(0.37)	(0.42)	—
		y			(0.24)	(0.29)	(0.34)	
	Green	x	θ=φ=0°		(0.25)	(0.30)	(0.35)	
		y			(0.32)	(0.37)	(0.42)	
	Blue	x	θ=φ=0°		(0.18)	(0.23)	(0.28)	
		y			(0.19)	(0.24)	(0.29)	
	White	x	θ=φ=0°		(0.27)	(0.32)	(0.37)	
		y			(0.29)	(0.34)	(0.39)	

Optimum contrast is obtained by adjusting the LCD driving voltage(Vop)
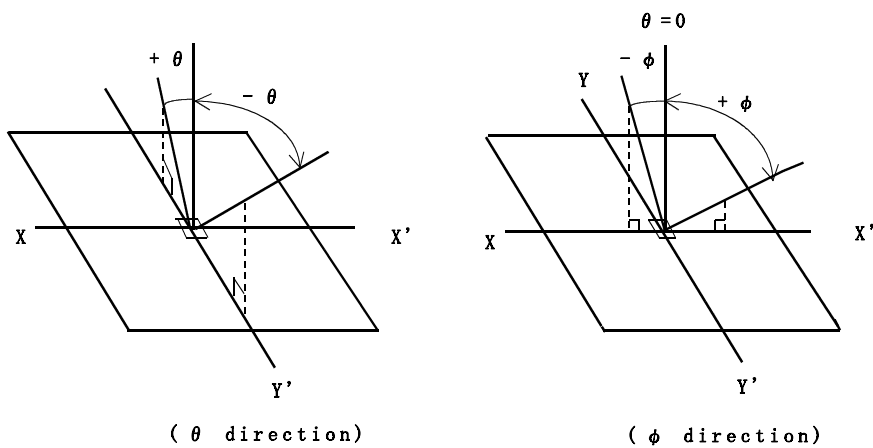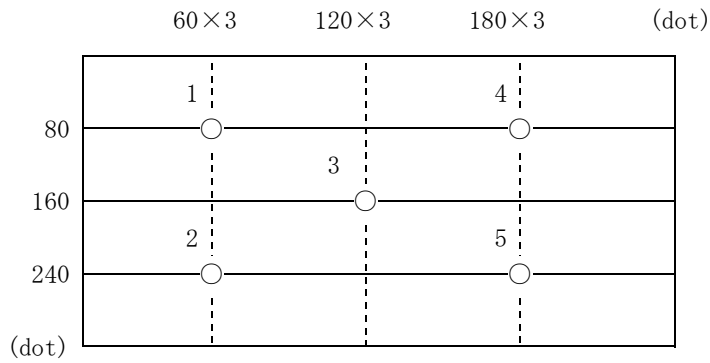while at the viewing angle of θ = φ = 0° .

6-3. Definition of Vop

Contrast

CR max

V0-V5 (V)

Vop
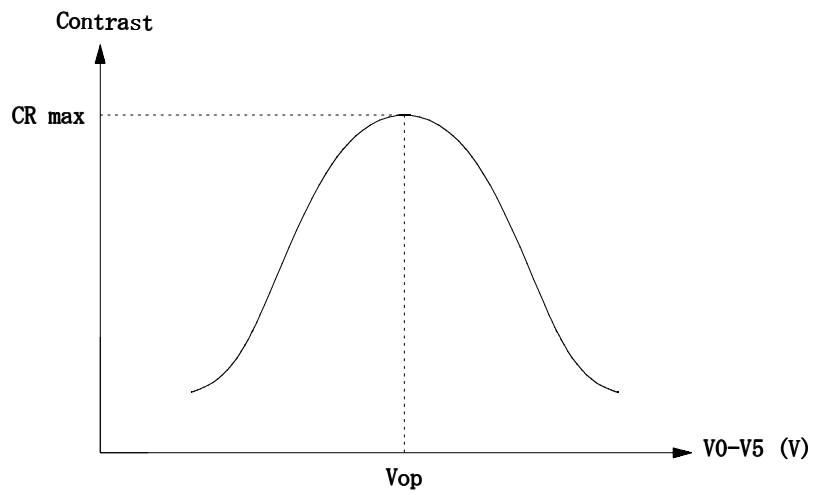
6-4. Definition of response time

Unselective state

Selective state

Unselective state

Brightness

100%

90%

10%

Tr

Td

6-5. Definition of viewing angle

$+\theta$

$-\theta$

X

X'

Y'

(θ direction)

$\theta=0$

$-\phi$

$+\phi$

Y

X

X'

Y'

(ϕ direction)

6-6. Measuring points

	60×3	120×3	180×3	(dot)
1			4	
80	○		○	
		3		
160		○		
2			5	
240	○		○	

(dot)

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.

6-7. Measurement method of reflectance

Direction of detection light

+Y

Direction of incident light

$\theta = 2 5°$

θ

-X   +X

-Y

7. Circuit Block Diagram

COMMON DRIVER IC

(240×3)×320 LCD

1/320 duty

SEGMENT DRIVER IC

FRM
V0, V1, V4, V5

D0～D7
V0, V2, V3, V5
CP
LOAD
DF
VDD, VSS
DISP
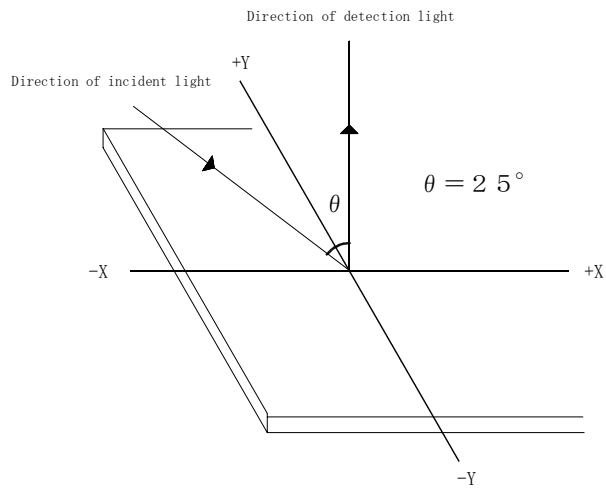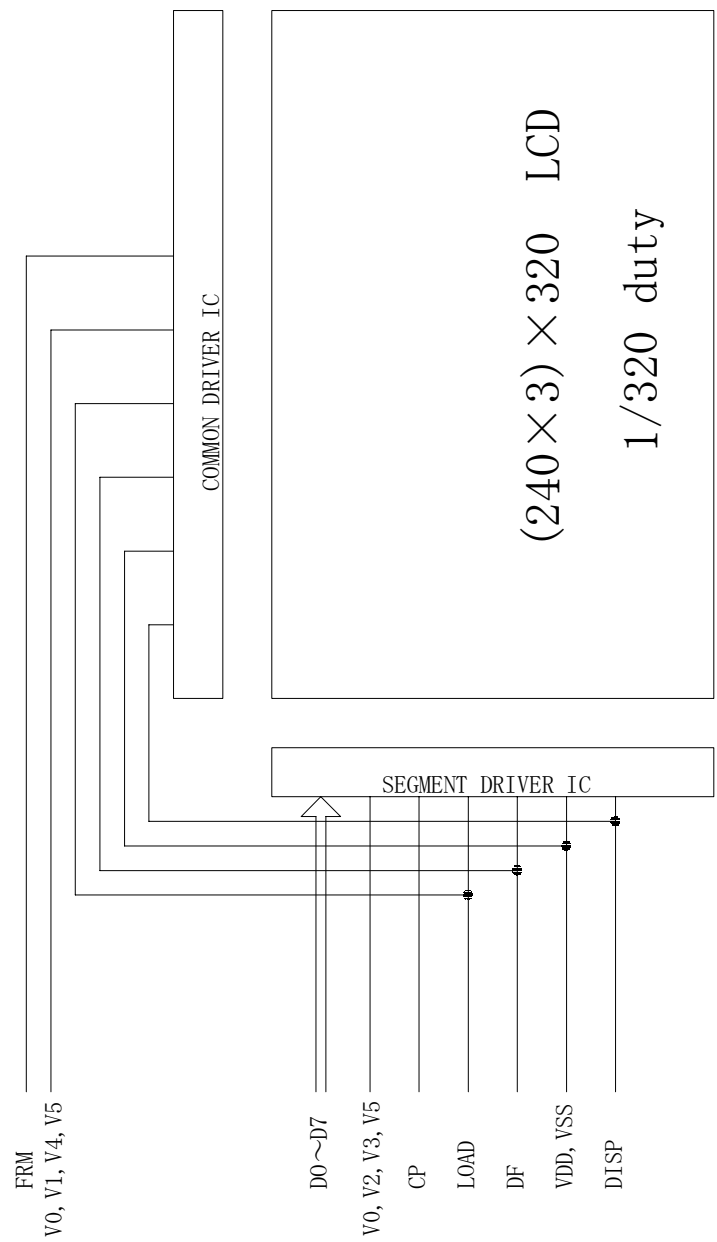
8. Interface signals

8-1. LCD

CN1 :

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	VDD	Power supply for logic	—
7	VSS	GND	—
8	DF	AC signal for driving	—
9	V0	*	—
10	V1	*	—
11	V2	*	—
12	V3	*	—
13	V4	*	—
14	V5	*	—
15	D7	Display data	H(ON),L(OFF)
16	D6		
17	D5		
18	D4		
19	D3		
20	D2		
21	D1		
22	D0		

*V0 ～ V5 : Refer 18. Recommended Bias Votage Circuit for driving LCD.

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)

9. Interface Timing Chart

LOAD

CP

D7 — G238 / R1 / B3 / G238 / R1

D6 — B238 / G1 / R4 / B238 / G1

D5 — R239 / B1 / G4 / R239 / B1

D4 — G239 / R2 / B4 / G239 / R2

D3 — B239 / G2 / R5 / B239 / G2

D2 — R240 / B2 / G5 / R240 / B2

D1 — G240 / R3 / B5 / G240 / R3

D0 — B240 / G3 / R6 / B240 / G3

FRM

CP × (240×3) / 8 pulse

LOAD

×1   ×2   ×320   ×1

D0～D7

FRM

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１０. Data and Screen

	Y1			Y2			Y3			・・・	Y240		
X1	D7 R1	D6 G1	D5 B1	D4 R2	D3 G2	D2 B2	D1 R3	D0 G3	D7 B3			D2 R240	D1 G240	D0 B240

CHIP AREA

C
H
I
P

A
R
E
A

X320

CHIP AREA

11. Input Timing Characteristics

- 14 -
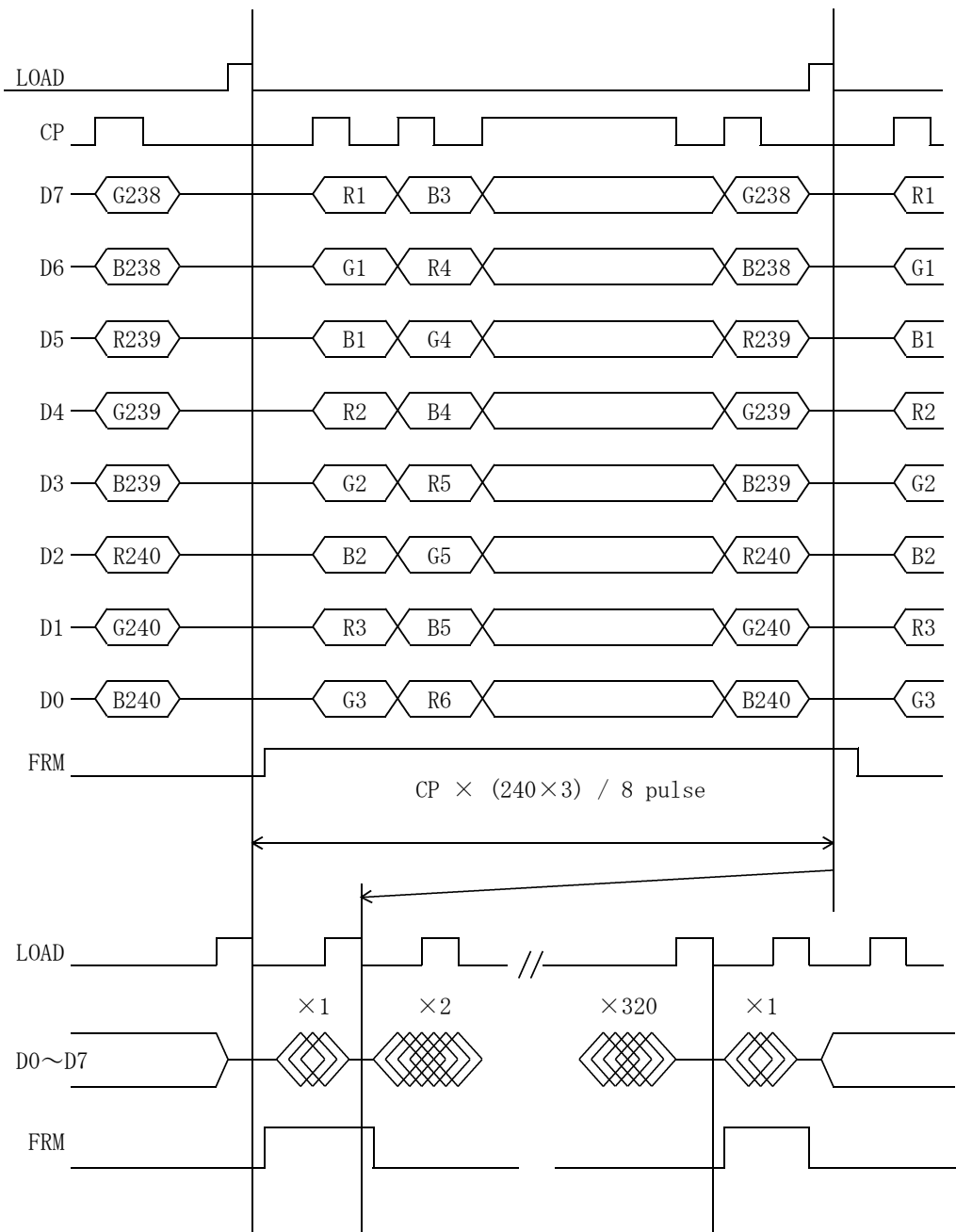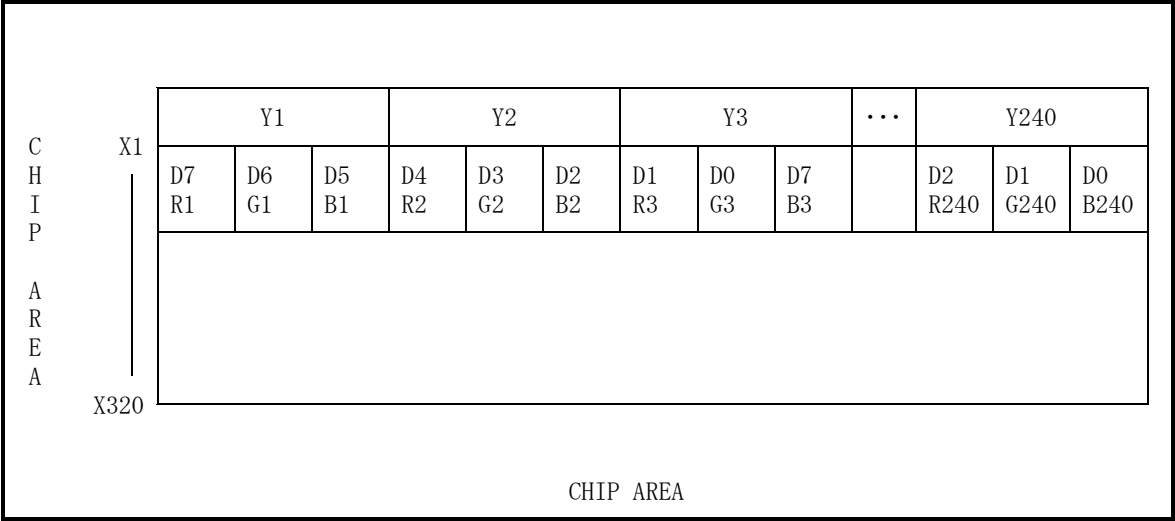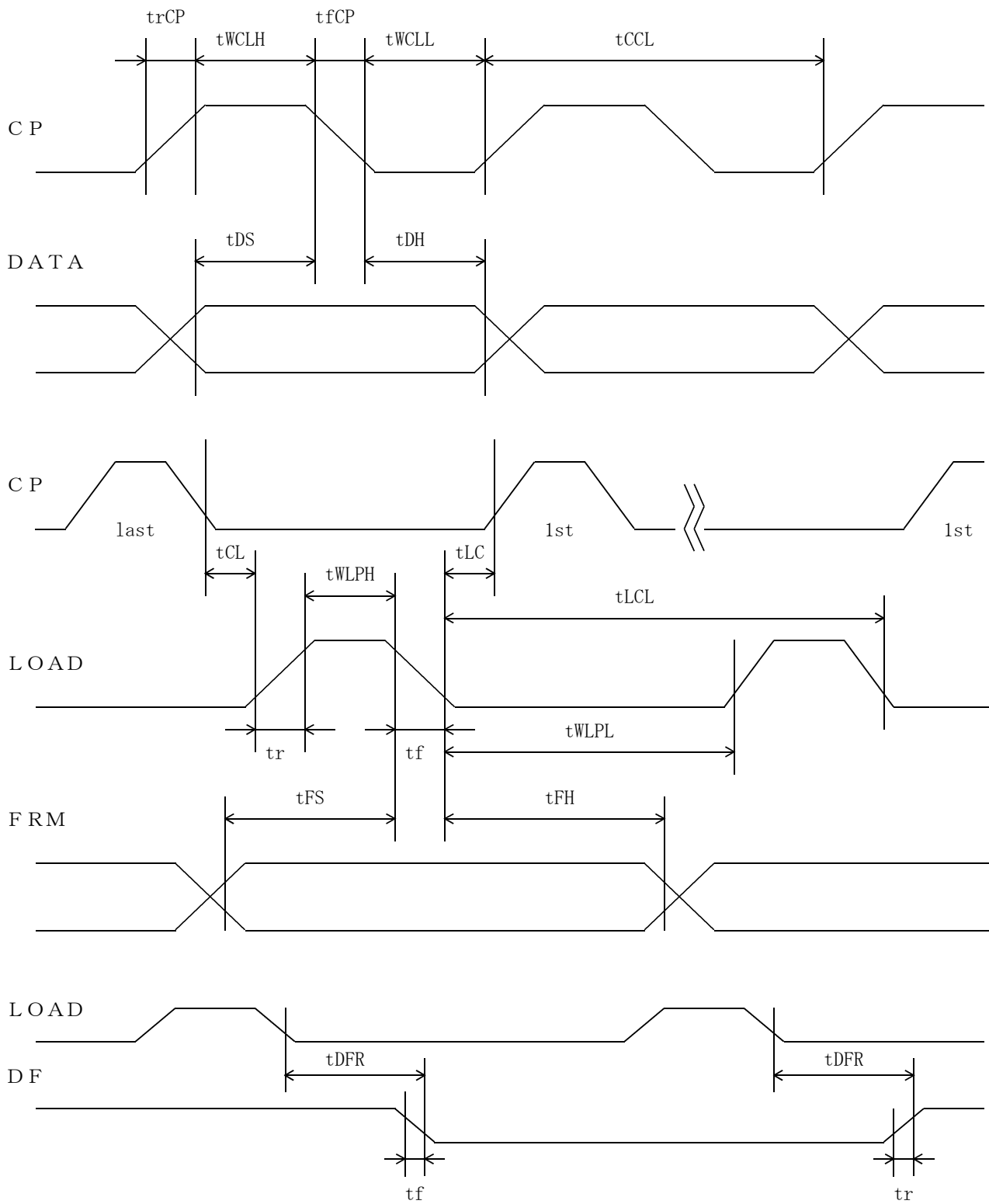
１１-1.Switchig characteristics

Input Characteristics ; VDD = +3.3V ± 0.3V, Temp. = 25 ℃

ITEM	SYMBOL	MIN.	MAX.	UNIT
CP Cycle *1,*2	tCCL	100	—	ns
CP ″H″ Pulse Width *2	tWCLH	40	—	ns
CP ″L″ Pulse Width *2	tWCLL	40	—	ns
CP Rise Up Time *2	trCP	—	30	ns
CP Fall Down Time *2	tfCP	—	30	ns
Data Set Up Time	tDS	25	—	ns
Data Hold Time	tDH	20	—	ns
LOAD ″H″ Pulse Width	tWLPH	100	—	ns
LOAD ″L″ Pulse Width	tWLPL	4900	—	ns
LOAD Cycle *3	tLCL	5000	—	ns
CP→LOAD Delay Time	tCL	0	—	ns
LOAD→CP Delay Time *4	tLC	200-tWLPH	—	ns
Input Signal Rise Up Time	tr	—	30	ns
Input Signal Fall Down Time	tf	—	30	ns
FRM Data Set Up Time	tFS	100	—	ns
FRM Data Hold Time	tFH	30	—	ns
DF Delay Time	tDFR	0	300	ns

*1 CP Cycle is adjust so that FRM signal is 75Hz.
*2 The formula of condition
  ①trCP + tfCP ≦ tCCL - (tWCLH + tWCLL)
  ②trCP,tfCP ≦ 30 ns
 Please use on condition that ①,② are filled.
*3 LOAD Cycle is const.
*4 tLC ≧ 0

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, V0-V5 third and finally DISP.
This will prevent DC driving of the LCD or CMOS LSI latch up as shown below.

1s. MIN.　　　　　　　　　　　　　　　　1 s. MIN.

VDD

0～50ms

Input signal

0～50ms

0～100ms　　　　100ms MIN.

V0-V5

0s.MIN.　　　0s. MIN.
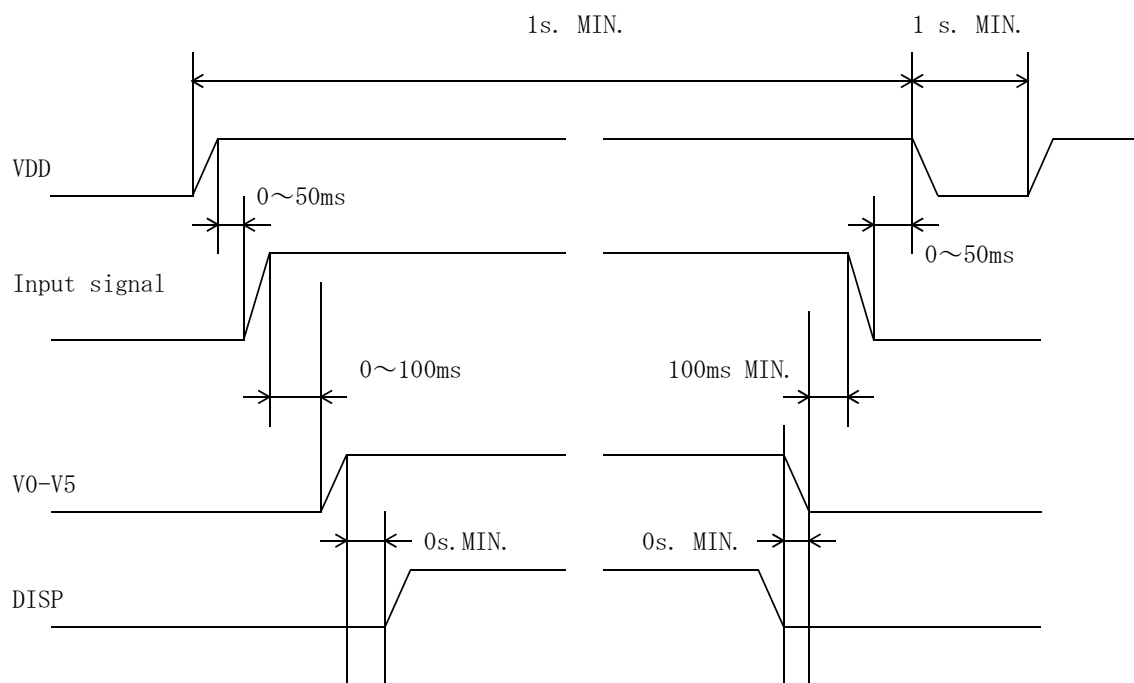
DISP

* The above sequence should be designed as to keep each normal figure on condition
  that liquid crystal module is loaded on your system.

* Control the input signal and V0 - V5 to the above ON - OFF timing when you switch
  ON/OFF the display during VDD and DISP are on.
  And also design the circuit as V0 - V5's OFF level become GND level.

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１３．Backlight Characteristics

CFL ratings

Temp.= 25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	NOTE
Starting discharge Voltage　　　*1	VS	－	－	(720) Vrms.	0 ℃
		－	－	(580) Vrms.	25 ℃
Discharging tube current *2	IL	(2.0)mArms.	(4.0)mArms.	(6.0)mArms.	－
Discharging tube voltage	VL	－	(275)Vrms.	－	－
Operating life (IL= 4.0 mArms.)　　*3	T	(27,000)h	(40,000)h.	－	－
Operating frequency	F	(40) 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: (936) Vrms MIN.)

*2 Do not apply more than (6.0)mA discharge tube current. Becouse CFL maybe broken
　　due to over current.

*3　When the illuminance or quantity of light has decreased to 50 % of the initial
　　value.
　　Average life time of CFL will be decreased when LCD is operating at lower and
　　higher temperature.

１４．Lot Number Identification

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

ＫＨＳ０３８ＡＡ１ＡＪ－Ｇ９３－　□　□－□　□

— DATE
— MONTH
— YEAR

YEAR	2000	2001	2002	2003	2004	2005
CODE	O	1	2	3	4	5

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.

１６. Precautions for use

16-1. Installation of the LCD

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

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

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

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

5. 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.

6. 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.

2. Aluminum foil covering the terminal electrodes should remain in place until installed.

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.

17. Reliability Data / Environmental Test

TEST ITEM	TEST CONDITION	TEST TIME	RESULT
High Temp. Atmosphere	80℃	240 h.	Display Quality : No defect Display Function : No defect Current Consumption : No defect
Low Temp. Atmosphere	−30℃	240 h.	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 h.	Display Quality : No defect Display Function : No defect Peel-off of Organic Sealing : None Current Consumption : No defect
Temp. Cycle	−30℃ 0.5 h. R.T. 0.5 h. 80℃ 0.5 h.	10cycles	Display Quality : No defect Display Function : No defect Peel-off of Organic Sealing : None Bubble on Cell : None
High Temp. Operation	70℃ Vop	240 h.	Display Quality : No defect Current Consumption : No 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.

18. Recommended additional circuit
a) Recommended Bias Voltage for Driving LCD

R3,4 = 15.0kΩ ± 0.5%
R6,7 = 15.0kΩ ± 0.5%
R5 = 220.0kΩ ± 1.0%
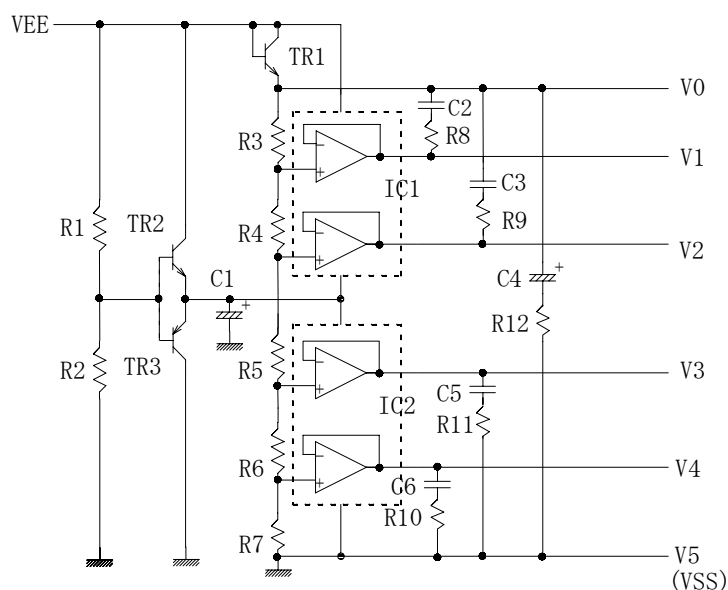
IC1, IC2
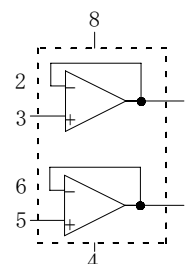
These value above are theoretically calculated. Fine tuning might be required in some cases.
For fine tuning value of the resistor shall be adjusted to conform with the follwing equation.

$$| V0-V1 | = | V1-V2 | = | V3-V4 | = | V4-V5 |$$

Recommended parts for Bios voltage circuit

①SEMI CONDUCTOR

Symbol	Type	Maker Name	note
IC1	MC33172D	MOTOROLA	
IC2	MC33172D	MOTOROLA	
TR1	2SC2412K	ROHM	
TR2	2SC2412K	ROHM	
TR3	2SA1037AK	ROHM	

②RESISTOR

Symbol	Characteristic	Example(Maker Name)	note
R1	100K/1608/J	CR10-104J	(KYOCERA)
R2	100K/1608/J	CR10-104J	(KYOCERA)
R3	15K/1608/D	RR0816R-153-D	(SUSUMU)
R4	15K/1608/D	RR0816R-153-D	(SUSUMU)
R5	220K/1608/F	RK73H1J-220KΩF	(KOA)
R6	15K/1608/D	RR0816R-153-D	(SUSUMU)
R7	15K/1608/D	RR0816R-153-D	(SUSUMU)
R8	15Ω/1608/J	CR10-150J	(KYOCERA)
R9	15Ω/1608/J	CR10-150J	(KYOCERA)
R10	15Ω/1608/J	CR10-150J	(KYOCERA)
R11	15Ω/1608/J	CR10-150J	(KYOCERA)
R12	15Ω/1608/J	CR10-150J	(KYOCERA)

③CAPACITOR

Symbol	Characteristic	Example(Maker Name)	note
C1	4.7μ/35V	MF35FD4R7MC6 (NIPPON CHEMI-CON)	Electrolytic capacitor
C2	B/4.7μF/10V/3216/M	LMK316BJ475ML (TAIYO YUDEN)	Ceramic Capacitor
C3	B/4.7μF/10V/3216/M	LMK316BJ475ML (TAIYO YUDEN)	Ceramic Capacitor
C4	4.7μ/50V	MF50FD4R7MC8 (NIPPON CHEMI-CON)	Electrolytic capacitor
C5	B/4.7μF/10V/3216/M	LMK316BJ475ML (TAIYO YUDEN)	Ceramic Capacitor
C6	B/4.7μF/10V/3216/M	LMK316BJ475ML (TAIYO YUDEN)	Ceramic Capacitor

b) Example of Randomizing Circuit
   Randomizing circuit is recommended in order to reduce "cross-talk" phenomenun
   of displayed images. (Tailing, vertical strips,etc)
   Its detail is subject to change according to actual operating condition and
   application of the LCD . Should you have any question when installing an actual
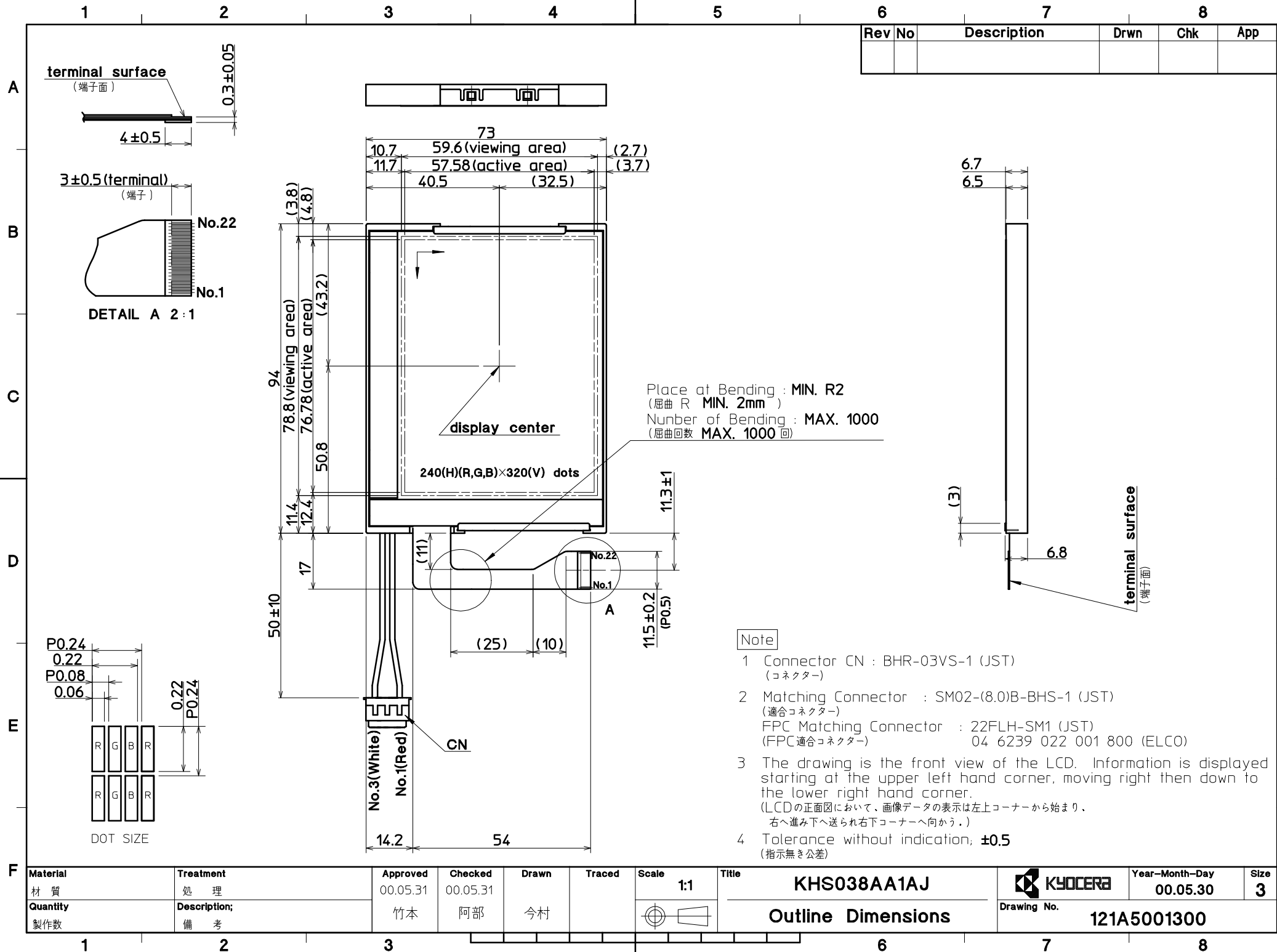   randomizing circuit, please ask Kyocera for details .

   b-1)

Prset		
76543210	A	
00000000	256	
00000001	X	
00000010	2	
00000011	3	
‖‖‖‖‖‖‖‖		
11111111	255	
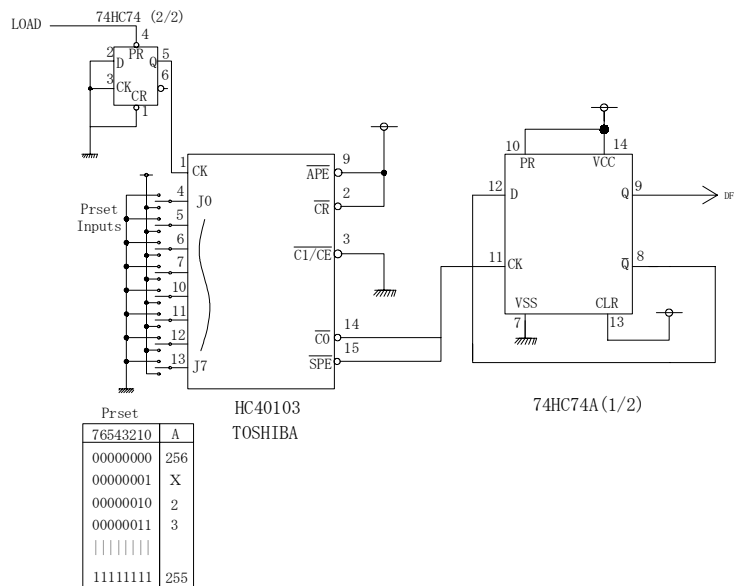
   There may be flickering on screen according to some LOAD signal frequencies.
   If in happens , set PRESET INPUTS terminals to select optimized conditions .

   b-2)

HD151011TEL

HITACHI

- 23 -

Rev	No	Description	Drwn	Chk	App

terminal surface
（端子面）

0.3±0.05

4±0.5

3±0.5(terminal)
（端子）

No.22

No.1

DETAIL A 2:1

73

10.7 59.6(viewing area) (2.7)
11.7 57.58(active area) (3.7)
40.5 (32.5)

(3.8)
(4.8)

94
78.8(viewing area)
76.78(active area)
(43.2)

50.8

display center

240(H)(R,G,B)×320(V) dots

11.4
12.4

17

50±10

(11)

(25) (10)

No.3(White)
No.1(Red)

CN

14.2 54

6.7
6.5

(3)

terminal surface
（端子面）

6.8

11.3±1

No.22
No.1

A

11.5±0.2
(P0.5)

Place at Bending : MIN. R2
（屈曲 R MIN. 2mm ）
Number of Bending : MAX. 1000
（屈曲回数 MAX. 1000回）

Note

1 Connector CN : BHR-03VS-1 (JST)
（コネクター）

2 Matching Connector : SM02-(8.0)B-BHS-1 (JST)
（適合コネクター）
FPC Matching Connector : 22FLH-SM1 (JST)
（FPC適合コネクター）   04 6239 022 001 800 (ELCO)

3 The drawing is the front view of the LCD. Information is displayed
starting at the upper left hand corner, moving right then down to
the lower right hand corner.
（LCDの正面図において、画像データの表示は左上コーナーから始まり、
  右へ進み下へ送られ右下コーナーへ向かう．）

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

P0.24
0.22
P0.08
0.06

0.22
P0.24

R G B R

R G B R

DOT SIZE

Material 材 質	Treatment 処 理		Approved 00.05.31	Checked 00.05.31	Drawn	Traced	Scale 1:1	Title	KHS038AA1AJ		KYOCERA	Year–Month–Day 00.05.30	Size 3
Quantity 製作数	Description; 備 考		竹本	阿部	今村				Outline Dimensions	Drawing No.		121A5001300	

Document NO.	TQ3C-8EAC0-E2CWN10-00
DATE	July 31,2000

FOR: _____

KYOCERA INSPECTION STANDARD

TYPE : KHS038AA1AJ-G93

KYOCERA CORPORATION
KAGOSHIMA HAYATO PLANT
LCD DIVISION

Original	Designed by :Engineering Dept.			Confirmed by :QA Dept.	
Issue Data	Prepared	Checked	Approved	Checked	Approved
July 31,2000	T. Yamaguchi	Y. Matsumoto	Y. Matsumura	S. Hayashi	y. Joshida

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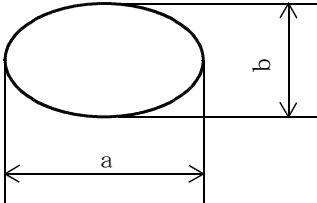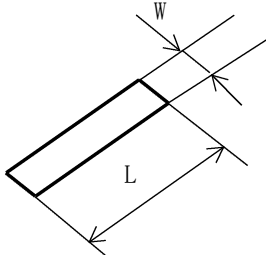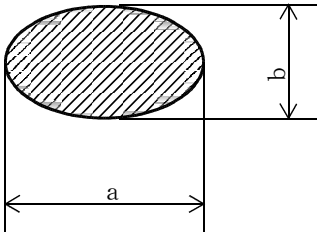
Date	Designed by : Engineering Dept.			Confirmed by : QA Dept.	
	Prepared	Checked	Approved	Checked	Approved

Rev. No.	Date	Page	Descriptions

Visuals specification
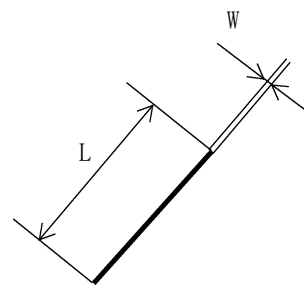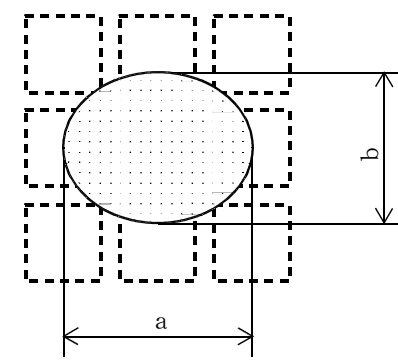
1)Note

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 dose 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 table below

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

Inspection item	Judgement standard
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'

Inspection item	Judgement standard
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 ≦ 0.1	―	neglected
B	0.1 < W ≦0.3	L ≦ 5.0	neglected
C	0.1 < W ≦0.3	5.0 < L	0
D	0.3 < W	―	0

(2)Bubble (dent)

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

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