SPEC.NO.	TQ3C-8EAC0-E1CWP08-00
DATE	September 11, 2000

SPEC

FOR:

TYPE:KCS038AA1AI-G20

CONTENTS

KYOCERA CORPORATION
KAGOSHIMA HAYATO PLANT
LCD DIVISION

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

Original Issue Data	Designed by :Engineering Dept.			Confirmed by :QA Dept.	
	Prepared	Checked	Approved	Checked	Approved
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Revision Record

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

Rev. No.	Date	Page	Descriptions

Caution

1. This general specification can be changed, just for your reference only. Kyocera will release specification later exclusive for you. Please refer to it as the formal document of specification.

2. This LCD is supposed to be for general electric appliances such as audio, office automation, industrial applications, home appliances and game machines. Do not use the LCD as a display for a medical instrument that is required extremely high reliability and its failure and malfunction may affect human lives. In the case you did, Kyocera will not take responsibility for it.

3. Kyocera may scrap the tooling or stop supplying the LCD, after 2 year time frame from your latest purchase of the LCD.

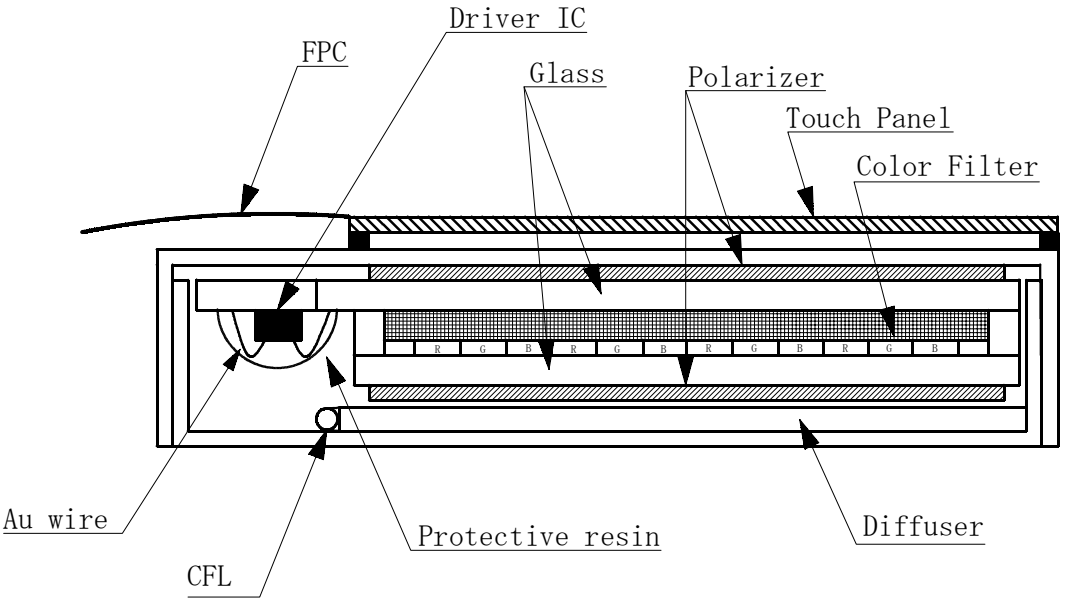
1. Application

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

2. Construction and Outline

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

Backlight system	: Side-edge type CFL (1 tube).
Inverter	: Option. Recommended Inverter : KCI-93(TAMURA CORPORATION) or equivalent.
Polarizer	: Glare treatment.
Additional circuit	: None.
Touch Panel	: Analog type . Non-Glare treatment.



This drawing is showing conception only.

3. Mechanical Specifications

3-1 Mechanical Specifications of LCD

ITEM	SPECIFICATION	UNIT
Outline dimensions	74.9 (W) × 94.8 (H) × 8.3 (D)	mm
Effective viewing area	59.6 (W) × 78.8 (H)	mm
Dot number	240×R.G.B (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	85	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

3-2 Specifications of touch panel

ITEM	SPECIFICATION	UNIT
Input	Radius-0.8 stylus or Finger	—
Actuation Force	Typ. 15, Max. 80	g
Transparency	Typ. 79	%
Surface hardness	pencil hardness 2H or more according to JIS-K5400	—

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	37.0	V
Input signal voltage *2	Vin	0	VDD	V
Touch Panel Supply voltage	Vtp	0	7.0	V
Touch Panel Input Current	Itp	0	24.0	mA

*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	0	50	℃
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℃ < 48 h , Temp = 60℃ < 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.

*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 : (0.3～9 m/S²)
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: 490 m/S²
Pulse width : 11 msec
3 times in each direction : ±X/±Y/±Z.
EIAJ ED-2531

5. Electrical Characteristics

5-1. LCD

Temp. = 25℃, VDD = +3.3V ± 0.3V

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 ℃	29.7	30.7	31.7	V
		25 ℃	28.5	29.5	30.5	V
		50 ℃	27.9	28.9	29.9	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	
Current consumption for LCD driving *4	IEE	*5	—	2.4	3.1	mA
		*6	—	1.1	1.4	
Power consumption *4	Pdisp	*5	—	75	100	mW
		*6	—	34	45	

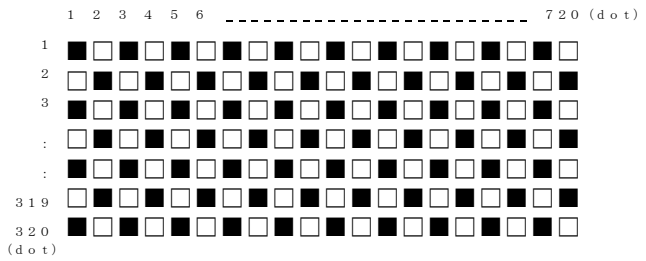
*1 Maximum contrast ratio is obtained by adjusting the LCD supply voltage (Vop= V0-V5) for driving LCD.

*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 19.recommended additional circuit.

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



*6 Display high frequency pattern, (see below).
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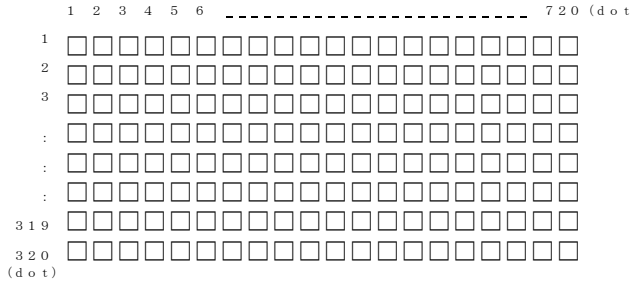


5-2. Touch Panel

5-2-1. Terminal resistance
Between XL and XR : (400 ～ 1000) Ω
Between YU and YL : (300 ～ 800) Ω

5-2-2. Linearity
±1.5%

5-2-3. Insulation resistance
20MΩ or more at DC25V

6. Optical Characteristics

Measuring Spot = φ6mm , Temp. = 25℃

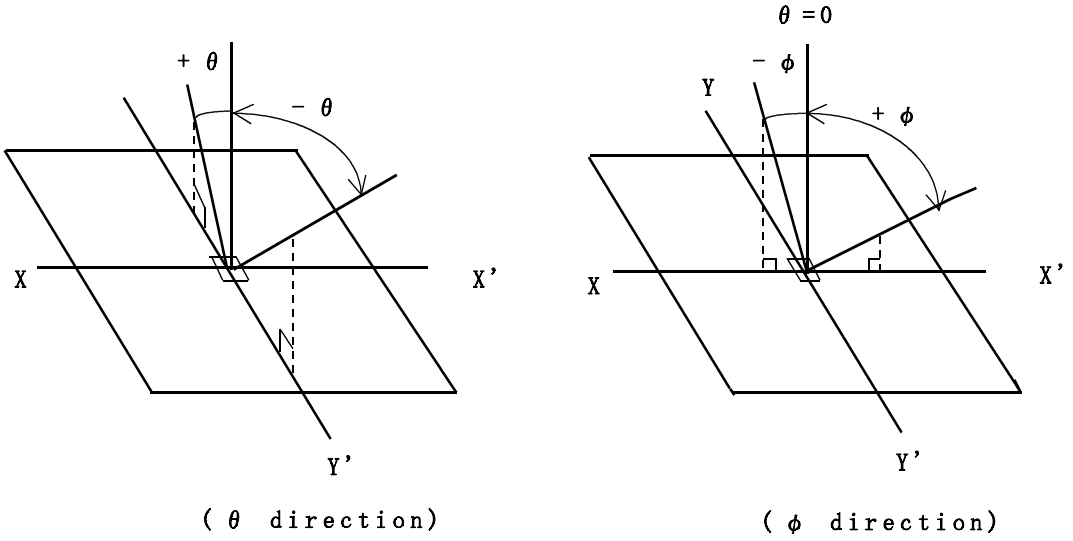
ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Response time	Rise	Tr	θ = φ =0°		—	250	350	ms
	Down	Td	θ = φ =0°		—	150	250	ms
Viewing angle range		θ	CR≧2	φ =0°	-50	—	50	deg.
		φ		θ =0°	-30	—	40	deg.
Contrast ratio		CR	θ = φ =0°		10.0	17.0	—	—
Chromaticity coordinates	Red	x	θ = φ =0°		0.45	0.50	0.55	—
		y			0.27	0.32	0.37	
	Green	x	θ = φ =0°		0.25	0.30	0.35	
		y			0.41	0.46	0.51	
	Blue	x	θ = φ =0°		0.12	0.17	0.22	
		y			0.11	0.16	0.21	
	White	x	θ = φ =0°		0.26	0.31	0.36	
		y			0.27	0.32	0.37	
	Black	x	θ = φ =0°		0.25	0.30	0.35	
		y			0.24	0.29	0.34	

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

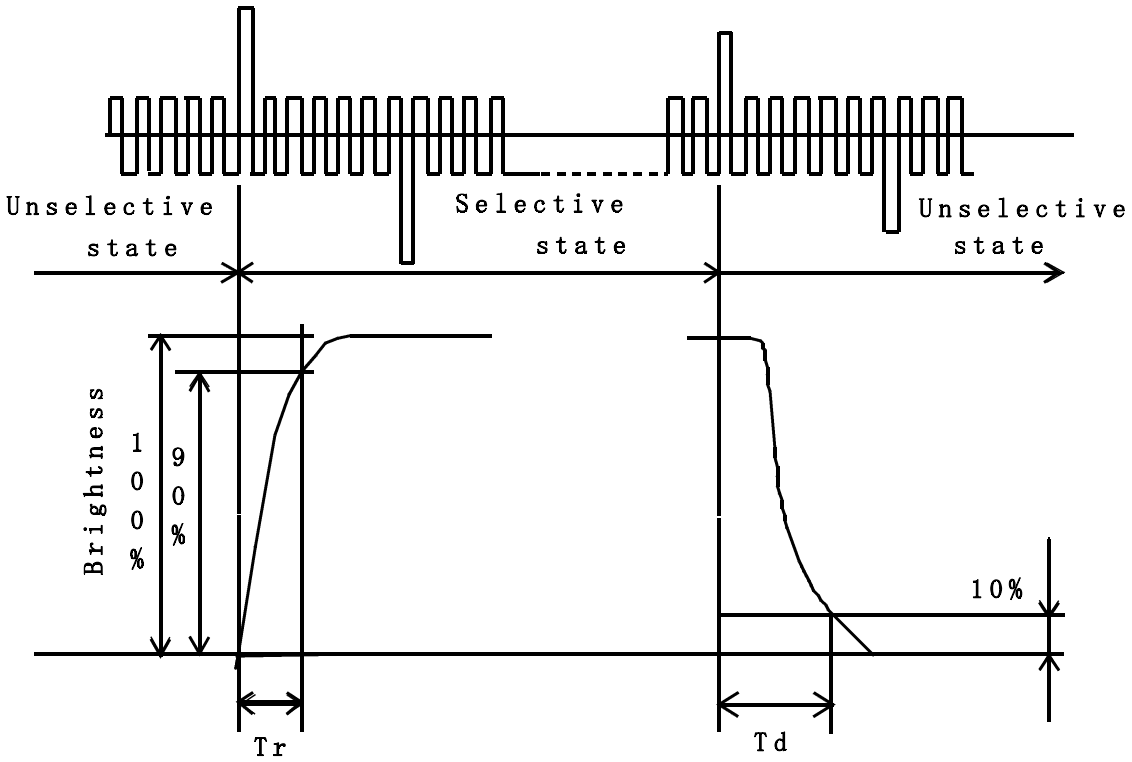
6-1 Contrast ratio is defined as follows :

$$\text{CR(Contrast)} = \frac{\text{Brightness all pixels "White"}}{\text{Brightness all pixels "Black"}}$$

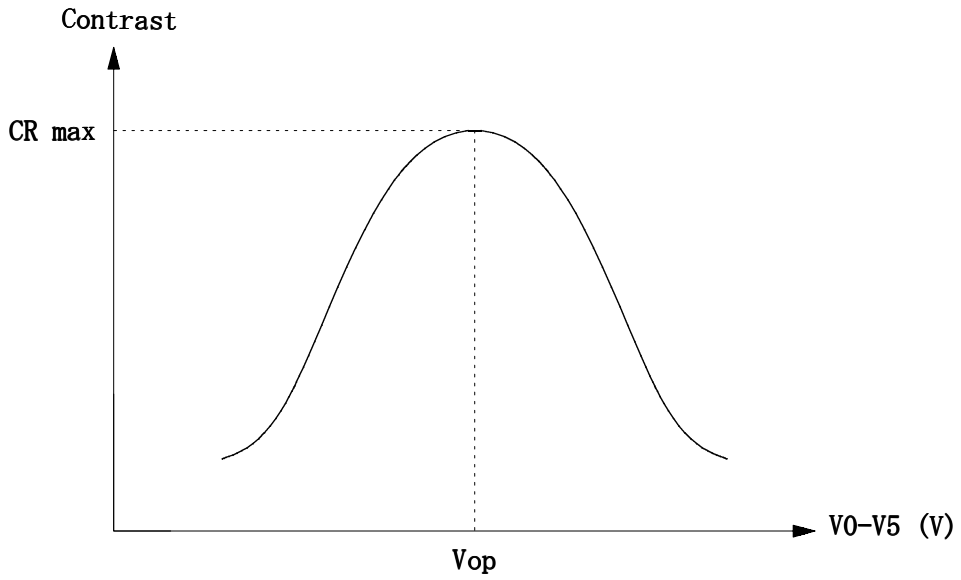
6-2. Definition of viewing angle



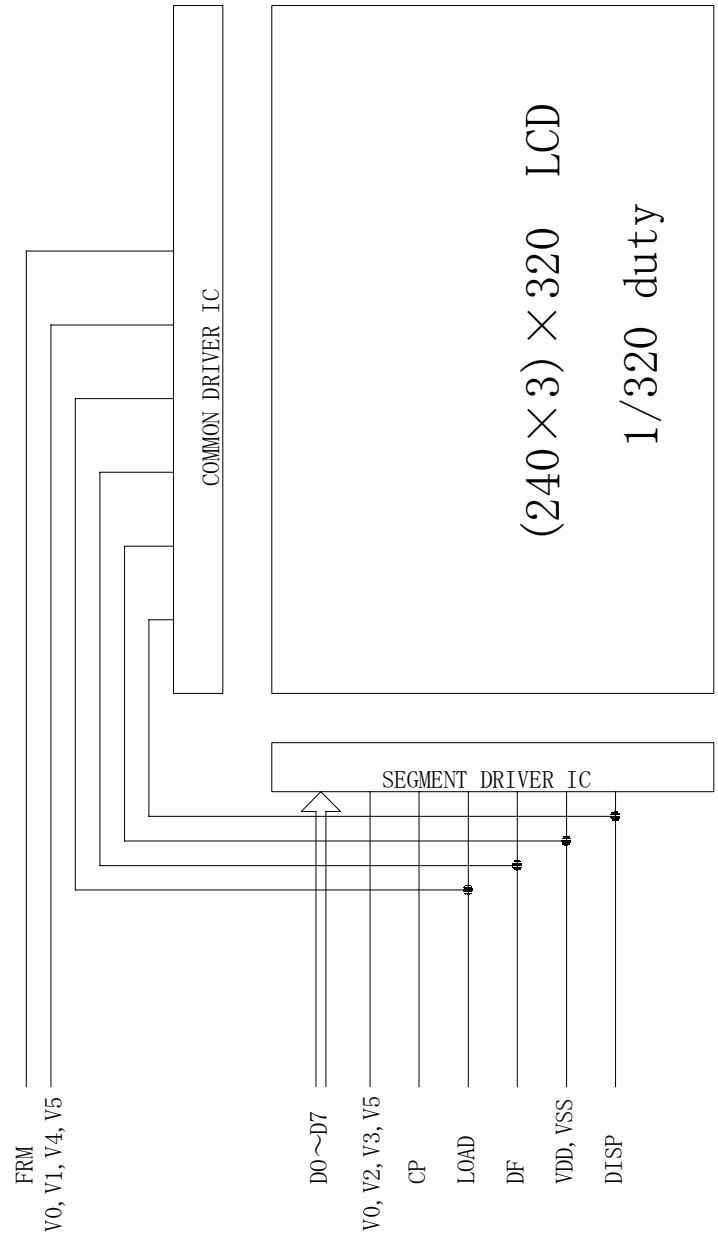
6-3. Definition of response time



6-4. Definition of Vop



7. Circuit Block Diagram of LCD



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 19. Recommended Bias Votage Circuit for driving LCD.

8-2. CFL

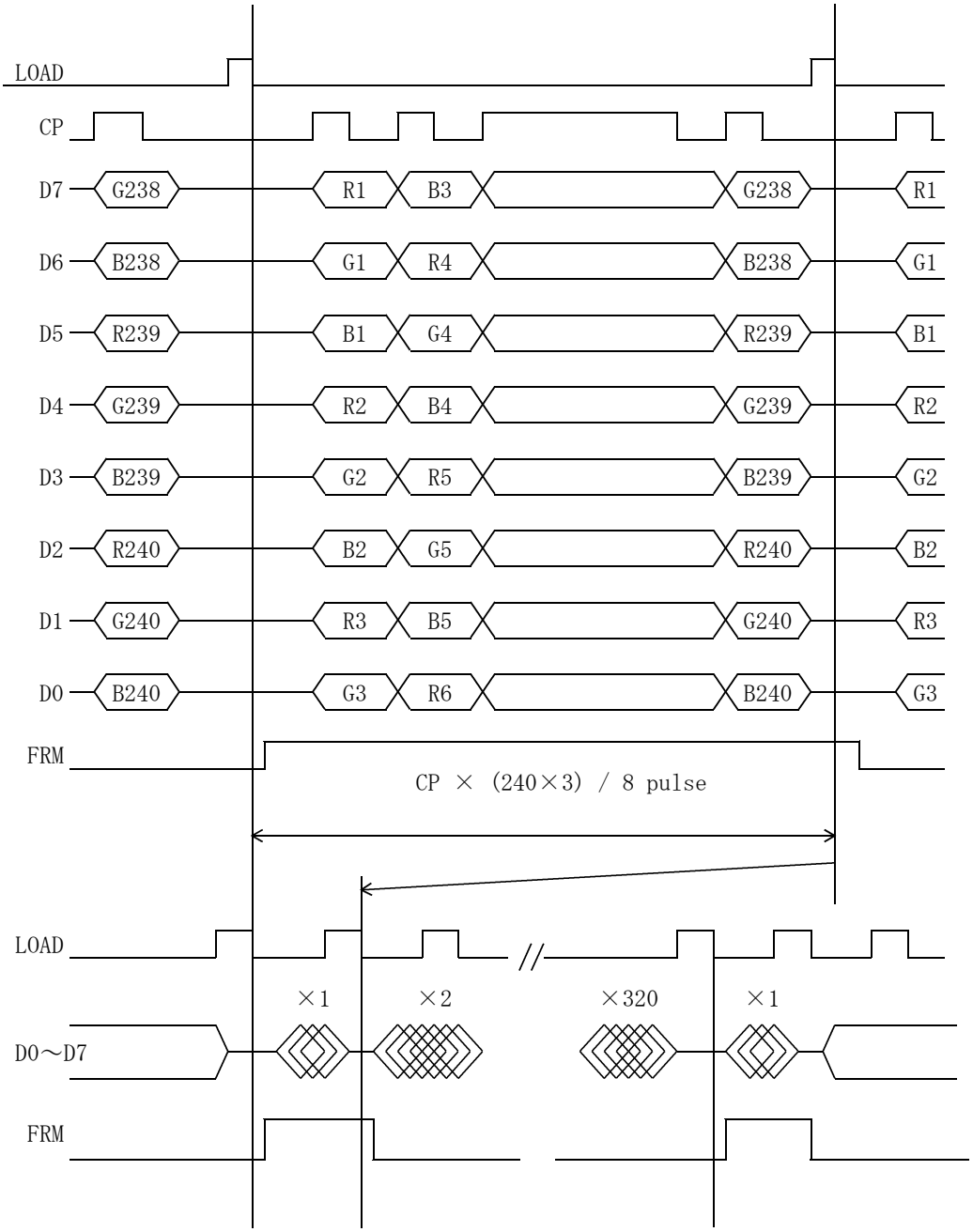
PIN No	SYMBOL	DESCRIPTION	LEVEL
1	HV	Power supply for CFL	AC
2	GND	Ground line (from inverter)	—

LCD side connector : HV-2S-C1 (JAE)
Recommended matching connector : HV-2P-HF (JAE)

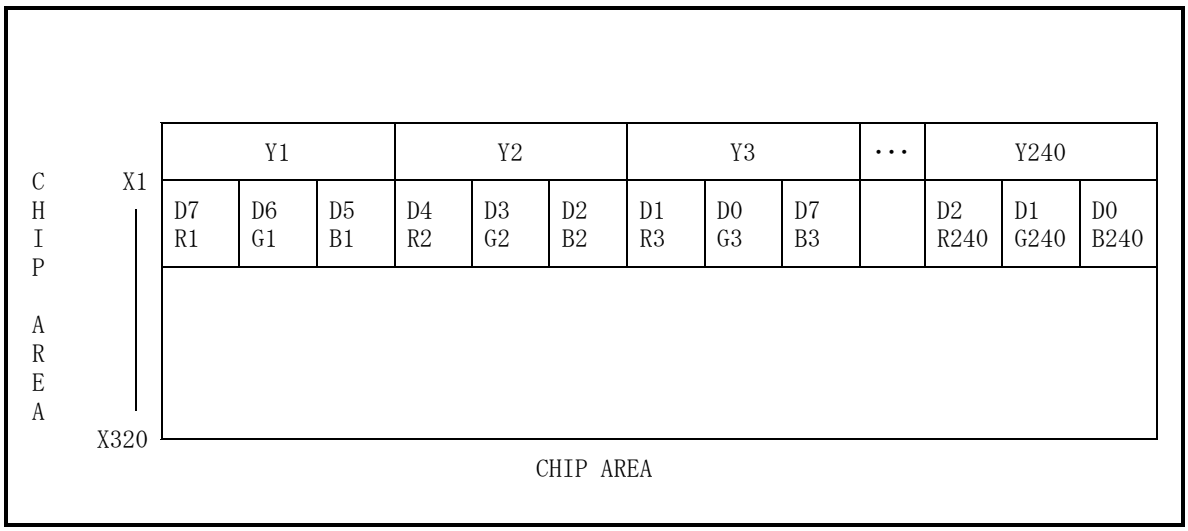
8-3. Touch Panel

PIN No	SYMBOL	DESCRIPTION
1	yU	y-Upper terminal
2	xL	x-Left terminal
3	yL	y-Lower terminal
4	xR	x-Right terminal

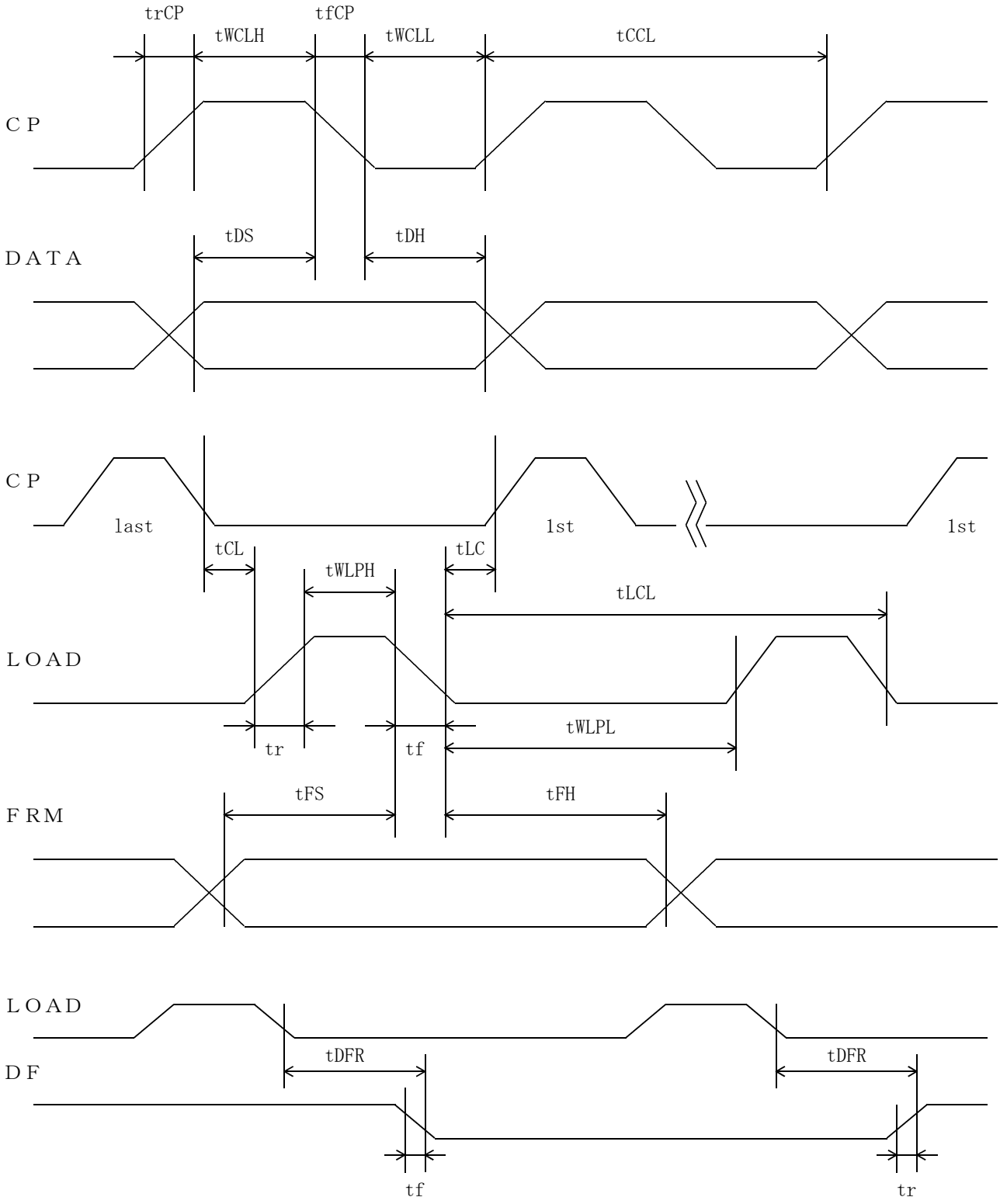
9. Interface Timing Chart of LCD



1０. Data and Screen



１１．Input Timing Characteristics of LCD



11-1.Switchig characteristics

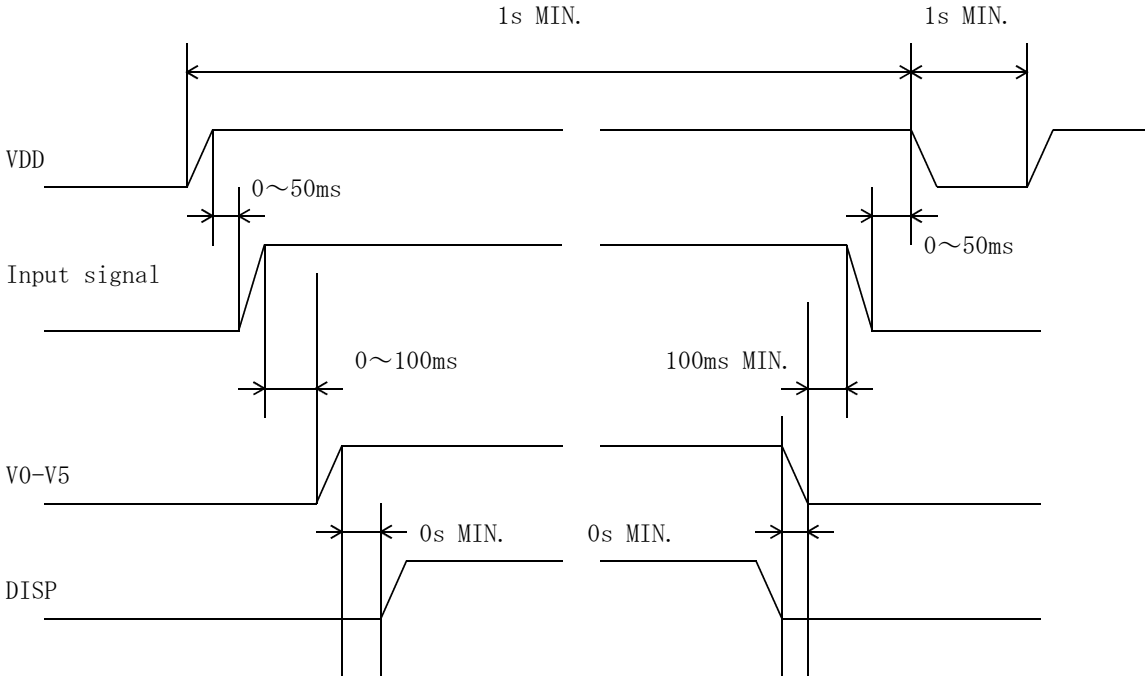
Input Characteristics ; VDD = +3.3V ± 0.3V, Temp. = 25 ℃

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

１２. Supply Voltage Sequence Condition of LCD

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.



* 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.

* Control the supply voltage sequence not to float all signal line when the LCD panel is driving.

1３. Backlight Characteristics

13-1. 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	—	(1.0) mArms.	(2.5) mArms.	—
Discharging tube voltage	VL	—	(345) Vrms.	—	—
Operating life *3 (IL=1.0 mArms.)	T	—	(10,000) Hr.	—	—
Operating frequency	F	(40) kHz	—	(150) 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 (2.5)mA discharge tube current. Because CFL maybe broken due to over current.

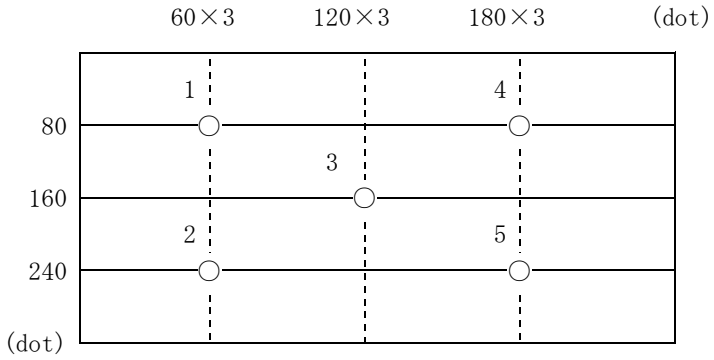
*3 When the illuminance or quantity of light has decreased to 50 % of the initial value.
Average life time of CFL will be decreased when LCD is operating at lower and higher temperature

13-2. Surface Brightness (IL = 1.0 mArms.)

Temp.=25℃

ITEM	MIN.	TYP.	MAX.	UNIT
Brightness	40	65	—	cd/m^2

(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.
4) Measuring Inverter :KCI-93(TAMURA CORPORATION)

１４. Design Guidance for Analog Touch-Panel(T/P)

14-1. Electrical

In customer's design, please remember the following considerations.

1. Do not use the current regulated circuit.
2. Keep the current limit with top and bottom layer.(See Sec, 4-1)
3. Analog T/P can not sense two point touching separately.
4. A contact resistance is appeared at the touch point between top and bottom layer. After this resistance has stable read the T/P position data.
5. Analog T/P is also a "Capacitor" in an equivalent circuit. Design your sensing circuit and low-pass filter with considering this "Capacitor" value.

14-2. Software

1. Do the "User Calibration".
2. "User Caribration" may be needed with long term using. Include "User Caribration" menu in your software.

14-3. Mechanical Design

14-3-1.Each "Area"

Please confirm the following information before starting your design.

(a) Key Area

"Key Area" is an area where T/P specifications(Linearity,Durability,Actuation force, etc.) are guaranteed.

1) Do a touch data sensing and calibration inside this area.
2) In normal cases it is a same size as your flat display's "active area".
3) The ITO layer durability near the edge of Key area is less stronger than the center.

(b) Transparent Insulation-paste Area.

Insulation-paste is printed with 1.0mm distance outer from "Key Area".

1) The purpose is to avoid potential shorting problem from the bezel housing edge from or housing "stick" when molding.
2) Consider your housing edge position to keep 1.0mm distance from this paste line. (See.Fig.1)
3) The cross section of this edge is taper shape. So if it is over the display's active area, it will be shining as a prism.

(c) Prohibition Area

Input by pen and finger is prohibited in this area.
Because of the thickness around T/P, the ITO layer on the PET film will be expanded and as a conclusion it will be cracked if pressed.(See.Fig.2)

1) We strongly recommend that the bezel should protect this area.
2) An exposure of this area and stylus contact should be avoided.
3) When assembling at the customer, do not press this area with tools.
4) Consider your design to avoid the pressure by the housing bezel.

14-3-2. Example of Housing Design.

1) If an consumer will put a palm on housing in normal usage care should be taken as follows.
2) Keep the gap, for example 0.3 to 0.7mm, between bezel edge and T/P surface. The reason is to avoid the bezel edge from contacting T/P surface that may cause a "short" with bottom layer.(See.Fig.1)
3) Insertion a cushion material is recommended.
4) The cushion material should be limited just on the busbar insulation past area. If it is over the transparent insulation paste area a "short" may be occurred.

14-3-3. Mounting on display and housing bezel

1) In all cases, the T/P should be supported form the backside of the glass.
2) Do not use an adhesive tape to bond it on the front of T/P and hang it to the housing bezel.
3) Never expand the T/P top layer (PET-film) like a balloon by internal air pressure. The life of the T/P will be extremely short.
4) If a dew will be on the heat-sealed area or exposed traces at the end of a flexible tail, the migration of silver can occur. This will cause sometimes a short circuit.

If your final product will used in a humid circumstance or will be moved from humid, warm environments to cold ones, a dew condensation can occur.

Consider a water seal with your housing bezel.

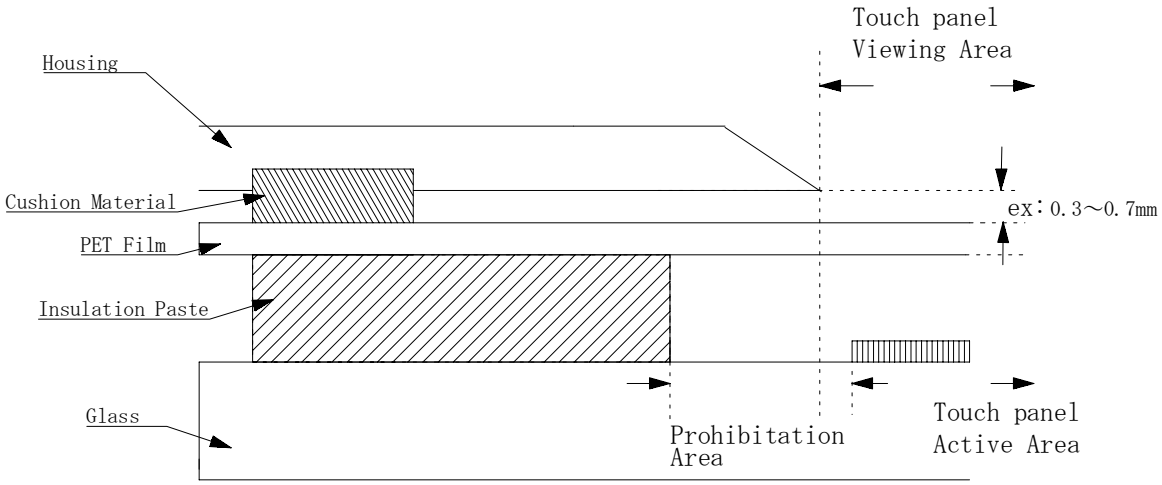


Fig.1

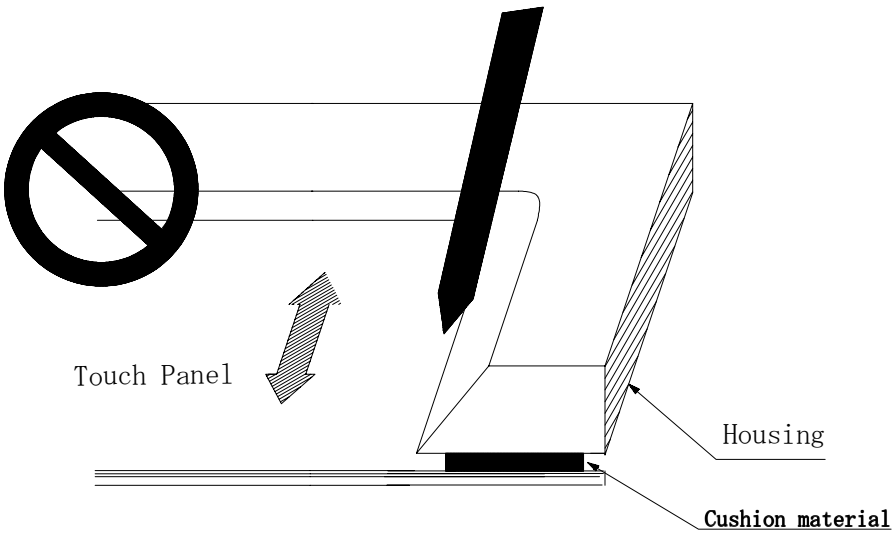
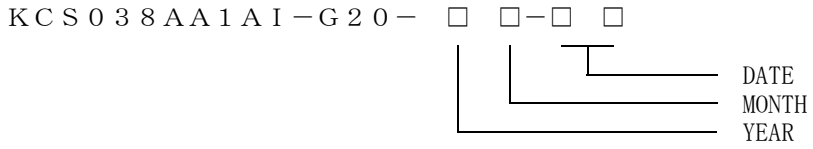


Fig.2

１５. Lot Number Identification

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



YEAR	2000	2001	2002	2003	2004	2005
CODE	0	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

１６. Warranty

16-1. Incoming inspection

Please inspect the LCD within one month after your receipt.

16-2. 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.

１７. Precautions for use

17-1. Installation of the LCD modules

1. The LCD module shall be installed so that there is no pressure on the LSI chips.
2. The LCD module shall be installed flat, without twisting or bending.
3. The display window size should be the same as the effective viewing area.
4. 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.
5. 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.

17-2. 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.

17-3. LCD module 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 module 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.

17-4. Storage

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

17-5. Screen Surface

1. DO NOT store in a high humidity environment for extended periods. Image degradation, bubbles may result.

2. The touch panel screen is easily scratched or damaged. Prevent touching it with any hard material, and from being pushed or rubbed.

3. Do not apply excessive force on the surface of touch panel, that is greater than the force specified by the spec. It may cause a color variation etc.on LCD display.

4. The touch panel 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 touch panel screen.
Clean any condensation or moisture from any source immediately.

6. Always keep the LCD module free from condensation during testing. Condensation may permanently spot or stain the touch panel screen.

１８. Reliability Data / Environmental Test

TEST ITEM	TEST CONDITION	TEST TIME	RESULT
High Temp. Atmosphere	70℃	240 h	Display Quality : No defect Display Function : No defect Current Consumption : No defect
Low Temp. Atmosphere	-20℃	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	-20℃ 0.5 h R.T. 0.5 h 70℃ 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	50℃ Vop	500 h	Display Quality : No defect Current Consumption : No defect
Point Activation life	Polyacetal stylus(R0.8) Hitting force 250g Hitting speed 3 time/s	one million times	Display Quality : No defect Current Consumption : No defect
Writing Friction	Special stylus writing force 250g writing speed 3000 Characters /h writing area 20mm x 20mm	a hundred thousand times	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.

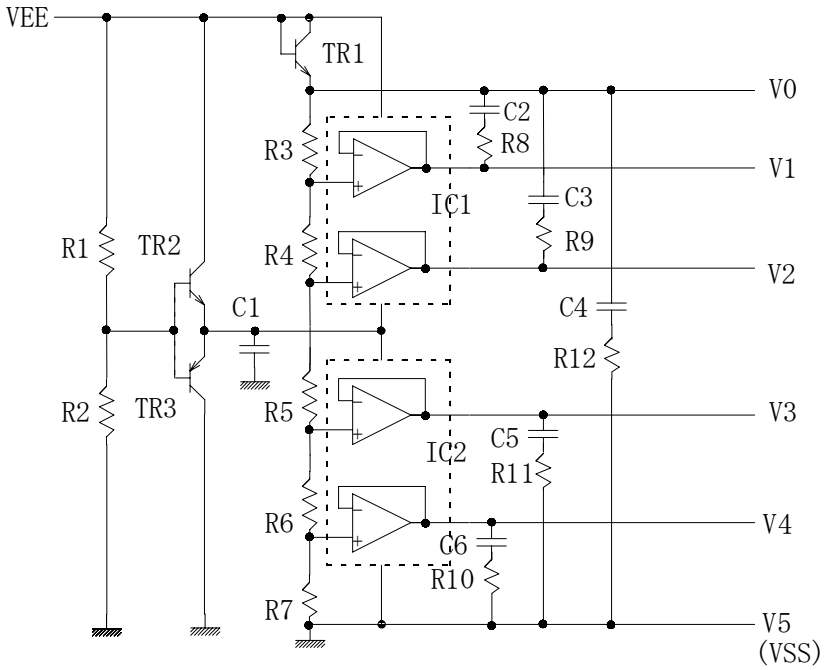
* The tested LCD is inspected after 24 hours of storage at room temperature and room humidity after each test is finished.

* 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.

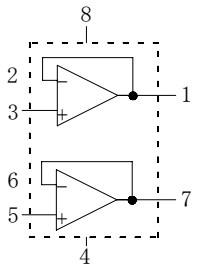
1 9. Recommended additional circuit

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 theoreticaly 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)

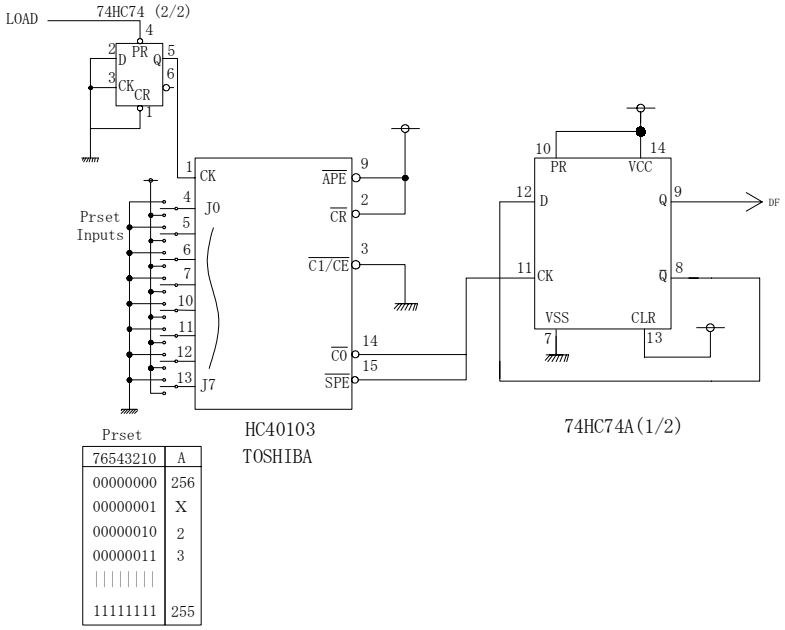
③CAPACITOR

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 .

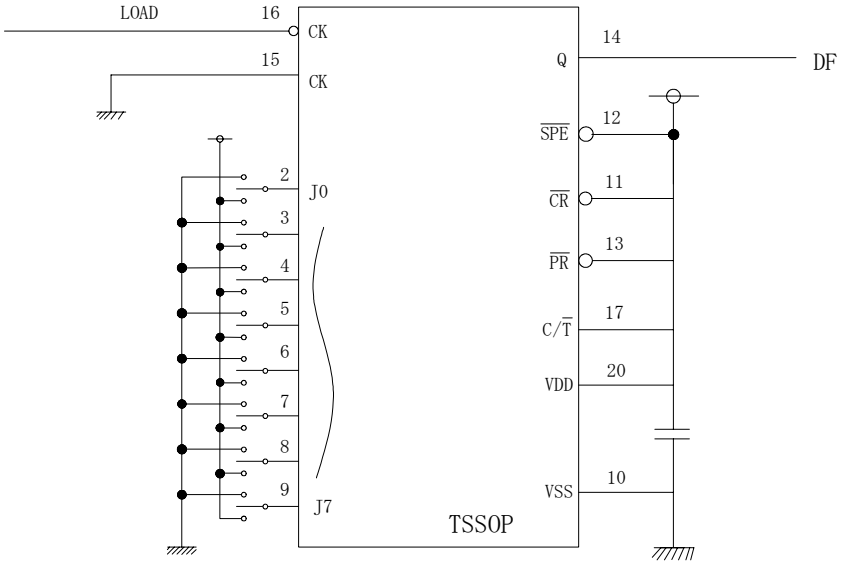
b-1)



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 .

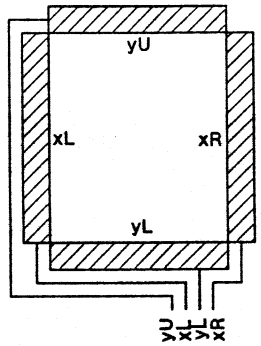
b-2)



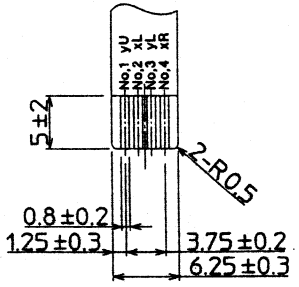
HD151011TEL

HITACHI

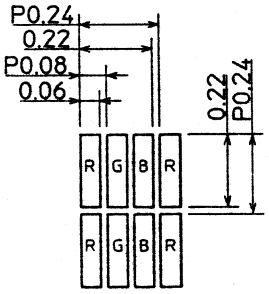
Rev	No	Description	Drwn	Chk	App



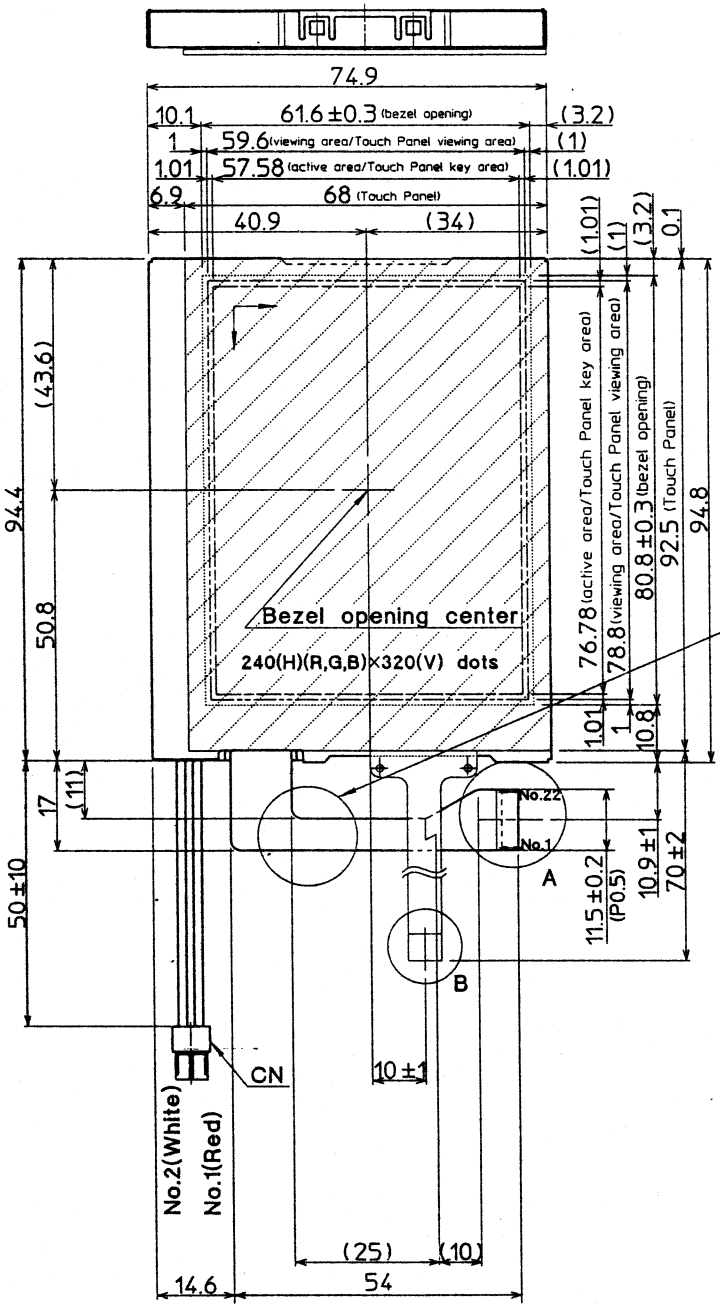
Touch Panel Pin-assign

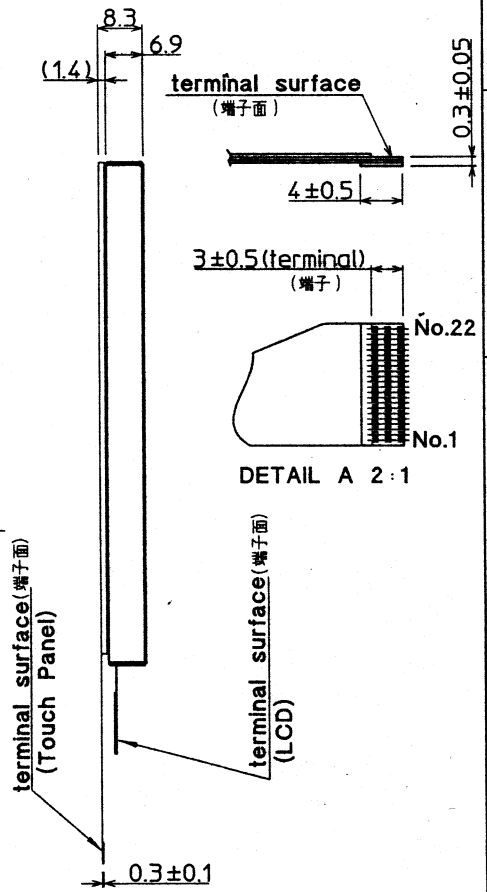


DETAIL B 2:1



DOT SIZE





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

Note

1. 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。)
2. Connector(CN) : HV-2S-C1 (JAE)
   (コネクタ)
3. Matching Connector : HV-2P-HF (JAE)
   (適合コネクタ)
4. Recommended Matching Connector(Touch Panel):Series 6216(ELCO)
   (推奨適合コネクタ) :Serise FE,FFS(JST)
   (LCD):22FLH-SM1-(JST)
   :04 6239 022 001 800(ELCO)
5. Tolerance without indication; ±0.5
   (指示無き公差)

Material 材質	Treatment 処理	Approved '00.08.04	Checked	Checked '00.08.04	Drawn	Scale 1:1	Title KCS038AA1AI KHS038AA1AI Outline Dimensions	KYOCERA	Year-Month-Day 00.08.03	Size 3
Quantity 製作数	Description; 備考							Drawing No. 121A5002800		

SPEC.NO.	TQ3C-8EAC0-E2CWP08-00
DATE	September 11, 2000

FOR:

KYOCERA INSPECTION STANDARD

TYPE : KCS038AA1AI-G20

KYOCERA CORPORATION
KAGOSHIMA HAYATO PLANT
LCD DIVISION

Original	Designed by :Engineering Dept.			Confirmed by :QA Dept.	
Issue Data	Prepared	Checked	Approved	Checked	Approved
September 11, 2000	S.Oshita	M.Fujitani			Y.Yoshida

Revision Record

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

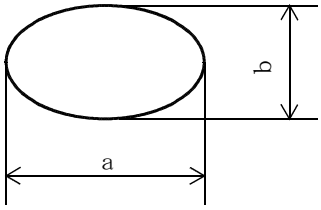
Rev. No.	Date	Page	Descriptions

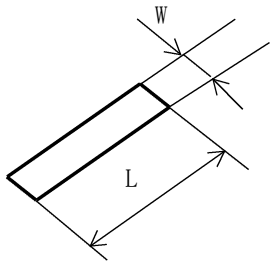
Visuals specification

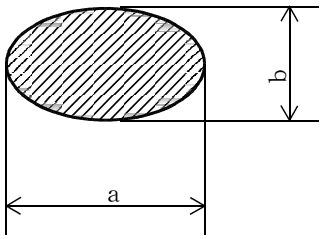
1)Note

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.

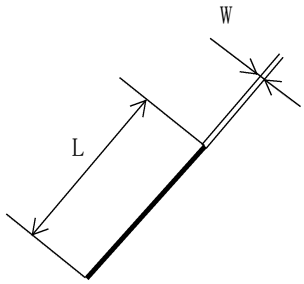
2)Standard

<table>
<tr><th>Inspection item</th><th>Judgement standard</th></tr>
<tr><td>Pinhole, Bright spot
Black spot,
Foreign particle
(LCD portion)</td><td>


d = (a + b) / 2
<table>
<tr><th>Category</th><th>Size (mm)</th><th>Acceptable number</th></tr>
<tr><td>A</td><td>d ≦ 0.2</td><td>neglected</td></tr>
<tr><td>B</td><td>0.2 ＜ d ≦ 0.3</td><td>5</td></tr>
<tr><td>C</td><td>0.3 ＜ d ≦ 0.5</td><td>3</td></tr>
<tr><td>D</td><td>0.5 ＜ d</td><td>0</td></tr>
</table>
</td></tr>
<tr><td>Scratch,Foreign particle
(LCD portion)</td><td>


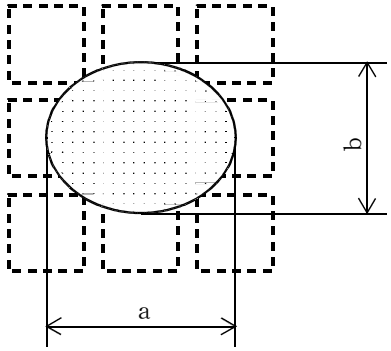
<table>
<tr><th></th><th>Width (mm)</th><th>Length (mm)</th><th>Acceptable No.</th></tr>
<tr><td>A</td><td>W ≦ 0.03</td><td>—</td><td>neglected</td></tr>
<tr><td>B</td><td rowspan="3">0.03＜ W ≦0.1</td><td>L ≦ 2.0</td><td>neglected</td></tr>
<tr><td>C</td><td>2.0 ＜ L ≦ 4.0</td><td>3</td></tr>
<tr><td>D</td><td>4.0 ＜ L</td><td>0</td></tr>
<tr><td>E</td><td>0.1 ＜ W</td><td>—</td><td>According to ' Circular '</td></tr>
</table>
</td></tr>
<tr><td>Contrast variation</td><td>


d = (a + b) / 2
<table>
<tr><th>Category</th><th>Size (mm)</th><th>Acceptable number</th></tr>
<tr><td>A</td><td>d ≦ 0.5</td><td>neglected</td></tr>
<tr><td>B</td><td>0.5 ＜ d ≦ 0.7</td><td>3</td></tr>
<tr><td>C</td><td>0.7 ＜ d</td><td>0</td></tr>
</table>
</td></tr>
</table>

Inspection item	Judgement standard
Polarizer (Scratch, Bubble, Dent)	(1) Scratch 

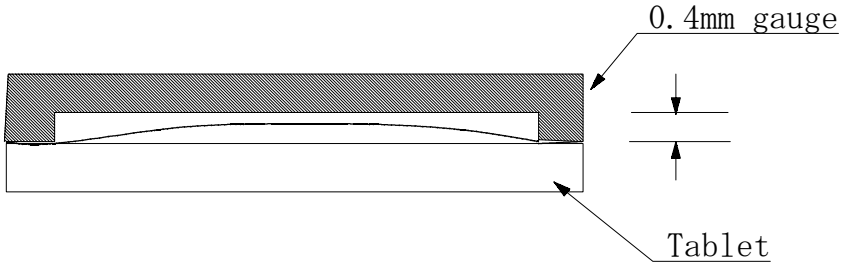
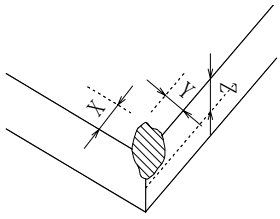
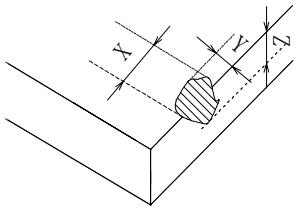
	Width (mm)	Length (mm)	Acceptable No.
A	W ≦ 0.1	—	neglected
B	0.1 < W ≦0.3	L ≦ 5.0	neglected
C		5.0 < L	0
D	0.3 < W	—	0

(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

<table>
<tr><th>Inspection item</th><th>Judgement standard</th></tr>
<tr><td>Scratch
(Touch Screen portion)</td><td>
<table>
<tr><th>Width(mm)</th><th>Length(mm)</th><th>Acceptable number</th></tr>
<tr><td>W ＜ 0.05</td><td rowspan="3">10 ＜ L</td><td>neglected</td></tr>
<tr><td>0.05 ≦ W ＜ 0.10</td><td>0</td></tr>
<tr><td>0.10 ≦ W</td><td>0</td></tr>
</table>
</td></tr>
<tr><td>Swell
(Touch Screen portion)</td><td>Touch Screen not to contact measurement surface of the gauge, 0.4mm gauge to be utilized for the measurement
 
</td></tr>
<tr><td>Glass crack
(Touch Screen portion)</td><td>
<table>
<tr><td>Judgement standard</td><td colspan="3">Corner crack
 
</td><td colspan="3">Cracks in other area than in corner
 
</td></tr>
<tr><td></td><td>X</td><td>Y</td><td>Z</td><td>X</td><td>Y</td><td>Z</td></tr>
<tr><td></td><td>OK≦3</td><td>OK≦3</td><td>OK≦t</td><td>OK≦5</td><td>OK≦1.5</td><td>OK≦t</td></tr>
</table>
・If one of X,Y,Z is not satisfied, it is regarded as NG.
・Regarding the corner crack, within 0.5mm depth is regarded as OK. (t=thickness of Touch panel)
</td></tr>
<tr><td></td><td></td></tr>
</table>